June 24, 2019
Re: JCEP Remanded Permit Application REM-19-001

North/West side of Conde B. McCullough Memorial Bridge, North Bend, Oregon - Jan 11, 2019 - Photo Jody McCaffree

To preserve, protect … and where possible, to restore or enhance, the resources of the Nation's coastal zone for this and succeeding generations. CZMA- § 1452 (Section 303) (1)

Submitted by:

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Table of Contents

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Andrew Stamp, Hearings Officer
Coos County Planning Department
225 N. Adams St.
Coquille OR 97423

RE: County Remand File No. REM-19-001/LUBA Case No. 2016-095

Dear Hearing Officer Stamp:

Please accept these comments into the record in addition to comments that have been previously submitted into the record on June 10, 2019 including those submitted from Attorney Tonia Moro and also comments from Katy Eymann on behalf of Citizens for Renewables and Crag Law on behalf of Oregon Shores.

The Remand application for the proposed Jordan Cove Energy Project (JCEP) is for Jordan Cove's prior LNG terminal design that FERC denied in March of 2016, yet we have had to waste precious time and resources fighting a terminal design that Jordan Cove no longer plans on building. This Remand application should be denied due to the following reasons and others that are being submitted by our Coalition.

According to the November 27, 2017 LUBA 2016-095 (*Oregon Shores v Coos County*) Decision pages 9 and 10:

> *…While the text of CBEMP Policy 5(I)(b) and Goal 16 IR2 is not entirely clear on this point**, the context indicates that the four standards do not apply only to the proposed dredging or fill**. We note that **Goal 16 IR2(c) requires a finding that "no feasible alternative upland locations exist,"** which clearly contemplates evaluation of the proposed land use, not proposed dredging, since dredging does not generally take place on upland locations. We conclude that, contrary to the county's finding, **CBEMP Policy 5(I)(b) requires the county to evaluate the substantiality of the public benefits provided by the use that the proposed dredging serves**, in this case the LNG terminal, or at least those components of the terminal that are properly viewed as water-dependent uses.*
> (Emphasis added)

LUBA 2016-095 (*Oregon Shores v Coos County*) Decision page 12 and 13 state:

> *…We agree with Oregon Shores. CBEMP Policy 5(I)(a) and Goal 16 IR2(a) in relevant part require that the proposed dredging serve a water-dependent use allowed under the county's code. The county's view that the "need/substantial public benefit" standard in CBEMP Policy*

S(I)(b) and Goal 16 IR2(b) is met simply by the fact that the proposed dredging serves a use allowed under the county's code, conflates CBEMP Policy 5(I)(a) and (b) and gives no independent effect to the latter. Even if the proposed dredging serves a water-dependent use allowed under the county's code, ***the county can allow the dredging only if it also finds that the use provides a substantial public benefit****.*

The proposed Barge Berth, Marine Slip Dock and Navigation Channel Reliability dredging have not met the requirements of the Coos Bay Estuary Management Plan (CBEMP) Policy 5.

#5 Estuarine Fill and Removal

I. Local government shall support dredge and/or fill ***only if such activities are allowed in the respective management unit, and****:*

a. The activity is required for navigation or other water-dependent use that require an estuarine location or in the case of fills for non-water-dependent uses, ***is needed for a public use and would satisfy a public need that outweighs harm to navigation, fishing and recreation****, as per ORS 541.625(4) and an exception has been taken in this Plan to allow such fill;*

b. ***A need (ie., a substantial public benefit) is demonstrated and the use or alteration does not unreasonably interfere with public trust rights****;*

c. No feasible alternative upland locations exist; and

d. ***Adverse impacts are minimized.***

e. Effects may be mitigated by creation, restoration or enhancement of another area to ensure that the integrity of the estuarine ecosystem is maintained;

f. The activity is consistent with the objectives of the Estuarine Resources Goal and with other requirements of state and federal law, specifically the conditions in ORS 541.615 and Section 404 of the Federal Water Pollution Control Act (P.L.92-500). (Emphasis added)

II. Other uses and activities which could alter the estuary shall only be allowed if the requirements in (b), (c), and (d) are met.

Identification and minimization of adverse impacts as required in "d" above shall follow the procedure set forth in Policy #4. (Emphasis added)

* * * *

…Identification and minimization of adverse impacts as required in "e" above shall follow the procedure set forth in Policy #4a. The findings shall be developed in response to a "request for comment" by the Division of State Lands (DSL), which shall seek local government's determination regarding the appropriateness of a permit to allow the proposed action.

"Significant" as used in "other significant reduction or degradation of natural estuarine values", shall be determined by: a) ***the U.S. Army Corps of Engineers through its Section 10.404 permit processes****; or b) the Department of Environmental Quality (DEQ) for approvals of new aquatic log storage areas only; or c) the Department of Fish and Wildlife (ODFW) for new aquaculture proposals only.* (Emphasis added)

This strategy recognizes that Goal #16 limits dredging, fill and other estuarine degradation in order to protect the integrity of the estuary. (Emphasis added)

A need (ie., a substantial public benefit) has not been demonstrated by the applicant. The project would unreasonably interfere with navigation, fishing and public recreation and would therefore not be in compliance with CBEMP Policy 5(I)(b). Components of the terminal and LNG tanker ships would conflict with the navigable airspace of the Southwest Oregon Regional Airport among many other public benefit and use impacts.

There is no American public benefit to the loss of fish, marine and wildlife habitat due to the destructive nature of all the proposed dredging for the Jordan Cove / Pacific Connector Project. The Pacific Connector Pipeline construction is projected to impact 485 wetlands and waterbodies in Southern Oregon, many of which are salmon bearing.

The Coos Bay Estuary is already 303D limited and this project will only make that situation worse. Jordan Cove's sedimentation expert expects us to believe that there would be no negative impacts with sedimentation or turbidity from all their proposed dredging. Our sedimentation expert actually proved Jordan Cove's data to be wrong on this issue during the land use process under Coos County File No. REM 10-01 for HBCU-10-01. (***See Exhibit 29***)

The proposed Barge Berth, Marine Slip Dock and Navigation Channel Reliability dredging have not met the requirements of the Coos County Zoning and Land Development Ordinance (CCZLDO):

SECTION 5.0.150 APPLICATION REQUIREMENTS:
Applications for development or land use action shall be filed on forms prescribed by the County and shall include sufficient information and evidence necessary to demonstrate compliance with the applicable criteria and standards of this Ordinance and be accompanied by the appropriate fee. An application shall not be considered to have been filed until all application fees have been paid. All applications shall include the following:

1. ***Applications shall be submitted by the property owner or a purchaser under a recorded land sale contract. "Property owner" means the owner of record, including a contract purchaser. The application shall include the signature of all owners of the property. A legal representative may sign on behalf of an owner upon providing evidence of formal legal authority to sign***. *(Emphasis added)*

* * * *

An application may be deemed incomplete for failure to comply with this section. ***The burden of proof in showing that an application complies with all applicable criteria and standards lies with the applicant***.

SECTION 5.0.175 APPLICATION MADE BY TRANSPORTATION AGENCIES, UTILITIES OR ENTITIES:
1. A transportation agency, ***utility company or entity with the private right of property acquisition pursuant to ORS Chapter 35*** *may submit an application to the Planning Department for a permit or zoning authorization required for a project without landowner consent otherwise required by this ordinance. (Emphasis added)*
* * * *

It should be noted that Jordan Cove is taking out land use permits for the Estuary when they are not the legal owner of the Coos Estuary nor do they have **the private right of property acquisition pursuant to ORS Chapter 35.**

On July 6, 1967, the Oregon Beach Bill[1] was passed by the legislature and signed by Oregon Governor Tom McCall. The Beach Bill declares that all "wet sand" within sixteen vertical feet of the low tide line **belongs to the State of Oregon**. The Beach Bill recognizes public easements of all beach and tidal areas up to the line of vegetation, regardless of underlying property rights. The public has free and uninterrupted use of these areas and property owners are required to seek **state permits** for building and other uses. While some parts of the beach and tidal areas remain privately owned, state and federal courts have upheld Oregon's right to **regulate development** of those lands and preserve public access.[2]

2017 ORS 537.110[3]

> *All water within the state from all sources of water supply **belongs to the public**.*
> (Emphasis added)

Citizens who actually live in Coos County have been trying for some 12 years now to get the natural hazard maps added to the Estuary and Coastal Shoreland zoning districts in Coos County and THAT STILL HAS NOT OCCURRED. And yet, when Jordan Cove wants to make changes to the Estuary zoning districts these applications are processed right away? **There needs to be some kind of investigation into these matters**. The natural hazard maps need to be added to the Coos Estuary and Shoreland zoning districts and Statewide Planning Goal #7, which prohibits the siting of hazardous facilities in identified natural hazard areas, **needs to be enforced by Coos County and the State of Oregon**.

In the matter of Jordan Cove, condemnation authority comes from the Federal Energy Regulatory Commission's (FERC) approval of a "Certificate of Public Convenience and Necessity" under the Natural Gas Act and FERC has not issued Pembina's Jordan Cove a Certificate yet. The "private' Jordan Cove/Pacific Connector Project DOES NOT HAVE THE RIGHT OF EMINENT DOMAIN.

2017 ORS 196.810 states:

> **Permit required to remove material from bed or banks of waters**
> *(1)(a) Except as otherwise specifically permitted under ORS 196.600 (Definitions for ORS 196.600 to 196.655) to 196.905 (Applicability), **a person may not remove any material from the beds or banks of any waters of this state or fill any waters of this state without a permit issued under authority of the Director of the Department of State Lands**, or in a manner contrary to the conditions set out in the permit, **or in a manner contrary to the conditions set out in an order approving a wetland conservation plan**.* (Emphasis added)
> * * * *

In addition. the Oregon Department of State Lands also must sign off on any removal of dredged material from the Coos Estuary as explained below.

ORS § 196.805 Policy

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[1] House Bill 1601, 1967
[2] https://en.wikipedia.org/wiki/Oregon_Beach_Bill
[3] https://www.oregonlaws.org/ors/537.110

*(1)**The protection, conservation and best use of the water resources of this state are matters of the utmost public concern**. Streams, lakes, bays, estuaries and other bodies of water in this state, including not only water and materials for domestic, agricultural and industrial use but also habitats and spawning areas for fish, avenues for transportation and sites for commerce and public recreation, are vital to the economy and well-being of this state and its people. **Unregulated removal of material from the beds and banks of the waters of this state may create hazards to the health, safety and welfare of the people of this state. Unregulated filling in the waters of this state for any purpose, may result in interfering with or injuring public navigation, fishery and recreational uses of the waters**. In order to provide for the best possible use of the water resources of this state, it is desirable to centralize authority in the Director of the Department of State Lands, and implement control of the removal of material from the beds and banks or filling of the waters of this state.* (Emphasis added)

The Jordan Cove proposal is not consistent with our land use laws and comp plan. According to DSL's own guidance the permit should be DENIED. **ORS 196.825 (3)(f)**

ORS 196.825 Criteria for issuance of permit:

(1) The Director of the Department of State Lands shall issue a permit applied for under ORS 196.815 if the director determines that the project described in the application:

*(a) **Is consistent with the protection, conservation and best use of the water resources of this state** as specified in ORS 196.600 to 196.905; and*

*(b) **Would not unreasonably interfere with the paramount policy of this state to preserve the use of its waters for navigation, fishing and public recreation**.*

(2) If the director issues a permit applied for under ORS 196.815 to a person that proposes a removal or fill activity for construction or maintenance of a linear facility, and if that person is not a landowner or a person authorized by a landowner to conduct the proposed removal or fill activity on a property, then the person may not conduct removal or fill activity on that property until the person obtains:

(a) The landowner's consent;

(b) A right, title or interest with respect to the property that is sufficient to undertake the removal or fill activity; or

(c) A court order or judgment authorizing the use of the property.

(3) In determining whether to issue a permit, the director shall consider all of the following:

*(a) **The public need for the proposed fill or removal** and the social, economic or other public benefits likely to result from the proposed fill or removal. When the applicant for a permit is a public body, the director may accept and rely upon the public body's findings as to local public need and local public benefit.*

(b) The economic cost to the public if the proposed fill or removal is not accomplished.

*(c) **The availability of alternatives to the project for which the fill or removal is proposed**.*

(d) The availability of alternative sites for the proposed fill or removal.

*(e) **Whether the proposed fill or removal conforms to sound policies of conservation and would not interfere with public health and safety**.*

*(f) **Whether the proposed fill or removal is in conformance with existing public uses of the waters and with uses designated for adjacent land in an acknowledged comprehensive plan and land use regulations**.*

(g) ***Whether the proposed fill or removal is compatible with the acknowledged comprehensive plan and land use regulations for the area where the proposed fill or removal is to take place or can be conditioned on a future local approval to meet this criterion.***

(h) ***Whether the proposed fill or removal is for streambank protection.***

(i) ***Whether the applicant has provided all practicable mitigation to reduce the adverse effects of the proposed fill or removal*** *in the manner set forth in ORS 196.800. In determining whether the applicant has provided all practicable mitigation, the director shall consider the findings regarding wetlands set forth in ORS 196.668 and whether the proposed mitigation advances the policy objectives for the protection of wetlands set forth in ORS 196.672.*

(4) The director may issue a permit for a project that results in a substantial fill in an estuary for a nonwater dependent use ***only if the project is for a public use and would satisfy a public need that outweighs harm to navigation, fishery and recreation and if the proposed fill meets all other criteria*** *contained in ORS 196.600 to 196.905.*
(Emphasis added)

COOS BAY ESTUARY OVERVIEW AND IMPACTS

The Coos Bay Estuary is the sixth largest estuary on the Pacific coast of the contiguous United States and the largest estuary completely within Oregon state lines. The Coos estuary is one of only 28 National Estuarine Research Reserves in the United States.[4] The process for federal designation of a National Estuarine Research Reserve has many steps and involves many individuals and organizations. Established by the Coastal Zone Management Act of 1972, as amended, the reserve system is a partnership program between the National Oceanic and Atmospheric Administration and the coastal states. The Coastal Zone Management Act of 1972, as Amended, is clear:
§ 1452. Congressional declaration of policy (Section 303) states:

The Congress finds and declares that it is the national policy--

1) **to preserve, protect**, develop, **and where possible, to restore or enhance, the resources of the Nation's coastal zone for this and succeeding generations**; (Emphasis added)

2) to encourage and assist the states to exercise effectively their responsibilities in the coastal zone through the development and implementation of management programs to achieve wise use of the land and water resources of the coastal zone, **giving full consideration to ecological, cultural, historic, and esthetic values** as well as the needs for compatible economic development, which programs should at least provide for-- (Emphasis added)

2(A) **the protection of natural resources, including wetlands, floodplains, estuaries, beaches, dunes, barrier islands, coral reefs, and fish and wildlife and their habitat, within the coastal zone**, (Emphasis added)

2(B) the management of coastal development to minimize the loss of life and property caused by improper development in flood-prone, storm surge, geological hazard, and erosion-prone areas and in areas likely to be affected by or vulnerable to sea level rise, land subsidence, and saltwater intrusion, and by the destruction of natural protective features such as beaches, dunes, wetlands, and barrier islands,

[4] National Estuarine Research Reserve System (NERRS): http://estuaries.noaa.gov/About/Default.aspx?ID=116

2(C) the management of coastal development to improve, safeguard, and restore the quality of coastal waters, and to protect natural resources and existing uses of those waters.

These laws as well as many others also listed in this act need to be fully considered and evaluated in with this Permit Application. The law demands protection and public access to the coastal areas for recreation purposes and assistance in the redevelopment of deteriorating urban waterfronts and ports, and sensitive preservation and restoration of historic, cultural, and esthetic coastal features.

Oregon's Statewide Planning GOAL 16 (OAR 660-015-0010(1))[5] requires Oregon:

To recognize and protect the unique environmental, economic, and social values of each estuary and associated wetlands; and

To protect, maintain, where appropriate develop, and where appropriate restore the long -term environmental, economic, and social values, diversity and benefits of Oregon's estuaries…

*… Estuary plans and activities **shall protect the estuarine ecosystem**, including its natural biological productivity, habitat, diversity, unique features and water quality.*

The general priorities (from highest to lowest) for management and use of estuarine resources as implemented through the management unit designation and permissible use requirements listed below shall be:

1. Uses which maintain the integrity of the estuarine ecosystem;
2. Water-dependent uses requiring estuarine location, as consistent with the overall Oregon Estuary Classification;
3. Water-related uses which do not degrade or reduce the natural estuarine resources and values;
4. Nondependent, nonrelated uses which do not alter, reduce or degrade estuarine resources and values

* * * *

IMPLEMENTATION REQUIREMENTS

*…2. Dredging and/or filling **shall be allowed only**: a. If required for navigation or other water-dependent uses that require an estuarine location or if specifically allowed by the applicable management unit requirements of this goal; and, b. **If a need (i.e., a substantial public benefit) is demonstrated and the use or alteration does not unreasonably interfere with public trust rights**; and c. If no feasible alternative upland locations exist; and, d. If **adverse impacts are minimized**. Other uses and activities which could alter the estuary shall only be allowed if the requirements in (b), (c), and (d) are met. All or portions of these requirements may be applied at the time of plan development for actions identified in the plan. Otherwise, they shall be applied at the time of permit review.*

3. State and federal agencies shall review, revise, and implement their plans, actions, and management authorities to maintain water quality and minimize man-induced sedimentation in

[5] http://www.oregon.gov/LCD/docs/goals/goal16.pdf

estuaries. ***Local government shall recognize these authorities in managing lands rather than developing new or duplicatory management techniques or controls****. Existing programs which shall be utilized include:*

a. The Oregon Forest Practices Act and Administrative Rules, for forest lands as defined in ORS
527.610-527.730 and 527.990 and the Forest Lands Goal;
b. The programs of the Soil and Water Conservation Commission and local districts and the Soil Conservation Service, for Agricultural Lands Goal;
c. The nonpoint source discharge water quality program administered by the Department of
Environmental Quality under Section 208 of the Federal Water Quality Act as amended in 1972 (PL92-500); and
d. ***The Fill and Removal Permit Program administered by the Division of State Lands under ORS 541.605 -541.665****.*

4. The State Water Policy Review Board, assisted by the staff of the Oregon Department of Water Resources, and the Oregon Department of Fish and Wildlife, the Oregon Department of Environmental Quality, the Division of State Lands, and the U.S. Geological Survey, shall consider establishing minimum fresh-water flow rates and standards so that resources and uses of the estuary, ***including navigation, fish and wildlife characteristics, and recreation, will be maintained****.*
(Emphases added)
[Oregon GOAL 16: Estuarine Resources pages 1 and 2.]

Coos Bay consists of about 14,000 acres of varied intertidal and subtidal substrate habitat conditions including algae beds, eelgrass sites, marshlands, and mostly unconsolidated substrate. The upper Coos Bay estuarine habitat contains important rearing habitat supplied by estuarine wetlands, algae, and eelgrass beds, which are important conditions for estuarine fish and migratory salmon, as well as commercial oyster beds.

Estuaries are the most important and dynamic habitat type known on earth; where fresh and saline waters mix, creating natural resource biomass far exceeding all others. Recent signs show improvement or biological recuperation of the Coos Bay estuary. Notwithstanding this important healing process, **the LNG (Jordan Cove facility and Pacific Connector Pipeline) development would reverse this biological recovery and cause irreplaceable and irretrievable ecosystem change.**

1. NEPA Process / Environmental Impact Statement (EIS) must be completed first

Full impacts to all potentially affected waterbodies and impacted species connected to those waterbodies in Coos, Douglas, Jackson and Klamath Counties should be analyzed by a third party independent analyst in a properly completed NEPA process and Environmental Impact Statement long before any additional decisions are made with respect to the proposed project or before any potential approval is given to the project. Alternatives to the Project do exist and those alternatives are not being considered in this application process.[6]

[6] https://elibrary.ferc.gov/idmws/file_list.asp?accession_num=20170710-5423:

The construction and operation of the Jordan Cove LNG export terminal and the Pacific Connector Gas Pipeline are entirely dependent on the issuance of an Order for authorization and *Certificate of Public Convenience and Necessity* under sections 3 and 7 of the Natural Gas Act (NGA) and Parts 153 and 380 of the Federal Energy Regulatory Commission's (FERC) regulation. Under existing law, FERC is required to document its decision-making process leading to the issuance **or non-issuance** of the FERC Certificate via an Environmental Impact Statement (EIS) prepared in conformance with National Environmental Policy Act (NEPA) regulations.

The EIS is to "*provide full and fair discussion of significant environmental impacts and shall inform decisionmakers and the public of the reasonable alternatives which would avoid or minimize adverse impacts or enhance the quality of the human environment*" (40 CFR 1502.1) "***Agencies shall not commit resources prejudicing selection of alternatives before making a final decision***" (40 CFR 1502.2(f)) (Emphasis added)

The EIS should "*serve practically as **an important contribution** to the decision-making process and **will not be used** to rationalize or justify decisions already made*." (40 CFR 1502.5) (Emphasis added) An EIS, in and of itself, is not a decision document. Rather, after public review and comment, it is followed up by a formal record of decision (ROD) which documents how and why one of the alternatives analyzed in the EIS was selected for implementation.

By processing land use applications prior to the completion of the EIS process, Coos County is committing agency resources for a preferred LNG terminal siting location and pipeline route alternative prior to the final alternative selection by the FERC. Coos County would essentially be approving a terminal and pipeline design that may **or may not** be the best alternative. The failure to limit the actions of the applicant prior to the completion of the EIS process as called for in existing regulations, clearly demonstrates that Coos County's view of the EIS is not as a critical part of the decision process, but rather as a disclosure and justification document relating to a decision that has already been made. This posture is a direct violation of both the letter and intent of the NEPA.

How can the FERC "*have the exclusive authority to approve or deny an application for the siting, construction, expansion, or operation of an LNG terminal*" [15 U.S. Code § 717b(e)(1)] if the Jordan Cove and Pacific Connector project are allowed to process permits for one of the preferred alternatives?

The fact that these land use applications for Coastal Zone Management Act permits and approvals are being processed at this time in advance of Jordan Cove/Pacific Connector FERC publication of a Final EIS tends to lend credence to the following assumptions:

026FERC_Exb20_Braddocks_Power Point Slide #17 to NWPPA.PDF
026FERC_Exb21_Weyerhaeuser_Hunting_Map.PDF
026FERC_Exb22_Alternative_PCGP_Route_Ver1_Weyco.PDF
026FERC_Exb23_Alternative_PCGP_Route_Ver2_Weyco.PDF
026FERC_Exb24_Alternative_PCGP_Route_Ver3_Weyco.PDF
026FERC_Exb25_Alternative_PCGP_Route_Ver4_SoOre.PDF
026FERC_Exb26_Alternative_JCEP_PCGP_Route_Ver5.PDF
026FERC_Exb27_AlternativeJCEPSitingLocation_Ver6.PDF

- The Jordan Cove/Pacific Connector applicant, by spending the time, effort, and funding to pursue these Federal, State and County permits in advance of the EIS, apparently fully believes the FERC EIS process, will result in the issuance of the federal permit. Thus, Jordan Cove fully expects that the EIS will be simply the justification of a pre-conceived action rather than an objective and un-biased analysis of all reasonable alternatives as explicitly called for in existing Federal regulations.

- FERC, Coos County, Army Corps, DEQ and DSL, by allowing the processing of these various Federal/State/County permit applications at this time, is demonstrating that it essentially concurs with this violation of the NEPA process.

How can Oregonians be expected to fully participate in the NEPA process by objectively evaluating the range of alternatives that would be provided in a valid EIS if, in fact, Oregon state and county agencies have already issued permits and certifications for one of the alternatives beforehand?

2. Oysters, Clams, Crabs and Fish would be negatively impacted by the Jordan Cove/Pacific Connector Project

The Coos Bay is the largest commercial producer of shellfish in the state of Oregon. Jordan Cove would dredge and excavate approximately 5.7 million cubic yards (mcy) of material to create the slip basin and access channel in an area currently known as Ingram Yard. It is well known that Ingram Yard contains toxic materials from past industrial activities that were buried out there long ago. **Appropriate environmental reviews need to be done on the Ingram Yard property**. The property has been filled over many years with material dredged from a bay surrounded by heavy industries, and the property was used by Menasha and then Weyerhaeuser for many years before strict contamination controls were required. In July of 1999, Nucor Corporation withdrew from purchasing 575 acres of land on the North Spit from Weyerhaeuser. Nucor purportedly backed out because Weyerhaeuser insisted on transferring all potential liability for past contamination of the property to the buyer.

Despite multiple requests, Jordan Cove continues to ignore these concerns and has yet to properly test the soils in Ingram Yard where toxic compounds are likely to be found. (***See Exhibits 5 and 6***) **Contaminates in the tidal muds of the project area have also not been fully evaluated for past industrial contaminates which are highly likely to be re-mobilized during dredging activities.** This would make the already poor water quality conditions of the Coos Estuary even worse.

Both Clausen Oysters[7] and Coos Bay Oyster Company[8] (***See Exhibit 7***) have expressed concerns in the past about the potential for turbidity and loss of their commercial oysters from Jordan Cove's dredging activities. Commercial oysters would be at risk as well as populations of Olympia oysters which are protected and not harvested. Page 13 of Jordan Cove's Oct 2017, 404 Application states under item #4 that *"…dredging associated with the navigation reliability improvements and eelgrass mitigation site, will be performed during the ODFW in water work window (October 1 to February 15)*." Electronic page 123 of Jordan Cove's DSL application ALSO states the same thing (See Page 28 of David Evans

[7] FERC Motion to Intervene Out-of-Time of Clausen Oysters and Lilli Clausen, as in individual and owner, under CP13-483, et. al.: http://elibrary.FERC.gov/idmws/file_list.asp?accession_num=20141015-5087

[8] FERC Motion to Intervene and update Contact Information of Coos Bay Oyster Company / Jack Hampel under CP13-483, et. al.: http://elibrary.FERC.gov/idmws/file_list.asp?accession_num=20150302-5065

and Associates Technical Memorandum). **October is the height of the Olympia oyster reproductive cycle[9] and would mean that Olympia oyster spat would be at risk of massive die-off** should dredging occur during this time.

Eelgrass can also be adversely affected by turbidity because the depth and distribution of eelgrass is strongly associated with water clarity and depth of light penetration (Dennison and Orth 1993; Thom et al. 1998) as well as nutrient availability (Short et al. 1995), salinity, and water temperatures (Thom et al. 2003). The proposed marine slip and access channel would result in the permanent loss of 14.5-acres of shallow subtidal and intertidal habitat, 0.06-acre of estuarine saltmarsh habitat and approximately 1.9-acres of submerged aquatic vegetation habitat (eelgrass). **This would affect baby salmon and other marine organisms that depend on these ecosystems remaining intact.**

The Oregon DEQ's Integrated Report identifies the Coos Bay Estuary status as Category 5, water quality limited, 303(d) list (in CWA), and Total Maximum Daily Load (TMDL) is needed due to elevated fecal coliform measurements. (ODEQ 2012d).[10] This is also the case for several of the tributaries and rivers that are upstream of the Coos Estuary.

The Clam Diggers Association of Oregon have already found high levels of contaminants in clams coming from the Coos Bay [11] (***See Exhibit 8***) and Commercial oysters are currently not always able to be harvested due to elevated fecal coliform measurements within the Coos Bay.

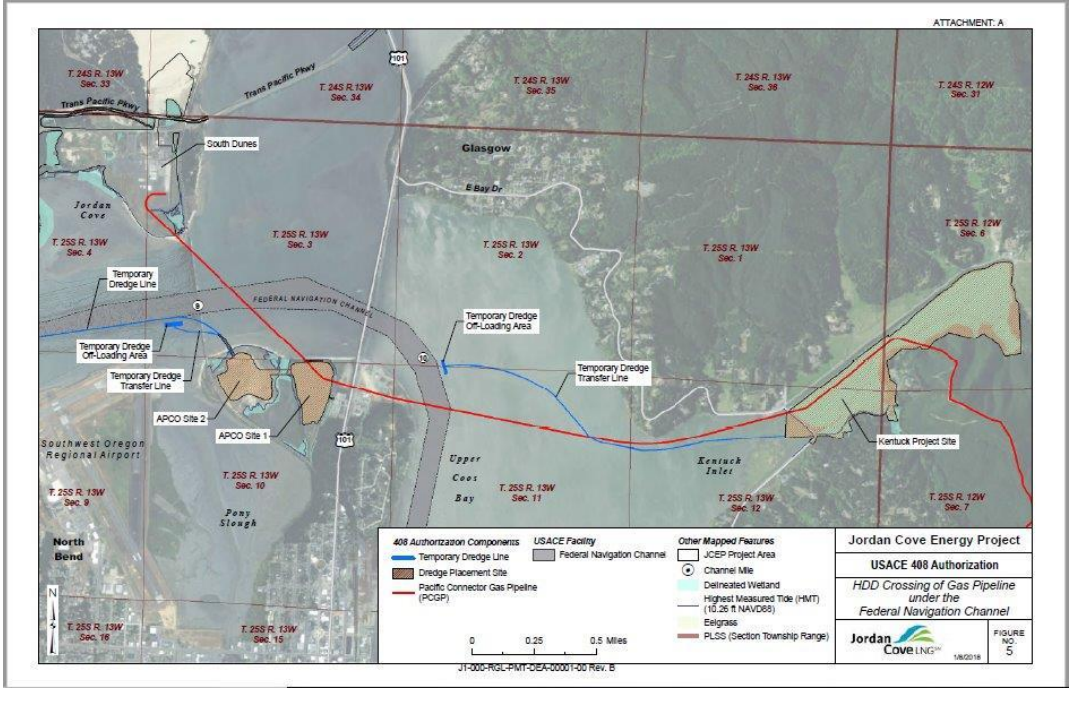
Dredging on the scale that is being proposed by Jordan Cove and the Port of Coos Bay has the potential to significantly affect both marine habitat and the amount and velocity of water flowing in and out of Coos Bay during the tidal cycle. All these increased impacts need to be evaluated due to their potential to significantly degrade these waters.

Currently the Pacific Connector is proposing to do an HDD through the Coos Estuary. Previously the Williams Pipeline company, who had a 50% interest in the Pacific Connector, also wanted to do an HDD that went under a much smaller section of the Coos Estuary. Williams did multiple tests and found the soils in the Estuary, particularly those below 35 feet, to be too unstable to do an HDD. It is rather suspect that now Pembina thinks that an even larger and more risky HDD in the Coos Estuary would be viable. There needs to be a third party investigation into these critical matters as the 12-inch pipeline that was built in 2003/2004 had dozens of frack-outs that severely contaminated tributaries in the Coos Watershed with drilling muds.

[9] "*Settlement Preference and the Timing of Settlement of the Olympia Oyster, Ostrea Lurida, In Coos Bay, Oregon"*, by Kristina M. Sawyer, A Thesis, Presented to the Department of Biology and the Graduate School of the University of Oregon in partial fulfillment of the requirements for the degree of Master of Science, September 2011.
[10] https://www.deq.state.or.us/wq/assessment/rpt2012/results303d12.asp
[11] Motion to Intervene Out-of-Time Clam Diggers Association of Oregon under CP13-483., et. al.: http://elibrary.FERC.gov/idmws/file_list.asp?accession_num=20140221-5118

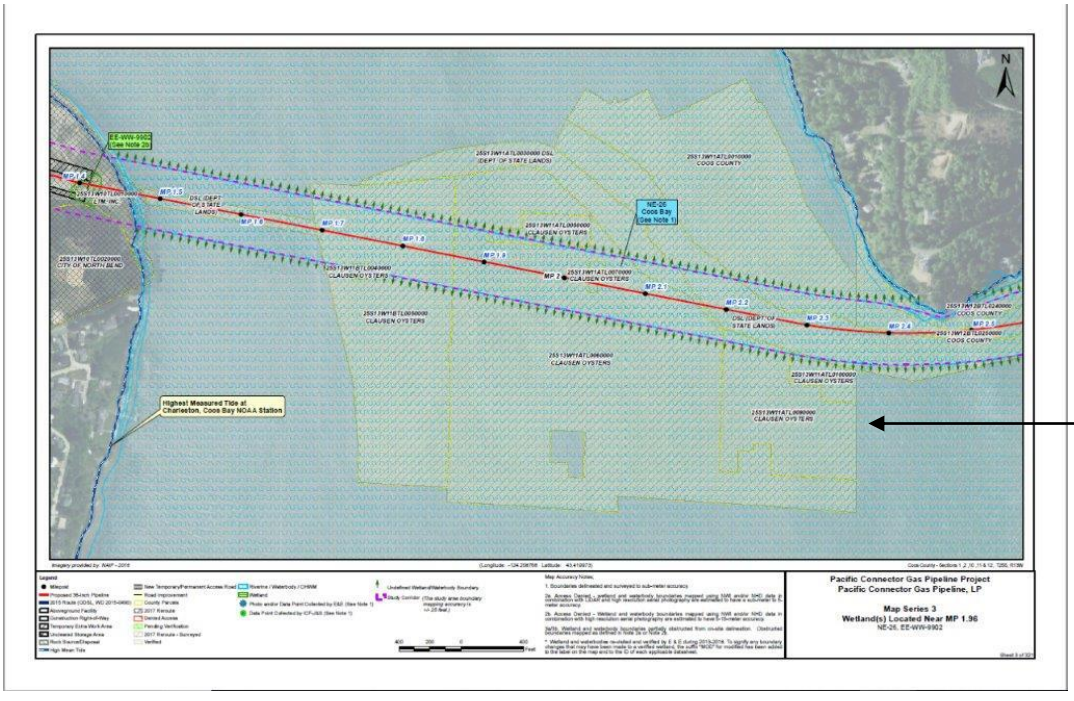
The photos above are frack-outs that occurred with the Coos County pipeline built in 2003/2004.

The diagram below is from Jordan Cove's May 10, 2018 filing (Part 1) with the FERC in response to staff data request dated Apr 20, 2018. This diagram was filed as part of Jordan Cove's 60% Design Package for their Section 408 Review.[12] It shows a temporary dredge transfer line that will also go through Clausen's oyster bed leases noted further below.



The diagram below is found in PCGP's May 24, 2018 filing to the FERC and shows a little more detail than what is found in other PCGP maps. These particular map pages show the PCGP HDD in relation to Clausen oyster bed leases in the Coos Bay estuary.[13]

[12] http://elibrary.FERC.gov/idmws/file_list.asp?accession_num=20180510-5165
[13] http://elibrary.FERC.gov/idmws/file_list.asp?accession_num=20180524-5118



It is doubtful that the Clausen oyster company even knows what exactly is being proposed or how it could negatively impact their oyster beds.

Sylvia Yamada, a marine ecologist who has studied native crabs and the European green crab in Oregon and Washington for over 20 years, submitted comments into the DSL record where she stated the following: (***See Exhibit 9***)

> *…Not only will the turbidity during the construction phase be of concern to the ecological community, the on-going dredging to maintain the berth and shipping channels will continue be a disturbance to the ecosystem. It will result in habitat loss for native species, including the valuable Dungeness crab. In one study between 45 to 85 % of the Dungeness crabs died during a simulated dredging operation (Chang and Levings, 1978). Marine habitat modification by construction of the Jordan Cove Energy Project could impact the important Oregon Dungeness fishery.*[14]

Dr. Mark Chernaik succinctly summarizes the issues in the following statement found on page 9 of this November 14, 2011 Coos County Surrebuttal report under File No. HBCU-10-01/REM-10-01:

> "*Proponents of multi-billion dollar industrial projects have vast resources to pay for scientific reports with elaborate illustrations that have the allure of scientific validity. Because citizens who are concerned about the impacts of such projects must make do with far fewer resources, these project proponents are not accustomed to close inspection of their technical data, assumptions, reasoning and conclusions. This imbalance describes the situation between PCGP and CALNG and the question of whether the proposed project would fail to protect the resource productivity of Haynes Inlet.*

[14] Comments of Sylvia B Yamada, Ph.D. in FERC Docket for Jordan Cove – PF-17-4 ;http://elibrary.FERC.gov/idmws/file_list.asp?accession_num=20170622-0008

"Despite the David-versus-Goliath situation they find themselves in, CALNG has revealed numerous, serious flaws in the technical arguments put forward by PCGP, including the early claim by Dr. Bob Ellis that Olympia oysters "are not known to inhabit the Project Action Area (ODLCD, 1998)." LUBA Record at page 1331. Following this, CALNG has revealed additional errors, including but not limited to the following errors that are the subject of this round of testimony: that PCGP relied on untrained surveyors to identify and find native oysters in Haynes Inlet; that PCGP misunderstands the nature of native oyster restoration experiments performed by Dr. Danielle Zacherl; and that PCGP relied on un-validated estimates of background turbidity and inaccurate assumptions of sediment particle size when predicting the impact of trenching activities.[6] Combined with previous errors, such as proposing to commence trenching activities at the beginning of October, just before the height of the spawning season for Olympia oysters in Coos Bay, these numerous mistakes place the applicant far short of meeting their burden of demonstrating that their proposed project would not have more than a de minimis or insignificant impact on native oysters in Haynes Inlet."[15]

We hope that the Coos County Commissioners will consider and address these issues, along with others presented here in this filing during their review and analysis of the Jordan Cove LNG Export project. Dredging impacts should **not have more than a *de minimis* or insignificant impact on commercially raised and native oysters in the Coos Estuary**. Conditions of Approval **should be imposed** on the project in order to protect and insure the vitality of the Olympia oyster (*Ostrea lurida*) and other functioning biological systems within the estuary.

3. Environmental contamination on the Jordan Cove property is not fully being evaluated and considered

A December 16, 2014 letter from Barbara Gimlin,[16] (***See Exhibits 5 & 6)*** former Environmental Lead for the Jordan Cove project, addressed to Jeff C. Wright, Director, Office of Energy Projects, at the Federal Energy Regulatory Commission, exposes the fact that the Ingram yard site is contaminated and proper environmental studies are not being done on the property. In March 2014, Barbara had been named as the acting Environmental Inspector (EI) for the JCEP Kiewit $15 million exploratory test program conducted at the LNG terminal site on the North Spit of Coos Bay. Work done by Jordan Cove at the Ingram yard site during 2014 under DEQ's, "*General NPDES 1200-C Permit for Construction Storm Water Discharges for Pile Test and Ground Improvement Testing Programs,*" involved clearing done on the property, road building and other work that was extensive and clearly impacted the current ecological environment at the Ingram Yard site. A video clip of contamination that leached into the nearby Henderson Marsh was noted during this time: http://citizensagainstlng.com/wp/wp-content/uploads/2014/12/Henderson-Marsh-on-North-Spit-5-18-2014-MVI_6925.mov

The Ingram Yard property where the Jordan Cove Project is being proposed contains dredging spoils that were dumped there many years ago. **When DEQ proposed a "*No Further Action*" letter for the site they made it clear that there were residual contaminants in the dredge spoils on the land**

[15] November 14, 2011: Mark Chernaik, Ph.D., Surrebuttal Report; Page 9 under Coos County File No. HBCU-10-01/*REM-10-01*

[16] Comment of Barbara J Gimlin under CP07-444, on Jordan Cove Energy Project, L.P., Draft Environmental Impact Statement; FERC/EIS-0223F ; LNG Terminal Facility. Concerns about site contamination issues. http://elibrary.FERC.gov/idmws/file_list.asp?accession_num=20141218-5020

surface, and that it was inappropriate for the material to be placed in waters of the state, **and inappropriate to be disposed elsewhere in an unrestricted fashion**. If it ever comes to the point where they are actually dredging the material, DEQ will have a roll in approving/disapproving the ultimate fate of where the excavated sediments go. As part of that approval process, DEQ will want to know about the quality of the sediments and where they are planning to put them. **There was no testing as to the deeper levels of residual contaminants by DEQ** that I am aware of.

CONTAMINATED SOILS WOULD NOT BE A PROPER USE AS FILL FOR THE LNG STORAGE TANKS OR THE POWER PLANT OR THE GAS PROCESSING FACILITY OR THE TRANSPACIFIC PARKWAY REALIGNMENT. These soils are likely to leach contamination into the Bay thus harming marine life and the bay's biological function. WHERE IS THE OVERSIGHT AND ENFORCEMENT THAT WOULD PROTECT THE BAY since it obviously did not occur during the stormwater permitting process? Empty promises by the applicant are no longer good enough.

4. Tidal soil contaminant testing is absent and/or not adequate

Jordan Cove's DSL application on electronic page 1015 states, "*The chemical analytical data from the Corps FNC indicate that chemicals of concern present near the project area generally include metals, phenols, various phthalates and PAHs*." The Roseburg Chip facility berth was tested in 2009 and TBT was detected above the SL1 in the west part of the berth; discrete re-sampling did not detect TBT but dredging was restricted to the eastern portion of the berth anyway. Past shipping contaminants including Tributyltin (TBT), arsenic, copper, lead, mercury, nickel, zinc, polycyclic aromatic hydrocarbons (PAHs), and polychlorinated biphenyls (PCBs) **could be re-suspended into the Coos Bay** harming marine life and businesses that depend on that marine life. (***See Exhibit 12***) Tidal muds need to be tested prior to any Coos County approval and Jordan Cove's sedimentation plan MUST CONTAIN TESTING FOR ALL POTENTIAL CONTAMINANTS AND CURRENTLY DOESN'T. (See electronic page 524 of Jordan Cove's DSL application, Table 9-2)

The cumulative damage to the Coos Bay Estuary from the proposed JCEP project would be significant due to the extensive dredging, ballast water, invasive species and water quality impacts.[17] **This would violate the Coastal Zone Management Act [18] and the Estuary Restoration Act of 2000 [19]**

Below find current evidence of clams and sand shrimp that **are not being properly mitigated** in the area of Jordan Cove's proposed marine terminal:

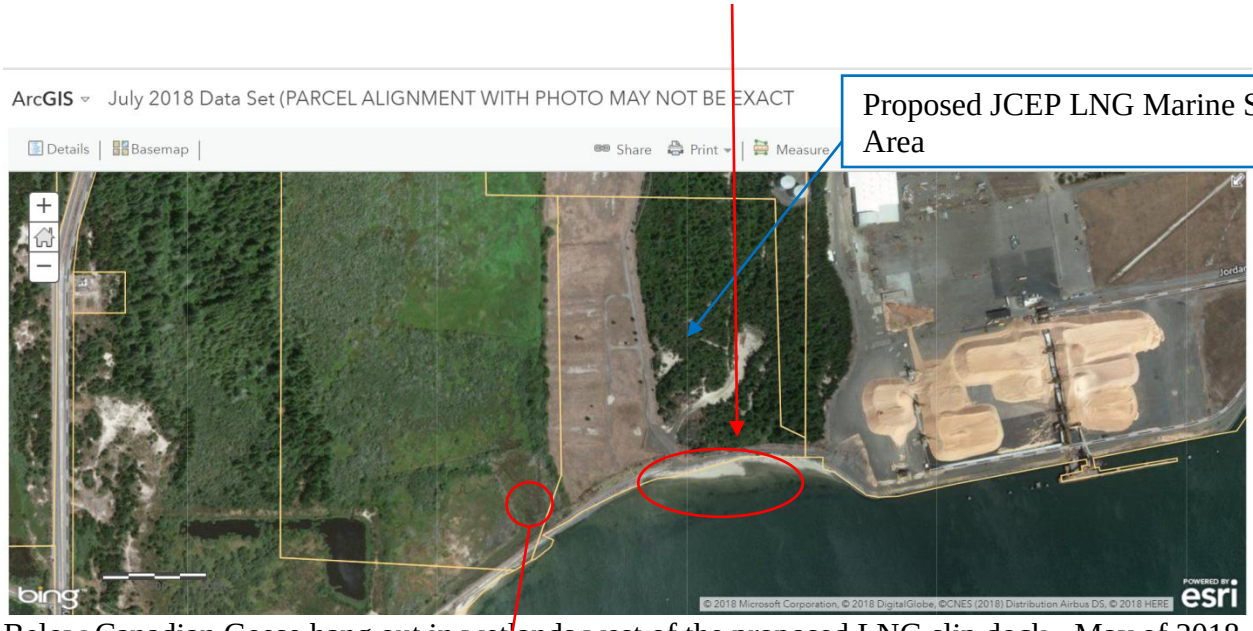
[17] The proposed Jordan Cove LNG Export Project would dredge 5.7 million cubic yards of dredge material in order to build their LNG marine slip dock and another .6 mcy of dredging in the Coos Bay for a total of 6.3 million cubic yards of material. The Port of Coos Bay has plans for an extensive deepening and widening of the shipping channel in the lower Coos Bay and removal of 18 mcy. This amounts to 24.3 million cubic yards of material in total. Ballast water, invasive species and water quality impacts from the project would be significant.
[18] The Coastal Zone Management Act. http://coast.noaa.gov/czm/act/?redirect=301ocm
[19] The Estuary Restoration Act: http://www.era.noaa.gov/information/act.html

Evidence of clams, thousands of sand shrimp and eelgrass can be found in the vicinity of the proposed LNG marine terminal but much of this habitat is not on any habitat maps and is not being protected or mitigated properly by Jordan Cove.

Above a clam digger digs for clams - May 2018

Below Plovers get a meal at low tide in the tidal areas of the proposed LNG marine slip dock.

Plovers & Geese take to flight in tidal areas where proposed LNG Marine Dock would be built - May 2018.



Below Canadian Geese hang out in wetlands west of the proposed LNG slip dock - May of 2018.

The habitat area above would be <u>totally destroyed</u> by the removal of 5.7 million cubic yards in these tidal areas. One-third of Oregon wetlands are estimated to have been lost since the late 1700s. Wetlands are now protected under federal law, and loss of estuarine wetlands has slowed substantially since the mid-1900s (Oregon Division of State Lands and Oregon State Parks and Recreation Division 1989, Dahl 1990). Of the waterbodies that would be crossed by this project in the analysis area, 14 waterbodies in the BLM's Coos District, 5 waterbodies in the BLM's Medford District and 4 waterbodies in the Klamath Sub-basin are known to be 303d water quality limited. (2009 FEIS *Biological Evaluation* - Page 170 - H-331).

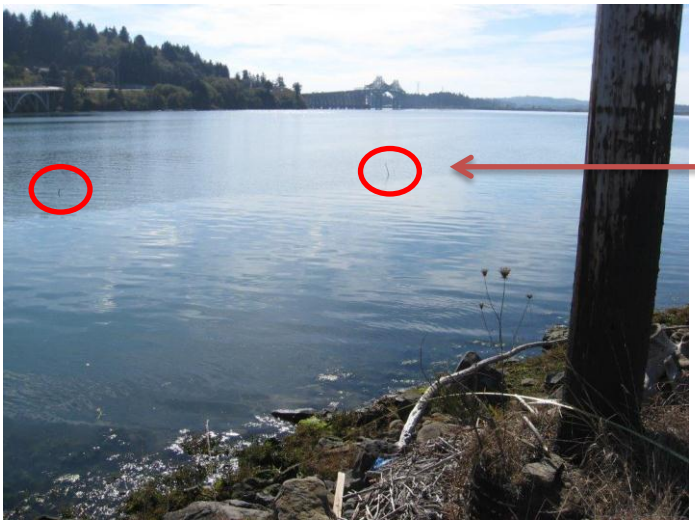
Coastal and inland mudflats are an important ecosystem for many shorebird types throughout our state and elsewhere. They rely on these mudflats particularly during migration as well as the late summer/fall/winter and possibly even early spring should shorebirds find a reliable food source to keep them viable until they again migrate to nest. The Sand Shrimp and other micro organisms that are part of mudflats are most likely important food sources for shorebirds.

Despite this Jordan Cove's September 2017 Resource Report #3 states on page 107: "*Noise associated with construction and operation of the facility is the only direct effect to plovers*." **I think the above pictures prove this not to be the case.**

The Canada Geese above are most likely permanent residents of the area and most Canada Geese can be seen year round (they are not long-range migrants, for the most part, like Greater White-fronted Geese and Snow Geese that breed in Alaska/Canada and then travel to areas such as Lower Klamath National Wildlife Refuge, Sacramento NWR, all the way to the southern interior of the U.S. during winter).

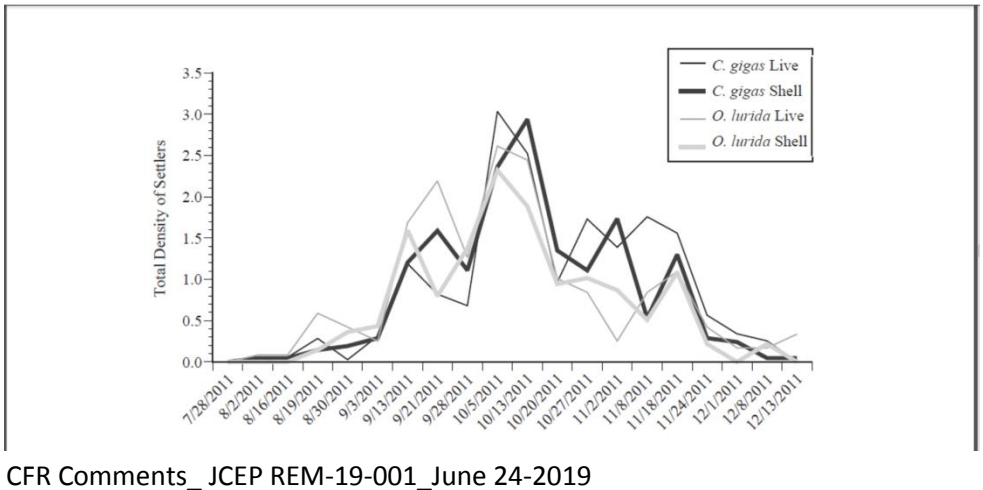
The Coos Estuary to the North of the proposed Transpacific Parkway impact area is also teaming with wildlife. A report from 1979 confirms this fact (***See Exhibit 10 filed on Jan 12, 2015 under HBCU-15-05.)*** The photo below is looking towards the West on the North Side of the Transpacific Parkway where the additional lane project is proposed.

Fish bones and bird excrement show that ecosystems exist in the rocky shoreline areas of the TPP impact zone.



South of the utility power pole on the south side of the TPP impact area, commercial oyster beds are observed in abundance. Turbidity and sedimentation impacts on the North side of the Transpacific Parkway in the 10A-NA zoning district would also impact the 13A-NA zoning district on the South side due to tidal influence.

"Settlement Preference and the Timing of Settlement of the Olympia oyster, Ostrea Lurida, in Coos Bay, Oregon" by Kristina M. Sawyer (A Thesis) September 2011 found the height of the Olympia oyster reproductive cycle to occur in or around the month of October. (See Digram from the Sawyer report below.) High sedimentation in the water is deadly for both Olympia oyster spat and also Commerical Pacific oysters that are farmed in the area. Large amounts of seditmentation can cause a high rate of fouling and oyster death. Any contaminated soils coming from the Ingram yard property would not be apropriate in this area. **Fill is not an allowed use in the 10-NA zone.**



The Environmental Analysis should include a section known as the Affected Environment
The EIS should contain an analysis of what the current conditions of our ecosystems are right now, along with how this project would impact those current biological compromised systems as a whole.

ESTUARY ISSUES OF CONCERN THAT NEED TO BE FULLY ADDRESSED

- Loss of habitat for fish, crabs, clams oysters and other marine and wildlife.
- Loss of vital eelgrass beds (this is supposedly to be mitigated, but State Agencies in the past have expressed series doubts about the adequacy of the planned mitigation)
- Possible erosion issues caused from the massive dredging and ship and tug wakes.
- The use of riprap and the altering of the bay's water velocity and flow.
- Sediment transport issues that can occur when channels are deepened. Tidal amplification and hyper concentrated sediment conditions can occur in the upstream tidal rivers. Channel deepening may increase up-estuary suspended sediment transport due to enhanced salinity-induced estuarine circulation and have a large impact on increasing suspended sediment concentration (SSC)[20]
- Risk of destabilizing Henderson Marsh wetlands and the North Spit due to the excessive dredging.
- Potential negative impacts to wetland areas including habitat and vegetation.
- Potential negative impacts to the nearby floodplains.
- Potential negative impacts to adjacent wildlife and people. What effect will dredging have on adjacent shorelands? Snowy Plover habitat? Clam beds? Other marine and wildlife? People? Shoreland structures? Rising water levels due to climate change?
- An increase in the Tsunami hazard zone areas due to an increase in amount of water and water velocity that will be in the bay due to the increased dredging.
- Interference with Traditional Activities on the Lower Bay (Fishing, Crabbing, Boating, Recreation, etc) including economic impacts to businesses associated with these activities.
- The potential for increased flooding upstream of the Kentuck Inlet.

[20] *The impact of channel deepening and dredging on estuarine sediment concentration* D.S.van Maren, T.van Kessel, K.Cronin, L.Sittoni ; Continental Shelf Research Volume 95, 1 March 2015, Pages 1-14

ENDANGERED SPECIES IMPACTS

The Project is not in compliance with Regulations for protecting threatened and endangered species including Army Corps Standard Local Operating Procedures for Endangered Species (SLOPES).

According to the former FERC September 2015 Jordan Cove FEIS page 5-15 to 5-16:

> The Project is ***likely to adversely affect***:
> □□the proposed threatened fisher (west coast DPS);
> □□the threatened MAMU;
> □□the threatened NSO;
> □□the threatened green sturgeon (Southern DPS);
> □□the threatened Pacific eulachon (Southern DPS);
> □□the threatened coho salmon (SONCC);
> □□the threatened coho salmon (Oregon Coast ESU);
> □□the endangered Lost River sucker;
> □□the endangered shortnose sucker;
> □□the threatened vernal pool fairy shrimp;
> □□the endangered Applegate's milk-vetch;
> □□the endangered Gentner's fritillary;
> □□the endangered large-flowered meadowfoam; and
> □□the threatened Kincaid's lupine.

This list is not complete, however. For example, Jordan Cove Resource Report #3, dated September 2017, page 100 states:[21]

> ***3.4.1.6 Plants***
> *Five federally- and state-listed plant species have the potential to occur in the JCEP Project Area. The western lily is the only federally-listed species. State-listed species include the pink sand verbena, Point Reyes bird's-beak, silvery phacelia, western lily, and Wolf's evening primrose. The only state-listed species detected within the vicinity of the JCEP Project Area was Point Reyes bird's beak.*

Jordan Cove's September 2017 Resource Report #3, May 2013 *Botanical Resources Assessment Report* page 23 states:

> *Based on the current location of development at the site, a small area of potential* ***habitat for Point Reyes bird's-beak will be removed. No state regulation applies to this species, because the project is on private property and this species is not federally listed***.[22] (Emphasis added)

[21] http://elibrary.FERC.gov/idmws/file_list.asp?accession_num=20170921-5142
[22] June 2017 RR#3 May 2013 *Botanical Resources Assessment Report* - Jordan Cove Energy Project Coos County, Oregon by SHN Consulting Engineers & Geologists, Inc.; Page 23 of report

The actual listing of this plant is as follows:

Point Reyes bird's-beak

- **Species Common Name** Point Reyes Bird's-beak
- **Species Scientific Name** *Cordylanthus maritimus ssp. palustris*
- **Federal Listing Status** Species of Concern
- **State Listing Status** Endangered

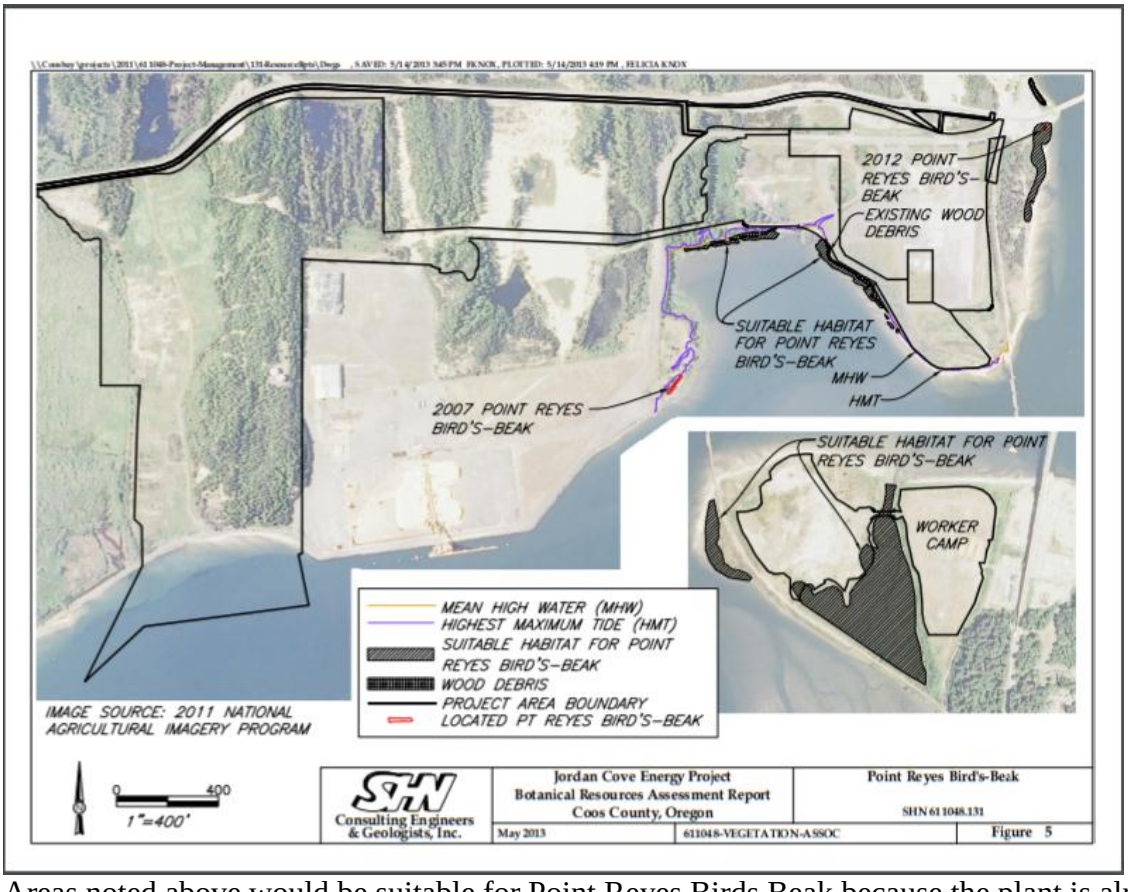
Jordan Cove Resource Report #3, dated September 2017, page 101 states:[23]

> ***3.4.1.6.3 Point Reyes Bird's-Beak (Federal Species of Concern, State Endangered)***
>
> *Point Reyes bird's-beak (Chloropyron maritimum ssp. Palustre, formerly Cordylanthus maritimus ssp. palustris) is an annual gray-green and purple-tinged herb that grows 4 to 16 inches tall and has few branched stems. Point Reyes bird's-beak inhabits the upper end of maritime salt marshes, and its habitat requirements are specific: approximately 7.5 to 8.5 feet above mean lower low water, sandy soils with soil salinity of 34 to 55 parts per thousand, and less than 30% bare soil in summer (Appendix D.3). It flowers from June to October. Associate species include those that are tolerant of high salinity levels such as salt grass, pickleweed, fleshy jaumea (Jaumea carnosa), sea lavender, and dodder (Cuscuta salina). Point Reyes bird's-beak occurs along the Pacific Coast from Tillamook County, Oregon, south to Santa Clara County, California. In Oregon, the species is restricted to Netarts Bay, Yaquina Bay, and Coos Bay, with the majority of known occurrences located in Coos Bay.*
>
> *Populations with 1,000 to 10,000 plants are located along the margins of Coos Bay and on sand salt marshes near the edge of high water marks (ORBIC 2017).* ***Several occurrences of Point Reyes bird's-beak are located in the vicinity of the JCEP Project Area (ORBIC 2017; Appendix D.3), as shown in Figure 3.4-4****. This species is known to occur within the intertidal wetland between APCO Sites 1 and 2. There is no suitable habitat on APCO Site 2 at the dredge disposal access point; this area is dominated by upland vegetation. This species also occurs outside the JCEP Project Area along the west and southeast shoreline of the South Dunes site (ORBIC 2017). Potential habitat for this species has also been observed along the shoreline south of the SouthDunes site. This habitat contains an abundance of the associated species, including pickleweed. Prior to construction, an additional survey for Point Reyes bird's-beak will be conducted during the appropriate blooming period in the area defined as potential habitat for the species.*
> (Emphasis added)

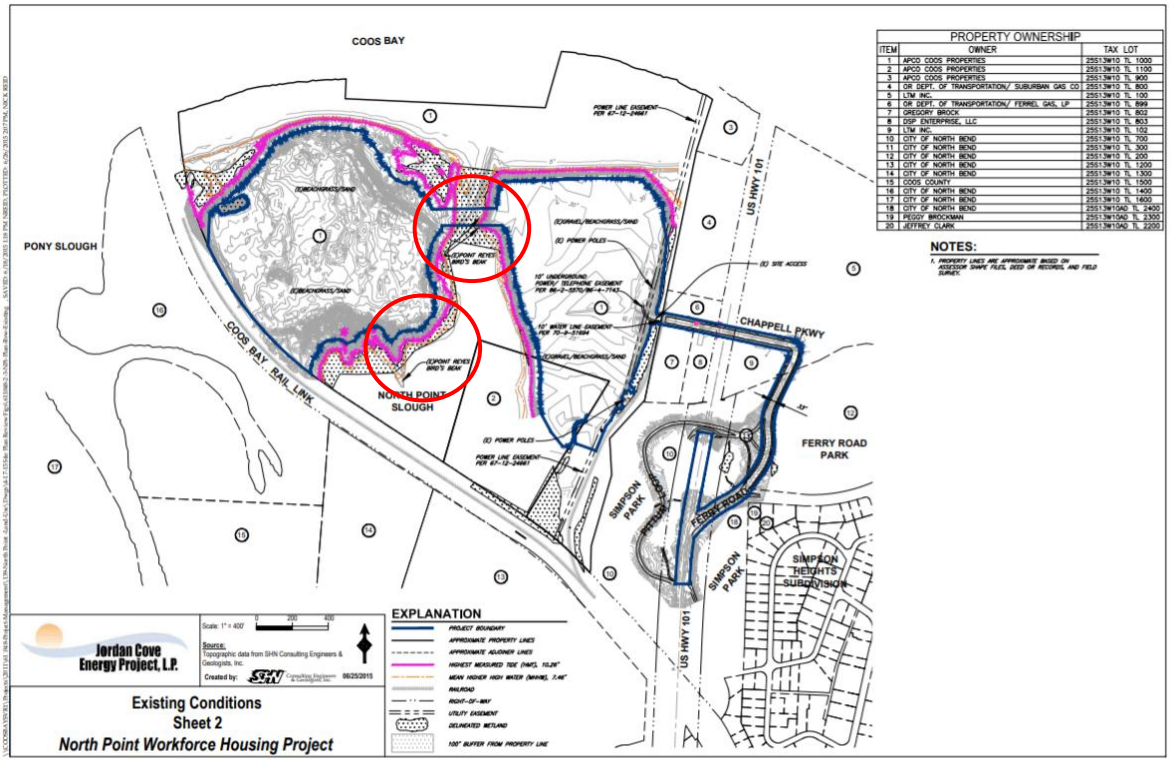
WHERE IS THE PROTECTION OF THIS OREGON ENDANGERED PLANT?

Jordan Cove's Figure 3.4-4 has been filed as privileged with the FERC but Jordan Cove's other drawings do not show all the areas where Point Reyes bird's beak has been located as indicated when comparing what is found in their current Resource Report #3 (below) to an earlier diagram from their former North Point Workforce Housing proposal (second diagram below).

[23] http://elibrary.FERC.gov/idmws/file_list.asp?accession_num=20170921-5142



Areas noted above would be suitable for Point Reyes Birds Beak <u>because the plant is already located there.</u> Note the red circled areas below showing where plants were found in the former Jordan Cove North Point Workforce Housing Diagram below:



This is just one significant plant that should be protected but is being overlooked. Waiting until construction is ready to begin before dealing with this plant species is not sufficient. **How many more plant and animal species are also being overlooked like this?** Jordan Cove's dredge placement sites will clearly negatively impact the Oregon Endangered Point Reyes bird's-beak and possibly other plant and animal life as well.

OAR 141-122-0020 Policies

> *(13)* ***The Department will not grant an easement if the proposed use or development is inconsistent with any endangered species management plan adopted by the Department under the Oregon Endangered Species Act*** *(ORS 496.171 to 496.192).*

The State of Oregon has listed the following plants in Coos County as being endangered:
Abronia umbellata var. *breviflora* - Pink sandverbena - Endangered
Cordylanthus maritimus ssp. *palustris* - Point Reyes bird's-beak - Endangered
Lilium occidentale - Western lily - Endangered
Phacelia argentea - Silvery phacelia – Threatened

There is no indication that surveys were done for any of these plant species. Point Reyes bird's-beak is a federal species of concern, is listed endangered by the State of Oregon, and is a Bureau Sensitive species. Historically, this annual, hemi-parasitic herb occurred along a 900 mile section of coastline, from Netarts Bay, Oregon, south to Morrow Bay, California. Today, it is known only from Netarts Bay, Yaquina Bay, and Coos Bay. The primary threat to the Point Reyes bird's-beak is habitat loss from development, OHVs, and water pollution from petroleum spills. **(*See Exhibit 13*)**

ORS 196.805 [24] Policy

> *(1)* ***The protection, conservation and best use of the water resources of this state are matters of the utmost public concern****. Streams, lakes, bays, estuaries and other bodies of water in this state, including not only water and materials for domestic, agricultural and industrial use but also* ***habitats and spawning areas for fish, avenues for transportation and sites for commerce and public recreation, are vital to the economy and well-being of this state and its people****. Unregulated removal of material from the beds and banks of the waters of this state may create hazards to the health, safety and welfare of the people of this state. Unregulated filling in the waters of this state for any purpose, may result in interfering with or injuring public navigation, fishery and recreational uses of the waters. In order to provide for the best possible use of the water resources of this state, it is desirable to centralize authority in the Director of the Department of State Lands, and implement control of the removal of material from the beds and banks or filling of the waters of this state.*
>
> *(2)* ***The director shall take into consideration all beneficial uses of water including streambank protection when administering fill and removal statutes.***
>
> *(3) There shall be no condemnation, inverse condemnation, other taking, or confiscating of property under ORS 196.600 to 196.905 without due process of law. [Formerly 541.610 and then 196.675; 2003 c.738 §16; 2012 c.108 §7]*
> (Emphasis added)

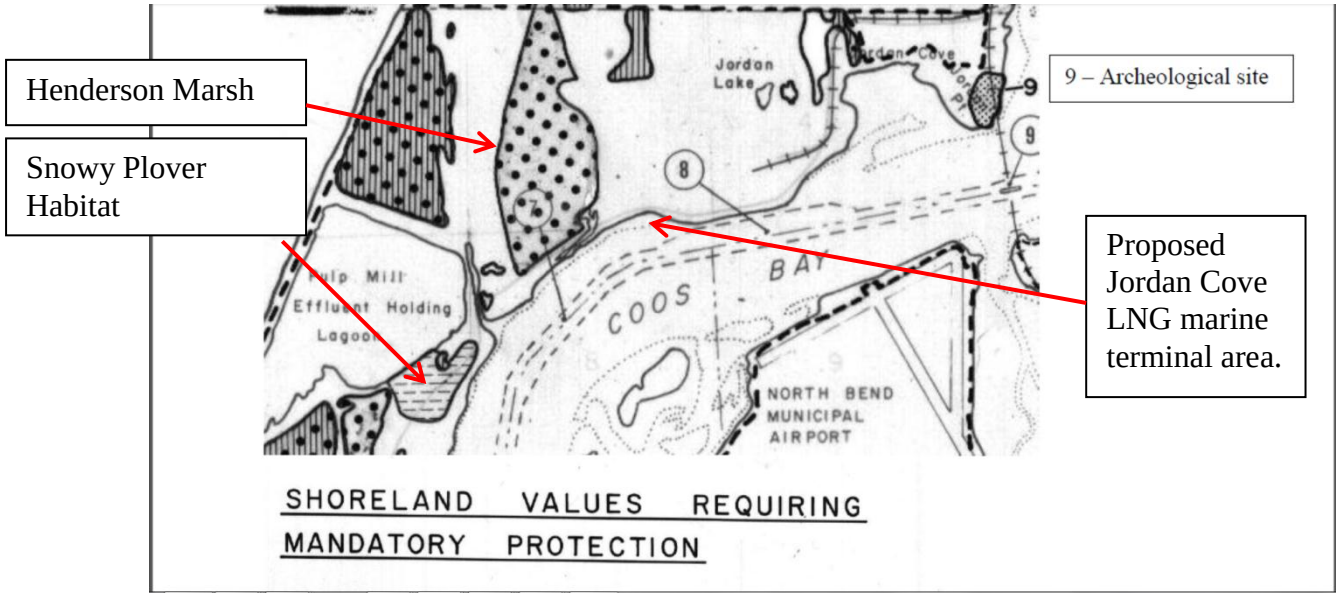
[24] http://www.oregonlaws.org/ors/196.805

Abalone

Southern Oregon is on the northern edge of red abalone range and the state's fishery is managed conservatively to protect the health of Oregon's relatively small population. Abalone are highly prized and the fishery creates a high demand, primarily among divers. While seven species exist on the West Coast, **five of these have some listing status under the Endangered Species Act**.[25] Red abalone are the only species still fished in the contiguous United States, and southern Oregon and northern California are the only areas where recreational harvest has occurred in recent years. Commercial harvest is not allowed in either state. Currently Oregon has postponed the 2018 recreational season that was set to open on Jan. 1 until further review and Commission consideration.

SHORELAND VALUES REQUIRING MANDATORY PROTECTION

The following shows the Coos County Shoreland Values Map Requiring Mandatory Protection under the Coos Bay Estuary Management Plan:



Conditions of Approval found in Coos County File No.'s HBCU-07-03; HBCU-07-04; and REM-09-02 of HBCU-07-04 call for protection of wetland areas including Henderson Marsh which is a high value habitat area. (***See Exhibits 14, 15 and 16***) Critical species, including Snowy Plovers, would be harmed by the Jordan Cove facility's loss of habitat areas, noise impacts and operations, including those coming from Jordan Cove's proposed gas flaring. Gas flares and noise are always more intense than what the industry claims they would be during permitting. These impacts would have negative

[25] https://www.dfw.state.or.us/news/2017/12_dec/122817.asp

impacts on Snowy Plovers and other habitat, including many other shorebirds that currently nest in the Henderson Marsh wetland area. In 2013 about 7,500 songbirds, possibly including some endangered species, were killed while flying over a flare at a gas plant in Saint John. (***See Exhibit 17***) Photo above and to the right is of a gas flaring event at the Corrib plant in 2016. Residents found the event to be 'frightening.' (***See Exhibit 18***)

AGENCY BIOLOGICAL OPINION HAS NOT BEEN RELEASED

Below find excerpts from the 2011 Army Corp / NMFS Consultation:

Endangered Species Act Section 7 Formal Programmatic Opinion, Letter of Concurrence
and
Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Conservation Recommendations

Revisions to Standard Local Operating Procedures for Endangered Species to Administer Actions Authorized or Carried Out by the U.S. Army Corps of Engineers in Oregon
(SLOPES IV In-water Over-water Structures)
NMFS Consultation Number: 2011/05585
Federal Action Agency: Army Corps of Engineers,
Portland District, Operations and Regulatory Branches

GLOSSARY

For this consultation –
***** ***** ***** *****

Fill *means any material that has been placed below the plane of the ordinary high water mark or the high tide line.*
* * * *

Listed species *means any species of fish, wildlife, or plant which has been determined to be endangered or threatened under section 4 of the Federal Endangered Species Act.*
* * * *

Riparian management area *means land: (1) Within 150 feet of any natural water occupied by listed species during any part of the year or designated or proposed as critical habitat; (2) within 100 feet of any natural water within 1/4 mile upstream from areas occupied by listed species or designated as critical habitat and that is physically connected by an above-ground channel system such that water, sediment, or woody material delivered to such waters will eventually be delivered to water occupied by listed salmon or designated as critical habitat; and (3) within 50 feet of any natural water upstream from areas occupied by listed species or designated as critical habitat and that is physically connected by an above-ground channel system such that water, sediment, or woody material delivered to such waters will eventually be delivered to water occupied by listed salmon or designated as critical habitat.*
***** ***** ***** *****

1.3 Proposed Action
* * * *

The Corps is proposing to use this iteration of SLOPES to authorize four categories of actions, specifically:
***** ***** ***** *****

Maintain, rehabilitate, replace, or remove an existing in-water or over-water

structure *as necessary to extend the useful service life of the structure, or to withdraw the public or private structure from service when its usefulness has ended. Eligible structures include, but are not limited to, an aid to navigation, boat house, boat launch ramp, breakwater, buoy, commercial/industrial/recreational pier or wharf, port/industrial/marina facilities,*[1] *covered boat house, dock, dolphin, float plane hanger, floating storage unit, floating walkway, groin, jetty, marina, mooring structure, permanently moored floating vessel, private boat dock, recreational boat ramp, or wharf.*

This does not include any action that would occur in a Superfund Site designated by the U.S. Environmental Protection Agency, a state-designated clean-up area, or the likely impact zone of a significant contaminant source, as identified by historical information or the Corps' best professional judgment.

* * * *

1.3.1. Proposed Design Criteria

The Corps proposes to apply the following design criteria, in relevant part, to every action authorized or carried out under the program and approved under this opinion. Measures described under "Administration" apply to the Corps as it manages the SLOPES program. Measures described under "General Construction" apply, in relevant part, to each action that involves a construction component. Measures described under "Types of Actions" apply, in relevant part, to each action as described.

* * * *

1.3.1.2 General Construction

*** * * ***

14.Compensatory mitigation*. Any action that will permanently displace riparian or aquatic habitats or otherwise prevent development of properly functioning condition of natural habitat processes will require compensatory mitigation to* ***fully offset those impacts****.* (Emphasis added)

a. Examples of actions requiring compensatory mitigation include construction of a new or enlarged boat ramp or float, the addition of scour protection to a boat ramp, or construction of new impervious surfaces without adequate stormwater treatment.

* * * *

d. As part of NMFS's review under clause 3 above, NMFS will determine if the proposed compensatory mitigation fully offsets permanent displacement of riparian or aquatic habitats and/or impacts that prevent development of properly functioning processes.

*** * * ***

16. Site preparation. *During site preparation, conserve native materials for restoration, including large wood, vegetation, topsoil and channel materials (gravel, cobble and boulders) displaced by construction. Whenever practical, leave native materials where they are found and in areas to be cleared, clip vegetation at ground level to retain root mass and encourage reestablishment of native vegetation.* ***Building and related structures may not be constructed inside the riparian management area****.* (Emphasis added)

The Jordan Cove project is NOT in compliance with Army Corps Standard Local Operating Procedures for Endangered Species (SLOPES) requirements. Jordan Cove does not comply with the Army Corps SLOPES program, particularly since their proposed building and related structures would be constructed inside the 150 foot riparian management area that is supposed to be protected due to the Coos Estuary containing threatened species of Oregon Coast Coho salmon, Southern Green Sturgeon (Acipenser medirostris) and Eulachon (Thaleichthys pacificus). Jordan Cove's Pacific Connector trenching and horizontal directional drill (HDD) structures near other impacted waterbodies likely affect several other ESA listed species as well.

[1] This includes replacing existing pilings, fender piles, group pilings, walers, and fender pads. It also includes the installation of new mooring dolphins and structural pilings, height extension of existing pilings and the relocation of floats within an existing marina.

DREDGING/FILL NOT IN COMPLIANCE WITH LAND USE

Jordan Cove Energy Project (JCEP) plans to remove 5.7 million cubic yards of material for their proposed marine terminal and access channel and also has plans to excavate four submerged areas lying adjacent to the federally-authorized Channel along with an area for eel grass mitigation. According to Jordan Cove this will allow for transit of LNG vessels of similar overall dimensions to those listed in the July 1, 2008 USCG Waterway Suitability Report, but under a broader weather window.

Two of the areas that Jordan Cove wants to dredge in the Coos Estuary are zoned "Natural Aquatic," one is zoned "Conservation Aquatic," two are zoned "Developmental Aquatic." One area where they want to place fill is zoned "Natural Aquatic" (***See Exhibit 19***) Most of these zoning districts DO NOT ALLOW NEW DREDGING except in zoning district 3-DA (Developmental Aquatic) and where the LNG marine terminal is being proposed (zoning district 6-DA), but even then, dredging is **only allowed** in those Developmental Aquatic zoning districts subject to Administrative Conditional Use – Special Conditions and General Conditions.

Chart below covers zoning issues within the Coos Bay Estuary itself (Does not include Coastal Shorelands and/or wetland areas that would also be affected.)

Jordan Cove Terminal Components	**Estuary Zoning District affected**	**New Dredging**	**Fill**	**Land Use Status**
Marine Slip and Access Channel 5.7 mcy total	6-DA and 5-DA	Allowed subject to Administrative Conditional Use – Special Conditions and General Conditions	Fill - Allowed subject to Administrative Conditional Use – Special Conditions and General Conditions Dredged material disposal - Not allowed	Pending – Under current Coos County Remand proceeding. REM-19-001
Channel Dredge Area 1	59-CA	Not allowed	Not allowed	Pending - Coos County Land use Hearing date: March 8, 2019 AM-18-011/RZ-18-007/HBCU-18-003
Channel Dredge Area 2	2-NA	Not allowed	Not allowed	Pending – Coos County Land use Hearing date: March 8, 2019 AM-18-011/RZ-18-007/HBCU-

				18-003
Channel Dredge Area 3	3-DA	Allowed subject to Administrative Conditional Use – Special Conditions and General Conditions	Allowed subject to Administrative Conditional Use – Special Conditions and General Conditions	Pending – Coos County Land use Hearing date: March 8, 2019 AM-18-011/RZ-18-007/HBCU-18-003
Channel Dredge Area 4	52-NA	New dredging shall be allowed only to dredge a small channel on the north side of the proposed airport fill as necessary to maintain tidal currents. In addition, this activity is only allowed subject to a finding that adverse impacts have been minimized (see Policy #5).	Not allowed	Pending – City of Coos Bay Application Hearing date: March 21, 2019 187-18-000153-PLNG-01
Transpacific Parkway ("TPP")/US 101 Intersection Widening	10-NA	Not allowed	Fill - Not allowed. Dredged material disposal - Not allowed.	Pending - Coos County Land use Hearing date: Feb 1, 2019. (Re Previous Land use process - Hearing Officer recommended denial.)

This means Jordan Cove will need to change the zoning (if that is even possible) in some of these Estuarine zoning districts to even be able to dredge or to place fill. Both the Coos County Planning and the City of Coos Bay are currently processing applications and in some cases setting up for additional hearings. **That is not right!!**

And how is it that Jordan Cove is even taking out land use permits for the Estuary when they are not the legal owner of the Coos Estuary?

Current Land Use Proceedings with examples of this:

- Coos County file No. **AM-18-009/RZ-18-006/HBCU-18-001** Concurrent Land Use Applications filed by the Jordan Cove Energy Project L.P. for Trans Pacific Parkway Intersection Alteration at U.S. Highway 101[26]; (***See Exhibit 20***)
  Hearing date: *February 1, 2019.*

  In 2015 the Coos County Planning had issued an Administrative approval under file No.ACU-15-21 for this same Trans Pacific Parkway Alteration and that decision was appealed under Coos County file No. AP-15-03. A hearing was held on October 9, 2015 in Coquille with comments due on Oct. 23, 2015; rebuttal comments on Oct. 30, 2015; and the Applicant Final Arguments on Nov. 6, 2015. The Hearing Officer Recommendation agreed with appellants that **fill is not an allowed use in these natural aquatic zoning districts to the North of the Transpacific Hwy** and the case sat in limbo pending awaiting a Commission Deliberation, which NEVER occurred.

- Coos County file No. **AM-18-011/RZ-18-007/HBCU-18-003** Concurrent Land Use Applications filed by the Jordan Cove Energy Project L.P. for Coos Bay Estuary Navigation Reliability Alterations [27]; (***See Exhibit 21***)
  Hearing date: *March 8, 2019*

- City of Coos Bay Application file No. **187-18-000153-PLNG-01** filed by the Jordan Cove Energy Project L.P. for Coos Bay Estuary Navigation Reliability Alteration. (***See Exhibit 22***)

The person who signed the applications **(AM-18-009; AM-18-010; and AM-18-011)** that were filed with Coos County was **Natalie Eades.** She has signed other documents as senior council for Jordan Cove/Pacific Connector, Pembina Pipeline Corporation. (***See Exhibit 23***) The person who signed the Coos Bay application (**187-18-000153-PLNG-01**) looks like **Tajvinder (Tony) S. Diocee.** He has signed other documents as Vice President, LNG Projects, Jordan Cove Energy Project, Pembina Pipeline Corporation. (***See Exhibit 24***) **These people essentially work for Pembina, a Canadian Energy Company, via JCEP.** They are signing statements with respect to the Coos Estuary that say**: *"I am the legal owner of record or an agent having consent of the legal owner of record and am authorized to obtain this zoning compliance letter so as to obtain necessary permits for development from the Department of Environmental Quality and/or the building codes agency."***

Neither Natalie Eades nor Tajvinder Diocee is a legal owner of the Coos Estuary and they do NOT have rights to obtain a zoning compliance letter or change the zoning in the Coos Estuary.

Citizens in Coos County have been trying for some 12 years now to get the natural hazard maps added to the Estuary and Coastal Shoreland zoning districts in Coos County and THAT STILL HAS NOT OCCURRED. And yet, when Jordan Cove wants to make changes to the Estuary zoning districts these

[26] AM-18-009/RZ-18-006/HBCU-18-001 - *View Nov 2, 2018 Application:* (188 pages)
http://www.co.coos.or.us/Portals/0/Planning/AM-18-009-RZ-18-006-HBCU-18-001/JCEP-TPP%20--%20Land%20Use%20Application%20to%20be%20filed%20with%20the%20Coos%20County%20Planning%20Department1.pdf

[27] AM-18-011/RZ-18-007/HBCU-18-003 : *View Nov 21, 2018 Application* (96 pages)
http://www.co.coos.or.us/Portals/0/Planning/AM-18-011-RZ-18-007-HBCU-18-003/Coos%20County%20Application%20-%20Coos%20Bay%20Estuary%20Navigation%20Reliability%20Improvements.PDF

applications are processed right away? **There needs to be some kind of investigation into these matters**. The natural hazard maps need to be added to the Coos Estuary and Shoreland zoning districts and Statewide Planning Goal #7, which prohibits the siting of hazardous facilities in identified natural hazard areas, **needs to be enforced by the State**.

Other Jordan Cove / Pacific Connector Land Use Permit Processes still in Limbo

Records are currently closed on AM-18-009 and AM-18-011 noted above while we wait for the Hearing Officer's recommendation.

- Coos County file No. AM-18-010/HBCU-18-002 (Pacific Connector Early Works HDD Route in Estuary/Coastal Shoreland/Forest/EFU Zones) – Pending – Record closed – Waiting for HO recommendation.

- City of North Bend File No. FP 2-18 And CBE 3-18 (Pipeline under Historic NB McCullough Bridge in M/H zone and Coastal Shoreland/Estuary Zone) – Pending – City Council Hearing set for July 23, 2019.

- City of Coos Bay File No.187-18-000153-PLNG-01 (Channel Navigation Alteration / Temporary Dredge Transport Pipeline in City of Coos Bay Estuary Zones) - Pending - Coos Bay Planning Deliberation set for July 23, 2019.

- City of North Bend File No. FP 4-19 & CBE 5-19 (Temporary Dredge Transport Pipeline / Temporary Dredge Offloading Facility / Permanent Bridge and Support Structures / Approval for Disposal of Dredge Materials) Pending - Initial Hearing held on May 20, 2019 – Record still open.

- Coos County File No. AP-19-002 Appeal of Coos County Planning approval of Extension Application for Blue Ridge Alternative Route under EXT-18-012. Initial BOC Order No. 14-09-062PL. Pending - Hearing held on May 31, 2019 – Record still open.

- Coos County File No. HBCU-19-003 Concurrent Land Use Applications by Jordan Cove Energy Project L.P. Various Proposals Related To Liquefied Natural Gas Terminal. This Application proposes the following new developments and activities: • A meteorological station in the 4-CS zone; • An industrial wastewater pipeline in the IND zone; • A concrete batch plant in the IND zone; • A safety, security, and emergency preparedness, management and response center in the IND zone; • A helipad in the IND zone; • Corporate and administrative offices in the IND zone; • Temporary workforce housing in the IND zone; • A wastewater treatment facility in the IND zone; • A bus depot in the IND zone; • Temporary construction laydown uses and activities in the IND, 6-WD, 3-WD, and 3- NWD zones; • A vapor barrier wall in the 6-WD zone; • A temporary barge berth in the 6-DA zone; • Shoreline stabilization within the 7-D and 6-WD zones; • Pile dike rock apron in the 5-DA zone; • Provision of primary access to the LNG Terminal in the 6-WD zone (driveway confirmation). This Application also proposes the following developments and activities that constitute modifications of uses and activities approved in the above referenced County authorization in 2016 and which, accordingly, require new land use approval: • Gas processing in the 6-WD zone; • A fire station in the 6-WD zone; • Temporary dredge transport lines in the 6-DA, 7-NA, 13B-NA, and 14-DA zones; Pending - Do not know when hearing date is yet.
http://www.co.coos.or.us/Departments/Planning/PlanningDepartment--Applications2019.aspx

- **Douglas County Pacific Connector Gas Pipeline Application Extension**. On January 23, 2019 the Pacific Connector Conditional Use Permit was nullified by Circuit Court Judge Kathleen Johnson who reversed the county's prior decisions to extend a conditional use permit for the pipeline proposed to be built on a 7-mile stretch in Douglas Counties Coastal Zone.

- **Conditions of Approval on several other land use permit applications that have been processed have yet to be completed or met so at the present time the Jordan Cove/Pacific Connector Project does NOT have final approved land use permits in the Coastal Zone.**

Any changes to the Coos Bay Estuary Management Plan (CBEMP) zoning districts or any impacts to the zoning districts must be in compliance with the other resource preservation and protection policies established elsewhere in the CBEMP. You cannot just pick and chose the sections you want to follow while ignoring everything else. That is not how the Plan is to be followed. The Resource productivity of the Coos Bay estuary must be maintained as established by Statewide Planning Goals 16, 17 and 18. Jordan Cove's proposed map amendment cannot throw out the resource protection requirements and other process requirements spelled out in the Goals. The CBEMP Policy 5 has requirements that specifically state they **must be met before any exceptions to the Plan or Goals are allowed**.

CBEMP 3.2 POLICY DEFINITIONS:

DREDGED MATERIAL DISPOSAL:

The deposition of dredged material in aquatic or upland areas. Methods of disposal include in-water disposal, beach and land disposal, and ocean disposal. In-Water Disposal is the deposition or dredged materials in a body of water. Ocean Disposal is the deposition or dredged materials in the ocean. Beach Disposal is the deposition of dredged materials in beachfront areas west of the foredunes. Land Disposal is the deposition of dredged materials landward of the line of non-aquatic vegetation, in "upland" areas.

DREDGING:

The removal of sediment or other material from a stream, river, estuary or other aquatic area. Maintenance Dredging refers to dredging necessary to maintain functional depths in maintained channels, or adjacent to existing docks and related facilities; New Dredging refers to deepening either an existing authorized navigation channel or deepening a natural channel, or to create a marina or other dock facilities; Dredging to Maintain Dikes and Tide gates refers to dredging necessary to provide material for existing dikes and tide gates; Minor Dredging refers to small amounts of removal as necessary, for instance, for a boat ramp. Minor dredging may exceed 50 cubic yards, and therefore, require a permit.

CBEMP Policy 5 Estuarine Fill and Removal

I. Local government shall support dredge and/or fill ***only if such activities are allowed in the respective management unit, and****:*

a. The activity is required for navigation or other water-dependent use that require an estuarine location or in the case of fills for non-water-dependent uses, ***is needed for a public use and would satisfy a public need that outweighs harm to navigation, fishing***

***and recreation**, as per ORS 541.625(4)[28] and an exception has been taken in this Plan to allow such fill;*
*b. **A need (ie., a substantial public benefit) is demonstrated and the use or alteration does not unreasonably interfere with public trust rights**;*
c. No feasible alternative upland locations exist; and
*d. **Adverse impacts are minimized.***
e. Effects may be mitigated by creation, restoration or enhancement of another area to ensure that the integrity of the estuarine ecosystem is maintained;
f. The activity is consistent with the objectives of the Estuarine Resources Goal and with other requirements of state and federal law, specifically the conditions in ORS 541.615[29] and Section 404 of the Federal Water Pollution Control Act (P.L.92-500). (Emphasis added)

II. Other uses and activities which could alter the estuary shall only be allowed if the requirements in (b), (c), and (d) are met.

Identification and minimization of adverse impacts as required in "d" above shall follow the procedure set forth in Policy #4. (Emphasis added)

As required by Goal #16, only dredging necessary for on-site maintenance of existing functional tidegates, associated drainage channels and bridge crossing support structures is permitted in Natural and Conservation Management Units (applies to 11-NA,18A-CA, 20-CA, 30-CA, 31-NA and 38-CA). Dredging necessary for the installation of new bridge crossing support structures is permitted in Conservation Management Units and may be allowed in Natural Management Units where consistent with the resource capabilities of the area and the purposes of the management unit.

In the Conservation Management Unit, new dredging for boat ramps and marinas, aquaculture requiring dredge or fill or other alteration of the estuary, and dredging necessary for mineral extraction may be allowed where consistent with the resource capabilities of the area and the purposes of the management unit.

*This strategy shall be implemented by the preparation of findings by local government documenting that such proposed actions are consistent with the Comprehensive Plan, and with the above criteria "a", "b", "c", "d", "e" and "f"; **however, where goal exceptions are included within this Plan, the findings in the exception shall be sufficient to satisfy above criteria "a" through "d"**. Identification and minimization of adverse impacts as required in "e" above **shall follow the procedure set forth in Policy #4a**. The findings shall be developed in response to a "request for comment" by the Division of State Lands (DSL), which shall seek local government's determination regarding the appropriateness of a permit to allow the proposed action.*

*"Significant" as used in "other significant reduction or degradation of natural estuarine values", shall be determined by: a) **the U.S. Army Corps of Engineers through its Section***

[28] ORS 541.625 [1967 c.567 §5; 1969 c.593 §49; 1971 c.754 §5; 1973 c.330 §3; 1973 c.674 §6; 1977 c.417 §1; 1979 c.200 §1; 1979 c.564 §3a; 1981 c.796 §1; 1987 c.70 §1; 1989 c.837 §16; 1989 c.904 §70; renumbered 196.695 and then 196.825 in 1989]
[29] ORS 541.615 [1967 c.567 §3; 1971 c.754 §3; 1989 c.837 §15; renumbered 196.680 and then 196.810 in 1989]

> ***10.404 permit processes****; or b) the Department of Environmental Quality (DEQ) for approvals of new aquatic log storage areas only; or c) the Department of Fish and Wildlife (ODFW) for new aquaculture proposals only.* (Emphasis added)
>
> ***This strategy recognizes that Goal #16 limits dredging, fill and other estuarine degradation in order to protect the integrity of the estuary.*** (Emphasis added)

A need (ie., a substantial public benefit) has not been demonstrated by the applicant. The project would unreasonably interfere with navigation, fishing and public recreation and would therefore not be in compliance with CBEMP Policy 5(I)(b). This requirement must be met **before an exception to the goals is allowed**. Jordan Cove's proposed use/activity is not consistent with the resource capabilities of the management segment and no assessment of impacts required by CBEMP Policy #4 has been done. CBEMP Policy 5 is an important CBEMP Policy that applies to **all Estuarine Fill and Removal**. Policy 5 requires that "a need (ie., a substantial public benefit) is demonstrated and the use or alteration does not unreasonably interfere with public trust rights." Policy 5 also requires that a determination be made that proves: d. Adverse impacts are minimized. **These requirements must be demonstrated before an exception is allowed**. **(OAR 660-004-0022)**

The applicant seems to think that all they need for an exception is the testimony of a Coos Bay Bar Pilot saying the channel modifications would improve shipping. At a recent public meeting that occurred on March 21, 2019, in Coos Bay, Captain George Wales from the Coos Bay Pilots Association made the statement that there are roughly 5 vessel calls per month on the Port of Coos Bay. The Port of Coos Bay's Annual Report for 2017 indicates around there were around 8 calls in 2017.[30] The real reason for the current request is spelled out in Captain Wales' letter filed by the applicant in with their Coos Bay application under Coos Bay File No.187-18-000153-PLNG-01 and their Coos County Application under File No. AM-18-011 in which he states, "*The Pilots believe the proposed NRI's are essential for achieving the* ***required number of LNG vessel transits needed*** *to lift the JCEP design annual LNG production volume. JCEP has informed the Pilots that excessive delays in LNG Carrier transits to and from the LNG terminal could result in a shore storage tank topping situation…*" (Emphasis added) The Planning Staff Report states on page 2, *"[t]his dredging will allow for vessel transit under a broader weather window* ***to enable JCEP to export the full capacity*** *from JCEP's liquefied natural gas ("LNG") terminal on the nearby North Spit*." (Emphasis added) So this is **ALL about what is best for Jordan Cove and not what is best for other users or uses of the Coos Bay Estuary**. Jordan Cove has agreements with the Roseburg Forest Products Company to use some of their property on the North Spit for an undisclosed amount of $$. It must be considerable considering the extreme hazards the LNG project presents to this chip facility and their 17 or so employees.[31] On the other hand a 2008 study by the Oregon State Marine Board (OSMB), found that recreational boaters in Coos Bay took a total of 31,560 boat trips the previous year. Nearly 90 percent of the boat use days involved fishing. In a March 2016 KCBY news article, Richard Dybevik, with Roseburg Forest Products Company, stated that the lower bay is always crowded with boats during the summer and that he has counted as many as 100 boats in that area at one time.[32] (***See Exhibit 42***) **The negative impacts to fishing, crabbing and shellfish habitat would be a significant impact on all those boat users and the fishing industry as a whole.**

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[30] Oregon International Port of Coos Bay Annual Report 2018 – Maritime https://www.oipcbannualreport18.com/maritime
[31] https://theworldlink.com/news/local/who-pays-the-most/article_37797b7c-4711-5608-869b-19dc0ee4e389.html
[32] *After a year of planning, Coos Bay has new marine patrol boat dock;* by KCBY; Wednesday, March 16th 2016 https://kcby.com/news/local/after-a-year-of-planning-coos-bay-has-new-marine-patrol-boat-dock

CBEMP Policy #5a Temporary Alterations

I. Local governments shall support as consistent with the Plan:

(a) temporary alterations to the estuary, in Natural and Conservation Management Units ***provided it is consistent with the resource capabilities of the management units****. Management unit in Development Management Units temporary alterations which are defined in the definition section of the plan are allowed provided they are consistent with purpose of the Development Management Unit.*

b) alterations necessary for federally authorized Corps of Engineers projects, such as access to dredge material disposal sites by barge or pipeline or staging areas, or dredging for jetty maintenance.

II. Further, the ***actions specified above shall only be allowed provided that****:*

a. ***The temporary alteration is consistent with the resource capabilities of the area (see Policy #4)****;*

b. ***Findings satisfying the impact minimization criterion of Policy #5 are made for actions involving dredge, fill or other significant temporary reduction or degradation of estuarine values****;*

c. The affected area is restored to its previous condition by removal of the fill or other structures, or by filling of dredged areas (passive restoration may be used for dredged areas, if this is shown to be effective); and

d. The maximum duration of the temporary alteration is three years, subject to annual permit renewal, and restoration measures are undertaken at the completion of the project within the life of the permit.

Mitigation shall not be required by this Plan for such temporary alterations.

This Policy shall be implemented through the administrative conditional use process and through local review and comment on state and federal permit applications.

This Policy is based on the recognition that temporary estuarine fill and habitat alterations are frequently legitimate actions when in conjunction with jetty repair and other important economic activities. It is not uncommon for projects to need staging areas and access that require temporary alteration to habitat that is otherwise protected by this Plan.

CBEMP Policy #8 Estuarine Mitigation Requirements

Local government recognizes that mitigation shall be required when estuarine dredge or fill activities are permitted in inter-tidal or tidal marsh areas*. The effects shall be mitigated by creation, restoration or enhancement of another area to ensure that the integrity of the estuarine ecosystem is maintained as required by ORS 196.830 (renumbered in 1989). However, mitigation shall not be required for projects which the Division of State Lands determined met the criteria of ORS 196.830(3).* (Emphasis added)

This strategy shall be implemented through procedures established by the Division of State Lands, and as consistent with ORS 196.830 and other mitigation/restoration policies set forth in this Plan.

This strategy recognizes the authority of the Director of the Division of State Lands in administering the statutes regarding mitigation.

CBEMP Policy #11 Authority of Other Agencies

Local government shall recognize the authority of the following agencies and their programs for managing land and water resources:
~ The Oregon Forest Practices Act and Administrative Rules for forest lands as defined in ORS 527.620(1991) to 527.730 and Forest Lands Goal;
~ The nonpoint source discharge water quality program administered by the Department of Environmental Quality (DEQ) under Section 208 of the Federal Water Quality Act as amended in 1972 (PL 92-500);
~ The Fill and Removal Permit Program administered by the Division of State Lands (DSL) under ORS 196.800-196.880 (renumbered 1989); and
~ The programs of the State Soil and Water Conservation Commission and local districts and the Soil Conservation Service and the Agricultural Lands Goal.

***This strategy recognizes there are several agencies with authority over coastal waters, and that their management programs should be used rather than developing new or duplicate management techniques or controls**, especially as related to existing programs functioning to maintain water quality and minimize man-induced sedimentation.*

***This strategy shall be implemented through the permit coordination with ODFW and the Army Corps of engineers prior to County sign-off on permits**.*

CBEMP Policy #14 General Policy on Uses within Rural Coastal Shorelands

1. Coos County shall manage its rural areas within the "Coos Bay Coastal Shorelands Boundary" by allowing only the following uses in rural shoreland areas, as prescribed in the management units of this Plan, except for areas where mandatory protection is prescribed by LCDC Goal #17 and CBEMP Policies #17 and #18:

* * * *

*e. Water-dependent commercial and industrial uses, water-related uses, and other uses **only upon a finding by the Board of Commissioners or its designee that such uses satisfy a need which cannot be accommodated on uplands or shorelands in urban and urbanizable areas or in rural areas built upon or irrevocably committed to non-resource use**.* (Emphasis added)

* * * *

*g. Any other uses, including non-farm uses and non-forest uses, provided that the Board of Commissioners or its designee determines that such uses satisfy a need which cannot be accommodated at other upland locations or in urban or urbanizable areas. **In addition, the above uses shall only be permitted upon a finding that such uses do not otherwise conflict with the resource preservation and protection policies established elsewhere in this Plan**.* (Emphasis added)

***This strategy recognizes (1) that Coos County's rural shorelands are a valuable resource and accordingly merit special consideration,** and (2) that LCDC Goal #17 places strict limitations on land divisions within coastal shorelands. This strategy further recognizes that rural uses*

"athrough "g" above, are allowed ***because of need and consistency findings documented in the "factual base" that supports this Plan.*** (Emphasis added)

Policy 14 requirements clearly link it to other CBEMP Policies and require compliance so there is no conflict with the preservation and protection of estuary resources. This clearly links Policy 14 to CBEMP Policy 5 along and other CBEMP Policies and also requires that alternatives that would not impact the high value Coastal Shoreland areas of the Coos Estuary are considered.

CBEMP Policy #16 Protection of Sites Suitable for Water-Dependent Uses and Special Allowance for new Non-Water-Dependent Uses in "Urban Water-Dependent (UW) Units"

Local government shall protect shorelands in the following areas that are suitable for waterdependent uses, for water-dependent commercial, recreational and industrial uses.

a. Urban or urbanizable areas;

b. Rural areas built upon or irrevocably committed to non-resource use; and

c. Any unincorporated community subject to OAR Chapter 660, Division 022 (Unincorporated Communities).

This strategy is implemented through the Estuary Plan, which provides for water-dependent uses within areas that are designated as Urban Water-Dependent (UW) management units

* * * *

II. Suitability. The shoreland area within the estuary designated to provide the minimum amount of protected shorelands shall be suitable for water-dependent uses. At a minimum such water-dependent shoreland areas shall possess, or be capable of possessing, structures or facilities that provide water-dependent uses ***with physical access to the adjacent coastal water body****. The designation of such areas shall comply with applicable Statewide Planning Goals.* (Emphasis added)

* * * *

This policy shall be implemented through provisions in ordinance measures that require an administrative conditional use application be filed and approved, and the above findings be made prior to the establishing of the proposed uses or activities.

CBEMP Policy #17 Protection of "Major Marshes" and "Significant Wildlife Habitat" in Coastal Shorelands

Local governments shall protect from development, major marshes and significant wildlife habitat, coastal headlands, and exceptional aesthetic resources located within the Coos Bay Coastal Shorelands Boundary, except where exceptions allow otherwise.

I. ***Local government shall protect****:*

a. "Major marshes" to include areas identified in the Goal #17, "Linkage Matrix", and the Shoreland Values Inventory map; and

b. "Significant wildlife habitats" to include those areas identified on the "Shoreland Values Inventory" map; and

c. "Coastal headlands"; and

*d. "****Exceptional aesthetic resources" where the quality is primarily derived from or related to the association with coastal water areas****.* (Emphasis added)

II. This strategy shall be implemented through:

a. Plan designations, and use and activity matrices set forth elsewhere in this Plan that

limit uses in these special areas to those that are consistent with protection of natural values; and
b. Through use of the Special Considerations Map, which identified such special areas and restricts uses and activities therein to uses that are consistent with the protection of natural values. Such uses may include propagation and selective harvesting of forest products consistent with the Oregon Forest Practices Act, grazing, harvesting wild crops, and low-intensity water-dependent recreation.
c. Contacting Oregon Department of Fish and Wildlife for review and comment on the proposed development within the area of the 5b or 5c bird sites.

This strategy recognizes that special protective consideration must be given to key resources in coastal shorelands over and above the protection afforded such resources elsewhere in this Plan.

CBEMP Policy #20a. Dredged Material Disposal Guidelines:

***Future dredged material disposal should be carried out in accordance with the guidelines outlined in Volume II, Part I, Section 6.2 of the Plan, which relate to: drainage diversion, sediment quality and turbidity, timing of disposal, land surface use, revegetation, toxic materials, land use outfalls and influent discharge points, water quality and removal of material from approved upland sites**. Future land use shall be governed by the uses/activities permitted and the Management Objective in that management unit. Additional guidelines contained in the "Special Considerations" section of the individual site fieldsheets (see Inventory and Factual Base, Volume II, Part 2, Section 7, Appendix 'A') provide site-specific information on the procedures that should be followed.*

These guidelines are intended to indicate the type of conditions that federal and state agencies are likely to impose on dredged material disposal permits, which shall be the primary means of implementation. Local government shall implement this policy by review and comment on permit applications.
* * * *
(Emphasis added)

CBEMP Policy #20c Intertidal Dredged Material Disposal

Local government shall prohibit dredged material disposal in intertidal or tidal marsh areas except where such disposal is part of an approved fill project.
***This strategy shall be implemented through operation of the waterway permit process as a response to a "request for comment" from the Division of State Lands and U. S. Army Corps of Engineers**.*

This strategy recognizes that upland disposal and ocean disposal are alternatives to intertidal disposal.
(Emphasis added)

CBEMP Policy #23 Riparian Vegetation and Streambank Protection

I. ***Local government shall strive to maintain riparian vegetation within the shorelands of the estuary, and when appropriate, restore or enhance it****, as consistent with water-dependent uses. Local government shall also encourage use of tax incentives to encourage maintenance of riparian vegetation, pursuant to ORS 308.792 - 308.803.* (Emphasis added)
Appropriate provisions for riparian vegetation are set forth in the CCZLDO Section 3.2.180 (OR 92-05-009PL). (Emphasis added)

II. Local government shall encourage streambank stabilization for the purpose of controlling streambank erosion along the estuary, subject to other policies concerning structural and non-structural stabilization measures.

This strategy shall be implemented by ***Oregon Department of Transportation (ODOT****) and local government where erosion threatens roads. Otherwise, individual landowners in cooperation with the* ***Oregon International Port of Coos Bay****, and* ***Coos Soil and Water Conservation District, Watershed Councils, Division of State Lands and Oregon Department of Fish & Wildlife*** *shall be responsible for bank protection.*

This strategy recognizes that the banks of the estuary, particularly the Coos and Millicoma Rivers are susceptible to erosion and have threatened valuable farm land, roads and other structures.

CBEMP Policy #27 Floodplain Protection within Coastal Shorelands

The respective flood regulations of local government set forth requirements for uses and activities in identified flood areas; these shall be recognized as implementing ordinances of this Plan.

This strategy recognizes ***the potential for property damage that could result from flooding of the estuary****.* (Emphasis added)

CBEMP Policy #47 Environmental Quality

The Coos Bay Estuary Management Plan and Implementing Ordinance ***shall comply with the Department of Environmental Quality (DEQ) regulations regarding air, water quality and noise source standards that are established as law****.* (Emphasis added)

Various other CBEMP polices must also be followed including CBEMP Policies 4, 4a, 7, 18, 19, 33, 22b, 24, 48, 50, among several others.

There is no American public benefit to the loss of fish, marine and wildlife habitat due to the destructive nature of all the proposed dredging for the Jordan Cove / Pacific Connector Project. The Pacific Connector Pipeline's construction is projected to impact 485 wetlands and waterbodies in Southern Oregon, many of which are salmon bearing.

The Coos Bay Estuary is already 303D limited and this project will only make that situation worse. We can look to what has happened at other LNG projects with respect to channel dredging and see that **even though the LNG industry promises there would be no negative impacts, promises and what actually happens does not always end up being the same**. (***See Exhibit 14***) Our fishing industry has ALREADY been negatively impacted and is in need or renewal, not more degradation. (***See Exhibit 15)*** Jordan Cove expects us to believe that there would be no negative impacts with sedimentation or turbidity from all their proposed dredging. Our sedimentation expert actually proved their expert to be wrong on this issue during the land use process under Coos County File No. REM 10-01 for HBCU-10-01. (***See Exhibit 29)***

In order to protect the integrity of the Estuary, Policy 5 requirements must be adhered to and marine habitat in the estuary protected. This is even a requirement in **DDNC-DA** zoning district for which the **applicant is not seeking a goal exception for**. The strong tidal currents in the Coos Estuary have the ability to transfer sediments a great distance**. No contaminated soils or fill should be suspended in the estuary.** The applicant should be made to test the tidal muds and mitigate for any damage that may be done. In addition, evacuation measures in the event of an earthquake and/or tsunami event off our coastline should also be taken into account as a part of permit requirements in order to fulfill the Comprehensive Plan's purpose of protecting the public health, safety, convenience and general welfare of local citizens.

In 2010, Clausen Oyster Company was hit with a $25,000 fine from the Oregon Department of Environmental Quality for wastewater violations. Clausen maintained that no oyster meat was entering the wash water - just mud that it was washing off the oyster that had just been taken out of the bay. "The mud comes out of the bay; it goes back in the bay," said Lilli Clausen. (***See Exhibit 33***) Despite the fact that the mud had just come out of the bay it was still considered a Clean Water Act violation.

The same scrutiny and oversight should be imposed with respect to the Jordan Cove Project and their proposed placement of fill and/or sedimentation in Waters of the State due to the negative impacts those sediments could have on fishing and recreation.

This should be of particular concern due to the fact that Jordan Cove has ALREADY been sited by the DEQ for violations with respect to their Project for work they were doing on May 8, 2014, at the Jordan Cove Ingram Yard site (***See Exhibit*** 68)

NEGATIVE IMPACTS ON NAVIGATION

The Coast Guard's July 1, 2008, Water Suitability Assessment (WSA) Report for the Jordan Cove project states on page 1 "*that Coos Bay is **not currently suitable**, but could be made suitable for the type and frequency of LNG marine traffic associated with this proposed project*." [33] (Emphasis added) Coast Guard mitigation measures include **limiting the LNG carrier to the physical dimensions of a 148,000 m3 class vessel**. The ship dimension used in the study reflected an overall length of 950 feet and a beam of 150 feet with a loaded **draft of 40 feet**. [34] (***See Exhibit 30***)

[33] Coast Guard WSA for Jordan Cove LNG project, July 2008: https://homeport.uscg.mil/Lists/Content/Attachments/1008/WSRscan.pdf
[34] https://homeport.uscg.mil/Lists/Content/DispForm.aspx?ID=1008

Jordan Cove's updated Resource Report #1 filed with the FERC on November 16, 2018 [35] states on page 41 (electronic page 82):

> *The waterway for LNG vessel marine traffic would traverse 7.5 miles of the existing Federal Navigation Channel within Coos Bay. The Federal Navigation Channel is zoned "Deep-Draft Navigation Channel" in the CBEMP.* ***The Federal Navigation Channel, which is generally 300 feet wide and 37 feet deep****, is maintained by the USACE on behalf of the Port. It is used by deep-draft commercial ships and barges, a commercial fishing fleet, and recreational boats*. (Emphasis added)

JCEP Nov 16, 2018 Update Resource Report #1 pages 25 to 26:

> *The Project's plans for the LNG carriers calling on the LNG Terminal and their transit route in Coos Bay, as described below, are primarily within the jurisdiction of the USCG. Because the USCG has authorized carriers of approximately 950 feet length, 150 feet beam, and loaded draft of 40 feet (nominal 148,000 m^3)[2] as the size of LNG carrier, the LNG Terminal could generate a maximum of 120 LNG carrier calls per year, although the average is expected to be between 110 and 120 LNG carriers per year. The actual number of LNG carriers per year will be dependent on the capacity of the LNG carriers calling on the LNG Terminal and the actual output production of the LNG Terminal. The LNG loading berth is designed so that it could accommodate LNG carriers up to 217,000 m^3 if larger-sized carriers were to be authorized by the USCG in the future, resulting in a reduced number of LNG carrier calls each year*

JCEP Nov 16, 2018 Update Resource Report #1 page 36:

> *The LNG Terminal would be located on the bay side of the North Spit, about 7.5 miles up the existing Federal Navigation Channel,* ***approximately 1,000 feet north of the city limit of North Bend****, in Coos County, Oregon*

Page 2 of the Coast Guard WSA states that "*the channel* ***must demonstrate sufficient adequacy to receive LNG carriers for any single dimension listed***." (Emphasis added) As noted above the Coos Bay is only dredged to 37 feet currently. LNG ships would transit the bay during high slack tides, the same tides used by the fishing fleet.

On May 10, 2018 the U.S. Coast Guard ignored FAA Presumed Hazard determinations for LNG tanker ships in the Coos Bay Estuary and many other channel hazard concerns including those listed in their 2008 WSA, and blindly issued a Letter of Recommendation (LOR) that stated the Coos Bay was now suitable for LNG traffic.[36] (?) If that is the case why is Jordan Cove currently proposing modifications to the Coos Bay channel? The May 2018 LOR included in with it the July 2008 WSA which clearly states that the Coos Bay waterway is "not" suitable, so the entire document kind of contradicts itself.

[35] https://elibrary.ferc.gov/idmws/file_list.asp?accession_num=20181116-5198
[36] https://content.govdelivery.com/accounts/USDHSCG/bulletins/1ef91ba

LNG VESSEL TRANSITS AND CHANNEL DEPTHS NOT COMPATABLE

Jordan Cove's Ship Simulation Study modeled its LNG carrier dimensions at 950 feet long, 150 feet at the beam, with a loaded draft of 40 feet deep, and a capacity of 148,000 m3.[37] **LNG ships with a 40 foot draft would transit the Coos Bay Navigation Channel that is dredged only 300 feet in width and 37 feet in depth.** (JCEP Rev RR#1) LNG vessels would be arriving and leaving at high tide (WSA page 3).

On February 13, 2015, Jordan Cove uploaded into the FERC library their 2008 Report "*148,000 m3 Class LNG Carrier Transit and Maneuvering Simulations March 17-20, 2008*" by Moffatt & Nichol. This report clearly shows that the Coos Bay Navigation Channel is NOT SUFFICIENT FOR TRANSITING LNG VESSELS.

Modeling items noted upon review of the 2008 LNG Carrier study are as follows:

Electronic page 174
Run 17030801
LNG ship hits Slip Channel Entrance Cement Barrier

Electronic page 193-195
Run 17030802
Maneuvering Tugboat on the wrong side of the Slip Channel Entrance Cement Barrier
LNG ship and Maneuvering tugs very close to hitting buoy

Electronic page 212
Run 17030804
LNG Ship runs over buoy

Electronic page 242-243
Run 18030802
Maneuvering Tugboat runs over buoy

Upon review of a NOAA Channel map of the Coos Bay - 70th Edition – Oct 2005 # 18587, channel depths vary greatly and do not always remain at the dredging depth of 37 feet. Please note photo taken of one section of the map below.

//

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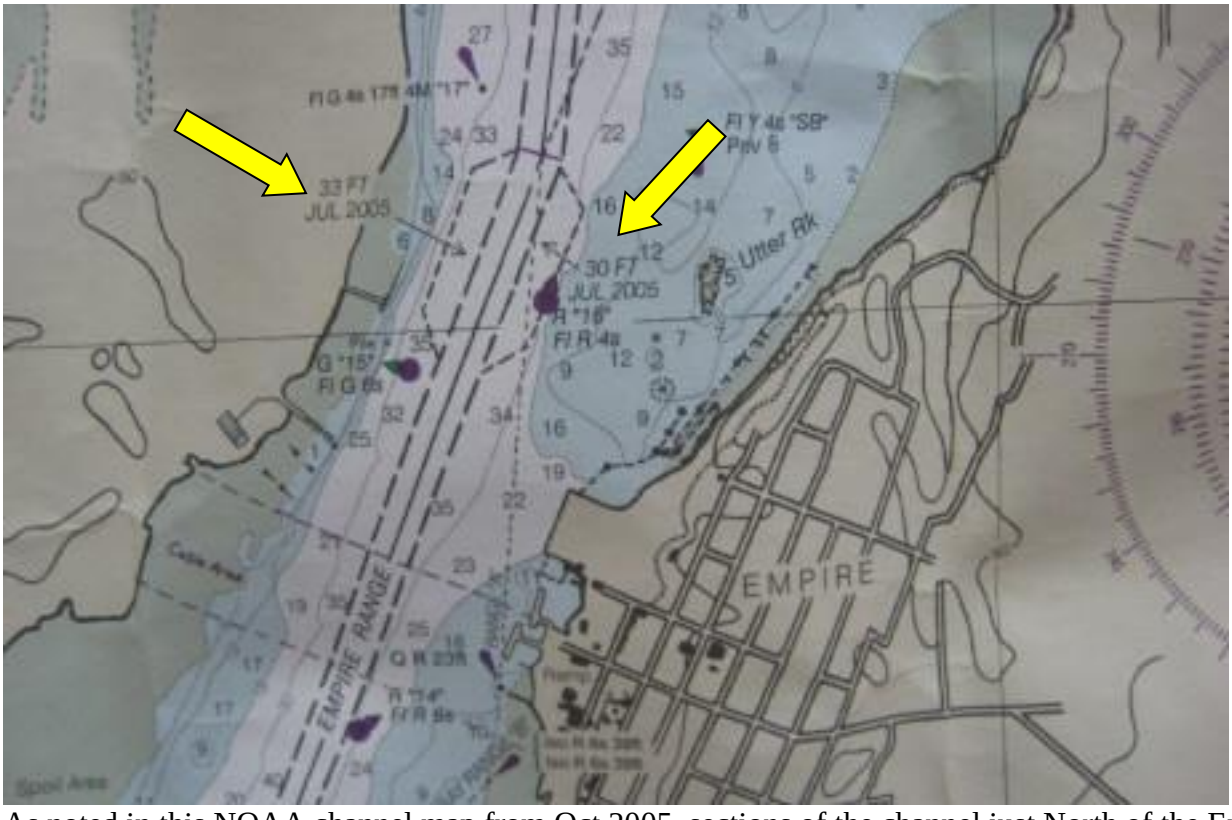
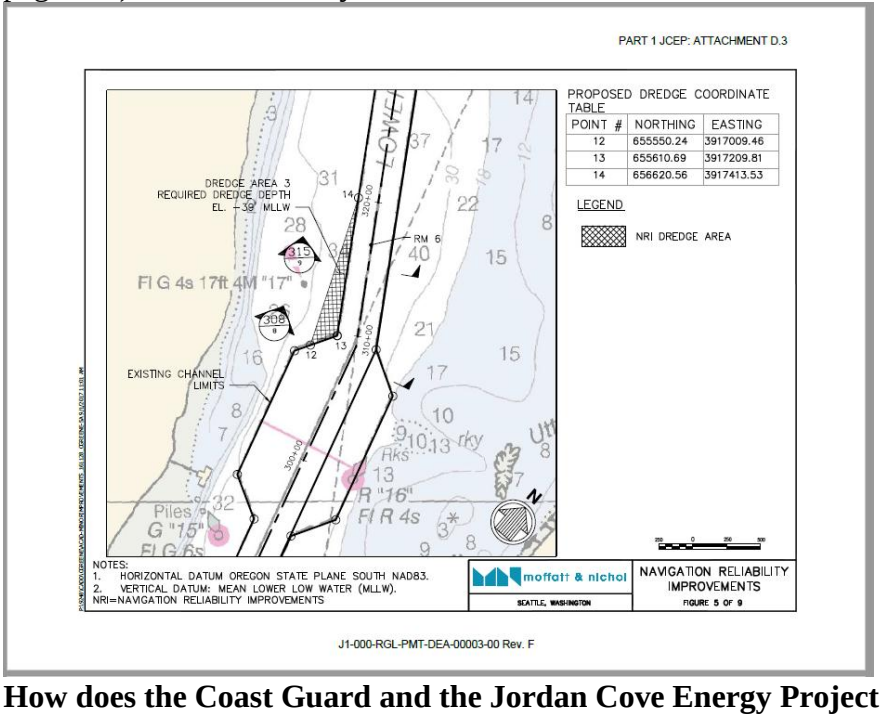
[37] 2-13-2015 filing with FERC by JCEP Re- USACE Permit Application of Jordan Cove Energy Project, L.P. under CP13-483. includes 2008 Report "*148,000 m3 Class LNG Carrier Transit and Maneuvering Simulations March 17-20, 2008*" by Moffatt & Nichol http://elibrary.FERC.gov/idmws/file_list.asp?accession_num=20150213-5115



As noted in this NOAA channel map from Oct 2005, sections of the channel just North of the Empire Community were shown to be at 30 feet and 33 feet in July of 2005.

Below Jordan Cove proposed dredge area #3 site in this same area (JCEP DSL application electronic page 436) shows **Coos Bay shallow channel issues would not totally be alleviated**

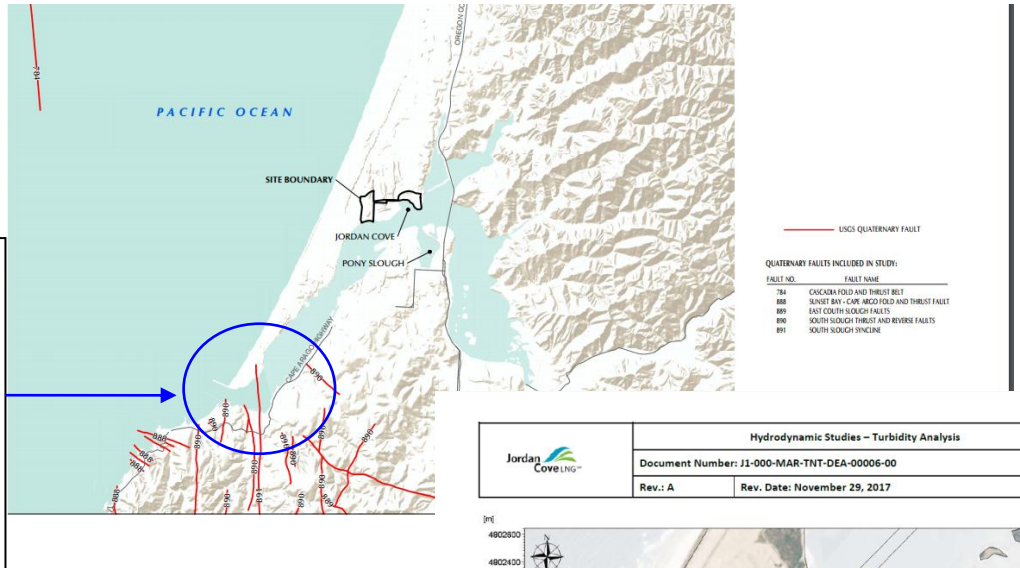


How does the Coast Guard and the Jordan Cove Energy Project plan to account for these issues in regard to JCEP's transiting LNG Carriers, which are designed to have a 40-foot draft? Even transiting at high slack tide this does not appear to be a sufficient clearance.

The Guano Rock formation found at the Coos Bay Harbor entrance would make it difficult for LNG tanker traffic and/or any efforts to widen and deepen the channel. Attempts to blast the rock would have dire consequences on water quality and marine life in the area and could very well bring on an earthquake or at least impact the earthquake fault that runs diagonally through the Bay in this same area. This was not considered in Jordan Cove's application.

Page 130 of Jordan Cove's 1-12-2016 submittal into the Coos County file No. HBCU-15-05 land use proceeding was from their GRI report and shows the following Earthquake Faults that were included in their study with respect to the LNG terminal only:

Note the location of this earthquake fault and compare it to the location of Jordan Cove's proposed channel dredging project below which is extremely close to this fault.



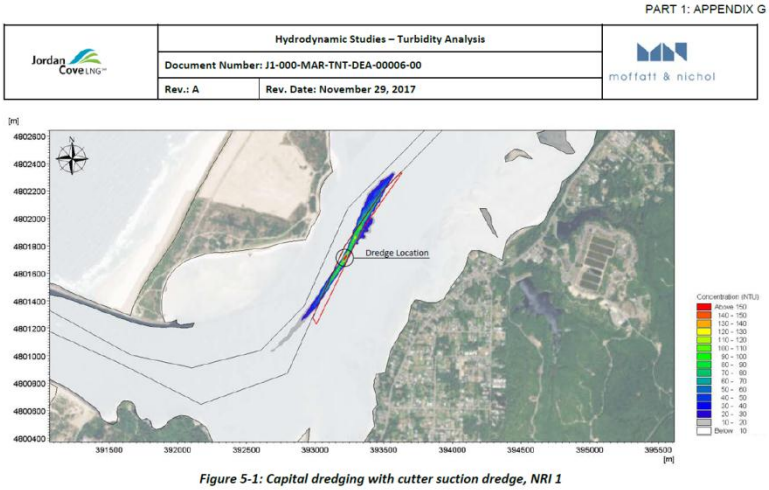
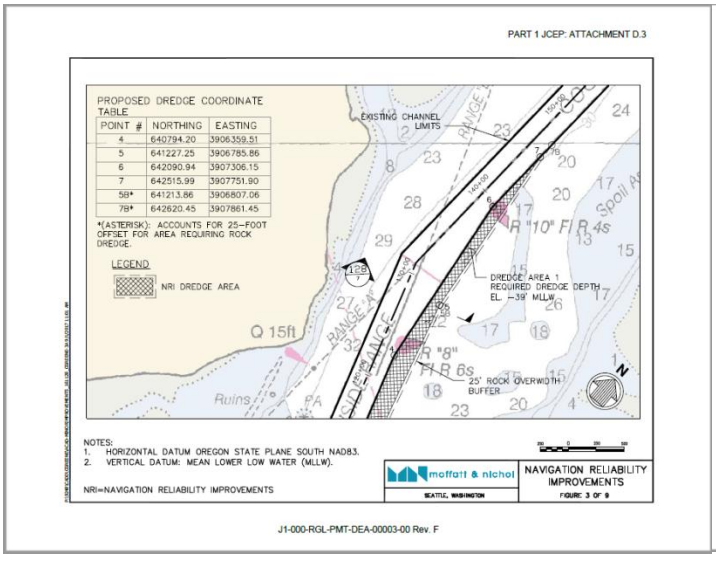
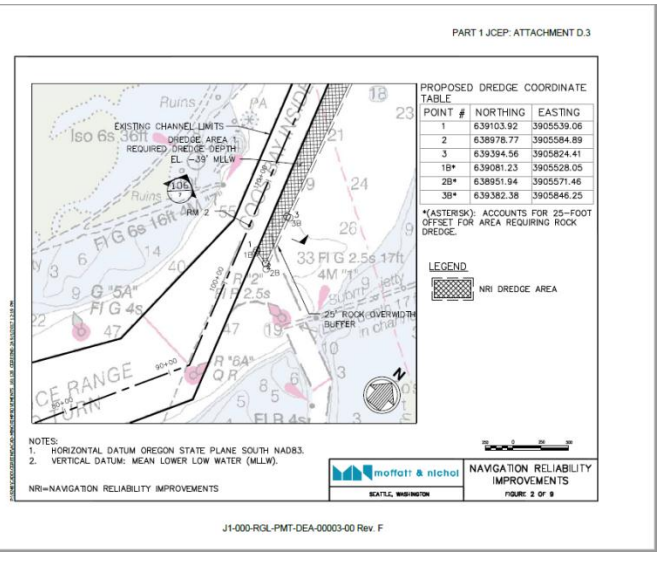
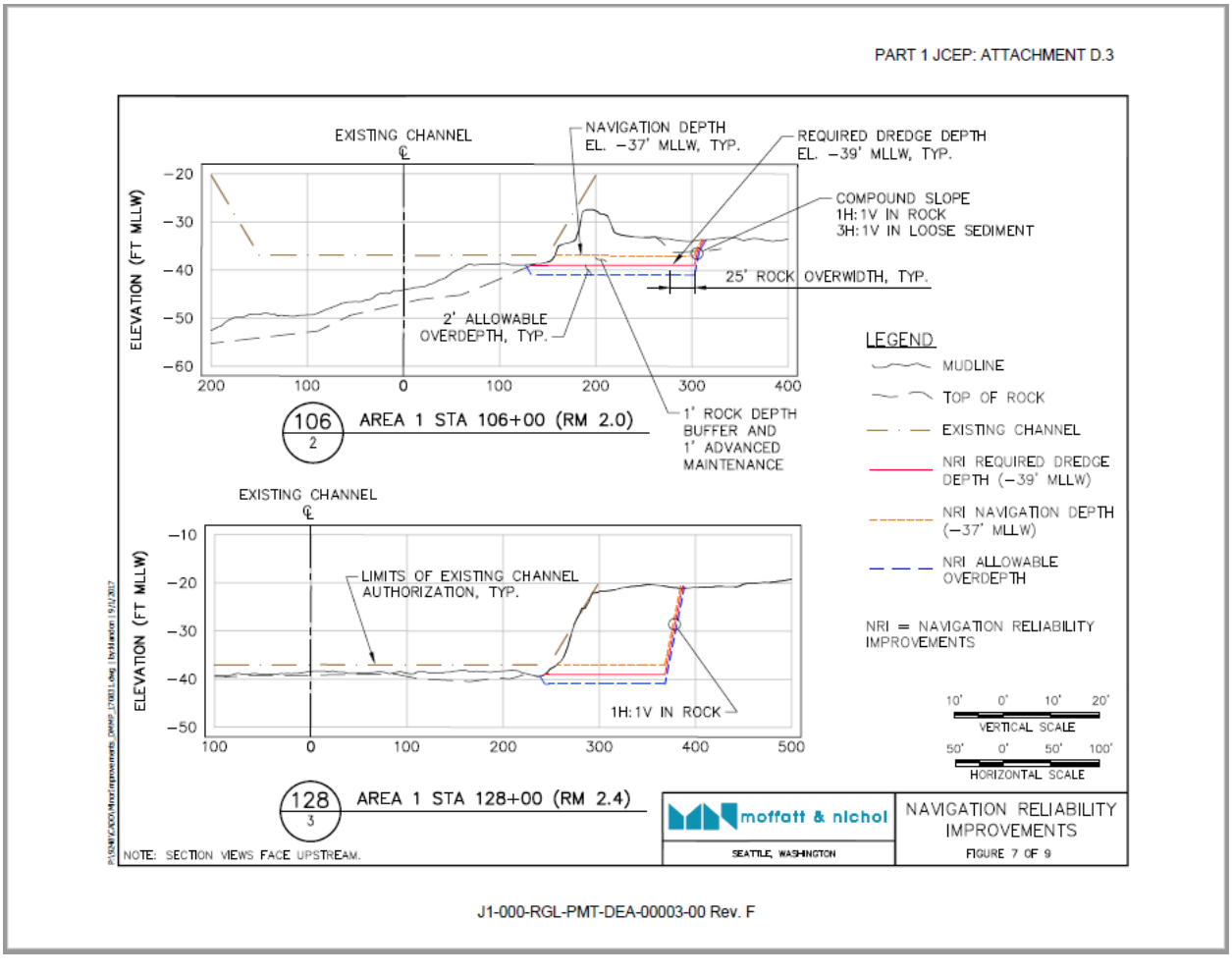


Figure 5-1: Capital dredging with cutter suction dredge, NRI 1

Jordan Cove's proposed dredge area #1 will inv
See diagrams below from DSL application electronic pages 433,434 and 438.







The Jordan Cove GRI study did not include negative impacts from the earthquake fault line or on habitat from all the blasting that would be required for proposed dredging in area #1.

At the Port Harbor Safety meeting held on January 15, 2019, Jordan Cove's consultant told everyone that the LNG ships would only have to transit during high slack tide when they were outgoing. Incoming LNG ships would be able to transit the channel at any time.

Despite Jordan Cove's recently refiled Resource Report #1 stating that the LNG ships would have an approximate loaded draft of 40 feet, Jordan Cove's consultant assured us that the ships had only a 37 foot draft at the Jan 15th Harbor Safety meeting. It wasn't clear how a 37 foot drafted ship could transit a 37 foot dredged channel, but even if Jordan Cove is allowed to dredge the channel down to 39 feet, by stating that this is a "required dredge depth" for a 37 foot navigational channel, **that still does not give enough clearance allowance**.

Criteria for the Depths of Dredged Navigational Channels Dec 12, 1983
https://apps.dtic.mil/dtic/tr/fulltext/u2/a135628.pdf

> Rules of Thumb The criteria used by the U.S. Army Corps of Engineers are empirical--rules of thumb. For design depth, or underkeel clearance, the rule is to select the design ship, add its draft + squat* (3 ft) + rolling and pitching allowance (estimate) + clearance (2 ft for soft channel bottoms; 3 ft for rocky or hard bottoms). The Corps' criteria recommend model tests and site evaluations.

The Feb 2018 Coos Bay Harbor Safety Plan[38] on electronic page 62 it states the following:

> *Guidelines for Under Keel Clearance in Coos Bays is on average 10% and is established by each vessel in consultation with the pilots.*

Ten percent of a 37 foot drafted ship would be 3.7 feet and of a 40 foot drafted ship would be 4 feet. **There is NOT enough clearance in the Coos Bay for safe passage of LNG tankerships even with Jordan Cove's proposed navigation improvements.**

The Feb 2018 Coos Bay Harbor Safety Plan states on electronic page 17: (***See Exhibit 31***)

> **3.5 Anchorage**
> * * * *
> *Due to the rapid and severe onset of weather from the North Pacific Ocean,* ***anchorage in the ocean outside of Coos Bay is reported not safe and is dangerous during the winter months****. Like all unprotected areas along the Oregon coast, large swells and heavy winds characterize the area during the winter. These conditions can suddenly and unexpectedly besiege the unwary with catastrophic results. The prevailing direction of both swell and wind will drive disabled or improperly handled vessels onto the shore.*
>
> *While desired,* ***there are currently no designated anchorage areas off the coast or within the channel, primarily due to the grounding of the M/V New Carissa in 1999 off the coast of Coos Bay.*** (Emphasis added)

38 https://static1.squarespace.com/static/569e6f1176d99c4f392858c4/t/5abc1b252b6a28c8f42cfd14/1522277173846/Coos+Bay+HSP+2018FEB20+update+2018MAR27.pdf

The Feb 2018 Coos Bay Harbor Safety Plan states on electronic page 26:

> ***4.1.3 Prevailing winds***
> *Prevailing winds in the offshore sector are southerly winds, **15-30 knots, in the summer and most of the year** but shifting to northerly winds in the winter. Prevailing NW winds and winter southerly storms.*
> *• 25 knots winds and above affect big ship movements*
> * * * *
> *Deep draft ships are warned of anchoring offshore during winter while awaiting calmer winds to transit. **The rapid and severe onset of weather may expose the vessel to the risk of dragging ashore**.* (Emphasis added)

U.S. Coast Guard July 2008 Water Suitability Report states on page 3:

> ***Tug Escort and Docking Assist**: …Based on the ship simulation study conducted by Moffatt and Nichol on March 17-20, 2008, **vessels are limited to transiting during periods of high tide and 25 knot winds or less**. While unloading, all three tugs will remain on standby to assist with emergency departure procedures.* (Emphasis added)

If LNG vessels are to remain off-shore in bad weather HOW DOES THIS MAKE US SAFE? **No Plan exists that I know of with respect to SAFE offshore anchoring or maneuvering of LNG tanker ships off of Coos Bay for periods when winds exceed 25 knots.** How do they plan to prevent another New Carissa grounding or WORSE?

GUIDELINES FOR SAFETY ARE NOT BEING FOLLOWED

Many of the guidelines for safety that are suggested in the gas industries own "*Society of International Gas Tanker & Terminal Operators"* (SIGTTO**)**[39] Information Paper No. 14 have been completely ignored in this terminal siting.

> **Examples of SIGTTO guidelines not addressed adequately include:**
> 1) **Approach Channels. Harbor channels should be of uniform cross-sectional depth and have a minimum width, equal to five time the beam of the largest ship**
> 2) **Turning Circles. Turning circles should have a minimum diameter of twice the overall length of the largest ship, where current effect is minimal. Where turning circles are located in areas of current, diameters should be increased by the anticipated drift.**
> 3) **Tug Power. Available tug power, expressed in terms of effective bollard pull, should be sufficient to overcome the maximum wind force generated on the largest ship using the terminal, under the maximum wind speed permitted for harbor maneuvers and with the LNG carrier's engines out of action.**
> 4) **Site selection process should remove as many risk as possible by placing LNG terminals in sheltered locations remote from other port users. Suggest port designers construct jetties handling hazardous cargoes in remote areas where**

[39] **Site Selection & Design for LNG Ports & Jetties – Information Paper No. 14 -** Published by *Society of International Gas Tanker and Terminal Operators Ltd* / 1997

ships do not pose a (collision) risk and <u>where any gas escaped cannot affect local populations.</u> Site selection should limit the risk of ship strikings, limiting interactive effects from passing ships and reducing the risk of dynamic wave forces within mooring lines.

5) **Building the LNG terminal on the outside of a river bend is considered unsuitable due to fact that a passing ship may strike the berthed carrier if the maneuver is not properly executed.**
6) **SIGTTO Examples given for reducing risk factors beyond normal operations of ship/shore interface include LNG terminal patrols of the perimeter of the offshore safety zones with guard boats and <u>to declare the air-space over an LNG terminal as being a restricted zone where no aircraft is allowed to fly</u> without written permission.**
7) **Restriction of the speed of large ships passing close to berthed LNG carriers.**

Also ignored were some of the safety guideline preventative measures found in the Sandia National Laboratories Report – "*Guidance on Risk Analysis and Safety Implications of Large Liquefied Natural Gas (LNG) Spill Over Water*" – Dec 04:

Guidelines (Pg 64) include: [40]

1) Appropriate off-shore LNG ship interdiction and inspections for explosives, hazardous materials, and proper operation of safety systems;
2) Appropriate monitoring and control of LNG ships when entering U.S. waters and **protection of harbor pilots and crews**;
3) **Enhanced safety zones around LNG vessels (safety halo) <u>that can be enforced</u>;**
4) **<u>Appropriate control of airspace over LNG ships</u>**; and
5) **Appropriate inspection and protection of terminal areas, tug operations prior to delivery and unloading operations.**

In addition, scientist have found that safety measures incorporated in the proposed Jordan Cove LNG terminal actually increase the chance of a catastrophic failure and present a far more serious public safety hazard than regulators have analyzed and deemed acceptable.[41] Jerry Havens , Distinguished Professor of Chemical Engineering at University of Arkansas, and James Venart, Professor Emeritus of Mechanical Engineering at University of New Brunswick, have asked specific questions to the FERC concerning these hazard issues. [42] Those questions need to be addressed properly. This would impact potential future industry and the Ports proposed Oregon Gateway cargo terminal to the East of the proposed LNG facility, which would not be allowed to operate in these hazard areas.

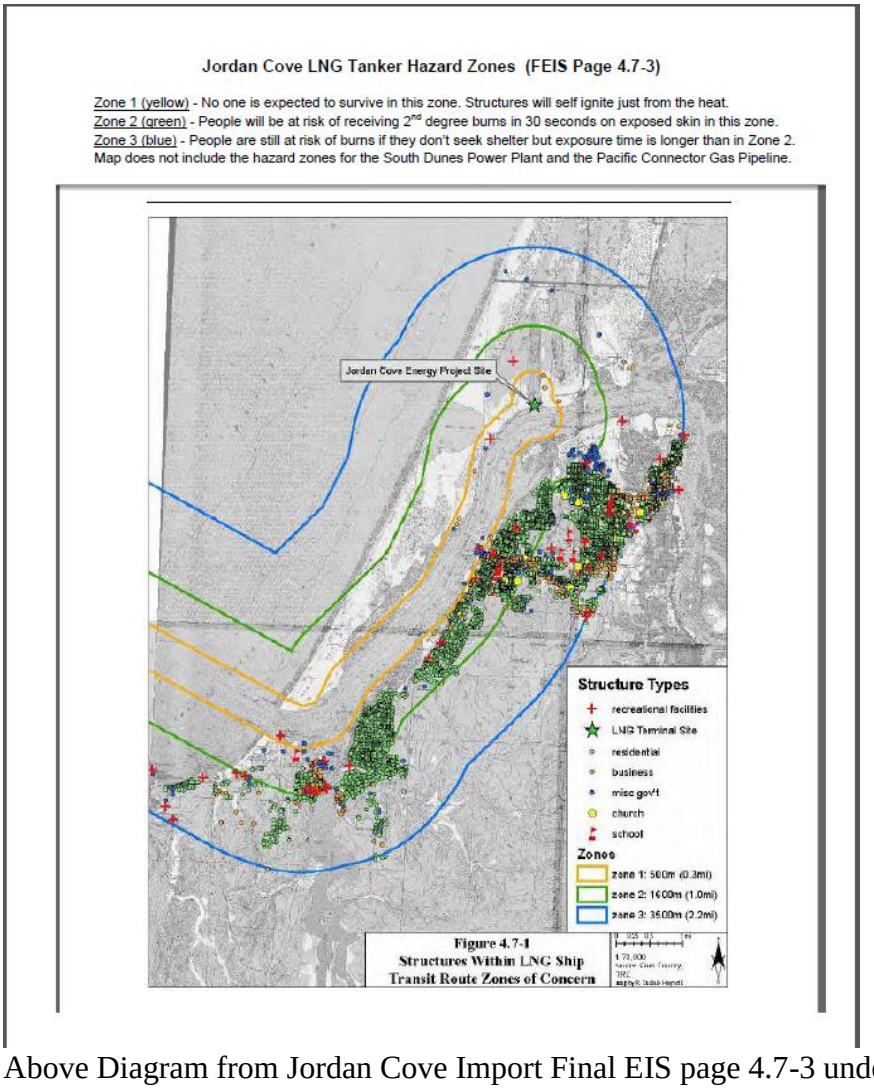
"*Once ignited, as is very likely when the spill is initiated by a chemical explosion, the floating LNG pool will burn vigorously…Like the attack on the World Trade Center in New York City**, there exists***

[40] Without an emergency response plan to review it is hard to know if some of these recommendations have been met.
[41] January 14, 2015 Report filed by Jerry Havens Ph.D and James Venart Ph.D. to FERC concerning *discrepancies and problems with Jordan Cove Energy Project hazard analysis* under CP13-483 et. al.
http://elibrary.FERC.gov/idmws/file_list.asp?accession_num=20150114-5038
[42] Feb 6, 2014 Follow-up Report/ *Questions concerning discrepancies and problems with Jordan Cove's hazard analysis* under CP13-483 et al.
http://elibrary.FERC.gov/idmws/file_list.asp?accession_num=20150206-5040

no relevant industrial experience with fires of this scale from which to project measures for securing public safety." – Statement by Professor James Fay, Massachusetts Institute of Technology (Emphasis added.)

Sandia Laboratory's Dec 2004 Report; "*Guidance on Risk Analysis and Safety Implications of a Large Liquefied Natural Gas (LNG) Spill Over Water",* states on page 83; "*... The distance from the fire to an object at which the radiant flux is 5 kW/m2 is 1.9 km"* (1.181 miles). **To clearly understand this one must understand that 5 kW/m2 is the heat flux level that can cause 2nd degree burns on exposed human skin in 30 seconds.**

An estimated 16,922 people would live in the hazardous zones of concern according to the former Jordan Cove Export Final EIS (page 4-1031) under CP13-483-000/CP13-492-000, and yet there is little concern given for their safety. Trees and burnable scrub brush cover our area. Secondary fires will be paramount and **most of our emergency responders are located in the LNG hazardous zones of concern**. The Coos Bay area has one hospital, it does not have a "Burn Unit." We have yet to see an emergency response plan on how the medical response to even a minor LNG hazardous event could be handled in light of our area's obvious insufficiency of appropriate medical facilities and personnel. This was just one of many concerns that were raised in scoping comments to FERC that have yet to be addressed.

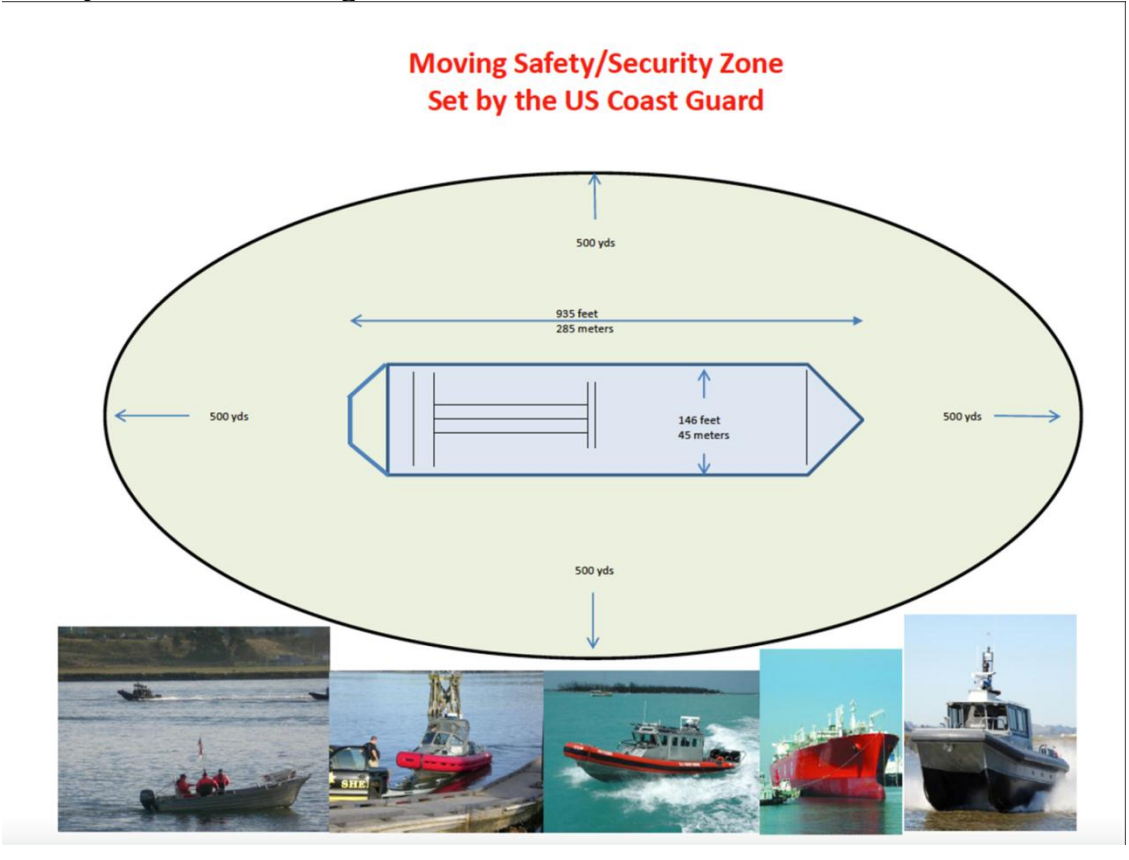


Above Diagram from Jordan Cove Import Final EIS page 4.7-3 under CP07-444-000/CP07-441-00.

Negative Impacts to other Bay Users

The Coast Guard WSA also established Safety / Security Zones for LNG vessels **both** while the vessels are moored and when they are not moored. When an LNG vessel is at the docking facility there is to be a 150 yard security zone around it, to include the entire terminal slip, and when there is no LNG vessel moored, the security zone will cover the entire terminal slip and extend 25-yards into the waterway. (See CG-WSA page 2) In addition, the Coast Guard has set a moving safety/security zone for the LNG tanker ship that extends 500-yards around the vessel but ends at the shoreline. **No vessel may enter the safety / security zone without first obtaining permission from the Coast Guard Captain of the Port who resides in the Portland, OR office**.[43] (See CG-WSA page 2)

This safety and security zone will encompass the entire bay in some areas and be a hindrance to other port users including recreational and commercial fishermen.



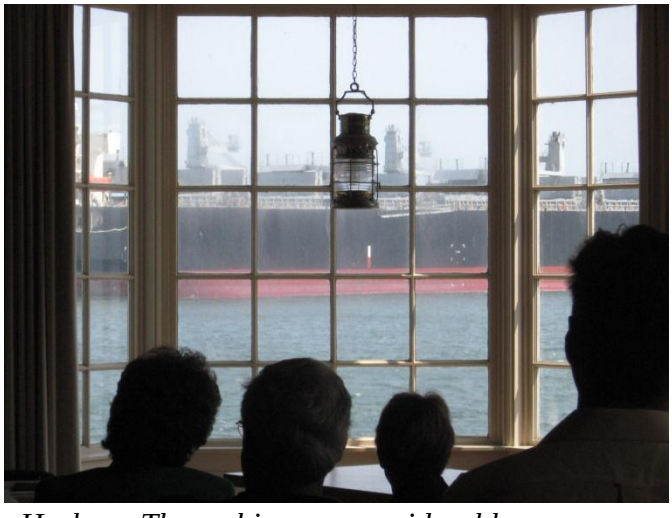
The Coast Guard WSA states on page 3 under Tug and Docking Assist:

> *…Based on the Ship simulation Study conducted by Moffatt & Nichol on March 17 -20, 2008,* ***vessels are limited to transiting during periods of high tide and 25 knot winds or less****. While unloading, all three tugs will remain on standby to assist with emergency departure procedures.*

[43] Coast Guard - LOR / WSR / WSA for Port of Coos Bay / Jordan Cove Energy Project: https://homeport.uscg.mil/Lists/Content/DispForm.aspx?ID=1008

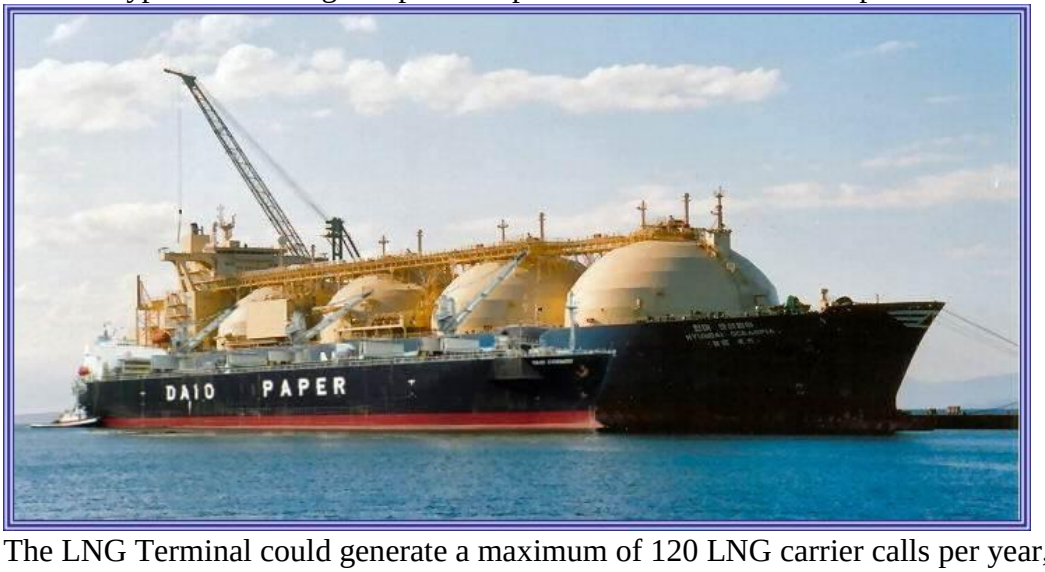
This is also optimal tides that the fishing fleet uses.

How close is too close for proposed transiting LNG Tanker Ships in Coos Bay? (***See Exhibit 32***)



Photos above are of cargo ships transiting our Coos Bay Harbor. These ships are considerably smaller than LNG ships. (See photo comparison below) The photo above on the left is the view from the deck of a local homeowner. The photo on the right is from the Boat House Auditorium in Charleston at a Coos County Board of Commissioners meeting held on July 10, 2012. A wood transport ship passes by in the Coos Bay Channel next to the Boat House Auditorium

Below a typical local cargo ship as compared to a smaller LNG ship



The LNG Terminal could generate a maximum of 120 LNG carrier calls per year, although the average is expected to be between 110 and 120 LNG carriers per year. [Jordan Cove RR #1 page 25 & 26]

This amounts to 220 to 240 harbor disruptions per year during high slack tides which are also prime tides used currently by other bay users.

If the Coast Guard choses to not follow their own Water Suitability Assessment requirements designed to protect the safety and security zone around both a transiting and docked LNG tanker ship, they would be placing some 20,000 to 40,000 people in Coos Bay Area at extreme risk, including Coast Guard personnel.

NEGATIVE IMPACTS ON THE AIRPORT

The Feb 2018 Coos Bay Harbor Safety Plan states on electronic page 18:

> ***Southwest Oregon Regional Airport****: For safety reasons, the FAA limits the height of vessel transiting in front of the runway. Inbound and outbound vessel traffic near the Airport may affect procedures for aircraft landing and departing at the airport. Vessels with an air draft of 144 feet or greater present a potential obstruction to airspace that requires advisories be issued to aircraft by air traffic controllers, and in some cases, runway use may need to be restricted. See Special Navigational Conditions for more for more details.*

On May 7, 2018 the FAA released 13 determinations of PRESUMED AIRPORT HAZARD with respect to the proposed Jordan Cove Project.[44] Jordan Cove has not resolved these issues and they are not able to be mitigated. Nine of these FAA Presumed Airport Hazards involve transiting LNG tanker ships at various points within the Coos Bay Estuary**. (*See Exhibit 1 filed on June 10, 2019*) This would be devastating to the Southwest Oregon Regional Airport operations, navigation and fishing. It clearly violates OAR 141-122-0020(5)(a) and ORS 196.825(1)(a)(b);(3)(a)(e)**

Presumed Airport Hazards are included in this document as follows:

- LNG Carrier Vessel - Stack, Transit Point 6 - 2018-ANM-720-OE
- LNG Carrier Vessel - Stack, Transit East Point - 2018-ANM-719-OE
- LNG Carrier Vessel - Stack, Transit West Point - 2018-ANM-718-OE
- LNG Carrier Vessel - Stack, Transit Point 5 - 2018-ANM-8-OE
- LNG Carrier Vessel - Stack, Transit Point 4 - 2018-ANM-7-OE
- LNG Carrier Vessel - Stack, Transit Point 3 - 2018-ANM-6-OE
- LNG Carrier Vessel - Stack, Transit Point 2 - 2018-ANM-5-OE
- LNG Carrier Vessel - Stack, Transit Point 1 - 2018-ANM-4-OE
- LNG Carrier Vessel - Stack - 2017-ANM-5418-OE
- Amine Regenerator - 2017-ANM-5389-OE
- Oxidizer - 2017-ANM-5388-OE
- LNG Tank North - 2017-ANM-5387-OE
- LNG Tank South - 2017-ANM-5386-OE

The Director of Dept of State Lands should deny the application due to the Project clearly being out of compliance with ORS 196.825(1)(a)(b);(3)(a)(e) and OAR 141-122-0020(5)(a):

> *"The Director of the Department of State Lands shall issue a permit applied for under ORS 196.815 (Application for permit) if the director determines that the project described in the application:*

[44] See Part 8 of Jordan Cove response filing with the FERC that includes the 13 FAA documents: http://elibrary.FERC.gov/idmws/file_list.asp?accession_num=20180510-5165

*(a) Is consistent with the protection, conservation and **best use of the water resources of this state** as specified in ORS 196.600 (Definitions for ORS 196.600 to 196.655) to 196.905 (Applicability); and*

*(b) **Would not unreasonably interfere with the paramount policy of this state to preserve the use of its waters for navigation, fishing and public recreation**.*

* * * *

*3) In determining whether to issue a permit, the director **shall consider all of the following**:*

*(a) **The public need** for the proposed fill or removal….*

* * * *

*(e) Whether the proposed fill or removal conforms to sound policies of conservation and **would not interfere with public health and safety**.*

* * * *

(Emphasis added)

OAR 141-122-0020 Policies

*5) The Department **will not grant an easement** if:*

*(a) As a result of its circulation for public comment of the application for easement as described in OAR 141-122-0050(3) it determines that **the proposed use or development would unreasonably impact uses or developments proposed or already in place within the requested area**; …*

(Emphasis added)

The Southwest Oregon Regional Airport in North Bend is a key part of the Coos Bay area's transportation system that is **already in use**. United Airlines flies to San Francisco daily. United also offers a seasonal flight to Denver on Wednesdays and Sundays from June 10th to October 3rd.[45] The airport also continues efforts to also secure Portland air service.[46]

The Coos Bay Navigation Channel is located here between the North Spit and the end of the East/West runway of the Southwest Oregon Regional Airport. OTH

[45] https://cooscountyairportdistrict.com/faq/
[46] https://cooscountyairportdistrict.com/airport-continues-efforts-to-secure-portland-air-service/

Photo below – Private jets facing north are lined up at Coos Aviation in Sept of 2015. The Bandon Dunes World Renowned Golf Course brings in a lot of private planes like this to our area.

The proposed Jordan Cove project would unreasonably negatively impact the Southwest Oregon Regional Airport and likely cause loss of federal dollars that the airport depends on in order to maintain operations.

Electronic page 107 of Jordan Cove DSL application states:

> ***6.2.3 Access and Utility Corridor***
> *An approximately 1-mile-long permanent access and utility corridor* ***will be constructed between Ingram Yard and the South Dunes site*** *to provide a conduit for the underground feed gas supply to the LNG Terminal and a number of underground utilities, as well as a location for permanent aboveground facilities, including fire water storage tanks for the LNG Terminal and the Fire Department facility.* (Emphasis added)

A utility corridor on top of proposed fill may not necessarily be an increased airport hazard but a high-pressure/high-volume hazardous natural gas pipeline with its significant hazard zone would be an increased hazard since it would cross the approach surface overlay of the South West Oregon Regional Airport. The proposed Pacific Connector Gas Pipeline hazardous zone would extend out 800 to over 1,000 feet from the center of the proposed pipeline. **It would NOT be acceptable to locate a hazardous pipeline such as this in the approach surface of the airport runway.** This hazard must be dealt with by someone outside of the local planning jurisdiction since the Coos County Planning Department has not been addressing this hazard.

Jordan Cove is proposing that large volumes of LNG be stored in two (2) full-containment LNG storage tanks, each designed to store 160,000 cubic meters of LNG, along with LNG ships that would be transiting our narrow harbor capable of storing up to 148,000 cubic meters. LNG tankerships would pass within feet of the end of the airport runway and the two storage tanks are located within a mile of

the runway. **This would NOT be in the public interest and violates safety recommendations for the safe siting of LNG ports and jetties.**

Planes also do not always fly down the centerline of the runway approach surfaces, as one can see in the photo below (looking across the Coos Bay towards the North Spit and Jordan Cove's property on Sept 20, 2014). Perhaps this planes direction was due to a missed approach or maybe it was just due to people doing some sightseeing along our Oregon Adventure Coastline.[47] A lot of people do that here.

COOS BAY AREA FOG

The Feb 2018 Coos Bay Harbor Safety Plan states on electronic page 18:

> ***4.1 Weather***
> *4.1.1 Fog*
> *The area is subject to fog conditions very similar to many west coast ports. Fog can be found anywhere within Coos Bay and its tributaries. Fog occurs mostly during summer and fall though is known to occur during other seasons too.*

Photos below are looking from the City of North Bend to the North at the Roseburg Chip Facility on the North Spit across the Bay from the Southwest Oregon Regional Airport.

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//

[47] http://www.oregonsadventurecoast.com/

July 30, 2014 - 10:00 a.m.

The same area July 30, 2014 - 2:00 p.m.

Photos below are looking from the City of North Bend to the North across the Southwest Oregon Regional Airport Runway at the proposed area for the Jordan Cove LNG Export facility that includes the proposed LNG marine terminal, liquefaction trains and two 255 foot high LNG storage tanks.

July 30, 2014 - 10:00 a.m.

The same area July 30, 2014 - 2:00 p.m.

Coos Bay area fog comes on rapidly and sometimes unexpectedly. Thermal heat plumes that would be coming from the proposed Jordan Cove facility would only increase this problem by causing even more fog clouds to form on cold days. **This increased hazard is not acceptable.**

JORDAN COVE'S THERMAL PLUMES

According to Jordan Cove's application they plan on liquefying a maximum of 7.8 mtpa (1,077 MMscf/d) of LNG production net, after deduction for Boil-Off Gas ("BOG") generation.[48] This requires an entirely different process from importing LNG that is considerably more hazardous. Liquefaction Trains that are currently proposed as a part of the Jordan Cove LNG Export

[48] Jordan Cove Revised Draft Resource Report #1 page 20.
http://elibrary.FERC.gov/idmws/file_list.asp?accession_num=20181116-5198

facility would emit enormous amounts of heat into the atmosphere. This would contribute to thermal plumes and additional fog in the area. **This would create additional hazards to both navigation in the Bay and to the operation of the South West Oregon Regional Airport**.

Jordan Cove DSL application on electronic page 257 states:

> *The Black & Vetch PRICO® Process, which utilizes five liquefaction trains to produce 7.8 mtpa of LNG, was selected as the preferred technology and is described as part of the proposed Project in Resource Report 1*

Jordan Cove's Revised Sept 2017 RR#1 page 20 states:

> *The PRICO® LNG technology (see Figure 1.3-4) utilizes a single mixed refrigerant ("SMR") circuit with a two-stage compressor and a brazed aluminum refrigerant exchanger. The dry treated gas from the gas conditioning train is divided equally among the five liquefaction trains. In each liquefaction train, the dry treated gas stream flows into a refrigerant exchanger where it is turned into liquid by cooling it to approximately -260oF with the mixed refrigerant. The refrigerant exchanger consists of multiple brazed aluminum heat exchanger cores arranged in parallel inside a perlite insulated cold box.* ***An aerial cooling system (fin-fan) rejects heat from the mixed refrigerant that is gained from the liquefaction of feed gas and compression****. The cold box is purged with nitrogen gas to prevent moisture intrusion and eliminate the potential for a flammable atmosphere inside*

In with Jordan Cove's Application to the FERC filed on Sept 21, 2017[49] under Resource Report #13 Part 2 - JCEP RR13 Public 2 of 7.PDF [39 MB] is a Gexcon report entitled, "*Facility Siting Hazard Analysis for the Jordan Cove Energy Project.*

The diagram below is from electronic page 696 (Page 9 of 115 of Gexcon report dated 8-28-2017) :

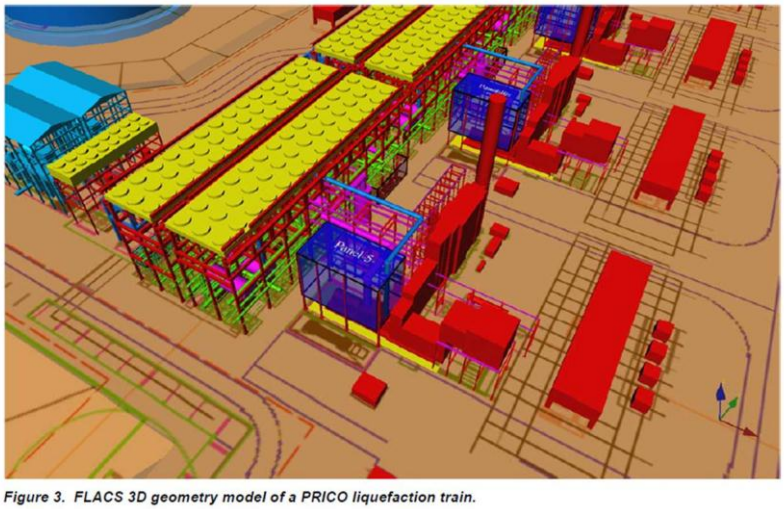


Figure 3. FLACS 3D geometry model of a PRICO liquefaction train.

The liquefaction train implements air coolers whose purpose is to extract heat from the refrigerant and discharge it to the atmosphere. The air coolers consist of arrays of axial fans mounted on top of the main refrigerant piperacks. They operate by pulling air from near ground level to flow through the coolers and then discharge it upwards; as such, they generally contribute to the dilution of dense vapor clouds that migrate underneath the fans. However, the simulations included in this report were conservatively run by neglecting the ventilation introduced by the air coolers.

[49] http://elibrary.FERC.gov/idmws/file_list.asp?accession_num=20170921-5142

In an updated Gexcon Report Jordan Cove filed with the FERC on November 11, 2018, Gexcon has changed the wording under this diagram for reasons which are not entirely clear. In any event this does not change the hazard.

The Diagram below is from page 9 of 112 Gexcon report dated 9-24-2018 filed with FERC 11-16-2018 [50]

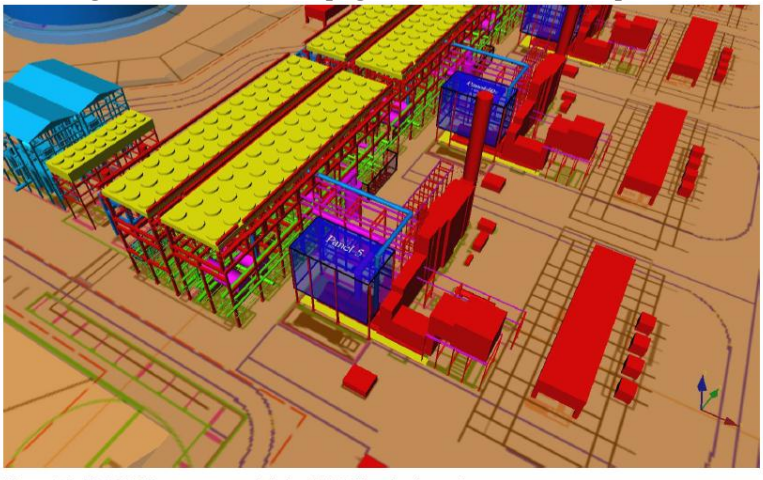


Figure 2-3. FLACS 3D geometry model of a PRICO liquefaction train.

The liquefaction train implements air coolers, the purpose of which is to extract heat from the refrigerant and discharge it to the atmosphere. The air coolers consist of arrays of axial fans mounted on top of the main refrigerant piperacks. They operate by pulling air from near ground level to flow through the coolers and then discharge it upwards; as such, they generally contribute to the dilution of dense vapor clouds that migrate underneath the fans. These dilution effects were included in the FLACS modeling, but only for scenarios that originate from a single liquefaction train in operation. Furthermore, only the fans on that operating train were assumed to be running. Scenarios that do not depend on a liquefaction train running did not include fan dilution effects in the FLACS model.

Jordan Cove Energy Project's prior Hazard Analysis Report (GexCon-13-P65569-R1) clearly showed the air cooler placement on top of the liquefaction trains (page 14 and 15): [51]

The PRICO liquefaction trains include air coolers whose purpose is to extract heat from the pipes carrying the refrigerants and discharge it to the atmosphere*. The air coolers consist of arrays of axial fans mounted on top of the main refrigerant piperacks (as labelled in Figure 3); they operate by pulling air from near ground level to flow through the pipe racks and then discharge it upwards. For simulation purposes, the air coolers are grouped in two arrays for each train, as outlined in Figure 9. The total air flow rates for the two air cooler arrays were calculated from data provided by B&V and are listed in Table 5.* (Emphasis added)

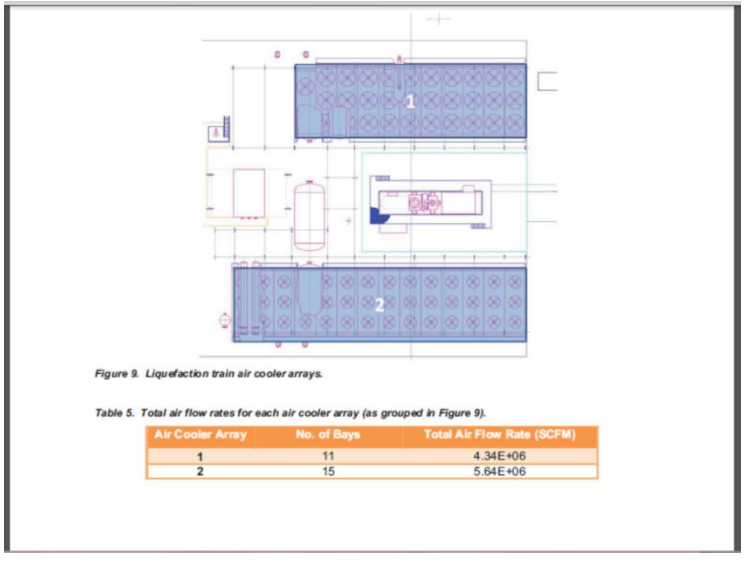


Figure 9. Liquefaction train air cooler arrays.

Table 5. Total air flow rates for each air cooler array (as grouped in Figure 9).

Air Cooler Array	No. of Bays	Total Air Flow Rate (SCFM)
1	11	4.34E+06
2	15	5.64E+06

The air coolers will be operating

[50] http://elibrary.FERC.gov/idmws/file_list.asp?accession_num=20181116-5198
[51] http://elibrary.ferc.gov/idmws/file_list.asp?accession_num=20130919-5169

continuously while the train is active; ***they will continue running until they are stopped by operator intervention; this is to ensure that the refrigerant in the pipes is cooled even following the shutdown of the liquefaction process***, *thus preventing pressure buildup in the refrigerant lines. Therefore, the vapor dispersion simulations from liquefaction process releases were performed assuming that the air coolers within the same train as the release would be operational for the duration of the release. The air coolers in the other trains were conservatively assumed not to be operational. The air cooler arrays were subdivided into a reduced number of "FAN" sources in the FLACS simulations, uniformly distributed across the two air cooler arrays. The total volumetric flow rate of air through the FLACS fans in each array was approximately equal to the total flow rate for that array, as listed in Table 5.* (Emphasis added)

On January 21, 2015, the FAA put out a Memorandum concerning a "*Technical Guidance and Assessment Tool for Evaluation of Thermal Exhaust Plume Impact on Airport Operations."* [52] (***See Exhibit*** 34)

Pilots in Troutdale, Oregon, have pointed out the hazards of such "heat" plumes in front of airport approach surfaces. An article that came out on April 22, 2015 in the Willamette Week entitled, "*Hot Air*" stated the following: [53] (***See Exhibit 35***)

…Initially, pilots worried that a power plant at Troutdale would hamper visibility. Gas-fired generating plants work by boiling water to produce steam that drives turbines. When the water is cooled, the steam roiling out of the plant's cooling towers could fog pilots' flight paths and create a hazard.

But the bigger concern now is heat.

Earlier this year, the Federal Aviation Administration directed Troutdale users to an independent consulting firm to analyze the potential impact of the invisible plume of hot air that the combustion of gas by the plant would produce.

"You're putting a known but invisible hazard right into the path that pilots using Troutdale must fly," says Mary Rosenblum, a Canby resident and president of the Oregon Pilots Association.

Rosenblum says modeling shows the plume could suddenly lift one wing and flip a plane upside down.

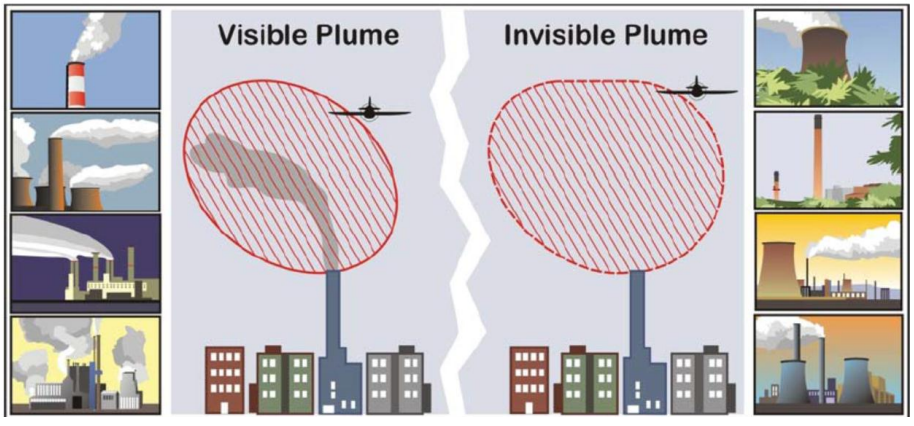
"This would happen when the plane is 1,000 feet or less off the ground," Rosenblum says. "At that altitude, you cannot recover."

The FAA consultant's initial analysis in March found that the invisible plumes could cause as many as a dozen planes to lose control and crash annually—with fatal consequences. A second run of the same model earlier this month found it could happen even more often.

[52] https://www.faa.gov/airports/environmental/land_use/media/Technical-Guidance-Assessment-Tool-Thermal-Exhaust-Plume-Impact.pdf
[53] http://www.wweek.com/portland/article-24594-hot_air.html

Risk modeling done for the Troutdale Energy Center in 2013 found no such danger…. (Emphasis added)

FIG 7-5-2
Plumes



(***See Exhibits 36 and 37***)

The top of the 160,000 cubic meter LNG tank is very vulnerable as this is where the supply pipeline penetrates the tank for both the transfer of LNG and capture of boil off gases. Dr. James Venart raised issue with the fact that a worst case scenario tank top fire hazard had not been sufficiently analyzed in the hazard analysis of the Jordan Cove LNG Export project. The potential hazards would be far worse than what has been estimated by Jordan Cove. There is no comparison between a plane hitting a tree as has been previously suggested by Jordan Cove's consultants and a plane hitting a 160,000 cubic meter storage tank full of liquefied natural gas. A tree does not have the ability to cause cascading failures that could lead to some 17, 000+ people, who live, work and recreate in Jordan Cove's acknowledged hazardous burn zones, from being severely burned and/or killed.

Shanghai Wuhaogou LNG Expansion Project two new 50,000 m3 LNG storage tanks.

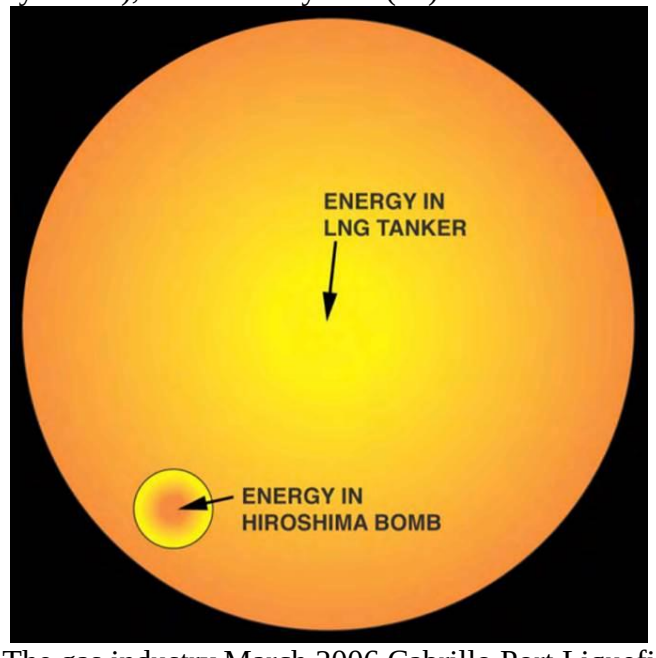
In an interview with Steve Curwood on NPR radio that aired in April of 2005, Robert (Bud) MacFarlane, former national security advisor to President Reagan and James Woolsey, former director of the CIA under the Clinton administration stated the following:

> *CURWOOD: Just to be clear, how vulnerable is vulnerable when you say that there are parts in the Persian Gulf that could be easily disrupted by a terrorist? How easy?*
> *WOOLSEY: Well, let me use only an illustration from Bob Baer, a former CIA officer that's written a book called, "Sleeping with the Devil," in which the opening scenario is a terrorist crashing a 747 into the sulfur cleaning towers up near Ras Tanura in northeastern Saudi Arabia. Since you have to get sulfur out of the Saudi oil that would take several million barrels, probably around five or six million barrels a day, off line for a year or more. And Bud here is an old artilleryman. He and I were talking the other day; I think he'll tell you you probably don't need a big 747 to do that. A pretty skilled guy with some orders could probably do it.*
> *CURWOOD: So, Bud MacFarlane, now the national security aspect of this?*
> *MACFARLANE:* ***Well, as Jim said, I was an artilleryman for 20 years and I can tell you with high confidence that I would have no problem at all in shutting down Ras Tanura on any given afternoon. Four-point-two inch mortar can go 4,000 yards very accurately and the ability of an Al-Qaeda terrorist to come within that distance is easy. There are other threats through shipping, through pipelines that are terribly vulnerable, easy targets and virtually impossible to defend. So, in short, back in the '70s we didn't have a declared enemy with that kind of capability, but today we do****....[54]*
> (Emphasis added)

Tom Bender, myself and several other citizens expressed concerns specific to this issue under FERC submittals 20150113-4002; 20141211-5046; 20141212-5017; 20141218-5046; 20150217-5145; among many others. **Accidental or intentional airplane crashes or dropping a fuel-air bomb would be virtually impossible to prevent or mitigate.**

[54] http://loe.org/shows/segments.html?programID=05-P13-00013&segmentID=4

According to a study called *Brittle Power, Energy Strategy for National Security*, originally prepared for the Pentagon, should the unthinkable happen, the energy content of ONE standard 125,000 cubic meter liquefied natural gas tanker, is equivalent to .7 megatons of TNT (that's 1.4 billion pounds of dynamite), or about fifty-five (55) Hiroshima bombs.



The gas industry March 2006 Cabrillo Port Liquefied Natural Gas Deepwater Port Revised Draft EIR determined that: (on page 4.2-38)[55]

> *For the worst credible intentional or accidental event release of 53 million gallons (200,000 m^3) from two tanks of LNG, it was determined that a wind speed of 2 m/s (4.5 mph) resulted in* ***the worst case in which the flammable vapor cloud extended about 6.3 NM*** *(****7.3 miles*** *****or 11.7 km****) downwind from the FSRU….*
> (Emphasis added)

This would NOT BE IN THE PUBLIC INTEREST

NEGATIVE IMPACTS ON TOURISM - RECREATION – FISHING

Tourism spending accounted for 3,300 jobs in Coos County in 2017[56]. Those jobs would be negatively impacted as would also jobs in fishing, clamming, crabbing and oyster growing.

The Jordan Cove FERC Final EIS under Docket CP13-483-000 et al states on page 4-737:

> *According to a 2008 study by the Oregon State Marine Board (OSMB), recreational boaters in Coos Bay took a total of 31,560 boat trips the previous year. Nearly 90 percent of the boat use days involved fishing (including angling, crabbing, and clamming), 9 percent was for pleasure cruising, and the remainder was for sailing and water skiing. Sixty-eight percent of the boating activities in Coos Bay originated from the Charleston Marina and the Empire ramp, 19 percent at the California Avenue boat ramps, and 4 percent at the North Spit ramps.*

[55] http://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=13982605
[56] http://www.deanrunyan.com/doc_library/ORImp.pdf

In the photo below, boats line the harbor during fall fishing runs on a sunny September afternoon in the lower Coos Bay in front of the area of the proposed LNG terminal. Recreational fishing is a big industry here with lots of events centered on the sport that go on throughout the year. ***See Exhibit 38*** for an example of one such event.

According to Roy Elicker, director of the Oregon Department of Fish and Wildlife "In the coastal counties up to 20 percent of the total net earnings in those counties come from fisheries ... commercial fisheries, in particular." [57]

Project Would Negatively Impact Current Coos Bay Estuary Dependent Industries.

Kayaking in Coos Bay has increased in recent years.

The proposed site of the Jordan Cove LNG terminal, seen here in the background, would border a National Recreation Area.

[57] *Wildlife officials confirm economic position of coast's fishing industry* By Steve Lindsley, The Umpqua Post Aug 25, 2014; https://theworldlink.com/news/local/wildlife-officials-confirm-economic-position-of-coast-s-fishing-industry/article_aa056b02-2c7b-11e4-adb5-0019bb2963f4.html

Terrestrial wildlife may not lose significant amounts of habitat in acres with the project. However, it is wrong to conclude their displacement to other areas is non-impacting. We take exception to the statement that the South Slough would not be impacted. Waterfowl and shorebirds and their natural cohorts displaced by construction or disturbed by vessel operations in the estuary will move away, likely to the South Slough. Displaced human uses such as clamming, crabbing, wildlife observation, fishing, and hunting would likely move these activities and conflict with the existing human uses in that area. Displacement of tourist activities could actually thwart future visitation numbers, negatively affecting the local economies.

Many local industries depend on a healthy bay and estuary. The Coos Bay Estuary currently supports many different types of industries such as fishing, crabbing, oyster growing, clamming, wildlife observation, shipping of wood and other products, recreation, tourism, etc. These all work in conjunction with one another. The proposed Jordan Cove LNG export terminal appears to have impacts that would be a vast deterrent from that trend.

A report prepared for the Oregon Department of Fish and Wildlife listed the following estimates of expenditures for Fishing, Hunting, Wildlife Viewing, and Shellfishing in Coos County and Oregon in 2009[58]:

Coos County Local Recreation Expenditures, 2008

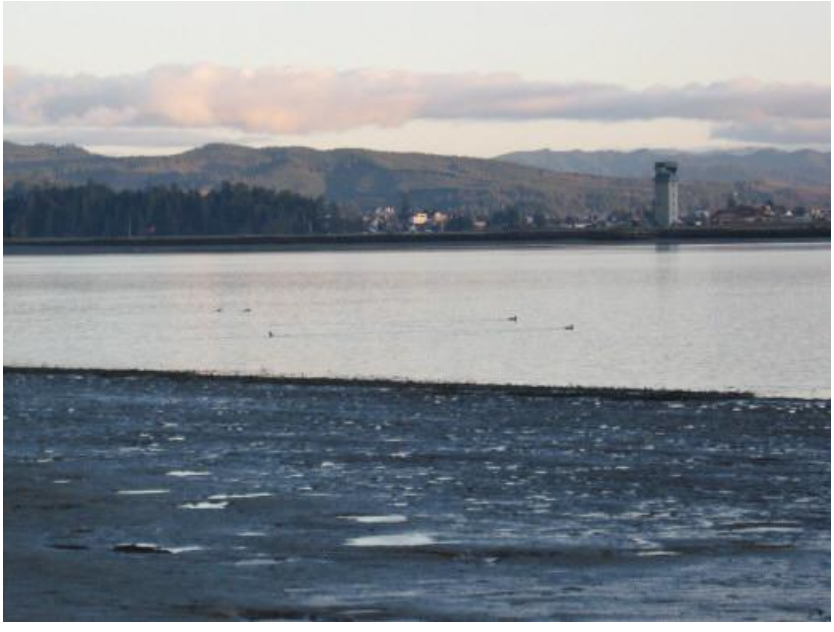
Category	Value	% of State Total*	% of All Travel**
Hunting	$904,977	2.90%	N/A
Fishing	$2,551,433	3.30%	N/A
Wildlife Viewing	$1,637,158	4.90%	N/A
Shellfishing	$1,080,963	20.60%	N/A
Total	$6,174,531	4.20%	N/A

Coos County Travel-Generated Expenditures, 2008

Category	Value	% of State Total*	% of All Travel**
Hunting	$2,534,940	2.40%	1.40%
Fishing	$12,253,254	4.60%	6.70%
Wildlife Viewing	$14,110,950	3.10%	7.70%
Shellfishing	$4,552,379	14.70%	2.50%
Total	$33,451,523	3.90%	18.30%

[58] "Fishing, Hunting, Wildlife Viewing, and Shellfishing in Oregon - *2008 State and County Expenditure Estimates*"; Prepared for the Oregon Department of Fish and Wildlife - Travel Oregon; DeanRunyan Associates; May 2009 http://www.dfw.state.or.us/agency/docs/Report_5_6_09--Final%20%282%29.pdf

Birds swim just off of tidal sand areas at low tide and several species leave footprints in the wet tidal



sands where the LNG slip dock is proposed to be built.

According to the World Newspaper; Monday, November 02, 2009:

> *"Coos Bay got a bit of a tourism boost over the last several days,* ***as 200 or so birders came to the bay to see a rare brown booby that is hanging out near Charleston.*** *People came to scope out the tropical bird from places including Eugene, Portland, Bend, McMinnville, Coos Bay and Washington. The rare tropical bird showed up last week and is the fourth verified sighting of this species of bird in Oregon. The last local sighting was in October 2008, when a dead female washed ashore at Lighthouse Beach."*[59]

[59] "***Flocking to see a rare bird***"; The World Newspaper; Monday, November 02, 2009
http://www.theworldlink.com/articles/2009/11/02/news/doc4aef7304e1c5b861714126.txt

The Weyerhaeuser site is arguably one of the best birding destinations in Coos County and attracts a multitude of breeding, migrant and vagrant species year-round. There are species like Wilsons Phalarope and Ring necked Duck. This is a crucial stop-over location for shorebirds during migration where they can rest and refuel, building fat reserves to last them on the next leg of their migration flight. Oregon has lost much of its shorebird habitat through urban development and filling in wetlands and this site is one of the last significant "refueling stations" left on the Oregon Coast. Shorebirds by the thousands feed in late summer and fall here.

There are many efforts currently underway in Oregon to restore flow restoration priorities for recovery of anadromous salmonids in Coast Basins.[60] (***See Exhibit 39***) The Jordan Cove / Pacific Connector project would be counterproductive and in fact detrimental to these efforts. This is an important issue to both commercial and recreational fishermen on the South Coast of Oregon. Recreational boaters average about 31,560 trips per year in Coos Bay, the majority of which are for fishing. (FEIS under CP13-483 page ES-11) **Total direct visitor travel spending in Coos County has gone from $95.8 million in 2009 to $271.1 million in 2017**.[61]

FEIS under CP13-483 page 4-734 states:

> *The ODNRA* [Oregon Dunes National Recreation Area] *contains the largest expanse of coastal sand dunes in North America, as well as a coastal forest and over 30 lakes and ponds. Recreational opportunities at the ODNRA include OHV use, hiking, camping, horseback riding, angling, canoeing, sailing, waterskiing, and swimming.*

Photo to Left: People clamming at low tide in the Lower Coos Bay along Cape Arago Hwy.

Photo to Right: Evidence of Clams in the tidal areas where the LNG slip dock is proposed to be built.

FEIS under FERC Docket CP13-483 page 4-827 states

> *DIA study by the COE in 2002 found that recreational marine activities along the Oregon coast and river ports generated $42 million in personal income and supported 1,700 jobs. This included spending on marina rental slips, boat ramp users, and other visitors to ports in Oregon. It was estimated that 735,000 party days a year resulted in $79 million in trip*

[60] South Coast Basin – Rivers and Streams – Flow Restoration Priorities for Recovery of Anadromous Salmonids in Coastal Basins -; http://nrimp.dfw.state.or.us/nrimp/information/streamflow/17southcoast/17stream.pdf
[61] http://www.deanrunyan.com/ORTravelImpacts/ORTravelImpacts.html# and http://www.deanrunyan.com/doc_library/ORImp.pdf

spending in the state (Chang and Jackson 2003). In the South Coast (Coos and Curry Counties), 106,000 saltwater fishing trips were counted in 2008, with $8.4 million in expenditures in Coos County. The OSMB counted 32,774 recreational boat fishing trips in Coos Bay in 2007. Ocean recreational fishing for salmon out of Coos Bay generated $693,000 in 2012 (The Research Group 2013a).

Please consider these vital industries which will be negatively affected when making your decisions.

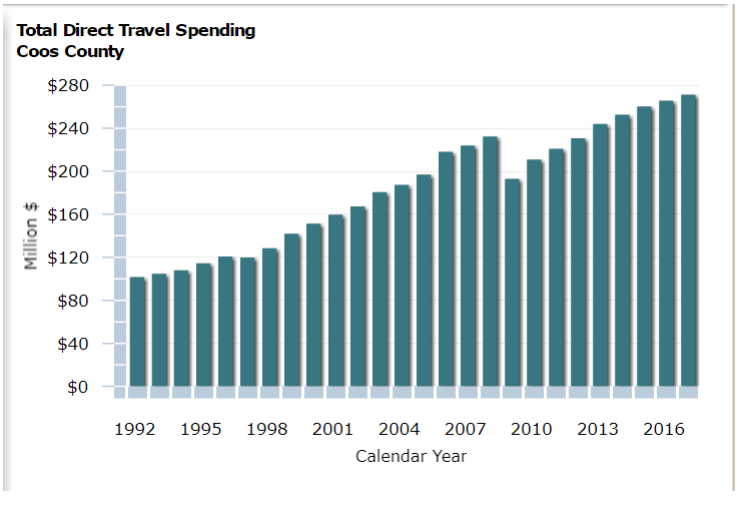
The FERC 2015 Final EIS states that there would be ballast water impacts in the estuary from Jordan Cove's LNG ships which would have their engines running the entire time they are in Port (***See Exhibit 40***). This would negatively impact not only the estuary but surrounding habitat and shorelands, along with recreation.

Jordan Cove states in the Sept 2017 RR#2 page 26

…The discharge velocities for the ballast water are low enough that it is not anticipated that any larger organisms (fish, marine mammals, and reptiles or amphibians) will be adversely affected by the ballast discharge. Some smaller organisms may be temporarily displaced by the discharge flow, but the displacement should be negligible in the confines of the slip.

This is not a reasonable assumption. Ignoring the potential invasive species problem and the warming of the water in the lower bay due to the release of ballast water from LNG ships will not make these problems go away.

Dean Runyan has reported the following for Total Direct Travel Spending since 1991 and as you can see it has gone up almost every year. [62]



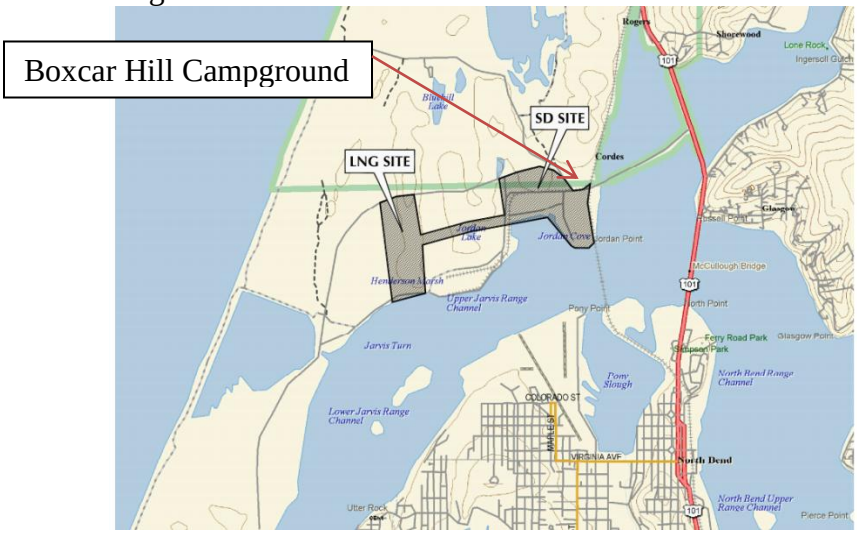
In Oct of 2007 Sunset Magazine listed the North Spit as one of the top 10 Beach Strolls (***See Exhibit 41***). In September 2008 the National Geographic listed Coos Bay as one of the top 50 places to live. (***See also Exhibit 41***). Jordan Cove would damage those remarkable attributes about our special area which would greatly harm recreation and tourism dollars coming into the area.

[62] http://www.deanrunyan.com/index.php?fuseaction=Main.TravelstatsDetail&page=Oregon

According to Jordan Cove's DSL Application Electronic page 676 states:

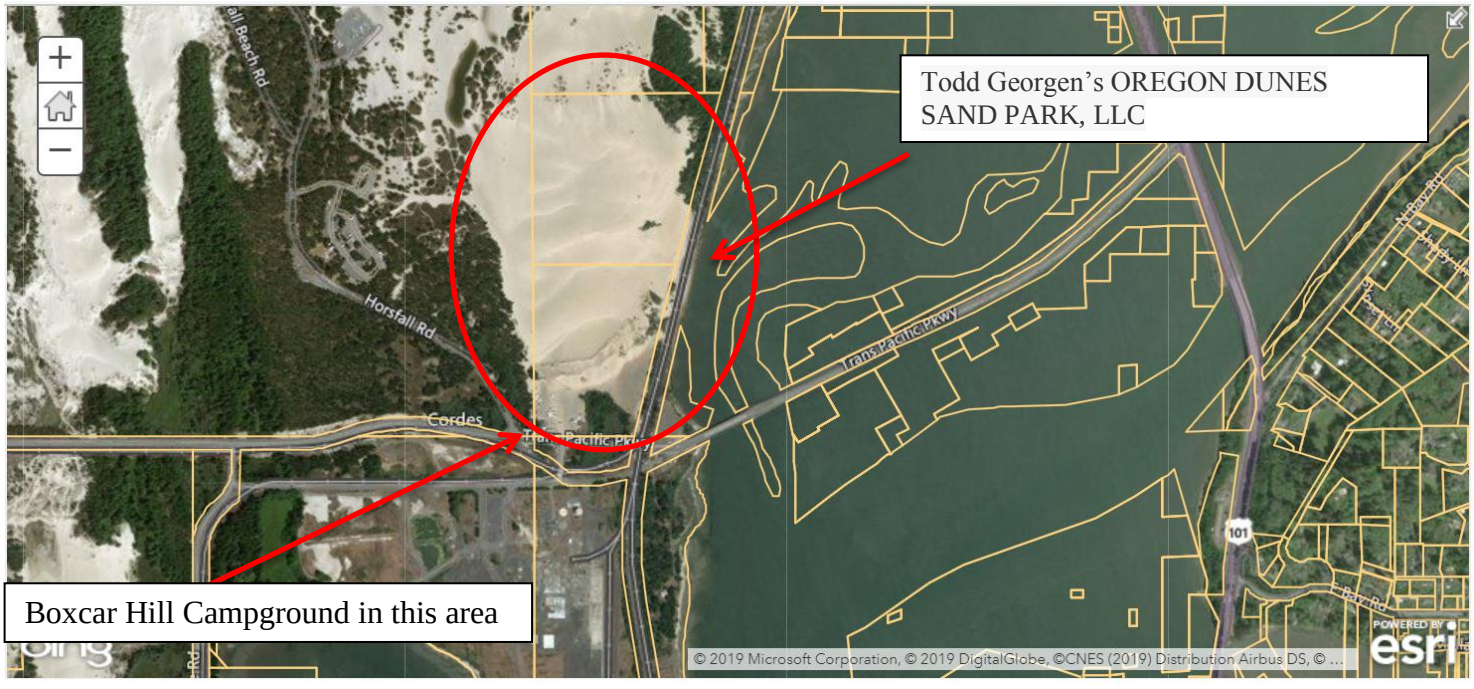
- *Approximately 10 acres at the Box Car Hill site will be used for temporary offices, parking, and a temporary concrete batch plant.*

Page 123 of Jordan Cove's 1-12-2016 submittal under file No. HBCU-15-05 had the following diagram:

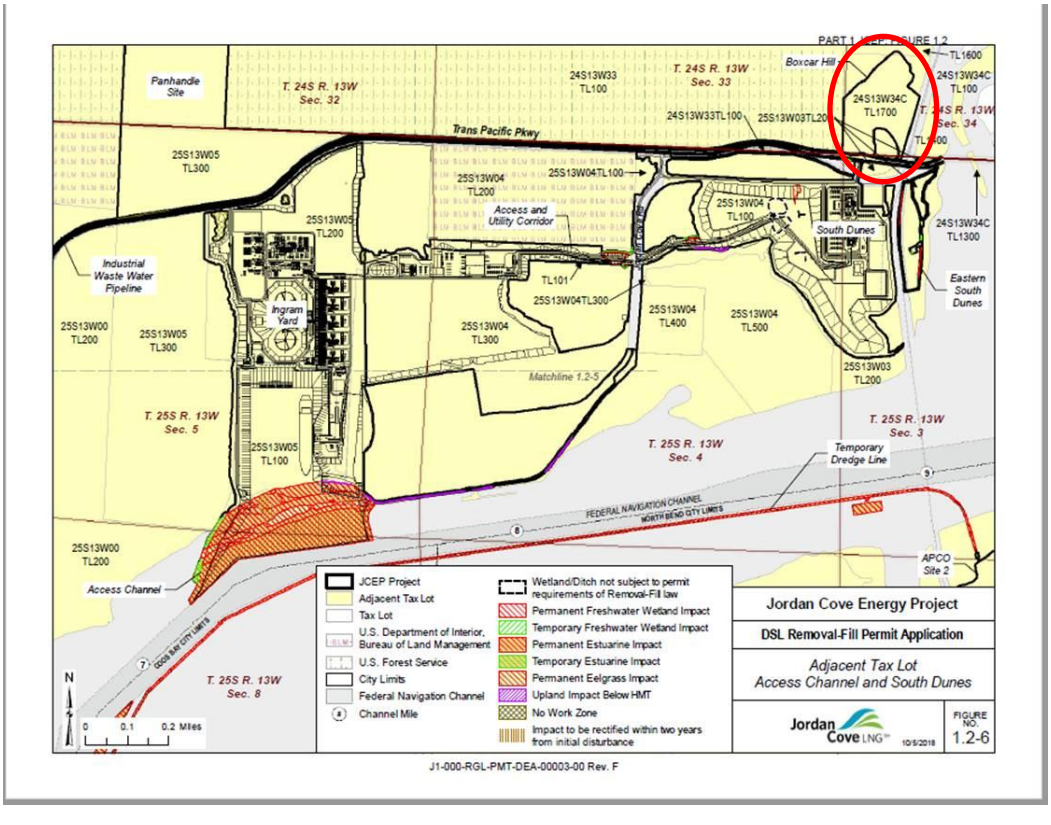


There are 65 spaces at the Boxcar Hill camping area that is directly next to the proposed Jordan Cove South Dunes Power Plant. Jordan Cove was leasing the entire Boxcar Hill Campground on the North Spit with plans to sign a 99 year lease in the near future due to this area being a noise sensitive property if their proposed LNG facility should proceed. (***See Exhibit 43***) The Boxcar Hill camping area is currently used all year long by people visiting the Dunes. Taking it out of service would detour future visitors from coming to camp, ride and play in our Dunes National Recreational Area. This would cost jobs and negatively cause harm to our tourism and recreation industries.

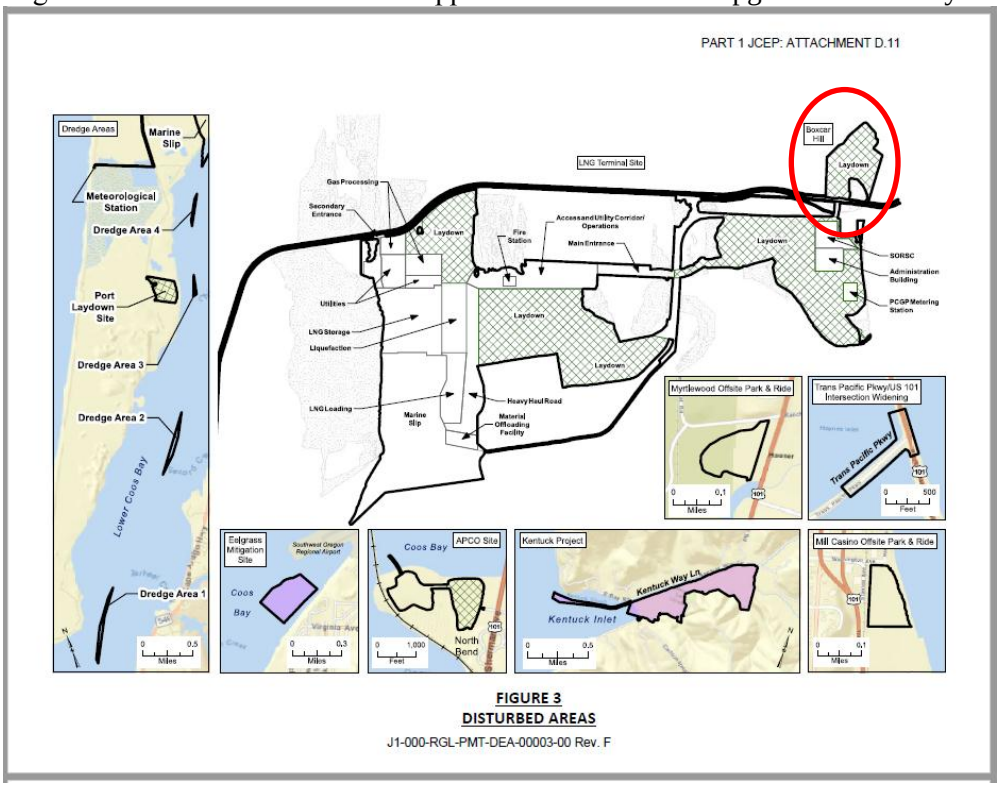
The heavily used Boxcar Hill camping area below would be negatively affected by the Jordan Cove project should it proceed:



Below from page 59 of JC DSL application: Note Boxcar Hill designation – appears to include campground for sure.



Page 749 from Jordan Cove's DSL application shows the campground to be a laydown area for Jordan Cove:



Boxcar Hill Campground Expansion Project -vs- JCEP Personal Cement Plant

In 2017 Todd Georgen applied for and obtained a permit to extend the Oregon Sand Park Campground and add another 250 Camping spaces.[63]

What Jordan Cove is proposing with their Cement batch plant and offices **will take out some 250 planned Camping sites that had been approved and 65 current camping sites at Boxcar hill campground directly south of the Dunes National Recreation Area**. **This would be a loss of Recreational opportunities for many people**.

There are lots of negative impacts to nearby towns that allow LNG terminals and work camps for the temporary workers. In 2007 when Royal Dutch Shell built an LNG export terminal on Russia's Sakhalin Island an article in Fortune magazine entitled "*Shell Shakedown*" about the Gazprom takeover of the project stated the following with respect to what happened to the locals in that area:

> *…Residents say the company led them to believe that housing for 6,000 construction workers would be located in the town, where it could later be reused by the community, which sorely*

[63] Oregon Sand Park Application:
http://www.co.coos.or.us/Portals/0/Planning/ACU-17-009/application.pdf?ver=2017-05-02-144014-527
Coos County Decision of approval:
http://www.co.coos.or.us/Portals/0/Planning/ACU-17-009/ACU-17-009%20Notice%20of%20Decision%20and%20Staff%20Report.pdf?ver=2017-05-02-144013-753
Amended notice of approval to reflect the correct map of the property:
http://www.co.coos.or.us/Portals/0/Planning/ACU-17-009/amended%20notice%20of%20decision.pdf?ver=2017-05-02-144014-237

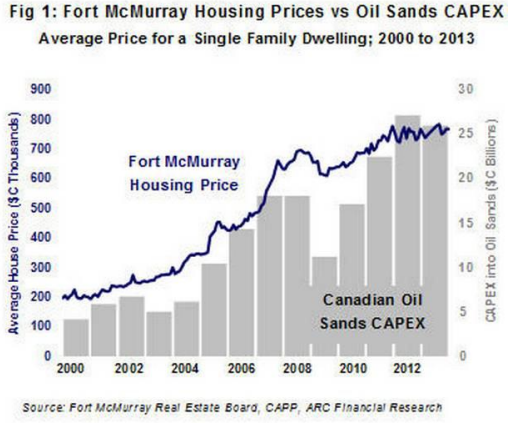
needs it. ***Many people in Korsakov earn less than $300 a month - a sharp contrast to the wealth of Sakhalin Energy employees, many of whom, especially those who come from other countries, make more than $1,000 a day****.*

*But when construction began, Sakhalin Energy built its housing for workers next to the plant itself, inside a one-kilometer safety zone, where it will be illegal for people to live once operations begin. "People here could use this place for their well-being, and it will be demolished," says Elena Lopukhina, director of a Korsakov advocacy group and an assistant to a regional government official, who says that is just one of the emotional issues in the community that have swayed people against Sakhalin Energy. "****The company did everything that was good for them and not good for us****."*

...Still, there are the small things - the $4 pencils and $500 space heaters a customs officer says she saw listed on a Sakhalin import form, the flaunting of money by expatriate staff in downtown nightclubs, the waxed and polished Land Cruiser fleet lined up in an island parking lot ***- that give Sakhaliners a feeling of watching a party in their living room to which they haven't been invite.***

If Sakhaliners think spending is out of control, that could explain why prices in Yuzhno also seem divorced from reality... ***…houses can cost nearly $1 million, while a one-bedroom apartment can rent for $3,000 a month, comparable to New York City prices****. A five-minute taxi ride costs $12, and lunch at a casual Indian restaurant starts at about $40 per person.*[64]

Housing and rent prices in the Coos Bay Area would most definitely go up as they have done in other areas. **This would not be in the public interest.** The following graph published in the Globe and Mail on Feb 24, 2014 [65] also confirms this to be the case:



[64] *Shell shakedown - Fortune's Abrahm Lustgarten reports how the world's second-largest oil company lost control of its $22 billion project on Russia's Sakhalin Island*. By Abrahm Lustgarten; Fortune; February 1, 2007
http://archive.fortune.com/magazines/fortune/fortune_archive/2007/02/05/8399125/index.htm

[65] *Fort McMurray's house prices vs. capital spending in the oil sands*
Special to The Globe and Mail; Published Monday, Feb. 24 2014
http://www.theglobeandmail.com/report-on-business/fort-mcmurrays-house-prices-vs-capital-spending-in-the-oil-sands/article17066573/?from=17066648

Pollution / GHG / Ocean Acidification / Domoic Acid Impacts

Increased LNG Shipping Impacts would not be in the Public Interest.

Increased volumes of LNG being exported would mean increased volumes of actual shipments. DEQ representatives stated at a February 18, 2015 public meeting held in Coos Bay, Oregon, that the **LNG ships were not a part of their permit analysis**.[66] Despite this statement, Jordan Cove's LNG ships and all their necessary support vessels would contribute to a significant additional air pollution impact on local residents in the North Bend/Coos Bay area and would also contribute to an increase in the risk of LNG hazards to our area. Jordan Cove has totally downplayed these impacts and the information found in the Oil Change International report (***See Exhibit 55***), despite the fact that particulate pollutants from the life cycle impact of the Jordan Cove LNG export project would increase respiratory and immune health problems in the local community. Children and elders are especially at risk.[67] Many people have moved here to get away from such impacts. A local (now retired) medical doctor who specialized in allergies has submitted several letters over the years expressing his concerns with Jordan Cove's air particulates and the affect it would have on the local population here. Those particulates would increase with increased export volumes.

Increased Impacts on Shellfish / Food Production / Greenhouse Gasses / Domoic Acid would not be in the Public Interest

Increasing LNG export volumes would increase lifecycle greenhouse gas (GHG) emission volumes as a direct result of the LNG project. This would contribute to increased planet warming impacts, increased droughts, wildfires and ocean acidification. Droughts have already negatively affected our U.S. west coast states and our food production.[68] **Ocean Acidification has already cost the Oregon and Washington shellfish industries $110 million, and endangered some 3,200 jobs**.[69] (***See Exhibits 44, 45 and 46***)

George Waldbusser, an Oregon State University marine ecologist and biogeochemist, said the spreading impact of ocean acidification is due primarily to increases in greenhouse gases. Waldbusser recently led a study that documented how larval oysters are sensitive to a change in the "saturation state" of ocean water - which ultimately is triggered by an increase in carbon dioxide. The inability of

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[66] *Oregon DEQ: Jordan Cove pollution estimates not accepted on blind faith - LNG opponents urge DEQ to consider impact of Jordan Cove's projected greenhouse gas emissions;* Chelsea Davis ; The World ; Feb 18, 2015

[67] ● Dr. Joseph T Morgan Oct 9, 2012, testimony concerning pollutants and the JCEP project: http://elibrary.FERC.gov/idmws/file_list.asp?accession_num=20121018-5150

● "*An Exploratory Study of Air Quality near Natural Gas Operations*" - Peer-reviewed and accepted for publication by Human and Ecological Risk Assessment (November 9, 2012).
Theo Colborn, Kim Schultz, Lucille Herrick, and Carol Kwiatkowski
http://www.endocrinedisruption.com/files/HERA12-137NGAirQualityManuscriptforwebwithfigures.pdf

[68] ● *"Drought prompts cuts to farm irrigation in California, Oregon"* Portland, Ore. | By Courtney Sherwood
http://www.reuters.com/article/2015/05/15/us-usa-drought-farming-idUSKBN0O02BL20150515

● *Oregon Governor Expands Drought Declaration* - Reuters 04/06/2015 By Courtney Sherwood
http://www.huffingtonpost.com/2015/04/06/oregon-drought_n_7014406.html

● *Kitzhaber declares drought emergency for four southern Oregon counties, opens up assistance*
By Bruce Hammond; Feb 14, 2014;
http://www.oregonlive.com/environment/index.ssf/2014/02/kitzhaber_declares_drought_eme.html

[69] *Study outlines threat of ocean acidification to coastal communities in the U.S.*; Feb 23, 2015
http://today.oregonstate.edu/archives/2015/feb/study-outlines-threat-ocean-acidification-coastal-communities-us

ecosystems to provide enough alkalinity to buffer the increase in CO_2 is what kills young oysters in the environment.

> "*This clearly illustrates the vulnerability of communities dependent on shellfish to ocean acidification," said Waldbusser, a researcher in OSU's College of Earth, Ocean, and Atmospheric Sciences and co-author on the paper. "We are still finding ways to increase the adaptive capacity of these communities and industries to cope, and refining our understanding of various species' specific responses to acidification*."
>
> "Ultimately, however, **without curbing carbon emissions, we will eventually run out of tools to address the short-term and we will be stuck with a much larger long-term problem**," Waldbusser added. [31] (Emphasis added)

Researchers and fishermen worry ocean acidification *could* be impacting Dungeness crab life cycles already. Dungeness crab represents the most valuable fishery on the West Coast, generating $167 million[70] in ex-vessel value in California in 2011. Like oysters, Dungeness crabs are a key driver of the fishing industry, so lucrative that many fishermen rely on them to guarantee an annual income. Fishermen have seen increased closures due to elevated levels of domoic acid, directly linked to lower ocean Ph levels as temperatures rise.[71] (***See Exhibit 46***) These closures have been devastating to the fishing industry. As reported on Feb 19, 2018,[72] the industry was already in a volatile state due to the latest start to a crab season most Oregon fishermen have ever remembered. These problems are likely to get worse in the coming decades.

Commercial crabbers in Oregon and California are suing 30 fossil fuel companies, claiming they are to blame for climate change, which has hurt their industry. The Pacific Coast Federation of Fishermen's Associations filed a lawsuit in November of 2018 with the California State Superior Court in San Francisco against gas and oil companies including Chevron and Exxon Mobil. [73] In October, **the Pacific Coast Federation of Fishermen's Associations successfully sued the U.S. Environmental Protection Association to protect salmon and steelhead trout populations in the Columbia River basin from warm water temperatures caused by dams and climate change**. (***See Exhibit 47***)

Researchers have found that **elevated concentrations of CO2 in seawater can disrupt numerous sensory systems in marine fish**. This is of particular concern for Pacific salmon because they rely on olfaction during all aspects of their life including during their homing migrations from the ocean back to their natal streams.[74] (***See Exhibit 48***)

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[70] https://www.psmfc.org/crab/2014-2015 files/DUNGENESS_CRAB_REPORT_2012.pdf
[71] https://newfoodeconomy.org/ocean-acidification-oysters-dungeness-crabs/
[72] http://theworldlink.com/news/local/new-legislation-to-localize-domoic-acid-closures/article_6933a960-59bd-5949-a9cc-c6191ae31de8.html
[73] *Oregon and California crabbers sue fossil fuel companies* Updated Nov 27, 2018 https://www.oregonlive.com/pacific-northwest-news/index.ssf/2018/11/oregon_and_california_crabbers.html
[74] Williams CR, Dittman AH, McElhany P, et al. *Elevated CO2 impairs olfactory‐mediated neural and behavioral responses and gene expression in ocean‐phase coho salmon (Oncorhynchus kisutch)*. Glob Change Biol. 2018;00:1–15. https://doi.org/10.1111/gcb.14532 November 2018

NEGATIVE IMPACTS ON OTHER RURAL BUSINESSES

Seneca Jones Timber Company LLC is a family owned company that owns forest land to supply fiber to its sawmill facilities that provides living wage jobs for over 300 employees. This is twice as many jobs as what Jordan Cove is proposing. Their business operations extend and employ a multitude of independent contractors and contribute importantly to the local economies in Lane, Douglas and Coos counties. The proposed Pacific Connector pipeline would affect nearly 2,600 acres of their forest lands that would be negatively affected in several ways by the PCGP. Seneca Jones filed a Motion with the FERC where they have discussed in detail the detrimental consequences on their business from loss of timber, increase in invasive species and wildfires. The potential for invasive species to spread to their property requires mitigation to maintaining tree growing sites and increases their operational costs. (***See Exhibit 49***) Fred Messerle and Sons, along with Yankee Creek Forestry, also explained the many problems with the proposed Pacific Connector Gas pipeline on rural independent timber companies in documents submitted to Coos County under File No. HBCU-10-01. (***See Exhibit 50 and 51***)

Bill Gow, a Rancher and impacted landowner, has also written about multiple problems with the proposed pipeline and what it would do to his working ranch. His business, home and wetlands would clearly suffer harm. (***See Exhibit 52***) More permanent jobs are being put at risk than what the Jordan Cove project is offering. This is a clear violation of:

OAR 141-122-0020 Policies:

5) The Department ***will not grant an easement*** *if:*

(a) As a result of its circulation for public comment of the application for easement as described in OAR 141-122-0050(3) it determines that ***the proposed use or development would unreasonably impact uses or developments proposed or already in place within the requested area****; ...* (Emphasis added)

PROJECT DOES NOT HAVE INDEPENDENT UTILITY

The Jordan Cove Project does not have Independent Utility as required under 141-085-0565 (3)(a)

141-085-0510 Definitions:

(*43) "Independent Utility" as used in the definition of "project," means that the project accomplishes its intended purpose without the need for additional phases or other projects requiring further removal-fill activities.*

A project is considered to have independent utility if it would be constructed absent the construction of other projects in the project area. Portions of a multi-phase project that depend upon other phases of the project do not have independent utility. Phases of a project that would be constructed even if the other phases were not built can be considered as separate single and complete projects with independent utility. The Jordan Cove project would require a 229 transmission pipeline, channel navigational alterations, a utility corridor, and several mitigation projects, one in another estuarine district. The project also requires substation upgrades, a worker camp, a safety and resource center along with a multitude of other project components. It does not have independent utility.

Jordan Cove's DSL Application on electronic page 676 states:

- *Approximately 38 acres at the Port Laydown site will be utilized for temporary laydown during construction.*

The Oregon International Port of Coos Bay Strategic Plan from July 2015 [75] shows the area of the Port's proposed Oregon Gateway project on electronic page 155:
(Page 27 of 54 BergerABAM, A14.0083.00 Facility Condition Assessment for Strategic Business Plan May 2015)

Photograph reference: Google Earth

Figure 2. North Spit properties

At Electronic page 61 of the Port's Strategic Plan also list the Port's proposed Oregon Gateway Multipurpose / Multimodal Cargo Terminal project:
(Page 48 of BergerABAM, A14.0083.00 Strategic Business Plan July 2015 DRAFT)

Oregon Gateway[a] Multipurpose/ Multimodal Cargo Terminal.	2015 – 2020	TBD	Timing of multipurpose/multimodal cargo terminal depends on Jordan Cove: this site will be used for construction laydown for Jordan Cove project	North Spit

This clearly states that "*Timing of multipurpose/multimodal cargo terminal depends on Jordan Cove: this site will be used for construction laydown for Jordan Cove project*."

The Port of Coos Bay's budget that was published on May 19, 2017,[76] states on page 9 :

> *The Department's 2017-18 primary focus will be on:*
>
> *1. Manage the Coos Bay 204(f) Ship Channel Modification Permitting Project.*
> *2. Safety and Security for Port assets and staff.*
> *3. Conduct evaluation of Port properties and infrastructure within the Bay.*

75 https://static1.squarespace.com/static/569e6f1176d99c4f392858c4/t/58b489d89f74562a52de8425/1488226796269/Strategic+Business+Plan+web.pdf

76 Port of Coos Bay FY 2017/2018 Budget Message by Hans Gundersen, CFO; May 19, 2017 https://static1.squarespace.com/static/569e6f1176d99c4f392858c4/t/594affd4ff7c50974dc3044d/1498087382779/Adopted+Budget+2017-18.pdf

*4. **Support operational objectives for the Jordan Cove LNG project**.*
5. Support permitting for Port projects.

*The Port Operations Department main project is included in the Special Projects Fund (The Coos Bay Channel Modification Study). Projected expenses are $4.1 million for the upcoming year, and is provided by a combination of State of Oregon grants **and a project reimbursement agreement with the Jordan Cove LNG Project**.* (Emphasis added)

The Port of Coos Bay is stating very clearly that their objectives are to "*Support operational objectives for the Jordan Cove LNG project*" and while they are doing this, other, more appropriate developments are NOT being supported or helped. All the dollars that come into our area from travel, fishing, crabbing, clamming and recreation are being harmed in this process.

PacificCorp has filed a land use application for a Substation Replacement Project on Jordan Cove's property under Coos County File No. ACU-18-050. This obviously is being done for the Jordan Cove project but many people may not even know about it because the application is under PacificCorp's name.

REASONABLE PROJECT ALTERNATIVES WERE NOT CONSIDERED

A wide range of alternatives should have been considered and analyzed in a viable EIS process that was completed prior to this application being processed by Coos County. Reasonable Alternatives were detailed in scoping comments submitted to the FERC in July of 2017 (***See Exhibit 53***). The EIS analysis should include a vast array of renewable energy alternatives to the LNG Project,[77] along with alternative pipeline routes, terminal designs and locations.[78]

Why should Coos County allow such an extensive Removal-Fill permit for a project that IS NOT PROVEN TO BE VIABLE or that has not been determined by Environmental Review under NEPA to be the best alternative?

On August 31, 2018, FERC Issued Environmental Schedules for 12 Pending U.S. LNG Terminal Applications.[79] All of the LNG projects affected by FERC's August 2018 issuances of regulatory schedules could be a reasonable alternative to the Jordan Cove project. They are listed as: Freeport Train 4 (CP17-470), Port Arthur (CP17-20), Driftwood LNG (CP17-117), Corpus Christi (CP18-512), Texas LNG (CP16-116), Gulf LNG (CP15-521), Rio Grande LNG (CP16-454),

[77] https://elibrary.ferc.gov/idmws/file_list.asp?accession_num=20170710-5423:
026FERC_Exb8_100_Oregon_Wind_Water_Solar-by-2050.PDF
026FERC_Exb9_Renewable_Energy_Alternative_Options.PDF
[78] https://elibrary.ferc.gov/idmws/file_list.asp?accession_num=20170710-5423:
026FERC_Exb20_Braddocks_Power Point Slide #17 to NWPPA.PDF
026FERC_Exb21_Weyerhaeuser_Hunting_Map.PDF
026FERC_Exb22_Alternative_PCGP_Route_Ver1_Weyco.PDF
026FERC_Exb23_Alternative_PCGP_Route_Ver2_Weyco.PDF
026FERC_Exb24_Alternative_PCGP_Route_Ver3_Weyco.PDF
026FERC_Exb25_Alternative_PCGP_Route_Ver4_SoOre.PDF
026FERC_Exb26_Alternative_JCEP_PCGP_Route_Ver5.PDF
026FERC_Exb27_AlternativeJCEPSitingLocation_Ver6.PDF
[79] http://elibrary.FERC.gov/idmws/file_list.asp?accession_num=20180831-3076

Jacksonville Eagle (CP17-41), Annova LNG (CP16-480), Plaquemines (CP17-66), Jordan Cove (CP17-495), and Alaska LNG (CP17-178).

In September the LNG Law Blog published a notice that the Alaska LNG project and Exxon Mobil had signed agreements for Alaska LNG Supplies.[80] According to the press release, the parties anticipate finalizing long-term gas sales agreements to purchase Exxon Mobil's share of 30 Tcf of gas from the Prudhoe Bay and Point Thomson units. The Prudhoe Bay field is one of the largest oil and gas fields in North America. The proposed Alaska LNG Project consists of an 800-mile pipeline, a liquefaction facility, and an LNG export terminal, among other things.

Other LNG projects already in the works include the development of the Sempra Energy Energía Costa Azul (ECA) liquefaction-export project in Baja California, Mexico. Sempra Energy announced in November 2018 that they had entered into a Memorandum of Understanding (MOU) that provides the framework for cooperation in the continued development of the Cameron LNG liquefaction and export project under construction in Cameron Parish, La., and the Energía Costa Azul (ECA) liquefaction-export project.[81]

In Oct 2018 LNG Canada announced that its joint venture participants – Shell, Petronas, PetroChina, Mitsubishi Corporation and KOGAS – had taken a Final Investment Decision (FID) to build the LNG Canada liquefaction and LNG export facility in Kitimat, British Columbia.[82]

So why does Pembina, a Canadian pipeline company with no experience in exporting LNG, think they will be able to outmaneuver all these seasoned LNG industry players in a flooded International LNG gas market?

Increasing exports of hydro-fracked Canadian gas would not be in the public interest.

Jordan Cove's February 6, 2018 U.S. Department of Energy Amendment Application page 4 and 5 states:

> *JCEP also hereby informs DOE/FE of a change in corporate ownership from what was described in the Applications. On October 2, 2017, Pembina Pipeline Corporation ("Pembina"), a Canadian corporation, acquired 100 percent of the outstanding shares of Veresen Inc., **JCEP's parent entity. JCEP is now a wholly owned subsidiary of Pembina**.* (Emphasis added)

For some time now Pembina has been trying to develop a West Coast export facility in order to export Canadian oil and gas products. Pembina's CEO Michael (Mick) Dilger has publicly stated that the purpose of their company is to get **Canadian hydrocarbons to the rest of the world**. [83] Dilger feels

[80] *Alaska and ExxonMobil Sign Agreement for Alaska LNG Supplies* Posted on Sep 12, 2018 https://www.lnglawblog.com/2018/09/alaska-and-exxonmobil-sign-agreement-for-alaska-lng-supplies/?utm_source=vuture&utm_medium=email&utm_campaign=vuture-emails

[81] *Sempra Energy Signs MOU with Total S.A. for LNG Terminal Development* Posted on Nov 7, 2018 https://www.lnglawblog.com/2018/11/sempra-energy-signs-mou-with-total-s-a-for-lng-terminal-development/?utm_source=vuture&utm_medium=email&utm_campaign=vuture-emails

[82] *LNG Canada Announces a Positive Final Investment Decision* Posted on Oct 2, 2018 https://www.lnglawblog.com/2018/10/lng-canada-announces-a-positive-final-investment-decision/?utm_source=vuture&utm_medium=email&utm_campaign=vuture-emails

[83] *Pembina Pipeline's new purpose: Get Canada's oil and gas to the rest of the world* ;By Claudia Cattaneo;

the shorter travel time to Asian markets versus the U.S. Gulf Coast would mean lower transportation costs for its LNG. (***See Exhibit 54***) He has become frustrated by Canada's infrastructure gridlock and sees the U.S. as a way to get Canadian gas and oil projects to Asia. His company would be in direct competition with U.S. Gulf Coast LNG terminals that are already in operation.

In December a joint venture of Pembina Pipeline Corp., Calgary, and Petrochemical Industries Co. KSC (PIC) of Kuwait was announced which involves a proposed 1.2 billion-lb/year grassroots, integrated propane dehydrogenation and polypropylene (PP) complex in Sturgeon County, Alberta, Canada.[84] In November Pembina announced construction of a $260M propane export facility on B.C.'s Watson Island.[85] The facility, which still requires regulatory and environmental approvals, would use rail cars, not pipelines, to transport propane to the facility from Alberta and B.C.. It is expected to be in service by mid-2020. Pembina dropped a proposal in February of 2016 to build a $500 million propane oil terminal in Portland, Oregon, after the City of Portland determined Pembina had not made a strong enough case as it relates to meeting Portland's environmental standards.[86]

The same could be said for the proposed Jordan Cove project. In January 2018, a new report released by Oil Change International, which looked at a full accounting of greenhouse gas emissions, found that the Jordan Cove Project would result in over 36.8 million metric tons of carbon dioxide equivalent (CO2e) per year.[87] (***See Exhibit 55***) This is some 15.4 times the emissions from Oregon's last remaining coal-fired power plant, the Boardman Coal plant, which is set to be retired by 2020 due to climate and air pollution concerns. When only considering the in-state emissions alone, **the Jordan Cove project would end up being the largest source of greenhouse gas emissions in the state by 2020**. The project would make it impossible for Oregon to achieve Governor Kate Brown's goal to have Oregon's climate reductions line-up with the targets of the Paris Accords, as well as the emission reduction goals enshrined by the Oregon legislature in 2007. The Oil Change Briefing paper found no evidence to support an assumption that gas supplied by the LNG project would replace coal in global markets

The fact is renewable energy is challenging both coal and gas-fired power generation on a cost-of-energy-produced basis. A peer-reviewed study published in the international journal Energy[88] found that LNG exports from the U.S. could raise emissions in destination markets by triggering additional energy demand rather than displacing coal, and by diverting capital from renewable energy development. According to the U.S. Department of Energy, **exporting natural gas from the U.S. to Asia could end up being worse from a greenhouse gas perspective than if China simply built a**

February 16, 2018; http://business.financialpost.com/commodities/energy/pembina-pipelines-new-purpose-get-canadas-oil-and-gas-to-the-rest-of-the-world

[84] *Canada Kuwait Petrochemical advances Alberta PP complex*; By Robert Brelsford – Houston; Dec. 5, 2017; https://www.ogj.com/articles/2017/12/canada-kuwait-petrochemical-advances-alberta-pp-complex.html

[85] *Pembina Pipeline approves construction of $260M propane export facility on B.C. island*; The Canadian Press; November 30, 2017 ; http://calgaryherald.com/business/energy/pembina-pipeline-approves-construction-of-260m-propane-export-facility-on-b-c-island

[86] *Pembina officially pulls away from $500M Portland propane terminal* By Andy Giegerich - Portland Business Journal; Feb 29, 2016 https://www.bizjournals.com/portland/blog/sbo/2016/02/pembina-officially-pulls-away-from-500m-portland.html

[87] *Jordan Cove LNG and Pacific Connector Pipeline Greenhouse Gas Emissions Briefing*; Oil Change International; January 2018 http://priceofoil.org/content/uploads/2018/01/JCEP_GHG_Final-Screen.pdf

[88] *US liquefied natural gas (LNG) exports: Boom or bust for the global climate*?; Energy Volume 141, 15 December 2017, Pages 1671-1680; https://www.sciencedirect.com/science/article/pii/S0360544217319564?via%3Dihub

new power plant and burned its own coal supplies.[89] In addition, Oil Change International found that due to wind and solar now being cheaper than coal and gas in many regions, new gas capacity often displaces new wind and solar rather than old coal.[90]

This would not be in the public interest!

The International Gas Union (IGU) reported in their 2018 World LNG Report (***See Exhibit 56 for select pages***)[91] that a record 293.1 million tonnes (MT) of LNG was traded in 2017. This marks an increase of 35.2 MT (+12%) from 2016; while global liquefaction capacity reached 369 million tonnes per annum (MTPA) as of March 2018. Despite a 75.9 MTPA of excess LNG being produced over what was traded, an additional 92.0 MTPA of liquefaction capacity was under construction as of March 2018.

According to the IGU World Gas LNG Report – 2018 Edition page 5:

> *…In engineering progress, the first floating liquefaction (FLNG) project came online in Malaysia, with additional FLNG projects set to come online during 2018 and beyond. Although no new liquefaction capacity had been added in Russia since Sakhalin 2 LNG T2 in 2010, the first train of Yamal LNG achieved commercial operations in March 2018 and* ***is expected to ultimately add 17.4 MTPA of liquefaction capacity***. (Emphasis added)

Even with an increase of 8.5% a year in export trading capacity (a 5% increase occurred from 2015 to 2016 (13.1 MT) and a 12% increase occurred from 2016 to 2017 (35.2 MT)), it would take 6.7 years for an average 8.5% increase per year (5% + 12% / 2 years = 8.5% average) (75.9MTPA + 92.0 MTPA = 167.9MTPA excess LNG divided by 25.MTPA (293.1 MTPA in 2017 x 8.5% = 25.MTPA yearly increase) = 6.7yr) until the current excess of LNG volumes would likely be absorbed into the international LNG export markets. The current excess of LNG available for export would take until 2024 to be absorbed using these calculations (2018 + 6yr = 2024), and that is 'without' the addition of other projects that are currently in the works ahead of Jordan Cove.

For example, in May of 2018 Petronas bought a 25% share of LNG Canada Project a year after it cancelled its own proposed Pacific NorthWest LNG project at Port Edward, British Columbia due to market conditions. Now that the deal is completed, LNG Canada's ownership interests are Shell at 40%, Petronas at 25%, PetroChina at 15%, Diamond LNG Canada (an affiliate of Mitsubishi Corporation) at 15%, and Kogas Canada LNG at 5%.[92] LNG Canada announced in October 2018 that it would go ahead with its $40-billion export facility on the West Coast.[93] Given the players involved,

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[89] https://www.washingtonpost.com/news/wonk/wp/2014/06/09/exporting-u-s-natural-gas-isnt-as-clean-as-you-think/?utm_term=.6abe89578728

[90] *BURNING THE GAS 'BRIDGE FUEL' MYTH;* Oil Change International; November 2017; This analysis provides five clear reasons why fossil gas is not a "bridge fuel." It shows that even with zero methane leakage, gas is not a climate change solution.;

[91] https://www.igu.org/sites/default/files/node-news_item-field_file/104747-IGU-Book-Final_062818.pdf

[92] *Petronas Buys 25% Share of LNG Canada Project* Posted on May 31, 2018 https://www.lnglawblog.com/2018/05/petronas-buys-25-share-of-lng-canada-project/?utm_source=vuture&utm_medium=email&utm_campaign=vuture-emails

[93] *$40B LNG facility is the light at the end of a long tunnel for Canada's natural gas sector* Struggling gas industry faces several more years of low prices until new Asia export project is built Kyle Bakx · CBC News · Posted: Oct 03, 2018 https://www.cbc.ca/news/business/lng-canada-gmp-firstenergy-arc-1.4847377

the LNG Canada west coast LNG project has a far greater chance of development over the Jordan Cove Project. Jordan Cove does not have the financial means necessary to build a greenfield LNG project, nor the experience. Pembina, Jordan Cove's parent company, has already announced that it intends to seek partners for both the pipeline and liquefaction facility thereby reducing its 100 percent ownership interest to a net ownership interest of between 40 and 60 percent. [94]

According to the IGU World Gas LNG Report – 2018 Edition, page 65:

> ***Will LNG Contracting and Liquefaction FIDs Take Shape This Year? Investment decisions on new LNG supply have come to a near standstill over the last two years. In 2017, only one large-scale LNG project reached FID – the 3.4 MTPA Coral South FLNG in Mozambique – marking the lowest volume of sanctioned LNG in nearly twenty years****. This follows the trend established in 2016, when only two projects reached FID for a combined sanctioned capacity of 6.3 MTPA. This contrasts with the high level of FIDs in 2011–15, when annual sanctioned capacity exceeded 20 MTPA. The slowdown in investments is partly a reflection of the wider trend of cutting back capital expenditure across the oil and gas industry during the commodity downturn, but can also be attributed to the lack of contracting activity from buyers hesitant to sign long-term deals in the face of growing near-term LNG supply.* ***Without long-term contracts, new liquefaction projects will find it challenging to proceed***
>
> ***The total volume and number of LNG contracts signed has declined consistently for the past three years****. In 2017, only one firm long-term contract was signed that was tied specifically to a proposed project working toward FID (Edison's SPA at Calcasieu Pass LNG), as the majority of deals completed were portfolio contracts (67% of all firm deals signed). The lower total volume of contracts is not only a result of fewer contracts being signed, but is also tied to the trend of smaller volume contracts – the average size of contracts signed has dropped, which means that marketing timelines extend as they seek to fill the entire capacity…*

The IGU World Gas LNG Report – 2018 Edition, page 19 states:

> *Projects planning to reach an FID in the near term are competing for customers willing to sign foundational contracts ahead of the large near-term buildup in supply, leading to a general slowdown in contracting activity over the last several years. Demand uncertainty, capital budget constraints, and a desire for shorter-term contracts are challenges facing project sponsors, many of which are emphasising their cost structures and location-specific advantages in an attempt to move forward.*

The IGU World Gas LNG Report – 2018 Edition, page 26 states:

> *Expectations of a well-supplied market in the near term, greater demand uncertainty, and lower oil and gas prices have reduced the number of FIDs and long-term foundational contracts that have been signed over the past two years. A number of projects were delayed or cancelled in 2016 and 2017 owing to project economics and partner alignment challenges in the current market environment.* ***Given the large number of projects aiming to reach an FID in 2018, further culling of projects is expected****.* (Emphasis added)

[94] *Pembina Pipeline Corporation Announces 2019 Capital Program and Guidance;* By Pembina Pipeline Corporation Dec 10, 2018; https://www.prnewswire.com/news-releases/pembina-pipeline-corporation-announces-2019-capital-program-and-guidance-300762358.html

Page 29 states:

> ***Only one US project – Calcasieu Pass LNG – signed a binding long-term contract in 2017, with Italy's Edison. Shell, the project's first customer, signed an SPA for 1 MTPA in 2016 and agreed in February 2018 to purchase an additional 1 MTPA****. Two binding contracts between Cheniere and China's CNPC were also signed in early 2018. In conjunction with a contract signed with Trafigura in early 2018, the deals are expected to support an FID at Corpus Christi LNG T3. The CNPC agreements stem from a memorandum of understanding (MOU) signed last November and* ***are the first long-term deals signed between a US LNG developer and Chinese companies***

The IGU World Gas LNG Report – 2017 Edition[95] stated that there was 879 MTPA of proposed liquefaction capacity, as of January 2017: (page 5)

> *New Liquefaction Proposals: Given abundant gas discoveries globally and the shale revolution in the US, proposed liquefaction capacity reached 890 million tonnes per annum (MTPA) by January 2016. This figure fell slightly to 879 MTPA at end-January 2017 in an attempt at rationalization with market demand.* ***More of these projects will not go forward as demand remains far below this ambitious target****; particularly as ample pipeline supply - by Russia and Norway to Europe, and the US to Mexico - reduce the need for LNG in those markets. Additionally, Egypt will experience a drastic reduction in LNG demand as the Zohr field comes on-line and preferentially supplies the domestic market. In fact, there is potential for Egypt to again be a significant LNG exporter. The areas with the largest proposed volumes include the US GOM, Canada, East Africa, and Asia-Pacific brownfield expansions.*

The IGU World Gas LNG Report – 2017 Edition, page 27 states:

> *Apart from high liquefaction costs, greenfield projects proposed in Western Canada and Alaska require lengthy (300 miles or more) pipeline infrastructure. Integrated Western Canadian projects have announced* ***cost estimates of up to $40 billion****, while in Alaska the estimate was revised downward in 2016 to approximately $45 billion from $45-65 billion previously*

The IGU World Gas LNG Report – 2017 Edition, page 31 states:

> *Eleven[18] projects have now moved through the FERC environmental review process, including four in 2016: Cameron LNG T4-5, Elba Island, Golden Pass, and Magnolia LNG. While there is greater clarity regarding expected timelines and costs, FERC also denied approval of an LNG export project for the first time in 2016.* ***FERC did not approve the 6 MTPA Jordan Cove LNG project and its associated pipeline, citing concerns that the pipeline had not demonstrated sufficient commercial need to outweigh landowner concerns****. After an unsuccessful appeal, the sponsor plans to submit a new application.* ***Most other projects in the continental US do not require significant new pipeline infrastructure and so may be less likely to face the same obstacles***. (Emphasis added)

[95] https://www.igu.org/sites/default/files/103419-World_IGU_Report_no%20crops.pdf

The IGU World Gas LNG Report – 2017 Edition, page 60 states:

> **How will existing LNG contracts come under pressure in 2017?**
> *** * * ***
> *Gas demand has slowed quicker than anticipated in some importing markets – particularly in Asia Pacific. As a result, buyers in those countries have to be creative to manage over-commitments.* ***China has been over-contracted since 2015*** *and this may continue in 2017 given the large additions of Australian capacity and associated contracts with the Chinese NOCs. Beyond the NOC's, smaller LNG players in China – e.g., ENN Energy, Beijing Gas, Jovo Group – are becoming more active players.* ***In the same way, other Asian LNG buyers in Japan and South Korea are potentially overcommitted in the near term and many have formed trading businesses to manage their portfolios****.*

INTERNATIONAL MARKET DOES NOT SUPPORT HIGHER LEVELS OF U.S. LNG EXPORTS

There are too many competitors in the international market currently and there is a glut of LNG that will last for many years. Due to this fact a higher level of scrutiny and independent review **is required in order to prevent an overbuild of pipelines and LNG facilities**, particularly when considering the negative impact these facilities can have on U.S. Manufacturing, jobs in other industries, American landowners and rural / low-income communities. The FERC, U.S. Department of Energy and the DSL should fully consider the American public interest and need and not just what is best for corporations who may or may not have the best interest of Americans.

It should be very clear that liquefied natural gas export plans face years of oversupply.[96] In addition, the press reported in August of 2016 that Japan's JERA had plans to cut long-term LNG contracts by 42 percent by 2030.[97]

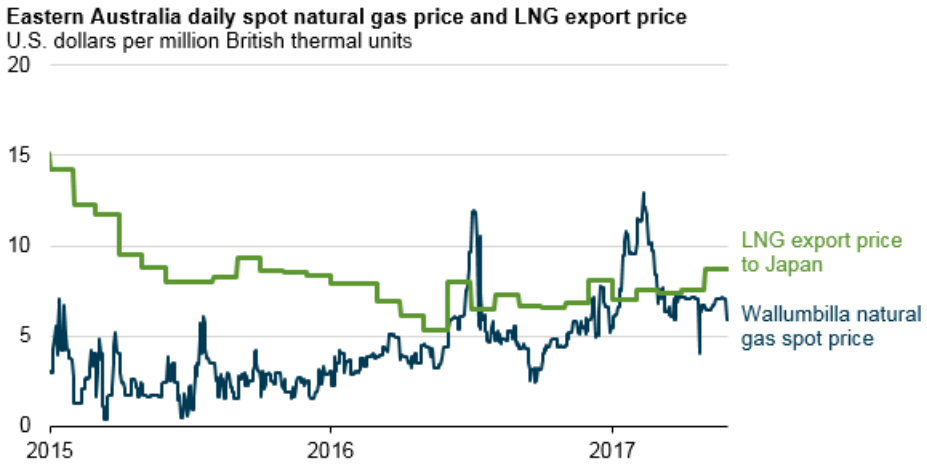
The U.S. Energy Information Administration (EIA) reported on October 20, 2017 in an article titled, "*Australian domestic natural gas prices increase as LNG exports rise"* that:

> *Australia became the world's second-largest exporter of liquefied natural gas (LNG) in 2015 and is likely to overtake Qatar as the world's largest LNG exporter by 2019****. As Australia's LNG exports have increased, primarily from LNG projects in eastern Australia, the country has had natural gas supply shortages in eastern and southeastern Australia and an increase in domestic natural gas prices****...*[98] (Emphasis added)

[96] Liquefied Natural Gas Export Plans Face Years of Oversupply (July 18, 2017) https://www.bna.com/liquefied-natural-gas-n73014461925/

[97] Japan's Jera plans 42 percent cut in long-term LNG contracts by 2030 (August 10, 2016) https://wwwreuters.com/article/us-lng-jera/japans-jera-plans-42-percent-cut-in-long-term-lng-contracts-by-2030-idUSKCN10L117

[98] EIA Australian domestic natural gas prices increase as LNG exports rise Oct 20, 2017 https://www.eia.gov/todayinenergy/detail.php?id=33412#



The EIA October 20, 2017 Report also states:

> *The U.S. experience with growing LNG exports is unlikely to be similar to Australia's.* ***More than half of Australia's total natural gas production was exported in 2016****. Australia's Energy Market Operator expects Australia's LNG exports will account for 80% of domestic production by 2020. Despite the rapid LNG export capacity growth, EIA's latest Annual Energy Outlook 2017 (AEO2017) Reference case—which reflects current policies and regulations—projects U.S. LNG exports to amount to only about 9% of total domestic natural gas production by 2020.* (Emphasis added)

This EIA statement above concerning U.S. impacts is misleading due to the fact that as of April 9, 2018 the U.S. Dept of Energy (DOE) had accepted applications for **LNG export volumes totaling 57.14 Bcf/d to Free Trade Agreement Nations and 54.46 Bcf/d to Non-Free Trade Agreement Nations**.[99] Most of these volumes have already been approved either directly or conditionally.

The U.S. EIA reported in an August 9, 2017 article titled, *United States expected to become a net exporter of natural gas this year* [100] that:

> *Natural gas production in the* ***United States increased from 55 billion cubic feet per day (Bcf/d) in 2008 to 72.5 Bcf/d in 2016****. Most of this natural gas—about 96% in 2016—****is consumed domestically****.* (Emphasis added)

The U.S. EIA was wrong to not consider in their analysis that the U.S. DOE has ALREADY APPROVED LNG Exports in excess of the EIA projected U.S. production and is HEADING THE U.S. FOR WORSE THAN WHAT IS HAPPENING IN AUSTRALIA where unfettered LNG Exports have tripled natural gas prices, harmed domestic consumers and caused manufacturing plants that rely on natural gas to close, throwing people out of work.[101]

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[99] https://www.energy.gov/sites/prod/files/2018/06/f53/Summary%20of%20LNG%20Export%20Applications_0.pdf

[100] EIA *United States expected to become a net exporter of natural gas this year* - August 9, 2017 https://www.eia.gov/todayinenergy/detail.php?id=32412

[101] • *Everyone's a Loser in Australia's LNG Boom* By David Fickling March 26, 2017 https://www.bloomberg.com/gadfly/articles/2017-03-26/everyone-s-a-loser-in-australia-s-lng-boom

• *IECA to Congress: Australians' Gas Bills Soar Amid LNG Export Boom* (view letter to U.S. House / Senate) October 3, 2014 http://www.ieca-us.com/wp-content/uploads/10.03.14_Australia-LNG-Article_Senate1.pdf http://www.ieca-us.com/wp-content/uploads/10.03.14_Australia-LNG-Article_House2.pdf

This is NOT IN THE PUBLIC INTEREST.

On July 11, 2017, The Industrial Energy Consumers of America (IECA) President, Paul N. Cicio, issued the following statement following a July 11, 2017 Wall Street Journal story titled "*How Energy-Rich Australia Exported Its Way Into an Energy Crisis*."[102]

> *"We applaud the Wall Street Journal on their story on how the Australian government failed the public and their manufacturing sector by failing to put consumer safeguards in place. Foreign consumers benefited from LNG exports, while Australian consumers saw natural gas prices skyrocket. Shortages forced power plant outages and manufacturers were forced to cut back production or shutdown. Manufacturers continue to leave the country, resulting in the loss of good paying jobs.*
>
> *"The U.S. is following the same failed policy. There are no consumer protections in place on U.S. LNG exports. Currently, a breathtaking volume equal to 71 percent of 2016 U.S. natural gas supply has been approved for exports.*
>
> *"The Energy Information Administration's (EIA) Annual Energy Outlook (AEO) 2017 forecasts that cumulative demand in 2050, only 33 years away, indicates that 56 percent of all U.S. natural gas resources in the lower 48 states will be consumed. Natural gas is unique and a valuable resource for manufacturing jobs and investment, for which there is no substitute.*
>
> *"**The U.S. still has time to put common-sense consumer safeguards in place now**." [103]*
> (Emphasis added)

On August 16, 2017, the Industrial Energy Consumers of America (IECA) sent a letter to Secretary Perry which outlines how the previous Administration failed to properly conduct public interest determinations on LNG application volumes for export to non-free trade agreement (NFTA) countries, as required under the Natural Gas Act (NGA).[104] On August 22, 2017, the Industrial Energy Consumers requested that the DOE conduct a legal review of this matter.[105] **We continue to stand in**

• *Australian Nitrogen Fertilizer CEO Confirms Unfettered LNG Exports Have Tripled Natural Gas Prices* April 15, 2014 http://www.ieca-us.com/wp-content/uploads/04.15.14_Australia-Congressional-Communication_Incitec-Pivot.pdf

[102] The Wall Street Journal "*How Energy-Rich Australia Exported Its Way Into an Energy Crisis*"

> *The world's No. 2 seller abroad of liquefied natural gas holds so little in reserve that it can't keep the lights on in Adelaide—a cautionary tale for the U.S.* By Rachel Pannett; July 10, 2017
>
> > *On a sweltering night this February, the world's No. 2 exporter of liquefied natural gas didn't have enough energy left to keep its own citizens cool.*
> > *A nationwide heat wave in Australia drove temperatures above 105 degrees Fahrenheit around the city of Adelaide on the southern coast. As air –conditioning demand soared, regulators called on Pelican Point, a local gas –fueled power station running at half capacity to crank up….*

https://www.wsj.com/articles/how-energy-rich-australia-exported-its-way-into-an-energy-crisis-1499700859

[103] IECA Press Release "*WSJ Story Illustrates How Australian LNG Exports Resulted in a Domestic Shortage for Consumers*" July 11, 2017 http://www.ieca-us.com/wp-content/uploads/07.11.17_WSJ_Australian-LNG-Story-Press-Release.pdf

[104] Manufacturers Justify LNG Export Approval Moratorium: 58 to 71 Percent of all Natural Gas Could be Consumed by 2050 (view press release) Aug 16, 2017 http://www.ieca-us.com/wp-content/uploads/08.16.17_Perry-Two-Exports-Scenarios-Letter_FINAL.pdf

[105] Manufacturers Request DOE to Conduct Legal Review of LNG Export Applications to NFTA Countries (view press release) Aug 22, 2017 http://www.ieca-us.com/wp-content/uploads/08.22.17_Letter-to-DOE-Legal.pdf

solidarity with the Industrial Energy Consumers of America (IECA) and fully support their urgent request for a legal review. See ***Exhibit 28*** for IECA's January 30, 2019 report, "*Excessive Liquefied Natural Gas (LNG) Exports to NFTA Countries are not in the Public Interest and Increase Natural Gas and Electricity Prices to Consumers.*"

On March 1, 2018 Reuters reported in an article titled "*U.S. trade group urges halt to further LNG export applications*"[106]

> *A U.S. manufacturing trade group on Thursday urged the U.S. Department of Energy not to approve further liquefied natural gas (LNG) export applications, citing concerns that* ***the country was consuming and exporting the fuel at a faster clip than it was finding new resources****.*
>
> ***The agency's approval of LNG export volumes equal almost 70 percent of 2016 U.S. demand for periods of 20 to 30 years, which cannot possibly be in the "public interest****," the Industrial Energy Consumers Of America (IECA) said….* (Emphasis added)

Why on earth would we harm our American manufacturing base like this, not to mention American consumers, property owners and rural and low income communities?

THE U.S. MUST AVOID THE ENERGY MISTAKES OF THE PAST

> *"Those who cannot remember the past are condemned to repeat it."* - Philosopher George Santayana

In the 1970's, the Washington Public Power Supply System (WPPSS, aka "whoops") began the largest nuclear power plant construction project in U.S. history: reactors 1, 2, and 4 at Hanford, and reactors 3 and 5 at Satsop, west of Olympia. By 1983, cost overruns, delays, a slowing of electricity demand growth, concerns over nuclear power, and several other factors, one having to do with geology, led to cancellation of two plants and a construction halt on two others. The agency in the end defaulted on $2.25 billion of municipal bonds, which is still the largest municipal bond default in U.S. history. The monumental court case which followed took nearly a decade to fully resolve. At Satsop, construction was well along on plants 3 and 5, with plant number 3 being about 85% complete, with the reactor in place when the default occurred. **Cooling towers, 480 feet tall, never saw a breath of steam, and demolition costs are estimated to be in the hundreds of millions. Ironically, the energy blackouts predicted by the industry to justify the building of the plants never occurred after the projects were stopped**.

[106] https://www.reuters.com/article/us-lng-tradegroup/u-s-trade-group-urges-halt-to-further-lng-export-applications-idUSKCN1GD6FY

Photo above: Defunct Satsop Nuclear Power Plant sits as an eyesore on the horizon – April 2017 [107]

The New York Times
Failure of Power Project Creates a Blank Canvas[108]
By Carey Goldberg
Published: March 09, 1997

> *"…A colossal white elephant that cost several billion dollars but was never finished, the plant was part of the boondoggle that led to the biggest municipal bond default in United States history, when the Washington Public Power Supply System — known locally as Whoops — defaulted on $2.25 billion in bonds in 1983.*
>
> *The plant has been sitting here in limbo since then — too expensive to tear down, too unwieldy to be bought, too costly to maintain in mothballs forever.* ***There is no demand for the expensive energy it would have produced, and proposals to turn it into everything from a nuclear weapons demolition plant to a theme park have come and gone****…"* (Emphasis added)

The New York Times / Elma Journal
Can Unused A-Plant Become a Princess?[109]
By Jessica Kowal
Published: April 21, 2006

> "*…ELMA, Wash. — The stillborn Satsop nuclear plant,* ***a product of cheap-power fantasies run amok*** *here a quarter-century ago, stands ominously on a hill in this economically depressed corner of western Washington.*

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[107] https://www.youtube.com/watch?v=ZxW7_jPB4CE By marantz2010; Published on Apr 10, 2017
[108] http://www.nytimes.com/1997/03/09/us/failure-of-power-project-creates-a-blank-canvas.html?pagewanted=all&src=pm
[109] http://www.nytimes.com/2006/04/21/us/21nuke.html

Because local officials cannot afford to tear the plant down, they are trying to market their nuclear lemon as job-creating lemonade. Sometimes, though, even they sound doubtful*....”* (Emphasis added)

Clean Energy Development Creates Far More Jobs Than Fracked Gas Developments.

Each dollar invested in clean energy creates two to seven times as many jobs as spending that dollar on fossil fuels.[110] Businesses, elected officials, and community residents in Oregon have been working together to speed our transition to cleaner energy like solar and to greater energy efficiency. The export of fracked gas threatens all the progress we are making.

CUMULATIVE IMPACTS NOT CONSIDERED

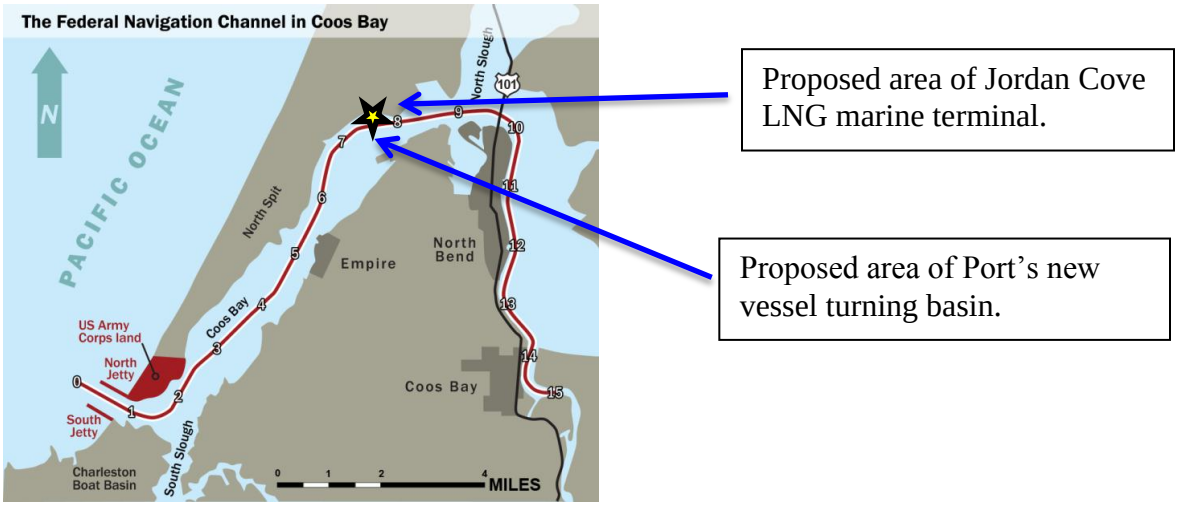
Cumulative Impacts with other proposed Projects must be considered.

- Port of Coos Bay dredging proposal for Channel Deepening and Widening involving the removal of 18 mcy of dredge material under Corps review
- City of North Bend California Street Boat Ramp Replacement including dock and piling replacement under Corps 47964 / DSL APP0061371[111]
- City of North Bend Pacific Connector Gas Pipeline application under North Bend File No. FP2-18 and CBE 3-18 and also DSL permits.
- Southport Forest Products LLC / R/F for 5 mooring dolphins adjacent to Barge Berth (Piling, RemFill) / DSL APP0061629[112]
- City of Coos Bay R/F for replacing 498 feet of existing sewer line parallel to Coal Bank Slough. (ErosionCon,Pipeline,RemFill,Util) / DSL APP0061778[113]
- Various other recent DSL projects at www.statelandsonline.com

The Port of Coos Bay channel modification project would include a new vessel turning basin with a designed length of 1,400 feet, width of 1,100 feet, and depth of -37 feet; constructed approximately between River Miles 7.3 to 7.8.

Obviously, the proposed Jordan Cove LNG Export Project would benefit greatly from the Port of Coos Bay's proposed Channel Modification project including the proposed new vessel turning basin. I do not understand, however, why the Port would propose deepening and widening the Coos Bay shipping channel to -45 feet and then develop a turning basin that is only -37 feet. The -37 foot turning basin negates the need for the shipping channel to be any deeper than the -37 feet that it currently

[110] http://www.sightline.org/2016/02/16/why-oregon-needs-the-healthy-climate-act/
[111] http://statelandsonline.com/index.cfm?fuseaction=Comments.AppDetail&id=61371
[112] https://lands.dsl.state.or.us/index.cfm?fuseaction=Comments.AppDetailLF&id=61629
[113] https://lands.dsl.state.or.us/index.cfm?fuseaction=Comments.AppDetailLF&id=61778



Immense Dredging would have Negative Impacts on the Coos Bay and Bay Users.

It is still not clear as to whether the Oregon International Port of Coos Bay and Jordan Cove have made enough dredge disposal site allowance needed for maintenance dredging as was indicated in a June 8th 2009 and an August 18, 2015 comment letter(s) that were sent to the FERC from the United States Environmental Protection Agency, REGION 10, Seattle, WA 98101-3140.[114] (***See Exhibit 58*** *for the August 2015 letter*.)

TURBIDITY MODELING FLAWED

Jordan Cove did not actually do test of the static tidal action with respect to sedimentation transport; they used computer modeling that is obviously severely flawed. The modeling methodology used by Moffatt & Nichols (the contractor hired to do the modeling) is fundamentally flawed for a number of reasons. The most important reason is they treat Coos Bay as a 2D problem when it is in fact 3D due to vertical variability in temperature, salinity, and sediment concentrations in the water column. This will affect how and where suspended sediment is transported by the currents in the bay, it will also affect the concentration of the suspended sediment.

Their flawed modeling makes it look like the sediments will only go a short distance out from the dredging activity when that would NOT be the case. In addition, deepening of the tidal channels actually increases estuarine circulation and suspended sediment concentration (SSC). **(*See Exhibit 59*)** At what point is a critical amount of dredging performed which raises deposition levels beyond an acceptable criterion? The negative impacts from dredging can sometimes last for many months and even in some cases years (***See Exhibits 60, 61 and 62***)

A covering of less than 50 microns (1/500th of an inch) is enough to impair the attachment of O. lurida larvae to hard substrate. It has long been known that a thin layer of sedimentation impairs the attachment of oyster larvae to hard substrate. According to the U.S. Army Corps of Engineers: U.S. Army Corps of Engineers (December 1998) "Technical Note DOER-E2: Environmental Windows Associated with Dredging Operations."

[114] http://elibrary.FERC.gov/idmws/file_list.asp?accession_num=20090617-0016 and http://elibrary.FERC.gov/idmws/file_list.asp?accession_num=20150901-0057

"Although a thin layer (several mm) of sediments may not be fatal to adult oysters, it may affect reproduction. Because larval oysters require hard substrata for settlement, the presence of even a few millimeters of sediment covering an oyster reef may inhibit larval recruitment (Galtsoff 1964; McKinney et al.1976)."[115]

Tidal Action in the Coos Estuary is extremely swift. In October of 2014 a construction worker died when he apparently accidentally drove his pickup truck off a work platform at the North Bend McCullough Bridge.[116] His body was found a few hours later some 4 miles from where his truck had entered the water. If a human male body can move that far just from Coos Bay's tidal action, it makes sense to assume that much lighter weight sediments would also move with the swift tidal action in the Coos Bay and essentially would impact the entire estuary. This is another example why independent review by other experts should be brought in by Coos County to confirm these findings being presented by Jordan Cove.

In 1999 Clausen Oysters lost 70 to 75 percent of their oysters when a freighter known as the New Carissa grounded on Horsfall beach about a mile north of the North Spit. The tides brought oil that escaped from the New Carissa into the Coos Bay and in addition to oysters more than 200 birds were killed along with immeasurable damage to local sea organisms. [117] (***See Exhibit 63***)

The Department of Agriculture continually stops oyster harvesting in the bay when certain bacteria levels reach a certain level. It can take anywhere from several days to several weeks for the bay to clear. **Unless appropriate modeling is used it is impossible to make projections of how dredging is going to impact water circulation which affects bacteria levels and how long it takes for it to clear out, among other critical issues**.

Proper testing of tidal muds and dredging soils has also not occurred. Past shipping contaminants including Tributyltin (TBT), arsenic, copper, lead, mercury, nickel, zinc, polycyclic aromatic hydrocarbons (PAHs), and polychlorinated biphenyls (PCBs) could be re-suspended into the Coos Bay harming marine life and business that depend on that marine life. (***See Exhibit 62***) As far as I can tell there are no plans to test for all these contaminants (See Table 9-2 found on electronic page 524 of DSL application). The Roseburg Chip facility berth was tested in 2009 and TBT was detected above the SL1 in the west part of the berth; discrete re-sampling did not detect TBT but dredging was restricted to the eastern portion of the berth anyway. (See electronic page 1015 of Jordan Cove's DSL application.) So these contaminates ARE there in areas right next to the planned project area and proper testing by an independent analysis has yet to be done.

Coos County should consider carefully the analysis that was done by sedimentation expert Thomas Ravens on Jordan Cove's Vladimir Shepsis's Coast Harbor and Engineering report (***See Exhibit 29***) A properly completed EIS / analysis should not just rubber stamp the industry's data.

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[115] U.S. Army Corps of Engineers (May 2005) "Sedimentation: Potential Biological Effects of Dredging Operations in Estuarine and Marine Environments."

[116] "*Florence man killed in McCullough Bridge accident*" By Kurtis Hair, The World Oct 23, 2014; https://theworldlink.com/news/local/florence-man-killed-in-mccullough-bridge-accident/article_2661e38e-5aca-11e4-8e8e-07378b90963a.html

[117] *Shell shock* , June 14, 2010, By Nate Traylor, Staff Writer - The World https://theworldlink.com/news/local/shell-shock/article_389a9be8-77dc-11df-9127-001cc4c03286.htm

Dr. Thomas Ravens who has been modeling hydrodynamics and sediment transport in estuarine environments for 18 years found serious deficiencies in Dr. Vladimir Shepsis's modeling work. Dr. Thomas Ravens states the following on page 2 of his November 13, 2011 report:

> "*Chapters 10 and 11 of Exhibit 4 (entitled Jordan Cove Energy Project and Pacific Connector Gas Pipeline - Volume 2) present sediment transport calculations which purport to show that sediment transport impacts of the proposed dredging project in Haynes Inlet would have minimal impacts. However, close scrutiny of Exhibit 4 shows that there are serious deficiencies in the methodology employed in the sediment transport modeling. Consequently, the finding that there would only be limited impacts is lacking a solid foundation*…." [118/119] (*Emphasis added*)

Dr. Thomas Ravens goes on to outline in his report the most serious flaws under the following subheadings:

> *1. Use of un-validated sediment transport model to establish background conditions.*
> *2. Assumption of spatially uniform sediment size despite data indicating significant heterogeneity*.[5]

INCREASED LNG VESSEL TRANSITS = INCREASED TURBIDITY

Physical movement of LNG vessels 950 feet in length and 150 feet wide and drafting 40 feet of water will greatly disturb the channel and its physical structure. The two - three 80 ton tugboats pulling or pushing the vessel will cause even more turbidity and erosive wave action.

The LNG Terminal could generate a maximum of 120 LNG carrier calls per year, although the average is expected to be between 110 and 120 LNG carriers per year. [Jordan Cove RR #1 page 25 & 26] **This amounts to 220 to 240 harbor disruptions per year during high slack tides which are also prime tides used currently by other bay users.**

The 240 trips up and down the seven and one-half mile channel that are predicted by the applicant would cause the estuary to become more turbid. According to a study done by the Jordan Cove Energy Project,[120] propeller wash velocities from the LNG vessels and tugs would be of similar magnitude to tidal currents in the navigation channel but the potential propeller wash velocities would be somewhat higher than the typical maximum tidal currents in the channel. Compounding negative effects, such as erosion of intertidal lands and shorelines would continually degrade water quality as vessels moved in and out of the bay. Increases in turbidity would negatively impact aquatic plant life, shellfish, and benthic organisms. **It appears these disturbances cannot be abated to the overall detriment of the Coos Bay estuary.**

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[118] When Dr. Ravens refers to 'Exhibit 4,' he is referring to "Technical Report Volume 2 - Jordan Cove Energy Project and Pacific Gas Connector Pipeline, Coastal Engineering Modeling and Analysis, dated March 9, 2011, prepared by Coast & Harbor Engineering, Inc

[119] November 14, 2011: Mark Chernaik, Ph.D., Surrebuttal Report submitted into the record by e-mail on Jan 12. 2015. Exhibit 3: *"Limitations of the Haynes Inlet sediment transport study,"* by Tom Ravens, Ph.D., Professor, Department of Civil Engineering, University of Alaska, Anchorage; November 13, 2011; Page 2,4

[120] 8.0 Summary ; "*Jordan Cove Energy Project* - "*Jordan Cove LNG Terminal Shoreline Erosion Study - Recommendation #15"* M&N Project No. 6753; Document No. 6753RP0002 Rev: 0; (Page 48) Docket No. CP07-444-000 http://elibrary.ferc.gov/idmws/file_list.asp?accession_num=20081205-5122

HISTORICAL SITES AND CULTURAL RESOURCE IMPACTS

The export facility is proposed on the traditional territory of the Confederated Tribes of the Coos, Lower Umpqua, and Siuslaw Indians. The Tribes have known cultural resources at this location and are attempting to monitor and work to the best of their ability to protect those. Construction of the two berth slip, off loading facilities, tanks, and power plant may destroy cultural resources. The linear north-south hill along the east boundary of the proposed facility most likely would have been used by Native Americans for burial sites. **Federal law dictates no impact to such by any federal permitting process, regardless of land ownership.** The adjacent shoreline is littered with historic remnants; it is difficult to understand why no value is attributed.

Photo to right is of a glass artifact found in the tidal areas of the proposed LNG marine terminal in May of 2018. It is unknown what may be just below the surface from past Tribal people that lived in these areas.

Conde B. McCullough Memorial Bridge

The Conde B. McCullough Memorial Bridge, is a cantilever bridge that spans Coos Bay on U.S. Route 101 near North Bend, Oregon. When completed in 1936 it was named the Coos Bay Bridge. In 1947 it was renamed in honor of Conde B. McCullough who died that year. This and 10 other major bridges on the Oregon Coast Highway were designed under his supervision.

The Conde B. McCullough Memorial Bridge replaced ferries that had formerly crossed the bay. The bridge is outstanding for its attention to form and detail, and **has been placed on the National Register of Historic Places in recognition of its design and cultural and economic importance**. Placing a potential pipeline bomb directly under the bridge would not be in line with the protection the bridge has as a registered historical site. The main towers of the Conde B. McCullough Memorial Bridge rise 280 feet (85 m) above the water surface, with curved sway bracing in a Gothic arch style. **The open-spandrel concrete approach arches vary in span from 265 feet (81 m) to 151 feet (46 m)**. The ends of the bridge are marked by pedestrian plazas meant to provide a viewing point for the bridge and to provide access to the shoreline. These plazas are detailed with Art Moderne motifs and are provided with built-in benches. The stairs are descend in sweeping curves to the park below.

Due to the high operating pressure, the proposed Pacific Connector Gas Pipeline hazardous zone would extend out 800 to over 1,000 feet from the center of the proposed pipeline. **It would NOT be acceptable to locate a hazardous pipeline such as this under a historically registered bridge.**

Pacific Connector Gas Pipelines Resource Report #1 that was filed with the FERC on September 21, 2017 states on page 10 the pipeline maximum allowable operating pressure will be increased from 1480 to 1600 psig.

Pacific Connector's 2017 FERC application under 18. GENERAL OPERATING PROVISIONS states:

> *18.3 Pressure Obligations at Receipt Points*
> *Shipper is responsible for ensuring that Scheduled Quantities are delivered to Transporter at the specified Receipt Points at pressures sufficient to allow the Gas to enter the facilities of Transporter,* ***but not at pressures below eight hundred-fifty (850) psig or in excess of the maximum allowable operating pressure*** *of Transporter's facilities at such Receipt Points, unless a lower pressure is otherwise mutually agreed to between Shipper and Transporter with such pressure specified for such Receipt Point in Exhibit A of such Shipper's firm Service Agreement.*

Pacific Connector Gas Pipeline's Gas Quality and Interchangeability Chart filed in with their FERC application also shows the minimum pressure to be 850 psig. By using the graph provided in ***Exhibit 64***, a 36-inch pipeline operating at 850 psig would have a hazard radius of approximately that same distance.

On December 3, 2011, a Williams-Transco pipeline ruptured in Alabama.[121] The explosion was heard more than 30 miles away and flames shot up nearly 100 feet in the air for 90 minutes after the pipeline was shut off. The pipe was a 36″ diameter gathering line. A 43 foot long section blew up and became a missile that landed 190 feet away from the blast site and traveled over the tops of 70 to 80 foot high trees to get to its final resting place. The accident left a crater more than 50 feet wide, destroyed 65 acres of trees and left 5 acres of soil that is like fired clay pottery. The cause was never announced. There was no construction going on so it was assumed to be caused by corrosion.[122] (See photo's below) Since 2006, Williams-Transco has had 35 PHMSA reportable accidents.

[121] http://www.texassharon.com/2012/01/02/pictures-acres-of-devistation-from-williams-gas-pipeline-explosion-in-alabama/
[122] http://spectrabusters.org/2014/01/26/a-36-inch-pipeline-blews-up-in-alabama/


Due to the high operating pressure, the proposed Pacific Connector Gas Pipeline hazard zone would be far greater than the accident noted above.

EARTHQUAKE / TSUNAMI HAZARD ISSUES

The Jordan Cove facility resides in the Cascadia subduction zone and Jordan Cove's LNG Hazardous Burn Zones have been underestimated according to top LNG hazard experts.[123] There is no Evacuation Plan and/or Emergency Response Plan for the facility, particularly if the Transpacific Parkway highway connecting the facility to Highway 101 fails. The LNG storage tanks, power plant and gas processing facility would be constructed on what is currently dredging spoils so its foundation would be on weak foundation soils that are likely to liquefy in the event of a Cascadia subduction earthquake event occurring off our coast here. A 13 year study completed by researchers in 2012 at Oregon State University, and published by the U.S. Geological Survey, concluded that **there is a 40 percent chance of a major earthquake in the Coos Bay, Ore., region during the next 50 years**. And that earthquake could approach the intensity of the Tohoku quake that devastated Japan in March of 2011.[124] (***See Exhibit 26***)

There are no plans on how Jordan Cove or their Fire and Safety Center would protect the Cities across the Bay that would be negatively impacted due to their increase in population and Jordan Cove's

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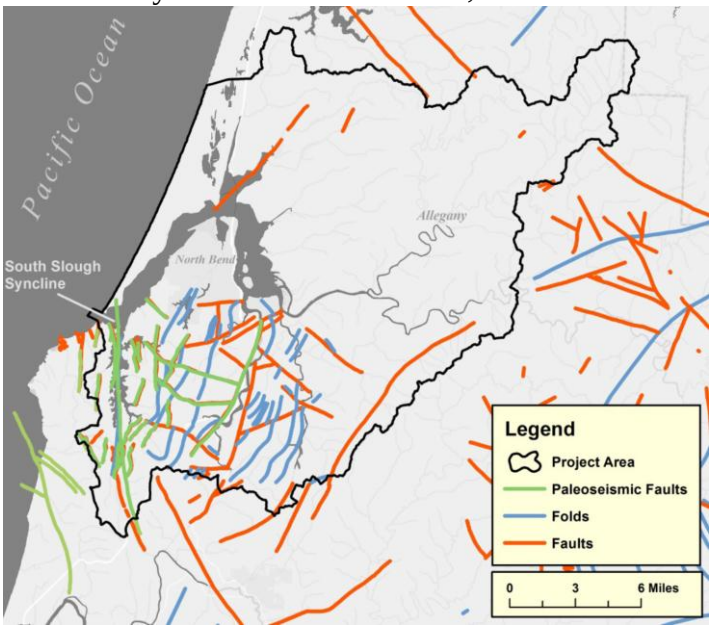
[123] 1-14-2015 - Jerry Havens Ph.D and James Venart Ph.D under CP13-483
http://elibrary.FERC.gov/idmws/file_list.asp?accession_num=20150114-5038
2-6-2015 - Supplementary Comment with Questions by Jerry Havens and James Venart under CP13-483.
http://elibrary.FERC.gov/idmws/file_list.asp?accession_num=20150206-5040

Professor Havens and Professor Venart found significant discrepancies and problems with Jordan Cove's hazard analysis and determined the hazards had been significantly underestimated. Safety measures incorporated in the proposed Jordan Cove LNG terminal actually increase the chance of a catastrophic failure and present a far more serious public safety hazard than regulators have analyzed and deemed acceptable. In their Feb 6, 2015, filing with the FERC, Professor Havens and Professor Venart asked specific questions to the FERC that have yet to be answered.

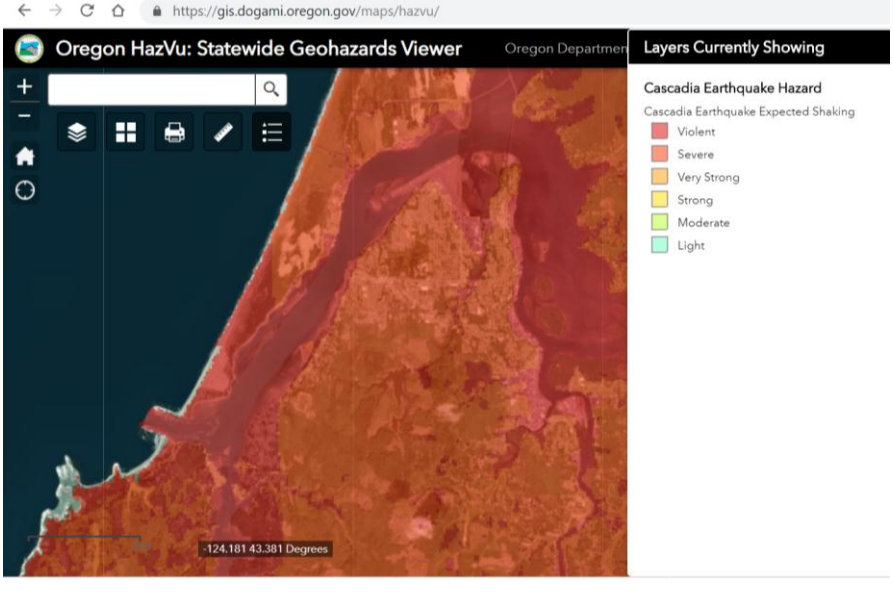
[124] 13-Year Cascadia Study Complete – And Earthquake Risk Looms Large
http://oregonstate.edu/ua/ncs/archives/2012/jul/13-year-cascadia-study-complete-%E2%80%93-and-earthquake-risk-looms-large
Study Link: *Turbidite Event History—Methods and Implications for Holocene Paleoseismicity of the Cascadia Subduction Zone* - By Chris Goldfinger, C. Hans Nelson, Ann E. Morey, Joel E. Johnson, Jason R. Patton, Eugene Karabanov, Julia Gutiérrez-Pastor, Andrew T. Eriksson, Eulàlia Gràcia, Gita Dunhill, Randolph J. Enkin, Audrey Dallimore, and Tracy Vallier - http://pubs.usgs.gov/pp/pp1661f/

proposed LNG hazards. There are no plans for Jordan Cove to hire extra emergency response personnel and in fact the Cities of North Bend and Coos Bay have both indemnified Jordan Cove from any hazard liability.

The Figure below shows faults and folds occurring within project boundaries. Paleoseismic faults are highlighted, designating faults that were the source of significant earthquake (6.0 or greater) in the past 1.6 million years. Data: USGS 2005; DOGAMI 2009. (***See Exhibit 25***)

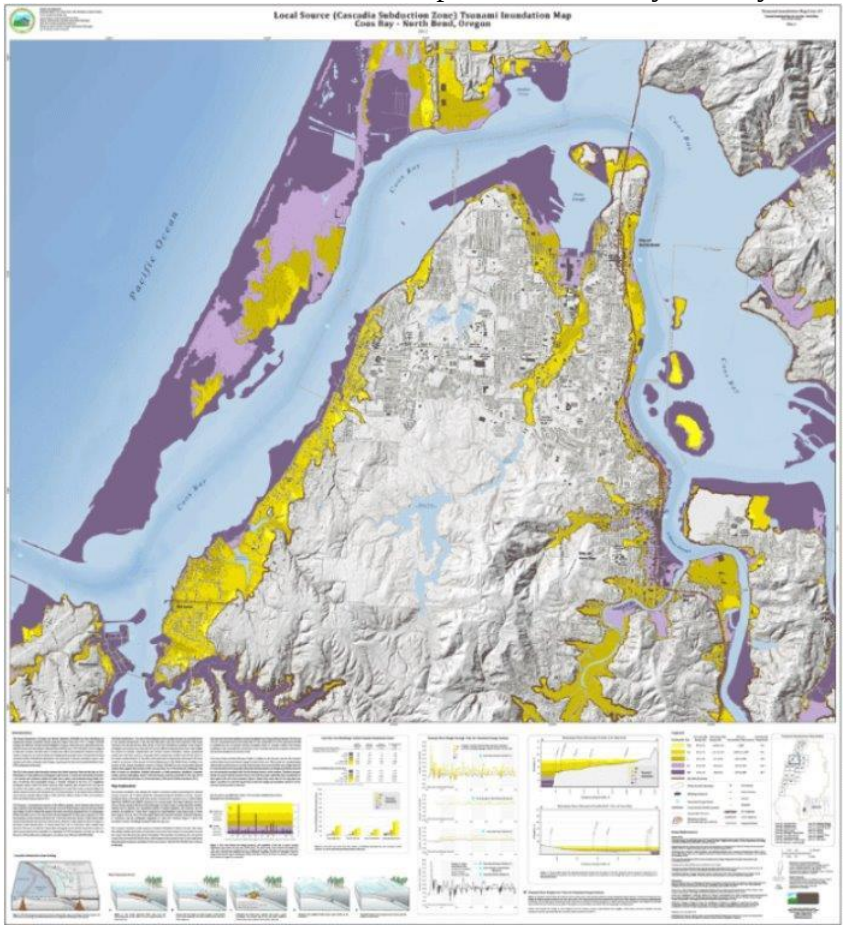


Earthquake Hazard Diagrams below were taken from the Department of Geology and Mineral Industries (DOGAMI) on-line Geohazards Viewer http://www.oregongeology.org/hazvu/



Statewide Planning Goal 7 does not allow the building of hazardous facilities in natural hazard zones. It also requires that applicants consult with the Oregon Department of Geology and Mineral Industries (DOGAMI). The DOGAMI determined in a letter dated November 6, 2017 that Jordan Cove's

Resource Reports were incomplete and deficient in scientific and engineering analyses related to geologic hazards and were not adequate to insure public safety. (***See Exhibit 65***) Below find DOGAMI tsunami inundation map of the Coos Bay Estuary:

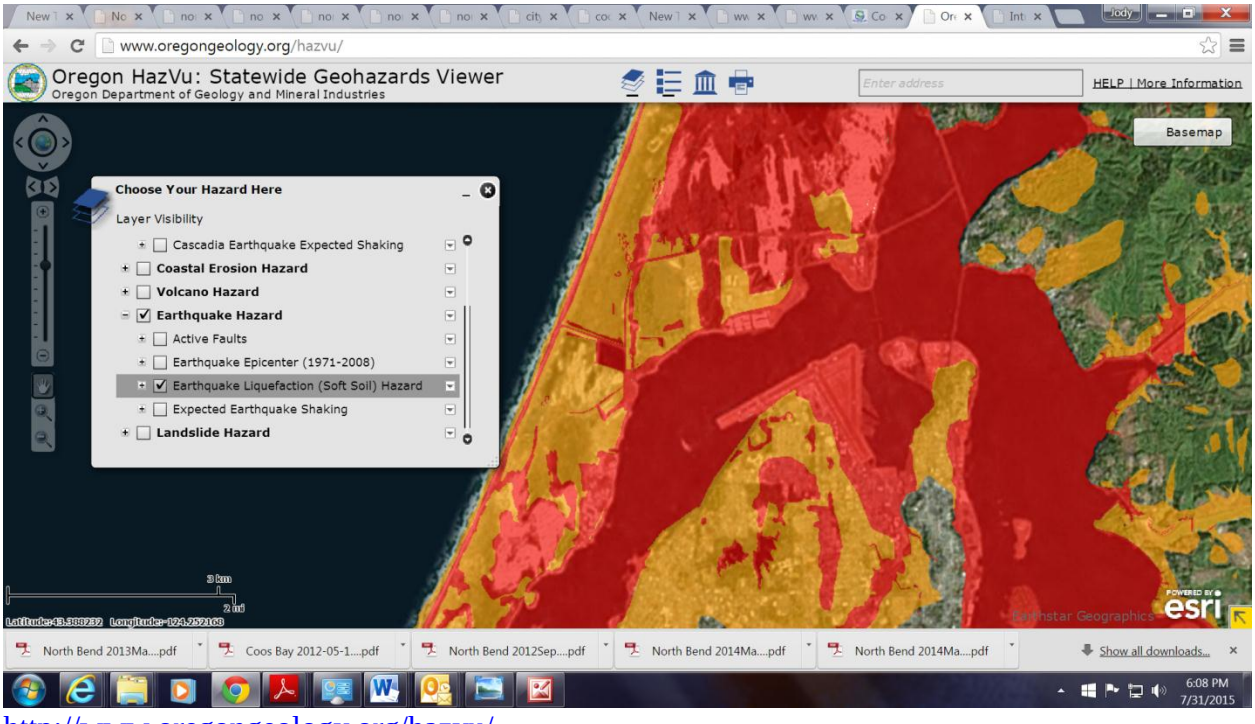


The Jordan Cove / Pacific Connector Project would increase water volume in the Coos Bay which would increase tsunami and flooding hazards. Jordan Cove's tsunami study shows the increased tsunami hazards due to their proposed removal fill on the North Spit. (***See Exhibit 67***) It only makes sense that this would **also** be the case due to their dredge disposal dumping on the APCO sites in North Bend and their Kentuck Mitigation site plans. (***See Exhibits 6 and 66***)

The tsunami that inundated Japan in 2011 proved that tsunami wave heights can and likely will go up much higher than what Jordan Cove is preparing for. USA today reported that:

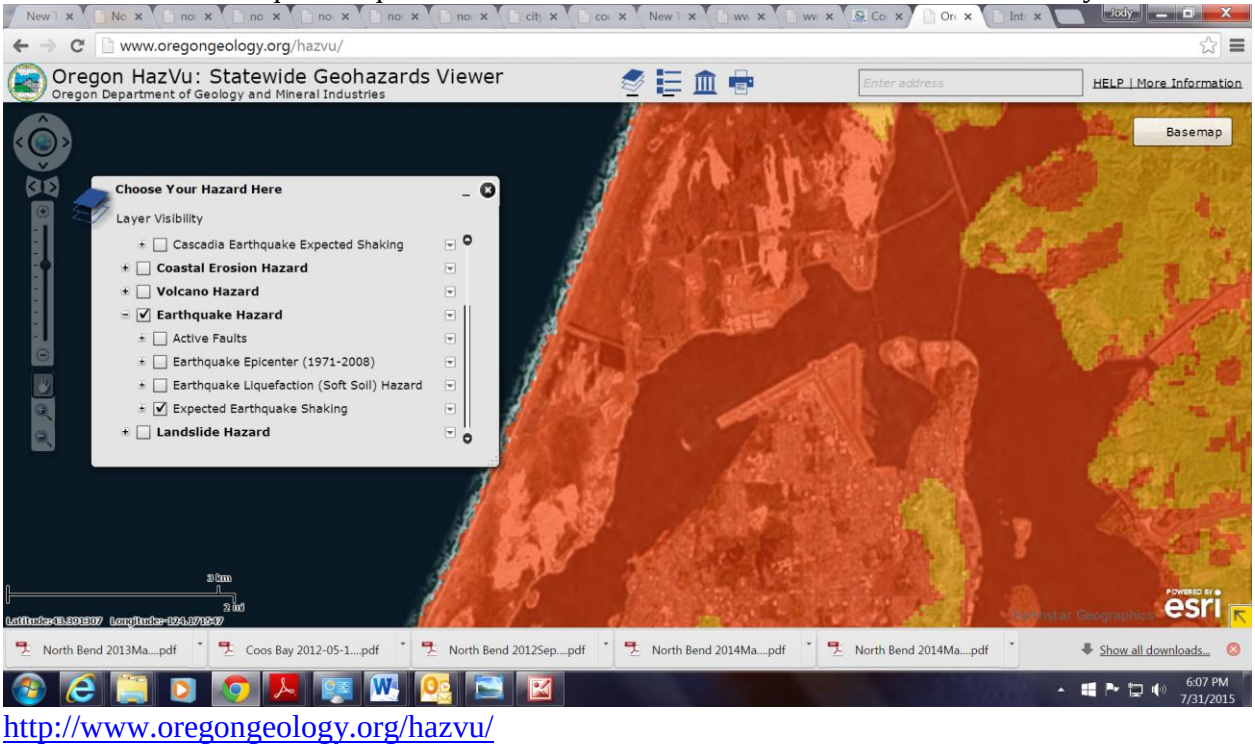
> ***Tsunami waves topped 60 feet or more*** *as they broke onshore following Japan's earthquake, according to some of the first surveys measuring the impact along the afflicted nation's entire coast.* ***Some waves grew to more than 100 feet high, breaking historic records****, as they squeezed between fingers of land surrounding port towns.*[125] (Emphasis added)

[125] *Japan's tsunami waves top historic heights*; By Dan Vergano, USA TODAY; 4/25/2011 http://usatoday30.usatoday.com/news/world/2011-04-24-Japan-record-tsunami-waves.htm



http://www.oregongeology.org/hazvu/

Jordan Cove's Earthquake liqufaction and seismic hazards should be considered fully.



http://www.oregongeology.org/hazvu/

When one also considers that the entire LNG facility would be built on fill and dredging spoil sand that water can easily and quickly penetrate, this confirms the instability of the soils which would liquefy and subside during the projected Cascadia subduction event. The Oregon Resilience Plan that was prepared for the 77th Legislative Assembly on February 2013 reported on earthquake and tsunami impacts from a Cascadia event and **showed subsidence levels of 5 to 9 feet in the Coos Bay area**.

This adds to the extreme hazard and need for there to be a far better evacuation plans in order for lives to be saved. Workers and citizens should not be placed at extreme risk due to by improper planning. An LNG export terminal poses far too much risk and hazard to be built here. (***See Exhibit 27***)

The New Yorker magazine reported on July 20, 2015 the following concerning the projected Cascadia subduction event that is scheduled to occur at any time off our coast here in an article by Kathryn Schultz entitled, "***The Really Big One - An earthquake will destroy a sizable portion of the coastal Northwest. The question is when***." [126]

> *…**By the time the shaking has ceased and the tsunami has receded, the region will be unrecognizable**. Kenneth Murphy, who directs FEMA's Region X, the division responsible for Oregon, Washington, Idaho, and Alaska, says, "**Our operating assumption is that everything west of Interstate 5 will be toast**."…*
>
> *…**FEMA projects that nearly thirteen thousand people will die in the Cascadia earthquake and tsunami**. Another twenty-seven thousand will be injured, and the agency expects that it will need to provide shelter for a million displaced people, and food and water for another two and a half million. "This is one time that I'm hoping all the science is wrong, and it won't happen for another thousand years," Murphy says.*
>
> *In fact, the science is robust, and one of the chief scientists behind it is Chris Goldfinger. Thanks to work done by him and his colleagues, we now know that the odds of the big Cascadia earthquake happening in the next fifty years are roughly one in three. The odds of the very big one are roughly one in ten. **Even those numbers do not fully reflect the danger—or, more to the point, how unprepared the Pacific Northwest is to face it**….*
>
> *…Those who cannot get out of the inundation zone under their own power will quickly be overtaken by a greater one. **A grown man is knocked over by ankle-deep water moving at 6.7 miles an hour. The tsunami will be moving more than twice that fast when it arrives. Its height will vary with the contours of the coast, from twenty feet to more than a hundred feet**. It will not look like a Hokusai-style wave, rising up from the surface of the sea and breaking from above. It will look like the whole ocean, elevated, overtaking land. Nor will it be made only of water—not once it reaches the shore. It will be a five-story deluge of pickup trucks and doorframes and cinder blocks and fishing boats and utility poles and everything else that once constituted the coastal towns of the Pacific Northwest….*
>
> *…OSSPAC estimates that in the I-5 corridor it will take between one and three months after the earthquake to restore electricity, a month to a year to restore drinking water and sewer service, six months to a year to restore major highways, and eighteen months to restore health-care facilities. **On the coast, those numbers go up. Whoever chooses or has no choice but to stay there will spend three to six months without electricity, one to three years without drinking water and sewage systems, and three or more years without hospitals. Those estimates do not apply to the tsunami-inundation zone, which will remain all but uninhabitable for years**….*

[126] *The Really Big One - An earthquake will destroy a sizable portion of the coastal Northwest. The question is when.* By Kathryn Schulz; The New Yorker; July 20, 2015 http://www.newyorker.com/magazine/2015/07/20/the-really-big-one

An Oregonian article that was published on June 26, 2014, entitled, "**Jordan Cove LNG terminal at Coos Bay designed for Cascadia quake, tsunami though hazards remain**," stated among many other things the following:

> *..."It should be an assumption that this will happen during the lifetime of the facility," said Chris Goldfinger, a seismologist at Oregon State University and leading authority on subduction zone earthquakes. "You can engineer anything to survive anything if you put enough money into it, but I've seen a lot of very well-engineered stuff destroyed as if it were Legos."*
>
> *"**From my perspective, and the probabilities, I would certainly have reservations about building one of these terminals down there**," he said…*
>
> *..."**I would say every one of us would be reluctant to suggest a liquefied natural gas terminal on the coast here**," said Anne Trehu, an OSU geologist who studies the Cascadia Subduction Zone….*
>
> *...Run-up and subsidence estimates were considerably less for the smaller, more likely, earthquake scenarios that Zhang modeled. In either case, the study concluded that the height of the proposed design "exceeds the design level tsunami event."*
>
> *Yet Zhang also says "**all the results need to be taken with a grain of salt**." Before the Japanese quake in 2011, he said**, geophysicists had concluded that 15-meter-high waves were not possible at Fukushima**.*
>
> ***Yet that's exactly what happened, resulting in cascading series of failures that ultimately resulted in the meltdown of three nuclear reactors**.*[127] (Emphasis added)

Statewide Planning Goal 7 does not allow the building of hazardous facilities in natural hazard zones. It also requires that applicants consult with the Oregon Department of Geology and Mineral Industries (DOGAMI). The DOGAMI determined in a letter dated November 6, 2017 that Jordan Cove's Resource Reports were incomplete and deficient in scientific and engineering analyses related to geologic hazards and were not adequate to insure public safety. ***(See Exhibit 65)***

EARTHQUAKE AND WEAK FOUNDATION SOILS

Jordan Cove's GRI Report is flawed due to not including all the earthquake faults lines that are in our area, particularly those near the proposed Jordan Cove facility.

Page 130 of Jordan Cove's 1-12-2016 submittal into the Coos County HBCU-15-05 land use proceeding is from their GRI report and shows the following Earthquake Faults that were included in their study with respect to the LNG terminal only:

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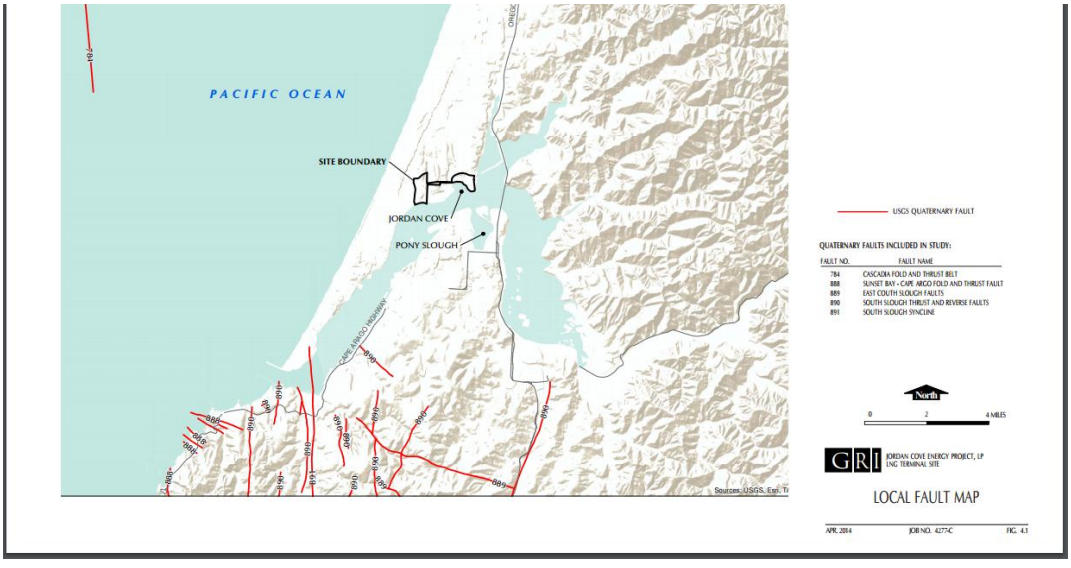
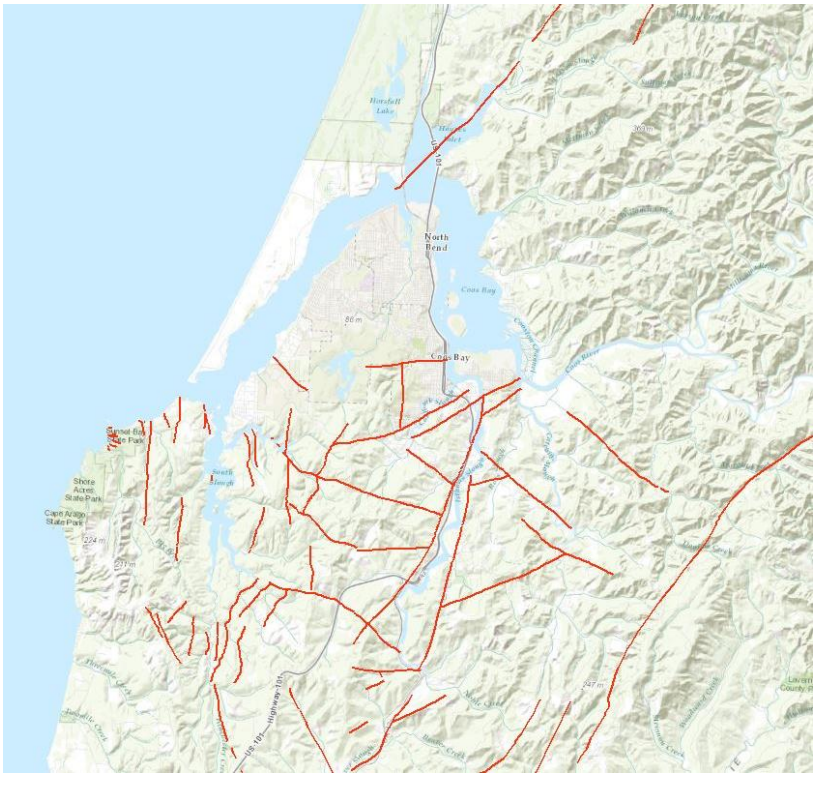
[127] *Jordan Cove LNG terminal at Coos Bay designed for Cascadia quake, tsunami though hazards remain*
By Ted Sickinger - The Oregonian - June 26, 2014
http://www.oregonlive.com/business/index.ssf/2014/06/coos_bay_lng_terminal_designed.html#incart_river

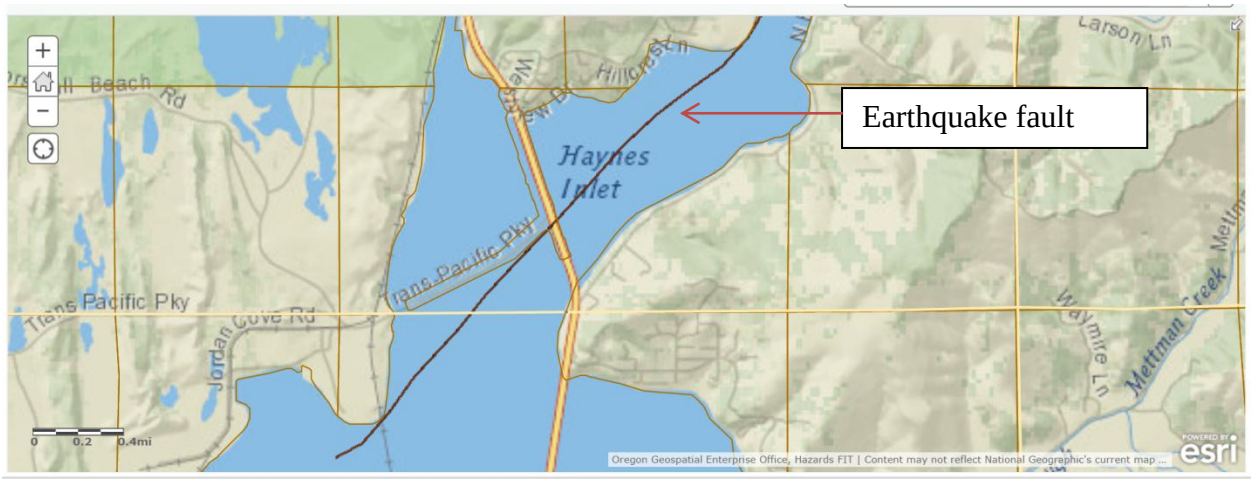


The Jordan Cove GRI study did not include the impact from the earthquake fault line that is in the Haynes Inlet area along with several others that are near where the proposed LNG export facility would be built. The diagram below comes from the Department of Geology and Mineral Industries (DOGAMI) and shows additional earthquake fault lines in the Coos Bay area in 2009:



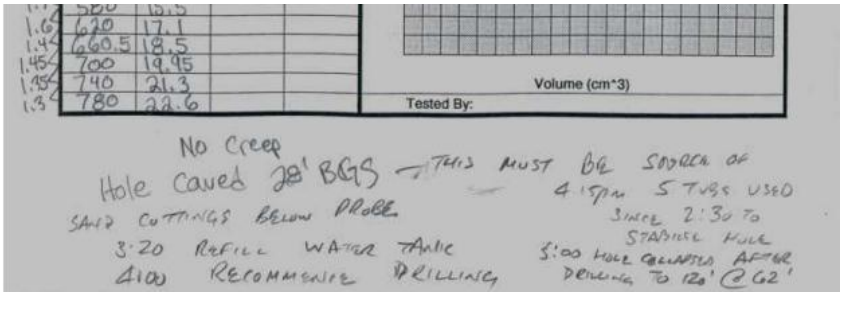
As you can see, some key earthquake fault lines were not included in Jordan Cove's GRI study which would affect the study's analysis and determinations. In addition, Jordan Cove's Pacific Connector feeder line would directly cross an earthquake fault line as it goes under the Bay. This would be in

violation of Oregon Statewide Planning Goal #7,[128] and also applies to the Jordan Cove facility in general also.



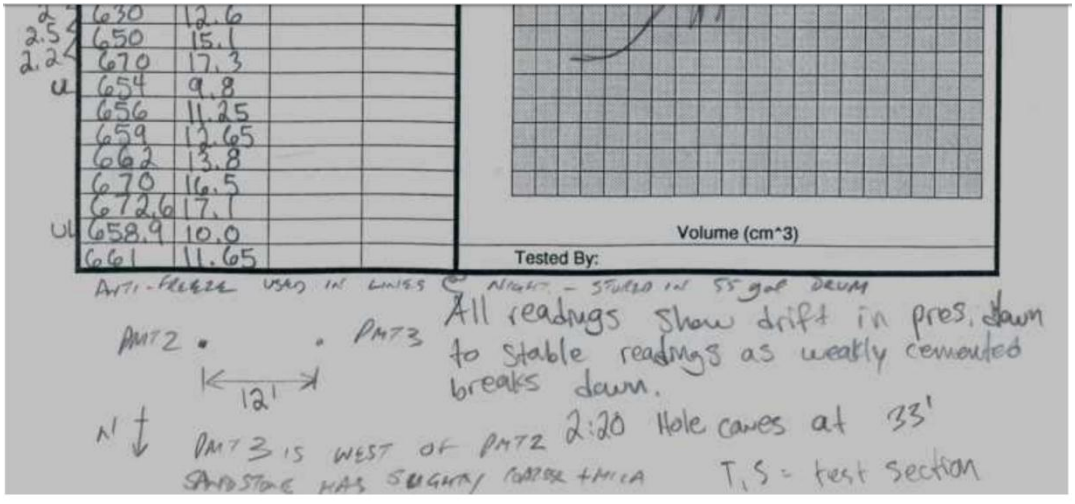
Jordan Cove's GRI report noted above also shows that there is weakness in the soils in the area of the LNG storage tanks.

On page 682 of Jordan Cove's 1-12-2016 submittal under Coos County File No. HBCU-15-05[129] it states that the test hole caved at 28 feet and also at 5:00 the hole collapsed after drilling to 120 feet at 62 feet:



[128] http://www.oregon.gov/LCD/docs/goals/goal7.pdf
[129] http://www.co.coos.or.us/Departments/Planning/2015Applications.aspx

Page 683 of Jordan Cove's 1-12-2016 submittal states that all readings showed a drift and that at 2:20 the hole caved at 33 feet.



Page 739 of Jordan Cove's 1-12-2016 submittal under Coos County File No. HBCU-15-05 states the following:

> **6. Conclusion**
>
> *We are here in a site with quite stiff sandy soil. According to the geotechnical baseline report, we can assume shallow foundations are feasible below these 160,000 m3 LNG tanks.*
>
> *Due to seismic considerations, some ground improvements should however be required on site so as to improve the wet fill layer and maybe deeper sand pockets. A new site investigation made with CPT tests and SPT is about to begin on site so to get an accurate idea concerning the soil improvement needed or not.*
>
> *Realized calculations with the FEM model and the double raft shows us:*
> - *Absolute settlement below the tank will be inferior to 30 cm during the operating period of the tank (among 10 cm during the construction),*
> - *Deflection will always be inferior to 1/300.*

An independent review on if these soils to determine if they are adequate to build on is in order to protect the public health, safety and welfare of Coos County citizens.

MITIGATION ISSUES AND INSUFFICIENCIES

Aquatic habitats are marine, intertidal, riverine, and wetland. Direct losses from construction of the project to intertidal habitat are supposed to be mitigated by flooding the Kentuck Golf and Country Club grounds. It makes no sense to us to destroy existing land and freshwater habitat to "ameliorate" the negative impacts of trenching a portion of the estuary for the proposed slip and pipeline. Improving existing tidal flat areas in the bay would be far superior mitigation effort toward recovering biological productivity. The South Slough recovery amply demonstrates the social and natural rewards of wise stewardship.

Riverine and wetland aquatic habitats are nationally recognized as critical habitats; thereby, federal laws have been extensively developed and refined since the 1970's to protect them. Strict environmental review to deal with adverse effects to riverine or wetland habitats require setting stringent terms and conditions. For example, avoidance of impact from pipeline development could certainly be obtained by utilizing existing Department of Transportation (DOT) and utility corridors. Also, the existing rail spur on the North Spit is capable, via tanker cars, to move LNG or natural gas to any destination.

Terrestrial habitats impacted are lowland and upland shrub and forest, bottomland pastures and riparian. The seral stage of the habitat basically identifies its former or present use by man or natural process of restoring its viability. The linear north-south hill where the facility would be developed did show a healthy, vigorous upland habitat type. Also, along the proposed pipeline, a great deal of pristine habitat exists (not trammeled by man). The Right of Way (ROW) is purposely planned narrower in width (especially on federal lands) to avoid negative impacts. This measure increases the safety risk and potential for increased maintenance and repair. **Clearing trees for the ROW will change fierce wind patterns.** Wetland and riparian associated timber will exasperate problems of pipeline corridor maintenance. These trees have shallow root zones and will blow over. We suggest that narrowing the proposed ROW will not reduce the environmental or safety consequences of the pipeline rather, increase the project costs. There would be no likely manner to remedy this change.

The surrounding mitigation sites that were previously developed by Weyerhaeuser on the North Spit do not appear to have been successful and have had very little upkeep and oversight. There is very little wildlife present there. **Any mitigation effort must prove to be successful beyond a 5 year time span.** The Weyerhaeuser mitigation site failure proves that mitigation efforts are not always successful. We cannot afford any more failures. Monitoring efforts need to be established that go beyond 5 years and a bond should be set up ahead of time to ensure that any mitigation that is proposed ends up being successful and not just a useless effort by the applicant in order to obtain their permits.

If wetlands are destroyed or degraded even by temporary workspace, depending on mitigation, they may never recover to their former character or it may take 5 years or more to do so. The loss of primary productivity and nutrient distribution is permanent and not temporary. **If a potential risk to the survival or recovery of a threatened or endangered species exists, the applicant must redesign or relocate the facility to avoid that risk or propose appropriate mitigation measures**.

Mitigation Insufficient / Lacking. Dredging / Temporary Dredge Pipeline would impact Eelgrass and other habitat areas.

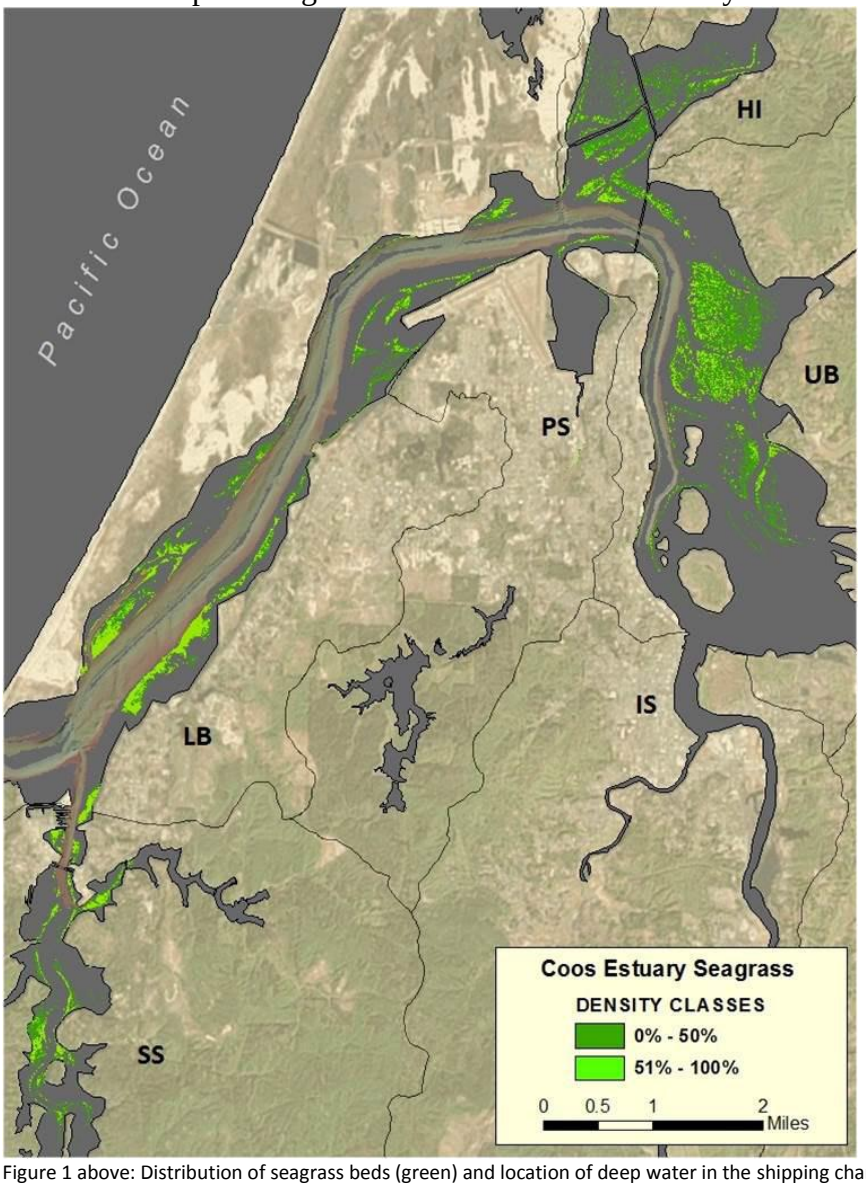
Jordan Cove has yet to prove a need for their dredging project that outweighs the negative impacts to fishing, recreation and navigation. They have provided no plans to mitigate habitat areas and marine life that would be destroyed by their proposed dredging plans. Jordan Cove's proposed eelgrass mitigation site also lacks sufficient proof that it would be successful.

A March 2019 letter by the Shon Schooler, Ph.D., Research Coordinator with the South Slough National Estuarine Research Reserve states: (***See Exhibit 10***)

> *We are particularly concerned with the potential impacts to eelgrass (Zostera marina) populations as eelgrass is an important habitat for many estuarine species and improves estuarine water quality. The following comments fit under CBEMP Policy 4: Resource Capability Consistency and Impact Assessment. Eelgrass habitat in the Coos Estuary has*

experienced a net loss since 2005 (from mapping/GIS methods) and abundance has declined more recently since 2016 (from intertidal field surveys).

Below find maps of eelgrass areas found in the lower bay in 2005:



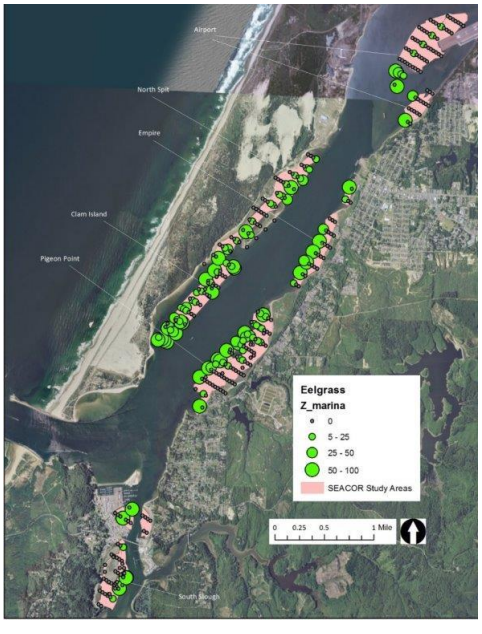
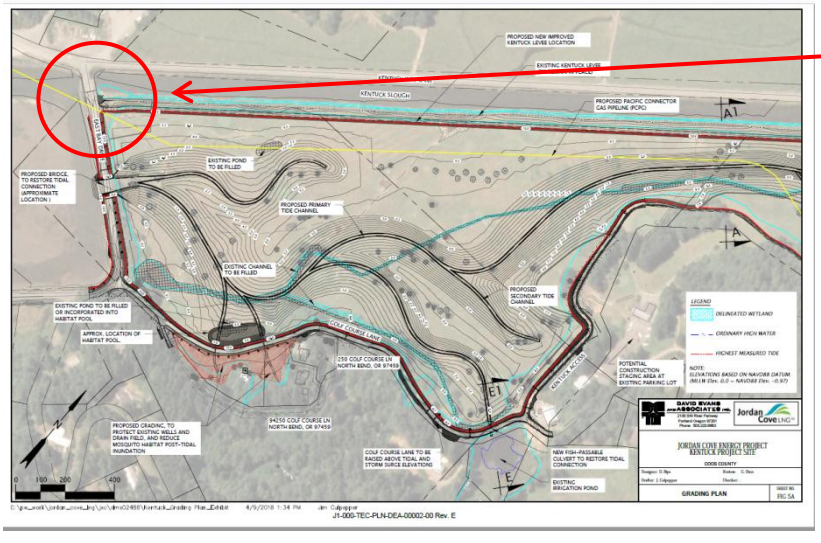


Figure 1 above: Distribution of seagrass beds (green) and location of deep water in the shipping channel (tan). Dense beds (> 50% ground cover from seagrasses) are shown in light green. Seagrass data generated from aerial photos taken in 2005. Data: Clinton et al. 2007, NGDC 2014

Jordan Cove's proposed dredging, eelgrass mitigation site, and temporary pipeline would directly impact known eelgrass areas in the Coos Bay as documented by the letter from Shon Schooler, Ph, D and as shown in the following diagrams. (***See Exhibit 10***) No evidence has been provided as to how these impacted areas would be successfully restored after being impacted. In addition, Jordan Cove's 2007 Coos Bay Estuary Mitigation permit has long since expired. (CBDC **17.130.140**) It is unclear how they plan to successfully mitigate eelgrass areas that would be destroyed by their dredging plans.

In addition, due to improper hydrology studies being done by Jordan Cove, the proposed mitigation site up the Kentuck inlet is highly likely to cause increased flooding in the inlet. (***See Exhibit 66***)

The following diagram is shown in the current 401 application of the proposed mitigation site. Jordan Cove plans on running their Pacific Connector Gas Pipeline under the current Kentuck tidegate that links the Coos Estuary to several upland streams and spawning areas. This is a fish passage area and could spell total disaster and instability to this particular tide gate. Alternative pipeline routes could have been considered that did not impact the estuary at all. This is why an EIS should have been completed first before Coos County, the Army Corp, DEQ and DSL processed Jordan Cove's applications



The current Pacific Connector Gas Pipeline Route goes directly under the East support for the current operating Kentuck Inlet tide gate.

The photo below was taken on Oct 6, 2015, and shows the existing dike that runs along the Kentuck slough that separates it from the former golf course that is currently being proposed as a wetland mitigation site for Jordan Cove. This photo below is on the North side of the East Bay Drive where it crosses the Kentuck Slough and the former golf course area. As the photo shows, the existing dike is not high enough to retain the water levels and volumes that Jordan Cove is proposing for their mitigation project.

Existing

Water levels on other side of the road are quite high even before large rain events have occurred in the area. (See also photo below)

What would happen to the stability of this existing tidegate with a 36 inch high pressure pipeline running directly under it? Other viable pipeline route alternatives that would not have impacted the estuary should have been considered in a properly completed EIS document but were not.

Photo below: South side of the East Bay Drive where it crosses the Kentuck Slough and the former golf course area. This was taken on the same day and time as the photo above.

At the hearing on December 18, 2015, Barbara Gimlin, former Jordan Cove Environmental lead, testified as to the flooding issues **that are already occurring on Kentuck Slough** to the North of the East Bay Drive due to Main Rock's placement of fill next to the Slough without proper hydrology studies and approvals. Jordan Cove's Feb 2, 2014 Supplement to Technical Memorandum – Tsunami Hydrodynamic Modeling report (***See Exhibit 67***) clearly shows the upland stream impacts from placing fill on the North Spit property:

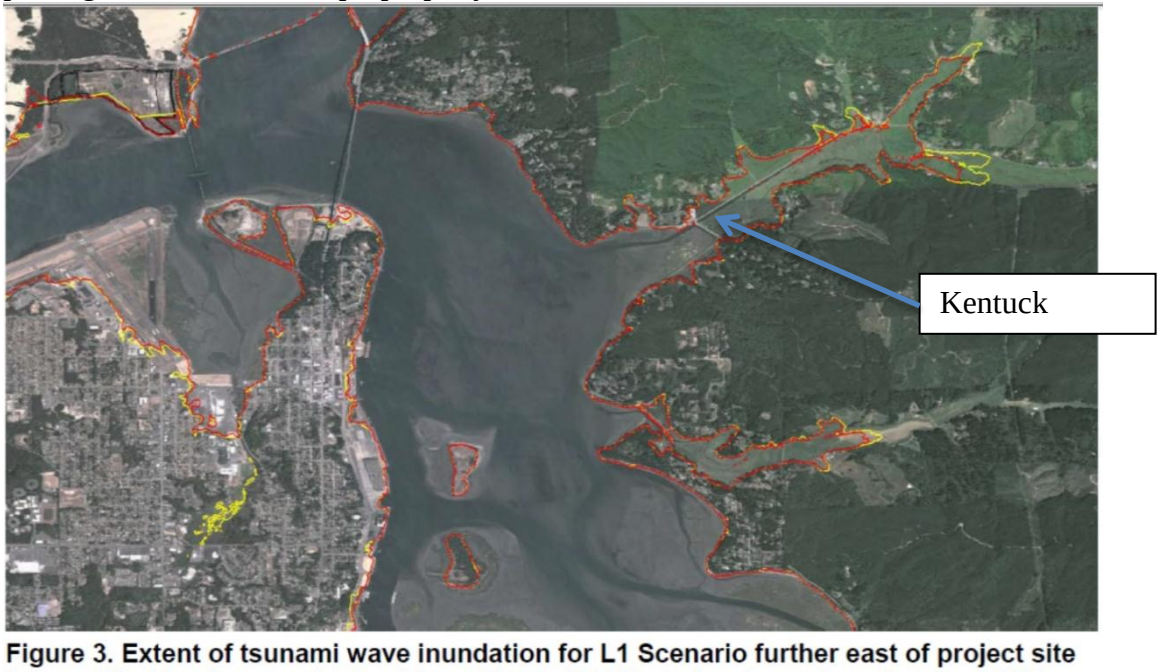
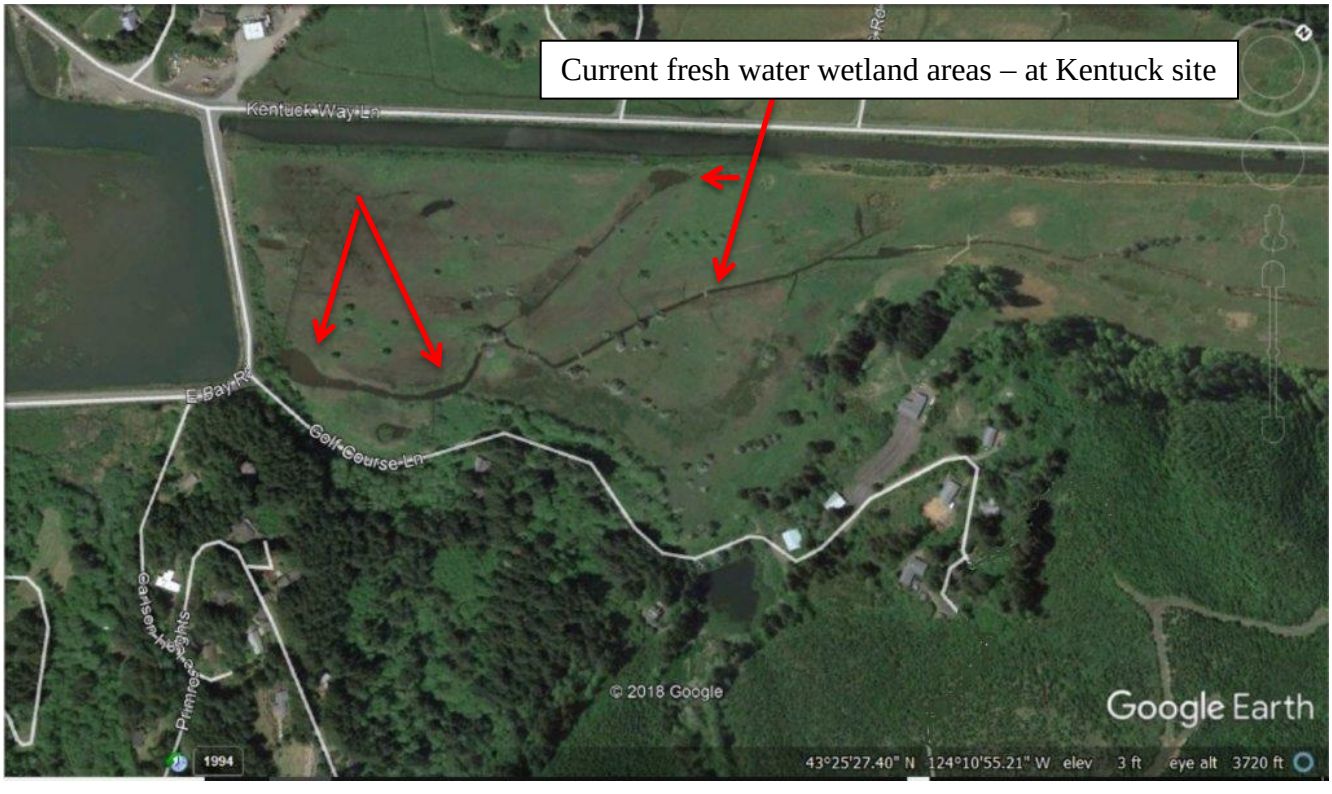


Figure 3. Extent of tsunami wave inundation for L1 Scenario further east of project site for modified landscape obtained from Zhang (2012) study, shown in yellow and CHE (2013b) study, shown in red

Fresh water wetlands and habitat already existing at the Kentuck Golf course mitigation site would be lost along with existing habitats currently located there. These impacts are not being mitigated properly. The proposed flooding of the golf course that JC has planned would also affect Golf Course lane and properties that depend on this road for access to East Bay Drive.

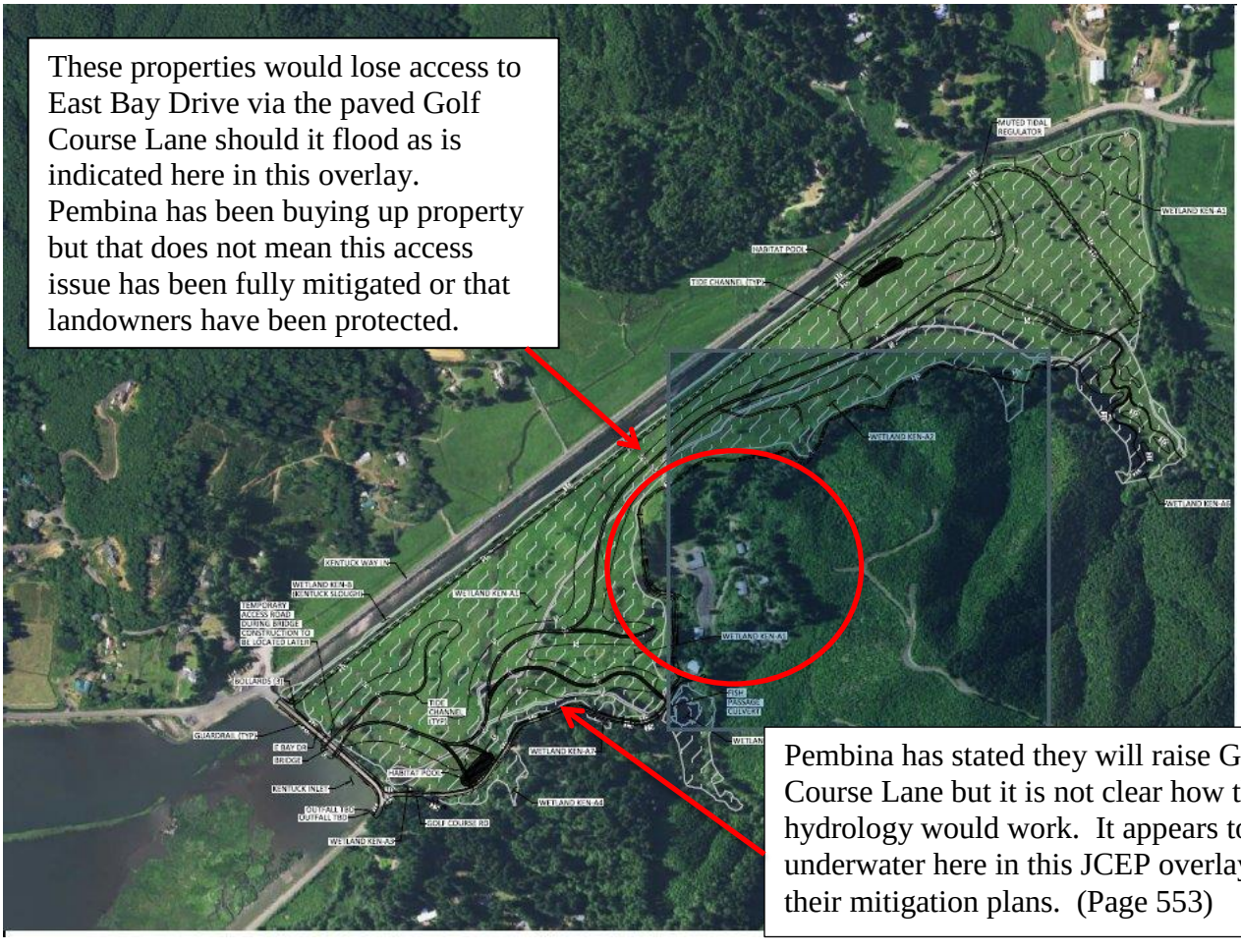


Jordan Cove's proposed mitigation is insufficient mitigation and in some cases is not even located in the same watershed. **Mitigation should remain in the same watershed that is being impacted**. It is irresponsible to allow Jordan Cove to destroy the Coos Bay Estuary lower bay and then do a mitigation project in the upper bay where different habitats exist or at Gardiner some 22 miles North or in Bandon some 30 miles to the South.

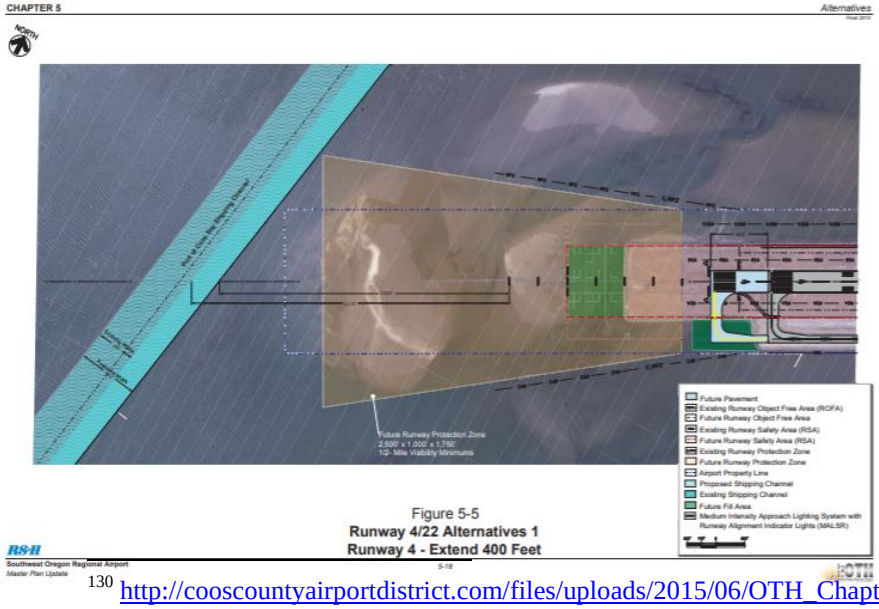
Below from electronic page 553 of Jordan Cove's DSL application shows areas that would be flooded with tidal salt marsh AFTER Jordan Cove's mitigation plan. Jordan Cove has been buying up property in this area but not everyone on Golf Course Lane has sold their property to them. This is some of the most desirable property in our area and it is really a shame that they are doing this. **The Kentuck Golf Course was previously used heavily by the locals here as it had reasonable fees and supported local fundraising golf events.** Locals could afford to golf there but now it will be gone and a significant amount of landowners who live around the former golf course may end up not having access to those properties should Jordan Cove proceed.

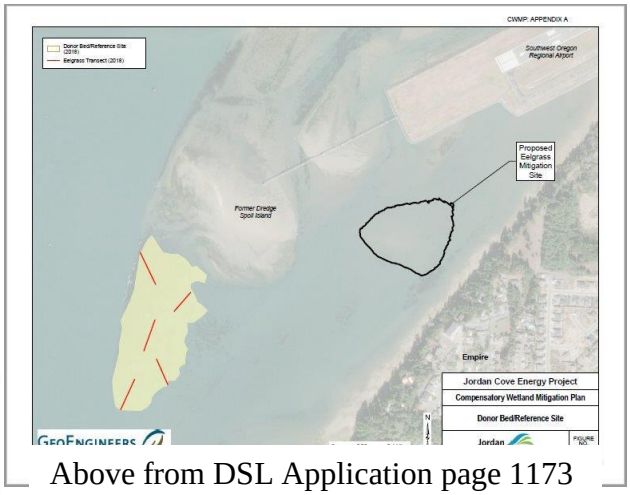
Jordan Cove is currently in the process of obtaining a 15-year tax abatement. Money will instead flow into a private non-profit. Jordan Cove is currently buying up large sections of property In Coos County that I have to assume will be taken off the tax rolls. They currently have not been paying the same tax rate as the rest of the people who currently live in Coos County pay.

This is NOT IN THE PUBLIC INTEREST.



The Eelgrass Mitigation site that would be located in Coos Bay, adjacent to the Southwest Oregon Regional Airport, is likely to conflict with the airport's planned expansion project noted in the diagram below on the left from Southwest Oregon Regional Airport Master Plan:[130]





Above from DSL Application page 1173

130 http://cooscountyairportdistrict.com/files/uploads/2015/06/OTH_Chapter_5_Alternatives.pdf

The turbidity caused from dredging in an area that is already right next to an eel grass mitigation site is likely to be detrimental to the eel grass beds that are located there. (***See Exhibit 61***)

Jordan Cove's temporary dredge transfer line appears to impact the entire lower bay of the Coos Estuary. The impact of that line on eel grass beds is uncertain. It is also unclear if the habitat and marine life that would be present in or near the proposed dredge removal sites are being properly mitigated for. Marine life that may be inadvertently sucked into the transfer pipe would end up with a death sentence and no hope of recovery. These critical impacts need to be FULLY considered and at the very least mitigated.

SAFETY ISSUES

- Industry SIGTTO Guidelines,[131] Sandia National Laboratory Guidelines[132] and GAO Report Guidelines[133] are not being followed. **The Application does not address the project's notable departures from industry standards or our scoping comments on those departures.**

- Airport airspace and Presumed Hazard issues are not being addressed properly. These issues are also not addressed in the Coast Guard's LOR or Jordan Cove's Memorandum of Understanding (MOU).

- Coast Guard WSA ignored the Gas Industry SIGTTO guidelines and recommendations; ignored Sandia National Laboratories guidelines and recommendations; did not account for many LNG potential hazards in the waterway, air and shoreline; failed to consider or mention hazard issues listed in the Coos County Natural Hazards Mitigation Plan; and included no plans for handling tsunami's and earthquakes.

- Emergency Response is inadequate with most Emergency Responders located in the Hazard Zones of Concern of the Facility and Tanker transit.

PROPOSED LNG FACILITY / VESSEL TRANSITS VIOLATE INDUSTRY GUIDELINES FOR SAFETY (As noted above on pages 38 and 39)

[131] "*Site Selection & Design for LNG Ports & Jetties – Information Paper No. 14*" - Published by Society of International Gas Tanker and Terminal Operators Ltd / 1997

[132] SANDIA REPORT "*Guidance on Risk Analysis and Safety Implications of a Large Liquefied Natural Gas (LNG) Spill Over Water"*; Mike Hightower, Louis Gritzo, Anay Luketa-Hanlin, John Covan, Sheldon Tieszen, Gerry Wellman, Mike Irwin, Mike Kaneshige, Brian Melof, Charles Morrow, Don Ragland; SAND2004-6258; Unlimited Release; Printed December 2004; http://www.fossil.energy.gov/programs/oilgas/storage/lng/sandia_lng_1204.pdf

[133] United States Government Accountability Office, Report to Congressional Requesters, Maritime Security; "*Public Safety Consequences of a Terrorist Attack on a Tanker Carrying Liquefied Natural Gas Need Clarification*", February 2007; GAO-07-316: http://www.gao.gov/new.items/d07316.pdf

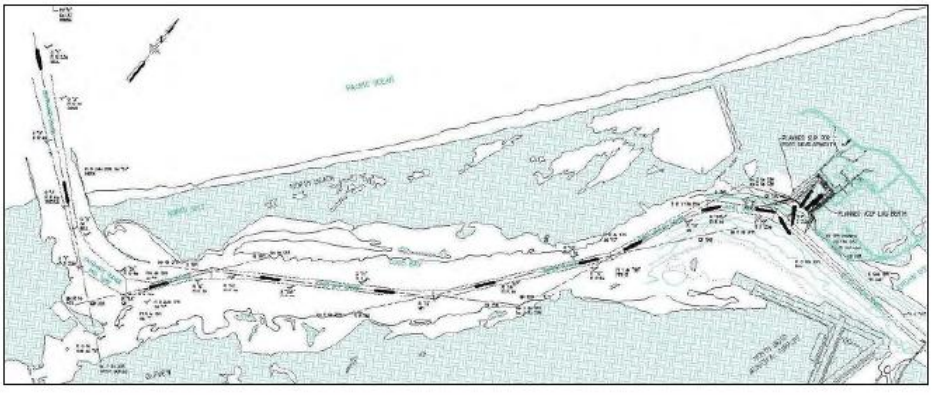


Figure 4-1: Location Map

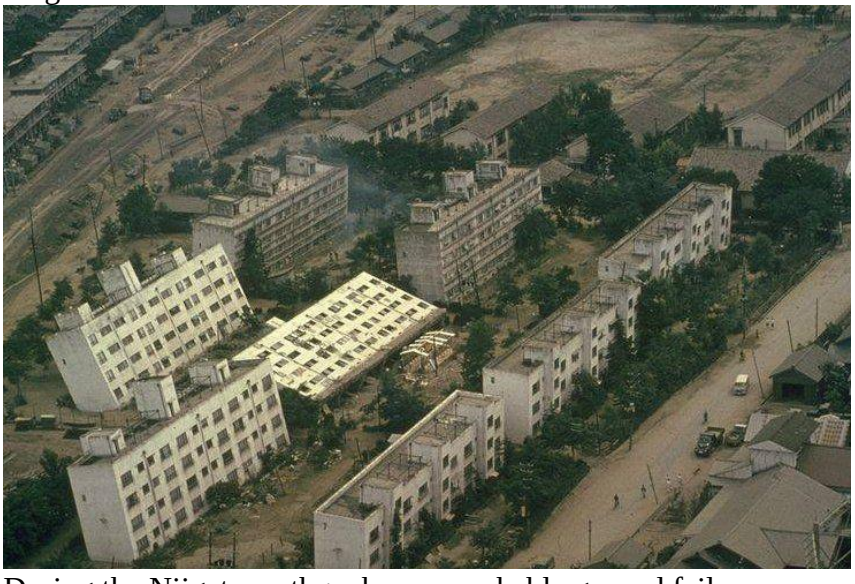
To insure the safety and security of the LNG project, big steps making new rules would be essential. Security for the vessels, facility, and the pipeline would likely shut down public use of those areas influenced, along the ROW, North Spit access road, and in and along the channel. The ship will be docked at the terminal approximately 17 - 22 hours to completely load its cargo according to the applicant. The time could be more depending on the change of tide, weather, harbor clearance, etc. Security for the vessel would not only be the 90 minutes to 2 hours it would take for travel in or out of Port, but the entire time of dockage. Using the applicant's estimate of 120 LNG vessel visits per year, the amount of time safety and security measures would be increased is alarming. A 24-hour turn around, which would include night operations, utilizing the applicants estimated 120 transits, would need 240 days for LNG commercial use of the bay. More likely, a 24-hour turn around would be necessary to avoid risks of nighttime operations. Tugboat operators require good visibility to pull laden vessels in the channel and using high tides would be the only way the deep drafted LNG vessels could be moved. If this scenario became the standard of operation, it is easy to see 300 or even as much as 365 days per year would be required and new safety and security limits would need to be enforced pretty much all the time. **This future shows a major detrimental impact to present recreational and commercial users of the seven and one-half miles of Coos Bay and that profound change cannot be mitigated.**

Additional details concerning this have been explained more fully on pages 38 to 40 above.

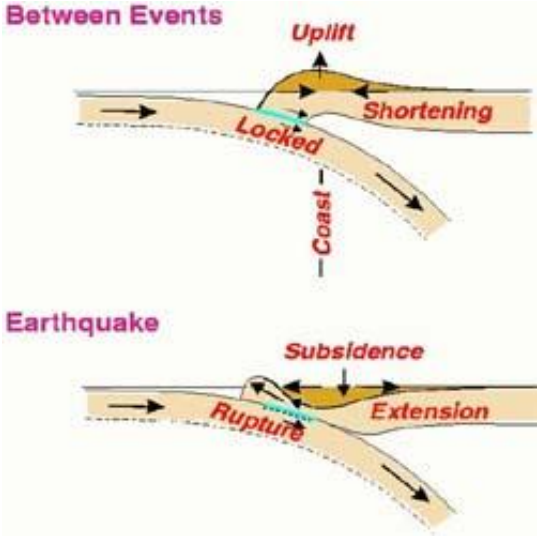
16,922 people live in the hazardous zones of concern according to the former Jordan Cove Export Final EIS (page 4-1031) under CP13-483-000/CP13-492-000, and yet there is little concern given for their safety. Trees and burnable scrub brush cover our area. Secondary fires will be paramount and most of our emergency responders are located in the LNG hazard zones of concern. The Coos Bay area has one hospital, it does not have a "Burn Unit." We have yet to see an emergency response plan on how the medical response to even a minor LNG hazardous event could be handled in light of our area's obvious insufficiency of appropriate medical facilities and personnel. This was just one of many concerns that were raised in scoping comments to FERC that have yet to be addressed.

1964 Niigata earthquake, Japan

The Niigata earthquake of June 16, 1964 had a magnitude of 7.5 and caused severe damage to many structures in Niigata. The **destruction was observed to be largely limited to buildings that were founded on top of loose, saturated soil deposits**. (*General report on the Niigata earthquake 1964*). A tsunami, triggered by movement of the sea floor associated with the fault rupture, totally destroyed the port of Niigata.



During the Niigata earthquake a remarkable ground failure occurred near the Shinano riverbank where the Kawagishi-cho apartment buildings suffered bearing capacity failures and tilted severely. (Photo above.)[134]



It is highly unlikely that the Jordan Cove Facility (Built on 30+ feet of fill) along with its Pacific Connector Gas Pipeline, would be able to withstand such ground movements. In addition, floating objects, barges, vessels, etc, can be a significant issue in a tsunami along with bridges that would be needed to evacuate the area. ODOT estimates they'll need $3 billion to prepare Oregon's bridges to withstand a major earthquake along the coast, far more money than they have. **Without such repairs, a 9.0 temblor would leave U.S. Highway 101 impassable and state highways 38 and 42 in disrepair.**

The Pacific Connector Pipeline

The Pacific Connector Gas Pipeline (PCGP) is an approximately 229-mile, 36-inch high-pressure gas pipeline operating at 1,600 PSI. PCGP is proposed to transport 1 billion cubic feet a day of gas to the Coos Bay LNG site from a connect at Malin, Oregon. **The hazard zone for this pipeline goes out**

[134] http://www.ce.washington.edu - http://www.ce.washington.edu/~liquefaction/html/quakes/niigata/niigata.html

approximately an 800 to 1,000 foot radius from the center of the pipe,[135] up to 2,000 feet across, which impacts many landowners who may not even be aware they are living or have property in a pipeline hazard zone. Pacific Connector appears only to be notifying landowners whose property is impacted directly by proposed gas pipeline itself.

Even though construction would impact 95+ feet, landowners would only be compensated for a 50 foot permanent easement and there is no compensation listed for hazard zone property value devaluation.

The freshwater streams crossed by proposed pipeline route include 6 major subbasins of rivers in southern Oregon, the Coos, Coquille, South Umpqua, Upper Rogue, Upper Klamath and Lost River subasins. **Most of the major streams, and many of the minor streams crossed, contain salmon and steelhead, some of which are federally listed as threatened fish species.**

It could take many decades for conditions within these wetlands to restore to preconstruction conditions.

For the sake of the thousands of people who are at risk in the Coos Bay area, we ask Coos County and DSL to require a thorough independent review before considering any approval of Jordan Cove's Removal/Fill Clean Water and Coastal Zone Management permit applications, particularly since the dredging of 6.3 million cubic yards (5.7 mcy for marine terminal + .6 mcy for navigational alterations) would not only change drastically the water velocity and flow of the tidal cycle in and out of the Coos Bay, but could contribute to additional dire consequences in the area in the event of an earthquake and/or tsunami. In addition, the proposal would mean the removal of an 100 foot high forested sand dune that is currently one of the few safety areas in this part of the North Spit where one could go to for protection should a tsunami occur.

CONCLUSION

Permit Should Be Denied.

There is no way as citizens we can go through the volume of permit material that is being thrown at us on a weekly basis in order for us to write substantive comments on these various permit applications for Jordan Cove. The land use processes on the Jordan Cove project have yet to be completed and those CUP permits approved. Why is the State and Coos County processing their permits prematurely? Citizens are having to prepare briefs for appeals on land use decisions while at the same time write comments to State and Federal Agencies who have decided to process their permits on the Jordan Cove project or review their regulations that would affect the project, all at the same time. This is a clear violation of the National Environmental Policy Act (NEPA).

In addition, Federal regulators have ruled Oregon's plan for reducing coastal pollution due to runoff from logging, agriculture, stormwater runoff and other sources is insufficient. The January 30, 2015

[135] GRI-00/0189 / C-FER Report 99068, " *A Model for Sizing High Consequence Areas Associated with Natural Gas Pipelines*" Topical Report prepared by Mark J Stephens, C-FER Technologies, for Gas Research Institute, Contract No 8174, Oct 2000

decision[136] by the National Oceanic and Atmospheric Administration and the U.S. Environmental Protection Agency found Oregon too weak in four forest management areas:

- Riparian protection for medium and small fish-bearing streams and non fish-bearing streams
- Practices that reduce runoff from old, unused forest roads
- Practices to reduce runoff from landslide-prone areas
- Assurances that herbicides are properly applied to reduce impact on waterways.

Dennis McLerran, region 10 administrator for the EPA, said in a news article[137] that the agencies are working with Oregon to create a timeline for the state to address its shortcomings. How can we be assured that proper reviews are being done on the Jordan Cove project and if Oregon's program is currently in line with the Federal guidelines?

Jordan Cove's Coastal Zone Management Act Land Use permit applications should be denied for multiple reasons:

1) Applications are out of compliance with the NEPA process that has yet to be completed.
2) There is no Finalized Environmental Impact Statement for citizens to review or analyze with respect to the analysis of alternatives and/or environmental impacts.
3) Project is not in compliance with Coos County and State regulations and would unreasonably interfere with navigation, fishing and public recreation
4) Cumulative Impacts are not being considered.
5) Land Use permits are still being processed and have not all been approved and/or completed yet. Current zoning is not in compliance with project objectives.
6) Inadequate Mitigation Plan(s) have been provided.
7) Applicants Design Package for Section 408 Review is only partially complete.
8) Proposed Port of Coos Bay Navigational Deepening and Widening Project impacts are not being considered.
9) There has been improper and/or incomplete testing of soils for contamination in the project area and in the navigational channel.
10) LNG vessel shipments, hazards and environmental impacts have been under-calculated and/or not considered.
11) The Jordan Cove LNG Facility is not in compliance with industry SIGTTO guidelines, Geotechnical guidelines, Airport and FAA guidelines and other Port uses.
12) Environmental impacts of the proposed project are too severe and do not substantiate benefits as has been documented above.
13) Proposed facility is not in the Public Interest. Coos County must determine that a public need for a proposed project predominates before a wetland fill and removal permit can be issued. *Citizens for Resp. Devel. In the Dalles v.Walmart* 295 Or App 310 (2018)

[136] *NOAA/EPA Finding That Oregon Has Not Submitted A Fully Approvable Coastal Nonpoint Program* – January 30, 2015
http://coast.noaa.gov/czm/pollutioncontrol/media/ORCZARAdecision013015.pdf
[137] *"Feds reject Oregon's coastal pollution plan, could impose financial sanctions"* January 30, 2015 - By Kelley House
http://www.oregonlive.com/environment/index.ssf/2015/01/feds_reject_oregons_coastal_po.html

-- Substantial Public Need and Benefit has not been demonstrated
-- An alternate site or design should be investigated.
-- Expect adverse impact to state-or federally-listed species.
-- Expect adverse impact to archeological or historical site.
-- Expect adverse impact to water resources.
-- Project will unreasonably interfere with navigation, fishing and/or public recreation.
-- Compensatory mitigation insufficient to compensate for adverse impacts.
-- Project not in compliance with local land use regulations and requirements.
-- Outdated Project Application should be denied.

Sincerely,

/s/ Jody McCaffree

Jody McCaffree

Index for Exhibits

June 24, 2019

McCaffree / Citizens For Renewables / CALNG

For Jordan Cove / Pacific Connector

REM-19-001

NOTE: The following Exhibits 1 to 4 were submitted into the Remand proceeding on June 10, 2019

Exhibit 1: May 7, 2018 the Federal Aviation Administration (FAA) issued 13 NOTICES OF PRESUMED HAZARD on components of the Jordan Cove LNG project,

Exhibit 2:

- Oregon Dept of State lands (DSL) March 5, 2019 notice that they extended their review time on the Jordan Cove project's removal-fill permit application until September 2019; and
- April 10, 2019 DSL *Overview of Decision Process and Need for Additional Information request* issued to Jordan Cove Re: DSL Removal-Fill Permit Application No. 60697-RF.

Exhibit 3: March 11, 2019, Oregon DEQ request for additional information from the Jordan Cove Project which included, among other things that the project conduct a benthic macroinvertebrate assessment to comply with the Biocriteria water quality standard (Oregon Administrative Rule 340-0410-0011).

Exhibit 4: May 6, 2019 News Release of the DEQ denial of Jordan Cove's application for 401 Water Quality Certification.

NOTE: Exhibit numbering has been continued from pervious June 10, 2019 submittals:

Exhibit 5: December 16, 2014 Public Comment by **Barbara Gimlin** on Jordan Cove Energy Project, L.P., Draft Environmental Impact Statement expressing concerns with respect to **contaminated soils on the Jordan Cove property** under CP13-483-000 via CP07-444-000.

Exhibit 6: February 13, 2015 Public Comment by **Barbara Gimlin** on Jordan Cove Energy Project, L.P., DEQ Water Quality permit process under FERC CP13-483-000.

Exhibit 7:

- Oct 15, 2014 Motion to Intervene Out of Time by **Clausen Oyster Company and Lilli Clausen** expressing concerns with **pipeline and sediment impacts to their Oysters**
- Feb 28, 2015 Motion to Intervene Out of Time by **Coos Bay Oyster Company and Jack Hampel** expressing concerns with **pipeline and sediment impacts to their Oysters**.

Exhibit 8: Feb 21, 2014 **Motion to Intervene Out of Time by Clam Diggers Association of Oregon** expressing concerns with LNG project **sedimentation and estuary impacts on clams**

Exhibit 9: ***Potential Impact of Jordan Cove LNG Terminal construction on the Nursery Habitat of Dungeness crab*** by Sylvia Yamada Ph.D. January 2019 for DSL and oral comment outline provided on January 15, 2019 under APP0060697 at Salem Hearing.

Exhibit 10: Letter from Shon Schooler, Ph.D., Research Coordinator with the South Slough National Estuarine Research Reserve concerning Eelgrass (March 2019)

Exhibit 11: Select pages from ***Oregon Travel Impacts Statewide Estimates 1992 - 2017p Report;*** June 2018 ; Dean Runyan Associates **(Coos County Impacts)** http://www.deanrunyan.com/doc_library/ORImp.pdf

Exhibit 12: May 21, 2010 and **Sept 17, 2007 testimony from Ron Sadler** placed into Jordan Cove and Pacific Connector Conditional Land Use Permit processes in Coos County concerning **sedimentation impacts in the Coos Estuary**.

Exhibit 13:

- ODFW – **Threatened / Endangered Species List** http://www.dfw.state.or.us/wildlife/diversity/species/threatened_endangered_candidate_list.asp
- **NOAA – Oregon Coast Coho protected species:** http://www.westcoast.fisheries.noaa.gov/protected_species/salmon_steelhead/salmon_and_steelhead_listings/coho/oregon_coast_coho.html
- **NOAA - Green Sturgeon protected species:** http://www.westcoast.fisheries.noaa.gov/protected_species/green_sturgeon/green_sturgeon_pg.html
- **NOAA – Pacific Eulachon protected species** http://www.westcoast.fisheries.noaa.gov/protected_species/eulachon/pacific_eulachon.html
- **ESA listed Marine Mammals** http://www.westcoast.fisheries.noaa.gov/protected_species/marine_mammals/esa.html
- **ESA listed Sea Turtles** http://www.westcoast.fisheries.noaa.gov/protected_species/sea_turtles/marine_turtles.html
- **Point Reyes bird's-beak** – Oregon Dept of Agriculture - Endangered http://www.oregon.gov/oda/shared/Documents/Publications/PlantConservation/CordylanthusMaritimusPalustrisProfile.pdf

Exhibit 14:

- Evidence of Shell's Sakhalin II LNG project in Russia and the Environmental Impacts to Avina Bay along with devastating upland impacts.
- Pipeline Impacts from Shell's Sakhalin II LNG project in Russia
- Fortune article "Shell shakedown" By Abrahm Lustgarten, Feb 1, 2007

Exhibit 15:

- Nation & World - ***Ocean salmon seasons in jeopardy off southern Oregon;*** Originally published March 5, 2018; The Associated Press https://www.seattletimes.com/nation-world/ocean-salmon-seasons-off-southern-oregon-coast-in-jeopardy/
- ***West Coast senators join call for salmon disaster declaration****;* Saphara Harrell - The Umpqua Post; Jun 13, 2017 http://theworldlink.com/news/local/west-coast-senators-join-

call-for-salmon-disaster-declaration/article_3690f87f-44b8-5f19-a385-7557776543b0.html

Exhibit 16: **Oregon Shorebird Festival Bird List** Compiled from all field trips August 26-28, 2011

Exhibit 17: ***7,500 songbirds killed at Canaport gas plant in Saint John*** - Migrating birds, some possible endangered species, flew into gas flare CBC News Posted: Sep 17, 2013 http://www.cbc.ca/news/canada/new-brunswick/7-500-songbirds-killed-at-canaport-gas-plant-in-saint-john-1.1857615

Exhibit 18: The Irish Times - ***Gas flaring at Corrib plant 'frightening', says resident*****;** Jan 1, 2016 ; By Lorna Siggins; http://www.irishtimes.com/news/ireland/irish-news/gas-flaring-at-corrib-plant-frightening-says-resident-1.2482377

Exhibit 19: Zoning Information for JCEP proposed dredging / fill sites within the Coos Estuary

Exhibit 20: Coos County file No. **AM-18-009/RZ-18-006/HBCU-18-001** Concurrent Land Use Application signature pages and Narratives filed by the Jordan Cove Energy Project L.P. for Trans Pacific Parkway Intersection Alteration at U.S. Highway 101

Exhibit 21: Coos County file No. **AM-18-011/RZ-18-007/HBCU-18-003** Concurrent Land Use Application signature pages and Narratives filed by the Jordan Cove Energy Project L.P. for Coos Bay Estuary Navigation Reliability Alterations.

Exhibit 22: City of Coos Bay file No. **187-18-000153-PLNG-01** Concurrent Land Use Application signature pages and Narratives filed by the Jordan Cove Energy Project L.P. for Coos Bay Estuary Navigation Reliability Alteration.

Exhibit 23: Dec 4, 2018 letter to the FERC under Docket Nos. CP17-494-000 and CP17-495-000 adding to Service list Natalie Eades, Manager, Environment, Jordan Cove Energy Project L.P. Pacific Connector Gas Pipeline, L.P**. /** contact NEades@pembina.com

Exhibit 24: Oct 2, 2018 letter to the FERC under Docket No. CP17-495-000 signed by Tajvinder (Tony) S. Diocee, Vice President, Projects LNG, Jordan Cove Energy Project L.P. on page 5 of the document.

Exhibit 25: ***Geology of the Coos Estuary and Lower Coos Watershed*** from Partnership for Coastal Watersheds Report https://www.partnershipforcoastalwatersheds.org/geology-of-the-coos-estuary-and-lower-coos-watershed/

Exhibit 26: *13-Year Cascadia Study Complete – And Earthquake Risk Looms Large* http://oregonstate.edu/ua/ncs/archives/2012/jul/13-year-cascadia-study-complete-%E2%80%93-and-earthquake-risk-looms-large

Exhibit 27: Select pages from ***The Oregon Resilience Plan Reducing Risk and Improving Recovery for the Next Cascadia Earthquake and Tsunami***; Report to the 77th Legislative Assembly from Oregon Seismic Safety Policy Advisory Commission (OSSPAC); Feb 2013

Exhibit 28: Industrial Energy Consumers of America "***Excessive Liquefied Natural Gas (LNG) Exports To NFTA Countries Are Not In The Public Interest And Increase Natural Gas And Electricity Prices To Consumers***" - January 30, 2019

Exhibit 29: ***Limitations of the Haynes Inlet sediment transport study*** by Tom Ravens, Ph.D., Professor, Dept. of Civil Engineering University of Alaska, Anchorage

Exhibit 30: U.S. Coast Guard ***July 1, 2008, Water Suitability Assessment (WSA) Report*** for the Jordan Cove project.

Exhibit 31: ***Coos Bay Harbor Safety Plan*** by Coos Bay Harbor Safety Committee, February 2018

Exhibit 32: ***Coos Bay Channel Entrance - Distances and Buoy Markings***. Proximity of Channel Buoys to the Shoreline.

Exhibit 33: ***DEQ hits Clausen Oysters with $25,000 fine*** By Gail Elber, Staff Writer Aug 25, 2010https://theworldlink.com/news/local/deq-hits-clausen-oysters-with-fine/article_9fb57e0c-b070-11df-8cc0-001cc4c03286.html

Exhibit 34: FAA Memorandum Re: "***Technical Guidance and Assessment Tool for Evaluation of Thermal Exhaust Plume Impact on Airport Operations";*** January 21, 2015

Exhibit 35: ***"Hot Air"*** Pilots say the Port of Portland's plans to sell land for a power plant next to the Troutdale Airport include a fatal flaw; April 22, 2015; Willamette Week http://www.wweek.com/portland/article-24594-hot_air.html

Exhibit 36: *"**Position Paper - Safety Concerns of Exhaust Plumes**"* -Prepared by: Federal Aviation Administration - Airport Obstructions Standards Committee Working Group; July 8, 2014

Exhibit 37: Potential Flight Hazards 8-22-13 AIM: "*7-5-15.* ***Avoid Flight in the Vicinity of Thermal Plumes (Smoke Stacks and Cooling Towers)"***

Exhibit 38: September 6, 2014 Newspaper **Ad announcing the 15th annual Coos Basin Salmon Derby** in Coos Bay, Oregon Sept 13 & 14th 2014

Exhibit 39: South Coast Basin - **Flow Restoration Priorities** for Recovery of Anadromous Salmonids in Coastal Basins

Exhibit 40: September 15, 2015 Jordan Cove Final EIS under CP13-483-000 et al pages 4-370 to 4-739 having to do with **Ballast Water**

Exhibit 41:

- North Spit listing in"**Top 10 Beach Strolls**" Sunset Magazine, Vol. 219, Issue 4, October 2007
- Coos Bay, Oregon listing in **50 Best Places to Live National Geographic Adventure Magazine** - September 2008

Exhibit 42: ***After a year of planning, Coos Bay has new marine patrol boat dock*** by KCBY; Wednesday, March 16th 2016; https://kcby.com/news/local/after-a-year-of-planning-coos-bay-has-new-marine-patrol-boat-dock

Exhibit 43: June 24, 2015 Letter from attorney's Motschenbacher and Blattner LLP concerning **Jordan Cove leasing the Boxcar Hill Campground**.

Exhibit 44: Study outlines threat of ***ocean acidification to coastal communities in the U.S***.; Oregon State University; Feb 23, 2015 http://today.oregonstate.edu/archives/2015/feb/study-outlines-threat-ocean-acidification-coastal-communities-us

Exhibit 45: *Vulnerability and adaptation of US shellfisheries to ocean acidification*; By Julia A. Ekstrom; Lisa Suatoni; Sarah R. Cooley; Linwood H. Pendleton; George G. Waldbusser; Josh E. Cinner; Jessica Ritter; Chris Langdon; Ruben van Hooidonk; Dwight Gledhill; Katharine Wellman; Michael W. Beck; Luke M. Brander; Dan Rittschof; Carolyn Doherty; Peter Edwards; and Rosimeiry Portela; Perspective in Nature Climate Change; Published on-line – Feb 2015

Exhibit 46: ***Oysters on acid: How the oceans's declining pH will change the way we eat*** ; By H. Claire Brown; November 28th, 2017; https://newfoodeconomy.org/ocean-acidification-oysters-dungeness-crabs/

Exhibit 47:

- **Oregon and California crabbers sue fossil fuel companies** Updated Nov 27, 2018; Posted Nov 26, 2018 https://www.oregonlive.com/pacific-northwest-news/index.ssf/2018/11/oregon_and_california_crabbers.html
- Superior Court of the State of California ***Pacific Coast Federation of Fishermen's Association, Inc –vs- Cheron Corp; Chevron U.S.A. Inc, Exxon Mobil Corp et.al.*** Petitioners Complaint under Case CGC-18-571285.
- United States District Court Western District of Washington at Seattle ***Columbia Riverkeeper et. al.-v- Scott Pruitt, et. al*** Order Re: Motions for Summary Judgment under Case No C17-289RSM

Exhibit 48: Williams CR, Dittman AH, McElhany P, et al. ***Elevated CO2 impairs olfactory-mediated neural and behavioral responses and gene expression in ocean- phase coho salmon (Oncorhynchus kisutch)***. Glob Change Biol. 2018;00:1–15. https://doi.org/10.1111/gcb.14532 November 2018

Exhibit 49: Senica Jones Timber Company , LLC Motion to Intervene with the FERC under Pacific Connector Gas Pipeline Docket No. CP17-494-000 concerning **Timber/Forest Impacts**

Exhibit 50: Messerle & Sons June 10, 2010 testimony under Coos County File No. HBCU-10-01 for the Pacific Connector Gas Pipeline concerning **Timber/Forest Impacts**

Exhibit 51: Yankee Creek Forestry June 7, 2010 comments under Coos County File No. HBCU-10-01 for the Pacific Connector Gas Pipeline concerning **Timber/Forest Impacts**

Exhibit 52: Sept 13, 2010 Declaration of Bill Gow under Case File No. CV-10-6279-HO

Exhibit 53: **Alternative LNG terminal locations**

Exhibit 54: *Pembina Pipeline's new purpose: Get Canada's oil and gas to the rest of the world* ;By Claudia Cattaneo; February 16, 2018; http://business.financialpost.com/commodities/energy/pembina-pipelines-new-purpose-get-canadas-oil-and-gas-to-the-rest-of-the-world

Exhibit 55: ***Jordan Cove LNG and Pacific Connector Pipeline Greenhouse Gas Emissions Briefing***; Oil Change International; Jan 2018; http://priceofoil.org/2018/01/11/jordan-cove-lng-and-pacific-connector-pipeline-greenhouse-gas-emissions/

Exhibit 56: Select pages from ***IGU 2018 World LNG Report*** - 27th World Gas Conference Edition

Exhibit 57: ***Current Removal-Fill Permit Applications*** in Coos County – Not a complete listing

Exhibit 58: August 18, 2015 **letter from United States Environmental Protection Agency Region 10** - concerning maintenance dredging disposal availability.

Exhibit 59: *The impact of channel deepening and dredging on estuarine sediment concentration* D.S. vanMaren n, T.vanKessel, K.Cronin, L.Sittoni - Coastal and Marine Systems 95(2015)1–14 Deltares, Delft, the Netherlands

Exhibit 60: ***The effects of marine gravel extraction on the macrobenthos: Results 2 years post-dredging*** A.J. Kenny, H.L. Rees ; Marine Pollution Bulletin ; Volume 32, Issues 8–9, August–September 1996, Pages 615-622 https://www.sciencedirect.com/science/article/pii/0025326X96000240?via%3Dihub

Exhibit 61: ***Seagrasses, Dredging and Light in Laguna Madre, Texas, U.S.A.*** Christopher P. Onuf - National Biological Survey, National Wetlands Research Center, Campus Estuarine, Coastal and Shelf Science; Volume 39, Issue 1, July 1994, Pages 75-91 https://www.sciencedirect.com/science/article/pii/S027277148471050X?via%3Dihub

Exhibit 62: ***Dredging related metal bioaccumulation in oysters*** L.H. Hedge , N.A. Knott, E.L. Johnston; Marine Pollution Bulletin; Volume 58, Issue 6, June 2009, Pages 832-840 https://www.sciencedirect.com/science/article/pii/S0025326X09000472?via%3Dihub

Exhibit 63: ***Shell shock*** , June 14, 2010, By Nate Traylor, Staff Writer - The World
http://theworldlink.com/news/local/shell-shock/article_389a9be8-77dc-11df-9127-001cc4c03286.html

Exhibit 64:
A MODEL FOR SIZING HIGH CONSEQUENCE AREAS ASSOCIATED WITH NATURAL GAS PIPELINES - *TOPICAL REPORT* Prepared by Mark J. Stephens,
C-FER Technologies, Oct 2000

Exhibit 65:
November 6, 2017 **DOGAMI comments related to Geologic Hazards** and the Proposed Jordan Cove LNG terminal and Pacific Connector Gas Pipeline.

Exhibit 66:
January 11, 2015 Public Comment by Barbara Gimlin, ***Intertidal Flats Mitigation Proposed for Kentuck Slough*** - Jordan Cove Energy Project Joint Permit Applications
U.S. Army Corps of Engineers/Oregon Department of State Lands

Exhibit 67:
Supplement to Technical Memorandum - ***Jordan Cove LNG Facility Tsunami Hydrodynamic Modeling*** – January 24, 2014

Exhibit 68: June 25, 2014 DEQ Warning letter issued to Jordan Cove for violations that occurred at the Ingram Yard property on May 8, 2014, along with the follow-up that also occurred.

Exhibit 5

Barbara Gimlin, P.O. Box 1527, North Bend, OR 97459

(541) 404-0355 — bgimlin@charter.net

December 16, 2014

Jeff C. Wright, Director
Office of Energy Projects
Federal Energy Regulatory Commission
888 First Street N.E.
Washington, DC 20426

RE: Public Comment on Jordan Cove Energy Project, L.P., Draft Environmental Impact Statement; FERC/EIS-0223F; Docket No. CP07-444-000; LNG Terminal Facility

Dear Mr. Wright,

I am sincerely concerned about soil contamination issues at the proposed site for a liquefied natural gas (LNG) terminal facility for the Jordan Cove Energy Project (JCEP) in North Bend, Oregon. I am a biologist and environmental specialist with a 30-year professional background that includes working as an educator and contract biologist, in addition to working 15 years for the Federal Emergency Management Agency (FEMA) as an environmental specialist from 1998 to 2013. At FEMA I specialized in writing Environmental Assessments and ensuring compliance with the National Environmental Policy Act (NEPA) for FEMA-funded projects. My knowledge and awareness related to JCEP site contaminants comes from firsthand experience working for the JCEP while employed by SHN Consulting Engineers & Geologists, Inc. (SHN) in Coos Bay as a biologist and environmental compliance specialist from March 2013 to April 2014.

I was initially hired by SHN to revise JCEP Resource Report 3 for Vegetation, Wildlife and Fish. I have also assisted in writing Exhibits P (Fish and Wildlife Habitat) and Exhibit Q (Endangered Species) for the Oregon Energy Facility Siting Council (EFSC) application for the JCEP South Dunes Power Plant (SDPP) portion of the project. In between writing these reports, I have spent a considerable amount of time at the various JCEP sites associated with the terminal facility. I have participated in and written reports for numerous habitat-related surveys and studies for the project. In March 2014, I was named as the acting Environmental Inspector (EI) for the JCEP Kiewit $15 million exploratory test program conducted at the LNG terminal site on the North Spit of Coos Bay.

During my time at SHN I struggled at times with the resistance by others working on the JCEP, both inside and out of the company, to respond to what is required for environmental compliance. It was understandable on some levels (it's all in education), but not understandable when substantial environmental issues were discovered.

What I experienced while working as the acting EI for the JCEP Kiewit test program led me to submit a resignation letter to SHN on April 21, 2014, as a matter of professional integrity. When considerable contaminated soils and sediments were exposed during the test program, I was repeatedly told the issues were "being taken care of" and that I didn't need to be involved, even although I was the acting EI. What occurred during the test program did not follow the Unanticipated Hazardous Waste Discovery

Plan written for the JCEP in Resource Report 7. This plan is referred to in the JCEP Draft Environmental Impact State (DEIS) as the process that would be implemented for any construction activities. Instead of management allowing me to further assess the situation and develop an action plan for the contamination issues discovered, I became the problem. I was bluntly told more than once that my job as the acting EI was to not to delay the test program construction being conducted.

I was, and still am, very concerned about site contamination and had hoped the issues I brought to the forefront would be acknowledged and addressed in the DEIS. They have not been. In addition, the contaminant issues I drafted for EFSC Exhibit Q were left out of that exhibit and ignored.

To back up a bit, questioning practices at the JCEP terminal site first began when I found out months after the fact that Southern Oregon University Laboratory of Anthropology (SOULA) archaeologists had discovered contaminated black soils along the JCEP shoreline during cultural resources surveys conducted in September 2013. The soils were discovered at the approximate site of the proposed barge berth. SOULA archaeologists stopped their surveys in the area because of black soils that they deemed to be contaminated (allegedly arsenic) and unsafe to work in. At the time, they notified Steve Donovan, my former boss at SHN, who is an environmental engineer.

When I found out about the soils in February during a meeting with SOULA, I asked if the Oregon Department of Environmental Quality (DEQ) had been informed. I was met with a type of subdued hostility from Steve Donovan and was told it was being taken care of, that it was going to be filled anyway, and that it was not my concern. At the time I thought to myself, not before workers go in there and move the stuff around. And why not report it to DEQ immediately and address it? Since there was a window where it could eventually be addressed, I sufficed in my mind that I would just watch and make sure it was taken care of properly. It was clear from the response I received from my initial queries that further discussion was not welcome. Of note, the site is included as a borrow site to be used as fill for the SDPP. To the best of my knowledge, no further action has been taken to have the soils tested and addressed.

Fast forward to the Kiewit exploratory test program conducted in the spring of 2014 at the proposed LNG terminal site, which includes Ingram Yard and parts the dune forest. As the acting EI, I attended the pre-construction meeting and was introduced by Kiewit as the person who would oversee environmental considerations at the site. As unidentified contaminated soils and sediment surfaced during excavations conducted in Ingram Yard, during my research I came across DEQ Environmental Site Cleanup Information (ESCI Site #4704) online for the 80-acre Ingram Yard property. Previously, I had been repeatedly told it was all “clean fill” from dredging conducted by the U.S. Army Corps of Engineers (USACE) in the 1970s. That was not the complete case at all. It had been used as a log sorting yard and had been authorized as a mill waste dump site by the DEQ following the placement of fill by the USACE. There have also been allegations by locals that the site was used as a dump site outside of mill waste. Limited and inadequate testing has been done post-closure at the site to determine the full extent of the contaminants, and the testing has been limited primarily to the northern half of the site.

In my efforts to ensure the contaminated soils uncovered were addressed appropriately, I provided a copy of the Unanticipated Hazardous Waste Discovery Plan for the JCEP to Steve Donovan at SHN along

with Kiewit personnel, West Coast Contractors personnel (a subcontractor hired by Kiewit), and to the archaeological monitor for the test program. As more contaminants were discovered during excavations, the protocol for site assessment, testing procedures, and compliance with regulations in place under the plan were not being followed. Although I pressed for compliance, I was precluded from any involvement in the matter as the EI. Instead, I was told it was being handled and that I didn't need to be involved. It became clear I was a figurehead EI. That worries me regarding how the future JCEP EI position will be managed.

Potential contaminates exposed by the Kiewit excavations conducted at the site included numerous black soils (north to south in Ingram Yard, including near the shoreline), bright yellow granulated/powder found in clumps of varying sizes, gray gummy material found in clumps (likely related to hydraulic drilling conducted by GRI), and the exposure of an underground concrete storage tank punched through by heavy equipment with unknown liquid inside. The underground tank was located within 15 feet of a temporary office trailer placed for workers at the site near the shoreline and was proclaimed to be an abandoned septic tank by Steve Donovan at SHN, without being tested or researched. There was no apparent smell and the liquid looked gray and foamy. The tank opening was covered by plywood and workers continued to park next to it and walk over it until I asked that it be cordoned off until tests were conducted.

To add to my growing alarm, the archaeologist hired to monitor Kiewit construction activities throughout the site reported his work boots were falling apart due to the seams disintegrating. Initially, he included reports of the potential contaminants he encountered during his monitoring for cultural resources. Under pressure he stopped including the information, as he's an employee who self proclaims he "rides for the brand." Additional information on the contaminants he encountered beyond his initial weekly reports can now only be found in his handwritten journals turned in for the project that are likely stuffed away in some box.

As the contaminant issues mounted, I stressed with my boss at SHN, Steve Donovan, that the Oregon DEQ needed to be contacted and that their policies and regulations needed to be followed. Instead, my hands were kept tied in terms of fulfilling my role as the acting EI and my attempts to initiate action were initially ignored (he was so busy) and then met with subdued hostility. Steve Donovan's standard line, similar to his response about the SOULA concerns with black soils, was to say that it was being taken care of and that I didn't need to be involved. When pressed, Steve Donovan would say he had contacted the DEQ but he wouldn't provide any details when asked for the sake of the administrative record. It was frustrating, to say the least.

While the potential contamination continued to be untested, I became the problem instead. When I repeatedly reported concerns about ongoing discoveries and the process that needed to be followed, my efforts were repeatedly ignored most of the time, or I was told I didn't need to be involved. I was restricted from taking any action that I felt would make the project not only compliant with environmental policies and regulations in place, but ultimately would assist the project as it continues to move forward. After submitting my resignation I contacted the primary DEQ contact for the environmental cleanup site at Ingram Yard, Bill Mason, and learned he had not been informed of any of the contaminant issues being exposed by the Kiewit test program.

The DEQ should have been contacted immediately when the black soils were discovered by SOULA archaeologists in September 2013, and again when the contaminated soils were uncovered during the Kiewit test program. Instead of taking action as the acting EI, I was restrained and told several times I needed to stop acting like a regulator. I have never been a regulator, but I do know the environmental laws and the ones I don't know I research when needed. There was a process that needed to be followed, but wasn't. And it was clear project managers did not want to hear about it from me.

I'm a supporter of the JCEP but am deeply concerned by the incidents that led me to sever my ties with SHN and the project. There is not a commitment to ensure regulatory compliance and, henceforth, accountability, transparency, and integrity for the project. I don't want to believe that the top project managers condone what has transpired. However, when I contacted Bob Braddock, JCEP Vice President and Project Manager, this past summer about my continued concerns, his short response was that he would take my concerns up with SHN. My response was, "therein lies the problem." I never heard back.

In the DEIS the Ingram Yard soils are repeated referred to as clean fill and as being free of contaminants. What little is mentioned as testing having been conducted does not address the limited areas tested and the concerns raised by the DEQ in 2006, including that there are bioaccumulating toxins that would be extremely harmful to marine life if released into the waters of Coos Bay (e.g., via stormwater during transportation, relocation, and use as filtration for stormwater management). The JCEP plans to excavate and transport approximately 2.3 million cubic yards of the upland soils from the terminal site for use as 20-30 feet of fill for the shoreline SDPP site.

The transparency of the JCEP has become a huge concern of mine since the implementation of the Kiewit test program. In addition to the large amounts of potential contaminants exposed during the test program that were not dealt with, I had repeatedly pointed out early in the design stage back in January that the access road along the shoreline was not paved during weekly conference calls with David Evans and Associates (DEA). It was not ever corrected in the NPDES permit submitted to the DEQ by DEA for the test program, or addressed by DEQ-required conditions for the permit, even though substantial improvements were conducted on this road. In addition, a staging area was constructed within 150 feet of the shoreline in Ingram Yard, ignoring standards established by the National Marine Fisheries Service. The approach of "let's wait and see if it comes out in the public comment period" proclaimed by Sean Sullivan, the DEA lead, for the NPDES permit didn't settle well with me. Vast improvements were made during the Kiewit test program to the shoreline dirt road, without any specifications or requirements by the DEQ for the work at that location because no one at the DEQ checked for site plan accuracy. Would other permits or authorizations have been required for work so close to the shoreline? That's what an environmental professional asks and I did. But only internally, as my comments were discounted by both SHN and DEA.

As the acting EI position for the Kiewit test program, I asked repeatedly that the correct process be followed, stressing transparency was paramount. I tried many times (oral, hand-delivered, phone messages, emails) to communicate this and either did not receive a response or was reprimanded. Despite my concerns raised, with not only SHN but with supervisors at the site, the process wasn't being followed. Prior to resigning from SHN, I learned of additional contaminants being exposed on Friday night of April 18, 2014. I went into work on Saturday morning and alerted all key personnel by email that the Unanticipated Hazardous Waste Discovery Plan for the JCEP needed to be implemented and the

protocol followed. The message was tagged as urgent and I emphasized the plan needed to be implemented before workers returned to the site on Monday. I included a personal commitment to assist in addressing the potential issues as expeditiously as possible.

I did not receive one response or phone call in return. When I went into work Monday morning, I was greeted by Steve Donovan who told me I had gotten myself in trouble with Bob Braddock and that I had gone too far. He sternly told me I had gotten off on the wrong foot, that I needed to focus on the "birds and the bunnies," that I had been very disruptive for the Kiewit test program, and that my job with SHN was not to delay the construction occurring at the time. I learned that nothing would be done, construction at the site was commencing without interruption, and there was no plan to deal with the potential contaminants. At that point, after 2-1/2 weeks of trying to resolve the matter, I felt I had no choice and turned in my letter of resignation.

I have a good rapport with the various resource agencies in Oregon from my work for FEMA, and also from when I have worked on my own as an independent environmental consultant. My professional name and integrity was put at stake when I was told my job was to stand back, thereby restricting me from ensuring the proper environmental response was carried out. Within my discipline there is a strict code of ethics (or should be) and I chose not to turn my back on doing the right thing. Transparency, due diligence, and integrity are very important to me. I have not felt they have been important for the JCEP decision makers at hand during the critical moments when a response could have been initiated.

I support the JCEP. I do not support what has recently transpired and sincerely hope it is a reflection of bad judgment on those firms (SHN, DEA) tasked with ensuring this project is transparent and committed to ensuring laws will be followed, including commencing with environmental cleanup as necessary that is coordinated with the Oregon DEQ. The JCEP has inherited property that has issues. These issues can and should be addressed immediately as they arise, and as spelled out by the DEQ. It would be a huge endorsement for the project that they are committed to doing the right thing. Handled correctly, it does not need to be covered up and people like me do not need to be treated as obstacles.

I felt as if I made a strong point by resigning. I had hoped that SHN and DEA would present and address the issues exposed and that the appropriate analysis would be included in the FERC DEIS. Instead, once the DEIS was released I saw that my concerns were excluded and that the Ingram Yard contaminated fill is instead repeatedly referred to as clean and plans are proceeding to use it as fill for the proposed SDPP shoreline site. And no mention is made of the proposed barge berth site, also a borrow site for the SDPP, being contaminated (SOULA, 2013)

The DEIS refers to the DEQ as issuing a "No Further Action" for the environmental clean-up at the terminal site (DEQ, 2006), but if you look at DEQ's website it is listed as a "Partial No Further Action" and is based on the premise that contaminants at the site excavated during future site activities or development must be properly managed and disposed of in accordance with DEQ regulations and policies. Much more testing is needed at the site, due to the much larger extent of contaminated soil exposed during the Kiewit test program. The contamination occurs well outside of the range of where the previous testing was conducted in only the northern portion of the site. Black soils were found all the way to the shoreline at Ingram Yard, along with the additional forested shoreline site to the east

encountered by the SOULA archaeologists. And I can't help but wonder if the underground storage tank was ever properly tested and analyzed. It certainly isn't mentioned in the DEIS. Very little regarding this whole issue is included in the DEIS, except for the misrepresentation of the fill being tested and as being free of contaminants.

In addition, the only stormwater management plan referred to in the DEIS is the one included in Resource Report 2, and it is far from adequate. A stormwater management plan needs to be individually developed for the site which clearly takes into account the contaminants at the site and ensures they are not transported to the shoreline SDPP site, where stormwater currently will be transported through a series of ditches and swales for release in the slip and access channel created for the project. Treatment is briefly mentioned as being included as needed, but there is no clear, site-specific plan included in the DEIS and there should be.

The narrative, plans and figures presented in the DEIS are substantially incomplete regarding the contaminant issues encountered by the project so far. It does not present or address these issues. Much more testing is needed and potentially hazardous materials need to be transferred off-site to a DEQ-approved facility for disposal, not transferred to the SDPP site for use as fill along the Coos Bay estuary. The matter is being swept under a rug and the project has set a very disconcerting precedence regarding how issues encountered at the terminal site will be managed. By not clearly and adequately analyzing the affected environment in the DEIS, the potential environmental consequences of the project are not being addressed. Therefore, cumulative effects and conclusions drawn from the misrepresentation of the site are inadequate.

The ongoing issues at the JCEP terminal site needs to be addressed, including corrective actions that will be taken to minimize potential adverse effects. This needs to be clearly spelled out in the Final EIS before a Record of Decision is issued; otherwise the NEPA process is not being followed.

I would be happy to answer any questions you may have and to steer you to the relevant reports that back up my allegations.

Sincerely,

Barbara Gimlin[1]

[1] electronic signature

cc: Ken Phippen, Branch Chief, Oregon Coast Habitat Branch, National Marine Fisheries Service (NMFS)
Brent Norberg, Office of Protected Resources, NMFS Northwest Region
Shawn Zinszer, Portland District Regulatory Branch Chief, USACE Portland District Regulatory Branch
Teena Monical, Eugene Section Chief, USACE Eugene Field Office
Tyler Krug, Project Manager, USACE North Bend Field Office
Patty Burke, District Manager, BLM Coos Bay District Office
Jennifer Sperling, Botanist, BLM Coos Bay District Office
Dennis McLerran, Administrator, U.S. Environmental Protection Agency (EPA), Region 10
Anne Dalrymple, Enforcement Coordinator, EPA Office of Compliance and Enforcement, Region 10
Laura Todd, Field Supervisor, Newport Field Office, U.S. Fish and Wildlife Service

Dick Pedersen, Director, Oregon Department of Environmental Quality (DEQ)
Sara Christensen, 401 Water Quality Certification Coordinator, Oregon DEQ
Bill Mason, Senior Groundwater Hydrologist, DEQ Western Region Office, Eugene
Steve Nichols, Permitting/Compliance Specialist, DEQ Coos Bay Office
Mary Abrams, Director, Oregon Department of State Lands (DSL)
Bob Lobdell, Resource Coordinator, Oregon DSL
Mike Gray, ODFW District Fish Biologist, Charleston Field Office
Stuart Love, ODFW District Wildlife Biologist, Charleston Field Office
Christopher Claire, ODFW Habitat Protection Biologist
Patti Evernden, Coos County Planning Department
Juna Hickner, Coastal State-Federal Relations Coordinator, Oregon Department of Land Conservation and Development
Crystal Shoji, Mayor, City of Coos Bay
Thomas Leahy, Councilor, Coos Bay City Council
Rick Wetherell, Mayor, City of North Bend
David Koch, Chief Executive Officer, International Port of Coos Bay
John Souder, Executive Director, Coos Watershed Association

Warren Brainard, Chief, Confederated Tribes of Coos Lower Umpqua and Siuslaw Indians (CTCLUSI)
Howard Crombie, Director, Department of Natural Resources, CTCLUSI
Bob Garcia, Chairman, CTCLUSI
Don Ivy, Chief, Coquille Indian Tribe
Brenda Meade, Chairperson, Coquille Indian Tribe

Exhibit 6

TOPIC	REQUESTED ACTIONS INCLUDING COMMENTS/QUESTIONS
Inconsistencies in Project Information That Have the Potential to Effect the Review of the DEQ WQC	The project information included in permit applications and authorization requests submitted to local, state and federal agencies by the Jordan Cove Energy Project (JCEP) varies, making it imperative that the Oregon Department of Environmental Quality (DEQ) coordinate with other respective agencies to ensure they are approving the same actions before approving the DEQ Water Quality Certification (WQC) for the project. Complete investigation and analysis is needed due to the substantial inconsistencies between what is presented to various agencies. There are significant lapses in portraying what the full scope of work for the project will entail and how potential adverse effects will be addressed. By not having a complete and consistent scope of work to evaluate, it makes it difficult for the DEQ to fully conduct the proper review and analysis needed for impacts to water quality.
Soil Contamination at the LNG Terminal Facility Site	The site of the LNG terminal (Ingram Yard) was the location of a livestock ranch until 1958. After it was acquired as part of the Menasha mill complex in 1961, the tract was occasionally used for log sorting activities. In 1972-1973, the U.S. Army Corps of Engineers spread materials dredged during maintenance of the Coos Bay navigation channel on the site. From the late 1970s through the early 1980s sand, boiler ash, and wood debris from milling operations were placed on the property. Weyerhaeuser, which acquired the mill in 1981, spread decant solids from its wastewater treatment facility at the site between 1985 and 1994. In addition to mill waste, it is common local knowledge that Ingram Yard was a dumping site used by other entities that found it a convenient place to dump waste of unknown origins. Following closure of the mill site in 2003, it was listed as an environment cleanup site by the DEQ (ECSI #1083) and included Ingram Yard (ECSI #4704). Both sites have undergone a series of limited environmental site assessments to determine the nature and extent of contaminants that occur. Contaminants detected during investigative work over the years have included: mineral spirits, hydraulic oil, diesel, heavy-oil-range petroleum hydrocarbons (total petroleum hydrocarbons, of "TPH"), heavy metals, butylated tin compounds, polynuclear aromatic hydrocarbons, polycholorinated biphenyls, and dioxins. The DEQ issued a **partial no further action** letter for both sites on September 15, 2006. Residual contamination remains at the former main mill complex and Ingram Yard sites and the DEQ approved leaving contamination based on the determination that the site will remain in commercial/industrial use. For Ingram Yard, the following requirements were noted: • **While surface soils at the Ingram Yard site meet human health and ecological screening criteria, they contain low levels of potentially bioaccumulating chemicals and must not be placed in waters of the**

TOPIC	REQUESTED ACTIONS INCLUDING COMMENTS/QUESTIONS
	state. Soils and/or sediments containing residual contamination must be managed or disposed of in accordance with DEQ rules. Additional testing, evaluation, and coordination with the DEQ is needed to ensure placement of fill removed from Ingram Yard or any other potentially contaminated sites within the project footprint consists of only clean fill that has been properly tested, due to the project's proximity to Coos Bay. **The potential release of contaminants into Coos Bay through improper placement of contaminated fill and subsequent release through stormwater or by washing into the bay due to a tsunami would expose fish and marine life to bioaccumulating toxins that would be devastating not only to the fish and marine life, but to humans who could potentially consume them.** During the implementation of a $15 million JCEP exploratory sheet pile and ground penetration test program at Ingram Yard and the dune forest to the east during the spring of 2014, contaminated soil was exposed virtually everywhere excavation occurred in Ingram Yard , all the way to the shoreline. This includes contaminated soils exposed during excavation of a 150'x150' staging area to approximately 4' depth in the northern portion of Ingram Yard and along the road improvements conducted in Ingram Yard from the Trans Pacific Parkway all the way to the shoreline. In addition, during archaeological surveys conducted in the southern portion of the dune forest along the Coos Bay shoreline (also mapped as a borrow area for project fill), archaeologists stopped surveys in the immediate vicinity due to dark black soils that they felt were too contaminated to safely proceed. The soils in this area have not been tested during previous site closure evaluations and the additional contamination issues exposed need to be taken seriously. It is now known that contamination at the JCEP terminal site occurs well outside of the range of where the previous testing was conducted. Much more testing is needed at the overall site to fully understand the extent. While the types of contaminants are somewhat understood, their extent is not. It is extremely important that all pertinent facts regarding potential contaminants be presented for consideration and evaluation prior to placement of fill anywhere within the project footprint. In the Draft Environmental Impact State (EIS) prepared for the project, the JCEP plans to excavate and transport approximately 2.3 million cubic yards of the upland soils from the terminal site (known as Ingram Yard) for use as fill for the shoreline South Dunes Power Plant (SDPP) site. This does not include additional sites along the forested shoreline where other contaminants have been exposed, and other potential sites within the project footprint on the North Spit of Coos Bay. Since the DEQ WQC application is not available for public review (at

TOPIC	REQUESTED ACTIONS INCLUDING COMMENTS/QUESTIONS
	least that I could find), my comments are based on what's presented regarding the use of the fill in the Draft EIS The Draft EIS states 20-30 feet of fill will be used at the South Dunes Power Plant (SDPP) site. However, in the JCEP's application to the Oregon Department of Energy (DOE) for the Energy Facility Siting Council, it states 40-46 feet of fill will be used and it will go right up to the shoreline along Jordan Cove. Regardless of the amount of fill, **due to the fact that it will be excavated from a site known to be a mill dumpsite with bioaccumulating toxins**, there should be a clear plan in place for how the extensive contamination will be managed, handled, and disposed of. It is not acceptable to use contaminated soils as fill anywhere within the project boundaries when the potential for stormwater runoff and/or being washed into the bay from a tsunami presents a very real concern to the marine and natural environment of Coos Bay. All contaminated soil needs to be hauled offsite, with Best Management Practices (BMPs) to ensure construction equipment and vehicles handling it do not result in the further spread of these contaminants into the bay. A testing and monitoring plan needs to be developed and approved by the DEQ prior to approval of the WQC to ensure any fill transferred within the project footprint for use as fill for elevation of the project is free of potential contaminants. By not clearly and adequately analyzing the contaminated soils throughout the JCEP North Spit site and at the Kentuck mitigation site, the effects to water quality have the potential to have significant adverse effects to fish and marine life in Coos Bay.
Unanticipated Hazardous Waste Discovery Plan and Need for Third Party Monitoring	The Unanticipated Hazardous Waste Discovery Plan developed by the JCEP sounds good, but I can tell you from firsthand experience as the acting Environmental Inspector for project's $15 million exploratory test program conducted at the LNG terminal site in the spring of 2014 that this plan was not followed in the least. Instead, I was ordered to not do my job, to not follow the plan, to not contact the DEQ, and to not delay the ongoing construction activities being conducted at the time**. It is essential that third-party environmental monitors are in place to ensure this doesn't happen again on a much larger scale.**
General Stormwater Management	Potential contaminants in stormwater need to be addressed in the development and implementation of a stormwater management plan that meets DEQ National Pollutant Discharge Elimination System (NPDES) permit requirements to reduce the potential impacts to fish and marine species, whether listed as threatened or endangered for not. The only stormwater management plan referred to in the Draft EIS is the one included in Resource Report 2, and it is far from adequate. A stormwater management plan needs to be individually developed for the site which

TOPIC	REQUESTED ACTIONS INCLUDING COMMENTS/QUESTIONS
	clearly takes into account the contaminants at the site and ensures they are not transported to the shoreline SDPP site or anywhere else inside the project footprint along the shoreline of Coos Bay. As stated in the Draft EIS, stormwater currently will be transported through a series of ditches and swales for release in the slip and access channel created for the project. Treatment is briefly mentioned as being included as needed, but there is no clear, site-specific plan included in the Draft EIS and there should be. For the Oregon Department of Energy site application with EFSC, a Conceptual Stormwater Management Plan for the JCEP (Document No. 142488-0000-DS0300) dated October 24, 2014, was included. It did not bring up or address the ongoing contamination issues at the site and the BMPs it proposes to not begin to properly address the real and relevant concerns. If anything, it is alarming as it states placement of what they refer to as "sand fill" throughout the plan (from Ingram Yard) will create approximately 2,512,300 square feet of exposed slopes along the SDPP shoreline. It also states monitoring and testing of the stormwater outfalls will be developed as the stormwater design is finalized. This is not good enough. If this issue is not fully evaluated and a stormwater management plan is approved by DEQ prior to issuing a WQC, there is no guarantee an adequate plan will be in place to address the ongoing issues. In addition, the proposed scope of work states the work will be conducted during the Oregon Department of Fish and Wildlife's work window for Coos Bay, which occurs during the months with the highest monthly averages of precipitation (November, December and January). This makes it imperative that extensive BMPs and policies are in place to ensure potential contaminants exposed during excavation at the site are not released into the bay via stormwater. In addition to ensuring ANY potential site contaminates are properly managed and disposed of, **a monitoring and testing program needs to be clearly spelled out in the WQC** in order for the DEQ to fully review and analyze the soil contamination issue and ensure the potential effects to the human and natural environment are minimized and mitigated.
Additional Contaminant Concerns Related to Stormwater	Stormwater management for the project plays on increasingly important role in determining the potential effects to coho salmon and other fish and marine species in Coos Bay. Potential concerns have been elevated in recent years regarding even trace amounts of contaminants (i.e., copper, zinc, PAHS, etc.) that may be discharged into waterways. Although limited studies have been conducted to date, it is theorized that depending on their reaction to water quality and activity within the mixing zone, coho salmon may have migration delays, may move into less-protected habitat, or may become more susceptible to predation.

TOPIC	REQUESTED ACTIONS INCLUDING COMMENTS/QUESTIONS
	Pollution reduction and treatment for stormwater runoff needs to clearly address how stormwater will be contained and/or transported from all contributing impervious areas within the project footprint to ensure contaminants harmful to fish and marine life are adequately controlled.
Intertidal Flats Mitigation Proposed for Kentuck Slough	Per the joint Public Notice by the DEQ and the U.S. Army Corps of Engineers (Corps), the JCEP proposes to mitigate for other estuarine aquatic resource impacts through the enhancement of 14.33 acres of freshwater wetland habitat, restoration of 1.88 estuarine wetland habitat and reestablishment of historic tidal flows to approximately 45.1 acres of wetland habitat (converting freshwater wetland to unvegetated tidal mudflat channels) at the former Kentuck Golf Course (Kentuck Slough Mitigation Site), east of North Bend. The estuarine intertidal flats mitigation proposed for Kentuck Slough by the JCEP has not undergone the serious environmental and hydrologic evaluation needed to ensure the mitigation will not result in contamination of the Coos Bay estuary due to the site's use as a golf course for over four decades, flooding of adjacent and upstream property owners, and a potential mosquito infestation that would affect area residents. Much more input is needed from hydrologists, engineers, natural resources scientists, and planners to fully understand and design a plan for the site that will address current and future site-specific conditions on the ground, including upstream of the site. There are substantial inconsistencies in the various compensatory mitigation plan versions floating around in the regulatory system for the Kentuck mitigation proposed by the JCEP. The lack of consistency is an indicator that the project warrants close and interactive scrutiny by the local, state and federal agencies that are authorized to review and approve the project. Each authorizing agency needs to ask tough questions, to coordinate with other respective agencies to ensure they are approving the same actions, and to expect complete investigation and analysis before approving any action. These inconsistencies, together with the lack of appropriate studies and associated documentation, is alarming. As it stands, there is a significant potential for substantial adverse effects from the mitigation proposed at Kentuck to water quality. My public comment to FERC submitted on February 12, 2015, provides substantially more information regarding this issue and I encourage the DEQ to review it (FERC Comment No. 20150212-5018).
State Endangered Plant Species (Point Reyes Bird's Beak) Occurrence Along the Jordan Cove Shoreline and North Point Workforce Housing Project Slough	The Point Reyes bird's-beak (*Chloropyron maritimum* ssp. *Palustre*, formerly *Cordylanthus maritimus* ssp. *palustris*) is an annual gray-green and purple-tinged herbaceous species with pinkish to purplish red flowers that grows 4 to 16 inches tall and has few branched stems. It is listed as endangered by the State of Oregon. In Oregon, the species is restricted to Netarts Bay, Yaquina Bay, and Coos Bay, with the majority of known occurrences located along the Coos Bay shoreline (ORBIC 2013). As required by the Oregon Department of Agriculture (ODA) under OAR 603-073-0090(5)(d)(A)-(E), the project needs to document that it has made a

TOPIC	REQUESTED ACTIONS INCLUDING COMMENTS/QUESTIONS
	reasonable effort to ensure that construction and operation of the project will not result in a population loss or decline of the Point Reyes bird's-beak at the locations where it is found on adjacent shorelines. Focused botanical surveys were conducted during July and August of 2013 during the appropriate blooming period to document occurrences of Point Reyes bird's-beak in or near the JCEP project footprint. Multiple occurrences of substantial populations were detected along the shoreline of Jordan Cove, near Wetland J at the SDPP site, on the shoreline east of the SDPP site boundary, and along the North Point Slough entrance at the proposed North Point Workforce Housing site. It is essential that appropriate Best Management Practices (BMPs) and mitigation measures are implemented to ensure the species is preserved and protected. Although the JCEP states appropriate mitigation measures will be developed and implemented through consultation with the ODA to ensure that suitable habitat for the Point Reyes bird's-beak will not be impacted by construction of the project, the lack of documentation of this actually happening is missing. While employed by SHN Consulting Engineers & Geologists, Inc. (SHN) for the JCEP, I initiated consultation with the ODA–but much more follow-up is needed. The project has dropped the ball on this one. The Point Reyes bird's-beak populations documented warrant further evaluation and site plans need to clearly document the potential impact to the species. At the North Point Slough location, current site plans call for a bridge to connect the two portions of the site on each side of the slough entrance and this action will involve the "take" of this species. Prior to approval of the WQC, the DEQ, as a state agency, needs to ensure mitigation measures developed in coordination with the ODA will be implemented to ensure that impacts to Point Reyes bird's-beak are avoided and minimized. A conservation and mitigation plan that includes monitoring needs be developed and approved by the ODA prior to issuance of the WQC by the DEQ to ensure the project is not likely to cause a significant reduction in the likelihood of survival or recovery of the species.
Tsunami Hazards	In a 13-year study completed by Oregon State University in 2012 (published online by the U.S. Geological Survey; Professional Paper 1661-F), **the study concluded that there is a 40 percent chance of a major earthquake in the Coos Bay region during the next 50 years due to its location along the Cascadia Subduction Zone**. The study determined such an earthquake could approach the intensity of the Tohoku quake that devastated Japan in March of 2011. This extensive study not discussed or considered in the risk evaluation by the JCEP. In addition, a multi-state mitigation project of the National Tsunami Hazard Mitigation Program (NTHMP) published Seven Principles for Planning and Designing for Tsunami Hazards in March 2001. Participants includes

TOPIC	REQUESTED ACTIONS INCLUDING COMMENTS/QUESTIONS
	the National Oceanic and Atmospheric Administration (NOAA), U.S. Geological Survey, Federal Emergency Management Agency, National Science Foundation and the states of Alaska, California, Hawaii, Oregon, and Washington. Funding for this project was provided by NOAA. This valuable study was not used either in determining the tsunami risks for the JCEP. The DEQ needs to review the findings of these two well researched reports in their decision-making process, as the potential for contaminants to be washed into the bay during a tsunami event becomes a very real concern to water quality.
Transparency and Integrity Issues	During my time working for the JCEP under SHN from March 2013 to April 2014, I encountered serious transparency and integrity issues with the management of both SHN and another primary consultant, David Evans and Associates. From inaccurate site plans submitted with permits to failing to address issues as they arose, the standard operating procedures of "let's wait and see if it comes out in public comment" is not the proper response to issues. Hence my public comment.

Exhibit 7

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMSSION

IN THE MATTERS OF

Jordan Cove Energy Project, L.P.	**)**	**Docket No. CP13-483-000**
Pacific Connector Gas Pipeline, L.P.	**)**	**Docket No. CP13-492-000**

MOTION TO INTERVENE OUT OF TIME OF CLAUSEN OYSTERS AND LILLI CLAUSEN, AS AN INDIVIDUAL AND OWNER

Pursuant to Rule 214 of the Commission's Rules of Practice and Procedure, 18 C. F. R., 385.214, I, Lilli Clausen, an individual and owner of Clausen Oysters, respectfully move to intervene out of time in the May 21, 2013, application of the Jordan Cove Energy Project, L.P. and the June 6, 2013, application of the Pacific Connector Gas Pipeline, L. P. in the above-captioned dockets.

I. Identity and Contact Information

I ask that all communication in regards to this motion be addressed to the following:

Lilli Clausen
Clausen Oysters
66234 North Bay Road
North Bend, Oregon 97459
[redacted]

II. Declaration of Interest

On May 21, 2013, Jordan Cove Energy Project, L.P. filed in FERC Docket No. CP13-483-000 an application under section 3 of the Natural Gas Act (NGA) and Parts 153 and 380 of the Commission's regulations, seeking authorization to site, construct and operate a natural gas liquefaction and liquefied natural gas (LNG) export facility on the bay side of the North Spit of Coos Bay in Coos County, Oregon, directly across from the Cities of North Bend, Coos Bay and the Southwest Oregon Regional Airport. The LNG Terminal would be capable of receiving natural gas via the Pacific Connector Gas Pipeline, liquefying it, storing it in its liquefied state in two cryogenic storage tanks, and loading the LNG onto ocean going vessels.

On June 6, 2013, Pacific Connector Gas Pipeline, L. P. filed an application under CP13-492-000 with FERC to construct and operate the Pacific Connector Gas Pipeline (PCGP) Project, a new 231.82-mile, 36-inch diameter interstate natural gas transmission system

and related facilities. The proposed PCGP system will extend from the proposed Jordan Cove Liquefied Natural Gas (LNG) Terminal, being developed by Jordan Cove Energy Project, L.P. (JCEP), to interconnects with two interstate natural gas pipelines near Malin, Oregon. The PCGP is the proposed supply pipeline for the proposed Jordan Cove Terminal.

We continue to get conflicting information about the proposed route of the Pacific Connector Gas Pipeline and have been very concerned about the proposed route of the pipeline through Haynes Inlet and the West side of Coos Bay. As we understand it, the line is proposed to run between Silverpoint 1 and Silverpoint 3 oyster beds. The route going under the Highway 101 Bridge would be very detrimental to our oyster business for several reasons:

We need access to the three oyster beds: Silverpoint 1, 7 and 8, depending on the different tide levels, at various times of the day or night. The harvest crew goes out with the boats at low tide. The large barge is taken out at high tide to bring in the full nets. The channel between Silverpoint 1 and 3 is narrow. We couldn't fill orders if big equipment is being used to dig the trench for the pipeline, preventing us from going through.

Also, we need access to our three oyster beds, Silverpoint 1, 7 and 8, at all times. All the Silverpoint oyster beds: 1, 3, 5, 6, 7, 8 & 9, may be affected by mud or fines in the water which might prevent us from harvesting the oysters according to Dept. of Agriculture regulations. We are also storing our "re-beds" on S 1 for more grow out time. We bring them in as they are ready. Another problem would be the new seed placed around S 1 could potentially be affected by the fines suspended in the water.

When a pipeline is constructed in the water, mud and sand are suspended in the water, especially on windy days. It could drift over our one, two and three year old oysters in the bay. Oysters are filter feeders. They seine out the tiny plankton from the seawater to feed on. Mud, sand or fines could clog the gills of countless oysters. I would hate to have a repeat of the New Carissa oil spill effect. It took 4 years and 9 months before we were paid for the damage!

Another worry is the 250 foot construction right of way in the Bay! Any kind of hole or ditch dug in the mudflats takes years before the ground above it solidifies. One example is at the foot of the boat ramp next to us. A five foot diameter hole left by someone was like quicksand, and one couldn't walk across it for several years!

The line between Silverpoint 1 and 3 could cause problems when accessing the oyster beds, especially at night. Usually the boats are parked in shallow water close to the area to be harvested. I would hate for our guys to get stuck there. And the channel is very narrow! Since the original Silverpoint oyster beds were established in 1890 in Coos Bay and over the years have been worked by various oyster companies, we feel that this resource should be maintained and not jeopardized.

Due to the fact that the Pacific Connector Gas Pipeline's current proposed route could destroy our oyster business, I move to intervene out of time in this proceeding. No other party has been willing or is able to adequately represent our interest in this proceeding and it is for this reason I wish to be made a party to this proceeding, with all the rights attendant to such status. The decision by FERC to allow this Motion/Notice of Intervention Out of Time would be in the public interest.

Dated this 15th day of October 2014.

Lilli Clausen

Lilli Clausen, Clausen Oysters

CERTIFICATE OF FILING

I certify that on the 15th day of Oct 2014, I filed by electronic filing the original document, Motion to Intervene Out of Time electronically with:

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, DC 20426

Dated this 15th day of Oct 2014

Lilli Clausen

Lilli Clausen, Clausen Oysters

CERTIFICATE OF SERVICE

I certify that on the 15th day of Oct 2014 I served electronically or by first class mail this Motion to Intervene Out of Time to each person designated on the official service list compiled by the Commission in the above-captioned proceedings.

Dated this 15th day of Oct 2014

Lilli Clausen

Lilli Clausen, Clausen Oysters

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMSSION

IN THE MATTERS OF

Jordan Cove Energy Project, L.P.	**)**	**Docket No. CP13-483-000**
Pacific Connector Gas Pipeline, L.P.	**)**	**Docket No. CP13-492-000**

MOTION TO INTERVENE OUT OF TIME OF COOS BAY OYSTER COMPANY AND JACK HAMPEL, AS AN INDIVIDUAL AND OWNER

Pursuant to Rule 214 of the Commission's Rules of Practice and Procedure, 18 C. F. R., 385.214, I, Jack Hampel, an individual and owner of Coos Bay Oyster Company, respectfully move to intervene out of time in the May 21, 2013, application of the Jordan Cove Energy Project, L.P. and the June 6, 2013, application of the Pacific Connector Gas Pipeline, L. P. in the above-captioned dockets.

I. Identity and Contact Information

I ask that all communication in regards to this motion be addressed to the following:

Jack Hampel
Coos Bay Oyster Company
PO Box 5478
Charleston, Oregon 97420
[redacted]

II. Declaration of Interest

On May 21, 2013, Jordan Cove Energy Project, L.P. filed in FERC Docket No. CP13-483-000 an application under section 3 of the Natural Gas Act (NGA) and Parts 153 and 380 of the Commission's regulations, seeking authorization to site, construct and operate a natural gas liquefaction and liquefied natural gas (LNG) export facility on the bay side of the North Spit of Coos Bay in Coos County, Oregon, directly across from the Cities of North Bend, Coos Bay and the Southwest Oregon Regional Airport. The LNG Terminal would be capable of receiving natural gas via the Pacific Connector Gas Pipeline, liquefying it, storing it in its liquefied state in two cryogenic storage tanks, and loading the LNG onto ocean going vessels.

On June 6, 2013, Pacific Connector Gas Pipeline, L. P. filed an application under CP13-492-000 with FERC to construct and operate the Pacific Connector Gas Pipeline (PCGP) Project, a new 231.82-mile, 36-inch diameter interstate natural gas transmission system and related facilities. The proposed PCGP system will extend from the proposed Jordan Cove Liquefied Natural Gas (LNG) Terminal, being developed by Jordan Cove Energy Project, L.P. (JCEP), to interconnects with two interstate natural gas pipelines near Malin, Oregon. The PCGP is the proposed supply pipeline for the proposed Jordan Cove Terminal.

On December 18, 2014, I met with Representative Caddy McKeown and Michael Hinricks of the Jordan Cove Energy Project where I learned about the plans of the Pacific Connector Gas Pipeline and the close proximity of the proposed pipeline to our Silverpoint oyster beds. As we understand it, the line is proposed to run up the channel between ours (Silver point 3) and Clausen Oysters (Silver point 1) oyster beds.

Our concern is the effect that the construction of the Pacific Connector Gas Pipeline will have on our oysters along the proposed route through the Haynes Inlet on Coos Bay.

Our oysters are planted at the minus tide lines to utilize the mud flats as close to the channel as we can get. At certain minus tides, the channel may only be 100-200 feet wide. With the amount of mud and sand sediment that would be created within the close proximity of our beds, I believe we could suffer a devastating dead loss.

In the summer months, we set oyster larvae on shell and place them on pallets in bags that keep them up about a foot off the mud flats. This is done to keep them out of any silt or sediment while letting them grow through fall and winter for planting in the spring.

These larvae, when first set, are very small and very vulnerable. (Twelve million larvae equal about the size of a tennis ball).

When the oyster spat are planted in the spring (March-June), by removing them from the bags and pallets and cast directly onto the mud flats, they are approximately ¼ to ½ inch in diameter, and if you cover them with sediment, they will die!

I am also concerned about the bay water quality in this area during the construction time. The Oregon Department of Agriculture will surely be testing this water and if they have any concerns during this period, they will shut our harvesting down.

We need continual access to these beds both day and night. We work on the tides and they change daily.

Due to the fact that the Pacific Connector Gas Pipeline's current proposed route could destroy our oyster business, I move to intervene out of time in this proceeding. No other party has been willing or is able to adequately represent our interest in this proceeding and it is for this reason I wish to be made a party to this proceeding, with all the rights attendant to such status. The decision by FERC to allow this Motion/Notice of Intervention Out of Time would be in the public interest.

Dated this 28th day of February 2015.

__/s/ Jack Hampel_____
Jack Hampel, Coos Bay Oyster Company

Exhibit 8

Clam Diggers Association of Oregon

Chuck Erickson, Director
2727 Stanton Street
North Bend, OR 97459

William Lackner, President
P.O. Box 746
Newport, OR 97365

February 21, 2014

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street NE
Washington, DC 20426

RE: Motion to Intervene Out of Time submitted by the Clam Diggers Association of Oregon on February 20, 2014, for FERC Dockets CP13-483-000 and CP13-492-000

Dear Secretary Bose:

After submitting our *Motion to Intervene Out of Time* yesterday it was brought to our attention that we had the wrong date listed under our Certificate of Service portion of that Motion. Please accept this corrected version of our *Motion to Intervene Out of Time* that corrects this error. The original Motion was served to everyone in the FERC Service List for FERC Dockets CP13-483-000 and CP13-492-000 on February 20, 2014, and this corrected *Motion to Intervene Out of Time* will also be served to everyone in the Service List for the Jordan Cove / Pacific Connector Project.

Sincerely,

Chuck Erickson
William Lackner

UNITED STATES OF AMERICA
DEPARTMENT OF ENERGY
FEDERAL ENERGY REGULATORY COMMISSION

IN THE MATTERS OF

Jordan Cove Energy Project, L.P. **) Docket CP13-483-000**

Pacific Connector Gas Pipeline, L.P. **) Docket CP13-492-000**

CLAM DIGGERS ASSOCIATION OF OREGON MOTION TO INTERVENE OUT OF TIME

Pursuant to 18 C.F.R. 385.214, the Clam Diggers Association of Oregon, hereby respectfully moves to intervene in the Jordan Cove Energy Project and the Pacific Connector Gas Pipeline applications submitted to the FERC on May 21, 2013 and June 6, 2013.

I. Identity/Contact Information

We ask that all communication in regards to this motion be addressed to the following:

Chuck Erickson, Director
Clam Diggers Association of Oregon
2727 Stanton Street
North Bend, OR 97459
[redacted]

William Lackner, President
Clam Diggers Association of Oregon
P.O. Box 746
Newport, OR 97365
[redacted]

II. Declaration of Interest

On May 21, 2013, Jordan Cove Energy Project, L.P. filed an application under section 3 of the Natural Gas Act (NGA) and Parts 153 and 380 of the Commission's regulations, seeking authorization to site, construct and operate a natural gas liquefaction and liquefied natural gas (LNG) export facility (Liquefaction Project) on the bay side of the North Spit of Coos Bay in unincorporated Coos County, Oregon, to the north of the Cities of North Bend and Coos Bay.

On June 6, 2013, Pacific Connector Gas Pipeline, L.P. filed an application with FERC for approval to construct, own and operate a natural gas transmission pipeline in southern Oregon. The Pacific Connector pipeline would deliver approximately 1 billion cubic feet of natural gas per day to the Jordan Cove Energy Project export terminal at Coos Bay Oregon. There the natural gas would be cooled to form LNG for export from Jordan Cove's proposed export terminal.

The proposed LNG export project would require extensive dredging of the Coos Bay, including but not limited to; Channel Deepening and Widening, an LNG Marine Terminal Slip Dock and Access Channel ; and the construction of the Pacific Connector Gas Pipeline through the Coos Bay Estuary and Haynes Inlet. Due to contamination that has been found in Coos Bay sediments, this dredging will negatively impact clams in the Coos Bay both indirectly and directly as described below.

III. **Basis for Intervention**

My name is Chuck Erickson and I am the Director of the Clam Diggers Association of Oregon and have been a resident of Oregon for 58 years. We recently received records from my Oregon Public Records Request we made to Oregon International Port of Coos Bay and Oregon Department of Environmental Quality. Port released documents to us in 2014.

The following information has recently come to light.

In December 2, 1998 EPA and Oregon DEQ entered into a deferral agreement that non-compliance would be reported to the EPA concerning the clean-up of Charleston sediment contamination of hazardous substances (Tributyltin, metals, PAHs, PCBs) in Coos Bay near the proposed Jordan Cove Energy site.

In 2001 EPA Superfund Record of Decision 12.0 clearly states that bioaccumulation test were to be done two years after cleanup and annual monitoring of the sediments for five years. When this was completed the sediment quality was to be monitored at five year intervals.

In the public records emails we received from the Oregon International Port of Coos Bay and their agents, they clearly state that the annual and the five year tests were never done. The Port did not supply the bioaccumulation test results and we assume those were also never done. The Oregon Department of Environmental Quality failed to contact the EPA that the Port was non-compliant with their cleanup agreements. Emails I received late 2013 from Eugene DEQ stated they have never received any test results from Oregon International Port of Coos Bay. These facts also show that DEQ was also non-compliant with the Superfund Deferral agreement.

The records request we received included emails from the Port which show that Coos Bay sediment testing was finally done in 2012.The test results were provided to the Port in October 2013 by Geosyntec consultants. The Port did not release these documents to us until 2014.

These documents indicate heavy metals exceeding minimum requirements in the sediment composite test. The single samples tested were near maximum allowed for heavy metal. These test results also show the following contaminates: tributyltin, antimony, chromium, copper, mercury, nickel and zinc are still present in the sediments sampled. In these same requested emails there were references being made of using samples from other areas of the bay in order to close this matter.

Through our website and members we have learned that Geoduck clams have been taken by commercial and sport harvesters in Coos Bay. Pictures were posted on our website showing a Geoduck harvested. Through our research we found that these clams were present in historical times. Our organization contacted the Oregon Department of Fish and Wildlife Director Roy Elicker to list the Geoduck clams as threatened or endangered species. These clams are only found in limited numbers in Coos Bay and Netarts Bay. ODFW refused our request to list these last remaining stocks of clams. We believe that the planned facility at Jordan Cove LNG export is the reason for their refusal to take action to protect these resources. These remaining Coos Bay Geoduck clams may be the last surviving Geoducks in the State of Oregon.

The President of the Clam Diggers Association of Oregon, William Lackner, was shown pictures of clams by an Oregon Department of Fish and Wildlife employee at the Charleston Field Office. These pictures clearly showed deformed clams from Coos Bay. Mr. Lackner contacted the ODFW employee by email for copies of these photographs. The Charleston ODFW employee refused the request for copies of the photographs and stated they were his personal property.

Mr. Lackner has repeatedly made requests to Newport Oregon Department of Fish and Wildlife to implement an Invertebrate Species Plan for Oregon bays. The Clam Diggers association of Oregon has members along the entire coast of Oregon. Our members have observed clam die offs and crab die offs. When these were reported to the State of Oregon we were told the die offs were natural or they don't have people available to investigate.

Clam Diggers Association of Oregon has contacted the State of Oregon to report sewage spills in Oregon bays. The Oregon Department of Agriculture in Salem has refused to implement the sewage spill notification system to which they agreed. The State excuse is they do not have enough money.

Through our recent request for information from Eugene Oregon Department of Environmental Quality we have learned that DEQ sampling of Coos Bay 1995 dredging samples for contaminates were done incorrectly. Because DEQ did not know how to collect the samples correctly, contaminates like tributyltin could not be tested and all 14 loads of dredged materials failed to detect (TBT) tributyltin. Tributyltin is a known human health risk and can bio-accumulate in shell fish and finned fish.

We also learned from documents and recent communications that DEQ did not use scientific proven methods for detecting contaminates in Coos Bay sediments. DEQ failed to do tissue sampling on clams before and after dredging took place in Coos Bay. Because clams bio-accumulate toxic contaminates they are the litmus test if contaminates are present in sediments. This sample method is used worldwide by scientists who study the effects of environmental pollution in sediments. In other words, clams are the canaries of the coal mine.

DEQ did some limited testing of clams for contaminates in Coos Bay. From DEQ documents and communications we have learned that their sampling methods were less than scientific. DEQ never sampled the original 1970's area where baseline for contaminates were established. When DEQ did test, they never tested the same area again even though contaminates were present in high numbers for the clams sampled. DEQ did not follow scientific protocol by using baseline methodology for their tissue contaminates studies. It was also learned that the clams samples were not all sent to the testing lab as whole shell clams. The larger gaper clams were dissected and not sent whole. It was learned that some internal parts of the clam were not sent for testing. This may explain why the Gaper clams tested much lower than the softshell clams. This methodology of using two systems for sampling is less than scientific and could result in errors.

DEQ has informed the Clam Diggers Association that non source point benzo(a)pyrene levels have risen since the 1979 EPA study. This increase is noted in the Coos Bay Toxics Study. The sediment studies for Jordan Cove LNG have not included tissue sampling for clams. The methodology used by the Jordan Cove studies may contain errors for contaminates in Coos Bay sediments.

Due to the recent findings described above showing that sufficient studies have not been completed to date, and in an effort to protect Coos Bay clams, clam diggers and the interest of any and all citizens who may potentially ingest clams coming from the Coos Bay, the Clam Diggers Association of Oregon respectfully request to be made a party to this proceeding and be permitted to intervene in this proceeding with all the rights attendant to such status. No other party will or can adequately represent the Clam Diggers Association of Oregon and no prejudice to, or additional burdens would occur to existing parties as a result of the FERC permitting this intervention. Participation of the Clam Diggers Association of Oregon in this proceeding would be in the public interest.

CERTIFICATE OF SERVICE

We hereby certify that notice of this Motion to Intervene Out of Time will be served electronically or by first class mail to each person designated in the official service list compiled by the Commission in the above-captioned proceedings.

Sincerely,

Chuck Erickson
William Lackner
Dated this 20th day of February 2014

Exhibit 9

Potential Impact of Jordan Cove LNG Terminal construction on the Nursery Habitat of the Dungeness crab.

Salem, Oregon, January 14, 2019

Sylvia Yamada Ph.D.
yamadas@science.oregonstate.edu

The **Dungeness crab** (***Cancer magister***) supports an important commercial and sport fishery from Alaska to California. Total annual landings in recent years exceeded 25,000 tons (55 million pounds) (FAO statistics, 2012). In Oregon, the 2014 Dungeness fishing season yielded 14.4 million pounds, $50 million to crabbers and an estimated $100 million to the Oregon economy (Oregon Dungeness Crab Commission in Fisherman's News On line). *The Dungeness fishery is the most valuable commercial fishery in Oregon (Rasmusen 2013).*

The life cycle of Dungeness crab is complex, depending on both estuarine and near-shore habitats. Typically, mating occurs in shallow water, and females migrate offshore to brood and hatch their eggs. The early larval stages feed and rear in the near-shore water column, after which the final larval stage rides tidal currents back to shore and settles out in shallow estuarine habitats. The final larval stage molts into a ~5 -7 mm wide first crab stage. *The highest densities of juvenile Dungeness crabs are found in estuaries, which provide warm water, high biological productivity and protection from predators. Sand substrate and eelgrass beds are preferred habitat for these young crabs, which bury in the sand and hide in the eelgrass to escape predators.* Size measurements of crabs trapped at Russell Point in Coos Bay (below the Highway 101 McCullough Bridge) show that Dungeness crabs in their first two years of life (100 mm carapace width and smaller) are extremely abundant in the mid-to low intertidal areas such as pools and eelgrass beds (Figure 1).

In my research documenting the status of the non-native European Green crab in Coos Bay, I encounter young Dungeness crabs in all my study sites. I selected a sub-set of my sites closest to the proposed Jordan Cove Energy Project: the north and south sides of Trans Pacific Lane and the beach adjacent to the Roseburg Forest Product watchman's booth. The results from over 600 trap-days, show that young Dungeness crabs are consistently abundant from 2002 to 2014 at all sites, with an average catch of 15 per trap (Table 1). *These trapping results confirm the findings by Emmett and Durkin (1985) that estuaries are important nursery habitats for Dungeness crabs. This fact has to be kept in mind when a trench is dug In Haynes Inlet, the Trans Pacific Parkway is to be expanded and an upland area is cut out to create a berth for ocean-going vessels. Not only will the turbidity during the construction phase be of concern to the ecological community, the on-going dredging to maintain the berth and shipping channels will continue to be a disturbance to the ecosystem. It will result in habitat loss for native species, including the valuable Dungeness crab. In one study between 45 to 85 % of the Dungeness crabs died during a simulated dredging operation (Chang and Levings, 1978).*

Sylvia Yamada is a marine ecologist who has studied native crabs and the invasive European green crab in Oregon and Washington for over 20 years.

References:

Chang, B., Levings, C. 1978. Effects of burial on the heart cockle *Clinocardium nuttalii* and the Dungenes crab *Cancer magister*. *Estuarine, Coastal and Shelf Scie*nce. 7, 4009-412.

Emmett, R.L. and Durkin, J.T. 1985. The Columbia River Estuary: An Important Nursery for Dungeness Crabs, *Cancer magister*. *Marine Fisheries Review*. 47(3), 21-25.

Fisherman's News On line Sept 24, 2014 http://fnonlinenews.blogspot.com/2014/09/oregons-crabbers-riding-market-value.html

Rasmuson, L.K. 2013. The Biology, Ecology and Fishery of the Dungeness crab, *Cancer magister*. In Michael Lesser, editor: *Advances in Marine Biology*, Vol 65, Burlington: Academic Press, pp. 95-148. ISBN: 978-0-12-410498-3 Elsevier Ltd. Academic Press.

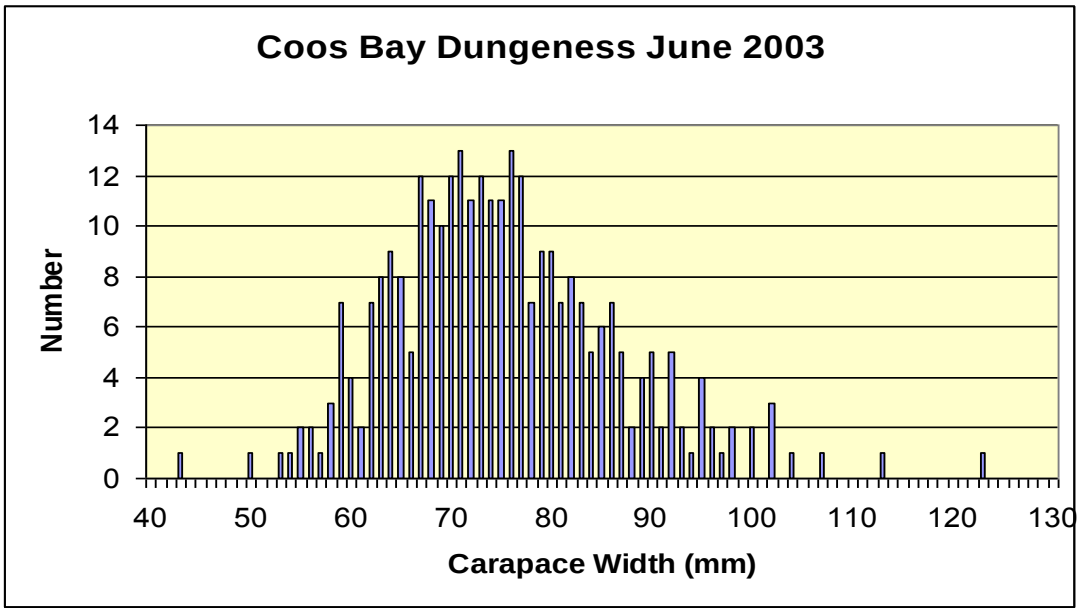


Figure 1. Size frequency distribution of Dungeness crabs trapped in pools and eelgrass at Russell Point, below the Highway 101 McCullough Bridge, in June 2003. Adult crabs are greater than 100 mm in carapace width. It is estimated that the first 2 year classes are represented.

Table 1. Trapping Data for study sites along Trans Pacific Lane and Roseburg Forest Product causeway from 2002-2014.

	Date	Trap Type	Zone	European green crab *Carcinus maenas*	Hairy shore crab *Hemigrapsus oregonensis*	Purple shore crab *Hemigrapsus nudus*	Dungeness crab *Cancer magister*	*Cancer magister* (Recruits <50mm)	Red rock crab *Cancer productus*	stag-horn sculpin	# Traps
Roseburg Lumber	6/25/2002	Fish	Site	0	0	0	45	0.5	0.1	0	10
Roseburg Lumber	6/16/2003	Fish	*low*	0	0	0	12.2	0	0.7	1.5	10
TransPacific S	7/10/2005	Fish	*low*	0	0	0	6.14	1.14	0	1.86	7
North	7/10/2005	Fish	*low*	0	0	0	0	5.7	0	1.1	10
South	3/25/2005	minnow	*Mid*	0	0	0	0	0	0	2.4	10
North	7/10/2005	minnow	*mid*	0	0.2	0	0	0.6	0	0.8	5
South	7/10/2005	minnow	*mid*	0	0	0	0	0.4	0	0.6	5
Trans-Pacific Bridge	9/1/2005	Fish	*Low*	0	0	0	6.6	0	3	1	5
	9/1/2005	Minnow	*high*	0	0	0	0.2	0	0	0.4	4
Trans-Pacific Ln.	6/8/2006	Fish	*Low*	0	0	0	4.9	0	0	2.6	10
	9/13/2006	Fish		0	0.4	0	0.2	0	0	0.2	5
	6/8/2006	Minnow	*high*	0	0	0	0.7	0	0	2.3	10
Trans Pacific Br.	9/13/2006	Minnow		0.2	0	0	0	0	0	0.2	5
TransPacific Ln. N	5/25/2007	Fish	Mid	0.5	0.2	0	1	0.1	0	0.8	10
	7/14/2007	Fish		0.4	1.47	0	23.53	0	0	0.2	15
	9/26/2007	Fish		0	0	0	4.75	0	0	0	8
TransPacific Ln. S	5/25/2007	Fish	Mid	0.09	0	0	0.82	0	0	0.36	11
	7/14/2007	Fish		0.27	0.07	0	9	0	0.07	1	15
	9/26/2007	Fish		0	0	0	2.71	0	0	0.14	7
TransPacific Bridge	5/25/2007	Fish	Mid	0	0	0	1.33	0	0	0	6
	9/25/2007	minnow	high	0	0	0	1.6	0	0	0.4	5
TransPacific Ln. N	6/18/2008	Fish	Mid	0.1	0.2	0	7.4	0	0	7.8	10
	6/19/2008	Fish		0	0	0	1.75	0	0	3.25	8
	9/18/2008	Fish		0	0.1	0	23.4	0	0	0.7	10
TransPacific Ln. S	6/18/2008	Fish	Mid	0.5	0	0	17.2	0	0	2.2	10
	6/19/2008	Fish		0.37	0	0	17.63	0	0	1.37	8
	9/18/2008	Fish		0.1	0	0	22.6	0	0	0.3	10
TransPacific Ln. N	7/8/2009	Fish	Mid	0.13	0	0	9.88	0	0	0.38	8

	7/9/2009	Fish		0.1	0.2	0	11.3	0	0	0.3	10
	07/0/09	Fish		0.1	0	0	11.7	0	0	0.5	10
TransPacific Ln. S	7/8/2009	Fish	Mid	0	0	0	24.38	0	0	0.25	8
	7/9/2009	Fish		0.1	0	0	30.2	0	0	0.9	10
	7/10/2009	Fish		0.4	0	0	16.6	0.1	0	0.5	10
	7/11/2009	Fish		0.4	0	0	13.1	0	0	2.7	10
TransPacific Ln. N	3/19/2010	Fish	Mid	0	0.4	0	0.7	0	0	0	10
	3/20/2010	Fish		0	0.1	0	0.1	0.2	0	0	10
	3/21/2010	Fish		0	0.3	0	0.3	0.4	0	0	10
	6/25/2010	Fish		0	0	0	35.7	0	0	1.1	9
	6/26/2010	Fish		0	0	0	75.9	0	0	0.4	10
TransPacific Ln. S	3/19/2010	Fish	Mid	0	0	0	1.9	0.9	0	0	10
	3/20/2010	Fish		0.1	0	0	1.7	0	0	0	10
	3/21/2010	Fish		0	0	0	2.5	0.1	0	0	10
	6/25/2010	Fish		0	0	0	90.6	0	0	0	10
	6/26/2010	Fish		0	0	0	69.9	0	0	1.6	20
TransPacific Ln. N	7/17/2011	Fish	Mid	0	0.6	0	4.73	0.27	0	0.73	15
	10/17/2011	Fish		0	0	0	5.3	0	0	0.2	10
TransPacific Ln. S	7/16/2011	Fish	Mid	0.03	0.09	0	1.5	0.06	0	1.53	34
	7/17/2011	Fish		0	0.13	0	2.07	0.47	0	1.2	15
TransPacific Ln. N	6/27/2012	Fish	Mid	0	0	0	89.2	0	0	0.4	5
TransPacific Ln. S	6/25/2012	Fish	Mid	0	0	0	9.75	0	0	0.75	12
	6/27/2012	Fish		0.11	0	0	5.2	0	0	0.67	9
TransPacific Ln. S	3/22/2013	Fish	Mid	0	0	0	1.75	0	0	0	20
	3/23/2013	Fish		0	0	0	6.79	0	0	0	19
	7/12/2013	Fish		0	0	0	7.37	0	0	1.6	30
	7/13/2013	Fish		0	0	0	5.24	0	0	1.48	25
TransPacific Ln N	7/12/2014	Fish		0	0	0	40.33	0	0	0.5	12
	7/13/2014	fish		0	0	0	24.9	0	0	0.4	12
TransPacific Ln. S	7/12/2014	Fish		0	0	0	47.27	0	0	0	15
	7/13/2014	fish		0	0	0	23.83	0	0	0	12
Average				0.068	0.075	0	14.955	0.067	0.065	0.874	
Total # Traps											649

Impact of Jordan Cove LNG Terminal
by Sylvia Yamada
Salem, Oregon January 15, 2019

- I have been studying crabs in Oregon estuaries, including Coos Bay, for over 20 years.
- I am concerned that the construction of the Jordan Cove Energy Project could impact important habitats for native species, including the Dungeness crab.
- The Dungeness crab fishery is the most valuable commercial fishery in Oregon. In a good year, landings yield 100 million $ to the Oregon economy.
- The highest numbers of juvenile crabs are found in soft sediments and eel grass beds of estuaries. This is where the young crabs find food and shelter from predators.
- In my study site along Trans Pacific Parkway, I have consistently trapped an average of 15 young Dungeness crabs per trap.
- The importance of this nursery habitats has to be kept in mind when
    - a trench is dug In Haynes Inlet,
    - the Trans Pacific Parkway is expanded and
    - an upland area is cut out to create a berth for ocean-going vessels.
- Not only will the turbidity during the construction phase be of concern to the ecological community, the on-going dredging to maintain the berth and shipping channels will continue to be a disturbance to the ecosystem.
- In a study, designed to simulated a dredging operation, between 45 to 85 % of the Dungeness crabs died.
- In summary, construction and maintenance of the Jordan Cove LNG Terminal will result in habitat loss for native species, including nursery habitat for the valuable Dungeness crab.

Exhibit 10

Oregon
Kate Brown, Governor

Department of State Lands
South Slough National Estuarine Research Reserve
P.O. Box 5417 | 61907 Seven Devils Road
Charleston, Oregon 97420
(541) 888-5558
FAX (541) 888-5559
www.oregon.gov/dsl/ss

RE: Questions and recommendations regarding the application for Coos Estuary Navigation Reliability Improvements (AM-18-011/RZ-18-007/HBCU-18-003 Jordan Cove Energy Project L.P)

To whom it may concern:

We understand that the application is for rezoning portions of 3 parcels of subtidal estuarine property (59-CA, 2-NA, 3-DA) to DDNC-DA in order to dredge for improved ship navigation.

We are particularly concerned with the potential impacts to eelgrass (*Zostera marina*) populations as eelgrass is an important habitat for many estuarine species and improves estuarine water quality. The following comments fit under CBEMP Policy 4: Resource Capability Consistency and Impact Assessment. Eelgrass habitat in the Coos Estuary has experienced a net loss since 2005 (from mapping/GIS methods) and abundance has declined more recently since 2016 (from intertidal field surveys).

Regarding our concerns we have questions and recommendations.

First, we have two questions regarding clarification of parcels in question.

1) Three parcels are listed in the narrative but four are shown in the maps. Why is 52-NA not included in the application narrative for rezoning?
2) Throughout the narrative the parcels are listed as 59-CA, 2-NA, 3-DA. However, on page 16 in the Response the parcels are listed as 59-CA, 3-NA, and 2-DA. Presumably this is a typo, but should be corrected.

Second, we are concerned about the potential presence of eelgrass in the areas to be dredged. The application classifies the areas to be dredged as “deep subtidal habitats” (exhibit 4: page 12) and cites Jefferts 1977 when stating that the substrate is mostly sand (exhibit 4: page 7). This survey is more than 40 years old and no source information for Jefferts 1977 is given in the application. It is unlikely that this survey applies directly to the specific areas intended for dredging. We do know that subtidal areas are important habitat for eelgrass and to our knowledge there have been no recent eelgrass surveys of the intended dredge or dredge-line areas (approximately 36.2 acres combined). Eelgrass is known to occur from depth ranges of 1.4 m to below -5.0 m MLLW in Pacific Northwest Estuaries (Puget Sound, Thom et al. 2008) and occurs in the primary channels

of the South Slough estuary. Our examination of the selected sites using GIS indicates depth range starting from -5.5 to below -8.0 MLLW, suggesting eelgrass could be present within these sites. We recommend these areas be surveyed for eelgrass and the survey data be included in the application before this application for rezoning is considered. This could be done rapidly and cost effectively using an underwater camera and focusing on the shallowest areas and a number of randomly selected locations.

Third, the temporary dredge line will cross eelgrass habitat as it approaches APCO site 2 (inset Figure 1.3-1, Exhibit 5, page 2). We appreciate that the plan intends to reduce impact to eelgrass by constructing a temporary structure to span above the eelgrass beds (Exhibit 4: page 2). However, this includes driving 5-6 piles within the eelgrass beds and then removing them at the completion of the project, which would cause additional ongoing disturbance during the 3 years allotted to the project. Eelgrass is known to be sensitive to increases in turbidity and sediment, due to light requirements for photosynthesis (Thom et al., 2008). The application states that the location was chosen in the narrowest location in the eelgrass bed (Exhibit 4: page 2). This is obviously not correct as the figure itself shows decreased eelgrass to the west along the railroad (Figure 1.3-1, Exhibit 5, page 2). We recommend that this disturbance be prevented entirely by simply running the pipe alongside the Trans Pacific Railroad Bridge or choosing an alternative disposal site. If the route cannot be altered, we recommend considering methods for reducing impacts on eelgrass due to the disturbance from pile installation and removal and damage incurred during positioning and stabilization of the barge used for pile installation and removal.

Thank you for considering these clarifying questions and recommendations for project improvement.

Sincerely,

Shon Schooler, Ph.D.
Research Coordinator
South Slough National Estuarine Research Reserve
PO Box 5417
Charleston, OR 97420

Reference:
Thom, R.M., Southard, S.L., Borde, A.B., and Stoltz, P., 2008. Light requirements for growth and survival of eelgrass (*Zostera marina* L.) in Pacific Northwest estuaries. Estuaries and Coasts 31:969-980.

Exhibit 11

Dean Runyan Associates

Oregon Travel Impacts

Statewide Estimates

1992 - 2017p

June 2018

Prepared for the

Oregon Tourism Commission
Salem, Oregon

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OREGON TRAVEL IMPACTS, 1992-2017p

STATEWIDE PRELIMINARY ESTIMATES
DETAILED COUNTY ESTIMATES
OVERNIGHT VISITOR VOLUME

June 2018

Prepared for

Oregon Tourism Commission
319 SW. Washington Street
Suite 700
Portland, Oregon 97204
503.967.1560
www.traveloregon.com

Prepared by

Dean Runyan Associates
833 SW Eleventh Avenue, Suite 920
Portland, Oregon 97205
503/226-2973
www.deanrunyan.com

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Executive Summary

This report provides detailed statewide, regional and county travel impact estimates for Oregon from 1992 to 2017. The report also provides average spending and volume estimates for overnight visitors for most counties. The estimates for 2017 are preliminary. Secondary impacts and travel industry GDP are provided at the state level.

Travel Spending, Employment and earnings continue to expand

The Oregon travel industry continued to exhibit strong growth in 2017, as all measures of travel activity were up over 2016.

- ***Spending.*** Total direct travel spending in Oregon was $11.8 billion in 2017. The annual increase from 2016 was 4.7 percent in current dollars. In real, inflation-adjusted, dollars travel spending increased by 3.2 percent. Visitor spending, excluding transportation, increased by 3.6 percent in current dollars. This is the eighth consecutive year of growth in travel spending following the recession.
- ***Travel Activity.*** An estimated 28.8 million overnight visitors traveled to Oregon destinations in 2017 (preliminary). This represents a 1.0 percent increase over 2016. Since 2010, overnight person-trips have increased by 2.2 percent per year. Domestic visitor air arrivals to Oregon (4.0 million) increased by 5.5 percent for the year. Room demand, as measured by STR, Inc., increased by 1.3 percent for the year.[1]
- ***Employment.*** Total travel generated employment was 112,200 in 2017. This represents a 2.2 percent increase over 2016, the seventh consecutive year of employment growth following the steep decline from 2008 to 2010. Employment has increased by 3.2 percent per year since 2010.
- ***Secondary Impacts.*** The re-spending of travel-generated revenues by businesses and employees generates additional impacts. In 2017, these secondary impacts were equivalent to 58,300 jobs with earnings of $2.8 billion. Most of these jobs were in various professional and business services.
- ***GDP.*** The Gross Domestic Product of the travel industry was $5.0 billion in 2017. Overall, the travel industry is one of the three largest export-oriented industries in rural Oregon counties (the other two being agriculture/food processing and logging/wood products).

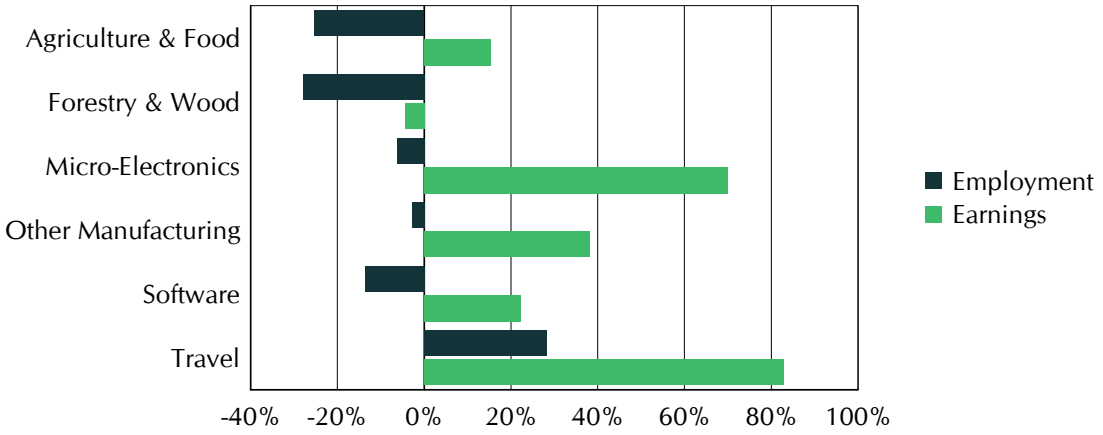
1. The STR reports were prepared for the Oregon Tourism Commission

The Oregon Travel Industry is A Leading Export-Oriented Industry

Travel and tourism is one of the most important ***"export-oriented"*** industries in Oregon. It is especially important in the non-metropolitan areas of the state, where manufacturing and traded services are less prevalent. Over the past decade, travel industry employment and earnings growth also compares favorably to other industries.

Change in Earnings and Employment (2003-2016)

Selected Export Oriented Industries



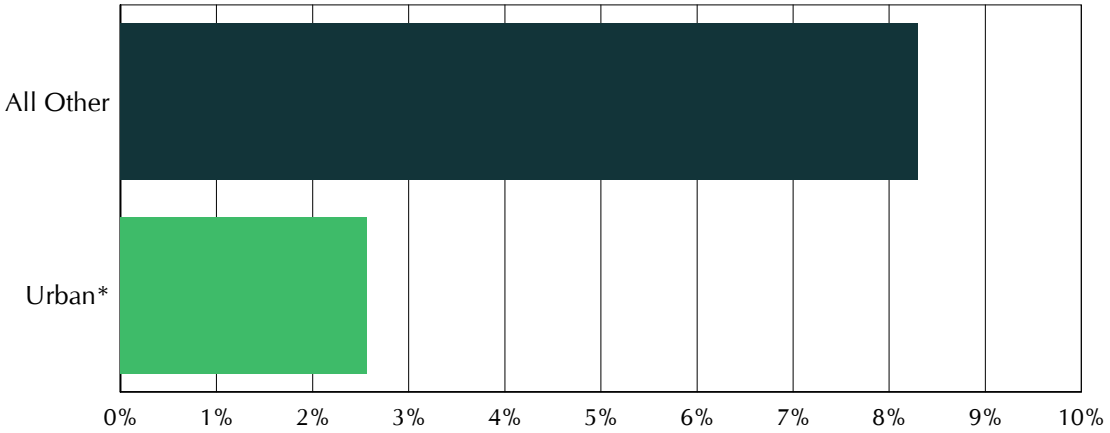
Note: The most current data is for 2016.

The Travel Industry Benefits All Regions of Oregon

Although most travel spending and related economic impacts occur within Oregon's urban areas, the travel industry is important throughout the state. In general, travel-generated employment is relatively more important in rural counties.

Travel Generated Employment

as a Percent of Total Employment (2016)



*The urban counties are Clackamas, Lane, Marion, Multnomah, and Washington. The most current data is for 2016.

Oregon Travel Impacts, 1992-2017

List of Tables & Figures

List Tables & Figures

Preface

The purpose of this study is to document the economic significance of the travel industry in Oregon and its thirty-six counties and seven tourism regions from 1992 to 2017. These findings show the level of travel spending by visitors traveling to and within the state, and the impact this spending had on the economy in terms of earnings, employment and tax revenue. Estimates of overnight visitor volume and average spending are also provided for all tourism regions and most counties. The estimates for 2017 are preliminary.

Dean Runyan Associates prepared this study for the Travel Oregon. Dean Runyan Associates has specialized in research and planning services for the travel, tourism and recreation industry since 1984. With respect to economic impact analysis, the firm developed and currently maintains the Regional Travel Impact Model (RTIM), a proprietary model for analyzing travel economic impacts at the state, regional and local level. Dean Runyan Associates also has extensive experience in project feasibility analysis, market evaluation, survey research and travel and tourism planning.

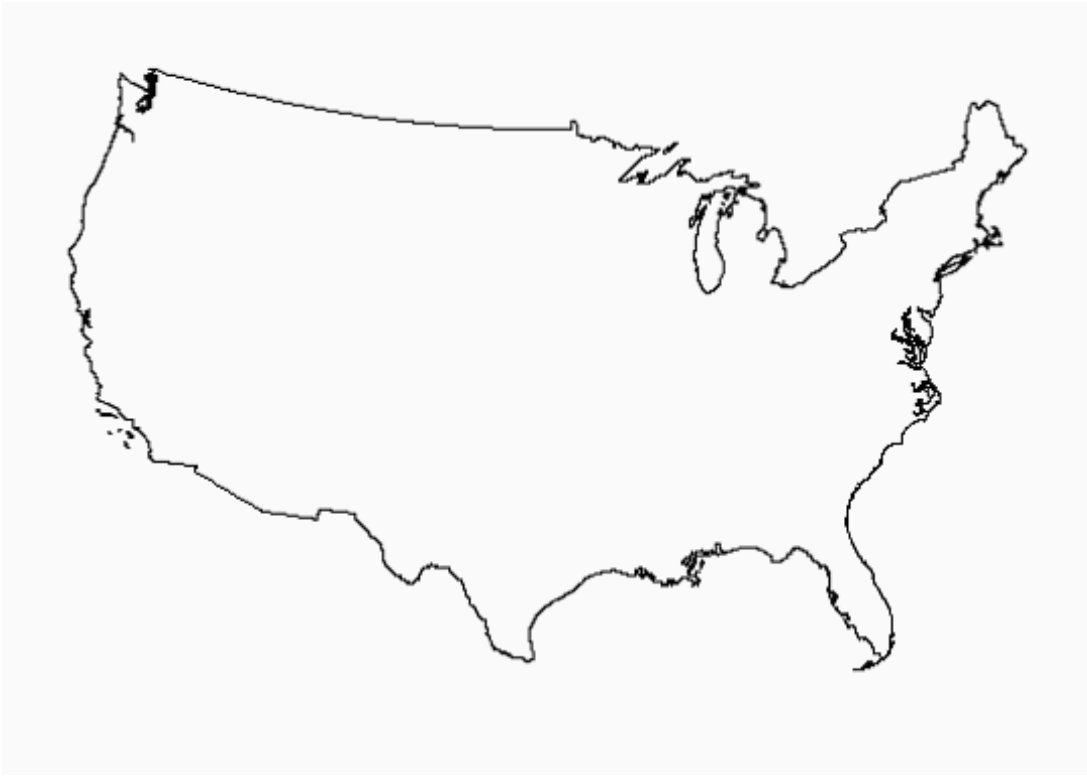
Many individuals and agencies provided information and advice for this report. The state agencies that provided essential information were the Parks and Recreation Department and the Department of Revenue. At the federal level, data was obtained from the U.S. Forest Service, the Department of Labor and the Bureau of Economic Analysis. Additionally, numerous local governments and visitor bureaus throughout Oregon provided information.

Finally, special thanks are due to Ladan Ghahramani, Research Manager, Michael Sturdevant, Director of Global Marketing Services , and Todd Davidson, Chief Executive Officer of Travel Oregon, for their support and assistance.

Dean Runyan Associates, Inc.
833 SW 11th Ave., Suite 920
Portland, OR 97205

503.226.2973
info@deanrunyan.com

I. U.S. TRAVEL



Oregon Coast Travel Impacts and Visitor Volume

Travel Indicators

Visitor Spending Impacts

Amount of Visitor Spending that supports 1 Job	$87,612
Employee Earnings generated by $100 Visitor Spending	$31
Local & State Tax Revenues generated by $100 Visitor Spending	$4.26

Visitor Volume

Additional visitor spending if each resident household encouraged one additional overnight visitor (in thousands)	$22,174
Additional employment if each resident household encouraged one additional overnight visitor	253

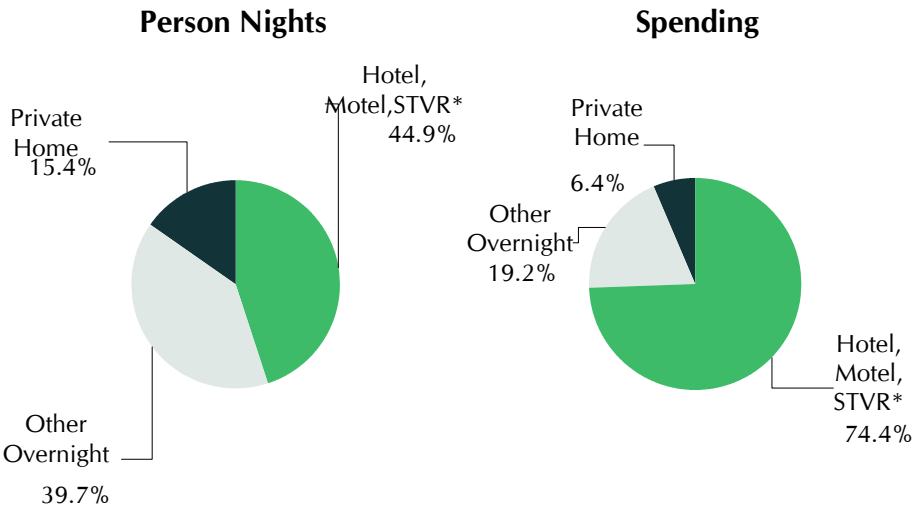
Visitor Shares

Travel Share of Total Employment (2016)*	18.5 %
Overnight Visitor Share of Resident Population (2017p)**	21.2 %

*Source: Bureau of Economic Analysis and Bureau of Labor Statistics. Estimates by Dean Runyan Associates.
**Annual Overnight Visitor Days divided by (Resident Population) *365.

Visitors who stay in private homes typically comprise the largest share of overnight visitor volume. Visitors who stay overnight in commercial lodging typically have the greatest economic impact. There is substantial variation among destinations, however. Most rural and suburban areas have high shares of private home visitation. Urban areas tend to have greater shares of hotel/motel stays.

Overnight Visitor Spending and Volume



	Person Trips (Thousands)	Person Nights (Thousands)	Visitor Spending ($Millions)
Hotel, Motel, STVR*	3,348	7,650	992
Private Home	728	2,624	86
Other Overnight	1,941	6,763	256
All Overnight	6,018	17,037	1,334

Note: Person Trips and Person Nights are in Thousands. Visitor Spending is in $Millions. Details may not round to total due to rounding

Oregon Coast

Direct Travel Impacts, 2010-2017p

							Ave. Annual Chg.	
Spending ($M)	**2010**	**2012**	**2014**	**2015**	**2016**	**2017**	**16-17**	**10-17**
Total (Current $)	1,500	1,592	1,801	1,872	1,943	1,985	2.2%	4.1%
Other	28	31	20	23	25	26	2.7%	-1.0%
Visitor	1,472	1,561	1,780	1,849	1,917	1,959	2.2%	4.2%
Non-transportation	1,291	1,347	1,562	1,664	1,740	1,768	1.6%	4.6%
Transportation	181	214	218	185	178	192	7.8%	0.8%
Earnings ($M)								
Earnings (Current $)	427	452	506	545	580	614	5.9%	5.3%
Employment (Jobs)								
Employment	19,690	19,670	20,830	21,540	22,320	22,710	1.7%	2.1%
Tax Revenue ($M)								
Total (Current $)	55	60	68	73	79	83	6.0%	6.1%
Local	20	20	24	27	28	30	4.5%	6.1%
State	36	40	43	46	50	54	6.9%	6.0%

Other spending includes resident air travel, travel arrangement and reservation services, and convention and trade show organizers. **Non-transportation visitor spending** includes accommodations, food services, retail, food stores, and arts, entertainment & recreation. **Visitor transportation spending** includes private auto, auto rental, other local ground transportation and one-way airfares.

Earnings include wages & salaries, earned benefits and proprietor income.

Employment includes all full- and part-time employment of payroll employees and proprietors.

Local tax revenue includes lodging taxes, auto rental taxes and airport passenger facility charges paid by visitors.

State tax revenue includes lodging, and motor fuel tax payments of visitors, and the income tax payments attributable to the travel industry income of businesses and employees.

Federal tax revenue includes motor fuel excise taxes and airline ticket taxes paid by visitors, and the payroll and income taxes attributable to the travel industry income of employees and businesses.

Oregon Coast

Travel Impacts, 2006-2017p

Total Direct Travel Spending ($Million)

	2006	2008	2010	2012	2015	2016	2017
Destination Spending	1,436.6	1,525.1	1,472.2	1,561.5	1,849.1	1,917.4	1,959.2
Other Travel*	26.4	25.6	28.0	30.9	22.7	25.4	26.1
Total	**1,463.0**	**1,550.7**	**1,500.1**	**1,592.4**	**1,871.9**	**1,942.8**	**1,985.4**

Visitor Spending By Commodity Purchased ($Million)

	2006	2008	2010	2012	2015	2016	2017
Accommodations	317.8	340.0	334.7	350.9	445.7	468.9	489.5
Food Service	360.0	386.9	393.3	413.4	532.4	566.6	579.3
Food Stores	141.5	152.4	146.4	157.1	186.7	188.7	186.3
Local Tran. & Gas	174.2	215.0	178.6	211.1	180.7	174.2	188.7
Arts, Ent. & Rec.	218.3	216.9	208.2	212.1	252.2	262.2	261.8
Retail Sales	220.3	209.6	208.1	213.9	247.5	253.2	250.5
Visitor Air Tran.	4.6	4.4	2.9	2.9	4.0	3.6	3.0
Total	**1,436.6**	**1,525.1**	**1,472.2**	**1,561.5**	**1,849.1**	**1,917.4**	**1,959.2**

Industry Earnings Generated by Travel Spending ($Million)

	2006	2008	2010	2012	2015	2016	2017
Accom. & Food Serv.	275.7	304.1	294.7	313.9	391.1	416.5	446.4
Arts, Ent. & Rec.	62.2	71.3	64.4	65.8	71.0	74.6	76.3
Retail**	48.1	49.6	47.7	49.9	60.9	64.0	65.7
Ground Tran.	5.3	5.7	5.4	5.8	7.5	8.3	8.7
Visitor Air Tran.	1.6	1.6	1.7	2.1	3.3	3.6	3.6
Other Travel*	12.2	11.9	13.4	14.9	11.5	12.8	13.3
Total	**405.1**	**444.2**	**427.4**	**452.5**	**545.3**	**579.8**	**614.1**

Industry Employment Generated by Travel Spending (Jobs)

	2006	2008	2010	2012	2015	2016	2017
Accom. & Food Serv.	13,140	13,710	12,850	12,860	14,330	14,900	15,350
Arts, Ent. & Rec.	4,060	4,430	4,070	3,970	4,000	4,090	4,050
Retail**	2,410	2,410	2,260	2,280	2,620	2,690	2,680
Ground Tran.	190	190	180	180	220	230	230
Visitor Air Tran.	40	40	30	40	60	60	60
Other Travel*	290	320	300	340	320	350	340
Total	**20,140**	**21,110**	**19,690**	**19,670**	**21,540**	**22,320**	**22,710**

Tax Receipts Generated by Travel Spending ($Million)

	2006	2008	2010	2012	2015	2016	2017
Local Tax Receipts	18.4	18.3	19.5	20.1	27.3	28.3	29.6
State Tax Receipts	34.6	37.2	35.7	39.5	46.0	50.4	53.8
Total	**53.0**	**55.6**	**55.2**	**59.6**	**73.3**	**78.7**	**83.4**

Details may not add to total due to rounding. * Other Travel includes ground transportation and air travel impacts for travel to other Oregon visitor destinations and travel arrangement services.** Retail includes gasoline. Federal tax receipts not included.

Oregon Coast Visitor Spending and Visitor Volume

Visitor Spending by Type of Traveler Accommodation ($Million), 2017p

	2008	2010	2012	2014	2016	2017
Total Destination Spending	**1,525**	**1,472**	**1,561**	**1,780**	**1,917**	**1,959**
All Overnight	1,030	990	1,042	1,191	1,298	1,334
Hotel, Motel, STVR*	724	696	729	863	962	992
Private Home	78	76	83	84	84	86
Other Overnight	227	218	230	244	252	256
Day Travel	496	482	520	589	619	626
Day Travel	496	482	520	589	619	626

Average Expenditures for Overnight Visitors, 2017p

	Travel Party		Person		Party	Length of
	Day	Trip	Day	Trip	Size	Stay (Nights)
Private Home	$84	$304	$33	$117	2.6	3.6
Other Overnight	$126	$440	$38	$132	3.3	3.5
All Overnight	$216	$597	$78	$222	2.8	2.8

Overnight Visitor Volume, 2015-2017p

	Person-Nights (000)			Party-Nights (000)		
	2015	2016	2017	2015	2016	2017
Hotel, Motel, STVR*	7,455	7,751	7,650	3,049	3,170	3,129
Private Home	2,595	2,619	2,624	1,006	1,015	1,017
Other Overnight	6,703	6,796	6,763	2,011	2,038	2,030
All Overnight	16,753	17,166	17,037	6,067	6,223	6,175

	Person-Trips (000)			Party-Trips (000)		
	2015	2016	2017	2015	2016	2017
Hotel, Motel, STVR*	3,514	3,646	3,348	1,437	1,491	1,369
Private Home	756	727	728	292	281	282
Other Overnight	1,973	1,999	1,941	592	600	582
All Overnight	6,242	6,372	6,018	2,322	2,372	2,233

"Hotel, Motel, STVR" category includes all lodging where a lodging tax is collected except campgrounds. "Other Overnight" category includes campgrounds and vacation homes.

Coos County

County Travel Impacts and Visitor Volume

Visitor Spending Impacts

Amount of Visitor Spending that supports 1 Job	$81,129
Employee Earnings generated by $100 Visitor Spending	$28
Local & State Tax Revenues generated by $100 Visitor Spending	$3.68

Visitor Volume

Additional visitor spending if each resident household encouraged one additional overnight visitor (in thousands)	$4,522
Additional employment if each resident household encouraged one additional overnight visitor	56

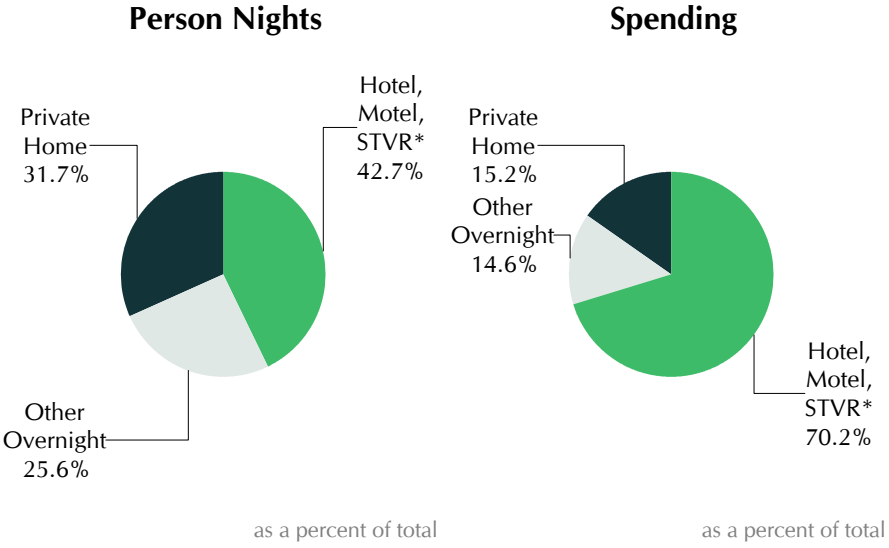
Visitor Shares

Travel Share of Total Employment (2016)*	10.5 %
Overnight Visitor Share of Resident Population (2017)**	11.0 %

*Source: Bureau of Economic Analysis and Bureau of Labor Statistics. Estimates by Dean Runyan Associates.
**Annual Overnight Visitor Days divided by (Resident Population) *365.

Visitors who stay in private homes typically comprise the largest share of overnight visitor volume. Visitors who stay overnight in commercial lodging typically have the greatest economic impact. There is substantial variation among destinations, however. Most rural and suburban areas have high shares of private home visitation. Urban areas tend to have greater shares of hotel/motel stays.

Overnight Visitor Spending and Volume



	Person Trips (Thousands)	Person Nights (Thousands)	Visitor Spending ($Millions)
Hotel, Motel, STVR*	579.7	1,096.4	121.2
Private Home	267.3	812.9	26.2
Other Overnight	203.4	657.6	25.3
All Overnight	1,050.4	2,567.0	172.7

Note: Person Trips and Person Nights are in Thousands. Visitor Spending is in $Millions. Details may not round to total due to rounding

Coos

Direct Travel Impacts, 2010-2017p

							Ave. Annual Chg.	
Spending ($M)	**2010**	**2012**	**2014**	**2015**	**2016**	**2017**	**16-17**	**10-17**
Total (Current $)	210.8	230.7	252.6	260.1	265.5	271.1	2.1%	3.7%
Other	11.9	12.6	11.2	9.4	9.1	10.0	9.7%	-2.5%
Visitor	198.9	218.0	241.3	250.8	256.4	261.1	1.8%	4.0%
Non-transportation	172.4	186.5	209.4	222.4	229.8	233.3	1.5%	4.4%
Transportation	26.4	31.5	31.9	28.4	26.6	27.8	4.4%	0.7%
Earnings ($M)								
Earnings (Current $)	56.3	60.4	66.6	72.0	76.5	79.0	3.3%	4.9%
Employment (Jobs)								
Employment	2,940	3,030	3,030	3,140	3,280	3,300	0.4%	1.6%
Tax Revenue ($M)								
Total (Current $)	6.5	7.3	7.9	8.4	9.0	9.5	5.6%	5.5%
Local	1.1	1.1	1.2	1.4	1.4	1.5	4.1%	3.9%
State	5.4	6.2	6.7	7.0	7.6	8.0	5.9%	5.8%

Other spending includes resident air travel, travel arrangement and reservation services, and convention and trade show organizers. **Non-transportation visitor spending** includes accommodations, food services, retail, food stores, and arts, entertainment & recreation. **Visitor transportation spending** includes private auto, auto rental, other local ground transportation and one-way airfares.
Earnings include wages & salaries, earned benefits and proprietor income.
Employment includes all full- and part-time employment of payroll employees and proprietors.
Local tax revenue includes lodging taxes, auto rental taxes and airport passenger facility charges paid by visitors.
State tax revenue includes lodging, and motor fuel tax payments of visitors, and the income tax payments attributable to the travel industry income of businesses and employees.
Federal tax revenue includes motor fuel excise taxes and airline ticket taxes paid by visitors, and the payroll and income taxes attributable to the travel industry income of employees and businesses.

Historical revisions have been made to correct for the assignment of visitor air travel to the other travel category total. This correction does not effect economic impact totals.

Coos County

Travel Impacts, 2006-2017p

Total Direct Travel Spending ($Million)

	2006	2008	2010	2012	2015	2016	2017
Destination Spending	204.8	217.4	198.9	218.0	250.8	256.4	261.1
Other Travel*	13.2	14.9	11.9	12.6	9.4	9.1	10.0
Total	**218.0**	**232.3**	**210.8**	**230.7**	**260.1**	**265.5**	**271.1**

Visitor Spending By Commodity Purchased ($Million)

	2006	2008	2010	2012	2015	2016	2017
Accommodations	42.7	44.7	40.7	45.3	55.5	58.8	61.5
Arts, Ent. & Rec.	36.1	35.9	33.1	34.8	39.8	40.7	40.6
Food Service	51.5	55.6	53.9	58.7	72.8	76.0	77.7
Food Stores	19.6	21.3	19.9	21.7	25.1	25.1	24.7
Local Tran. & Gas	23.7	29.6	23.5	28.6	24.4	23.0	24.8
Retail Sales	26.6	26.0	24.8	26.1	29.1	29.2	28.9
Visitor Air Tran.	4.6	4.4	2.9	2.9	4.0	3.6	3.0
Total	**204.8**	**217.4**	**198.9**	**218.0**	**250.8**	**256.4**	**261.1**

Industry Earnings Generated by Travel Spending ($Million)

	2006	2008	2010	2012	2015	2016	2017
Accom. & Food Serv.	35.9	39.5	36.1	38.8	46.5	49.6	51.3
Arts, Ent. & Rec.	9.6	11.0	9.5	10.5	12.0	12.5	12.8
Ground Tran.	0.8	0.9	0.8	0.9	1.1	1.2	1.3
Other Travel*	3.5	3.5	3.8	3.8	4.8	5.2	5.5
Retail**	6.1	6.5	6.0	6.4	7.6	7.9	8.0
Total	**56.0**	**61.3**	**56.3**	**60.4**	**72.0**	**76.5**	**79.0**

Industry Employment Generated by Travel Spending (Jobs)

	2006	2008	2010	2012	2015	2016	2017
Accom. & Food Serv.	1,930	2,010	1,700	1,750	1,860	1,950	2,000
Arts, Ent. & Rec.	770	840	830	870	830	860	820
Ground Tran.	30	30	30	30	30	30	30
Other Travel*	100	110	100	90	100	110	110
Retail**	300	310	280	290	320	330	330
Total	**3,140**	**3,300**	**2,940**	**3,030**	**3,140**	**3,280**	**3,300**

Tax Receipts Generated by Travel Spending ($Million)

	2006	2008	2010	2012	2015	2016	2017
Local Tax Receipts	1.3	1.3	1.1	1.1	1.4	1.4	1.5
State Tax Receipts	5.5	5.9	5.4	6.2	7.0	7.6	8.0
Total	**6.9**	**7.3**	**6.5**	**7.3**	**8.4**	**9.0**	**9.5**

Details may not add to total due to rounding. * Other Travel includes ground transportation and air travel impacts for travel to other Oregon visitor destinations, travel arrangement services, and convention & trade show organizers.** Retail includes gasoline.

Historical revisions have been made to correct for the assignment of visitor air travel to the other travel category total. This correction does not effect economic impact totals.

Coos County Visitor Spending and Visitor Volume

Visitor Spending by Type of Traveler Accommodation ($Million), 2017p

	2008	2010	2012	2014	2016	2017
Total Destination Spending	**213.0**	**195.9**	**215.1**	**238.3**	**252.8**	**258.1**
All Overnight	**141.9**	**129.3**	**141.9**	**157.2**	**168.3**	**172.7**
Hotel, Motel, STVR*	94.5	83.9	93.7	107.1	117.3	121.2
Private Home	24.6	24.2	25.7	26.0	25.8	26.2
Other Overnight	22.8	21.2	22.5	24.1	25.1	25.3
Day Travel	**71.1**	**66.6**	**73.2**	**81.1**	**84.6**	**85.4**
Day Travel	71.1	66.6	73.2	81.1	84.6	85.4

Average Expenditures for Overnight Visitors, 2017p

	Travel Party		Person		Party	Length of
	Day	Trip	Day	Trip	Size	Stay (Nights)
Hotel, Motel, STVR*	$269	$510	$111	$209	2.4	1.9
Private Home	$83	$253	$32	$98	2.6	3.1
Other Overnight	$131	$425	$38	$124	3.4	3.2
All Overnight	$180	$431	$67	$164	2.7	2.4

Overnight Visitor Volume, 2015-2017p

	Person-Nights (000)			Party-Nights (000)		
	2015	2016	2017	2015	2016	2017
Hotel, Motel, STVR*	1,095	1,109	1,096	450	456	450
Private Home	815	816	813	319	319	317
Other Overnight	656	667	658	192	196	193
All Overnight	2,565	2,592	2,567	961	970	960

	Person-Trips (000)			Party-Trips (000)		
	2015	2016	2017	2015	2016	2017
Hotel, Motel, STVR*	579	586	580	237	241	238
Private Home	268	268	267	104	104	103
Other Overnight	203	206	203	59	60	60
All Overnight	1,050	1,061	1,050	401	405	401

"Hotel, Motel" category includes all lodging where a lodging tax is collected except campgrounds.
"Other Overnight" category includes campgrounds and vacation homes.

Exhibit 12

RON SADLER

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North Bend, Oregon 97459

ronsad@uci.net

Planning Department
Coos County Courthouse
250 N. Baxter
Coquille, Oregon 97423

May 21, 2010

LAND USE HEARING (FILE # HBCU-10-01

SUPPLEMENTAL TESTIMONY

I have previously submitted written and oral testimony in this case.

During the Applicant's Rebuttal phase at the hearing on May 20, a matter came up that I feel warrants further discussion.

A participant at the hearing had offered oral testimony regarding his concern that installing the pipeline across the floor of the bay might re-activate pollutants buried in the bottom sediments.

His concerns have merit.

Research has shown that Coos Bay contains a number of introduced contaminants, including several chlorinated hydrocarbons. Chlorinated hydrocarbons are extremely worrisome in that, once introduced into an ecosystem, they are not broken down by natural processes and persist in their original form almost indefinitely. While they are not metabolized and inactivated, they can be removed from cycling through the food chain by, for example, becoming sequestered and buried in bottom sediments. Significant disturbances of bottom sediments, such as by trenching and burying a new pipeline, release these contaminants to once again re-enter the food cycle where they essentially have the effect of increasing the dosage to which living elements are exposed.

For a more comprehensive and documented discussion of these points, please see my previous testimony in the Jordan Cove Marine Docking Berth land use hearing included herewith as Enclosure #1.

Reacting to these concerns during the Rebuttal phase, the Applicant's stated they would be sampling the sediments along the pipeline route across the bay. They stated that an unspecified standardized evaluation process would be used which apparently refers to the

protocol used by the Corps of Engineers.

That is all well and good, but one thing is highly probable. The results of the testing will almost certainly show some level of contaminants occurring at sub-lethal doses.

It is at this point that the logic of attempting to complete the land use approval process in the absence of a viable Environmental Impact Statement begins to disintegrate.

Let's assume, for the sake of argument, the sediments show a few parts per billion (ppb) each of polychlorinated biphenyls (PCBs) and polycyclic aromatic hydrocarbons (PAHs). Apparently nothing to worry about, these are small amounts and any released contaminants would be washed away with the next outgoing tide. Based on the record currently before the Board of Commissioners, the decision would no doubt be to go ahead and approve the pipeline installation as this small amount of persistent organic pollutants recycling through the food chain should not cause any apparent bad effects.

If a viable EIS were available, in the section entitled "Affected Environment" (missing entirely, by the way, from the Jordan Cove FEIS), we would find that juvenile Chinook salmon currently swimming in the Coos Bay estuary carry 25 ppb of PCBs and 300 ppb of PAHs in their bodies. We would learn that juvenile salmon and their prey bioaccumulate chlorinated hydrocarbons whenever they become available in the food chain with detrimental effects on their immune systems which results in increased disease susceptibility (Enclosure 1). In addition, at some level, genetic effects begin to appear. In addition, rather than being flushed away on the next tide, we would learn that particles suspended in the water column in parts of Coos Bay can take as long as 48 days to be flushed from the estuary (Enclosure 1).

At this point, from a land use approval perspective, it would be apparent that a rubber stamp approval of the project would not be warranted, as the possibility exists the planned project could move us closer to a threshold which could initiate irreversible catastrophic impacts on the bay ecosystem. However, the unknown probability of this happening would cause a reluctance to cancel the project out of hand.

At this point, it would be logical to refer back to the EIS once again and turn to the sections on "Need for the project" (also missing from the Jordan Cove EIS) as well as the section which gives a balanced and complete side-by side comparison of the proposed project and all reasonable alternatives (yet again, missing from the Jordan Cove EIS).

The rationale of a logical land use decision could be developed as follows:

- If the need was dire and immediate, and if few viable alternatives were available, it would not be arbitrary or capricious to knowingly accept the environmental risks to the estuary and approve the pipeline in order to better serve the greater societal needs.

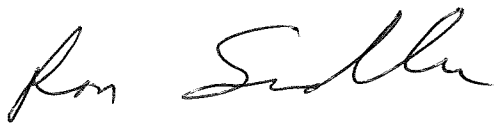
- If the need was speculative and future oriented, and if there were viable alternatives in place or readily available, it would not be worthwhile to risk the real possibility but uncertain probability of triggering catastrophic impacts to the estuarine ecosystem and the pipeline would not be approved.

In my estimation, the interplay of a valid and complete EIS within the County land use approval process is absolutely essential in this case given the importance and possible long-term implications of the decision to be made.

I understand the legal constraints placed on the Hearing Officer by the existing County land use approval process. I also understand this to be a somewhat arcane process probably inadequate to function adequately in today's managerial climate.

I find that the Oregon Progress Board essentially agrees with this premise: "The State's existing environmental data collection and management system must be improved to effectively measure ecological conditions, trends or risks. Measuring ecological conditions, trends, and risks is fundamentally different from the problems Oregon's environmental programs were initially established to address. Resolving them will require new approaches....." (Oregon State of the Environment Report 2000, Statewide Summary, page 3).

I ask that you apply your best creative efforts to find a way to postpone the land use approval decision until such time as it can be more fully and logically considered within the context of a viable and objective Environmental Impact Statement. I believe the environmental risks involved fully justify your efforts in this area.



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Phone: 541-759-4790

In the matter of: Coos County Land Use Hearing
Jordan Cove Marine Docking Berth

September 17, 2007
Coquille, Oregon

Testimony of Ron Sadler:

It is critical to remember, as was stated in a U.S. Department of Interior report, that Coos Bay is truly an ecosystem and one modification or activity could start a chain reaction which could affect the whole, resulting in severe damage to certain natural resources.[1]

The displacement, handling, and disposition of approximately 6,000,000 cubic yards of excavated and dredged material from the bottom and shoreline of the bay is certainly an activity that has great potential to do significant damage to marine life in the estuary, especially salmonid fish populations. This potential for damage is especially worrisome given what the sediments involved may contain.

Samples taken at various points in the Coos Bay estuary have shown concentrations of toxic materials in bottom sediments exceeding levels at which ecological effects are noted. These toxins include Tributyltin, arsenic, copper, lead, mercury, nickel, zinc, polycyclic aromatic hydrocarbons (PAHs), and polychlorinated biphenyls (PCBs).[2]

In addition, there are ongoing inputs of materials that may contribute to the accumulation of toxins in bottom sediments. In the year 2000, for example, there were inputs totaling 2,470 pounds of arsenic, chromium, zinc, copper, and mercury released in Coos County.[3] Further, the Coos Bay estuary receives unknown amounts of aliphatic organochlorines, chlorinated dibenzofurans, chlorinated phenols, and metabolites of each, as a by-product of the release of treated municipal wastewater. Looking further back in time, 40 years ago there was a pulp mill located on the bay at Empire. Its outfall of wastewater entered the bay untreated via a pipe located in the middle of the shipping channel. The resulting outflow resulted in a linear "dead zone" extending towards the mouth of Coos Bay. The types and amounts of toxins residing in the deep sediments at this location have not been investigated to my knowledge.

The various chlorinated organic compounds mentioned above are known as POPs – persistent organic pollutants. At the molecular level, they are extremely stable and

ENCLOSURE # 1

virtually indestructible by natural processes. In some instances, polymer chains may be broken by natural processes, but may recombine to form new compounds (metabolites) even more toxic than the originals.

Most appropriate to this discussion, then, is the fact that toxic material such as metals, PCBs, PAHs, etc. once released into the environment can remain unchanged for thousands of years. They are not biodegraded into more benign substances. They continue to cycle through the ecosystem raising havoc until they become no longer available to the flora and fauna through the process of sequestration.

In an estuarine ecosystem, the primary mechanism for sequestering toxins results in them being locked up by becoming buried in or attached to bottom sediments. There they remain out of reach of most organisms until some disturbance releases them to re-enter the food chain once again.

This is not a perfect process, however, as evidenced by conditions as they exist in Coos Bay today. Juvenile Chinook salmon in the Coos Bay estuary presently carry about 300 ppb of PAH metabolite concentrations in their bodies. They also carry about 25 ppb of PCB concentrations. As testimony to the longevity of these types of toxins, they also carry about 9 ppb of DDT concentrations, a full 30 years after its use was banned.[4]

It is well established that sediments in estuaries sequester and act as repositories for contaminants. It has also been shown that juvenile salmon and their prey bioaccumulate chlorinated and aromatic hydrocarbons, when they become available in the food chain, with detrimental effects on their immune systems which results in increased disease susceptibility.[5] Given current baseline loadings of toxins in juvenile salmon, how much room exists for additional inputs of toxins before critical thresholds are crossed?

The dynamics of tidal flows in estuaries are often viewed in simplistic terms. It is tempting to think of a cloud of murky water, with its associated toxins, created by dredging being carried out of sight and out of mind by the next out-going tide. This is not realistic, however. Studies have shown that a particle suspended in the water column in parts of Coos Bay can take as long as 48 days to be flushed from the estuary.[6]

Given the serious and potentially catastrophic effects that could negatively impact the salmonid productivity of the Coos Bay estuary, it appears premature and inappropriate to approve the construction of the marine docking berth at this time.

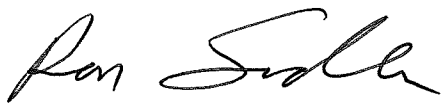
Several key elements of information essential to an informed and rational decision appear to be missing at this time. A viable decision process would require the following:

1. An intensive sampling of all areas proposed for dredging or excavation, to the full depth of planned disturbance, to determine the types and concentrations of all toxins expected in the spoils.

2. A detailed and explicit disposal and/or storage plan for all dredged and excavated material, with explicit requirements to prevent water or wind borne re-deposition in the estuary.

3. A risk assessment detailing an estimation of the net effects of unavoidable releases of sequestered toxins on salmonid productivity.

I ask that this information be gathered and analyzed before further action is taken on the marine docking berth proposal.



FOOTNOTES

1. USDI, "Natural Resources, Ecological Aspects, Uses and Guidelines for the Management of Coos Bay", L. B. Day, June, 1971, pg. 128.
2. NOAA, "Preliminary Natural Resource Survey, Coos Bay, December 12, 1997, pg. 11.
3. EPA, "Toxic Release Inventory, Coos County, Oregon", 2000
4. Dr. Mary Arkoosh, National Marine Fisheries Service, Newport, Oregon, 2000.
5. Dr. Mary Arkoosh, "Effect of Pollution on Fish Diseases: Potential Impacts on Salmonid Populations", Journal of Aquatic Animal Health, Vol. 10, June 1998, pp. 182-190.
6. Arneson, "Seasonal Variation in Tidal Dynamics, Water Quality and Sediments in the Coos Bay Estuary", OSU Masters Thesis, June, 1976.

1
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3
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5
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Exhibit 13

WILDLIFE DIVISION
Regulating harvest, health, and enhancement of wildlife populations

Threatened, Endangered, and Candidate Fish and Wildlife Species

(T= Threatened, E= Endangered, C= Candidate, DPS= Distinct Population Segment)

Threatened, Endangered, and Candidate Fish and Wildlife Species in Oregon (pdf)

Common Name	Scientific Name	State Status*	Federal Status
FISH			
Borax Lake Chub	*Siphateles boraxobius*	T	E
Bull Trout (range-wide)	*Salvelinus confluentus*		T
Columbia River Chum Salmon	*Oncorhynchus keta*		T
Foskett Spring Speckled Dace	*Rhinichthys osculus* ssp		T
Green Sturgeon (Southern DPS)	*Acipenser medirostris*		T
Hutton Spring Tui Chub	*Siphateles bicolor* ssp	T	T
Lahontan Cutthroat Trout	*Oncorhynchus clarki henshawi*	T	T
Lost River Sucker	*Deltistes luxatus*	E	E
Lower Columbia River Chinook Salmon	*Oncorhynchus tshawytscha*		T
Lower Columbia River Coho Salmon	*Oncorhynchus kisutch*	E	T
Lower Columbia River Steelhead	*Oncorhynchus mykiss*		T
Middle Columbia River Steelhead	*Oncorhynchus mykiss*		T
Oregon Coast Coho Salmon	*Oncorhynchus kisutch*		T
Pacific Eulachon/Smelt (Southern DPS)	*Thaleichthys pacificus*		T
Shortnose Sucker	*Chasmistes brevirostris*	E	E
Snake River Chinook Salmon (Fall)	*Oncorhynchus tshawytscha*	T	T
Snake River Chinook Salmon (Spring/Summer)	*Oncorhynchus tshawytscha*	T	T
Snake River Sockeye Salmon	*Oncorhynchus nerka*		E
Snake River Steelhead	*Oncorhynchus mykiss*		T
Southern Oregon/Northern California Coast Coho Salmon	*Oncorhynchus kisutch*		T
Upper Columbia River Spring Chinook Salmon	*Oncorhynchus tshawytscha*		E
Upper Columbia River Steelhead	*Oncorhynchus mykiss*		T
Upper Willamette River Chinook Salmon	*Oncorhynchus tshawytscha*		T
Upper Willamette River Steelhead	*Oncorhynchus mykiss*		T

Warner Sucker	*Catostomus warnerensis*	T	T
AMPHIBIANS AND REPTILES			
Green Sea Turtle	*Chelonia mydas*	E	T
Leatherback Sea Turtle	*Dermochelys coriacea*	E	E
Loggerhead Sea Turtle	*Caretta caretta*	T	E
Olive Ridley Sea Turtle	*Lepidochelys olivacea*	T	T
Oregon Spotted Frog	*Rana pretiosa*		T
BIRDS			
California Brown Pelican	*Pelecanus occidentalis californicus*	E	
California Least Tern	*Sternula antillarum browni*	E	E
Marbled Murrelet	*Brachyramphus marmoratus*	T	T
Northern Spotted Owl	*Strix occidentalis caurina*	T	T
Short-tailed Albatross	*Phoebastria albatrus*	E	E
Streaked Horned Lark	*Eremophila alpestris strigata*		T
Western Snowy Plover	*Charadrius nivosus nivosus*	T	T (Pacific Coast population DPS)
Yellow-billed Cuckoo (Western DPS)	*Coccyzus americanus*		T
MAMMALS			
Blue Whale	*Balaenoptera musculus*	E	E
Canada Lynx	*Lynx canadensis*		T
Columbian White-tailed Deer (Columbia River DPS)	*Odocoileus virginianus leucurus*		T
Fin Whale	*Balaenoptera physalus*	E	E
Gray Whale	*Eschrichtius robustus*	E	
Gray Wolf	*Canis lupus*		E1
Humpback Whale	*Megaptera novaeangliae*	E	E
Killer Whale (Southern Resident DPS)	*Orcinus orca*		E
Kit Fox	*Vulpes macrotis*	T	
North Pacific Right Whale	*Eubalaena japonica*	E	E
Red Tree Vole (North Oregon Coast DPS)	*Arborimus longicaudus*		C
Sea Otter	*Enhydra lutris*	T	T
Sei Whale	*Balaenoptera borealis*	E	E
Sperm Whale	*Physeter macrocephalus*	E	E
Washington Ground Squirrel	*Urocitellus washingtoni*	E	
Wolverine	*Gulo gulo*	T	

* Listed under the Oregon Endangered Species Act (ORS 496.171 through 496.192)

1: The gray wolf is protected as endangered under the authority of the federal Endangered Species Act in Oregon west of highways 395, 78, and 95.

Revised June 11, 2018

4034 Fairview Industrial Drive SE :: Salem, OR 97302 :: Main Phone (503) 947-6000 or (800) 720-ODFW [6339]

Do you have a question or comment for ODFW? Contact ODFW's Public Service Representative at: odfw.info@state.or.us
Share your opinion or comments on a Fish and Wildlife Commission issue at: odfw.commission@state.or.us

West Coast Region Home
About Us
What We Do
Aquaculture
Fish Passage
Habitat
Protected Species
Fisheries
Hatcheries
Resources
Permits & Authorizations
Publications
Education & Outreach
Maps & Data
Recent Stories
Newsroom
NOAA Affiliates

How do I?

- Contact the West Coast Region
- Learn more about ESA Section 7 consultations
- Learn more about the Pacific Coastal Salmon Recovery Fund
- Log into my IFQ account
- Find a biological opinion
- Report a stranded or entangled marine mammal
- Report a violation
- Find grant opportunities

West Coast Region Home » Salmon & Steelhead » Salmon & Steelhead Listings » Coho

Oregon Coast Coho

ESA Listing Status: *Threatened* on June 20, 2011 *250kb*; updated April 14, 2014 *503kb*

ESU Definition: This evolutionarily significant unit, or ESU, includes naturally spawned coho salmon originating from coastal rivers south of the Columbia River and north of Cape Blanco, and also coho salmon from one artificial propagation program: Cow Creek Hatchery Program (Oregon Department of Fish and Wildlife Stock #18).

Current Population Trends:

- Salmon Population Trend Summaries
- Salmon Population Summary Database
- 5-Year Salmon Status Review *1.2MB*

Critical Habitat: Designated Feb. 11, 2008 *1.5MB*

- Supporting Information

Protective Regulations: Issued Feb. 11, 2008 *1.5MB*

Coho Salmon Status Reviews

Coho Salmon Federal Register Notices

Coho Salmon Maps & GIS Data

ESA Chronology for Oregon Coast Coho

West Coast Region Home
About Us
What We Do
Aquaculture
Fish Passage
Habitat
Protected Species
Fisheries
Hatcheries
Resources
Permits & Authorizations
Publications
Education & Outreach
Maps & Data
Recent Stories
Newsroom
NOAA Affiliates

How do I?

- Contact the West Coast Region
- Learn more about ESA Section 7 consultations
- Learn more about the Pacific Coastal Salmon Recovery Fund
- Log into my IFQ account
- Find a biological opinion
- Report a stranded or entangled marine mammal
- Report a violation
- Find grant opportunities

West Coast Region Home » Green Sturgeon

Green Sturgeon

Twenty seven species of sturgeons can be found in temperate waters of the Northern Hemisphere, two of which reside on the West Coast of North America: the green sturgeon (*Acipenser medirostris)* and the white sturgeon *(Acipenser transmontanus)*.

NOAA Fisheries received a petition in June 2001 from several environmental organizations requesting that the agency list the North American green sturgeon under the Endangered Species Act (ESA). On April 7, 2006, NOAA Fisheries listed the southern distinct population segment, or sDPS, of North American green sturgeon as threatened under the ESA. Critical habitat was designated on **October 9, 2009.** On June 2, 2010, NOAA Fisheries published final ESA protective regulations 4(d) for the southern distinct population segment of North American green sturgeon, and released a final environmental assessment analyzing the environmental impacts of these ESA Section 4(d) rules. The northern distinct population segment, or nDPS, of North American green sturgeon is a **species of concern** within the region.

Species Background

Biology

Life History

Threats

Critical Habitat

Status Reviews

Education

Identification Guide

Conservation Efforts & Research

Management & Policy

Final Recovery Plan, August 2018

- **Final sDPS Green Sturgeon Recovery Plan**
- **Appendix A - Final sDPS Green Sturgeon Recovery Plan**

Draft Recovery Plan, January 2018

- ***Federal Register* notice requesting comments on Draft sDPS Green Stugeon Recovery Plan**

ESA Listing

- ***Federal Register* Notice, April 7, 2006, Southern DPS**
  - **updated April 14, 2014**
- **References for Final Rule Listing, Southern DPS**
- **Final Green Sturgeon Listing Q & A**

Protective Regulations, ESA Section 4(d)

- **News Release**
- ***Federal Register* Notice**
- **Environmental Assessment**
- **Impact Review**
- **Flexibility Analysis**
- **References for 4(d) rule**

West Coast Region Home
About Us
What We Do
Aquaculture
Fish Passage
Habitat
Protected Species
Fisheries
Hatcheries
Resources
Permits & Authorizations
Publications
Education & Outreach
Maps & Data
Recent Stories
Newsroom
NOAA Affiliates

How do I?

- Contact the West Coast Region
- Learn more about ESA Section 7 consultations
- Learn more about the Pacific Coastal Salmon Recovery Fund
- Log into my IFQ account
- Find a biological opinion
- Report a stranded or entangled marine mammal
- Report a violation
- Find grant opportunities

Eulachon

Eulachon are an anadromous forage fish and are endemic to the northeastern Pacific Ocean; they range from northern California to southwest and south-central Alaska and into the southeastern Bering Sea. The southern DPS of eulachon is comprised of fish that spawn in rivers south of the Nass River in British Columbia to, and including, the Mad River in California. Adult eulachon typically spawn at age 2-5 in the lower portions of rivers. Many rivers within the range of eulachon have consistent yearly spawning runs; however, eulachon may appear in other rivers only on an irregular or occasional basis. The spawning migration usually occurs between December and June.

If you have any questions about the recovery planning process or for more information, please contact **Robert Anderson**, 503-231-2226.

Recovery Planning

FINAL Recovery Plan for the Southern DPS of Eulachon September 2017

Notice of Intent to Prepare a Recovery Plan for the Southern DPS of Eulachon 78 *FR* 40104, July 3, 2013

DRAFT Eulachon Recovery Plan October 20, 2016

***FR* Notice** October 20, 2016

Recovery Plan Outline

Listing Information

Eulachon Species Information

ESA Listing Status *Threatened* 75 FR 13012, March 18, 2010

Endangered and Threatened Wildlife; Final Rule to Revise the Code of Federal Regulations for Species under the Jurisdiction of the National Marine Fisheries Service April 14, 2014

Eulachon Critical Habitat 76 FR 65324, Oct 20, 2011

2016 5-Year Review Summary and Evaluation

2016 Status Review Update

Initiation of Eulachon 5-Year Status Review

2010 Eulachon Status Review

2008 Eulachon Status Review

Resources

Washington Department of Fish and Wildlife

http://wdfw.wa.gov/

http://wdfw.wa.gov/conservation/fisheries/smelt/

Oregon Department of Fish and Wildlife

www.dfw.state.or.us/

www.dfw.state.or.us/fish/oscrp/cri/publications.asp#Eulachon

California Department of Fish and Wildlife

www.wildlife.ca.gov/

file:///C:/Users/robert/Downloads/06_Anadromous%20Fish_092415[1].p

Department of Fisheries and Oceans, Canada

www.dfo-mpo.gc.ca/index-eng.htm

www.pac.dfo-mpo.gc.ca/science/species-especes/pelagic-pelagique/eulachon-eulakane-eng.html

Studies of Eulachon Smelt in OR and WA, 2014

Eulachon Newsletters

September 2014 Eulachon Newsletter

December 2014 Eulachon Newsletter

July 2015 Eulachon Newsletter

December 2015 Eulachon Newsletter

Biological Opinions

West Coast Region Home
About Us
What We Do
Aquaculture
Fish Passage
Habitat
Protected Species
Fisheries
Hatcheries
Resources
Permits & Authorizations
Publications
Education & Outreach
Maps & Data
Recent Stories
Newsroom
NOAA Affiliates
How do I?

- Contact the West Coast Region
- Learn more about ESA Section 7 consultations
- Learn more about the Pacific Coastal Salmon Recovery Fund
- Log into my IFQ account
- Find a biological opinion
- Report a stranded or entangled marine mammal
- Report a violation
- Find grant opportunities

West Coast Region Home » Marine Mammals

ESA-Listed Marine Mammals

NOAA Fisheries has listed 22 species of marine mammals under the Endangered Species Act, where 8 of those species are from the West Coast. We manage 7 different species of cetaceans (listed below) and Guadalupe fur seals. NOAA Fisheries' **Alaska Region** manages Steller sea lions. The Alaska Fisheries Science Center's **Marine Mammal Laboratory does research on Steller sea lions**.

Blue Whales

Fin Whales

Guadalupe Fur Seals

Central America **Humpback Whale** DPS * change in status, endangered as of October 2016

Mexico **Humpback Whale** DPS * change in status, threatened as of October 2016

Northern Pacific Right Whales

Western North Pacific Gray Whales

Sei Whales

Southern Resident Killer Whales

Sperm Whales

Steller Sea Lions * change in status, *delisted* as of December 2013

West Coast Region Home
About Us
What We Do
Aquaculture
Fish Passage
Habitat
Protected Species
Fisheries
Hatcheries
Resources
Permits & Authorizations
Publications
Education & Outreach
Maps & Data
Recent Stories
Newsroom
NOAA Affiliates

How do I?

- Contact the West Coast Region
- Learn more about ESA Section 7 consultations
- Learn more about the Pacific Coastal Salmon Recovery Fund
- Log into my IFQ account
- Find a biological opinion
- Report a stranded or entangled marine mammal
- Report a violation
- Find grant opportunities

West Coast Region Home » Sea Turtles

Sea Turtles

We share jurisdiction of marine turtles with the U.S. Fish & Wildlife Service. Sightings and strandings of turtles listed under the Endangered Species Act (ESA) in the region are rare, and there are no breeding beaches in California, Oregon, or Washington. However, encounters may occur. **Please report a dead, injured, or stranded sea turtle by calling: 1-866-767-6114.** Additional species information is provided below.

ESA-Listed Sea Turtles

Critical Habitat Designation for Pacific Leatherback Sea Turtles

- News release
- Federal Register Notice

Species in the Spotlight Initiative - Pacific Leatherback Sea Turtles

- Five-Year Action Plan

Point Reyes bird's-beak (*Cordylanthus maritimus* ssp. *palustris*)

Oregon Department of Agriculture

ENDANGERED

Flowers (left), habit (center), and habitat (right) of Point Reyes bird's-beak. Photos by Melissa Carr. If downloading images from this website, please credit the photographer.

Family
Orobanchaceae

Taxonomic notes
Synonym: *Chloropyron maritimum* ssp. *palustre**

*Revised classification by Tank et al. (2009) based on recent molecular research of subtribe Castillejinae (Orobanchaceae).

This taxon was formerly included within the Scrophulariaceae.

Plant description
Point Reyes bird's-beak is a halophytic annual 10-20 (-30) cm tall, simple or sparingly branched with ascending lateral branches equal to or shorter than the central spike. The herbage is grayish green to glaucous, often purplish tinged, and villous to glabrescent. Leaves are oblong to oblong-lanceolate, 1-2.5 cm long and 0.3-0.7 cm wide, with a blunt to pointed apex. Flowers are arranged in dense spikes with oblong floral bracts bearing a pair of short teeth near the apex. The corolla is 1.8-2.5 cm long, the lower lip and pouch suffused with pinkish to purplish red, the galea pale cream to white. Capsules produce 10-20 seeds that are 0.2-0.3 cm long.

Distinguishing characteristics
Point Reyes bird's-beak shares the same coastal salt marsh habitat as *Cordylanthus maritimus* ssp. *maritimus* (*Chloropyron maritimum* ssp. *maritimum*), but the two taxa are geographically separated by over 100 air miles (160 km), with the latter species restricted to southern California. Point Reyes bird's beak is distinguished from *C. m.* ssp. *maritimus* by its simple or few-branched stem with branches equal to or shorter than the central spike, by its larger, broader leaves, denser and somewhat broader spikes, and larger bracts and flowers. Another subspecies, ssp. *canescens*, is a widespread species of the Great Basin associated with alkaline lakes and hot springs.

When to survey
Surveys for Point Reyes bird's-beak should be conducted when the species is flowering, from June to October.

Habitat
Point Reye's bird's-beak inhabits the upper end of maritime salt marshes at approximately 2.3-2.6 m (7.5-8.5 ft) above Mean Lower Low Water (MLLW, the mean height of water at the lowest of the daily low tides), in sandy substrates with soil salinity 34-55 ppt, and less than 30% bare soil in summer.

Point Reyes bird's-beak is a hemiparasite, forming root connections with host plants from which it derives some of its resources. Point Reyes bird's-beak is not host-specific, but standard hosts for the species probably include *Salicornia virginica*, *Jaumea carnosa*, *Distichlis spicata*, *Limonium californicum,* and *Deschampsia cespitosa*. Other associated species are *Cuscuta salina, Plantago maritima*, *Hordeum jubatum*, *Juncus gerardii*, *Castilleja ambigua* var. *ambigua*, *Spergularia macrotheca*, *S. canadensis*, *Atriplex patula*, *Carex lyngbyei*, *and Glaux maritima.*

Range
Point Reyes bird's-beak occurs along the Pacific Coast from Tillamook County in Oregon, south to Santa Clara County, California. In Oregon, the species is restricted to Netarts Bay, Yaquina Bay, and Coos Bay, with the majority of known occurrences located in Coos Bay.

Oregon counties
Coos, Lincoln, Tillamook

Federal status
Species of Concern

Threats
The primary threat to Point Reyes bird's-beak is habitat loss due to development. The species is also threatened by off-road vehicle use, water pollution, and habitat alteration due to invasion by non-native *Spartina densiflora*.

Did you know?
Research indicates that Point Reyes bird's-beak and other hemiparasites help reduce the abundance of competitive dominant plants, promote plant species diversity, and reduce root zone salinity stress in salt marsh communities.

References
Chuang, T. I. and L. R. Heckard. 1973. Taxonomy of *Cordylanthus* subgenus Hemistegia (Scrophulariaceae). Brittonia 25:135-158.

Clifford, P. M. 2002. Dense-flowered cordgrass (*Spartina densiflora*) in Humboldt Bay, summary and literature review. California State Coastal Conservancy, Oakland, California.

Grewell, B. J. 2008. Hemiparasites generate environmental heterogeneity and enhance species coexistence in salt marshes. Ecological Applications 18:1297-1306.

Kaye, T. 1992. Population monitoring for salt marsh bird's beak, *Cordylanthus maritimus* ssp. *palustris*, Second year summary. Unpublished report for the Bureau of

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Meinke, R.J. 1982. Threatened and endangered vascular plants of Oregon: An illustrated guide. Unpublished report for the U.S. Fish and Wildlife Service, Region 1, Portland, Oregon. Oregon Department of Agriculture, Salem, Oregon.

ORNHIC (Oregon Natural Heritage Information Center). 2007. Rare, threatened and endangered species of Oregon. Oregon Natural Heritage Information Center, Oregon State University, Portland, Oregon.

ORNHIC (Oregon Natural Heritage Information Center). 2010. ORNHIC element occurrence database. Portland, Oregon.

Rittenhouse, B. 1999. Status of salt marsh bird's-beak (*Cordylanthus maritimus* ssp. *palustris*) in the Coos Bay Estuary. Bureau of Land Management, Coos Bay District, Coos Bay, Oregon. 10+ pp.

Tank, D.C., J. M. Egger, and R. G. Olmstead. 2009. Phylogenetic classification of subtribe Castillejinae (Orobanchaceae). Systematic Botany 34:182-197.

Exhibit 14

Shell's Sakhalin II LNG project:
Impacts of LNG production

2002 project design included a LNG jetty of 1,400 m length, and around 160,000 m3 of dredging
2003 project design (finally implemented) involved a LNG jetty that was 800 m in length, requiring around 1,680,000 m3 of dredging. Final amount of dredging was about 2 million m3.
(2 million cubic meters is equal to 2.6 million cubic yards)

What Avina Bay looked like BEFORE dredging work and dumping of dredged materials…..

Cont:

What Avina Bay looked like BEFORE dredging work and dumping of dredged materials…..

Aniva Bay - the same area AFTER….

The 2 pictures below were done in Aniva Bay, a year after dumping on the area, which, according SEIC, should not have any negative impact (sedimentation) from the dumping zone.
Now this area is almost an underwater desert.

"Shell's Sakhalin II LNG project in Russia"

Photo to Left Above: *Shell's Sakhalin II LNG project in Russia. Upstream of wild salmon spawning river huge sedimentation contamination occurred. Salmon can swim up rivers with high content of suspended solids, but cannot spawn in water with suspended solids content 220 mg a liter and higher.*
Photo to Right Above: *Ozernaya river on Sakhalin Island several km downstream of pipeline crossings: Females died before laying eggs*
Photos below: *Landslides and erosion from Shell's Sakhalin II LNG pipeline project in Russia.*

Many of our local industries depend on environmentally sound, ecological and biological systems working properly in our Coastal Zone and those systems not being compromised. We know what the environmental impact results ended up being with regard to Russia's Sakhalin Island. Fishing there is still suffering with low fish returns in areas where gas and oil developments have taken place. Can we expect these same kinds of impacts to occur in Oregon? Who will monitor the Pacific Connector Gas Pipeline so that what is being promised currently by them in regard to the construction of the Pacific Connector is actually completed as promised and without this same degradation? If proposed mitigation measures fail, what will be the recourse? We already have compromised streams and low fish runs in the South Coast Basin. Will Pacific Connector impacts push already compromised biological and ecological systems over the edge?

http://money.cnn.com/magazines/fortune/fortune_archive/2007/02/05/8399125/index.htm

FORTUNE

Shell shakedown

Fortune's Abrahm Lustgarten reports how the world's second-largest oil company lost control of its $22 billion project on Russia's Sakhalin Island.

By Abrahm Lustgarten, Fortune
February 1 2007: 12:10 PM EST

(Fortune Magazine) -- Word that control of the world's largest integrated oil and gas project had been wrested from Royal Dutch Shell trickled down to the company's staff on Russia's Sakhalin Island in December the same way it reached everyone else: via the newswires.

Outside Shell's six-story steel-and-glass compound in Yuzhno-Sakhalinsk, a town of 175,000, snow swirled in subzero wind past drab rows of communist-era cinderblock apartments. Inside, Jim Niven, the company's gregarious head of external affairs, was halfway through an upbeat presentation on the vast potential held in this claw-shaped island dangling from the Siberian Arctic - an estimated 45 billion barrels of oil and gas - when he was interrupted by a nervous colleague, paper in hand.

The news was stunning, even if rumors had been flying: Shell (Charts) was halving its ownership in the $22 billion project, cutting its stake from 55% to 27.5%, and Gazprom, the Russian gas giant, was stepping in, buying Shell's share plus half the stakes owned by Japanese partners Mitsui and Mitsubishi, for just $7.5 billion - the equivalent, says a Shell spokesman, of "paying to enter on the ground floor, as if they were a shareholder at the beginning." The foreign companies also agreed to absorb $3.6 billion of the project's mounting cost overruns.

Shell's top executives, who were in Moscow at the time, weren't negotiating from a position of strength. Not in Vladimir Putin's Russia, where strong-arm tactics have been used to reassert government control of the country's vast natural resources. Last summer the Russian Ministry of Natural Resources suddenly backed Sakhalin Island environmentalists, revoking permits and delaying work on twin 400-mile pipelines that connect to a monstrous LNG terminal and an oil-export facility. The threat of a $50 billion lawsuit meant Shell stood to lose everything.

"A guy says, 'Give me half of what is in your pocket, or I shoot you and kill you,'" says Oppenheimer oil analyst Fadel Gheit. "You give him half and say, 'Thank God I am alive to live another day.' They could have lost all of it."

That December night Yuzhno was abuzz with the news. In the Chameleon bar, where Russian bands hammer out Western rock riffs and twentysomethings pass the hose of a hookah pipe, phones started to vibrate and text messages were thumbed out. The talk was exultant, nationalistic. The feeling was that Shell had it coming.

"I'm not proud of how it was done," said one Russian oil worker. "Russia has lost a lot of reputation on this. But I am happy. Shell - they just don't understand how this place works."

Risks on the frontier

That Shell and its partners were victims of an unscrupulous campaign by the Russians to win leverage at the negotiating table is certainly true. The company's loss of its controlling interest in what chief executive Jeroen van der Veer called a "key part of Shell's upstream strategy," amounting to an estimated 5 percent of its global reserves, is largely a story about the high risks of frontier international energy projects. But it is also a tale of how Shell misplayed a strong hand and, after 12 years of work, lost untold billions of dollars in future earnings.

It starts with a production-sharing agreement that most observers agree was inherently unfair to Russia - a deal signed in 1996, when oil was $22 a barrel and Russia was on its knees, that gave the Shell-controlled Sakhalin Energy Investment Corp. the right to recoup all its costs plus a 17.5% rate of return before Russia would get a 10% share of the hydrocarbons coming out of the ground.

Then there was the cost of the second phase of the project, which ballooned from $10 billion in 1997 to $20 billion in 2005, fueling a perception that the company was profligate while Russians picked up the tab. The chapters in between include a calamitous safety record, a failure to meet local expectations for new roads and schools, a fuel spill in Sakhalin's third-largest city, and environmental concerns that caused anger and resentment toward Shell's leadership, earning it a reputation for stubbornness and for consistently misreading political realities.

Gallery: Scenes from Sakhalin

"Shell is always resisting," says Tom Madderom, a veteran Sakhalin contractor who has worked on the Shell project but is now employed at another site, run by Exxon Neftgas, on the northern tip of the island. "Instead of accommodating, they come out with lawyers and try to prove their case. You can run a project in Russia and have a win-win deal - even a project of this size. But it takes engaging with these people, and Sakhalin Energy hasn't been real good at it."

Take, for instance, the ire the company has drawn in Korsakov, a small weather-beaten port city on the island's southern coast, near Sakhalin Energy's Prigorodnoye LNG plant. Residents say the company led them to believe that housing for 6,000 construction workers would be located in the town, where it could later be reused by the community, which sorely needs it. Many people in Korsakov earn less than $300 a month - a sharp contrast to the wealth of Sakhalin Energy employees, many of whom, especially those who come from other countries, make more than $1,000 a day.

But when construction began, Sakhalin Energy built its housing for workers next to the plant itself, inside a one-kilometer safety zone, where it will be illegal for people to live once operations begin. "People here could use this place for their well-being, and it will be demolished," says Elena Lopukhina, director of a Korsakov advocacy group and an assistant to a regional government official, who says that is just one of the emotional issues in the community that have swayed people against Sakhalin Energy. "The company did everything that was good for them and not good for us."

Executives at Sakhalin Energy say the production-sharing agreement would have prohibited such a promise, and they maintain that these sorts of complaints are based on unrealistic hopes. "When big projects come along, expectations are always running higher than reality," says Niven. "But clearly there are also opportunities."

Local government revenue, he says, has increased fivefold, and unemployment is just over 1%. Sakhalin Energy has contributed more than $300 million so far to roads and infrastructure. And while it's too early to offer a verdict, he believes Sakhalin is on the cusp of a four-decade period

of economic development. There are at least nine major oil and gas projects planned on the island, involving many of the world's largest oil companies. Shell's problem is that its project, known as Sakhalin II, is the largest of them all - and therefore the biggest target.

Much of the ammunition for Russia's political war against Sakhalin Energy comes from the cramped Yuzhno office of an independent environmental group called Sakhalin Environment Watch. At its helm is Dmitry Lisitsyn, a sharp-witted 39-year-old who has been hounding oil companies on the island for more than a decade. "We understand that our issues are being used as leverage," Lisitsyn says, "but at the same time, real problems exist."

If the government's inspections were politically fueled, though, Lisitsyn's motivations are not. He has the respect of his foes, and as Sakhalin Energy's Hilary Mercer, who heads the LNG project, puts it, "wants what is best for this place." Lisitsyn says Sakhalin II is a "lighthouse," a template for how future projects will deal with environmental and social standards. Chief among his concerns is the impact of the LNG plant, Russia's first, and the pipeline that leads to it.

The LNG plant and export terminal lie on a 1,210-acre patch of land about eight miles from Korsakov, abutting the steel-gray Aniva Bay. To the north a wide right-of-way cut in the forest marks the gas and oil pipelines' path up over the hills to the offshore platforms. To the south a jetty sticks out into the bay like a needle, ready to inject the 156 LNG tankers expected to dock there annually with liquefied gas, before sending them off to markets in the U.S., Japan, and Korea. The plant, mostly completed, won't come online until 2008, but already its output for the next 20 years is sold out.

Inside the perimeter fencing, where roughly 10,000 of Sakhalin Energy's 18,000 employees work, is - for now - the world's largest LNG facility. What happens inside the fence is by most accounts an orderly, world-class operation and a feat of engineering in Sakhalin's near-arctic conditions. It's what happens outside the fence that has drawn the scrutiny of Sakhalin Environment Watch and fomented ill will.

In order to bring LNG tankers into Aniva Bay, Sakhalin Energy had to dredge the bottom near shore, then dump the mud - two million cubic meters of it, Lisitsyn says - farther out in the bay. The island's second-largest industry after oil is fishing, and Aniva Bay is home to a diverse ecosystem that could be threatened by the dredging.

Lisitsyn wanted the company to use a longer pier, requiring less dredging, and dump the material farther out at sea. Instead Sakhalin Energy pursued the cheaper near-shore option. Now Lisitsyn is taking Sakhalin Energy to court, seeking a full accounting of environmental damages in the bay. Among other things, he alleges some of the dredging was conducted during the summer, in violation of laws protecting salmon spawning.

In that case and in disputes over the pipeline route, Lisitsyn has been highly critical of Sakhalin Energy's oil-spill preparedness and construction techniques. He says the company spends more time talking than taking action. "Sakhalin Energy loves the dialogue - it is one of their gods," he says. "But we don't want just talk, we want solutions."

Gallery: Scenes from Sakhalin

That approach has led to delays and cost increases. In 2005, Sakhalin Energy made routing adjustments to its pipeline design to minimize risk from a possible earthquake. The company says it followed proper channels, but Oleg Mitvol, deputy director for environmental inspections at the Natural Resources Ministry, told the press that the pipeline cut into a protected nature

reserve, prompting him to describe Sakhalin Energy as "a pure banana republic - colonizers in cork helmets."

The following year a controversy erupted over large piles of earth left along the pipeline, which Sakhalin Environment Watch says were never permitted and which led to the temporary revocation of construction licenses last September.

"Look, this is a huge, complex, frontier type of project," says Sakhalin Energy's Niven, explaining the slew of confrontations. "We were the first company ever to put an offshore production platform in here. These are new to Russia, so the Russians themselves have had to learn how to manage and approve them."

To be sure, Shell isn't the only culprit. Russia's own oil and timber companies have been pillaging the island for resources for more than a century, and Lisitsyn says, "There is a common perception that Gazprom will be much worse." Furthermore, it was the Kremlin, not Shell, that recently cut the island's take of oil taxes from 60% to just 5%. And Sakhalin Energy deserves credit for keeping the project afloat and providing employment through a period of unprecedented economic and political change in Russia.

But to a large extent the mood on Sakhalin Island comes down to perception, not fact. Says Oleg Yugai, deputy for economic policy and budget for the regional government: "This is all about the psychology of the people."

When Shell signed the Sakhalin production-sharing agreement in 1996, the oil company had the upper hand. The oil and gas reserves on the island had been identified, and there weren't any exploration risks, but Moscow didn't have the capital to get to them. Shell and its partners did. Details about the document are sketchy, and the company won't comment. But in effect, the agreement meant that the higher the cost of the project, the longer the Kremlin would have to wait to see any royalties.

Production-sharing agreements are common in the oil industry, but the Sakhalin contract broke new ground. "This one is particularly disadvantageous to the Russian party," Ian Rutledge, an economist with Sheffield Energy & Resources Information Services, wrote in a 2004 report. "SEIC has transferred most of the risks... to the Russian government."

At the time the deal was struck, though, says Sakhalin Energy CEO Ian Craig, Russia was too volatile an investment without the framework and the fiscal regime the agreement provided. "You can debate whether [the terms] are fair or not now," he says, pointing out that the $13 billion invested to date is all shareholder-funded. "But it's a debate about dividing up a share that simply would not exist, had we not set them up then."

Russia's patience ran out in 2005, when Sakhalin Energy announced that project costs had doubled. Much of the jump can be attributed to a 20%-a-year leap in the price of labor, rising costs of materials like the steel used for pipelines, and higher oil prices. "It cost me twice as much to fly from Moscow to Yuzhno as it did two years ago," Craig says. "We're living in a $60-a-barrel world, and that applies to everything."

But even if many of the extra costs can be rationalized, frustrated residents tend to focus on the ones that can't. Sakhalin Energy is said by contractors to be spending up to $15,000 a month to house the families of some staff. When one contractor's barge ignored storm warnings to leave port and broke apart, spilling 55,000 gallons of fuel, Madderom says the tab was about $60 million, just for the boat.

Gallery: Scenes from Sakhalin

And when Sakhalin Energy rerouted the underwater portion of its pipeline in response to international criticism about the threat to endangered western gray whales - environmentalists say the original route was planned without thorough review - the shift cost nearly $300 million. The company says that was the pricetag for complying with environmental demands. It also denies spending extravagantly.

Still, there are the small things - the $4 pencils and $500 space heaters a customs officer says she saw listed on a Sakhalin import form, the flaunting of money by expatriate staff in downtown nightclubs, the waxed and polished Land Cruiser fleet lined up in an island parking lot - that give Sakhaliners a feeling of watching a party in their living room to which they haven't been invited.

If Sakhaliners think spending is out of control, that could explain why prices in Yuzhno also seem divorced from reality. The town stretches just a few square miles, with a neat grid of unremarkable streets bookended by a 25-foot statue of Lenin and an imposing Victory Square. The city center is for the most part architectural remnants of the communist era, while the suburbs contain acres of new middle-class housing developments - a reflection of the oil industry's impact on Sakhalin's economy. One of these houses can cost nearly $1 million, while a one-bedroom apartment can rent for $3,000 a month, comparable to New York City prices. A five-minute taxi ride costs $12, and lunch at a casual Indian restaurant starts at about $40 per person.

"I've spent time in Moscow, Tokyo, and Hong Kong," says an oil-well engineer for services company Schlumberger, who paid a $70 cover charge to walk into Yuzhno's newest nightclub, Schastie Project, only to fork over another $19 for a whiskey. "Yuzhno-Sakhalinsk is the most expensive town I've worked in."

Whether Gazprom or Shell owns Sakhalin Energy, the culture is probably not going to change. For one thing, as an analyst pointed out, Gazprom "might be omnipotent, but they still don't make LNG." That means Shell and many of its highly paid employees will stay on to manage the project, and staff may even increase as Gazprom brings in shadow workers to watch and learn.

One thing is certain, though: The deal stinks for Royal Dutch Shell, whose top executives declined to comment for this article. Its reserves will take a big hit, a tough swallow for a company already having trouble replacing its in-ground assets. Whether renegotiating a contract with a gun to its head was the smartest move for Shell is an open question. But now that the terms are settled in Russia's favor, oil majors around the world can expect their playing fields to tilt too. ■

Exhibit 15

https://www.seattletimes.com/nation-world/ocean-salmon-seasons-off-southern-oregon-coast-in-jeopardy/
Nation & World

Ocean salmon seasons in jeopardy off southern Oregon

Originally published March 5, 2018
The Associated Press

MEDFORD, Ore. (AP) — Ongoing problems with Sacramento River salmon survival means there likely will be very little, if any, sport and commercial salmon fishing this summer off the Southern Oregon coast.

Preliminary stock assessments estimate only 229,400 Sacramento River fall chinook will be in the ocean, according to federal Pacific Fishery Management Council reports. That's 1,300 fewer than last year's small run, whose protection shut down sport and commercial chinook fishing off Southern Oregon.

Salmon managers heading into the Pacific Fishery Management Council's March 8-14 meeting said they think the council will be able to propose at least possible sport and commercial seasons with as little impact to Sacramento salmon stocks as possible.

Richard Heap of Brookings-Harbor, who is vice chairman of the PFMC's salmon advisory subpanel, remains hopeful despite the numbers. "I'm going up there with the possibility that we'll fish this year, unlike last year.

"We'll have to wait and see how it plays out."

The Pacific Fishery Management Council is expected to float three sport and commercial season options for public comment. Heap said he "wouldn't be surprised" if one of those options calls for a repeat of last year when the season failed to happen, The Medford Mail Tribune reported .

The Pacific Fishery Management Council will set its final season recommendations when it meets April 5-11 in Portland. The federal Department of Commerce has the final say in setting ocean-fishing seasons.

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Information from: Mail Tribune, http://www.mailtribune.com/

http://theworldlink.com/news/local/west-coast-senators-join-call-for-salmon-disaster-declaration/article_3690f87f-44b8-5f19-a385-7557776543b0.html

West Coast senators join call for salmon disaster declaration

SAPHARA HARRELL The Umpqua Post
Jun 13, 2017

OREGON COAST — Some Oregon and California U.S. senators are asking for a federal salmon fishery disaster declaration to support economic recovery in coastal communities in the two states after extensive commercial fishing closures due to declining salmon populations.

In April, the Pacific Fishery Management Council, a federal body that regulates commercial and sport fishing, made its 2017 salmon season recommendations. As a result, nearly half of the Oregon coast and a 130-mile section of the California coast — from Florence to Horse Mountain- is closed to commercial fishing.

In a letter written to Commerce Secretary Wilbur Ross Friday, Oregon Sens. Ron Wyden and Jeff Merkley and California Sens. Kamala Harris and Dianne Feinstein wrote that salmon catches have consistently declined over the last decade and that the disaster designation will provide a safety net to keep fishermen in business.

The senators' request follows one made by Oregon Gov. Kate Brown and California Gov. Jerry Brown, who called for a disaster declaration in a May 24 letter to Ross.

That letter stated Oregon commercial salmon fisheries are projected to make 63-percent less this year compared to the 2012-2016 average earnings of $7.3 million.

Commercial operations aren't the only ones that will be affected.

Recreational fishing will be closed from the Oregon and California border to just south of Eureka. Last year, the Oregon recreational Chinook salmon catch was expected to be 9,000, but fell short at 4,100.

Closures are also set to impact fish processors, fishing equipment retailers, marine repair businesses, charter boat operators, bait shops and motels.

Oregon has had four disaster declarations between 2006 and 2016. A disaster declaration in 2009 resulted in $100 million of disaster-relief aid given out by NOAA's Fisheries Service.

Michael Milstein with NOAA fisheries said the administration has known that this was going to be a difficult year for a while.

"We've known that it was going to be a lean year for salmon, because we know the ocean conditions have been not as productive," Milstein said.

He said the upwelling of deep colder water that provides the fish with nutrients has been minimal the last couple of years and that has a lot to do with salmon survival.

Milstein said the Klamath River area was closed because it's an area where a lot of fish get caught when they're returning from the ocean.

"It's a management area where we know a lot of those fish sustain a lot of the fishing pressure," he said.

To protect adult salmon returning to spawn, the California the Fish and Game Commission decided to close all in-river fishing on the Klamath-Trinity watershed from Aug. 15 through the end of the year.

California Department of Fish and Wildlife's Wade Sinnen said in an email Monday that this is the lowest projected fall Chinook abundance on record. The projected number of

fish is 54,200 compared to 142,200 last year. However, he said last year's estimate wasn't reflective of the actual outcome.

"The post-season estimate for last year was 68,438, which points out that the pre-season estimates are not always precise," Sinnen said in the email.

Knute Nemeth is a retired fisherman in Charleston.

He said some local fishermen have traveled as far as Newport to fish for salmon, but it's time-consuming and expensive. Couple that with the limit on the amount of fish that can be caught and Nemeth said it has cut back on the incentive to fish for salmon at all.

Now, most salmon fishing is out of Newport.

According to the letter written by the two governors, 74-percent of the Chinook salmon caught by the Oregon commercial fishery was in Newport.

Nemeth said fishermen in the area are focusing on other fish like cod and tuna instead. But there's not always a guarantee you'll catch anything, he adds.

"Fishing is a feast or famine type of a deal and there are people with pretty skinny stomachs right now," Nemeth said.

NOAA's Milstein echoed that sentiment.

"We've known that this is a tough year for everyone and certainly it's tough for the fleet to make it through a year like this," Milstein said.

Reach Saphara Harrell at (541) 269-1222 ext. 239 or by email at saphara.harrell@theworldlink.com

Exhibit 16

Oregon Shorebird Festival
Bird List
Compiled from all field trips
August 26-28, 2011

Loons and Grebes
Red-throated Loon
Pacific Loon
Pied-billed Grebe
Western Grebe
Red-necked Grebe

Pelagic and Herons
Black-footed Albatross
South Polar Skua
Northern Fulmar
Pink-footed Shearwater
Sooty Shearwater
Buller's Shearwater
Fork-tailed Storm-Petrel
Brown Pelican
Brandt's Cormorant
Double-crested Cormorant
Pelagic Cormorant
Great Blue Heron
Great Egret
Snowy Egret
Black-crowned Night Heron

Waterfowl
Canada Goose
Mallard
Northern Pintail
Cinnamon Teal
American Wigeon
Gadwall
Ring-necked Duck
Harlequin Duck
Surf Scoter
Hooded Merganser
Bufflehead
Ruddy Duck

Birds of Prey
Turkey Vulture
Osprey
Northern Harrier
Red-shouldered Hawk
White-tailed Kite
Sharp-shinned Hawk
Cooper's Hawk
Bald Eagle
Peregrine Falcon

Rails & Bitterns
American Bittern
American Coot
Sora

Marsh and Shorebirds
Virginia Rail
Black-bellied Plover
Pacific Golden-Plover
Semipalmated Plover
Snowy Plover
Killdeer
Black Oystercatcher
Spotted Sandpiper
Baird's Sandpiper
Western Sandpiper
Least Sandpiper
Dowitcher Sp.
Greater Yellowlegs
Lesser Yellowlegs
Whimbrel
Marbled Godwit
Wandering Tattler
Black Turnstone
Surfbird
Sanderling
Wilson's Snipe
Red-necked Phalarope
Red Phalarope
*Red-necked Stint

Gulls, Terns & Alcids
Parasitic Jaeger
Long-tailed Jaeger
California Gull
Glaucous-winged Gull
Heermann's Gull
Sabine's Gull
Western Gull
Ring-billed Gull
Caspian Tern
Arctic Tern
Common Murre
Pigeon Guillemot
Marbled Murrelet
Cassin's Auklet
Rhinoceros Auklet
Tufted Puffin

Pigeons and Doves
Mourning Dove
Band-tailed Pigeon
Rock Pigeon
Eurasian Collared-dove

Owls
Great Horned Owl

Hummingbirds
Anna's Hummingbird
Rufous Hummingbird

Kingfisher
Belted Kingfisher

Woodpeckers
Downy Woodpecker
Hairy Woodpecker
Northern Flicker
Pileated Woodpecker

Flycatchers
Black Phoebe

Corvids
Steller's Jay
American Crow

Swallows
Purple Martin
Barn Swallow

Chickadees & Bushtits
Black-capped Chickadee
Chestnut-backed Chickadee
Bushtit

Wrens
Bewick's Wren
Marsh Wren

Kinglets
Golden-crowned Kinglet

Bluebirds & Thrushes
American Robin
Swainson's Thrush

Babblers
Wrentit

Starlings
European Starling

Waxwings
Cedar Waxwing

Warblers
Common Yellowthroat
Wilson's Warbler

Tanagers
Western Tanager

Sparrows
Spotted Towhee
Savannah Sparrow
Song Sparrow
White-crowned Sparrow

Blackbirds
Red-winged Blackbird
Brewer's Blackbird
Brown-headed Cowbird

Finches
House Finch
American Goldfinch
Lesser Goldfinch
House Sparrow

Exhibit 17

http://www.cbc.ca/news/canada/new-brunswick/7-500-songbirds-killed-at-canaport-gas-plant-in-saint-john-1.1857615

7,500 songbirds killed at Canaport gas plant in Saint John

Migrating birds, some possible endangered species, flew into gas flare

CBC News Posted: Sep 17, 2013 1:24 PM AT ; Last Updated: Sep 18, 2013 7:48 AM AT

About 7,500 songbirds, possibly including some endangered species, were killed while flying over a gas plant in Saint John late last week, officials have confirmed.

It appears the migrating birds flew into the gas flare at Canaport LNG between Friday night and Saturday morning, said Fraser Forsythe, the company's health, safety, security and environmental manager.

The birds were drawn to the flame like moths, an extremely unusual event, according to Don McAlpine, the head of zoology at the New Brunswick Museum.

"They would circle in around that and of course with a large flame like that and high temperatures, they wouldn't need to get terribly close to become singed or burned."

The weather conditions were foggy and overcast at the time, which may have contributed to the incident, said McAlpine.

Not much is known about how such birds navigate at night, but officials believe they are attracted to light, particularly red or flashing lights, he said.

The flare tower at the Canaport liquefied natural gas receiving and regasification terminal is about 30 metres tall and the size of the flame varies, depending on weather conditions. It is typically higher amid low-pressure systems.

Flaring is part of the standard operation at the east side plant, located on Red Head Road, and is designed as a safety release system. It is used to maintain normal operating pressure by burning off small amounts of excess natural gas.

An estimated 6,800 birds were killed, while several hundred more were injured and had to be put down. "There were too many birds to count," said McAlpine.

"A crude estimate at this stage suggests about 7,500 birds died," he said. "There's certainly more than 5,000 and probably less than 10,000 birds affected."

McAlpine is still examining several hundred of the dead birds, which are being stored in a freezer, to try to identify their species.

There were a large number of red-eyed vireos, several types of warblers, including parula, black-and-white, magnolias and redstarts, as well as a few thrushes and rose-breasted grosbeaks, he said.

It's possible there may have also been some endangered species, such as the olive-sided flycatcher and Canada warbler, which are on the federal government's species at risk registry, said McAlpine.

"There are some flycatchers involved, but I haven't identified them yet. There's very few. Likewise with the Canada warbler, I haven't seen any yet, but it doesn't mean they're not there."

Many of the birds were badly burned, but some appeared completely unscathed, said McAlpine. He suspects they became disoriented and hit the tower or the ground, but several have been sent to the Atlantic Veterinary College in Prince Edward Island for necropsies to determine if there were any underlying conditions or external factors that may have contributed to the bird deaths.

The affected birds, which are mostly insect-eating, spend their summers in New Brunswick nesting and breeding before heading to Mexico, Central and South America for the winter, he said.

Staff 'reduced to tears'

Canaport LNG employees were devastated when they discovered the dead and injured birds piled up around the base of the plant's flame on Saturday morning, said Forsythe.

"We've got people that are pretty well reduced to tears here," he said.

"It has really struck home to our employees here and they've expressed a lot of remorse to me that this would happen. It's a very unexpected event," Forsythe said, adding it was the first incident of this type at the plant.

Cleanup efforts continued into Tuesday, said Forsythe.

Staff alerted the provincial Department of Environment, the Canadian Wildlife Service and the Atlantic Wildlife Institute in Sackville about the incident immediately, he said.

Barry Rothfuss, executive director of the Atlantic Wildlife Institute, said they are still busy dealing with the "carnage."

But they hope to be able to determine the cause and make recommendations to prevent a similar occurrence. "That's going to take some time," he said.

"I don't think it could have been necessarily perceived and accidents like this do happen and so it's a learning experience for all of us," Rothfuss added.

McAlpine said there is not a lot of information about bird mortalities involving flare towers.

"There's been a recognized need recently for further monitoring of this kind of thing," he said.

Still, McAlpine, said it's important to put the incident in perspective, noting an estimated one billion birds in the U.S. are killed every year from human causes.

"Although this is certainly a tragic event and it's shocking to see 7,500 dead birds, it’s a drop in the bucket in terms of the number of birds that are killed from human actions every year," said McAlpine.

The leading cause of death is birds flying into tall office buildings, while house cats rank third, he said.

Canaport LNG, owned by Repsol and Irving Oil Ltd., lists bird monitoring as among its environmental and reporting activities on its website.

Migratory birds have been considered in previous environmental impact assessments at the terminal.

In March 2012, Canaport LNG announced plans for a $43-million upgrade to make the facility more efficient and cut down on flaring.

Exhibit 18

The Irish Times
http://www.irishtimes.com/news/ireland/irish-news/gas-flaring-at-corrib-plant-frightening-says-resident-1.2482377

Gas flaring at Corrib plant 'frightening', says resident

Clip from Shell E&P Ireland showing flaring removed from YouTube on Friday night
Fri, Jan 1, 2016
By Lorna Siggins

Eyewitness footage from the Corrib gas field in Mayo captures flames lighting up the night sky on New Years Eve. Video: Tony Bourke

Residents living close to the Corrib gas plant in north Mayo have expressed alarm over the intensity of gas flaring during New Year's Eve.

Shell E&P Ireland acknowledged on Friday evening that the flaring level was "exceptional".

"As the start up process continues ,there may be further intermittent flaring activity in the coming days," it said.

"This will not be at the same level and we will take all measures to minimise any flaring occurrences,"it said.

Gas flaring at Corrib terminal filmed on December 31st, 2015

The company had advised residents on Wednesday that flaring would take place "intermittently" as gas was brought from the field 83 km offshore to land.

Valves controlling the wells at sea were opened after final operating consent for the project was issued by Minister for Energy Alex White on December 29th.

Flaring or burning off of flammable gas is activated if there is a pressure rise within the plant, or a confirmed fire or gas release.

YouTube clip

A YouTube film with John Egan of Shell E&P Ireland showing the flaring some minutes before it reached its peak, was removed from Youtube on Friday night.

In the video clip, Mr Egan was filmed against the backdrop of the flaring stack. He said it was 8pm on New Year's Eve at Ballinaboy, and described the arrival of first gas as an "extraordinary sight" .

He said it was a "fantastic way to spend New Year's Eve".

The Corrib gas plant's emissions levels are governed by an integrated pollution prevention and control licence awarded to the project last October by the Environmental Protection Agency (EPA).

At the EPA oral hearing into its original IPPC licence, Corrib's deputy operations manager said "a small amount of gas will be flared during a start-up until the export gas composition meets the required Bord Gais specification".

He said volumes of gas flared and vented or released into the atmosphere are "kept as low as possible to minimise environmental impact". Flaring worldwide is a significant contributor to greenhouse gas emissions.

Residents in the areas around Ballinaboy have witnessed flaring since November 2014, during testing of the system with gas from the existing network.

'Nothing normal'

However, Aughoose farmer Gerry Bourke, who lives about a mile from the Ballinaboy plant, said that there was "nothing normal" about Thursday night's flaring, and said it was far more intensive and extensive than previously witnessed.

He said it "lit up the sky" and was accompanied by a "low loud rumble like a supersonic boom".

Diane Taylor, who lives in Glengad, said she would not normally have had a view of the test flaring at the Ballinaboy stack from her home, but witnessed the New Year's Eve incident which she described as "frightening".

“The sky over Broadhaven Bay was pure orange, and it seemed as if thick smoke was billowing over the hill behind me,” she said. “It looked like the hill over by Pollathomas was on fire.

“It was about 8.15pm, and I opened the door and could smell smoke which would burn your nose, so I came right back inside,” Ms Taylor said. She estimated it lasted for about a half hour to 45 minutes.

Ms Taylor and neighbours subscribe to a text alert system, which Shell has invited residents to register for.

The company issued an alert on Wednesday which stated that “the valves which control the well out at the Corrib field have now been opened up” and “as part of normal start-up activities, please expect some flaring over the next 48 hours”.

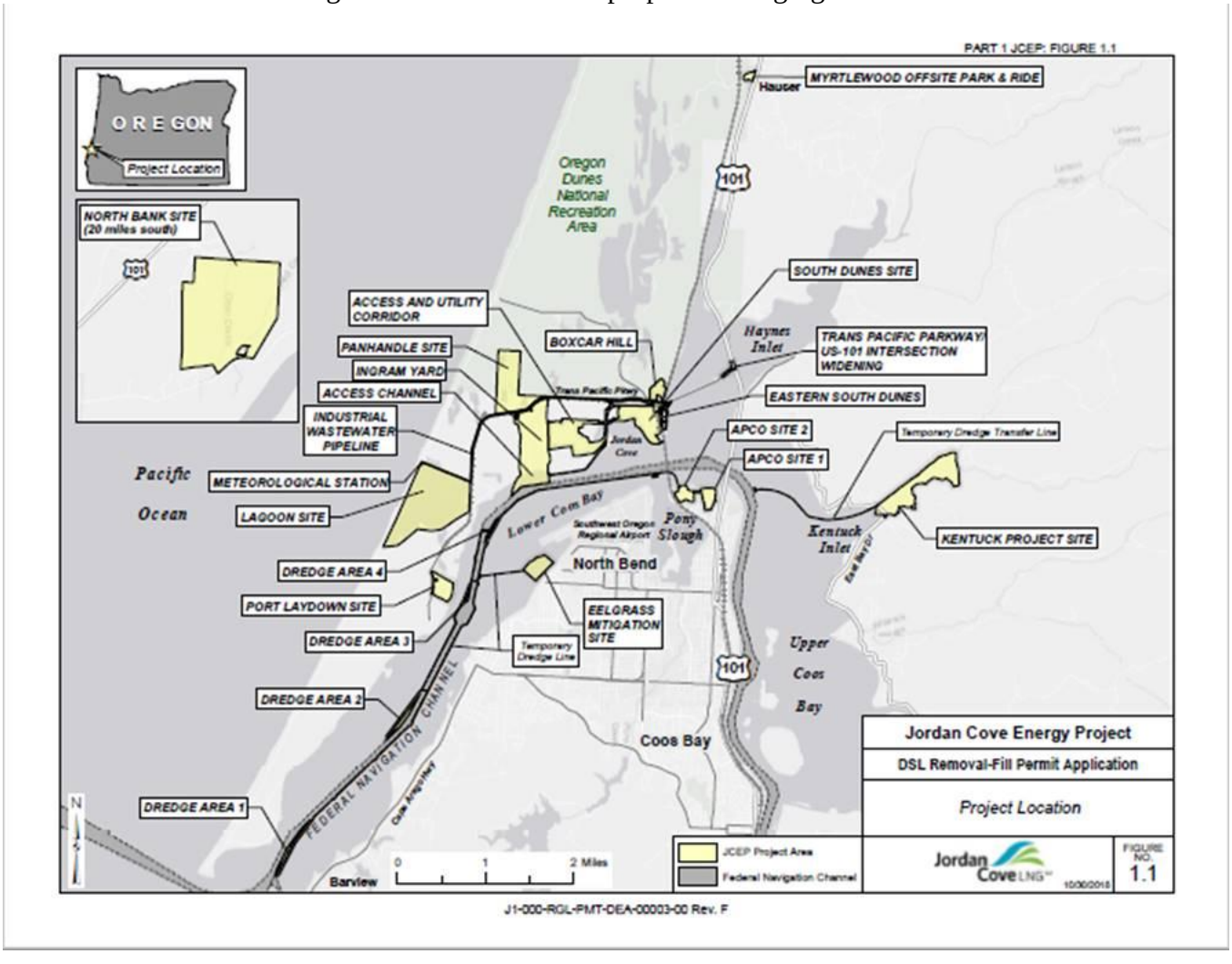
Mr Bourke said he had also received this text, but it gave no indication of the extent.

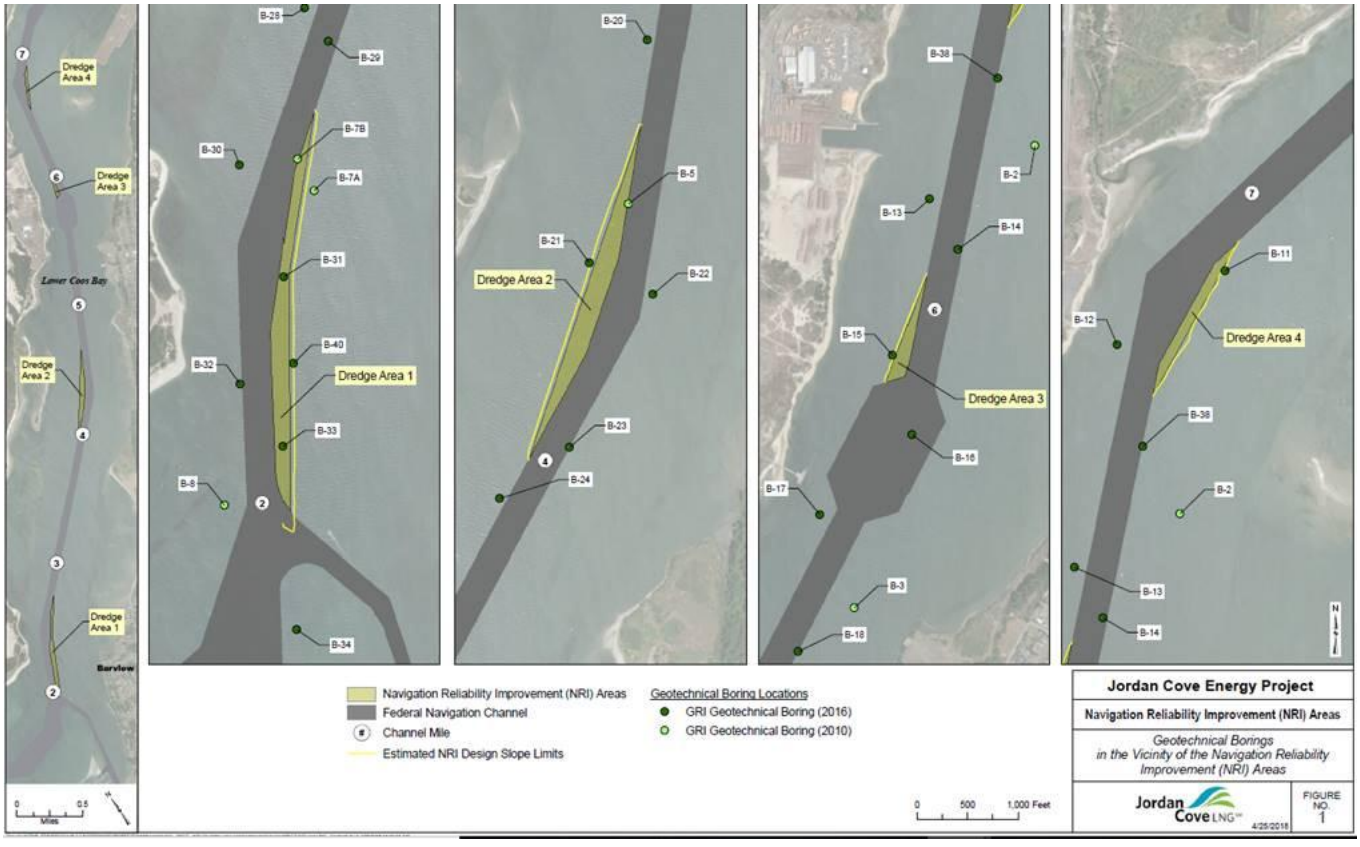
“If this is normal, as Shell is saying, I don’t want to live like this,” he said.

Flaring continued on Friday. The EPA was unavailable for comment.

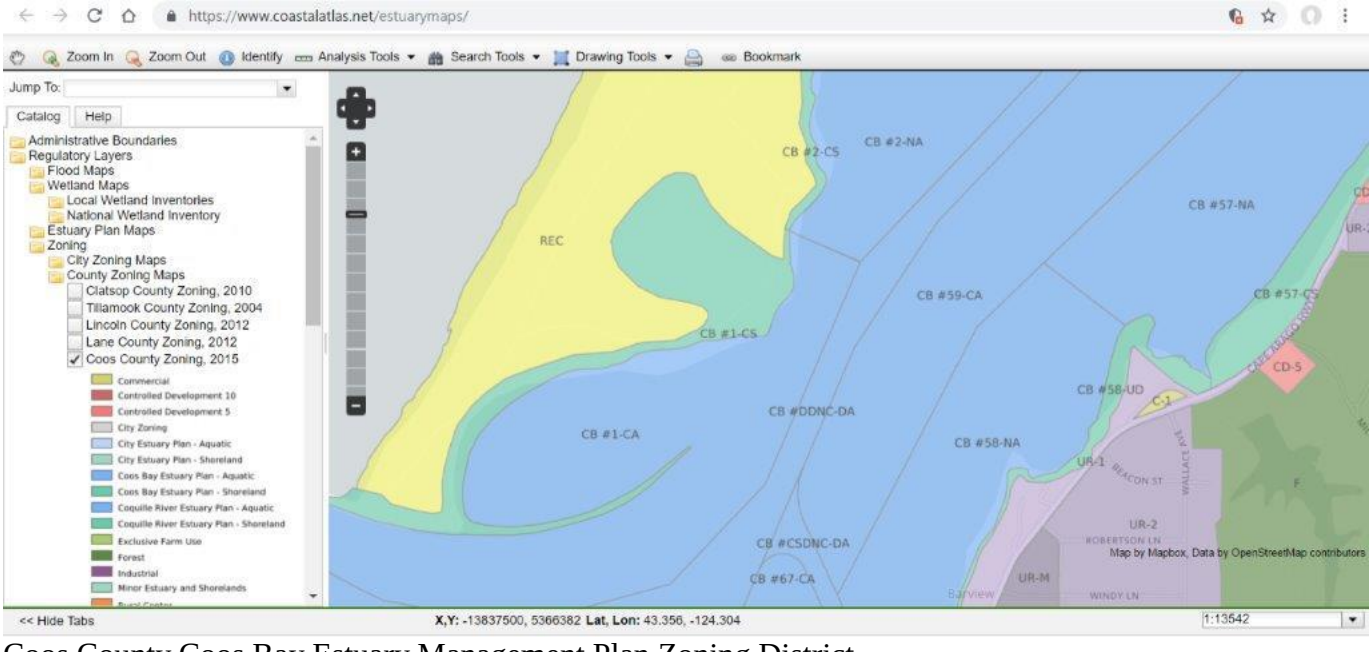
Exhibit 19

Zoning Information for JCEP proposed dredging sites




Dredge Area 4
Dredge Area 3
Lower Coos Bay
Dredge Area 2
Dredge Area 1
Barview
B-28
B-29
B-30
B-7B
B-7A
B-31
B-40
B-32
B-33
B-8
B-34
B-20
B-5
B-21
B-22
B-23
B-24
B-38
B-2
B-13
B-14
B-15
B-16
B-17
B-3
B-18
B-11
B-12
B-38
B-2
B-13
B-14
Navigation Reliability Improvement (NRI) Areas
Federal Navigation Channel
Channel Mile
Estimated NRI Design Slope Limits
Geotechnical Boring Locations
GRI Geotechnical Boring (2016)
GRI Geotechnical Boring (2010)
0 500 1,000 Feet
0 0.5 Miles
Jordan Cove Energy Project
Navigation Reliability Improvement (NRI) Areas
Geotechnical Borings
in the Vicinity of the Navigation Reliability
Improvement (NRI) Areas
Jordan Cove LNG
4/25/2018
FIGURE NO. 1

JCEP Dredge area #1 zoned **59-CA** (Conservation Aquatic)



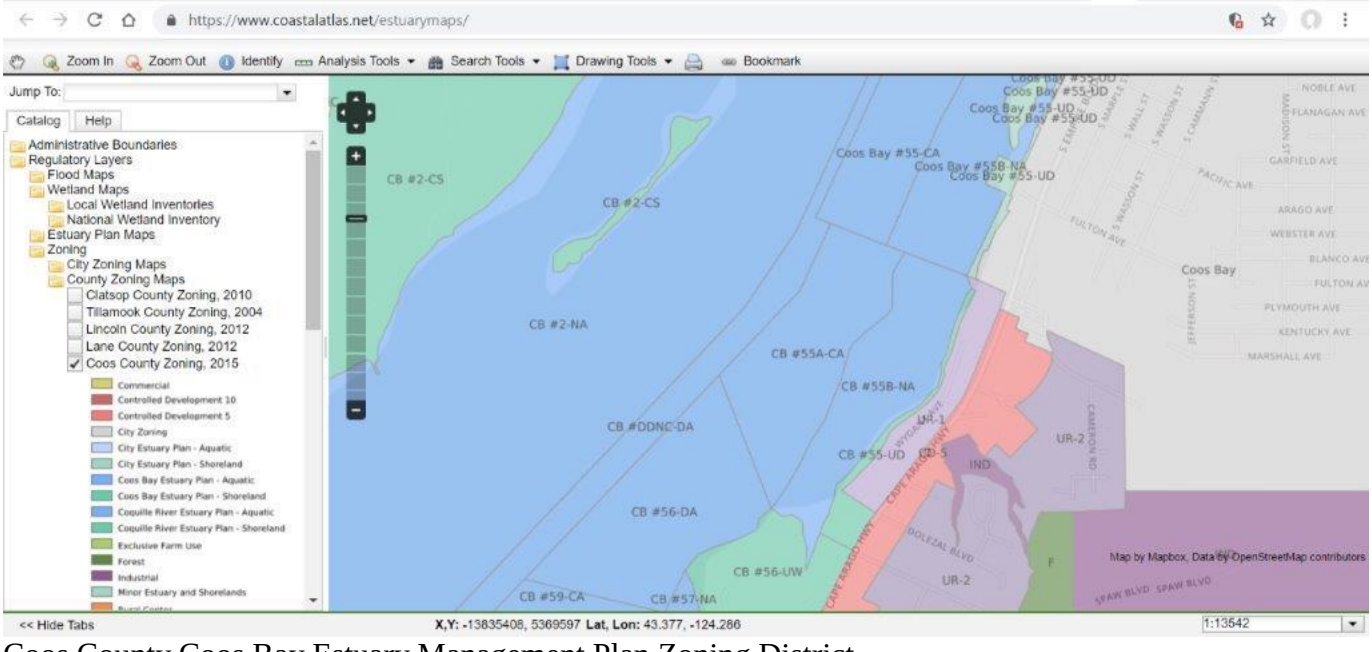
Coos County Coos Bay Estuary Management Plan Zoning District
59-CA

2. Dredging
   a. New… N [Not allowed]
   b. Maintenance dredging of existing facilities… ACU-S, G
   c. To repair dikes and tidegates… N/A

   GENERAL CONDITION [G] (the following condition applies to all uses and activities):
   1. Inventoried resources requiring mandatory protection in this unit are subject to Policies #17 and #18.

   ACU-S
   2b. This activity is only allowed subject to finding that adverse impacts have been minimized (see Policy #5); and to Policy #8 requiring mitigation.

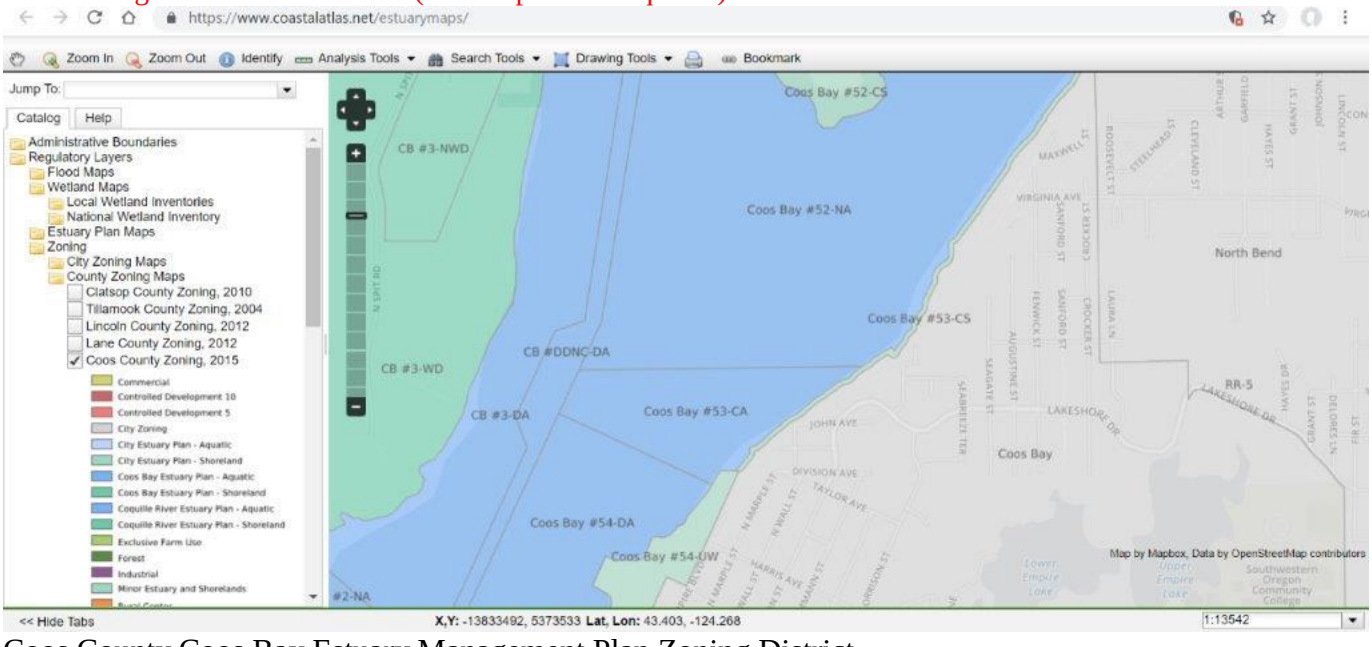
JCEP Dredge area #2 zoned **2-NA** (Natural Aquatic)



Coos County Coos Bay Estuary Management Plan Zoning District
2-NA

2. Dredging
    a. New… N [Not allowed]
    b. Maintenance dredging of existing facilities… N
    c. To repair dikes and tidegates… N/A

JCEP Dredge area #3 zoned **3-DA** (Developmental Aquatic)



Coos County Coos Bay Estuary Management Plan Zoning District
3-DA

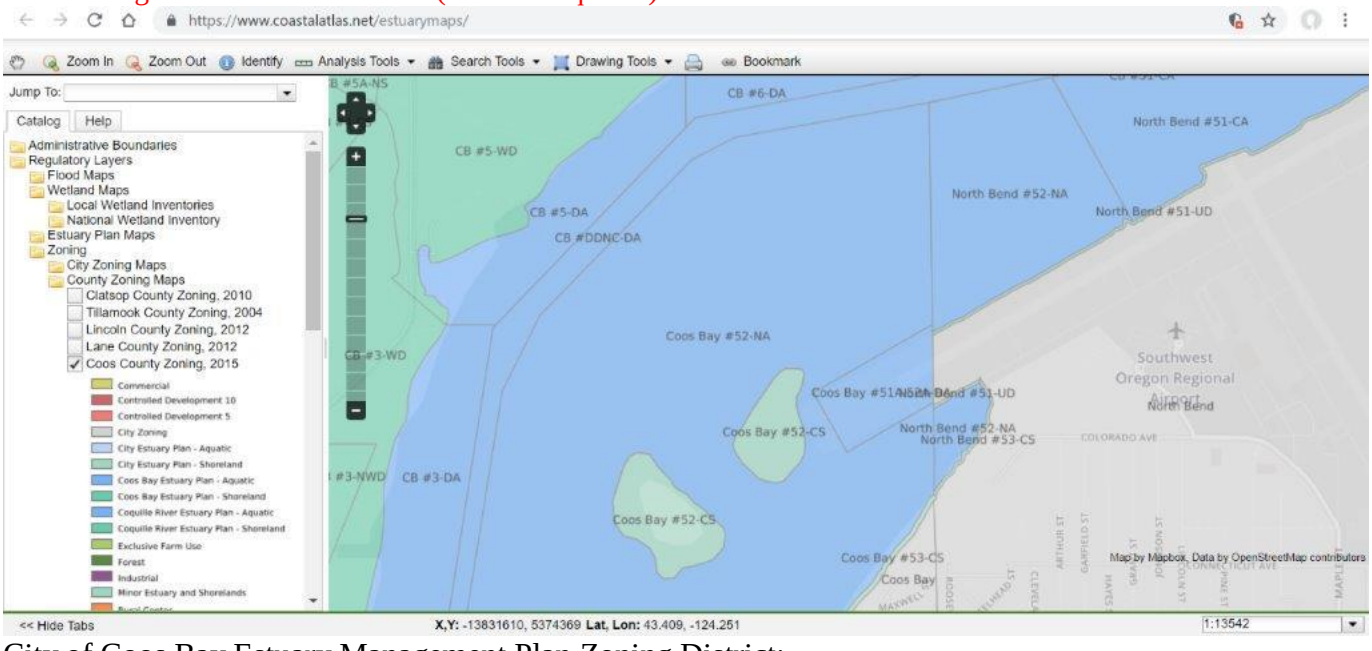
2. Dredging

a. New… ACU-S, G [Allowed subject to Administrative Conditional Use – Special Conditions and General Conditions]
b. Maintenance dredging of existing facilities… ACU-S, G
c. To repair dikes and tidegates… N/A

GENERAL CONDITION [G] (the following condition applies to all uses and activities):
1. Inventoried resources requiring mandatory protection in this unit are subject to Policies #17 and #18.

ACU-S
2a.,2b.,3.,4.,5b.,5d. These activities are only allowed subject to finding that adverse impacts have been minimized (see Policy #5); and to Policy #8 requiring mitigation.

JCEP Dredge area #4 zoned **52-NA** (Natural Aquatic)

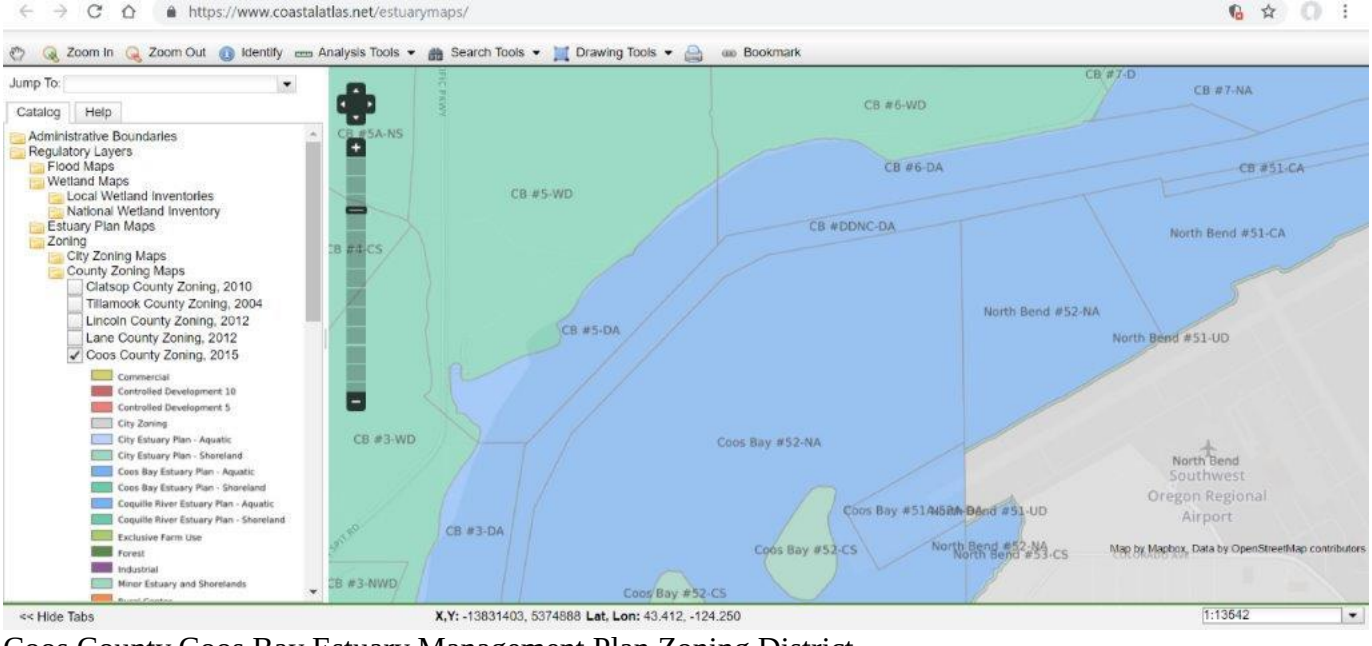


City of Coos Bay Estuary Management Plan Zoning District:
52-NA

2. Dredging
   a. New… *
   b. Maintenance Dredging of Existing Facilities… N
   c. To Repair Dikes and Tidegates… N/A

   Activity
   2a New dredging shall be allowed only to dredge a small channel on the north side of the proposed airport fill as necessary to maintain tidal currents. In addition, this activity is only allowed subject to a finding that adverse impacts have been minimized (see Policy #5).

JCEP Dredging area for LNG Marine Terminal zoned 6-DA (Developmental Aquatic)



Coos County Coos Bay Estuary Management Plan Zoning District
6-DA (Zoning district for JCEP Marine Terminal)

2. Dredging

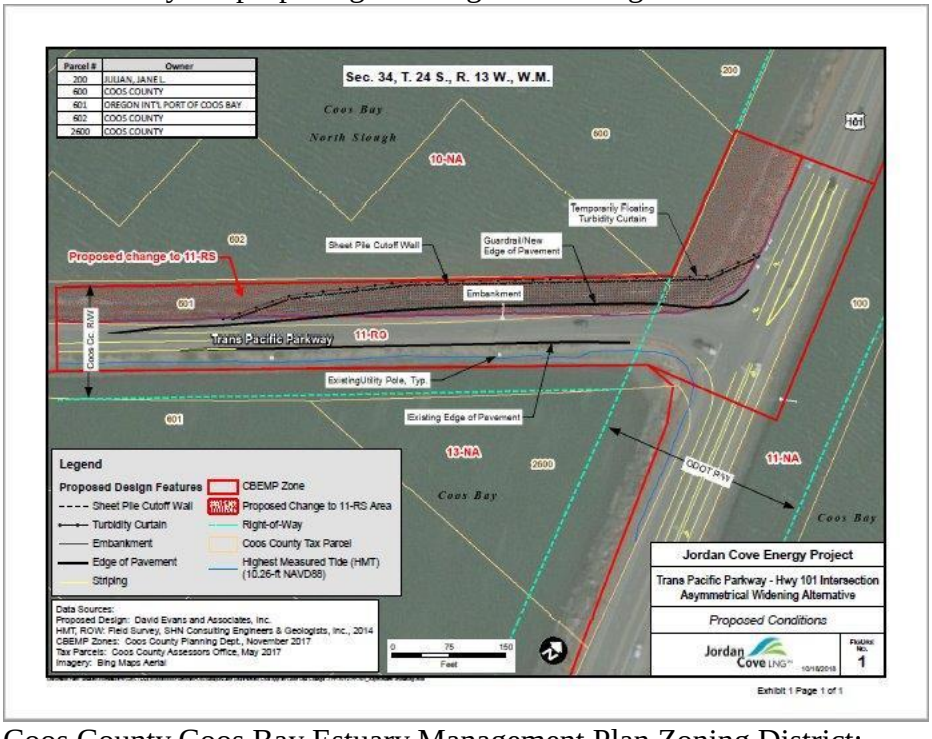
a. New… ACU-S, G [Allowed subject to Administrative Conditional Use – Special Conditions and General Conditions]
b. Maintenance dredging of existing facilities… ACU-S, G
c. to repair dikes and tidegates… N

3. Dredged material disposal… N [Not allowed]

GENERAL CONDITION (the following condition applies to all uses and activities): 1. Inventoried resources requiring mandatory protection in this unit are subject to Policies #17 and #18.

2a.,2b.,5b.,5d. These activities are only allowed subject to finding that adverse impacts have been minimized (see Policy #5); and to Policy #8 requiring mitigation.

Transpacific Parkway Alignment for "Fill" in zoning district 10-NA (Natural Aquatic)
A Hearing Officer has ALREADY determined this was not an allowed use in this zoning district. They are proposing to change the Zoning District to 11-RS



Coos County Coos Bay Estuary Management Plan Zoning District:
10-NA

2. Dredging
    a. New… N [Not Allowed]
    b. Maintenance dredging of existing facilities… N
    c. To repair dikes and tidegates… N
3. Dredged material disposal… N [Not Allowed]
4. Fill… N [Not Allowed]

Coos County CBEMP Matrix codes – What they mean

P - means the use or activity is permitted outright subject only to the management objective.

S - indicates that the use or activity may be allowed subject to "Special Conditions" presented following the use and activity table. A few of the special conditions are non-discretionary, but most require local judgment and discretion and the development of findings to support any final decision about whether or not to allow the use or activity.

Some uses and activities may be identified as being subject to a special condition that is not discretionary or may not apply to a site-specific request. If such is the situation, the Planning Director shall make such determination and if "General Conditions" are not applicable regard the use or activity as permitted outright. Such determination shall consist of a statement of facts supporting the decision.

G - indicates the use or activity may be allowed subject to "General Conditions" presented following the use and activities table. "General Conditions" provide a convenient cross-reference to applicable Baywide Policies which may further limit or condition the uses and activities. A few "General Conditions" may not apply to a site specific request. If such is the situation, the Planning Director shall make such determination and if "Special Conditions" are not applicable, regard the use or activity as permitted outright. Such determination shall consist of a statement of facts supporting the decision.

ACU - means the use or activity may be permitted as provided above or subject to "Special" or "General" conditions pursuant to an Administrative Conditional Use.

HB - means the use or activity may be permitted except as provided above or subject to "Special" or General" conditions pursuant to a Hearings Body Conditional Use.

N - means the use or activity is prohibited.

N/A - means Not Applicable; the use or activity is not realistic considering the physical character of the district and therefore does not apply

---

City of Coos Bay CBEMP Matrix Codes – What they mean (This would be for zoning district 52-NA)

3.8 USES AND ACTIVITIES MATRIX

A detailed "Uses and Activities Matrix" follows the "Management Objective" statement presented
for each respective aquatic and shoreland segment in Section 5 of this Plan. The matrix describes specific uses and activities deemed appropriate and inappropriate for each segment. To this end, the matrix further refines the "Management Objective" and Management Classification" for each segment by stipulating exactly what will and will not be allowed with each respective segment.

As policy, use and activity matrix requirements for each segment are subordinate to the "Management Objective" for the respective segments in that allowed uses and activities must be consistent with respective segments' "Management Objective" statements. (Which must in turn be consistent with Bay-wide Policies set forth in Section 3.3, above).

Interim use and activities are set forth for a few aquatic and shorelands segments. These allow temporary actions that do not preclude the ultimate use of the segment for a higher priority action - such as use as a dredged material disposal site or fulfilling mitigation/restoration projects.

Symbols denote whether or not the specific use or activity listed in the matrix is allowed, may be allowed subject to standards or special conditions or prohibited in the specific segment. The following symbols are pertinent:

"A" means the use or activity is allowed as of right, subject only to Bay-wide Policies and Management Objectives.

"*****" indicates that the use or activity may be allowed subject to "Special Conditions" presented following the use and activity matrix. A few of the special conditions are non-discretionary, but most require local judgment and discretion and that development of findings to support any final decision about whether or not to allow the use or activity.

"N" means the use or activity is prohibited.

"N/A" means Not Applicable; The use or activity is not realistic considering the physical character of the segment and therefore does not apply.

In addition, "General Conditions" provide a convenient cross-reference to applicable Bay-Wide Policies which may further limit or condition allowed uses and activities in Shoreland areas.

Implementing ordinance measures are expected to further refine the general uses and activities presented in the matrices. These refinements are encouraged but must be consistent with the general matrix categories presented in the Plan.

Exhibit 20

PERKINSCOIE

1120 NW Couch Street
10th Floor
Portland, OR 97209-4128

T +1.503.727.2000
F +1.503.727.2222
PerkinsCoie.com

November 2, 2018

Seth J. King
sking@perkinscoie.com
D. +1.503.727.2024
F. +1.503.346.2024

VIA OVERNIGHT DELIVERY

Jill Rolfe, Director
Coos County Planning Department
225 N Adams St
Coquille, OR 97423

Re: Concurrent Land Use Applications for Intersection Improvements
TransPacific Parkway at U.S. Highway 101
County File Nos. _____

Dear Jill:

This office represents Jordan Cove Energy Project L.P. ("JCEP"). With this letter, please accept JCEP's concurrent land use applications to complete required improvements at the intersection of TransPacific Parkway at U.S. Highway 101. In support of these applications, enclosed please find the original and two copies of the following:

- Completed and signed Coos County Land Use Application, Amendment/Rezone Application, Plan/Ordinance Amendment Application, and Compliance Determination Application
- Check payable to "Coos County" for the application fees ($5,355.00)
- Narrative explaining the proposal and how it complies with applicable approval criteria, with the following exhibits:
    - Exhibit 1 - Location map identifying ownership, rezone area, and proposed improvements
    - Exhibit 2 - August 2, 2012 Letter from Oregon Department of Transportation requiring intersection improvements
    - Exhibit 3 - Consent to filing of application by Coos County and International Port of Coos Bay

- Exhibit 4 - Detailed project plans
- Exhibit 5 - October 22, 2018 memorandum from David Evans and Associates, Inc. re: Environmental Information for Goal 16 Exception
- Exhibit 6 - North Bay Urban Renewal Plan
- Exhibit 7 - October 22, 2018 memorandum from David Evans and Associates, Inc. re: Traffic Alternatives
- Exhibit 8 - October 22, 2018 memorandum from David Evans and Associates, Inc. re: Widening Alternatives

We are also sending an electronic copy of these materials to the County. We are hopeful that, upon receipt of these materials, the County will deem the applications complete and will process them for review as soon as possible.

I am JCEP's representative in this matter. Please copy me on all correspondence, notices, staff reports, and decisions in this matter.

Finally, JCEP also withdraws its pending applications for a use determination and administrative conditional use permit for these improvements under consideration in County File No. ACU-15-21.

If you have any questions or need any additional information, do not hesitate to contact me. We look forward to working with the County toward approval of this request. Thank you for your courtesies in this matter.

Very truly yours,

Seth J. King

Encls.
cc: Steve Pfeiffer (via email) (w/encls.)
Client (via email) (w/encls.)

Coos County Planning Department
Land Use Application

Official Use Only
FEE: _____
Receipt No. _____
Check No./Cash _____
Date _____
Received By _____
File No. _____

Please place a check mark on the appropriate type of review that has been requested.

☒ Administrative Review ☐ Hearings Body Review

☐ Final Development Plan (BDR) ☐ Variance

An **incomplete** application **will not** be processed. Applicant is responsible for completing the form and addressing all criteria. Attach additional sheets to answer questions if needed. Please indicated not applicable on any portion of the application that does not apply to your request.

A. Applicant:

Name: Jordan Cove Energy Project L.P. Telephone: _____
Address: Attn: Meagan Masten, 111 SW 5th Avenue, Suite 1100
City: Portland State: OR Zip Code: 97204

B. Owner:

Name: Multiple - see consents Telephone: _____
Address: _____
City: _____ State: _____ Zip Code: _____

C. As applicant, I am (check one): Please provide documentation.

☐ The owner of the property (shown on deed of record);

☐ The purchaser of the property under a duly executed written contract who has the written consent of the vendor to make such application (consent form attached).

☐ A lessee in possession of the property who has written consent of the owner to make such application (consent form attached).

☒ The agent of any of the foregoing who states on the application that he/she is the duly authorized agent and who submits evidence of being duly authorized in writing by his principal (consent form attached).

D. Description of Property:

Township 24S Range 13W Section 34 Tax Lot 601

Tax Account _____ Lot Size _____ Zoning District 11-RS

E. Information (please check off as you complete)

- ☒ 1. Project Proposal. Attach description if needed. _____
- ☒ 2. A detailed parcel map of the subject property illustrating the size and location of existing and proposed uses, structures and roads on an 8½" x 11" paper to scale. Applicable distances must be noted on the parcel map along with slopes. (See example plot map)Covenants or deed restrictions on the property, if unknown contact title company.
- ☒ 3. Existing Use TransPacific Parkway/Estuary
- ☐ 4. Site Address N/A
- ☐ 5. Access Road N/A
- ☐ 6. Is the Property on Farm/Forest Tax Deferral No
- ☒ 7. Current Land Use (timber, farming, residential, etc.) Road/Estuary
- ☐ 8. Major Topography Features (streams, ditches, slopes, etc.) _____
- ☐ 9. List all lots or parcels that the current owner owns, co-owns or is purchasing which have a common boundary with the subject property on an assessment map.
- ☐ 10. Identify any homes or development that exists on properties identified in #9.
- ☐ 11. A copy of the current deed of record.

F. Proposed use and Justification

Please attach an explanation of the requested proposed use and **findings (or reasons)** regarding how your application and proposed use comply with the following the Coos County Zoning and Land Development Ordinance (LDO). Pursuant to the LDO, this application may be approved only if it is found to comply with the applicable criteria for the proposed use. Staff will provide you with the criteria; however, staff cannot provide you with any legal information concerning the adequacy of the submitted findings, there is no guarantee of approval and the burden rests on the applicant. (You may request examples of a finding)

☒ **List of Applicable Criteria and Justification:**

See narrative.

G. **Authorization:**

All areas must be initialed by all applicant(s) prior to the Planning Department accepting any application unless the statement is not applicable. If one of the statements, below is not applicable to your request indicated by writing N/A.

I hereby attest that I am authorized to make the application for a conditional use and the statements within this application are true and correct to the best of my knowledge and belief. I affirm that this is a legally created tract, lot or parcel of land. I understand that I have the right to an attorney for verification as to the creation of the subject property. I understand that any action authorized by Coos County may be revoked if it is determined that the action was issued based upon false statements or misrepresentation.

ORS 215.416 Permit application; fees; consolidated procedures; hearings; notice; approval criteria; decision without hearing. (1) When required or authorized by the ordinances, rules and regulations of a county, an owner of land may apply in writing to such persons as the governing body designates, for a permit, in the manner prescribed by the governing body. The governing body shall establish fees charged for processing permits at an amount no more than the actual or average cost of providing that service. The Coos County Board of Commissioners adopt a schedule of fees which reflect the average review cost of processing and set-forth that the Planning Department shall charge the actual cost of processing an application. Therefore, upon completion of review of your submitted application/permit a cost evaluation will be done and any balance owed will be billed to the applicant(s) and is due at that time. By signing this form you acknowledge that you are responsible to pay any debt caused by the processing of this application. Furthermore, the Coos County Planning Department reserves the right to determine the appropriate amount of time required to thoroughly complete any type of request and, by signing this page as the applicant and/or owner of the subject property, you agree to pay the amount owed as a result of this review. If the amount is not paid within 30 days of the invoice, or other arrangements have not been made, the Planning Department may choose to revoke this permit or send this debt to a collection agency at your expense.

I understand it is the function of the planning office to impartially review my application and to address all issues affecting it regardless of whether the issues promote or hinder the approval of my application. In the event a public hearing is required to consider my application, I agree I bear the burden of proof. I understand that approval is not guaranteed and the applicant(s) bear the burden of proof to demonstrate compliance with the applicable review criteria.

As applicant(s) I/we acknowledge that is in my/our desire to submit this application and staff has not encouraged or discouraged the submittal of this application.

Natalie Eades

Applicant(s) Original Signature

Applicant(s) Original Signature

Natalie Eades

Print Name

Print Name

Coos County Planning Department
Coos County Courthouse Annex, Coquille, Oregon 97423
Mailing Address: 250 N. Baxter, Coos County Courthouse, Coquille, OR 97423
Physical Address: 225 N. Adams, Coquille, Oregon
(541) 396-7770
FAX (541) 396-1022 / TDD (800) 735-2900
planning@co.coos.or.us

Official Use Only
FEE:
Receipt No.
Check No./Cash
Date
Received By
File No.

AMENDMENT/REZONE APPLICATION
PLEASE SUBMIT 2 COMPLETE UNBOUND COPIES OF THIS APPLICATION OR 1 ELECTRONIC AND ONE UNBOUND COPY

The following questions are to be completed in full. An application **will not** be accepted for an Amendment/Rezone without this information. The applicant should contact the Planning Department prior to filing, in order to determine a valid basis for the request.

The Board of Commissioners and Hearings Body will use these answers in their analysis of the merits of the request.

PLEASE PRINT OR TYPE:

A. APPLICANT:

Name: Jordan Cove Energy Project L.P. Telephone: _____
Address: Attn: Meagan Masten, 111 SW 5th Avenue, Suite 1100
Portland, OR 97204

As applicant, I am (check one):

☐ Property owner or a purchaser under a recorded land sale contract. "Property owner" means the owner of record, including a contract purchaser. The application shall include the signature of all owners of the property. A legal representative may sign on behalf of an owner upon providing evidence of formal legal authority to sign;

☒ A person or persons that have written consent of the property owner to make an application. A legal representative may sign on behalf of an owner upon providing evidence of formal legal authority to sign. In the case of an attorney a statement of representation shall accompany the application;

☐ Transportation agency, utility or entity that meets the criteria in Section 5.0.175 of the Coos County Zoning and Land Use Development Ordinance (CCZLDO)

If other than the owner, please give the owner's name and address:
Multiple - see consent forms

B. DESCRIPTION OF PROPERTY:

Township 24S Range 13W Section 34 Tax Lot 601
Account No. _____ Lot Size _____ Zoning District 10-NA/11-RS
Existing Use TransPacific Parkway and U.S. Highway 101

C. STATE SPECIFIC ZONE DISTRICT REQUESTED: CBEMP 11-RS

D. JUSTIFICATION:

(1) If the purpose of this rezone request is to rezone one or more lots or parcels in the interior of an exclusive farm use zone for non-farm uses, the following question must be answered:
Were the lots or parcels for which a rezone request is made, physically developed for a non-farm use prior to February 16, 1983? N/A
Explain and provide documentation: _____

(2) If the purpose of this rezone request is for other than (1) above the following questions must be answered:

a. Will the rezone conform with the comprehensive plan? Yes.
Explain: See narrative.

b. Will the rezone seriously interfere with the permitted uses on other nearby parcels? No.
Explain: See narrative.

c. Will the rezone comply with other adopted plan policies and ordinances? Yes.
Explain: See narrative.

(3) If a Goal Exception is required please review and address this section.

All land use plans shall include identification of issues and problems, inventories and other factual information for each applicable statewide planning goal, evaluation of alternative courses of action and ultimate policy choices, taking into consideration social, economic, energy and environmental needs. The Coos County Comprehensive Plan (CCCP) and Implementing Zoning Land Development Ordinance (CCZLDO) was acknowledge[1] as having all necessary components of a comprehensive plan as defined in ORS 197.015(5) after the Coos County adopted the documents on April 4, 1985. The date of the effective plan and ordinance is January 1, 1986. Coos County did go through a periodic review exercise in the 1990's but due to lack of gain in population, economic growth and public request plan zones were not altered. Changes to the comprehensive plan and implementing ordinance have been done to ensure that any required statutory or rules requirements have been complied with. However, sometimes it is necessary for property owners or applicants to make a request to have certain properties or situations such as text amendments considered to reflect a current condition or conditions. These applications are reviewed on a case by case basis with the Board of Commissioners making a final determination. This type application and process is way to ensure that process is available to ensure changing needs are considered and met. The process for plan amendments and rezones are set out in CCZLDO Article 5.1.

Exception means a comprehensive plan provision, including an amendment to an acknowledged comprehensive plan, that; (a) Is applicable to specific properties or situations and does not establish a planning or zoning policy of general

[1] "Acknowledgment" means a commission order that certifies that a comprehensive plan and land use regulations, land use regulation or plan or regulation amendment complies with the goals or certifies that Metro land use planning goals and objectives, Metro regional framework plan, amendments to Metro planning goals and objectives or amendments to the Metro regional framework plan comply with the goals. In Coos County's case the commission refers to the Land Conservation and Development Commission.

applicability; (b) Does not comply with some or all goal requirements applicable to the subject properties or situations; and (c) Complies with standards for an exception.

NOTE: This information outlines standards at OAR 660-004-0025, 660-004-0028 and 660-04-0022 for goal exceptions, but is NOT to be considered a substitute for specific language of the OARs. Consult the specific Oregon Administrative Rule for the detailed legal requirements.

A local government may adopt an exception to a goal when one of the following exception process is justified:

(a) The land subject to the exception is "physically developed" to the extent that it is no longer available for uses allowed by the applicable goal;

(b) The land subject to the exception is "irrevocably committed" to uses not allowed by the applicable goal because existing adjacent uses and other relevant factors make uses allowed by the applicable goal impracticable; or

(c) A "reasons exception" addressing the following standards is met:

(1) Reasons justify why the state policy embodied in the applicable goals should not apply;

(2) Areas which do not require a new exception cannot reasonably accommodate the use;

(3) The long-term environmental, economic, social and energy consequences resulting from the use of the proposed site with measures designed to reduce adverse impacts are not significantly more adverse than would typically result from the same proposal being located in areas requiring a goal exception other than the proposed site; and

(4) The proposed uses are compatible with other adjacent uses or will be so rendered through measures designed to reduce adverse impacts. Compatible, as used in subparagraph (4) is not intended as an absolute term meaning no interference or adverse impacts of any type with adjacent uses. A local government approving or denying a proposed exception shall set forth findings of fact and a statement of reasons which demonstrate that the

Compatible, as used in subparagraph (4) is not intended as an absolute term meaning no interference or adverse impacts of any type with adjacent uses. A local government approving or denying a proposed exception shall set forth findings of fact and a statement of reasons which demonstrate that the standards for an exception have or have not been met.

PART III -- USE OF GUIDELINES Governmental units shall review the guidelines set forth for the goals and either utilize the guidelines or develop alternative means that will achieve the

E. REQUIRED SUPPLEMENTAL INFORMATION TO BE SUBMITTED WITH APPLICATION:

1. A legal description of the subject property (deed);
2. Covenants or deed restrictions on property, if any;
3. A general location map of the property;
4. A detailed parcel map of the property illustrating the size and location of existing and proposed uses and structures on 8 ½" x 11" paper. If proposed structures are not know then the plot plan will need to include only existing with a note that no new structures are proposed at this time;

5. If applicant is not the owner, documentation of consent of the owner, including:
   a. A description of the property;
   b. Date of consent
   c. Signature of owner
   d. Party to whom consent is given

6. The applicant must supply a minimum of 2 copies of the entire application or one paper copy and electronic copy (email is acceptable), including all exhibits and color photocopies, or as directed by the Planning Staff.

G. Authorization:

All areas must be initialed by all applicants, if this application pertains to a certain property all property owners[2] must either sign or provide consistent for application unless otherwise allowed by Section 5.0.175 of the CCZLDO. As an applicant by initializing each statement I am accepting or agreeing to the statements next to each area designated for my initials and/or signature. All property owners shall sign and initial the designated areas of the application or provide consent from another party to sign on their behalf. If another party is signing as part of a consent that does not release that party that gave consent from complying with requirements listed below or any conditions that may be placed on an application. In the case of a text amendment the procedures for set out in Section 5.1.110 WHO SEEK CHANGE applies and an applicant may not be a property owner.

NE I hereby attest that I am authorized to make the application and the statements within this application are true and correct to the best of my knowledge. I affirm to the best of my knowledge that the property is in compliance with or will become in compliance with CCCP and CCZLDO. I understand that any action authorized by Coos County may be revoked if it is determined that the action was issued based upon false statements or misrepresentation.

NE I understand it is the function of the planning staff to impartially review my application and to address all issues affecting it regardless of whether the issues promote or hinder the approval of my application. In the event a public hearing is required to consider my application, I agree, as applicant I have the burden of proof. I understand that approval is not guaranteed and the applicant(s) has the burden of proof to demonstrate compliance with the applicable review criteria.

NE As the applicant(s) I acknowledge that is in my desire to submit this application of free will and staff has not encouraged or discouraged the submittal of this application.

NE I understand as applicant I am responsible for actual cost of that review if the Board of Commissioners appoints a hearings officer to hear the application I have submitted. As applicant I will be billed for actual time of planning services, materials and hearings officer cost and if not paid the application maybe become void.

Applicant(s) Original Signature

Natalie Encke
Applicant(s) Original Signature

11/1/2018
Date

[2] Property owner" means the owner of record, including a contract purchaser

Coos County Planning Department
Plan/Ordinance Amendment

Receipt #:
Check #/Cash
Date
Received by
Fee

The following application is to be completed in full. An application cannot be accepted for a Plan/Ordinance Text Amendment without this information.

A. APPLICANT: Jordan Cove Energy Project L.P.
Mailing Address: Attn: Meagan Masten, 111 SW 5th Avenue, Suite 1100, Portland, OR 97204
Telephone: _____

B. DOCUMENT TO BE AMENDED:

Comprehensive Plan X _____ CCZLDO X _____

TEXT X _____ MAP _____ BOTH: _____

C. IDENTIFY THE TEXT TO BE AMENDED BY SECTION REFERENCE OR MAPS THAT NEED TO BE AMENDED BY NAME: (If amending text, attach the edits to this form, deletion should be shown with strikethrough and additions in bold Italicized. This should be submitted in a word format by email)

(1) Adopt reasons exception to Statewide Planning Goal 16; and

(2) Amend the "Specific Boundaries" of the 11-RS zone above CCZLDO 3.2.400.

D. LIST APPLICABLE STATEWIDE OR LOCAL PLANNING GOALS OR OTHER CRITERIA: (please use additional page if necessary)

See application narrative.

F. APPLICANT'S STATEMENT

I, Natalie Eades for JCEP , have filed an application for an Amendment with the Coos County Planning Department to be reviewed and processed according to state and county requirements. I hereby acknowledge the following disclosures (please initial all statements below):

NE I understand that any representations, conclusions or opinions expressed by staff in the pre-application review, if one was conducted, for this request does not constitute final authority or approval and that I am not entitled to rely upon any such expressions in the place of final approval.

NE I understand I may ask questions and receive input from planning staff, but acknowledge that I am ultimately responsible for all information and documentation submitted with this application. I further understand planning staff cannot legally bind the County to any fact or

circumstance that conflicts with state or local laws and, in the event a conflict occurs, all such statements and agreements are void.

NE I understand I have the burden of demonstrating my application meets all of the applicable criteria. The criteria for approving or denying my request have been furnished to me as part of this application and I acknowledge receipt.

NE I understand planning staff is entitled to ask for additional information or documentation any time after the submission of this application if it is determined such information is needed for the review of my application.

NE I understand my application may be reviewed by the Oregon Department of Land Conservation and Development (DLCD). If this happens, and DLCD comments on the application, I understand DLCD has the authority to appeal the County's decision to the Oregon Land Use Board of Appeals, if it chooses to do so.

NE I understand it is the function of the planning office to impartially review my application and to address all issues affecting it regardless of whether the issues promote or hinder the approval of my application. In the event a public hearing is required to consider my application, I agree I bare the burden of proof. I understand that approval is not guaranteed and the applicant(s) bear the burden of proof to demonstrate compliance with the applicable review criteria.

_____ **ORS 215.416 Permit application; fees; consolidated procedures; hearings; notice; approval criteria; decision without hearing.** (1) When required or authorized by the ordinances, rules and regulations of a county, an owner of land may apply in writing to such persons as the governing body designates, for a permit, in the manner prescribed by the governing body. By signing this form you acknowledge that you are response to pay any debt caused by the processing of this application. Furthermore, the Coos County Planning Department reserves the right to determine the appropriate amount of time required to thoroughly complete any type of request and, by signing this page as the applicant and/or owner of the subject property, you agree to pay the amount owed as a result of this review. If this triggers a Measure 56 Notice or a Hearings Officer review you are responsible for that cost. If the amount is not paid within 30 days of the invoice, or other arrangements have not been made, the Planning Department may chose to revoke this permit or send this debt to a collection agency at your expense.

Natalie Eccles

Applicant's Signature

11/2/18

Date

Compliance Determination

SUBMIT TO COOS COUNTY PLANNING DEPT. AT 225 N. ADAMS STREET OR MAIL TO: COOS COUNTY PLANNING 250 N. BAXTER, COQUILLE OR 97423. EMAIL PLANNING@CO.COOS.OR.US PHONE: 541-396-7770

Date Received: _____ *Fee Received* _____ *Receipt #:* _____ *Received by:* _____

Please be aware if the fees are not with the included the application will not be processed.

FILE # CD- _____ (If payment is received on line a file number is required prior to submittal)

Land Owner(s) (print name): Multiple - see consent forms

Mailing address: _____

Phone: _____ Email: _____

Applicant(s) (print name): Jordan Cove Eneregy Project L.P.

Mailing address: Attn: Meagan Masten, 111 SW 5th Avenue, Suite 1100, Portland, OR 97204

Phone: _____ Email: mmasten@pembina.com

PROPERTY LOCATION:

24S	13W	34	601
Township	Range	Section	Tax lot(s)

N/A

Site address

PROJECT DESCRIPTION:

Request for determination that widened TransPacific Parkway at Highway 101 complies with general conditions of 11-RS zone.

An application for Compliance Determination (CD) is required to be submitted to the Planning Department with the elements described in §5.10.200. Once the application is received the Planning Staff will review the CD against the applicable zoning district to determine if additional reviews or notifications are required.

ACKNOWLEDGEMENT STATEMENT: PERTAINING TO THE SUBJECT PROPERTY DESCRIBED ABOVE, I HEREBY DECLARE THAT I AM THE LEGAL OWNER OF RECORD OR AN AGENT HAVING CONSENT OF THE LEGAL OWNER OF RECORD AND I AM AUTHORIZED TO OBTAIN THIS ZONING COMPLIANCE LETTER SO AS TO OBTAIN NECESSARY PERMITS FOR DEVELOPMENT FROM THE DEPARTMENT OF ENVIRONMENTAL QUALITY AND/OR THE BUILDING CODES AGENCY. THE STATEMENTS WITHIN THIS FORM ARE TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF. I UNDERSTAND THAT ANY PERMITS AND/OR AUTHORIZATION FOR DEVELOPMENT ISSUED BY THE PLANNING DEPARTMENT MAY BE REVOKED IF IT IS DETERMINED THAT IT WAS ISSUED BASED ON FALSE STATEMENTS, MISREPRESENTATIONS OR IN ERROR. AS A CONDITION FOR THE ISSUANCE OF THIS ZONING COMPLIANCE LETTER THE UNDERSIGNED HEREBY AGREES TO HOLD COOS COUNTY HARMLESS FROM AND INDEMNIFY THE COUNTY FOR ANY LIABILITY FOR DAMAGE WHICH MAY OCCUR AS A RESULT OF THE FAILURE TO BUILD, IMPROVE OR MAINTAIN ROADS WHICH SERVE AS ACCESS TO THE SUBJECT PROPERTY.

RURAL RESIDENTIAL COMPATIBILITY WITH FARM/FOREST MANAGEMENT PRACTICES: I HEREBY ACKNOWLEDGE THAT THE NORMAL INTENSIVE MANAGEMENT PRACTICES OCCURRING ON

ADJACENT RESOURCE LAND WILL NOT CONFLICT WITH THE RURAL RESIDENTIAL USE OR ENJOYMENT OF THE ABOVE DESCRIBED PROPERTY.

BY SIGNING THIS APPLICATION I AM ACKNOWLEDGING THAT I CAN ONLY DEVELOPE MY PROPERTY AS ALLOWED PURSUANT TO THE AUTHORIZATIONS GRANTED IN THE ZONING COMPLIANCE LETTER THAT WILL BE ISSUED. IF ADDITIONAL REVIEW IS REQUIRED I UNDERSTAND THAT IT IS MY RESPONSIBLY TO COMPLETE THE REVIEW. ALL APPLICABLE FEDERAL, STATE, AND LOCAL PERMITS SHALL BE OBTAINED PRIOR TO THE COMMENCEMENT OF ANY DEVELOPMENT ACTIVITY. ALL COSTS ASSOCIATED WITH COMPLYING WITH THE CONDITIONS ARE THE RESPONSIBILITY OF THE APPLICANT AND THAT THE APPLICANT IS NOT ACTING AS AN AGENT OF THE COUNTY.

APPLICANTS SIGNATURE: Natalie Eades

SUBMITTAL REQUIREMENTS PLEASE CHECK OFF

The application form must be completed and include the following:

1. ☒ Plot plan drawn to scale;
2. ☐ If this is for an industrial or commercial use a parking plan is required (see Article 7.5);
3. ☐ If this is bare land and a driveway has not be completed a driveway confirmation form is required to be completed by the Roadmaster (see Article 7.6 for bonding options);
4. ☐ If this is bare land and the request is for a dwelling an address is required;
5. ☒ If this is for an estuary zoned property as defined in Chapter III then applicable zoning district standards and policies must be addressed; and
6. ☒ Consent if not the legal owner of record.

Coos County / Official Use Only

☐ **Zoning Compliance Letter Issued** ☐ **Requires additional Review**

Planner: _____ **Date** _____

Version 5/2014

BEFORE THE PLANNING COMMISSION AND BOARD OF COMMISSIONERS OF COOS COUNTY, OREGON

In the Matter of the Following Applications to Allow State-Required Improvements to the TransPacific Parkway at its Intersection with U.S. Highway 101: (1) an Amendment of the Coos Bay Estuary Management Plan Map to Change the Designation of Approximately 1.37 Acres of Land from 10-NA to 11-RS; (2) an Amendment of the Coos County Comprehensive Plan to take a Reasons Exception to Statewide Planning Goal 16 in order to Widen an Existing "Land Transportation Facility" in Coos County's 11-RS Zone; (3) an Amendment of the Text of the 11-RS CBEMP Management Unit to Change its Boundary Description to Reflect the Zone Change; (4) Determination that the Widened "Land Transportation Facility" Complies with General Conditions in the 11-RS Zone; and (5) Administrative Conditional Use Approval to Use Fill and Riprap to Support Widening of the "Land Transportation Facility."	**NARRATIVE IN SUPPORT OF THE APPLICATIONS FILED BY JORDAN COVE ENERGY PROJECT L.P.**

I. Land Use Requests

These concurrent applications ("Applications") seek Coos County ("County") land use approval under the applicable review procedures and criteria of the Coos County Zoning and Land Development Ordinance ("CCZLDO"), the Coos Bay Estuary Management Plan ("CBEMP"), Oregon Revised Statutes ("ORS"), and Oregon Administrative Rules ("OAR") to allow public transportation improvements to the intersection of U.S. Highway 101 and TransPacific Parkway, as follows:

> (1) A post-acknowledgment amendment of the CBEMP map to change the zoning designation of approximately 1.37 acres of land on the north side of TransPacific Parkway depicted in Exhibit 1 ("Rezone Property") from 10-NA to 11-RS;

(2) A post-acknowledgment amendment of the CBEMP, which is part of the Coos County Comprehensive Plan ("CCCP"), to take a reasons exception to Statewide Planning Goal ("Goal") 16, to allow the zone change of the Rezone Property;

(3) Amendment to the text of the CCZLDO to change the boundary description of the 10-NA and 11-RS estuarine districts to reflect the zone change of the Rezone Property;

(4) Review of a proposal to widen TransPacific Parkway, an existing "land transportation facility," in the County's 11-RS zone for compliance with general conditions; and

(5) Approval of an Administrative Conditional Use ("ACU") for the use of fill and riprap in the 11-RS zone to allow widening of TransPacific Parkway, an existing "land transportation facility."

II. Background and Description of Improvements

Jordan Cove Energy Project L.P. ("Applicant" or "JCEP") seeks to develop a liquefied natural gas liquefaction facility and port terminal on the North Spit adjacent to Coos Bay ("Project"). The Project will generate construction-related traffic that may have operational impacts on the nearby transportation network, specifically the intersection of US 101 and the TransPacific Parkway ("TPP"). The Oregon Department of Transportation ("ODOT") required, as a condition of approval of the Project, that the Applicant mitigate such traffic impacts by widening the intersection of U.S. Highway 101 and the TPP to include: an additional 600 foot long dedicated eastbound turn lane; temporary signalization of the intersection that will be removed following construction of the LNG terminal; and the use of a riprap embankment in unvegetated mudflats on the north side of the TPP/101 intersection to facilitate widening of the road for the turn lane (together, "Improvements"). A copy of ODOT's condition is set forth in Exhibit 2. This submittal includes the various land use applications necessary to develop the Improvements.

The area in which the Applicant seeks to develop the Improvements ("Site") is subject to the CBEMP. *See* location map in Exhibit 1. In the CBEMP, a "Land Transportation Facility," includes "[b]ridges and associated structures, highways and railroads." The Improvements include constructing an additional eastbound turn lane at the intersection of a highway and a road. Therefore, this aspect of the Improvements most closely corresponds to the CBEMP use category "Land Transportation Facility." The County's 11-RS zone expressly allows "Land Transportation Facilities," but the County's 10-NA zone does not. In a separate proceeding (County File Nos. ACU-15-21/AP-15-03), the County Hearings Officer issued a recommended order finding that a portion of the

Site is zoned 11-RS, and a portion of the Site is zoned 10-NA, which mixed zoning prohibits the Applicant from constructing the Improvements at the Site. Thus, these Applications include a request to rezone the entire Site to 11-RS, to amend the CCCP (a CBEMP amendment) to take an exception to Goal 16 to allow the rezoning of the Site, and to amend the text of the CCZLDO to change the boundary descriptions of the 10-NA and 11-RS zones. The Applications also request use authorization for the widened road improvements (determination of compliance with general conditions) and fill and riprap to support the road improvements (administrative conditional use).

Most of the Improvements are occurring on Tax Lot 601, which is owned by the International Port of Coos Bay ("Port"). The Port has consented to the Applications, as has Coos County, which has jurisdiction over the TPP. *See* owner consent forms in Exhibit 3. JCEP has also requested a consent from ODOT, which has jurisdiction over Highway 101, and will submit that to the County as soon as it is signed.

A detailed copy of the plans for the Improvements are included in Exhibit 4.

III. Applicable Approval Criteria

A. Amendment of CBEMP Map

1. CCZLDO Provisions

CCZLDO 5.1.200 - Rezones:

Rezoning constitutes a change in the permissible use of a specific piece of property after it has been previously zoned. Rezoning is therefore distinguished from original zoning and amendments to the text of the Ordinance in that it entails the application of a pre-existing zone classification to a specific piece of property, whereas both original zoning and amendments to the text of the Ordinance are general in scope and apply more broadly.

Response: The County uses a single map to designate zoning districts for its comprehensive plan and the CCZLDO. Thus, CCZLDO 5.1.200, which governs rezones, establishes the applicable process and approval criteria for an amendment of the CBEMP map to change the zoning designation of the Rezone Property from 10-NA to 11-RS.

CCZLDO 5.1.225 - Decisions of the Hearings Body For a Rezone

The Hearings Body shall, after a public hearing on any rezone application, either:

1. Recommend the Board of Commissioners approve the rezoning, only if on the basis of the initiation or application, investigation and evidence submitted, all the following criteria are found to exist:

a. The rezoning will conform with the Comprehensive Plan or Section 5.1.215; and

Response: The County should find that the rezoning will conform with the CCCP for two reasons. First, it will comply with the CBEMP for the reasons set forth in response to CBEMP policies in Section III.D and E of this narrative. Second, it will conform with applicable provisions of the CCZLDO, which implements and is consistent with the CCCP and thus ensures that the rezoning conforms with the CCCP.

b. The rezoning will not seriously interfere with permitted uses on other nearby parcels; and

Response: The rezoning will not seriously interfere with permitted uses on nearby parcels. The rezone is a small area of the estuary and is generally isolated from the main part of the bay, which is south of the TPP, and other uses on other parcels. The rezone will merely facilitate an additional eastbound right turn lane at the intersection of U.S. 101 and the TPP, enhancing the efficacy of those transportation facilities. The rezone will not interfere with nearby estuary uses because Applicant has designed the Improvements to minimize resource impacts to the estuary. As support for this conclusion, the County should rely upon the memorandum from David Evans & Associates in Exhibit 5. The rezoning will facilitate completion of the Improvements, which will, in turn, improve access to/from nearby Port and industrial properties that rely upon the intersection for access. In this way, the rezoning may facilitate development of permitted uses on nearby Port and industrial parcels; it will not seriously interfere with them.

c. The rezoning will comply with other policies and ordinances as may be adopted by the Board of Commissioners.

Response: The rezoning will comply with other policies and ordinances adopted by the Board of Commissioners for the reasons explained in this narrative. The County should find that the rezoning satisfies this criterion.

2. Statewide Planning Goals

Post-acknowledgment plan amendments ("PAPAs") must comply with the Oregon Statewide Planning Goals ("Goals"). ORS 197.175(2)(a); *1000 Friends of Oregon v. LCDC*, 301 Or 447, 724 P2d 268 (1986). The rezoning is a PAPA. Therefore, the County's

decision must explain why the rezoning is in compliance with the Goals. Alternatively, if a Goal is not applicable, the County must adopt findings explaining why the Goal is not applicable. *Davenport v. City of Tigard*, 22 Or LUBA 577, 586 (1992). The responses below provide findings explaining why the Applications comply with the Goals, or alternatively, why the Goals are not applicable to the Applications.

Goal 16 - OAR 660-015-0010(1): Estuarine Resources

To recognize and protect the unique environmental, economic, and social values of each estuary and associated wetlands; and to protect, maintain, where appropriate develop, and where appropriate restore the long-term environmental, economic, and social values, diversity and benefits of Oregon's estuaries.

…

MANAGEMENT UNITS

Diverse resources, values, and benefits shall be maintained by classifying the estuary into distinct water use management units. When classifying estuarine areas into management units, the following shall be considered in addition to the inventories:

1. **Adjacent upland characteristics and existing land uses;**

2. **Compatibility with adjacent uses;**

3. **Energy costs and benefits; and**

4. **The extent to which the limited water surface area of the estuary shall be committed to different surface uses.**

At a minimum, the following kinds of management units shall be established:

1. **Natural -- in all estuaries, areas shall be designated to assure the protection of significant fish and wildlife habitats, of continued biological productivity within the**

estuary, and of scientific, research, and educational needs. These shall be managed to preserve the natural resources in recognition of dynamic, natural, geological, and evolutionary processes. Such areas shall include, at a minimum, all major tracts of salt marsh, tideflats, and seagrass and algae beds. Permissible uses in natural management units shall include the following:

a. Undeveloped low-intensity, water-dependent recreation;

b. Research and educational observations;

c. Navigation aids, such as beacons and buoys;

d. Protection of habitat, nutrient, fish, wildlife, and aesthetic resources;

e. Passive restoration measures;

f. Dredging necessary for on-site maintenance of existing functional tidegates and associated drainage channels and bridge crossing support structures;

g. Riprap for protection of uses existing as of October 7, 1977, unique natural resources, historical and archaeological values; and public facilities; and

h. Bridge crossings.

Where consistent with the resource capabilities of the area and the purposes of this management unit the following uses may be allowed:

a. Aquaculture which does not involve dredge or fill or other estuarine alteration other than incidental

dredging for harvest or benthic species or removable in-water structures such as stakes or racks;

b. Communication facilities;

c. Active restoration of fish and wildlife habitat or water quality and estuarine enhancement;

d. Boat ramps for public use where no dredging or fill for navigational access is needed; and

e. Pipelines, cables, and utility crossings, including incidental dredging necessary for their installation.

f. Installation of tidegates in existing functional dikes.

g. Temporary alterations.

h. Bridge crossing support structures and dredging necessary for their installation.

A use or activity is consistent with the resource capabilities of the area when either the impacts of the use on estuarine species, habitats, biological productivity and water quality are not significant or that the resources of the area are able to assimilate the use and activity and their effects and continue to function in a manner to protect significant wildlife habitats, natural biological productivity, and values for scientific research and education.

2. Conservation -- in all estuaries, except those in the overall Oregon Estuary Classification which are classed for preservation, areas shall be designated for long-term uses of renewable resources that do not require major alteration of the estuary, except for the

purpose of restoration. These areas shall be managed to conserve the natural resources and benefits. These shall include areas needed for maintenance and enhancement of biological productivity, recreational and aesthetic uses, and aquaculture. They shall include tracts of significant habitat smaller or of less biological importance than those in (1) above, and recreational or commercial oyster and clam beds are not included in (1) above. Areas that are partially altered and adjacent to existing development of moderate intensity which do not possess the resource characteristics of natural or development units shall also be included in this classification. Permissible uses in conservation management units shall be all uses listed in (1) above except temporary alterations. Where consistent with the resource capabilities of the area and the purposes of this management unit the following uses may be allowed:

a. High-intensity water-dependent recreation, including boat ramps, marinas and new dredging for boat ramps and marinas;

b. Minor navigational improvements;

c. Mining and mineral extraction, including dredging necessary for mineral extraction;

d. Other water dependent uses requiring occupation of water surface area by means other than dredge or fill;

e. Aquaculture requiring dredge or fill or other alteration of the estuary;

f. Active restoration for purposes other than those listed in 1(d).

g. Temporary alterations.

A use or activity is consistent with the resource capabilities of the area when ether the impacts of the use on estuarine species, habitats, biological productivity, and water quality are not significant or that the resources of the area are able to assimilate the use and activity and their effects and continue to function in a manner which conserves long-term renewable resources, natural biologic productivity, recreational and aesthetic values and aquaculture.

3. Development -- in estuaries classified in the overall Oregon Estuary Classification for more intense development or alteration, areas shall be designated to provide for navigation and other identified needs for public, commercial, and industrial water-dependent uses, consistent with the level of development or alteration allowed by the overall Oregon Estuary Classification. Such areas shall include deep-water areas adjacent or in proximity to the shoreline, navigation channels, subtidal areas for in-water disposal of dredged material and areas of minimal biological significance needed for uses requiring alterations of the estuary not included in (1) and (2) above. Permissible uses in areas managed for water-dependent activities shall be navigation and water-dependent commercial and industrial uses. As appropriate the following uses shall also be permissible in development management units:

a. Dredge or fill, as allowed elsewhere in the goal;

b. Navigation and water-dependent commercial enterprises and activities;

c. Water transport channels where dredging may be necessary;

d. Flow-lane disposal of dredged material monitored to assure that estuarine sedimentation is consistent with the resource capabilities and purposes of affected natural and conservation management units.

e. Water storage areas where needed for products used in or resulting from industry, commerce, and recreation;

f. Marinas.

Where consistent with the purposes of this management unit and adjacent shorelands designated especially suited for water-dependent uses or designated for waterfront redevelopment, water-related and nondependent, nonrelated uses not requiring dredge or fill; mining and mineral extraction; and activities identified in (1) and (2) above shall also be appropriate. In designating areas for these uses, local governments shall consider the potential for using upland sites to reduce or limit the commitment of the estuarine surface area for surface uses.

Response: Goal 16 requires that local governments divide all estuaries that Goal 16 protects into, at a minimum, the above "management units"—Natural, Conservation, and Development. The CBEMP complies with Goal 16 by creating and maintaining three "Aquatic Management Units" and seven "Shoreland Management Units" including the baseline Natural, Conservation, and Development management units that Goal 16 requires. The Site currently has two Goal 16 management units--10-NA (Natural Aquatic), which is a "Natural" Goal 16 management unit, and 11-RS (Rural Shoreland), which is either a "Conservation" or "Development" Goal 16 management unit, or a new type of management unit that Goal 16 does not explicitly contemplate but allows nonetheless. The Applications seek to amend the CBEMP to apply the 11-RS

management unit to the entire Site in order to allow development that the 10-NA management unit forbids in accordance with Goal 16. Because the permitted use would not be allowed on the Rezone Property consistent with Goal 16, the Applications request an exception to that Goal.

Goal 1 - OAR 660-015-0000(1): Citizen Involvement

To develop a citizen involvement program that insures the opportunity for citizens to be involved in all phases of the planning process.

Response: The Applications comply with Goal 1. The County has an acknowledged land use process that involves opportunity for citizen input on the Applications. The County will process the Applications in accordance with those acknowledged procedures.

Goal 2 - OAR 660-015-0000(2): Land Use Planning

To establish a land use planning process and policy framework as a basis for all decision and actions related to use of land and to assure an adequate factual base for such decisions and actions.

Response: The County has an acknowledged comprehensive plan, and the CCZLDO which implements it. The provisions in these documents form a land use planning process and policy framework that is the basis for all decisions and actions related to land use in the County. The inventories supporting the CBEMP, and the evidence submitted with these Applications also assures an adequate factual base for such decisions and actions. The County will process these Applications in accordance with the CCCP (including the CBEMP) and the CCZLDO. Therefore, these Applications comply with Goal 2.

Goal 3 - OAR 660-015-0000(3): Agricultural Lands

To preserve and maintain agricultural lands.

Response: The Applications do not involve agricultural lands. Therefore, Goal 3 is not applicable.

Goal 4 - OAR 660-015-0000(4): Forest Lands

To conserve forest lands by maintaining the forest land base and to protect the state's forest economy by making possible economically efficient forest practices that assure the continuous growing and harvesting of forest tree species as the leading use on

forest land consistent with sound management of soil, air, water, and fish and wildlife resources and to provide for recreational opportunities and agriculture.

Response: The Applications do not involve forest lands. Therefore, Goal 4 is inapplicable.

Goal 5 - OAR 660-015-0000(5): Natural Resources, Scenic and Historic Areas, and Open Spaces

To protect natural resources and conserve scenic and historic areas and open spaces.

Response: The Applications do not involve or affect inventoried Goal 5 resources. Therefore, Goal 5 is inapplicable.

Goal 6 - OAR 660-015-0000(6): Air, Water, and Land Resources Quality

To maintain and improve the quality of the air, water and land resources of the state.

Response: Goal 6 requires the County to protect air, water, and land resources from waste and process discharges from development. The Applications seek to amend the County's comprehensive plan with a reasons exception to allow a rezone of the Rezone Property from 10-NA to 11-RS. The purpose of the Applications is to allow Applicant to construct the Improvements at the intersection of U.S. Highway 101 and the TPP. With respect to that development, Applicant will comply with the CCZLDO, which implements the County's acknowledged comprehensive plan, with respect to protecting water resources from pollution. In fact, Applicant will be installing a stormwater treatment as part of the Improvements where one currently does not exist. Therefore, the Application complies with Goal 6.

Goal 7 - OAR 660-015-0000(7): Areas Subject to Natural Hazards

To protect people and property from natural hazards.

Response: The requested amendment does not increase the risk of natural hazards. The County should find that the Applications comply with Goal 7.

Goal 8 - OAR 660-015-0000(8): Recreational Needs

To satisfy the recreational needs of the citizens of the state and visitors and, where appropriate, to provide for the siting of necessary recreational facilities including destination resorts.

Response: The Applications do not affect inventoried recreational needs or facilities. Therefore, Goal 8 is not applicable.

Goal 9 - OAR 660-015-0000(9): Economic Development

To provide adequate opportunities throughout the state for a variety of economic activities vital to the health, welfare, and prosperity of Oregon's citizens.

Response: The Site is not zoned for industrial or employment purposes; however, the amendment will facilitate intersection improvements, which will facilitate use of nearby Port and industrial lands, including for the Project. Development of the Project will benefit the local and regional economy. The County should find that the Applications comply with Goal 9.

Goal 10 - OAR 660-015-0000(10): Housing

To provide for the housing needs of citizens of the state.

Response: The Applications do not affect the supply of or demand for housing in the County. Therefore, Goal 10 is not applicable.

Goal 11 - OAR 660-015-0000(11): Public Facilities and Services

To plan and develop a timely, orderly and efficient arrangement of public facilities and services to serve as a framework for urban and rural development.

Response: The Applications will facilitate widening of a public street intersection (TPP and U.S. Highway 101) to facilitate permitted water-dependent industrial development of the North Spit. As a result, approval of the Applications is consistent with Goal 11.

Goal 12 - OAR 660-015-0000(12): Transportation

To provide and encourage a safe, convenient and economic transportation system

Response: The purpose of the requested amendment of the County's comprehensive plan (reasons exception) is to facilitate the widening of U.S. Highway 101 and the TPP to provide safe and efficient transportation infrastructure. Therefore, the Application complies with Goal 12.

Goal 13 - OAR 660-015-0000(13): Energy Conservation

To conserve energy.

Response: The purpose of the requested amendment of the County's comprehensive plan (reasons exception) is to facilitate the widening of U.S. Highway 101 and the TPP. Widening the intersection will facilitate more efficient operations at the intersection, including reducing vehicle queues. Reducing vehicle queues will reduce fuel consumption and thus conserve energy. Therefore, the Applications are consistent with Goal 13.

Goal 14 - OAR 660-015-0000(14): Urbanization

To provide for an orderly and efficient transition from rural to urban land use, to accommodate urban population and urban employment inside urban growth boundaries, to ensure efficient use of land, and to provide for livable communities.

Response: The proposed exception and rezone will not affect the location of any urban growth boundary and will not involve development of any new urban uses outside of any urban growth boundary. The County should find that the Applications are consistent with Goal 14.

Goal 15 - OAR 660-015-0005: Willamette River Greenway

To protect, conserve, enhance and maintain the natural, scenic, historical, agricultural, economic and recreational qualities of lands along the Willamette River as the Willamette River Greenway.

Response: The Applications do not concern the Willamette River Greenway. Therefore, Goal 15 is not applicable.

Goal 17 - OAR 660-015-0010(2): Coastal Shorelands

To conserve, protect, where appropriate, develop and where appropriate restore the resources and benefits of all coastal shorelands, recognizing their value for protection and maintenance of water quality, fish and wildlife habitat, water-dependent uses, economic resources and recreation and aesthetics. The management of these shoreland areas shall be compatible with the characteristics of the adjacent coastal waters; and to reduce the hazard to human life and property, and the adverse effects upon water quality and fish and wildlife habitat, resulting from the use and enjoyment of Oregon's coastal shorelands.

Response: The Rezone Property is not located within the County's designated Coastal Shorelands Boundary. *See* Coastal Shorelands Boundary Map for Township 24S, Range 13W. Therefore, Goal 17 is not applicable to this request.

Goal 18 - OAR 660-015-0010(3): Beaches and Dunes

To conserve, protect, where appropriate develop, and where appropriate restore the resources and benefits of coastal beach and dune areas; and to reduce the hazard to human life and property from natural or man-induced actions associated with these areas.

Response: The Applications do not involve or affect any designated beach or dune areas. Therefore, Goal 18 is not applicable.

Goal 19 - OAR 660-015-0010(4): Ocean Resources

To conserve marine resources and ecological functions for the purpose of providing long-term ecological, economic, and social value and benefits to future generations.

Response: The Applications do not involve Oregon's territorial sea. Therefore, Goal 19 is not applicable.

B. Goal 16 "Reasons" Exception: ORS 197.732, OAR 660-004-0020

ORS 197.732

(2) A local government may adopt an exception to a goal if:

…

(c) The following standards are met:

(A) Reasons justify why the state policy embodied in the applicable goals should not apply;

(B) Areas that do not require a new exception cannot reasonably accommodate the use;

(C) The long term environmental, economic, social and energy consequences resulting from the use at the proposed site with measures designed to reduce adverse impacts are not significantly more adverse than would typically result from the same proposal being located in areas requiring a goal exception other than the proposed site; and

(D) The proposed uses are compatible with other adjacent uses or will be so rendered through measures designed to reduce adverse impacts.

RESPONSE: The above criteria are duplicative of the criteria set forth in OAR 660-004-0020. For the reasons explained below, the proposed exception complies with applicable provisions of OAR 660-004-0020. Compliance with these administrative rules will ensure compliance with OAR 197.732.

OAR 660-004-0020

(1) If a jurisdiction determines there are reasons consistent with OAR 660-004-0022 to use resource lands for uses not allowed by the applicable Goal or to allow public facilities or services not allowed by the applicable Goal, the justification shall be set

forth in the comprehensive plan as an exception. As provided in OAR 660-004-0000(1), rules in other divisions may also apply.

Response: This narrative presents "reasons" (as set forth in more detail below) consistent with OAR 660-004-0022 why Applicant/the County should be able to use the Rezone Property for an improved public facility. Applicant requests that the County set forth in its comprehensive plan the justification for a Goal 16 exception at the Rezone Property. Therefore, the Applications satisfy this approval criterion.

(2) The four standards in Goal 2 Part II(c) required to be addressed when taking an exception to a goal are described in subsections (a) through (d) of this section, including general requirements applicable to each of the factors:

(a) "Reasons justify why the state policy embodied in the applicable goals should not apply." The exception shall set forth the facts and assumptions used as the basis for determining that a state policy embodied in a goal should not apply to specific properties or situations, including the amount of land for the use being planned and why the use requires a location on resource land;

…

Response: This standard requires identifying "reasons" why the state policy in Goal 16 should not apply to the Rezone Property. OAR 660-004-0022 identifies the types of "reasons" that may be used to justify the exception. Applicant's responses to that rule below justify the proposed Goal 16 exception.

OAR 660-004-0022

An exception under Goal 2, Part II(c) may be taken for any use not allowed by the applicable goal(s) or for a use authorized by a statewide planning goal that cannot comply with the approval standards for that type of use. The types of reasons that may or may not be used to justify certain types of uses not

allowed on resource lands are set forth in the following sections of this rule. Reasons that may allow an exception to Goal 11 to provide sewer service to rural lands are described in OAR 660-011-0060. Reasons that may allow transportation facilities and improvements that do not meet the requirements of OAR 660-012-0065 are provided in OAR 660-012-0070. Reasons that rural lands are irrevocably committed to urban levels of development are provided in OAR 660-014-0030. Reasons that may justify the establishment of new urban development on undeveloped rural land are provided in OAR 660-014-0040.

(1) For uses not specifically provided for in this division, or in OAR 660-011-0060, 660-012-0070, 660-014-0030 or 660-014-0040, the reasons shall justify why the state policy embodied in the applicable goals should not apply. Such reasons include but are not limited to the following:

(a) There is a demonstrated need for the proposed use or activity, based on one or more of the requirements of Goals 3 to 19; and either

(A) A resource upon which the proposed use or activity is dependent can be reasonably obtained only at the proposed exception site and the use or activity requires a location near the resource. An exception based on this paragraph must include analysis of

the market area to be served by the proposed use or activity. That analysis must demonstrate that the proposed exception site is the only one within the market area at which the resource depended upon can be reasonably obtained; or

(B) The proposed use or activity has special features or qualities that necessitate its location on or near the proposed exception site.

Response: The County should find that this provision is not applicable because the use is specifically provided for in this division (OAR 660-004-0022(8)). Applicant addresses the reasons for the exception in response to that rule below.

Alternatively, to the extent the County find that the use is not specifically provided for below, this provision is applicable and has two requirements. First, Applicant must show a "demonstrated need" for the proposed use or activity based on the requirements of one or more of Goals 3 to 19. The "demonstrated need" for the Improvements is that ODOT is requiring the Improvements to secure the safety and efficiency of the intersection of US 101 and the TPP, as required by Goal 12. Therefore, there is a "demonstrated need" for the Improvements based upon Goal 12. Furthermore, Goal 9 encourages economic opportunity and prosperity, and this Application will facilitate Applicant's construction of the Project, which will be a boon to the region's economy.

The Application must also explain how the "proposed use or activity has special features or qualities that necessitate its location on or near the proposed exception site." The purpose of the Improvements is to mitigate adverse traffic effects that the Project may have upon the intersection of U.S. Highway 101 and the TPP. ODOT requires that such mitigation take the form of an additional eastbound turn lane at that intersection along with installation of a signal (the Improvements). The alignment of the TPP and the intersection are existing and immediately adjacent to the exception site. By definition,

widening the existing roadway must occur adjacent to that roadway. Therefore, the Improvements have special features or qualities that necessitate their location on the Rezone Property. To the extent this provision applies, this response identifies the reasons why the policy embodied in Goal 16 should not apply.

…

(7) Goal 16 - Water-Dependent Development: To allow water-dependent industrial, commercial, or recreational uses that require an exception in development and conservation estuaries, an economic analysis must show that there is a reasonable probability that the proposed use will locate in the planning area during the planning period, considering the following:

(a) Goal 9 or, for recreational uses, the Goal 8 recreation Planning provisions;

(b) The generally predicted level of market demand for the proposed use;

(c) The siting and operational requirements of the proposed use including land needs, and as applicable, moorage, water frontage, draft, or similar requirements;

(d) Whether the site and surrounding area are able to provide for the siting and operational requirements of the proposed use; and

(e) The economic analysis must be based on the Goal 9 element

of the County Comprehensive Plan and must consider and respond to all economic needs information available or supplied to the jurisdiction. The scope of this analysis will depend on the type of use proposed, the regional extent of the market and the ability of other areas to provide for the proposed use.

Response: OAR 660-004-0022(7) does not apply to the Application. The Application does not seek to allow a water-dependent industrial, commercial, or recreational use that requires an exception in a development or conservation estuary. The Application seeks to allow the Improvements, which are for a Land Transportation Facility that is not water-dependent in nature.

(8) Goal 16 - Other Alterations or Uses: An exception to the requirement limiting dredge and fill or other reductions or degradations of natural values to water-dependent uses or to the natural and conservation management unit requirements limiting alterations and uses is justified, where consistent with ORS chapter 196, in any of the circumstances specified in subsections (a) through (e) of this section:

Response: The Applications request an exception to "the natural and conservation management unit requirements limiting alterations and uses" in order to rezone land from a natural management unit designation (10-NA) to a conservation or development management unit designation (11-RS). The Improvements are an expansion of an existing public non-water-dependent use, which use is the County roadway at the Site. The County's 10-NA zone does not permit the Improvements. The County's 11-RS zone does permit the Improvements. (And the use of fill and riprap is necessary for the Applicant to construct the Improvements.) Therefore, OAR 660-004-0022(8)(e) applies

to the Application, and the Application must comply with OAR 660-004-0022(8)(e)(A)-(C).

…

> **(e) Dredge or fill or other alteration for expansion of an existing public non-water-dependent use or a nonsubstantial fill for a private non-water-dependent use (as provided for in ORS 196.825) where:**
>
> > **(A) Countywide Economic Analysis based on Goal 9 demonstrates that additional land is required to accommodate the proposed use;**

Response: The County should find, alternatively, that this provision is not applicable or is satisfied.

First, the County should find that this provision is not applicable to the requested exception because it is intended for industrial or commercial projects and cannot be applied in the same way to public works projects. This provision calls for an economic analysis pursuant to Goal 9, but the Goal 9 rules apply only to lands within urban growth boundaries (OAR 660-009-0010(1)) and the Rezone Property is not located within an urban growth boundary.

Second, multiple adopted plans demonstrate that additional land is required to accommodate TPP in order to support development of prime industrial and employment lands in the County. For example, the North Bay Urban Renewal Plan ("URP") calls for capacity improvements to the intersection of TPP/U.S. Highway 101:

> "Capacity improvements at the intersection of Highway 101 and TransPacific Parkway are likely needed to include new turn lanes, road

widening, or new approach lanes, or traffic signals depending on specific recommendations in a traffic study."

See URP at 24 in Exhibit 6. According to the URP, the purpose of the project is "to accommodate future industrial growth." *See* URP at 23-24. The URP is consistent with Goal 9. *See* URP at 28-31. Moreover, the urban renewal agency adopted the 2017 amendment to the URP to implement the Port's 2015 Strategic Business Plan, which itself was found to be in compliance with Goal 9. Based upon the adopted provisions of these plans, the County should find that the exception satisfies this criterion.

(B) An analysis of the operational characteristics of the existing use and proposed expansion demonstrates that the entire operation or the proposed expansion cannot be reasonably relocated; and

Response: An analysis of the operational characteristics of the existing TPP and the Improvements demonstrates that neither the TPP nor the Improvements can be reasonably relocated. The TPP is an existing, expansive piece of public transportation infrastructure that spans a long stretch of County right-of-way that extends over Coos Bay and intersects there with U.S. Highway 101. It is not reasonable to relocate an existing piece of public infrastructure of the size and extent of the TPP. Furthermore, the Improvements are a location-specific measure to mitigate the Project's adverse traffic effects upon the intersection of the TPP and U.S. Highway 101. ODOT requires the Improvements be located at the Site because the intersection of the TPP and U.S. Highway 101 is where ODOT expects the adverse traffic effects of the Project. Therefore, it is not possible to relocate the Improvements and therefore it is not reasonable to do so. Additionally, Applicant's transportation engineer analyzed the potential to relocate the Improvements by way of an alternate design, including installing a roundabout or widening on U.S. Highway 101; however, neither of these options was cost-effective or feasible. *See* Memorandum from Josh Anderson, PE, PTOE in Exhibit 7. The Applications comply with OAR 660-004-0022(8)(e)(B).

(C) The size and design of the proposed use and the extent of the proposed activity are the minimum amount necessary to provide for the use.

Response: The size and design of the proposed use and the extent of the proposed activity are the minimum amount necessary to provide for the use. To construct the Improvement, the Applicant will extend riprap at most forty feet (40') north from the existing rip rap toe of slope at the Site. Applicant will place rip rap on the north side of the TPP to asymmetrically widen the roadway. Applicant will also fill approximately 1.02 acres below the Highest Measured Tide in the 11-RS zone in order to support the new roadway addition. Applicant will place fill on the north side of the TPP to asymmetrically widen the roadway. Exhibit 2 shows the land area the Applicant will use to construct the Improvement, which is the minimum land area necessary to accommodate an additional turn lane at the intersection of U.S. Highway 101 and the TPP. Applicant's civil engineer analyzed the construction alternatives and explained the need for the particular size and design of the Improvements. *See* memo from Terry Stones, PE in Exhibit 8.

(f) In each of the situations set forth in subsections (7)(a) to (e) of this rule, the exception must demonstrate that the proposed use and alteration (including, where applicable, disposal of dredged materials) will be carried out in a manner that minimizes adverse impacts upon the affected aquatic and shoreland areas and habitats.

Response: The Applicant evaluated design alternatives for the Improvements and chose the design that to the extent possible avoids impacts to the affected aquatic and shoreland areas and habitats, including riparian vegetation within the shorelands of the

estuary, and, to the extent not possible, minimizes such impacts. As support for this conclusion, the County should rely upon the testimony from Applicant's environmental consultant, who explained that Applicant would minimize adverse impacts through the following measures:

- Limiting impacts to 0.5 acre of unvegetated mudflat;
- Using a turbidity curtain to limit the effects of turbidity;
- Using untreated wood pile and sheet pile to stabilize riprap, which will minimize the size of the revetment to the greatest extent practicable; and
- Installing the sheet pile at low tide during a single in-water work window, which will minimize effects on vulnerable life stages of important fish species.

See Exhibit 5.

(b) "Areas that do not require a new exception cannot reasonably accommodate the use." The exception must meet the following requirements:

Response: The Improvements are location-specific. Their purpose is to mitigate the Project's adverse traffic impacts on the Site, which is at the intersection of US 101 and the TPP. The only area other than the Rezone Property that can accomplish this mitigation is to the south of the existing TPP; however, this alternative is zoned 13A-NA and would also require an exception. Therefore, this alternative does not require further consideration under this subsection, and "areas that do not require a new exception cannot reasonably accommodate the use." The exception satisfies this criterion.

(A) The exception shall indicate on a map or otherwise describe the location of possible alternative areas considered for the use that do not require a new exception. The area for which the exception is taken shall be identified;

Response: As explained above, the Improvements are location-specific, and it would not be possible for the Applicant to locate them anywhere that does not require a new exception. Exhibit 1 identifies the Rezone Property, which is the area in which the Applicant proposes to locate the exception. The exception satisfies this criterion.

(B) To show why the particular site is justified, it is necessary to discuss why other areas that do not require a new exception cannot reasonably accommodate the proposed use. Economic factors may be considered along with other relevant factors in determining that the use cannot reasonably be accommodated in other areas. Under this test the following questions shall be addressed:

(i) Can the proposed use be reasonably accommodated on resource land that would not require an exception, including the density of uses on nonresource land? If not, why not?

(ii) Can the proposed use be reasonably accommodated on resource land that is already irrevocably committed to nonresource uses not allowed by the applicable Goal, including resource land in existing unincorporated communities, or by increasing the density of uses on committed lands? If not, why not?

(iii) Can the proposed use be reasonably accommodated inside an urban growth boundary? If not, why not?

(iv) Can the proposed use be reasonably accommodated without the provision of a

proposed public facility or service? If not, why not?

Response: As explained above, the Improvements are location-specific, and it would not be possible for Applicant to locate them anywhere that does not require a new exception. The Improvements cannot be located inside an urban growth boundary because the Site is not within an urban growth boundary. Moreover, the Improvements are a public facility and will not require any additional public facilities or services to construct. The exception satisfies this criterion.

(C) The "alternative areas" standard in paragraph B may be met by a broad review of similar types of areas rather than a review of specific alternative sites. Initially, a local government adopting an exception need assess only whether those similar types of areas in the vicinity could not reasonably accommodate the proposed use. Site specific comparisons are not required of a local government taking an exception unless another party to the local proceeding describes specific sites that can more reasonably accommodate the proposed use. A detailed evaluation of specific alternative sites is thus not required unless such sites are specifically described, with facts to support the assertion that the sites are more reasonable, by another party during the local exceptions proceeding.

Response: As explained above, the Improvements are location-specific, and it would not be possible for Applicant to locate them anywhere that does not require a new exception. The exception satisfies this criterion.

(c) "The long-term environmental, economic, social and energy consequences resulting from the use at the proposed site with measures designed to reduce adverse impacts are not

significantly more adverse than would typically result from the same proposal being located in areas requiring a goal exception other than the proposed site." The exception shall describe: the characteristics of each alternative area considered by the jurisdiction in which an exception might be taken, the typical advantages and disadvantages of using the area for a use not allowed by the Goal, and the typical positive and negative consequences resulting from the use at the proposed site with measures designed to reduce adverse impacts. A detailed evaluation of specific alternative sites is not required unless such sites are specifically described with facts to support the assertion that the sites have significantly fewer adverse impacts during the local exceptions proceeding. The exception shall include the reasons why the consequences of the use at the chosen site are not significantly more adverse than would typically result from the same proposal being located in areas requiring a goal exception other than the proposed site. Such reasons shall include but are not limited to a description of: the facts used to determine which resource land is least productive, the ability to sustain resource uses near the proposed use, and the long-term economic impact on the general area caused by irreversible removal of the land from the resource base. Other possible impacts to be addressed include the effects of the proposed use on the water table, on the costs of improving roads and on the costs to special service districts.

Response: The consequences of the use on the Rezone Property are not significantly more adverse than would typically result from the same proposal in a different area requiring a Goal 16 exception. As support for this conclusion, the County should rely upon the testimony of Applicant's environmental consultant, who concluded that the

asymmetrical widening to the north would have no worse than, and in many cases, fewer environmental impacts than alternative designs for the following reasons:

- Widening to the north only (as opposed to the south only) allows for a slightly smaller fill footprint because the obtuse angle of the intersection more easily enables construction of a dedicated left turn lane with sufficient geometry and turning radius than the acute intersection angle on the south.

- If the TPP is widened on both sides, features will be duplicative and will ultimately require higher volume of rock fill, wood pile, and sheet pile in mudflat habitat.

- If widening to south, any turbidity impacts and noise impacts are worse than on the north because they would occur in the main body of the bay, where they spread over a larger area and where there are expected to be more anadromous fish.

See Exhibit 5. As additional support for this conclusion, the County should rely upon the testimony of Applicant's civil engineer, who summarized the social and economic impacts of alternative designs:

- A cantilevered sheet pile design would cost about $9,000,000, fifty percent more than the chosen design.

- A tie-back design would allow for smaller, lighter steel sections but would conflict with utilities.

- Both designs require installation of unattractive walls, which has adverse social consequences.

- Both designs require pile driving, which would require the road to be closed. The TPP is the only access to the North Spit, so this closure would have significant economic and social consequences.

See Exhibit 8. The exception satisfies this criterion.

(d) "The proposed uses are compatible with other adjacent uses or will be so rendered through measures designed to reduce adverse impacts." The exception shall describe how the proposed use will be rendered compatible with adjacent land uses. The exception shall demonstrate that the proposed use is situated

in such a manner as to be compatible with surrounding natural resources and resource management or production practices. "Compatible" is not intended as an absolute term meaning no interference or adverse impacts of any type with adjacent uses.

Response: The County should find that the exception will be compatible with other uses or will be so rendered through measures designed to reduce adverse impacts. As support for this conclusion, the County should rely upon the testimony of Applicant's environmental consultant, who explained that the Improvements would be compatible for the following reasons:

- They will facilitate use of nearby industrial and Port properties;
- There will be no meaningful change to nearby estuarine uses;
- Applicant has minimized environmental impacts to the greatest extent practicable; and
- Water quality impacts would actually be reduced because Applicant will build a stormwater treatment system for the TPP as part of the Improvements.

See Exhibit 5.

(3) If the exception involves more than one area for which the reasons and circumstances are the same, the areas may be considered as a group. Each of the areas shall be identified on a map, or their location otherwise described, and keyed to the appropriate findings.

Response: This Applications do not seek an exception for more than one area. Therefore, this criterion does not apply to the Applications.

(4) For the expansion of an unincorporated community described under OAR 660-022-0010, including an urban unincorporated community pursuant to OAR 660-022-0040(2), the reasons exception requirements necessary to address standards 2 through 4 of Goal 2, Part II(c), as described in of subsections (2)(b), (c) and (d) of this rule, are modified to also include the following:

(a) Prioritize land for expansion: First priority goes to exceptions lands in proximity to an unincorporated community boundary. Second priority goes to land designated as marginal land. Third priority goes to land designated in an acknowledged comprehensive plan for agriculture or forestry, or both. Higher priority is given to land of lower capability site class for agricultural land, or lower cubic foot site class for forest land; and

(b) Land of lower priority described in subsection (a) of this section may be included if land of higher priority is inadequate to accommodate the use for any of the following reasons:

(A) Specific types of identified land needs cannot be reasonably accommodated on higher priority land;

(B) Public facilities and services cannot reasonably be provided to the higher priority area due to topographic or other physical constraints; or

(C) Maximum efficiency of land uses with the unincorporated community requires inclusion of lower priority land in order to provide public facilities and services to higher priority land.

Response: This Applications do not seek to expand an unincorporated community. Therefore, these approval criteria do not apply to the Applications.

C. Text Amendment of CCZLDO to Change Boundary Descriptions of 10-NA and 11-RS Zones

CCZLDO 5.1.100 - Legislative Amendment of Text Only

An amendment to the text of this ordinance or the comprehensive plan is a legislative act within the authority of the Board of Commissioners.

Response: Applicant seeks to amend the text of the CCZLDO to change the boundary description of the 11-RS zone in accordance with the contemporaneous rezone and comprehensive plan amendments filed by Applicant. A legislative text amendment of the CCZLDO is within the authority of the Board of Commissioners.

CCZLDO 5.1.110 - Who May Seek Change

Coos County shall consider the appropriateness of legislative plan text and map amendment proposals upon:

1. **A motion by the Board of Commissioners; or**
2. **A motion of the Planning Commission; or**
3. **The submission of formal request made by either:**
    a. **The Citizen Advisory Committee; or**
    b. **An application filed by a citizen or organization, accompanied by a prescribed filing fee. If a Measure 56 notice is required the applicant shall be responsible for the payment of all cost associated with that service.**

Response: The County has broadly defined "citizen" to include "any public or private entity or association within the planning area, including corporations, governmental and private agencies, associations, firms, partnerships * * *." CCZLDO 2.1.200. Applicant is a partnership and qualifies as a "citizen." Therefore, Applicant may initiate a legislative amendment to the text of the CCZLDO. Applicant has included the required filing fee with this Application.

CCZLDO 5.1.130 - Need for Studies

The Board of Commissioners, Hearings Body, or Citizen Advisory Committee may direct the Planning Director to make such studies as are necessary to determine the need for amending the text of the Plan and/or this Ordinance. When the amendment is initiated by application, such studies, justification and documentation are a burden of the initiator.

Response: No studies are necessary to determine the need for amending the text of the CCZLDO's boundary descriptions of the 11-RS zone. Included with these Applications (and addressed above) Applicant has requested a rezone and comprehensive plan amendments to change the zoning designation of the Rezone Property from 10-NA to 11-RS. If the County approves the change, it should amend the text of the CCZLDO to

ensure the boundary description of the 11-RS zone is consistent with the amended boundary between the 10-NA and 11-RS zones. The amended text would read as follows:

GENERAL LOCATION: NORTH SLOUGH/HAYNES INLET

ZONING DESIGNATION: 11-RS

ZONING DISTRICT: 11-RURAL SHORELANDS

SPECIFIC BOUNDARIES: Northwestern boundary: a line extending west from the pumphouse north of the Highway 101 Causeway; this shoreline borders on North Slough and extends to the northern right-of-way of the TransPacific Parkway.

Southeastern boundary: a line extending west along the north property line of the Clausen Oyster processing facility on the South side of Haynes Inlet. This district includes land up to 1,000-feet above head of tide (major tidegates) on Palouse and Larson Sloughs.

The request further implements the zone change and exception, which are consistent with the Goals for the reasons stated above. The County should approve Applicant's request to amend the CCZLDO's boundary description of the 11-RS zone.

D. Compliance Determination For "Land Transportation Facility" In 11-RS Zone.

CCZLDO 5.10.100 - Compliance Determinations

An application for Compliance Determination (CD) are required to be submitted to the Planning Department with the elements described in § 5.10.200. Once the application is received the Planning Staff will review the CD against the applicable zoning district to determine if additional reviews or notifications are required. If the application requires any type of discretionary analysis or interpretation, findings of compatibility or conditions of approval, then the application will be treated as an administrative conditional use and is subject to notice requirements of §5.10.400. If a conditional use is required the applicant is responsible for an additional fees and satisfying the criteria. If the application simply requires a check-off of clear and objective development standards, no administrative conditional use is required and a zoning compliance letter will be issued.

A compliance determination is not required in the following circumstances:

1. If the compliance letter is needed for a sewage disposal system permits or evaluation; or

2. If a final land uses decision covering the property or site has been issued and is still valid.

3. If a compliance determination has previously been completed for the subject property and the request is an Accessory Activity, Use or Structure to that activity and/or use.

There are two types of compliance determinations: one for Balance of County and the other for Estuary Plans.

Response: These Applications seek a compliance determination for a "Land Transportation Facility" in the County's 11-RS estuary zone.

CCZLDO 5.10.200 - Application Requirements:

The application form must be completed with a plot plan attached and include the following:

1. If this is for an industrial or commercial use a parking plan is required (see Article 7.5).

2. If this is bare land and a driveway has not be completed a driveway confirmation form is required to be completed by the Roadmaster (see Article 7.6 for bonding options).

3. If this is bare land and the request is for a dwelling an address is required.

4. If this is for an estuary zoned property as defined in Chapter III then applicable zoning district standards and policies must be addressed.

Response: Applicant seeks a compliance determination for an estuary zoned property. The applicable zoning district standards and policies are addressed below.

CCZLDO 5.10.300 - Review for Uses and Activities in Estuary Management Plan Zone

1. Compliance determinations will be reviewed for any permitted uses subject to general conditions which require polices to be addressed. If the policies require a conditional use that process shall be followed.

2. If it is determined that other land use reviews are required the planning, staff will provide a letter explaining what applications and criteria are required to the applicant and the application will be deemed incomplete until all submittal requirements have been met. Once all conditional use applications have received a final land use decision a zoning compliance letter will be issued.

3. If a compliance determination application is received for a use or activity that is not listed a denial will be issued unless § 4.1.190 Uses Not Listed applies.

4. If no other reviews are required the compliance determination and discretion was used to determine compliance the compliance determination decision will serve as the final land use decision. However, if the application simply requires a check-off of clear and objective development standards, no administrative conditional use is required and a zoning compliance letter will be issued and the compliance determination will not be characterized as a land use decision.

All new and replacement developments, with the exception of sewage disposal system permits, require a driveway permit and/or parking permit prior as part of this review unless one has been completed. Industrial and Commercial development will require a parking plan to be submitted as part of the compliance determination review. Parking plans will be reviewed by the County Roadmaster

Response: Applicant seeks a compliance determination for a "Land Transportation Facility" in the 11-RS zone. This zone permits "Land Transportation Facilities" subject to general conditions. This Application must address the Improvements' compliance with those general conditions, and does so below.

CCZLDO Chapter III - Estuary Zones

CCZLDO 3.2.150 - How To Use This Article

…

5.

…

b) Review the district's Uses, Activities, and Special Conditions Table to determine whether or not a proposed use or activity is allowable outright, allowable with conditions, or conditionally allowable subject to an

Administrative or Hearings Body Conditional Use. Symbols denote whether or not the specific use or activity listed in the tables is permitted outright, may be allowed subject to an Administrative Conditional Use, may be allowed subject to a Hearings Body conditional use, or prohibited in the specific district. The following symbols are pertinent:

P - means the use or activity is permitted outright subject only to the management objective.

…

S - means that the use or activity <u>may</u> be allowed subject to <u>"Special Conditions"</u> presented following the use and activity table. A few of the special conditions are non-discretionary, but most require local judgment and discretion and the development of findings to support any final decision about whether or not to allow the use or activity. Some uses and activities may be identified as being subject to a special condition that is not discretionary or may not apply to a site-specific request. If such is the situation, the Planning Director shall make such determination and if "General Conditions" are not applicable regard the use or activity as permitted outright. Such determination shall consist of a statement of facts supporting the decision.

G - indicates the use or activity may be allowed subject to <u>"General Conditions"</u> presented following the use and activities table. "General Conditions" provide a convenient cross-reference to applicable Baywide Policies which may further limit or condition the uses and activities.

A few "General Conditions" may not apply to a site specific request. If such is the situation, the Planning Director shall make such determination and if "Special Conditions" are not applicable, regard the use or activity as permitted outright. Such determination shall consist of a statement of facts supporting the decision.

ACU - means the use or activity may be permitted as provided above or subject to "Special" or "General" conditions pursuant to an Administrative Conditional Use.

CCZLDO 3.2.400 - 11-RS District Management Objective:

This district shall be managed so as to continue its rural low-intensity character and uses that have limited (if any) association with the aquatic district. This district includes three designated mitigation sites (M-12, M-13 and M-22). However, only Site M-22 shall be protected from preemptive uses. Other sites are "low" priority, and need not be protected (See Policy #22).

Response: The Improvements comply with the 11-RS district's management objective because it is a low-intensity character use and has no association with the aquatic district. The Improvements consist of a widening of the intersection at U.S. Highway 101 and the TPP to accomplish construction traffic mitigation for the Project. The Improvements do not impact the designated mitigation sites in the 11-RS district.

CCZLDO 3.2.401 - 11-RS Zone - Uses, Activities And Special Conditions.

Table 11-RS sets forth the uses and activities which are permitted, which may be permitted as conditional uses, or which are prohibited in this zoning district. Table 11-RS also sets forth special conditions which may restrict certain uses or activities, or modify the manner in which certain uses or activities may occur. Reference to "policy numbers" refers to Plan Policies set forth in the Coos Bay Estuary Management Plan.

A. Uses:

…

7. Land transportation facilities P-G

…

GENERAL CONDITIONS (the following condition applies to all uses and activities):

1. Inventoried resources requiring mandatory protection in this district are subject to Policies #17 and #18.

2. All permitted uses and activities shall be consistent with Policy #23, requiring protection of riparian vegetation.

The following condition applies to all permitted uses.

3. Where "agricultural lands" or "forest lands" occur within this district as identified in the "Special Considerations Map," uses in these areas shall be limited to those permitted in Policies #28 and #34.

4. Uses in this district are only permitted as stated in Policy #14, "General Policy on Uses within Rural Coastal Shorelands". Except as permitted outright, or where findings are made in this Plan uses are only allowed subject to the findings in this policy.

5. In rural areas (outside of UGBs) utilities, public facilities and services shall only be provided subject to Policies #49, #50, and #51.

…

Response: Applicant seeks approval to construct the Improvements. As explained above, CCZLDO 2.1.200 defines "Land Transportation Facility" as "[b]ridges and associated structures, highways and railroads." The Improvements include an additional eastbound turn lane at the intersection of a *highway* and a road. Therefore, the Improvements most closely correspond to the CBEMP use category "Land Transportation Facility," which is a permitted use in the 11-RS zone subject to General Conditions. Therefore, Applicant must show that the Improvements comply with the General Conditions set forth above.

CCZLDO 3.2.410 - 11-RS Zone - General Conditions

General Condition #1 - Inventoried resources requiring mandatory protection in this district are subject to Policies #17 and #18.

CBEMP Policy #17

Protection of "Major Marshes" and "Significant Wildlife Habitat" in Coastal Shorelands

Local governments shall protect from development major marshes and significant wildlife habitat, coastal headlands, and exceptional aesthetic resources located within the Coos Bay Coastal Shorelands Boundary, except where exceptions allow otherwise.

I. Local government shall protect:

a. "Major Marshes" to include areas identified in the Goal #17, "Linkage Matrix", and the Shoreland Values Inventory map; and

b. "Significant wildlife habitats" to include those areas identified on the "Shoreland Values Inventory" map; and

c. "Coastal headlands"; and

d. "Exceptional aesthetic resources" where the quality is primarily derived from or related to the association with coastal water areas.

II. This strategy shall be implemented through:

a. Plan designations and use and activity matrices set forth elsewhere in this Plan that limit uses in these special areas to those that are consistent with protection of natural values; and

b. Through use of the Special Considerations Map that identified such special areas and restricts uses and activities therein to uses that are consistent with the protection of natural values. Such uses may include propagation and selective harvesting of forest products consistent with the Oregon Forest Practices Act, grazing, harvesting wild crops, and low-intensity water-dependent recreation; and

c. Contacting Oregon Department of Fish and Wildlife for review and comment on the proposed development within the area of the 5b or 5c bird sites.

This strategy recognizes that special protective consideration must be given to key resources in coastal shorelands over and above the protection afforded such resources elsewhere in this Plan.

Response: For two reasons, the CCCP demonstrates that there are no resources at the Site for which Policy #17 requires protection. First, the County's Shoreland Values Inventory Map does not depict any major marshes, significant wildlife habitat, or coastal headlands in the area of the proposed improvements. Second, according to the CCCP, there are no exceptional aesthetic resources in the area of the proposed Improvements: "There are no areas of exceptional or aesthetic or scenic quality within the Planning

Area [See Section 4.3].” Plan Volume II, Part 2, Section 3.3-3. The Planning Area is defined as “all lands west of the Oregon Coast Highway,” subject to limited exceptions not applicable here. Plan Volume II, Part 2, Section 3.1-1. The Improvements will be constructed along, and within the existing right-of-way of, the TPP, which is located to the west of U.S. Highway 101 (Oregon Coast Highway). Accordingly, the Planning Area includes the area of the proposed Improvements. Therefore, CBEMP Policy #17 does not apply to the Applicant’s request for approval to construct the Improvements.

CBEMP Policy #18

Protection of Historical, Cultural and Archaeological Sites

Local government shall provide protection to historical, cultural and archaeological sites and shall continue to refrain from widespread dissemination of site-specific information about identified archaeological sites.

I. This strategy shall be implemented by requiring review of all development proposals involving a cultural, archaeological or historical site, to determine whether the project as proposed would protect the cultural, archaeological and historical values of the site.

II. The development proposal, when submitted shall include a Plot Plan, showing, at a minimum, all areas proposed for excavation, clearing and construction. Within three (3) working days of receipt of the development proposal, the local government shall notify the Coquille Indian Tribe and Coos, Siuslaw, Lower Umpqua Tribe(s) in writing, together with a copy of the Plot Plan. The Tribe(s) shall have the right to submit a written statement to the local government within thirty (30) days of receipt of such notification,

stating whether the project as proposed would protect the cultural, historical and archaeological values of the site, or if not, whether the project could be modified by appropriate measures to protect those values.

"Appropriate measures" may include, but shall not be limited to the following:

a. Retaining the prehistoric and/or historic structure in situ or moving it intact to another site; or

b. Paving over the site without disturbance of any human remains or cultural objects upon the written consent of the Tribe(s); or

c. Clustering development so as to avoid disturbing the site; or

d. Setting the site aside for non-impacting activities, such as storage; or

e. If permitted pursuant to the substantive and procedural requirements of ORS 97.750, contracting with a qualified archaeologist to excavate the site and remove any cultural objects and human remains, reinterring the human remains at the developer's expense; or

f. Using civil means to ensure adequate protection of the resources, such as

acquisition of easements, public dedications, or transfer of title.

If a previously unknown or unrecorded archaeological site is encountered in the development process, the above measures shall still apply. Land development activities, which violate the intent of this strategy shall be subject to penalties prescribed in ORS 97.990.

III. Upon receipt of the statement by the Tribe(s), or upon expiration of the Tribe(s) thirty day response period, the local government shall review the Plot Plan and shall:

a. Approve the development proposal if no adverse impacts have been identified, as long as consistent with other portions of this plan, or

b. Approve the development proposal subject to appropriate measures agreed upon by the landowner and the Tribe(s), as well as any additional measures deemed necessary by the local government to protect the cultural, historical and archaeological values of the site. If the property owner and the Tribe(s) cannot agree on the appropriate measures, then the governing body shall hold a quasi-judicial hearing to resolve the dispute. The hearing shall be a public hearing at which the governing body shall determine by preponderance of the

evidence whether the development project may be allowed to proceed, subject to any modifications deemed necessary by the governing body to protect the cultural, historical and archaeological values of the site.

IV. Through the "overlay concept" of this policy and the Special Considerations Map, unless an exception has been taken, no uses other than propagation and selective harvesting of forest products consistent with the Oregon Forest Practices Act, grazing, harvesting wild crops, and low intensity water-dependent recreation shall be allowed unless such uses are consistent with the protection of the cultural, historical and archaeological values, or unless appropriate measures have been taken to protect the historic and archaeological values of the site. This strategy recognizes that protection of cultural, historical and archaeological sites is not only a community's social responsibility, it is also legally required by ORS 97.745. It also recognizes that cultural, historical and archaeological sites are non-renewable cultural resources.

Response: CBEMP Policy #18 only applies in locations where there are identified historical, cultural, and archaeological resources in the area of proposed development. According to the County's Shoreland Values Inventory Map there are no such resources in the Site area. Therefore, this policy is not applicable to the Applications.

General Condition #2 - All permitted uses and activities shall be consistent with Policy #23, requiring protection of riparian vegetation.

CBEMP Policy #23 - Riparian Vegetation and Streambank Protection

I. Local government shall strive to maintain riparian vegetation within the shorelands of this estuary and, when appropriate, restore or enhance it, as consistent with water dependent uses. Local government shall also encourage use of tax incentives to encourage maintenance of riparian vegetation, pursuant to ORS 308.792 - 308.803.

Appropriate provisions for riparian vegetation are set forth in the CCZLDO Section 4.5.180 (OR 92 05009PL).

II. Local government shall encourage streambank stabilization for the purpose of controlling streambank erosion along the estuary, subject to other policies concerning structural and nonstructural stabilization measures.

This strategy shall be implemented by Oregon Department of Transportation (ODOT) and local government where erosion threatens roads. Otherwise, individual landowners in cooperation with the Oregon International Port of Coos Bay, and Coos Soil and Water Conservation District, Watershed Councils, Division of State Lands and Oregon Department of Fish & Wildlife shall be responsible for bank protection.

This strategy recognizes that the banks of the estuary, particularly in the Coos and Millicoma Rivers are susceptible to erosion and have threatened valuable farm land, roads and other structures.

Response: This policy is aspirational in nature because it includes non-binding language such as stating that the County shall "strive" and shall "encourage." As a result, it is not a mandatory approval criterion.

General Condition #3 - Where "agricultural lands" or "forest lands" occur within this district as identified in the "Special Considerations Map," uses in these areas shall be limited to those permitted in Policies # 28 and # 34.

Response: According to the County's maps, there are no "agricultural lands" or "forest lands" within the Site area. Therefore, this General Condition does not apply to the Applicant's request for approval to construct the Improvements.

General Condition #4 - Uses in this district are only permitted as stated in Policy #14, "General Policy on Uses within Rural Coastal Shorelands." Except as permitted outright, or where findings are made in this Plan uses are only allowed subject to the findings in this policy.

CBEMP Policy #14

General Policy on Uses within Rural Coastal Shorelands

I. Coos County shall manage its rural areas within the "Coos Bay Coastal Shorelands Boundary" by allowing only the following uses in rural shoreland areas, as prescribed in the management units of this Plan, except for areas where mandatory protection is prescribed by LCDC Goal #17 and CBEMP Policies #17 and #18:

a. Farm uses as provided in ORS 215.203;

b. Propagation and harvesting of forest products;

c. Private and public water-dependent recreation developments;

d. Aquaculture;

e. Water-dependent commercial and industrial uses, water-related uses, and other uses only upon a finding by the Board of Commissioners or its designee that such uses satisfy a need which cannot be accommodated on uplands or shorelands in urban and urbanizable areas or in rural areas built upon or irrevocably committed to non-resource use.

f. Single-family residences on lots, parcels, or units of land existing on January 1, 1977, when it is established that:

1. The dwelling is in conjunction with a permitted farm or forest use, or

2. The dwelling is in a documented "committed" area, or

3. The dwelling has been justified through a goal exception; and

4. Such uses do not conflict with the resource preservation and protection policies established elsewhere in this Plan;

g. Any other uses, including non-farm uses and non-forest

uses, provided that the Board of Commissioners or its designee determines that such uses satisfy a need which cannot be accommodated at other upland locations or in urban or urbanizable areas. In addition, the above uses shall only be permitted upon a finding that such uses do not otherwise conflict with the resource preservation and protection policies established elsewhere in this Plan.

This strategy recognizes (1) that Coos County's rural shorelands are a valuable resource and accordingly merit special consideration, and (2) that LCDC Goal #17 places strict limitations on land divisions within coastal shorelands. This strategy further recognizes that rural uses "a through "g" above, are allowed because of need and consistency findings documented in the "factual base" that supports this Plan.

Response: The proposed Improvements are a location-specific use that cannot be accommodated at other upland locations or in urban or urbanizable areas under the language of subsection g. in CBEMP Policy #14. Applicant proposes the Improvements for the purpose of increasing capacity and mitigating transportation impacts at the intersection of US 101 and the TPP that the Project's construction-related traffic may cause. The Improvements can only be located at the Site because it is the Project's traffic impact upon the Site that necessitates the Improvements in the first place.

The Project as a whole cannot be accommodated within an urban growth boundary or on existing rural exception lands because it requires a large number of contiguous acres, that allow water-dependent industrial uses, are sparsely populated, are compatible with surrounding uses, have few navigation restrictions, minimize environmental and safety impacts, and minimize cargo transit distance. Sites that meet these characteristics are in

short supply. In fact, that analysis identified only four candidate sites, and the Applicant identified the subject property as the preferred site based upon these criteria.

As additional support for this conclusion, the County can rely upon the factual base for the Comprehensive Plan, which also includes a detailed analysis of industrial land needs and determines that there is insufficient urban land to accommodate industrial land needs. *See* Plan, Volume II, Part 2, Section 5.8.2. Furthermore, the Improvements satisfy not conflict with the resource preservation and protection policies that the CBEMP sets forth, as explained above.

Applicant has designed the Improvements to minimize impacts to natural resources in the Site area. As support for this conclusion, the County should rely upon the testimony from Applicant's environmental consultant, who explained that Applicant would minimize adverse impacts through the following measures:

- Limiting impacts to 0.5 acre of unvegetated mudflat;
- Using a turbidity curtain to limit the effects of turbidity;
- Using untreated wood pile and sheet pile to stabilize riprap, which will minimize the size of the revetment to the greatest extent practicable; and
- Installing the sheet pile at low tide during a single in-water work window, which will minimize effects on vulnerable life stages of important fish species.

See Exhibit 5.

For these reasons and based upon the evidence in the record, the County should find that the Improvements, together with the Project that they will serve, satisfy a need that cannot be accommodated within the urban growth boundary or in a rural area irrevocably committed to non-resource use. Therefore, Applicant's request for approval to construct the Improvements are consistent with CBEMP Policy #14.

General Condition #5 - In rural areas (outside of UGBs) utilities, public facilities and services shall only be provided subject to CBEMP Policies #49, #50, and #51.

CBEMP Policy #49 - Rural Residential Public Services

Coos County shall provide opportunities to its citizens for a rural residential living experience […].

Response: Applicant does not request rural residential uses. CBEMP Policy #49 does not apply to the Applicant's request for approval to construct the Improvements.

CBEMP Policy #50 - Rural Public Services

Coos County shall consider on-site wells and springs [..]: fire districts, school districts, road districts, telephone lines, electrical and gas lines, and similar, low-intensity facilities and services traditionally enjoyed by rural property owners.

Response: The TPP currently accommodates rural types and levels of service. The proposed Improvements are the result of a need that ODOT identified for additional capacity to mitigate construction-related traffic concerns that the Project creates. Thus, the road, with the proposed Improvements, continues to provide rural types and levels of service. The County should find that Applicant's request for approval to construct the Improvements satisfy CBEMP Policy #50.

CBEMP Policy #51 - Public Services Extension

I. Coos County shall permit the extension of existing public sewer and water systems to areas outside urban growth boundaries (UGBs) where such service provision is solely for: … [specified development or reasons].

Response: The Improvements do not require any public sewer or water systems. Therefore, CBEMP Policy #51 does not apply to the Applicant's request for approval to construct the Improvements.

For the above reasons, the County should approve this Application for a compliance determination for a "Land Transportation Facility" in the 11-RS zone.

E. Application for Administrative Conditional Use Approval for Riprap and Fill

1. CCZLDO Chapter III - Estuary Zones

CCZLDO 3.2.150 - How To Use This Article

…

5.

…

b) Review the district's Uses, Activities, and Special Conditions Table to determine whether or not a proposed use or activity is allowable outright, allowable with conditions, or conditionally allowable subject to an Administrative or Hearings Body Conditional Use. Symbols denote whether or not the specific use or activity listed in the tables is permitted outright, may be allowed subject to an Administrative Conditional Use, may be allowed subject to a Hearings Body conditional use, or prohibited in the specific district. The following symbols are pertinent:

P - means the use or activity is permitted outright subject only to the management objective.

…

S - means that the use or activity may be allowed subject to "Special Conditions" presented following the use and activity table. A few of the special conditions are non-discretionary, but most require local judgment and discretion and the development of findings to support any final decision about whether or not to allow the use or activity. Some uses and activities may be identified as being subject to a special condition that is not discretionary or may not apply to a site-specific request. If such is the situation, the Planning Director shall make such determination and if "General Conditions" are

not applicable regard the use or activity as permitted outright. Such determination shall consist of a statement of facts supporting the decision.

G - indicates the use or activity may be allowed subject to <u>"General Conditions"</u> presented following the use and activities table. "General Conditions" provide a convenient cross-reference to applicable Baywide Policies which may further limit or condition the uses and activities.

A few "General Conditions" may not apply to a site specific request. If such is the situation, the Planning Director shall make such determination and if "Special Conditions" are not applicable, regard the use or activity as permitted outright. Such determination shall consist of a statement of facts supporting the decision.

ACU - means the use or activity may be permitted as provided above or subject to "Special" or "General" conditions pursuant to an Administrative Conditional Use.

CCZLDO 3.2.400 - 11-RS District Management Objective:

This district shall be managed so as to continue its rural low-intensity character and uses that have limited (if any) association with the aquatic district. This district includes three designated mitigation sites (M-12, M-13 and M-22). However, only Site M-22 shall be protected from preemptive uses. Other sites are "low" priority, and need not be protected (See Policy #22).

<u>Response</u>: The Improvements, and the fill and riprap for which this Application seeks approval that are necessary to construct the Improvements, comply with the 11-RS district's management objective because they are low-intensity in character and have

no association with the aquatic district. The Improvements generally consist of a widening of the intersection at U.S. Highway 101 and the TPP to accomplish traffic mitigation for the LNG facility that the Applicant plans to construct. The Improvements do not impact the designated mitigation sites in the 11-RS district.

CCZLDO 3.2.410 - 11-RS Zone - Uses, Activities And Special Conditions.

Table 11-RS sets forth the uses and activities which are permitted, which may be permitted as conditional uses, or which are prohibited in this zoning district. Table 11-RS also sets forth special conditions which may restrict certain uses or activities, or modify the manner in which certain uses or activities may occur. Reference to "policy numbers" refers to Plan Policies set forth in the Coos Bay Estuary Management Plan.

…

B. Activities:

…

5. Fill ACU-S, G

6. Shoreline stabilization

…

b. Riprap ACU-S, G

GENERAL CONDITIONS (the following condition applies to all uses and activities):

1. Inventoried resources requiring mandatory protection in this district are subject to Policies #17 and #18.

2. All permitted uses and activities shall be consistent with Policy #23, requiring protection of riparian vegetation.

The following condition applies to all permitted uses.

3. Where "agricultural lands" or "forest lands" occur within this district as identified in the "Special Considerations Map," uses in these areas shall be limited to those permitted in Policies #28 and #34.

4. Uses in this district are only permitted as stated in Policy #14, "General Policy on Uses within Rural Coastal Shorelands".

5. In rural areas (outside of UGBs) utilities, public facilities and services shall only be provided subject to Policies #49, #50, and #51.

SPECIAL CONDITIONS

Activities:

4. Excavation to create new water use shall be allowed in conjunction with an allowable use when findings are developed which document that the excavation is the minimum necessary to accommodate the proposed use.

3.,5. Fill and dredge material disposal shall not be allowed in areas of "wet meadow" wetland, as identified in the "Special Considerations Map," except as otherwise allowed in Policy #19.

6b.,6c.These activities are permitted subject to the findings required by Policy #9, "Solutions to Erosion and Flooding Problems."

Response: Applicant seeks ACU approval for fill and riprap in the 11-RS zone that is necessary to construct the Improvements. In the 11-RS zone, an application for approval to engage in the "activities" "fill" and "riprap" is an ACU that is subject to the General and Special Conditions of CCZLDO 3.2.401. Therefore, Applicant must show that the Improvements comply with the General and Special Conditions set forth above. The CCZLDO does not impose additional approval criteria on fill and riprap in the 11-RS zone.

CCZLDO 5.2.100 - Conditional Uses

Conditional uses are discretionary reviews that involve judgment or discretion in determining compliance with the approval requirements. The review is discretionary because not all of the approval requirements are objective. That is, they are not easily definable or measurable. The amount of discretion and the potential impact of the request vary among different reviews. Some have less discretion or impact, such as the reduction of a garage setback for a house on a hillside. Others may involve more discretion or potential impacts, such as the Discretionary reviews that must provide opportunities for public involvement by either a public hearing or the right to appeal. All conditions that are placed on an application shall be completed at the cost of the applicant. There are different application types that are considered conditional uses but below are the three most common types of conditional use applications.

1. **Hearings Body Conditional Uses (HBCU or C). A Hearings Body conditional use is a use or activity which is basically similar to the uses permitted in a district but which may not be entirely compatible with the permitted uses. An application for a conditional use requires review by the Hearings Body to insure that the conditional use is or may be made compatible with the permitted uses in a district and consistent with the general and specific purposes of this Ordinance.**

2. **Administrative Conditional Uses (ACU). An Administrative Conditional use is a use or activity with similar compatibility or special conservation problems. An application for an administrative conditional use requires review by the Planning Director to insure compliance with approval criteria.**

3. **Variance (V). Practical difficulty and unnecessary physical hardship may result from the size, shape, or dimensions of a site or the location of existing structures thereon, geographic, topographic or other physical conditions on the site or in the immediate vicinity, or, from population density, street location, or traffic conditions in the immediate vicinity. The authority to grant variances does not extend to use regulations, minimum lot sizes or riparian areas within the Coastal Shoreland Boundary.**

Discretionary reviews contain approval criteria. Approval criteria are listed with a specific review and findings must be made to address such criteria. The criteria set the bounds for the issues that must be addressed by the applicant and which may be raised by the City or affected parties. A proposal that complies with all of the criteria will be approved. A proposal that can comply with the criteria with mitigation

measures or limitations will be approved with conditions. A proposal that cannot comply with the criteria outright or cannot comply with mitigation measures will be denied.

Approval criteria have been derived from, and are based on the Comprehensive Plan, Statute, Rule and/or Oregon Statewide Planning Goals or any combination thereof. The Coos County Comprehensive Plan has been acknowledged by the Department of Land Conservation and Development. The identified enforceable policies have been incorporated into the Coos County Zoning and Land Development Ordinance. The county shall use the review criteria The county shall use the review criteria set forth in the Coos County Zoning and Land Development Ordinance unless otherwise specified. Fulfillment of all requirements and approval criteria means the proposal is in compliance with the Comprehensive Plan and the implementing ordinance.

When approval criteria refer to the request meeting a specific threshold, such as adequacy of services or no significant detrimental environmental impacts, the review body will consider any proposed improvements, mitigation measures, or limitations proposed as part of the request when reviewing whether the request meets the threshold. All proposed improvements, mitigation measures, and limitations must be submitted for consideration prior to a final decision by a review body.

Response: Applicant seeks approval for fill and riprap needed to construct the Improvements in the 11-RS zone. These activities are subject to administrative conditional use procedures in the 11-RS zone.

CCZLDO 5.2.500 - Criteria for Approval of All Applications

An application for a conditional use or an administrative conditional use shall be approved only if it is found to comply with this Article and the applicable review standards and special development conditions set forth in the zoning regulations and any other applicable requirements of this Ordinance.

Response: Applicant's request for approval for fill and riprap complies with CCZLDO 5.2 and the applicable review standards and special development conditions of CCZLDO 3.2.401, as explained below.

CCZLDO 3.2.401 - 11-RS Zone - General Conditions

General Condition #1 - Inventoried resources requiring mandatory protection in this district are subject to Policies #17 and #18.

CBEMP Policy #17

Protection of "Major Marshes" and "Significant Wildlife Habitat" in Coastal Shorelands

Local governments shall protect from development major marshes and significant wildlife habitat, coastal headlands, and exceptional aesthetic resources located within the Coos Bay Coastal Shorelands Boundary, except where exceptions allow otherwise.

I. Local government shall protect:

a. "Major Marshes" to include areas identified in the Goal #17, "Linkage Matrix", and the Shoreland Values Inventory map; and

b. "Significant wildlife habitats" to include those areas identified on the "Shoreland Values Inventory" map; and

c. "Coastal headlands"; and

d. "Exceptional aesthetic resources" where the quality is primarily derived from or related to the association with coastal water areas.

II. This strategy shall be implemented through:

a. Plan designations and use and activity matrices set forth elsewhere in this Plan that limit uses in these special areas to those that are consistent with protection of natural values; and

b. Through use of the Special Considerations Map that identified such special areas and restricts uses and activities therein to uses that are consistent with the protection of natural values. Such uses may include

propagation and selective harvesting of forest products consistent with the Oregon Forest Practices Act, grazing, harvesting wild crops, and low-intensity water-dependent recreation; and

c. Contacting Oregon Department of Fish and Wildlife for review and comment on the proposed development within the area of the 5b or 5c bird sites.

This strategy recognizes that special protective consideration must be given to key resources in coastal shorelands over and above the protection afforded such resources elsewhere in this Plan.

Response: The CCCP demonstrates that there are no resources that require protection in the Site area. The County's Shoreland Values Inventory Map does not depict any major marshes, significant wildlife habitat, or coastal headlands in the Site area. According to the CCCP, there are no exceptional aesthetic resources in the Site area: "There are no areas of exceptional or aesthetic or scenic quality within the Planning Area [See Section 4.3]." Plan Volume II, Part 2, Section 3.3-3. The Planning Area is defined as "all lands west of the Oregon Coast Highway," subject to limited exceptions not applicable here. Plan Volume II, Part 2, Section 3.1-1. The proposed Improvements run along the TPP, which is located west of U.S. Highway 101 (Oregon Coast Highway). Accordingly, the Planning area includes the Site area. Therefore, CBEMP Policy #17 does not apply to this request.

CBEMP Policy #18 - Protection of Historical, Cultural and Archaeological Sites

Local government shall provide protection to historical, cultural and archaeological sites and shall continue to refrain from widespread dissemination of site-specific information about identified archaeological sites.

I. This strategy shall be implemented by requiring review of all development proposals involving a cultural, archaeological or historical site, to determine whether the

project as proposed would protect the cultural, archaeological and historical values of the site.

II. The development proposal, when submitted shall include a Plot Plan, showing, at a minimum, all areas proposed for excavation, clearing and construction. Within three (3) working days of receipt of the development proposal, the local government shall notify the Coquille Indian Tribe and Coos, Siuslaw, Lower Umpqua Tribe(s) in writing, together with a copy of the Plot Plan. The Tribe(s) shall have the right to submit a written statement to the local government within thirty (30) days of receipt of such notification, stating whether the project as proposed would protect the cultural, historical and archaeological values of the site, or if not, whether the project could be modified by appropriate measures to protect those values.

"Appropriate measures" may include, but shall not be limited to the following:

a. Retaining the prehistoric and/or historic structure in situ or moving it intact to another site; or

b. Paving over the site without disturbance of any human remains or cultural objects upon the written consent of the Tribe(s); or

c. Clustering development so as to avoid disturbing the site; or

d. Setting the site aside for non-impacting activities, such as storage; or

e. If permitted pursuant to the substantive and procedural

requirements of ORS 97.750, contracting with a qualified archaeologist to excavate the site and remove any cultural objects and human remains, reinterring the human remains at the developer's expense; or

f. Using civil means to ensure adequate protection of the resources, such as acquisition of easements, public dedications, or transfer of title.

If a previously unknown or unrecorded archaeological site is encountered in the development process, the above measures shall still apply. Land development activities, which violate the intent of this strategy shall be subject to penalties prescribed in ORS 97.990.

III. Upon receipt of the statement by the Tribe(s), or upon expiration of the Tribe(s) thirty day response period, the local government shall review the Plot Plan and shall:

a. Approve the development proposal if no adverse impacts have been identified, as long as consistent with other portions of this plan, or

b. Approve the development proposal subject to appropriate measures agreed upon by the landowner and the Tribe(s), as well as any additional measures deemed necessary by the local government to protect the cultural, historical and archaeological values of the site. If the property owner and the Tribe(s) cannot agree on the appropriate measures, then the governing body shall hold a quasi-judicial hearing to resolve the

dispute. The hearing shall be a public hearing at which the governing body shall determine by preponderance of the evidence whether the development project may be allowed to proceed, subject to any modifications deemed necessary by the governing body to protect the cultural, historical and archaeological values of the site.

IV. Through the "overlay concept" of this policy and the Special Considerations Map, unless an exception has been taken, no uses other than propagation and selective harvesting of forest products consistent with the Oregon Forest Practices Act, grazing, harvesting wild crops, and low intensity water-dependent recreation shall be allowed unless such uses are consistent with the protection of the cultural, historical and archaeological values, or unless appropriate measures have been taken to protect the historic and archaeological values of the site. This strategy recognizes that protection of cultural, historical and archaeological sites is not only a community's social responsibility, it is also legally required by ORS 97.745. It also recognizes that cultural, historical and archaeological sites are non-renewable cultural resources.

Response: CBEMP Policy #18 applies only if there are identified historical, cultural, and archaeological resources in the Site area. According to the County's Shoreland Values Inventory Map, there are no such resources in the Site area. Therefore, CBEMP Policy #18 does not apply to Applicant's request for approval for fill and riprap.

General Condition #2 - All permitted uses and activities shall be consistent with Policy #23, requiring protection of riparian vegetation.

CBEMP Policy #23 - Riparian Vegetation and Streambank Protection

I. Local government shall strive to maintain riparian vegetation within the shorelands of this estuary and, when appropriate, restore or enhance it, as consistent with water dependent uses. Local government shall also encourage use of tax incentives to encourage maintenance of riparian vegetation, pursuant to ORS 308.792 - 308.803.

Appropriate provisions for riparian vegetation are set forth in the CCZLDO Section 4.5.180 (OR 92 05009PL).

II. Local government shall encourage streambank stabilization for the purpose of controlling streambank erosion along the estuary, subject to other policies concerning structural and nonstructural stabilization measures.

This strategy shall be implemented by Oregon Department of Transportation (ODOT) and local government where erosion threatens roads. Otherwise, individual landowners in cooperation with the Oregon International Port of Coos Bay, and Coos Soil and Water Conservation District, Watershed Councils, Division of State Lands and Oregon Department of Fish & Wildlife shall be responsible for bank protection.

This strategy recognizes that the banks of the estuary, particularly in the Coos and Millicoma Rivers are susceptible to erosion and have threatened valuable farm land, roads and other structures.

Response: This policy is aspirational in nature because it includes non-binding language such as stating that the County shall "strive" and shall "encourage." As a result, it is not a mandatory approval criterion.

General Condition #3 - Where "agricultural lands" or "forest lands" occur within this district as identified in the "Special Considerations Map", uses in these areas shall be limited to those permitted in Policies #28 and #34.

Response: This request does not involve any areas that the County's applicable maps designate as forest or agricultural lands. Therefore, CBEMP Policies #28 and #34 are not applicable.

General Condition #4 - Uses in this district are only permitted as stated in Policy #14, "General Policy on Uses within Rural Coastal Shorelands". Except as permitted outright, or where findings are made in this Plan uses are only allowed subject to the findings in this policy.

CBEMP Policy #14

General Policy on Uses within Rural Coastal Shorelands

I. Coos County shall manage its rural areas within the "Coos Bay Coastal Shorelands Boundary" by allowing only the following uses in rural shoreland areas, as prescribed in the management units of this Plan, except for areas where mandatory protection is prescribed by LCDC Goal #17 and CBEMP Policies #17 and #18:

a. Farm uses as provided in ORS 215.203;

b. Propagation and harvesting of forest products;

c. Private and public water-dependent recreation developments;

d. Aquaculture;

e. Water-dependent commercial and industrial uses, water-related uses, and other

uses only upon a finding by the Board of Commissioners or its designee that such uses satisfy a need which cannot be accommodated on uplands or shorelands in urban and urbanizable areas or in rural areas built upon or irrevocably committed to non-resource use.

f. Single-family residences on lots, parcels, or units of land existing on January 1, 1977, when it is established that:

1. The dwelling is in conjunction with a permitted farm or forest use, or

2. The dwelling is in a documented "committed" area, or

3. The dwelling has been justified through a goal exception; and

4. Such uses do not conflict with the resource preservation and protection policies established elsewhere in this Plan;

g. Any other uses, including non-farm uses and non-forest uses, provided that the Board of Commissioners or its designee determines that such uses satisfy a need which cannot be accommodated at other upland

locations or in urban or urbanizable areas. In addition, the above uses shall only be permitted upon a finding that such uses do not otherwise conflict with the resource preservation and protection policies established elsewhere in this Plan.

This strategy recognizes (1) that Coos County's rural shorelands are a valuable resource and accordingly merit special consideration, and (2) that LCDC Goal #17 places strict limitations on land divisions within coastal shorelands. This strategy further recognizes that rural uses "a through "g" above, are allowed because of need and consistency findings documented in the "factual base" that supports this Plan.

Response: The proposed Improvements are a location-specific use that cannot be accommodated at other upland locations or in urban or urbanizable areas under the language of subsection g. in CBEMP Policy #14. Applicant proposes the Improvement, and the fill and riprap necessary to construct it, for the purpose of increasing capacity and mitigating transportation impacts at the intersection of US 101 and the TPP that the Project's construction-related traffic may cause. The Improvements can only be located at the Site because it is the Project's traffic impact upon the Site that necessitates the Improvements in the first place.

The Project as a whole cannot be accommodated within an urban growth boundary or on existing rural exception lands because it requires a large number of contiguous acres, that allow water-dependent industrial uses, are sparsely populated, are compatible with surrounding uses, have few navigation restrictions, minimize environmental and safety impacts, and minimize cargo transit distance. Sites that meet these characteristics are in short supply. In fact, that analysis identified only four candidate sites, and the Applicant identified the subject property as the preferred site based upon these criteria. As additional support for this conclusion, the County should rely upon the factual base for the Comprehensive Plan, which also includes a detailed analysis of industrial land needs

and determines that there is insufficient urban land to accommodate industrial land needs. *See* Plan, Volume II, Part 2, Section 5.8.2. Furthermore, the Improvements do not conflict with the resource preservation and protection policies that the CBEMP sets forth, as explained above. Applicant has designed the Improvements, and the fill and riprap necessary to construct them, to minimize impacts to natural resources in the Site area.

For these reasons and based upon the evidence in the record, the County can find that the Improvement, together with the Project that it serves, satisfies a need that cannot be accommodated within an urban growth boundary or in a rural area irrevocably committed to non-resource use. Therefore, the Applicant's request for approval to construct the Improvements are consistent with CBEMP Policy #14.

General Condition #5 - In rural areas (outside of UGBs) utilities, public facilities and services shall only be provided subject to Policies #49, #50, and #51.

> **CBEMP Policy #49 - Rural Residential Public Services**
>
> **Coos County shall provide opportunities to its citizens for a rural residential living experience […].**

Response: Applicant is not requesting rural residential uses. Therefore, CBEMP Policy #49 does not apply to the Applicant's request for approval to construct the Improvements.

> **CBEMP Policy #50 - Rural Public Services**
>
> **Coos County shall consider on-site wells and springs [..]: fire districts, school districts, road districts, telephone lines, electrical and gas lines, and similar, low-intensity facilities and services traditionally enjoyed by rural property owners.**

Response: The TPP currently accommodates rural types and levels of service. The proposed Improvements, and the fill and riprap necessary to construct them, are the result of a need that ODOT identified for additional capacity to mitigate construction-related traffic concerns that the Project creates. Thus, the road, with the proposed Improvements, continues to provide rural types and levels of service. The County should

find that Applicant's request for approval to construct the Improvements satisfy CBEMP Policy #50.

CBEMP Policy #51 - Public Services Extension

> **I. Coos County shall permit the extension of existing public sewer and water systems to areas outside urban growth boundaries (UGBs) where such service provision is solely for: … [specified development or reasons].**

Response: The Improvements do not require any public sewer or water systems. Therefore, CBEMP Policy #51 does not apply to Applicant's request for approval to construct the Improvements.

CCZLDO 3.2.410 - 11-RS Zone - Special Conditions

> **Special Condition # 1 (3., 5.) - Fill and dredge material disposal shall not be allowed in areas of "wet meadow" wetland, as identified in the "Special Considerations Map," except as otherwise allowed in Policy #19.**

Response: According to the County's adopted Wet Meadows Map #33, there are no areas of "wet meadow" wetland in the Site area. Therefore, CBEMP Policy #19 does not apply to Applicant's request for approval for fill.

> **Special Condition # 2 (6b., 6c.) - These activities are permitted subject to the findings required by CBEMP Policy #9, "Solutions to Erosion and Flooding Problems."**
>
> **CBEMP Policy #9 - Solutions to Erosion and Flooding Problems**
>
> **Local government shall prefer nonstructural solutions to problems of erosion and flooding to structural solutions. Where shown to be necessary, water and erosion control structures such as jetties, bulkheads, seawalls and similar protective structures and fill whether located in the waterways or on shorelands above ordinary high water mark shall be**

designed to minimize adverse impacts on water currents, erosion and accretion patterns.

Response: The Site area is not subject to flooding and erosion problems, and Applicant is not undertaking the proposed Improvements for the purpose of solving any flooding or erosion problems; therefore, CBEMP Policy #9 does not apply to Applicant's request for approval for riprap.

Even if CBEMP Policy #9 did apply to Applicant's request, the proposal to asymmetrically construct the Improvements on the north side of the TPP is a design alternative using fill and riprap, and which does not use structural support such as retaining walls or bulkheads. Applicant's proposal minimizes impacts to the estuary by avoiding fill in direct hydraulic contact with the main channel estuary, avoiding hydraulic noise impacts caused by driving retaining wall piling in soft bay sediment, using positive turbidity containment to control silt migration, minimizing the size of needed revetment by impacting solely the north side of the TPP, and minimizing the duration of potential temporary impacts by using a single construction state during a single in-water work window.

For these reasons, Applicant's request for approval for riprap either satisfies CBEMP Policy #9, or CBEMP Policy #9 does not apply to Applicant's request.

I. Further, where listed as an "allowable" activity within the respective management units, riprap may be allowed in development Management Units upon findings that:

a. Land use management practices and nonstructural solutions are inadequate; and

b. Adverse impacts on water currents, erosion and accretion patterns are minimized; and

c. It is consistent with the Development management unit requirements of the Estuarine Resources Goal.

Response: Part I of CBEMP Policy #9 does not apply to Applicant's request for approval for fill and riprap because Applicant is requesting riprap in a Rural Shorelands Unit, not a Development Unit.

> **II. Further, where listed as an "allowable" activity within respective management units, riprap shall only be allowed in Conservation Aquatic (CA) units upon findings that:**
>
> > **a. Land use management practices and nonstructural solutions are inadequate; and**
> >
> > **b. Adverse impacts on water currents, erosion and accretion patterns are minimized; and**
> >
> > **c. Riprap is consistent with the resource capabilities of the area and the purposes of maintaining Conservation management units.**

Response: Part II of CBEMP Policy #9 does not apply to Applicant's request for approval for fill and riprap because Applicant is requesting riprap in a Rural Shorelands Unit, not a Conservation Aquatic Unit.

> **III. Further, where listed as an "allowable" activity within respective management units, riprap shall only be allowed in Natural Aquatic (NA) units upon findings that:**
>
> > **a. There is a need to protect from erosion: uses existing as of October 7, 1977, unique natural resources and historic archaeological values, or public facilities;**
> >
> > **b. Land use management practices and nonstructural solutions are inadequate;**

c. It is consistent with the natural management unit as set forth in this Plan and required by Goal #16; and

d. Adverse impacts on water currents, erosion and accretion patterns and estuarine organisms and their habitat are minimized.

Response: Part III of CBEMP Policy #9 does not apply to Applicant's request for approval for fill and riprap because Applicant is requesting riprap in a Rural Shorelands Unit, not a Natural Aquatic Unit.

Implementation of this strategy shall occur through local review of and comment on state and federal permit applications for such projects.

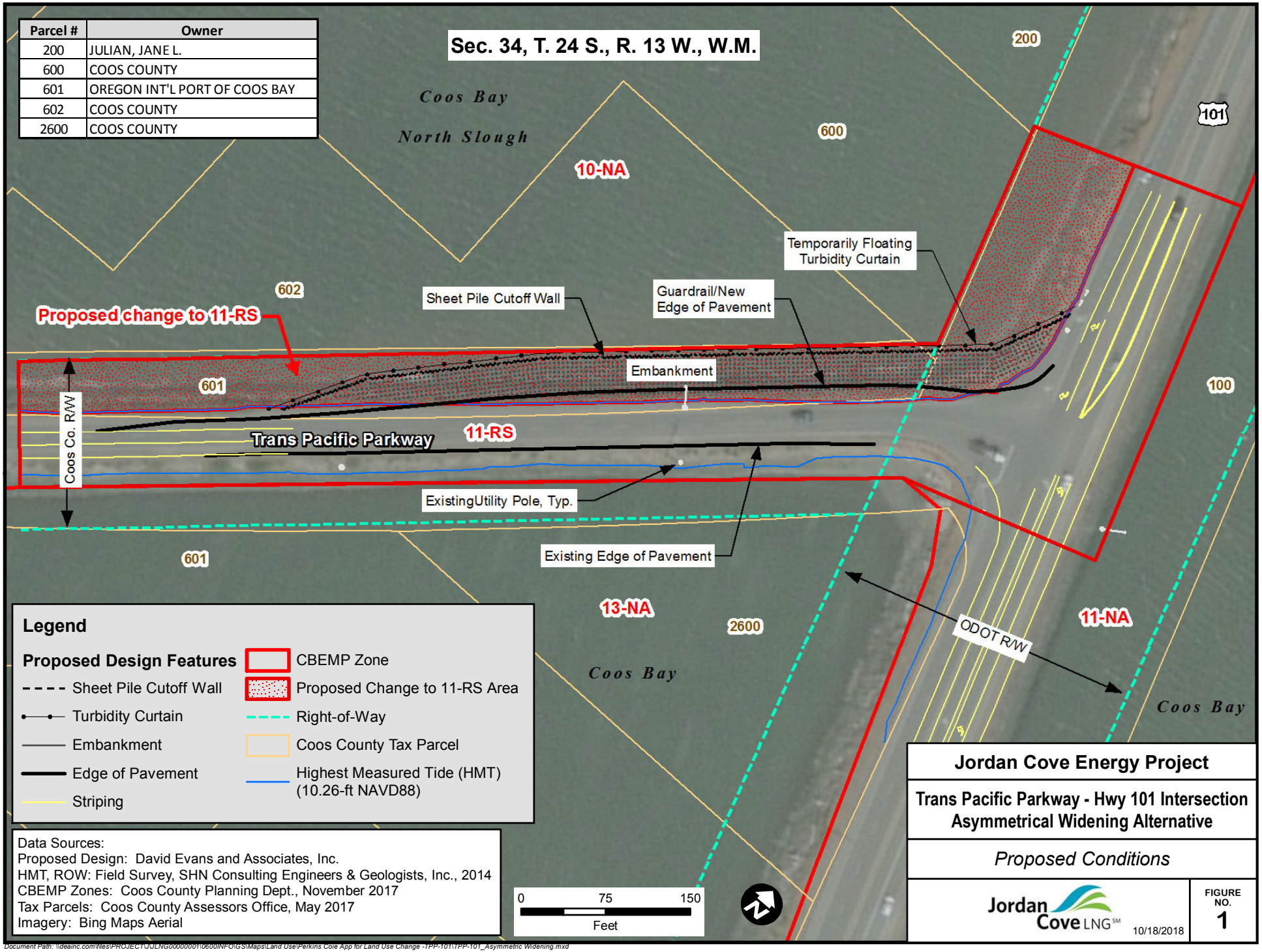
This strategy is based on the recognition that nonstructural solutions are often more cost-effective as corrective measures, but that carefully designed structural solutions are occasionally necessary. The strategy also recognizes LCDC Goals #16 and #17 requirements and the Oregon Administrative Rule classifying Oregon estuaries (OAR 660-17-000 as amended June, 1981).

Response: Applicant acknowledges these provisions of CBEMP Policy #9, which do not include additional substantive approval criteria.

For the reasons above, the County should find that Applicant's request for approval for fill and riprap satisfies all applicable General and Special Conditions in the 11-RS zone.

IV. Conclusion

Based upon the above explanation and the enclosed evidence, the County should approve the Applicant's requests to: (1) amend the CBEMP map to change the zoning designation of the Rezone Property from 10-NA to 11-RS; (2) amend the CCCP to take a reasons exception to Goal 16, to change the zoning designation of the Rezone Property; (3) amend the CCZLDO text to change the boundary descriptions of the 11-RS district to reflect the contemporaneous zone change; (4) determine that a widened "Land Transportation Facility" in the County's 11-RS zone complies with general standards and conditions; and (5) approve an ACU for fill and riprap in the County's 11-RS zone.



Parcel #	Owner
200	JULIAN, JANE L.
600	COOS COUNTY
601	OREGON INT'L PORT OF COOS BAY
602	COOS COUNTY
2600	COOS COUNTY

Data Sources:
Proposed Design: David Evans and Associates, Inc.
HMT, ROW: Field Survey, SHN Consulting Engineers & Geologists, Inc., 2014
CBEMP Zones: Coos County Planning Dept., November 2017
Tax Parcels: Coos County Assessors Office, May 2017
Imagery: Bing Maps Aerial

Document Path: \\dealnc.com\files\PROJECT\JOLNG00000001\0600\INFO\GIS\Maps\Land Use\Perkins Coie App for Land Use Change -TPP-101\TPP-101_Asymmetric Widening.mxd

Exhibit 21

PERKINSCOIE

1120 NW Couch Street
10th Floor
Portland, OR 97209-4128

T +1.503.727.2000
F +1.503.727.2222
PerkinsCoie.com

November 21, 2018

Steven L. Pfeiffer
SPfeiffer@perkinscoie.com
D. +1.503.727.2261
F. +1.503.346.2261

VIA OVERNIGHT DELIVERY

Jill Rolfe, Director
Coos County Planning Department
225 N Adams St
Coquille, OR 97423

Re: Concurrent Land Use Applications by Jordan Cove Energy Project L.P.
Coos Bay Estuary Navigation Reliability Improvements
County File Nos. _____

Dear Jill:

This office represents Jordan Cove Energy Project L.P. ("JCEP"). With this letter, please accept JCEP's concurrent land use applications to complete navigation reliability improvements for the Deep Draft Navigation Channel of the Coos Bay estuary. In support of these applications, enclosed please find the original and two copies of the following:

- Completed and signed Coos County Compliance Determination form, Coos County Planning Department Plan/Ordinance Amendment, Amendment/Rezone Application and Coos County Planning Department Land Use Application
- Check payable to "Coos County" for the application fee deposit ($5,355.00)
- Narrative explaining the proposal and how it complies with applicable approval criteria, with the following exhibits:
  - Exhibit 1 - Depictions of navigation reliability improvements
  - Exhibit 2 - Letters of support
  - Exhibit 3 - U.S. Coast Guard letters dated May 10, 2018 and November 7, 2018

- Exhibit 4 - Memorandum from David Evans & Associates Inc.
- Exhibit 5 - Depiction of temporary dredge pipeline

We are also sending an electronic copy of these materials to the County. We are hopeful that, upon receipt of these materials, the County will deem the applications complete and will process them for review as soon as possible.

Seth King (SKing@perkinscoie.com) and I are PCGP's representatives in this matter. Please copy both of us on all correspondence, notices, staff reports, and decisions in this matter.

If you have any questions or need any additional information, do not hesitate to contact me. We look forward to working with the County toward approval of this request. Thank you for your courtesies in this matter.

Very truly yours,

Steven L. Pfeiffer

SLP
Enclosures

cc: Seth King (via email) (w/encls.)
Client (via email) (w/encls.)

Compliance Determination

SUBMIT TO COOS COUNTY PLANNING DEPT. AT 225 N. ADAMS STREET OR MAIL TO: COOS COUNTY PLANNING 250 N. BAXTER, COQUILLE OR 97423. EMAIL PLANNING@CO.COOS.OR.US PHONE: 541-396-7770

Date Received: _____ *Fee Received* _____ *Receipt #:* _____ *Received by:* _____

Please be aware if the fees are not with the included the application will not be processed.

FILE # CD- _____ (If payment is received on line a file number is required prior to submittal)

Land Owner(s) (print name): State of Oregon by and through Dept. of State Lands

Mailing address: 775 Summer St. NE, Suite 100, Salem, OR 97301-1279

Phone: 503.986.5200 Email: dsl@dsl.state.or.us

Applicant(s) (print name): Jordan Cove Energy Project L.P.

Mailing address: Attn: Meagan Masten, 111 SW 5th Avenue, Suite 1100, Portland, OR 97204

Phone: _____ Email: mmasten@pembina.com

PROPERTY LOCATION:

Multiple within Coos Bay Estuary

Township Range Section Tax lot(s)

Site address

PROJECT DESCRIPTION: Requests for compliance determinations for:

(1) Temporary dredge transport line as "Temporary Alteration" in DDNC-DA and 3-DA; and

(2) Buoy as "Navigation Aid" in 5-DA.

An application for Compliance Determination (CD) is required to be submitted to the Planning Department with the elements described in §5.10.200. Once the application is received the Planning Staff will review the CD against the applicable zoning district to determine if additional reviews or notifications are required.

ACKNOWLEDGEMENT STATEMENT: PERTAINING TO THE SUBJECT PROPERTY DESCRIBED ABOVE, I HEREBY DECLARE THAT I AM THE LEGAL OWNER OF RECORD OR AN AGENT HAVING CONSENT OF THE LEGAL OWNER OF RECORD AND I AM AUTHORIZED TO OBTAIN THIS ZONING COMPLIANCE LETTER SO AS TO OBTAIN NECESSARY PERMITS FOR DEVELOPMENT FROM THE DEPARTMENT OF ENVIRONMENTAL QUALITY AND/OR THE BUILDING CODES AGENCY. THE STATEMENTS WITHIN THIS FORM ARE TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF. I UNDERSTAND THAT ANY PERMITS AND/OR AUTHORIZATION FOR DEVELOPMENT ISSUED BY THE PLANNING DEPARTMENT MAY BE REVOKED IF IT IS DETERMINED THAT IT WAS ISSUED BASED ON FALSE STATEMENTS, MISREPRESENTATIONS OR IN ERROR. AS A CONDITION FOR THE ISSUANCE OF THIS ZONING COMPLIANCE LETTER THE UNDERSIGNED HEREBY AGREES TO HOLD COOS COUNTY HARMLESS FROM AND INDEMNIFY THE COUNTY FOR ANY LIABILITY FOR DAMAGE WHICH MAY OCCUR AS A RESULT OF THE FAILURE TO BUILD, IMPROVE OR MAINTAIN ROADS WHICH SERVE AS ACCESS TO THE SUBJECT PROPERTY.

RURAL RESIDENTIAL COMPATIBILITY WITH FARM/FOREST MANAGEMENT PRACTICES: I HEREBY ACKNOWLEDGE THAT THE NORMAL INTENSIVE MANAGEMENT PRACTICES OCCURRING ON

ADJACENT RESOURCE LAND WILL NOT CONFLICT WITH THE RURAL RESIDENTIAL USE OR ENJOYMENT OF THE ABOVE DESCRIBED PROPERTY.

BY SIGNING THIS APPLICATION I AM ACKNOWLEDGING THAT I CAN ONLY DEVELOPE MY PROPERTY AS ALLOWED PURSUANT TO THE AUTHORIZATIONS GRANTED IN THE ZONING COMPLIANCE LETTER THAT WILL BE ISSUED. IF ADDITIONAL REVIEW IS REQUIRED I UNDERSTAND THAT IT IS MY RESPONSIBLY TO COMPLETE THE REVIEW. ALL APPLICABLE FEDERAL, STATE, AND LOCAL PERMITS SHALL BE OBTAINED PRIOR TO THE COMMENCEMENT OF ANY DEVELOPMENT ACTIVITY. ALL COSTS ASSOCIATED WITH COMPLYING WITH THE CONDITIONS ARE THE RESPONSIBILITY OF THE APPLICANT AND THAT THE APPLICANT IS NOT ACTING AS AN AGENT OF THE COUNTY.

APPLICANTS SIGNATURE: Natalie Eades

SUBMITTAL REQUIREMENTS PLEASE CHECK OFF

The application form must be completed and include the following:

1. ☒ Plot plan drawn to scale;
2. ☐ If this is for an industrial or commercial use a parking plan is required (see Article 7.5);
3. ☐ If this is bare land and a driveway has not be completed a driveway confirmation form is required to be completed by the Roadmaster (see Article 7.6 for bonding options);
4. ☐ If this is bare land and the request is for a dwelling an address is required;
5. ☒ If this is for an estuary zoned property as defined in Chapter III then applicable zoning district standards and policies must be addressed; and
6. ☒ Consent if not the legal owner of record.

Coos County / Official Use Only

☐ **Zoning Compliance Letter Issued** ☐ **Requires additional Review**

Planner: _____ **Date** _____

Version 5/2014

Coos County Planning Department
Plan/Ordinance Amendment

Receipt #: Check #/Cash Date Received by Fee

The following application is to be completed in full. An application cannot be accepted for a Plan/Ordinance Text Amendment without this information.

A. APPLICANT: Jordan Cove Energy Project L.P.
Mailing Address: Attn: Meagan Masten, 111 SW 5th Avenue, Suite 1100, Portland, OR 97204
Telephone: _____

B. DOCUMENT TO BE AMENDED:

Comprehensive Plan X CCZLDO X

TEXT X MAP _____ BOTH: _____

C. IDENTIFY THE TEXT TO BE AMENDED BY SECTION REFERENCE OR MAPS THAT NEED TO BE AMENDED BY NAME: (If amending text, attach the edits to this form, deletion should be shown with strikethrough and additions in bold Italicized. This should be submitted in a word format by email)

(1) Adopt reasons exception to Statewide Planning Goal 16; and
(2) Amend the "Specific Boundaries" of the DDNC-DA zone above CCZLDO 3.2.201.

CI. LIST APPLICABLE STATEWIDE OR LOCAL PLANNING GOALS OR OTHER CRITERIA: (please use additional page if necessary)

See application narrative.

F. APPLICANT'S STATEMENT

I, Natalie Eades for JCEP , have filed an application for an Amendment with the Coos County Planning Department to be reviewed and processed according to state and county requirements. I hereby acknowledge the following disclosures (please initial all statements below):

NE I understand that any representations, conclusions or opinions expressed by staff in the pre-application review, if one was conducted, for this request does not constitute final authority or approval and that I am not entitled to rely upon any such expressions in the place of final approval.

NE I understand I may ask questions and receive input from planning staff, but acknowledge that I am ultimately responsible for all information and documentation submitted with this application. I further understand planning staff cannot legally bind the County to any fact or

circumstance that conflicts with state or local laws and, in the event a conflict occurs, all such statements and agreements are void.

NE I understand I have the burden of demonstrating my application meets all of the applicable criteria. The criteria for approving or denying my request have been furnished to me as part of this application and I acknowledge receipt.

NE I understand planning staff is entitled to ask for additional information or documentation any time after the submission of this application if it is determined such information is needed for the review of my application.

NE I understand my application may be reviewed by the Oregon Department of Land Conservation and Development (DLCD). If this happens, and DLCD comments on the application, I understand DLCD has the authority to appeal the County's decision to the Oregon Land Use Board of Appeals, if it chooses to do so.

NE I understand it is the function of the planning office to impartially review my application and to address all issues affecting it regardless of whether the issues promote or hinder the approval of my application. In the event a public hearing is required to consider my application, I agree I bare the burden of proof. I understand that approval is not guaranteed and the applicant(s) bear the burden of proof to demonstrate compliance with the applicable review criteria.

_____ **ORS 215.416 Permit application; fees; consolidated procedures; hearings; notice; approval criteria; decision without hearing.** (1) When required or authorized by the ordinances, rules and regulations of a county, an owner of land may apply in writing to such persons as the governing body designates, for a permit, in the manner prescribed by the governing body. By signing this form you acknowledge that you are response to pay any debt caused by the processing of this application. Furthermore, the Coos County Planning Department reserves the right to determine the appropriate amount of time required to thoroughly complete any type of request and, by signing this page as the applicant and/or owner of the subject property, you agree to pay the amount owed as a result of this review. If this triggers a Measure 56 Notice or a Hearings Officer review you are responsible for that cost. If the amount is not paid within 30 days of the invoice, or other arrangements have not been made, the Planning Department may chose to revoke this permit or send this debt to a collection agency at your expense.

Natalie Eades

Applicant's Signature

11/2/18

Date

Coos County Planning Department
Coos County Courthouse Annex, Coquille, Oregon 97423
Mailing Address: 250 N. Baxter, Coos County Courthouse, Coquille, OR 97423
Physical Address: 225 N. Adams, Coquille, Oregon
(541) 396-7770
FAX (541) 396-1022 / TDD (800) 735-2900
planning@co.coos.or.us

Official Use Only
FEE: _____
Receipt No. _____
Check No./Cash _____
Date _____
Received By _____
File No. _____

AMENDMENT/REZONE APPLICATION

PLEASE SUBMIT 2 COMPLETE UNBOUND COPIES OF THIS APPLICATION
OR 1 ELECTRONIC AND ONE UNBOUND COPY

The following questions are to be completed in full. An application **will not** be accepted for an Amendment/Rezone without this information. The applicant should contact the Planning Department prior to filing, in order to determine a valid basis for the request.

The Board of Commissioners and Hearings Body will use these answers in their analysis of the merits of the request.

PLEASE PRINT OR TYPE:

A. APPLICANT:

Name: Jordan Cove Energy Project L.P. Telephone: _____
Address: Attn: Meagan Masten, 111 SW 5th Avenue, Suite 1100, Portland, OR 97204

As applicant, I am (check one):

☐ Property owner or a purchaser under a recorded land sale contract. "Property owner" means the owner of record, including a contract purchaser. The application shall include the signature of all owners of the property. A legal representative may sign on behalf of an owner upon providing evidence of formal legal authority to sign;

☒ A person or persons that have written consent of the property owner to make an application. A legal representative may sign on behalf of an owner upon providing evidence of formal legal authority to sign. In the case of an attorney a statement of representation shall accompany the application;

☐ Transportation agency, utility or entity that meets the criteria in Section 5.0.175 of the Coos County Zoning and Land Use Development Ordinance (CCZLDO)

If other than the owner, please give the owner's name and address:
State of Oregon by and through the Dept. of State Lands, 775 Summer St NE, Suite 100, Salem, OR 97301-1279

B. DESCRIPTION OF PROPERTY: Multiple

Township _____ Range _____ Section _____ Tax Lot _____
Account No. _____ Lot Size _____ Zoning District 59-CA, 2-NA, 3-DA
Existing Use Coos Bay Estuary

C. STATE SPECIFIC ZONE DISTRICT REQUESTED: DDNC-DA

D. JUSTIFICATION:

(1) If the purpose of this rezone request is to rezone one or more lots or parcels in the interior of an exclusive farm use zone for non-farm uses, the following question must be answered:
Were the lots or parcels for which a rezone request is made, physically developed for a non-farm use prior to February 16, 1983? N/A
Explain and provide documentation: _____

(2) If the purpose of this rezone request is for other than (1) above the following questions must be answered:

a. Will the rezone conform with the comprehensive plan? Yes.
Explain: See narrative.

b. Will the rezone seriously interfere with the permitted uses on other nearby parcels? No.
Explain: See narrative.

c. Will the rezone comply with other adopted plan policies and ordinances? Yes.
Explain: See narrative.

(3) If a Goal Exception is required please review and address this section.

All land use plans shall include identification of issues and problems, inventories and other factual information for each applicable statewide planning goal, evaluation of alternative courses of action and ultimate policy choices, taking into consideration social, economic, energy and environmental needs. The Coos County Comprehensive Plan (CCCP) and Implementing Zoning Land Development Ordinance (CCZLDO) was acknowledge[1] as having all necessary components of a comprehensive plan as defined in ORS 197.015(5) after the Coos County adopted the documents on April 4, 1985. The date of the effective plan and ordinance is January 1, 1986. Coos County did go through a periodic review exercise in the 1990's but due to lack of gain in population, economic growth and public request plan zones were not altered. Changes to the comprehensive plan and implementing ordinance have been done to ensure that any required statutory or rules requirements have been complied with. However, sometimes it is necessary for property owners or applicants to make a request to have certain properties or situations such as text amendments considered to reflect a current condition or conditions. These applications are reviewed on a case by case basis with the Board of Commissioners making a final determination. This type application and process is way to ensure that process is available to ensure changing needs are considered and met. The process for plan amendments and rezones are set out in CCZLDO Article 5.1.

Exception means a comprehensive plan provision, including an amendment to an acknowledged comprehensive plan, that; (a) Is applicable to specific properties or situations and does not establish a planning or zoning policy of general

[1] "Acknowledgment" means a commission order that certifies that a comprehensive plan and land use regulations, land use regulation or plan or regulation amendment complies with the goals or certifies that Metro land use planning goals and objectives, Metro regional framework plan, amendments to Metro planning goals and objectives or amendments to the Metro regional framework plan comply with the goals. In Coos County's case the commission refers to the Land Conservation and Development Commission.

applicability; (b) Does not comply with some or all goal requirements applicable to the subject properties or situations; and (c) Complies with standards for an exception.

NOTE: This information outlines standards at OAR 660-004-0025, 660-004-0028 and 660-04-0022 for goal exceptions, but is NOT to be considered a substitute for specific language of the OARs. Consult the specific Oregon Administrative Rule for the detailed legal requirements.

A local government may adopt an exception to a goal when one of the following exception process is justified:

(a) The land subject to the exception is "physically developed" to the extent that it is no longer available for uses allowed by the applicable goal;

(b) The land subject to the exception is "irrevocably committed" to uses not allowed by the applicable goal because existing adjacent uses and other relevant factors make uses allowed by the applicable goal impracticable; or

(c) A "reasons exception" addressing the following standards is met:

(1) Reasons justify why the state policy embodied in the applicable goals should not apply;

(2) Areas which do not require a new exception cannot reasonably accommodate the use;

(3) The long-term environmental, economic, social and energy consequences resulting from the use of the proposed site with measures designed to reduce adverse impacts are not significantly more adverse than would typically result from the same proposal being located in areas requiring a goal exception other than the proposed site; and

(4) The proposed uses are compatible with other adjacent uses or will be so rendered through measures designed to reduce adverse impacts. Compatible, as used in subparagraph (4) is not intended as an absolute term meaning no interference or adverse impacts of any type with adjacent uses. A local government approving or denying a proposed exception shall set forth findings of fact and a statement of reasons which demonstrate that the

Compatible, as used in subparagraph (4) is not intended as an absolute term meaning no interference or adverse impacts of any type with adjacent uses. A local government approving or denying a proposed exception shall set forth findings of fact and a statement of reasons which demonstrate that the standards for an exception have or have not been met.

PART III -- USE OF GUIDELINES Governmental units shall review the guidelines set forth for the goals and either utilize the guidelines or develop alternative means that will achieve the

E. REQUIRED SUPPLEMENTAL INFORMATION TO BE SUBMITTED WITH APPLICATION:

1. A legal description of the subject property (deed);
2. Covenants or deed restrictions on property, if any;
3. A general location map of the property;
4. A detailed parcel map of the property illustrating the size and location of existing and proposed uses and structures on 8 ½" x 11" paper. If proposed structures are not know then the plot plan will need to include only existing with a note that no new structures are proposed at this time;

5. If applicant is not the owner, documentation of consent of the owner, including:
   a. A description of the property;
   b. Date of consent
   c. Signature of owner
   d. Party to whom consent is given

6. The applicant must supply a minimum of 2 copies of the entire application or one paper copy and electronic copy (email is acceptable), including all exhibits and color photocopies, or as directed by the Planning Staff.

G. Authorization:

All areas must be initialed by all applicants, if this application pertains to a certain property all property owners[2] must either sign or provide consistent for application unless otherwise allowed by Section 5.0.175 of the CCZLDO. As an applicant by initializing each statement I am accepting or agreeing to the statements next to each area designated for my initials and/or signature. All property owners shall sign and initial the designated areas of the application or provide consent from another party to sign on their behalf. If another party is signing as part of a consent that does not release that party that gave consent from complying with requirements listed below or any conditions that may be placed on an application. In the case of a text amendment the procedures for set out in Section 5.1.110 WHO SEEK CHANGE applies and an applicant may not be a property owner.

NE I hereby attest that I am authorized to make the application and the statements within this application are true and correct to the best of my knowledge. I affirm to the best of my knowledge that the property is in compliance with or will become in compliance with CCCP and CCZLDO. I understand that any action authorized by Coos County may be revoked if it is determined that the action was issued based upon false statements or misrepresentation.

NE I understand it is the function of the planning staff to impartially review my application and to address all issues affecting it regardless of whether the issues promote or hinder the approval of my application. In the event a public hearing is required to consider my application, I agree, as applicant I have the burden of proof. I understand that approval is not guaranteed and the applicant(s) has the burden of proof to demonstrate compliance with the applicable review criteria.

NE As the applicant(s) I acknowledge that is in my desire to submit this application of free will and staff has not encouraged or discouraged the submittal of this application.

NE I understand as applicant I am responsible for actual cost of that review if the Board of Commissioners appoints a hearings officer to hear the application I have submitted. As applicant I will be billed for actual time of planning services, materials and hearings officer cost and if not paid the application maybe become void.

Applicant(s) Original Signature

Natalie Eades
Applicant(s) Original Signature

11/2/18
Date

[2] Property owner" means the owner of record, including a contract purchaser

Coos County Planning Department
Land Use Application

Official Use Only
FEE: _____
Receipt No. _____
Check No./Cash _____
Date _____
Received By _____
File No. _____

Please place a check mark on the appropriate type of review that has been requested.

☒ Administrative Review ☐ Hearings Body Review
☐ Final Development Plan (BDR) ☐ Variance

An **incomplete** application **will not** be processed. Applicant is responsible for completing the form and addressing all criteria. Attach additional sheets to answer questions if needed. Please indicated not applicable on any portion of the application that does not apply to your request.

A. Applicant:

Name: Jordan Cove Energy Project L.P. Telephone: _____
Address: Attn: Meagan Masten, 111 SW 5th Avenue, Suite 1100
City: Portland State: OR Zip Code: 97204

B. Owner:

Name: State of Oregon by and through the Dept. of State Lands Telephone: 503.986.5200
Address: 775 Summer St NE, Suite 100
City: Salem State: OR Zip Code: 97301-1279

C. As applicant, I am (check one): Please provide documentation.

☐ The owner of the property (shown on deed of record);

☐ The purchaser of the property under a duly executed written contract who has the written consent of the vendor to make such application (consent form attached).

☐ A lessee in possession of the property who has written consent of the owner to make such application (consent form attached).

☒ The agent of any of the foregoing who states on the application that he/she is the duly authorized agent and who submits evidence of being duly authorized in writing by his principal (consent form attached).

D. Description of Property: Multiple

Township _____ Range _____ Section _____ Tax Lot _____

Tax Account _____ Lot Size _____ Zoning District DDNC-DA, 59-CA, 55A-CA, 2-NA

E. Information (please check off as you complete)

- ☒ 1. Project Proposal. Attach description if needed. _____
- ☒ 2. A detailed parcel map of the subject property illustrating the size and location of existing and proposed uses, structures and roads on an 8½" x 11" paper to scale. Applicable distances must be noted on the parcel map along with slopes. (See example plot map)Covenants or deed restrictions on the property, if unknown contact title company.
- ☒ 3. Existing Use Coos Bay Estuary
- ☐ 4. Site Address N/A
- ☐ 5. Access Road N/A
- ☐ 6. Is the Property on Farm/Forest Tax Deferral No
- ☒ 7. Current Land Use (timber, farming, residential, etc.) estuary
- ☐ 8. Major Topography Features (streams, ditches, slopes, etc.) _____
- ☐ 9. List all lots or parcels that the current owner owns, co-owns or is purchasing which have a common boundary with the subject property on an assessment map.
- ☐ 10. Identify any homes or development that exists on properties identified in #9.
- ☐ 11. A copy of the current deed of record.

F. Proposed use and Justification

Please attach an explanation of the requested proposed use and **findings (or reasons)** regarding how your application and proposed use comply with the following the Coos County Zoning and Land Development Ordinance (LDO). Pursuant to the LDO, this application may be approved only if it is found to comply with the applicable criteria for the proposed use. Staff will provide you with the criteria; however, staff cannot provide you with any legal information concerning the adequacy of the submitted findings, there is no guarantee of approval and the burden rests on the applicant. (You may request examples of a finding)

☒ **List of Applicable Criteria and Justification:**

See narrative.

G. Authorization:

All areas must be initialed by all applicant(s) prior to the Planning Department accepting any application unless the statement is not applicable. If one of the statements, below is not applicable to your request indicated by writing N/A.

I hereby attest that I am authorized to make the application for a conditional use and the statements within this application are true and correct to the best of my knowledge and belief. I affirm that this is a legally created tract, lot or parcel of land. I understand that I have the right to an attorney for verification as to the creation of the subject property. I understand that any action authorized by Coos County may be revoked if it is determined that the action was issued based upon false statements or misrepresentation.

ORS 215.416 Permit application; fees; consolidated procedures; hearings; notice; approval criteria; decision without hearing. (1) When required or authorized by the ordinances, rules and regulations of a county, an owner of land may apply in writing to such persons as the governing body designates, for a permit, in the manner prescribed by the governing body. The governing body shall establish fees charged for processing permits at an amount no more than the actual or average cost of providing that service. The Coos County Board of Commissioners adopt a schedule of fees which reflect the average review cost of processing and set-forth that the Planning Department shall charge the actual cost of processing an application. Therefore, upon completion of review of your submitted application/permit a cost evaluation will be done and any balance owed will be billed to the applicant(s) and is due at that time. By signing this form you acknowledge that you are responsible to pay any debt caused by the processing of this application. Furthermore, the Coos County Planning Department reserves the right to determine the appropriate amount of time required to thoroughly complete any type of request and, by signing this page as the applicant and/or owner of the subject property, you agree to pay the amount owed as a result of this review. If the amount is not paid within 30 days of the invoice, or other arrangements have not been made, the Planning Department may choose to revoke this permit or send this debt to a collection agency at your expense.

I understand it is the function of the planning office to impartially review my application and to address all issues affecting it regardless of whether the issues promote or hinder the approval of my application. In the event a public hearing is required to consider my application, I agree I bear the burden of proof. I understand that approval is not guaranteed and the applicant(s) bear the burden of proof to demonstrate compliance with the applicable review criteria.

As applicant(s) I/we acknowledge that is in my/our desire to submit this application and staff has not encouraged or discouraged the submittal of this application.

_____	Natalie Eades
Applicant(s) Original Signature	Applicant(s) Original Signature
_____	Natalie Eades
Print Name	Print Name

BEFORE THE PLANNING COMMISSION AND

BOARD OF COMMISSIONERS OF COOS COUNTY, OREGON

In the Matter of Requests to Improve the Navigation Efficiency and Reliability of the Coos Bay Deep Draft Navigation Channel by Approving the Following Applications: (1) Map Amendments to the Coos Bay Estuary Management Plan to Change the Designation of 10.53 Acres of 2-NA, 2.18 Acres of 3-DA, and 10.51 Acres of 59-CA to DDNC-DA; (2) an Amendment of the Coos County Comprehensive Plan to take a Reasons Exception to Statewide Planning Goal 16 to Authorize These Three Map Amendments; (3) a Text Amendment to the Coos County Zoning and Land Development Ordinance to Refine the Location of the DDNC-DA Designation; and (4) Conditional Use Permit to Allow New and Maintenance Dredging at the Locations of the Three Map Amendments, Along with an Accessory Temporary Dredge Transport Line in the 59-CA, 55A-CA, 2-NA, DDNC-DA, and 3-DA Districts and an Accessory Buoy in the 5-DA District.	**NARRATIVE IN SUPPORT OF THE APPLICATIONS FILED BY THE JORDAN COVE ENERGY PROJECT L.P.**

I. Land Use Requests.

Jordan Cove Energy Project L.P. ("JCEP") proposes to make navigation efficiency and reliability improvements to the Coos County ("County")-designated Coos Bay Deep-Draft Navigation Channel ("Channel") by dredging three submerged areas lying adjacent to

the existing Channel.[1] This dredging will allow for vessel transit under a broader weather window to enable JCEP to export the full capacity of the optimized design production of 7.8 metric tonnes per annum ("mtpa") from JCEP's liquefied natural gas ("LNG") terminal on the nearby North Spit.

JCEP submits the following concurrent applications ("Applications") to the County to seek local authorization to complete these improvements to the Channel:

(1) Post-acknowledgment amendments to the Coos Bay Estuary Management Plan ("CBEMP") map at three Coos Bay locations depicted in Exhibit 1 to these Applications ("Navigation Reliability Improvement Sites" or "NRI Sites") to change the zoning designation of approximately 10.51 acres of 59-CA, approximately 10.53 acres of 2-NA, and approximately 2.18 acres of 3-DA, to DDNC-DA;

(2) A post-acknowledgment amendment of the CBEMP, which is part of the Coos County Comprehensive Plan ("CCCP"), to take a reasons exception to Statewide Planning Goal ("Goal") 16 text amendment adopted of the CBEMP, which is part of the Coos County Comprehensive Plan ("CCCP"), in the form of a reasons exception to Statewide Planning Goal ("Goal") 16 to authorize the rezone of the NRI Sites to DDNC-DA;

(3) An amendment of the text of the Coos County Zoning and Land Development Ordinance ("CCZLDO") to clarify that the DDNC-DA designation is appropriate for application to area adjacent to, and not only within, the designated federal navigation channel;

(4) Administrative conditional use permit to authorize new and maintenance dredging at the NRI Sites in the DDNC-DA zone, as this Application proposes to amend those sites. The activities at the NRI Sites will be referred to in this narrative as the "NRIs." Accessory to this dredging, JCEP will maintain a temporary dredge transport pipeline in the 59-CA, 55A-CA, 2-NA, DDNC-DA, and 3-DA districts and a buoy in the 5-DA district.

This narrative provides the evidentiary basis and related analysis demonstrating how the Application satisfies the applicable approval criteria set forth in the Statewide Planning

[1] JCEP is also proposing to widen and deepen the Channel in a fourth location, which is subject to the planning and zoning jurisdiction of the City of Coos Bay. That request is outside the scope of these Applications. JCEP is filing a separate land use application with the City of Coos Bay to obtain authorization for the navigability enhancements at this fourth location.

Goals ("Goals"), the Oregon Revised Statutes ("ORS"), the CBEMP, and the CCZLDO. Based upon this evidence and argument, the County should approve the Applications.

II. Description of Request.

A. Current Constraints on Utilizing the Channel.

The Channel serves a vital purpose because it provides the only safe vessel access to and from Coos Bay and the Pacific Ocean for marine terminals located along the Bayfront. The Channel was initially authorized in 1899 and since then has undergone ten modifications. Most recently, the Channel was expanded from -35 feet to -37 feet in 1997 to allow for the safe navigation and transit of Coos Bay for the size of ships prevalent during that time period. However, over the last 20 years the dimensions and tonnage of ships serving terminals in Coos Bay has increased. The size of vessels typically calling on Coos Bay terminals has increased from an average of 45,422 Metric Tonnes to an average of 52,894 Metric Tonnes with a projected near-term vessel size of 70,400 Metric Tonnes.

Currently, environmental conditions, including wind, fog, and currents, coupled with the increasing ship size explained above, have caused the Coos Bay Pilots Association[2] ("Pilots") to impose ever more limiting restrictions on when vessels may safely transit the Channel. These restrictions, in turn, cause significant delays and increased pressure on the Pilots to navigate ships through the Channel. Delays are measured in the total transit time, from the time the vessel arrives off the coast of Coos Bay until it returns offshore after calling at its local Coos Bay destination. These delays generally decrease the efficiency and competitiveness of maritime commerce on a global scale, thereby jeopardizing continued success for maritime commerce in Coos Bay. Minimizing delay is a pressing need because companies that utilize the port of Coos Bay have identified potential new customers in Asia that desire to export cargo using bulk carriers that are slightly larger than the ships typically calling today. Various marine terminal businesses within Coos Bay require assurances that terminals can efficiently accommodate larger dimension bulk carriers in the future.

[2] The Pilots, regulated and approved by the State of Oregon, are responsible for supporting deep sea vessel Masters in navigating their vessels into and out of the Channel. Pilotage is mandatory in Oregon. The Pilots serve a vital function for maritime commerce in Coos Bay because they safely and efficiently guide vessels through the Channel (known as pilotage) using visual aids, radar, and other means. The Channel provides the only safe vessel access to marine terminals within Coos Bay. Pilots are trained to navigate the Channel and therefore have detailed knowledge of its bathymetric conditions and visual layout.

B. How NRIs will Improve Navigation Efficiency and Reliability.

Dredging to complete the NRI Sites will increase the available operational window to safely transit any vessel through the Channel. The NRIs, which are described in more detail below, are designated to increase the environmental operating windows for all ships entering Coos Bay by softening critical turns, relocate aids to navigation and reduce the required Channel directional changes. The NRIs are designed to reduce entry and departure delays and allow for more efficient vessel transits through the Channel for the size of vessels entering the Port today.

The NRIs will allow companies to secure emerging opportunities to export products with today's larger vessels, including bulk carriers of up to 299.9 meters (983.3 feet) in length, 49 meters (160.8 feet) in beam, and 11.9 meters (39 feet) in draft. Although log export vessels serving the upper bay are smaller, the proposed enhancements also benefit these vessels by broadening the tidal and environmental windows for transiting the Channel, providing an enhanced margin of safety and improved efficiency in the loaded vessel departure schedule. Both Roseburg Forest Products and the Pilots have submitted letters of support for the NRIs. *See* Exhibit 2.

For JCEP and its LNG terminal, the NRI enhancements will allow for transit of LNG vessels of similar overall dimensions to those listed in the July 1, 2008 United States Coast Guard ("USCG") Waterway Suitability Report and United States Coast Guard letter confirmation dated November 7, 2018 *see* Exhibit 3, but under a broader range of weather conditions, specifically higher wind speeds. As a result, JCEP estimates that, upon completion of the NRIs, JCEP will be able to export the full capacity of the optimized design production of the LNG Terminal on a consistent annual basis.

C. Description of Channel NRIs.

The NRIs are illustrated in Exhibit 1 and consist of the following specific navigation enhancements to the Channel:

- NRI #1: Coos Bay Inside Range Channel and Right Turn to Coos Bay Range (Points # 6, 7, 8) – Reduce the constriction to vessel passage at the inbound entrance to the Coos Bay Inside Range for a ship making the 95-degree turn from the Entrance Range through the Entrance Turn and Range while continuously carrying to the east side of the Channel. After making this 95-degree turn, the ship has the need to center itself in the Channel and prepare to make a 21-degree right turn into the Coos Bay Range within a distance of about 2.0 ship lengths, which is much less than the minimum of 5.0 ship lengths recommended by normal industry guidance (US Army Corps of Engineers Engineering and Design

Hydraulic Design of Deep-Draft Navigation Projects (EM 1110-2-1613) Chapter 8-2). Address these challenges by widening the Coos Bay Inside Range channel from the current 300 feet to 450 feet. Lengthen the total corner cutoff on the Coos Bay Range side of the 21-degree turn from the current 850 feet to about 1,400 feet from the turn's apex. NRI #1 is located in an area that currently has the 59-CA zoning designation.

- NRI #2: Turn from Coos Bay Range to Empire Range Channels (Points #9 & 10) – The current corner cutoff distance from the apex of this turn of only 500 feet, which is much less than one ship length, is inadequate to allow deep draft vessels to start their turn early enough to safely make the turn and be positioned in the center of the next channel. Widening the turn area from the Coos Bay Range to the Empire Range from the current 400 feet to about 600 feet at the apex of the turn. Lengthening the total corner cutoff area of the turn from the current 1000 feet to about 3500 feet, or about 4.0 ship lengths, will allow vessels to commence their turn much earlier and make this turn much safer. NRI #2 is located in an area that currently has the 2-NA zoning designation.

- NRI #3: Turn from Empire Range to Lower Jarvis Range Channels (Points #11 & 12) – During inbound transits, it is very difficult to make this 16-degree left turn without crossing the boundary of the existing Channel on the west side. Adding a corner cut about 1150 feet in length on the west side to enhance inbound vessel navigational safety during the left turn from the Empire Range into the Lower Jarvis Range will provide the additional room necessary to safely make this turn with the slightly longer vessels. NRI #3 is located in an area that currently has the 3-DA zoning designation.

The three submerged areas in the County proposed for re-designation would be dredged to a -37-foot MLLW elevation to match the current depth of the Channel. Dredging of the NRIs would include a two-foot over-dredge allowance and a two-foot advanced maintenance allowance (total depth: -41-feet MLLW). Channel side slopes would be constructed at a 3:1 horizontal to vertical slope. Notably, these improvements have been identified by the USCG as a required navigation risk mitigation measure for the JCEP terminal operations. *See* Letter of Recommendation from USCG dated May 10, 2018 in Exhibit 3.

D. Proposed Dredging and Accessory Transport Activities.

JCEP will accomplish the Channel enhancements by dredging at each of the NRI Sites. Dredging would be accomplished with mechanical or hydraulic methods. The specific

characteristics of the dredging are described in the memorandum from David Evans & Associates, Inc. ("DEA") included in Exhibit 4 and are summarized as follows:

NRI ID NO.	APPROX. CHANNEL MILE	ZONING	AFFECTED LAND AREA	VOLUME OF DREDGED MATERIAL	TYPE OF DREDGED MATERIAL
1	2	59-CA	10.51 acres	350,200 cu. yds.	Rock and sand
2	4	2-NA	10.53 acres	184,000 cu. yds.	Rock and sand
3	6	3-DA	2.18 acres	25,200 cu. yds.	Rock and sand

All work associated with the NRIs will take place during the approved in-water work period for Coos Bay (October 1 to February 15), unless otherwise approved.

JCEP will place initial and future dredged material derived from the NRI Sites at the APCO 1 and 2 sites near the southern terminus of the U.S. Highway 101 McCullough Bridge. These sites are located in the City of North Bend; JCEP will file a separate application with the City to authorize disposal of these dredge spoils in these locations.

If dredging by hydraulic methods, JCEP will utilize a 24-inch dredge line to transport the dredged material to the disposal sites via a temporary pipeline on the bottom or horizontal extent of the Channel to reduce potential conflicts with vessel navigation. The maximum distance from the NRIs to the APCO sites is approximately 8.3-miles. The dredge line is illustrated in Exhibit 5. Booster pumps would be required to move the material to the disposal sites.

III. Applicable Approval Criteria.

The Application complies with all applicable approval criteria, as follows.

A. CBEMP Map Amendment

1. CCZLDO Provisions

CCZLDO 5.1.200 - Rezones:

Rezoning constitutes a change in the permissible use of a specific piece of property after it has been previously zoned. Rezoning is therefore distinguished from original zoning and amendments to the text of the Ordinance in that it entails the application of a pre-existing zone classification to a specific piece of property, whereas both original zoning and amendments to the text of the Ordinance are general in scope and apply more broadly.

RESPONSE: The County uses a single map to designate zoning districts for its comprehensive plan and the CCZLDO. Thus, CCZLDO 5.1.200, which governs rezones, establishes the applicable process and approval criteria for an amendment of the CBEMP map to change the zoning designations of the three NRI Sites depicted in Exhibit 1 to DDNC-DA.

CCZLDO 5.1.225 - Decisions of the Hearings Body For a Rezone

The Hearings Body shall, after a public hearing on any rezone application, either:

1. Recommend the Board of Commissioners approve the rezoning, only if on the basis of the initiation or application, investigation and evidence submitted, all the following criteria are found to exist:

a. The rezoning will conform with the Comprehensive Plan or Section 5.1.215; and

b. The rezoning will not seriously interfere with permitted uses on other nearby parcels; and

c. The rezoning will comply with other policies and ordinances as may be adopted by the Board of Commissioners.

RESPONSE: The County should make the above findings regarding JCEP's request to rezone the NRI Sites depicted in Exhibit 1 to DDNC-DA. This Application also includes a request to amend the CBEMP in the form of a reasons exception to support the rezone pursuant to Goal 2 and OAR 660-004. Thus, if the County approves the reasons exception, JCEP's request to rezone the NRI Sites will comply with the CCCP, as amended. Even if the County did not approve the reasons exception, the rezoning would not violate any policy of the CCCP, and would therefore comply with it. The purpose of the rezone is to allow the NRIs, which are designed to provide for more efficient navigation in the Channel, and the submerged nature of the proposed dredging within state-owned lands ensure no adverse effects on adjacent properties or uses/activities. Finally, the rezone will comply with other policies and ordinances as may be adopted by the Board of Commissioners, should the Board adopt them. Therefore, the County should find that the zone change satisfies this criterion.

2. Statewide Planning Goals

Post-acknowledgment plan amendments must be in compliance with the Oregon Statewide Planning Goals ("Goals"). ORS 197.175(2)(a); *1000 Friends of Oregon v. LCDC*,

301 Or 447, 724 P2d 268 (1986). The rezoning is a post-acknowledgment plan amendment. Therefore, the County's decision must explain why the rezoning is in compliance with the Goals. Alternatively, if a Goal is not applicable, the County must adopt findings explaining why that Goal is not applicable. *Davenport v. City of Tigard*, 22 Or LUBA 577, 586 (1992). The responses below provide findings explaining why the Applications are in compliance with the Goals, or alternatively, why the Goals are not applicable to the Applications.

Goal 1: Citizen Involvement.

To develop a citizen involvement program that insures the opportunity for citizens to be involved in all phases of the planning process.

RESPONSE: Goal 1 requires local governments to adopt and administer programs to ensure the opportunity for citizens to be involved in all phases of the planning process. The County has adopted such a program for PAPAs, and it is incorporated within the CCCP and CCZLDO and has been acknowledged by LCDC. Among other things, the County's program requires notice to citizens, agencies, neighbors, and other interested parties followed by multiple public hearings before the County makes a decision on the Application. These procedures will provide ample opportunity for citizen involvement in all phases of these Applications. The County should find that, upon compliance with the County's notice and hearing procedures, the County has reviewed the Applications in a manner consistent with Goal 1. *See Wade v. Lane County*, 20 Or LUBA 369, 376 (1990) (Goal 1 is satisfied as long as the local government follows its acknowledged citizen involvement program).

Goal 2: Land Use Planning.

To establish a land use planning process and policy framework as a basis for all decisions and actions related to use of land and to assure an adequate factual base for such decisions and actions.

RESPONSE: Goal 2 requires establishing a land use planning process and policy framework as a basis for all land use decisions and requires an adequate factual base for all land use decisions. In the present case, the provisions of the CCZLDO and the ORS establish the land use planning process and policy framework for considering the Application. Further, the enclosed materials, including this narrative, demonstrate that the Application satisfies all applicable approval criteria. As such, there is an adequate factual base for the County's decision.

Additionally, Goal 2 requires that the County coordinate its review and decision on the Applications with appropriate government agencies. In its review of the Applications, the County has provided notice and an opportunity to comment to affected government agencies, including nearby cities and the State Departments of Land Conservation and Development and Transportation.

The County should find that the Application is consistent with Goal 2.

Goal 3: Agricultural Lands.

To maintain and preserve agricultural lands.

RESPONSE: Goal 3 concerns agricultural lands. The NRI sites do not include any agricultural lands, and approval of the amendments will not impact any agricultural lands. Therefore, the County should find that Goal 3 is not applicable to the Application.

Goal 4: Forest Lands.

To conserve forest lands by maintaining the forest land base and to protect the state's forest economy by making possible economically efficient forest practices that assure the continuous growing and harvesting of forest tree species as the leading use on forest land consistent with sound management of soil, air, water, and fish and wildlife resources and to provide for recreational opportunities and agriculture.

RESPONSE: Goal 4 protects forest lands. The NRI sites do not include any forest lands, and approval of the amendments will not impact any forest lands. Therefore, the County should find that Goal 4 is not applicable to the Application.

Goal 5: Natural Resources, Scenic and Historic Areas, and Open Spaces.

To protect natural resources and conserve scenic and historic areas and open spaces.

RESPONSE: Goal 5 protects certain types of inventoried resources. The NRI Sites do not include any inventoried Goal 5 resources, and approval of the Applications will not impact any Goal 5 inventoried resources. Therefore, the County should find that Goal 5 is not applicable to the Application.

Goal 6: Air, Water and Land Resources Quality.

To maintain and improve the quality of the air, water and land resources of the state.

RESPONSE: Goal 6 requires comprehensive plans to follow multiple guidelines to conserve the quality of air, water and land resources in the state. The Goal exception that this Application proposes will not undermine the CCCP's implementation of these guidelines. JCEP anticipates that completing the NRIs will have effects upon air, water and land resources in the County, but these effects will be temporary, insignificant, or both, and JCEP will complete the NRIs using methods to protect these resources.

In a post-acknowledgment plan amendment proceeding, the County is only required to find that it is reasonable to expect that federal and state environmental standards will be met in the future when permits for the dredging are sought. *Nicita v. City of Oregon City*, 74 Or LUBA 176 (2016). For two reasons, the County should find that it is reasonable to expect that JCEP's proposed dredging will satisfy federal and state environmental standards. First, JCEP has applied for state and federal approval of dredging activities at the NRI Sites, and there is no indication that JCEP is precluded as a matter of law from obtaining approval of these applications. Second, the proposed map amendments do not alter existing County protections provided by the CBEMP restricting dredging activities, which protections have been previously deemed consistent with Goal 6, and are addressed later in this narrative.

For the above reasons, the Application complies with Goal 6.

Goal 7: Areas Subject to Natural Hazards.

To protect people and property from natural hazards.

RESPONSE: Goal 7 requires local governments to identify and plan for natural hazard areas, and coordinate their natural hazard plans and programs with state agencies. The County has a natural hazard inventory and has made provisions for consideration, through the CCZLDO, of natural hazards during the land use planning process. This Application complies with Goal 7 because it complies with the CCZLDO's natural hazard provisions, which implement the County's approved comprehensive plan.

Goal 8: Recreational Needs.

To satisfy the recreational needs of the citizens of the state and visitors, and where appropriate, to provide for the siting of necessary recreational facilities including destination resorts.

RESPONSE: Goal 8 does not apply to the Application because it does not involve recreational needs.

Goal 9: Economic Development.

To provide adequate opportunities throughout the state for a variety of economic activities vital to the health, welfare, and prosperity of Oregon's citizens.

RESPONSE: The Application complies with Goal 9. The purpose of the Application is to complete the NRIs, which in turn will facilitate a broader operational window, and increase safety and efficiency of transit, in the Channel. This will be a boon to the economic prospects for the County and the state, because it will make the Channel safer and more efficient for productive economic enterprises of the kind that provide opportunities to Oregonians.

Goal 10: Housing.

To provide for the housing needs of the citizens of the state.

RESPONSE: Goal 10 and its implementing rules require each local government to inventory the supply of buildable residential lands and to ensure that the supply of such buildable lands meets the local government's anticipated housing needs. The Application will not affect the supply of residential lands in the County. Therefore, the County should find that the Application is consistent with Goal 10, to the extent it is applicable.

Goal 11: Public Facilities and Services.

To plan and develop a timely, orderly and efficient arrangement of public facilities and services to serve as a framework for urban and rural development.

RESPONSE: Goal 11 does not apply to the Application because the Application does not involve or affect public facilities and services as a framework for development.

Goal 12: Transportation.

To provide and encourage a safe, convenient and economic transportation system.

RESPONSE: The Application complies with Goal 12. Goal 12 directs local governments to plan transportation systems that consider all modes of transportation, including water, that facilitate the flow of goods and services so as to strengthen the local and regional economy, that conserve energy, and that avoid principal reliance on one mode of transportation. The Application furthers these goals by supporting safer and more efficient use of the Channel for water transportation. This safer and more efficient use of the Channel will conserve energy that is currently wasted when, outside

the Channel's operational window, vessels wait outside the Channel, using fuel and adding time and expense to transit.

Goal 13: Energy Conservation.

To conserve energy.

RESPONSE: The Application complies with Goal 13. Goal 13 directs local governments to manage land use so as to maximize the conservation of all forms of energy. The Application will facilitate maximal energy conservation by increasing the safety and efficiency of vessel transit of the Channel, and by increasing the Channel's operational window. This will reduce the amount of time vessels spend waiting to enter and navigate the Channel due to environmental conditions that exceed those required by the Pilots for a safe vessel transit, which will increase the efficiency of material transportation and reduce energy waste from inefficiency of transportation.

Goal 14: Urbanization.

To provide for an orderly and efficient transition from rural to urban land use.

RESPONSE: Goal 14 does not apply to the Application, which does not involve urban development on rural land.

Goal 15: Willamette River Greenway.

To protect, conserve, enhance and maintain the natural, scenic, historical, agricultural, economic and recreational qualities of lands along the Willamette River as the Willamette River Greenway.

RESPONSE: Goal 15 only applies to lands along the Willamette River. The Modification Sites are not located along the Willamette River or in the Willamette River Greenway. Approval of the amendments will not impact the Willamette River of the Willamette River Greenway. Therefore, the County should find that Goal 15 is not applicable to the Applications.

Goal 16: Estuarine Resources.

To recognize and protect the unique environmental, economic, and social values of each estuary and associated wetlands; and to protect, maintain, where appropriate develop, and where appropriate restore the long-term environmental, economic, and social values, diversity and benefits of Oregon's estuaries.

…

MANAGEMENT UNITS

Diverse resources, values, and benefits shall be maintained by classifying the estuary into distinct water use management units. When classifying estuarine areas into management units, the following shall be considered in addition to the inventories:

1. Adjacent upland characteristics and existing land uses;

2. Compatibility with adjacent uses;

3. Energy costs and benefits; and

4. The extent to which the limited water surface area of the estuary shall be committed to different surface uses.

At a minimum, the following kinds of management units shall be established:

1. Natural -- in all estuaries, areas shall be designated to assure the protection of significant fish and wildlife habitats, of continued biological productivity within the estuary, and of scientific, research, and educational needs. These shall be managed to preserve the natural resources in recognition of dynamic, natural, geological, and evolutionary processes. Such areas shall include, at a minimum, all major tracts of salt marsh, tide flats, and seagrass and algae beds. Permissible uses in natural management units shall include the following:

a. Undeveloped low-intensity, water-dependent recreation;

b. Research and educational observations;

c. Navigation aids, such as beacons and buoys;

d. Protection of habitat, nutrient, fish, wildlife, and aesthetic resources;

e. Passive restoration measures;

f. Dredging necessary for on-site maintenance of existing functional tide gates and associated drainage channels and bridge crossing support structures;

g. Riprap for protection of uses existing as of October 7, 1977, unique natural resources, historical and archaeological values; and public facilities; and

h. Bridge crossings.

Where consistent with the resource capabilities of the area and the purposes of this management unit the following uses may be allowed:

a. Aquaculture which does not involve dredge or fill or other estuarine alteration other than incidental dredging for harvest or benthic species or removable in-water structures such as stakes or racks;

b. Communication facilities;

c. Active restoration of fish and wildlife habitat or water quality and estuarine enhancement;

d. Boat ramps for public use where no dredging or fill for navigational access is needed; and

e. Pipelines, cables, and utility crossings, including incidental dredging necessary for their installation.

f. Installation of tide gates in existing functional dikes.

g. Temporary alterations.

h. Bridge crossing support structures and dredging necessary for their installation.

A use or activity is consistent with the resource capabilities of the area when either the impacts of the use on estuarine species, habitats, biological productivity and water quality are not significant or that the resources of the area are able to assimilate the use and activity and their effects and continue to function in a manner to protect significant wildlife habitats, natural biological productivity, and values for scientific research and education.

2. Conservation -- in all estuaries, except those in the overall Oregon Estuary Classification which are classed for preservation, areas shall be designated for long-term uses of renewable resources that do not require major alteration of the estuary, except for the purpose of restoration. These areas shall be managed to conserve the natural resources and benefits. These shall include areas needed for maintenance and enhancement of biological productivity, recreational and aesthetic uses, and aquaculture. They shall include tracts of significant habitat smaller or of less biological importance than those in (1) above, and recreational or commercial oyster

and clam beds are not included in (1) above. Areas that are partially altered and adjacent to existing development of moderate intensity which do not possess the resource characteristics of natural or development units shall also be included in this classification. Permissible uses in conservation management units shall be all uses listed in (1) above except temporary alterations. Where consistent with the resource capabilities of the area and the purposes of this management unit the following uses may be allowed:

a. High-intensity water-dependent recreation, including boat ramps, marinas and new dredging for boat ramps and marinas;

b. Minor navigational improvements;

c. Mining and mineral extraction, including dredging necessary for mineral extraction;

d. Other water dependent uses requiring occupation of water surface area by means other than dredge or fill;

e. Aquaculture requiring dredge or fill or other alteration of the estuary;

f. Active restoration for purposes other than those listed in 1(d).

g. Temporary alterations.

A use or activity is consistent with the resource capabilities of the area when ether the impacts of the use on estuarine species, habitats, biological productivity, and water quality are not significant or that the resources of the area are able to assimilate the use and activity and their effects and continue to function in a manner which conserves long-term renewable resources, natural biologic productivity, recreational and aesthetic values and aquaculture.

3. Development -- in estuaries classified in the overall Oregon Estuary Classification for more intense development or alteration, areas shall be designated to provide for navigation and other identified needs for public, commercial, and industrial water-dependent uses, consistent with the level of development or alteration allowed by the overall Oregon Estuary Classification. Such areas shall include deep-water areas adjacent or in proximity to the shoreline, navigation channels, subtidal areas for in-water disposal of dredged material and areas of minimal biological significance needed for uses requiring alterations of the estuary not included in (1) and (2) above. Permissible uses in areas managed for water-dependent activities shall be navigation and water-dependent commercial and industrial uses. As

appropriate the following uses shall also be permissible in development management units:

a. Dredge or fill, as allowed elsewhere in the goal;

b. Navigation and water-dependent commercial enterprises and activities;

c. Water transport channels where dredging may be necessary;

d. Flow-lane disposal of dredged material monitored to assure that estuarine sedimentation is consistent with the resource capabilities and purposes of affected natural and conservation management units.

e. Water storage areas where needed for products used in or resulting from industry, commerce, and recreation;

f. Marinas.

Where consistent with the purposes of this management unit and adjacent shorelands designated especially suited for water-dependent uses or designated for waterfront redevelopment, water-related and nondependent, nonrelated uses not requiring dredge or fill; mining and mineral extraction; and activities identified in (1) and (2) above shall also be appropriate. In designating areas for these uses, local governments shall consider the potential for using upland sites to reduce or limit the commitment of the estuarine surface area for surface uses.

RESPONSE: Goal 16 requires that local governments divide all estuaries that Goal 16 protects into, at a minimum, the above "management units" --Natural, Conservation, and Development. The CBEMP complies with Goal 16 by creating and maintaining three "Aquatic Management Units" and seven "Shoreland Management Units" including the baseline Natural, Conservation, and Development management units that Goal 16 requires. The NRI sites are currently zoned 59-CA (a conservation aquatic unit), 3-NA (a natural aquatic unit), and 2-DA (a development aquatic unit). This Application seeks to amend the CBEMP to apply the DDNC-DA (a development aquatic) management unit to the NRI sites in order to allow dredging necessary to complete the NRIs. Goal 16 allows dredging for such purposes in development management units ("water transport channels where dredging may be necessary"), which means a Goal 16 exception is not required to rezone Improvement Site #3 from 2-DA (a development management unit) to DDNC-DA (a development management unit). However, such dredging is not allowed in natural or conservation management units, and NRI sites #1 and #2 are a

conservation and a natural management unit, respectively. Therefore, a Goal 16 exception is required to rezone those NRI sites to DDNC-DA.

Goal 17: Coastal Shorelands.

To conserve, protect, where appropriate, develop and where appropriate restore the resources and benefits of all coastal shorelands, recognizing their value for protection and maintenance of water quality, fish and wildlife habitat, water-dependent uses, economic resources and recreation and aesthetics. The management of these shoreland areas shall be compatible with the characteristics of the adjacent coastal waters; and

To reduce the hazard to human life and property, and the adverse effects upon water quality and fish and wildlife habitat, resulting from the use and enjoyment of Oregon's coastal shorelands.

RESPONSE: Goal 17 regulates coastal shorelands. The NRI sites do not include any designated coastal shorelands. Moreover, the proposed amendments will not impact any designated coastal shorelands. Therefore, the County should find that Goal 17 is not applicable to the Applications.

Goal 18: Beaches and Dunes.

To conserve, protect, where appropriate develop, and where appropriate restore the resources and benefits of coastal beach and dune areas; and

To reduce the hazard to human life and property from natural or man-induced actions associated with these areas.

RESPONSE: Goal 18 concerns beaches and dunes. The NRI sites do not include any designated beaches or dunes. Moreover, the proposed amendments will not impact any designated beaches or dunes. Thus, the County should find that Goal 18 is not applicable to the Applications.

Goal 19: Ocean Resources.

To conserve marine resources and ecological functions for the purpose of providing long-term ecological, economic, and social value and benefits to future generations.

RESPONSE: Goal 19 calls for the conservation of ocean resources. The NRI sites do not include or abut any ocean resources, and the proposed amendments will not

impact any ocean resources. Therefore, the County should find that Goal 19 is not applicable to the Applications.

B. Goal 16 "Reasons" Exception: ORS 197.732, OAR 660-004-0020

ORS 197.732

(2) A local government may adopt an exception to a goal if:

…

(c) The following standards are met:

(A) Reasons justify why the state policy embodied in the applicable goals should not apply;

(B) Areas that do not require a new exception cannot reasonably accommodate the use;

(C) The long term environmental, economic, social and energy consequences resulting from the use at the proposed site with measures designed to reduce adverse impacts are not significantly more adverse than would typically result from the same proposal being located in areas requiring a goal exception other than the proposed site; and

(D) The proposed uses are compatible with other adjacent uses or will be so rendered through measures designed to reduce adverse impacts.

RESPONSE: The above criteria are duplicative with the same criteria set forth in OAR 660-004-0020, which implements ORS 197.732. Therefore, this Application responds to the above criteria in the section immediately below that is devoted to OAR 660-004-0020. For the reasons explained below, the proposed exception complies with the administrative rules, and compliance with these administrative rules will ensure compliance with ORS 197.732.

OAR 660-004-0020

(1) If a jurisdiction determines there are reasons consistent with OAR 660-004-0022 to use resource lands for uses not allowed by the applicable Goal or to allow public facilities or services not allowed by the applicable

Goal, the justification shall be set forth in the comprehensive plan as an exception. As provided in OAR 660-004-0000(1), rules in other divisions may also apply.

RESPONSE: This Application presents "reasons" (as set forth in more detail below) consistent with OAR 660-004-0022 why Goal 16 should not apply to the NRI sites. This Application proposes that the County set forth in its comprehensive plan the justification for a Goal 16 exception at the NRI Sites. Therefore, this Application satisfies this approval criterion.

(2) The four standards in Goal 2 Part II(c) required to be addressed when taking an exception to a goal are described in subsections (a) through (d) of this section, including general requirements applicable to each of the factors:

(a) "Reasons justify why the state policy embodied in the applicable goals should not apply." The exception shall set forth the facts and assumptions used as the basis for determining that a state policy embodied in a goal should not apply to specific properties or situations, including the amount of land for the use being planned and why the use requires a location on resource land;

RESPONSE: This standard requires identifying "reasons" why the state policy in Goal 16 should not apply to the NRI Sites. OAR 660-004-0022 identifies the types of "reasons" that may be used to justify the exception. Applicant's responses to that rule below justify the proposed Goal 16 exception.

OAR 660-004-0022

An exception under Goal 2, Part II(c) may be taken for any use not allowed by the applicable goal(s) or for a use authorized by a statewide planning goal that cannot comply with the approval standards for that type of use. The types of reasons that may or may not be used to justify certain types of uses not allowed on resource lands are set forth in the following sections of this rule. Reasons that may allow an exception to Goal 11 to provide sewer service to rural lands are described in OAR 660-011-0060. Reasons that may allow transportation facilities and improvements that do not meet the requirements of OAR 660-012-0065 are provided in OAR 660-012-0070. Reasons that rural lands are irrevocably committed to urban levels of development are provided in OAR 660-014-0030. Reasons that may justify the establishment of new urban development on undeveloped rural land are provided in OAR 660-014-0040.

(1) For uses not specifically provided for in this division, or in OAR 660-011-0060, 660-012-0070, 660-014-0030 or 660-014-0040, the reasons shall justify why the state policy embodied in the applicable goals should not apply. Such reasons include but are not limited to the following:

(a) There is a demonstrated need for the proposed use or activity, based on one or more of the requirements of Goals 3 to 19; and either

(A) A resource upon which the proposed use or activity is dependent can be reasonably obtained only at the proposed exception site and the use or activity requires a location near the resource. An exception based on this paragraph must include analysis of the market area to be served by the proposed use or activity. That analysis must demonstrate that the proposed exception site is the only one within the market area at which the resource depended upon can be reasonably obtained; or

(B) The proposed use or activity has special features or qualities that necessitate its location on or near the proposed exception site.

RESPONSE: The Application must show a "demonstrated need" for the proposed use or activity based on the requirements of one or more of Goals 3 to 19. The "demonstrated need" for the NRIs is based primarily on Goals 9 and 12. **Exhibit 2** to this Application provides evidentiary support for the following. As explained in Section II. of this narrative above, structural restrictions on the Channel cause significant transit delays and unduly increase required directional changes during transit through the Channel. Delays are measured in the total transit time, from the time the vessel arrives off the coast of Coos Bay until it returns offshore after calling at its local Coos Bay destination. These delays decrease the efficiency and competitiveness of maritime commerce on a global scale, thereby jeopardizing continued success for maritime commerce in Coos Bay. Minimizing delay is a pressing need because companies that utilize the port of Coos Bay have identified potential new customers in Asia that desire to export cargo using bulk carriers that are slightly larger than the ships typically calling today. Various marine terminal businesses within Coos Bay require assurances that terminals can efficiently accommodate larger dimension bulk carriers in the future. The NRIs will allow companies to secure emerging opportunities to efficiently export products with today's larger vessels, including bulk carriers of up to 229.9 meters (983.3

feet) in length, 49 meters (160.8 feet) in beam, and 11.9 meters (39 feet) in draft. With respect to the Liquefied Natural Gas ("LNG") facility that JCEP proposes to develop in the lower bay, JCEP and the Pilots believe the NRIs are essential to achieve the required number of LNG vessel transits needed to lift the JCEP design annual LNG production volume. Excessive delays in LNG carrier transit in the Channel, to and from the LNG terminal, could result in a shore storage tank topping situation, requiring JCEP to curtail LNG production.

The JCEP estimate that dredging to complete navigation efficiency and reliability improvements at the NRI Sites will allow JCEP to export the full capacity of the optimized design production of 7.8 mtpa from JCEP's LNG terminal on the North Spit. To satisfy this need, JCEP proposes the NRIs to improve the navigation efficiency and reliability for vessels transiting the Channel by widening three extremely restrictive, unavoidable turns in the Channel. The NRIs will fulfill a demonstrated need for continued and enhanced shipping within the Bay; consistent with the Policy objections of Goals 9 and 12.

The Application must also provide "reasons" that "justify why the state policy embodied in the applicable goals should not apply." OAR 660-004-0022(1)(a)(B) provides that a sufficient "reason" is that the "proposed use or activity has special features or qualities that necessitate its location on or near the proposed exception site." That is the case here. JCEP seeks to improve navigation in the Channel and to do so has selected three NRI sites that correspond to the areas of the Channel most in need of improvement in order to facilitate safer and more efficient navigation. Therefore, this Application provides reasons why the "proposed use or activity has special features or qualities that necessitate its location on or near the proposed exception site."

(8) Goal 16 - Other Alterations or Uses: An exception to the requirement limiting dredge and fill or other reductions or degradations of natural values to water-dependent uses or to the natural and conservation management unit requirements limiting alterations and uses is justified, where consistent with ORS chapter 196, in any of the circumstances specified in subsections (a) through (e) of this section:

RESPONSE: The Application seeks an exception to allow dredging in areas that are currently designated, in accordance with Goal 16, as natural and conservation management units. The dredging that the Application seeks to allow for enhanced mitigation efficiency of the federal navigation Channel would not otherwise be allowed in these areas. Therefore, OAR 660-004-0022(8)(e) applies to the Application, and the Application must comply with OAR 660-004-0022(8)(b).

…

(b) Dredging to maintain adequate depth to permit continuation of the present level of navigation in the area to be dredged.

RESPONSE: The size and design of the proposed use and the extent of the proposed activity are the minimum amount necessary to provide the required Channel depth on the subject locations for enhanced navigation. To make the proposed NRIs, the JCEP will use the minimum amount possible of additional area, as explained in Section II. of this narrative above.

For Improvement #1, JCEP will deepen and widen the Coos Bay Inside Range channel to 37 feet (plus 2 feet over dredge) and from the current 300 feet to 450 feet, respectively, and lengthen the total corner cutoff on the Coos Bay Range side of the 21-degree turn from the current 850 feet to about 1400 feet from the turn's apex.

For Improvement #2, JCEP will widen the turn area from the Coos Bay Range to the Empire Range to 37 feet and from the current 400 feet to about 600 feet at the apex of the turn. The current corner cutoff distance from the apex of this turn of only 500 feet, which is much less than one ship length, is inadequate to allow deep draft vessels to start their turn early enough to safely make the turn and be positioned in the center of the next channel. JCEP will also lengthen the total corner cutoff area of the turn from the current 1000 feet to about 3500 feet, or about 4.0 ship lengths, which will allow vessels to commence their turn much earlier and make this turn much safer.

For Improvement #3, JCEP will deepen to 37 feet and add a corner cut of about 1150 feet in length on the west side to enhance inbound vessel navigational safety during the left turn from the Empire Range into the Lower Jarvis Range, which will provide the additional room necessary to safely make this turn with the slightly longer vessels.

JCEP has designed the NRIs to use the minimum possible area to achieve the needed increases in navigational safety and efficiency. Therefore, the Application satisfies this criterion.

(f) In each of the situations set forth in subsections (7)(a) to (e) of this rule, the exception must demonstrate that the proposed use and alteration (including, where applicable, disposal of dredged materials) will be carried out in a manner that minimizes adverse impacts upon the affected aquatic and shoreland areas and habitats.

RESPONSE: JCEP will complete its proposed NRIs in a manner that minimizes adverse impacts upon the affected aquatic and shoreland areas and habitats. To complete the NRIs, JCEP will dredge within the Channel and adjacent to the Channel at the NRI Sites.

JCEP plans to perform capital and maintenance dredging during the ODFW-approved in-water work window (October 1 to February 15) to reduce impacts to sensitive life stages of fish in the bay.

JCEP will use various dredging methods to minimize the effects of the NRIs on water turbidity within the Bay. JCEP will use best management practices (including cutter head suction, clamshell, and hopper dredging) associated with dredging to reduce turbidity effects, and as a result of those methods JCEP expects increased water turbidity as a result of the NRIs to be temporary and limited to the immediate vicinity of dredging operations. Furthermore, JCEP does not anticipate oil spills or toxic discharges to occur when constructing the NRIs, and JCEP will use precautions to avoid either. Dredging and material transport vessels will carry small volumes of petroleum in comparison to large bulk carriers and Panamax vessels that regular traverse Coos Bay. JCEP will use best management practices to avoid and minimize spills or discharges during dredging operations and dredged material transport, including the implementation of spill containment plans.

Dredging equipment and material transport vessels related to the NRIs may generate temporary noise disturbances. However, the noise will be localized to the immediate dredging area. JCEP does not anticipate that noise levels will have more than temporary effects on the behavior of aquatic species in the area of the NRI Sites.

JCEP's environmental consultant has further evaluated potential adverse impacts associated with the dredging activities and describes ways by which JCEP will minimize such adverse impacts. *See* DEA memorandum in Exhibit 4.

(b) "Areas that do not require a new exception cannot reasonably accommodate the use." The exception must meet the following requirements:

RESPONSE: The NRIs are location-specific. Their purpose is to improve safety and navigational efficiency in the Channel. There are no other areas that could accommodate the use. Therefore, "areas that do not require a new exception cannot reasonably accommodate the use." The Application satisfies this criterion.

(A) The exception shall indicate on a map or otherwise describe the location of possible alternative areas considered for the use that do not require a new exception. The area for which the exception is taken shall be identified;

RESPONSE: As explained above, the NRIs are location-specific and it would not be possible for JCEP to locate them anywhere that does not require a new exception. Exhibit 1 identifies the NRI sites, which are the areas in which JCEP proposes to locate the exception. The Application satisfies this criterion.

(B) To show why the particular site is justified, it is necessary to discuss why other areas that do not require a new exception cannot reasonably accommodate the proposed use. Economic factors may be considered along with other relevant factors in determining that the use cannot reasonably be accommodated in other areas. Under this test the following questions shall be addressed:

(i) Can the proposed use be reasonably accommodated on resource land that would not require an exception, including the density of uses on nonresource land? If not, why not?

(ii) Can the proposed use be reasonably accommodated on resource land that is already irrevocably committed to nonresource uses not allowed by the applicable Goal, including resource land in existing unincorporated communities, or by increasing the density of uses on committed lands? If not, why not?

(iii) Can the proposed use be reasonably accommodated inside an urban growth boundary? If not, why not?

(iv) Can the proposed use be reasonably accommodated without the provision of a proposed public facility or service? If not, why not?

RESPONSE: As explained above, the NRIs are location-specific and it would not be possible for JCEP to locate them anywhere that does not require a new exception. Whether or not the NRIs can be accommodated inside a UGB, they still require a Goal 16 exception and they still must be located at the NRI sites, so this question is not

applicable to an analysis of whether alternative areas that do not require an exception cannot accommodate the NRIs. Moreover, the NRIs will not require any additional public facilities or services to construct. The Application satisfies this criterion.

> **(C) The "alternative areas" standard in paragraph B may be met by a broad review of similar types of areas rather than a review of specific alternative sites. Initially, a local government adopting an exception need assess only whether those similar types of areas in the vicinity could not reasonably accommodate the proposed use. Site specific comparisons are not required of a local government taking an exception unless another party to the local proceeding describes specific sites that can more reasonably accommodate the proposed use. A detailed evaluation of specific alternative sites is thus not required unless such sites are specifically described, with facts to support the assertion that the sites are more reasonable, by another party during the local exceptions proceeding.**

RESPONSE: As explained above, the NRIs are location-specific and so it is not possible for JCEP to locate them anywhere that does not require a new exception. There are no "alternative areas" that can accommodate the NRIs. The Application satisfies this criterion.

> **(c) "The long-term environmental, economic, social and energy consequences resulting from the use at the proposed site with measures designed to reduce adverse impacts are not significantly more adverse than would typically result from the same proposal being located in areas requiring a goal exception other than the proposed site." The exception shall describe: the characteristics of each alternative area considered by the jurisdiction in which an exception might be taken, the typical advantages and disadvantages of using the area for a use not allowed by the Goal, and the typical positive and negative consequences resulting from the use at the proposed site with measures designed to reduce adverse impacts. A detailed evaluation of specific alternative sites is not required unless such sites are specifically described with facts to support the assertion that the sites have significantly fewer adverse impacts during the local exceptions proceeding. The exception shall include the reasons why the consequences of**

the use at the chosen site are not significantly more adverse than would typically result from the same proposal being located in areas requiring a goal exception other than the proposed site. Such reasons shall include but are not limited to a description of: the facts used to determine which resource land is least productive, the ability to sustain resource uses near the proposed use, and the long-term economic impact on the general area caused by irreversible removal of the land from the resource base. Other possible impacts to be addressed include the effects of the proposed use on the water table, on the costs of improving roads and on the costs to special service districts.

RESPONSE: The NRI sites are the only possible sites at which JCEP can make the improvements necessary to increase the safety and efficiency of vessel navigation in the Channel. The NRI sites are three locations that JCEP identified where, as explained above, there are three extremely restrictive, unavoidable turns in the Channel. These turns are responsible for significant delays in vessel transit in the Channel. Although JCEP could widen other areas of the Channel to improve navigational efficiency, the NRI sites are the sites most in need of improvement to achieve the results in improved efficiency and safety of navigation, that is required within the Channel. Therefore, in order to improve the safety and efficiency of such transit, JCEP must widen the Channel at the locations of these turns (the NRI Sites). There are no alternative sites requiring a Goal exception at which JCEP can make the necessary improvements. Moreover, the long-term economic, environmental, social and energy costs of widening other areas of the Channel that JCEP could feasibly widen (although doing so would not achieve the results in improved efficiency and safety of navigation that JCEP desires) are not materially different from the same consequences of making the NRIs at the NRI Sites. All such areas are nearby each other and are within the Channel. Furthermore, the Channel itself is a fixed location that cannot be moved. Therefore, the County can find that the Application satisfies this criterion.

(d) "The proposed uses are compatible with other adjacent uses or will be so rendered through measures designed to reduce adverse impacts." The exception shall describe how the proposed use will be rendered compatible with adjacent land uses. The exception shall demonstrate that the proposed use is situated in such a manner as to be compatible with surrounding natural resources and resource management or production practices. "Compatible" is not intended as an absolute term meaning no interference or adverse impacts of any type with adjacent uses.

RESPONSE: The NRI Sites located immediately adjacent to the existing Channel. This criterion, therefore, requires JCEP to demonstrate that JCEP's proposal for the NRIs is designed to reduce adverse impacts on the waters of the Bay and the Channel, and to be compatible with the use of the Channel for transportation. The proposal is compatible with land uses in the Channel (including transit) because it involves dredging below the surface of the water for the purpose of increasing safety and efficiency in navigating the Channel. The proposal is compatible with land uses in the Channel because it is designed to make them easier and more effective. Furthermore, the proposal is designed to reduce adverse environmental impacts upon the waters of the bay and the Channel. *See* DEA memo included in Exhibit 5.

(3) If the exception involves more than one area for which the reasons and circumstances are the same, the areas may be considered as a group. Each of the areas shall be identified on a map, or their location otherwise described, and keyed to the appropriate findings.

RESPONSE: This Application seeks Goal 16 exceptions for three NRI sites. This Application narrative responds to the applicable Goal 16 exception criteria for those three NRI sites as a group, and because the criteria and JCEP's responses apply equally to each of the NRI sites, this narrative does not key findings to particular sites. Exhibit 1 identifies the NRI sites.

(4) For the expansion of an unincorporated community described under OAR 660-022-0010, including an urban unincorporated community pursuant to OAR 660-022-0040(2), the reasons exception requirements necessary to address standards 2 through 4 of Goal 2, Part II(c), as described in of subsections (2)(b), (c) and (d) of this rule, are modified to also include the following:

(a) Prioritize land for expansion: First priority goes to exceptions lands in proximity to an unincorporated community boundary. Second priority goes to land designated as marginal land. Third priority goes to land designated in an acknowledged comprehensive plan for agriculture or forestry, or both. Higher priority is given to land of lower capability site class for agricultural land, or lower cubic foot site class for forest land; and

(b) Land of lower priority described in subsection (a) of this section may be included if land of higher priority is inadequate to accommodate the use for any of the following reasons:

(A) Specific types of identified land needs cannot be reasonably accommodated on higher priority land;

(B) Public facilities and services cannot reasonably be provided to the higher priority area due to topographic or other physical constraints; or

(C) Maximum efficiency of land uses with the unincorporated community requires inclusion of lower priority land in order to provide public facilities and services to higher priority land.

RESPONSE: This Application does not seek to expand an unincorporated community. Therefore, these approval criteria do not apply to the Application.

C. Text Amendment of CCZLDO

CCZLDO 5.1.100 - Legislative Amendment of Text Only

An amendment to the text of this ordinance or the comprehensive plan is a legislative act within the authority of the Board of Commissioners.

RESPONSE: This Application seeks to amend the text of the CCZLDO, where said text describes the "specific boundaries" of the DDNC-DA zone in the heading above CCZLDO 3.2.201. This Application seeks to amend this text to define the "specific boundaries" of the DDNC-DA zone as follows (underline text is proposed to be added to the CCZLDO):

"THE AUTHORIZED 37' DEEP-DRAFT NAVIGATION CHANNEL, AND CERTAIN AREAS ADJACENT TO THE CHANNEL WHERE THE COUNTY HAS TAKEN AN EXCEPTION TO STATEWIDE PLANNING GOAL 16 TO ALLOW CHANNEL-RELATED NAVIGATIONAL EFFICIENCY AND RELIABILITY IMPROVEMENTS, PLUS SUBTIDAL AREAS HISTORICALLY USED FOR IN-WATER DMD."

The reason for the change is to define the boundaries of the DDNC-DA zone such that they will include the NRIs, which are adjacent to, but not within, the federally-defined Deep-Draft Navigational Channel.

CCZLDO 5.1.110 - Who May Seek Change

Coos County shall consider the appropriateness of legislative plan text and map amendment proposals upon:

1. A motion by the Board of Commissioners; or

2. A motion of the Planning Commission; or

3. The submission of formal request made by either:

a. The Citizen Advisory Committee; or

b. An application filed by a citizen or organization, accompanied by a prescribed filing fee. If a Measure 56 notice is required the applicant shall be responsible for the payment of all cost associated with that service.

RESPONSE: CCZLDO 5.1.110 allows JCEP, a citizen and organization, to seek a legislative amendment to the text of the CCZLDO. JCEP has included the required filing fee with this Application.

CCZLDO 5.1.130 - Need for Studies

The Board of Commissioners, Hearings Body, or Citizen Advisory Committee may direct the Planning Director to make such studies as are necessary to determine the need for amending the text of the Plan and/or this Ordinance. When the amendment is initiated by application, such studies, justification and documentation are a burden of the initiator.

RESPONSE: No studies are necessary to determine the need for amending the text of the CCZLDO's boundary description of the DDNC-DA zone. This Application requests approval to amend the CCZLDO and CBEMP maps to change the zoning designation of the NRI sites to DDNC-DA. If the County approves the change, it should amend the text of the CCZLDO to ensure the DDNC-DA zone is allowed to include the NRI sites.

For the above reasons, the County should approve JCEP's request to amend the CCZLDO's boundary descriptions of the DDNC-DA zone.

D. Application for Administrative Conditional Use Permit for Dredging

This Application seeks administrative conditional use ("ACU") approval to permit JCEP to dredge the NRI sites (provided the County simultaneously approves this Application to amend the CBEMP and CCZLDO map designations of the sites to DDNC-DA) to construct the NRIs. The DDNC-DA zone allows both new and maintenance dredging as an ACU, subject to general and special conditions. The Application complies

with all applicable approval criteria for ACU approval for new and maintenance dredging in the DDNC-DA zone, as follows.

1. CCZLDO Provisions

CCZLDO 2.1.200 Definitions

*** * * ***

DREDGING: The removal of sediment or other material from a stream, river, estuary, or other aquatic area: (1) Maintenance Dredging refers to dredging necessary to maintain functional depths in maintained channels, or adjacent to existing docks and related facilities; (2) New Dredging refers to deepening either an existing authorized navigation channel, or to create a marina or other dock facilities, or to obtain fill for the North Bend Airport runway extension project; (3) Dredging to Maintain Dikes and Tidegates refers to dredging necessary to provide material for existing dikes and tidegates; (4) Minor dredging refers to small amounts of removal as necessary, for instance, for a boat ramp. Minor dredging may exceed 50 yards, and therefore require a permit.

RESPONSE: As explained in Section II of this narrative, JCEP intends to first deepen the NRI Sites over time and then to maintain their functional depth consistent with the remainder of the Channel. Therefore, JCEP's proposed activities constitute New Dredging and Maintenance Dredging as described in this definition.

JCEP also requests approval an accessory temporary dredge transport line in 59-CA, 55A-CA, 2-NA, DDNC-DA, and 3-DA districts and an accessory buoy in the 5-DA district. The dredge line is described in the DEA memo included in Exhibit 4, and it is depicted in the figures included in Exhibit 5.

CCZLDO 3.2.150 - How To Use This Article

…

5.

…

b) Review the district's Uses, Activities, and Special Conditions Table to determine whether or not a proposed use or activity is allowable outright, allowable with conditions, or conditionally allowable subject to an Administrative or Hearings Body Conditional Use. Symbols denote

whether or not the specific use or activity listed in the tables is permitted outright, may be allowed subject to an Administrative Conditional Use, may be allowed subject to a Hearings Body conditional use, or prohibited in the specific district. The following symbols are pertinent:

P - means the use or activity is permitted outright subject only to the management objective.

…

S - means that the use or activity may be allowed subject to "Special Conditions" presented following the use and activity table. A few of the special conditions are non-discretionary, but most require local judgment and discretion and the development of findings to support any final decision about whether or not to allow the use or activity. Some uses and activities may be identified as being subject to a special condition that is not discretionary or may not apply to a site-specific request. If such is the situation, the Planning Director shall make such determination and if "General Conditions" are not applicable regard the use or activity as permitted outright. Such determination shall consist of a statement of facts supporting the decision.

G - indicates the use or activity may be allowed subject to "General Conditions" presented following the use and activities table. "General Conditions" provide a convenient cross-reference to applicable Baywide Policies which may further limit or condition the uses and activities.

A few "General Conditions" may not apply to a site specific request. If such is the situation, the Planning Director shall make such determination and if "Special Conditions" are not applicable, regard the use or activity as permitted outright. Such determination shall consist of a statement of facts supporting the decision.

ACU - means the use or activity may be permitted as provided above or subject to "Special" or "General" conditions pursuant to an Administrative Conditional Use.

CCZLDO 3.2.201 - Management Objective:

This district shall be regularly maintained to authorized depths as the deep-draft navigation channel. Conflicting uses and activities are not permitted.

Response: The NRIs seek to expand the DDNC-DA district in specified locations in order to improve navigation safety and reliability. These actions will facilitate use of the Deep Draft Navigation Channel and are consistent with this management objective.

CCZLDO 3.2.202 - Uses, Activities and Special Conditions.

Table DDNC-DA sets forth the uses and activities which are permitted, which may be permitted as conditional uses, or which are prohibited in this zoning district. Table DDNC-DA also sets forth special conditions which may restrict certain uses or activities, or modify the manner in which certain uses or activities may occur. Reference to "policy numbers" refers to Plan Policies set forth in the Coos Bay Estuary Management Plan.

…

B. Activities:

…

2. Dredging

a. New	**ACU-S, G**
b. Maintenance dredging of existing facilities	**ACU-S, G**

GENERAL CONDITIONS (the following condition applies to ALL uses and activities):

1. Inventoried resources requiring mandatory protection in this district shall be protected, and are subject to Policies #17 and #18.

SPECIAL CONDITIONS

Activities:

2a., 2b. These activities are only allowed subject to finding that adverse impacts have been minimized (see Policy #5).

Response: This Application seeks ACU approval for new and maintenance dredging in the DDNC-DA zone that are necessary to complete the NRIs. In the DDNC-DA zone, an application for approval to engage in new and maintenance dredging activities is an ACU that is subject to the General and Special Conditions of CCZLDO 3.2.202. Therefore, the

Applicant must show that new and maintenance dredging complies with the General and Special Conditions set forth above.

CCZLDO 5.2.100 - Conditional Uses

Conditional uses are discretionary reviews that involve judgment or discretion in determining compliance with the approval requirements. The review is discretionary because not all of the approval requirements are objective. That is, they are not easily definable or measurable. The amount of discretion and the potential impact of the request vary among different reviews. Some have less discretion or impact, such as the reduction of a garage setback for a house on a hillside. Others may involve more discretion or potential impacts, such as the Discretionary reviews that must provide opportunities for public involvement by either a public hearing or the right to appeal. All conditions that are placed on an application shall be completed at the cost of the applicant. There are different application types that are considered conditional uses but below are the three most common types of conditional use applications.

1. **Hearings Body Conditional Uses (HBCU or C). A Hearings Body conditional use is a use or activity which is basically similar to the uses permitted in a district but which may not be entirely compatible with the permitted uses. An application for a conditional use requires review by the Hearings Body to insure that the conditional use is or may be made compatible with the permitted uses in a district and consistent with the general and specific purposes of this Ordinance.**

2. **Administrative Conditional Uses (ACU). An Administrative Conditional use is a use or activity with similar compatibility or special conservation problems. An application for an administrative conditional use requires review by the Planning Director to insure compliance with approval criteria.**

3. **Variance (V). Practical difficulty and unnecessary physical hardship may result from the size, shape, or dimensions of a site or the location of existing structures thereon, geographic, topographic or other physical conditions on the site or in the immediate vicinity, or, from population density, street location, or traffic conditions in the immediate vicinity. The authority to grant variances does not extend to use regulations, minimum lot sizes or riparian areas within the Coastal Shoreland Boundary.**

Discretionary reviews contain approval criteria. Approval criteria are listed with a specific review and findings must be made to address such criteria. The criteria set the bounds for the issues that must be addressed by the applicant and which may be raised by the City or affected parties. A proposal that complies with all of the criteria will be approved. A proposal that can comply with the criteria with mitigation measures or limitations will be approved with conditions. A proposal that cannot comply with the criteria outright or cannot comply with mitigation measures will be denied.

Approval criteria have been derived from, and are based on the Comprehensive Plan, Statute, Rule and/or Oregon Statewide Planning Goals or any combination thereof. The Coos County Comprehensive Plan has been acknowledged by the Department of Land Conservation and Development. The identified enforceable policies have been incorporated into the Coos County Zoning and Land Development Ordinance. The county shall use the review criteria The county shall use the review criteria set forth in the Coos County Zoning and Land Development Ordinance unless otherwise specified. Fulfillment of all requirements and approval criteria means the proposal is in compliance with the Comprehensive Plan and the implementing ordinance.

When approval criteria refer to the request meeting a specific threshold, such as adequacy of services or no significant detrimental environmental impacts, the review body will consider any proposed improvements, mitigation measures, or limitations proposed as part of the request when reviewing whether the request meets the threshold. All proposed improvements, mitigation measures, and limitations must be submitted for consideration prior to a final decision by a review body.

Response: This Application seeks approval for new and maintenance dredging needed to complete the NRIs in the DDNC-DA zone. New and maintenance dredging is subject to administrative conditional use procedures in the DDNC-DA zone.

CCZLDO 5.2.500 - Criteria for Approval of All Applications

An application for a conditional use or an administrative conditional use shall be approved only if it is found to comply with this Article and the applicable review standards and special development conditions set forth in the zoning regulations and any other applicable requirements of this Ordinance.

RESPONSE: This Application seeks ACU approval for new and maintenance dredging in the DDNC-DA zone. Therefore, the Application must comply with all approval criteria of the DDNC-DA zone and other generally applicable approval criteria.

2. CBEMP Policies

CBEMP Policy #5 - Estuarine Fill and Removal

I. Local government shall support dredge and/or fill only if such activities are allowed in the respective management unit, and:

a. The activity is required for navigation or other water-dependent use that requires an estuarine location or, in the case of fill for non-water-dependent uses, is needed for a public use and would satisfy a public need that outweighs harm to navigation, fishing, and recreation, as per ORS 541.625(4) and an exception has been taken in this Plan to allow such fill.

b. A need (i.e., a substantial public benefit) is demonstrated and the use or alteration does not unreasonably interfere with public trust rights.

c. No feasible alternative upland locations exist; and

d. Adverse impacts are minimized.

e. Effects may be mitigated by creation, restoration, or enhancement of another area to ensure that the integrity of the estuarine ecosystem is maintained.

f. The activity is consistent with the objectives of the Estuarine Resources Goal and with other requirements of state and federal law, specifically the conditions in ORS 541.615 and Section 404 of the Federal Water Pollution Control Act (P.L.92-500).

II. Other uses and activities which could alter the estuary shall only be allowed if the requirements in (b), (c), and (d) are met.

Identification and minimization of adverse impacts as required in "d" above shall follow the procedure set forth in Policy #4.

As required by Goal #16, only dredging necessary for on-site maintenance of existing functional tidegates, associated drainage channels, and bridge crossing support structures is permitted in Natural and Conservation Management Units (applies to 11 NA, 18A CA, 20 CA, 30 CA, 31 NA and 38 CA).

Dredging necessary for the installation of new bridge crossing support structures is permitted in Conservation Management Units and may be allowed in Natural Management Units where consistent with the resource capabilities of the area and the purposes of the management unit.

In the Conservation Management Unit, new dredging for boat ramps and marinas, aquaculture requiring dredge or fill or other alteration of the estuary, and dredging necessary for mineral extraction may be allowed where consistent with the resource capabilities of the area and the purposes of the management unit.

This strategy shall be implemented by the preparation of findings by local government documenting that such proposed actions are consistent with the Comprehensive Plan and with the above criteria "a", "b", "c", "d", "e" and "f"; however, where goal exceptions are included within this Plan, the findings in the exception shall be sufficient to satisfy above criteria "a" through "d". Identification and minimization of adverse impacts as required in "e" above shall follow the procedure set forth in Policy #4a. The findings shall be developed in response to a "request for comment" by the Division of State Lands (DSL), which shall seek local government's determination regarding the appropriateness of a permit to allow the proposed action.

"Significant" as used in "other significant reduction or degradation of natural estuarine values", shall be determined by: a) the U.S. Army Corps of Engineers through its Section 10.404 permit processes; or b) the Department of Environmental Quality (DEQ) for approvals of new aquatic log storage areas only; or c) the Department of Fish and Wildlife (ODFW) for new aquaculture proposals only. This strategy recognizes that Goal #16 limits dredging, fill, and other estuarine degradation in order to protect the integrity of the estuary.

RESPONSE: JCEP's new and maintenance dredging activities must be consistent with CBEMP Policy #5. The DDNC-DA zone allows new and maintenance dredging. Furthermore, because the Application includes a Goal 16 exception, Policy #5 requires only that the Application comply with criteria "e" and "f" above, because, as expressly noted within the Policy, the findings for the Goal 16 exception suffice for this Application to comply with "a" - "d."

Policy #5 directs that compliance with I.e. of Policy #5 (identification and minimization of adverse impacts) will follow the procedure set forth in CBEMP Policy #4a. Although it is not clear what this means for an application, such as this one, for ACU approval for new and maintenance dredging, Policy #4a sets forth a "procedure" for assessing resource impacts of "log storage dredging." Since that activity is the most analogous to new and maintenance dredging of the activities that Policy #4a contemplates, this Application will follow the procedure that Policy #4a sets forth for log storage dredging. JCEP acknowledges that procedure, which the County and Oregon Department of Environmental Quality will undertake. Part I.e. of Policy #5 simply allows JCEP to mitigate adverse effects of the development on estuarine resources by enhancing, creating, or restoring another area. As discussed above, JCEP does not anticipate that the NRIs will cause significant permanent adverse effects upon the estuary, and this Application sets forth myriad methods JCEP plans to employ to minimize adverse effects. Therefore, it is not necessary for JCEP to create, restore, or enhance other areas to mitigate adverse effects of the NRIs on estuarine resources.

Part I.f. of Policy #5 requires that the NRIs are "consistent with the objectives of the Estuarine Resources Goal and with other requirements of state and federal law, specifically the conditions in ORS 541.615 and Section 404 of the Federal Water Pollution Control Act (P.L.92-500)." The NRIs are consistent with Goal 16, as set forth in section III.B.1. of this narrative. The Application is consistent with other requirements of state and federal law, including the conditions in ORS 541.615 and Section 404 of the Federal Water Pollution Control Act. ORS 541.615, which is now ORS 196.810, requires a permit from the Department of State Lands to remove any material from the beds or banks of waters of the state. JCEP acknowledges this obligation, and all necessary DSL and Federal Section 404 authorizations will be obtained as a condition of dredging commencement.

Furthermore, CCZLDO 3.2.202's Special Conditions for ACU approval of new and maintenance dredging in the DDNC-DA zone provide that such dredging is allowed only "subject to finding that adverse impacts have been minimized." JCEP will minimize adverse impacts from the NRIs as summarized below and as further discussed in the DEA memo included in Exhibit 4.

Maintenance dredging at the NRI sites will reduce habitat function, and this will affect benthic and epibenthic organisms such as invertebrates occupying the substrate, as well as organisms that feed on them. JCEP plans to perform capital and maintenance dredging during the ODFW-approved in-water work window (October 1 to February 15) to reduce impacts to sensitive life stages of fish in the bay.

JCEP will use various dredging methods to minimize the effects of the NRIs on water turbidity within the bay. JCEP will use best management practices (including cutter head suction, clamshell, and hopper dredging) associated with dredging to reduce turbidity effects, and as a result of those methods JCEP expects increased water turbidity as a result of the NRIs to be temporary and limited to the immediate vicinity of dredging operations. Furthermore, JCEP does not anticipate oil spills or toxic discharges to occur when constructing the NRIs, and JCEP will use precautions to avoid either. Dredging and material transport vessels will carry small volumes of petroleum in comparison to large bulk carriers and Panamax vessels that regular traverse Coos Bay. JCEP will use best management practices to avoid and minimize spills or discharges during dredging operations and dredged material transport, including the implementation of spill containment plans.

Therefore, the County should find that JCEP's proposed new and maintenance dredging activities are consistent with CBEMP Policy #5.

#4 Resource Capability Consistency and Impact Assessment

I. Local government concludes that all proposed actions (approved in this Plan) which would potentially alter the integrity of the estuarine ecosystem have been based upon a full consideration of the impacts of the proposed alteration. Except for the following uses and activities:

a. <u>Natural Management Units</u> ~ Aquaculture ~ Log storage ~ Bridge Crossings

b. <u>Conservation Management Units</u> ~ High-intensity water-dependent recreation ~ Aquaculture ~ New or expanded log storage ~ Log storage dredging ~ Dike maintenance dredging ~ Minor navigational improvements requiring dredging or fill ~ Bulkheading ~ Water intake or withdrawal and effluent discharge ~ Riprap

c. <u>Development Management Units</u> ~ Aquaculture ~ New or expanded log storage ~ Mining and mineral extraction ~ Water-related and non-dependent, non-related uses not requiring fill ~ Dredging ~ Bulkheading (except for Aquatic Units #3DA, #5DA and #6DA) ~ Fill ~ In-water structures ~ Flow-lane disposal of dredged material and other activities which could affect the estuary's physical processes or biological resources ~ Application of pesticides

d. Any other uses and activities which require the resource capability consistency test as a condition within a particular management unit.

For uses and activities requiring the resource capabilities test, a special condition is noted in the applicable management unit uses/activities matrix. A determination of consistency with resource capability and the purposes of the management unit shall be based on the following:

i. A description of resources identified in the plan inventory;

ii. An evaluation of impacts on those resources by the proposed use (see Impact Assessment procedure, below);

iii. A determination of whether the proposed use or activity is consistent with III-401 Return to Top of Document the resource capabilities of the area, or that the resources of the area are able to assimilate the use and activity and their effects and continue to function in a manner to protect significant wildlife habitats, natural biological productivity, and values for scientific research and education.

Where the impact assessment requirement (of Goal #16 Implementation Requirements #1) has not been satisfied in this Plan for certain uses or activities (i.e., those identified above), then such uses or activities shall not be permitted until findings demonstrate the public's need and gain which would warrant any modification or loss to the estuarine ecosystem, based upon a clear presentation of the impacts of the proposed alteration, as implemented in Policy #4a.

III. An impact assessment need not be lengthy or complex, but it should give reviewers an overview of the impacts to be expected. It may include information on:

a. the type and extent of alterations expected;

b. the type of resource(s) affected;

c. the expected extent of impacts of the proposed alteration on water quality and other physical characteristics of the estuary, living resources, recreation and aesthetic use, navigation and other existing and potential uses of the estuary; and

d. the methods which could be employed to avoid or minimize adverse impacts.

This policy is based on the recognition that the need for and cumulative effects of estuarine developments were fully addressed during the preparation of this Plan and may be mitigated by the imposition, as necessary, of conditions through the administrative conditional use process.

RESPONSE: As required by CBEMP Policy #5, "[i]dentification and minimization of impacts shall follow the procedure set forth in Policy #4. JCEP has addressed the provisions of this policy in the DEA memo included in Exhibit 4.

#4a Deferral of (I) Resource Capability Consistency Findings, and (II) Resource Impact Assessments

Local government shall defer, until the time of permit application, findings regarding consistency of the uses/activities listed in Policy #4 with the resource capabilities of the particular management unit.

Additionally, the impact assessment requirement for those uses/activities as specified in Policy #4 shall be performed concurrently with resource capability findings above at the time of permit application.

I. This strategy shall be implemented through an Administrative Conditional Use process that includes local cooperation with the appropriate state agencies:

a. Where aquaculture is proposed as a use, local government shall notify the Oregon Department of Fish & Wildlife (ODFW) and Department of Agriculture in writing of the request, with a map of the proposed site;

b. Where log storage dredging is proposed as an activity local government shall notify the Oregon Department of Environmental Quality (DEQ) in writing of the request, together with a map of the proposed site.

II. Within twenty (20) days of receipt of the notification, the state agency shall submit in writing to the local government a statement as to whether the proposed use/activity will:

a. Be consistent with the resource capabilities of the management unit or,

b. If determined not to be consistent, whether the proposal can be made consistent through imposition of conditions on the permit.

III. The appropriate state agency shall also perform the impact assessment required in Policy #4. If no statement is received from the state agency by the expiration of the twenty (20) day period, local government shall:

a. Presume consistency of the proposal with the resource capabilities of the management unit; and

b. Make findings appropriate to that presumption; and

c. Perform the assessment of impacts required by Policy #4.

IV. For all other uses/activities specified above, local government shall:

a. Determine through appropriate findings whether the proposed use/activity is consistent with the resource capabilities of the management unit, and

b. Perform the assessment of impacts required by Policy #4.

V. This strategy recognizes:

a. That resource capability consistency findings and impact assessments as required by LCDC Goal #16 can only be made for the uses specified above at the time of permit application, and

b. That the specified state agencies have expertise appropriate to assist local government in making the required finding and assessments.

This strategy is based upon the recognition that the need for and cumulative effects of estuarine developments were fully addressed during development of this Plan and that no additional findings are required to meet Implementation Requirement #1 of Goal #16.

RESPONSE: As noted above, CBEMP Policy #4 requires findings demonstrating the public's need and gain that would warrant any modification or loss to the estuarine ecosystem, based upon a clear presentation of the impacts of the proposed alteration, as implemented in Policy #4a. None of the prerequisites to providing notice to state agencies under Policy #4a are triggered. Therefore, this policy requires the County to perform the impacts assessment consistent with CBEMP Policy #4. The County has completed that assessment above.

CBEMP Policy #17 - Protection of "Major Marshes" and "Significant Wildlife Habitat" in Coastal Shorelands

Local governments shall protect from development major marshes and significant wildlife habitat, coastal headlands, and exceptional aesthetic resources located within the Coos Bay Coastal Shorelands Boundary, except where exceptions allow otherwise.

I. Local government shall protect:

a. "Major Marshes" to include areas identified in the Goal #17, "Linkage Matrix", and the Shoreland Values Inventory map; and

b. "Significant wildlife habitats" to include those areas identified on the "Shoreland Values Inventory" map; and

c. "Coastal headlands"; and

d. "Exceptional aesthetic resources" where the quality is primarily derived from or related to the association with coastal water areas.

II. This strategy shall be implemented through:

a. Plan designations and use and activity matrices set forth elsewhere in this Plan that limit uses in these special areas to those that are consistent with protection of natural values; and

b. Through use of the Special Considerations Map that identified such special areas and restricts uses and activities therein to uses that are consistent with the protection of natural values. Such uses may include propagation and selective harvesting of forest products consistent with the Oregon Forest Practices Act, grazing, harvesting wild crops, and low-intensity water-dependent recreation; and

c. Contacting Oregon Department of Fish and Wildlife for review and comment on the proposed development within the area of the 5b or 5c bird sites.

This strategy recognizes that special protective consideration must be given to key resources in coastal shorelands over and above the protection afforded such resources elsewhere in this Plan.

RESPONSE: For two reasons, the CCCP demonstrates that there are no resources at the Site for which Policy #17 requires protection. First, the County's Shoreland Values Inventory Map does not depict any major marshes, significant wildlife habitat, or coastal headlands in the area of the proposed improvements. Second, according to the CCCP, there are no exceptional aesthetic resources in the area of the proposed Improvement: "There are no areas of exceptional or aesthetic or scenic quality within the Planning Area [See Section 4.3]." Plan Volume II, Part 2, Section 3.3-3. The Planning Area is defined as "all lands west of the Oregon Coast Highway," subject to limited exceptions

not applicable here. Plan Volume II, Part 2, Section 3.1-1. Therefore, CBEMP Policy #17 does not apply to JCEP's request for approval to construct the Improvement.

CBEMP Policy #18 - Protection of Historical, Cultural and Archaeological Sites

Local government shall provide protection to historical, cultural and archaeological sites and shall continue to refrain from widespread dissemination of site-specific information about identified archaeological sites.

I. This strategy shall be implemented by requiring review of all development proposals involving a cultural, archaeological or historical site, to determine whether the project as proposed would protect the cultural, archaeological and historical values of the site.

II. The development proposal, when submitted shall include a Plot Plan, showing, at a minimum, all areas proposed for excavation, clearing and construction. Within three (3) working days of receipt of the development proposal, the local government shall notify the Coquille Indian Tribe and Coos, Siuslaw, Lower Umpqua Tribe(s) in writing, together with a copy of the Plot Plan. The Tribe(s) shall have the right to submit a written statement to the local government within thirty (30) days of receipt of such notification, stating whether the project as proposed would protect the cultural, historical and archaeological values of the site, or if not, whether the project could be modified by appropriate measures to protect those values.

"Appropriate measures" may include, but shall not be limited to the following:

a. Retaining the prehistoric and/or historic structure in situ or moving it intact to another site; or

b. Paving over the site without disturbance of any human remains or cultural objects upon the written consent of the Tribe(s); or

c. Clustering development so as to avoid disturbing the site; or

d. Setting the site aside for non-impacting activities, such as storage; or

e. If permitted pursuant to the substantive and procedural requirements of ORS 97.750, contracting with a qualified

archaeologist to excavate the site and remove any cultural objects and human remains, reinterring the human remains at the developer's expense; or

f. Using civil means to ensure adequate protection of the resources, such as acquisition of easements, public dedications, or transfer of title.

If a previously unknown or unrecorded archaeological site is encountered in the development process, the above measures shall still apply. Land development activities, which violate the intent of this strategy shall be subject to penalties prescribed in ORS 97.990.

III. Upon receipt of the statement by the Tribe(s), or upon expiration of the Tribe(s) thirty day response period, the local government shall review

a. Approve the development proposal if no adverse impacts have been identified, as long as consistent with other portions of this plan, or

b. Approve the development proposal subject to appropriate measures agreed upon by the landowner and the Tribe(s), as well as any additional measures deemed necessary by the local government to protect the cultural, historical and archaeological values of the site. If the property owner and the Tribe(s) cannot agree on the appropriate measures, then the governing body shall hold a quasi-judicial hearing to resolve the dispute. The hearing shall be a public hearing at which the governing body shall determine by preponderance of the evidence whether the development project may be allowed to proceed, subject to any modifications deemed necessary by the governing body to protect the cultural, historical and archaeological values of the site.

IV. Through the "overlay concept" of this policy and the Special Considerations Map, unless an exception has been taken, no uses other than propagation and selective harvesting of forest products consistent with the Oregon Forest Practices Act, grazing, harvesting wild crops, and low intensity water-dependent recreation shall be allowed unless such uses are consistent with the protection of the cultural, historical and archaeological values, or unless appropriate measures have been taken to protect the historic and archaeological values of the site. This strategy

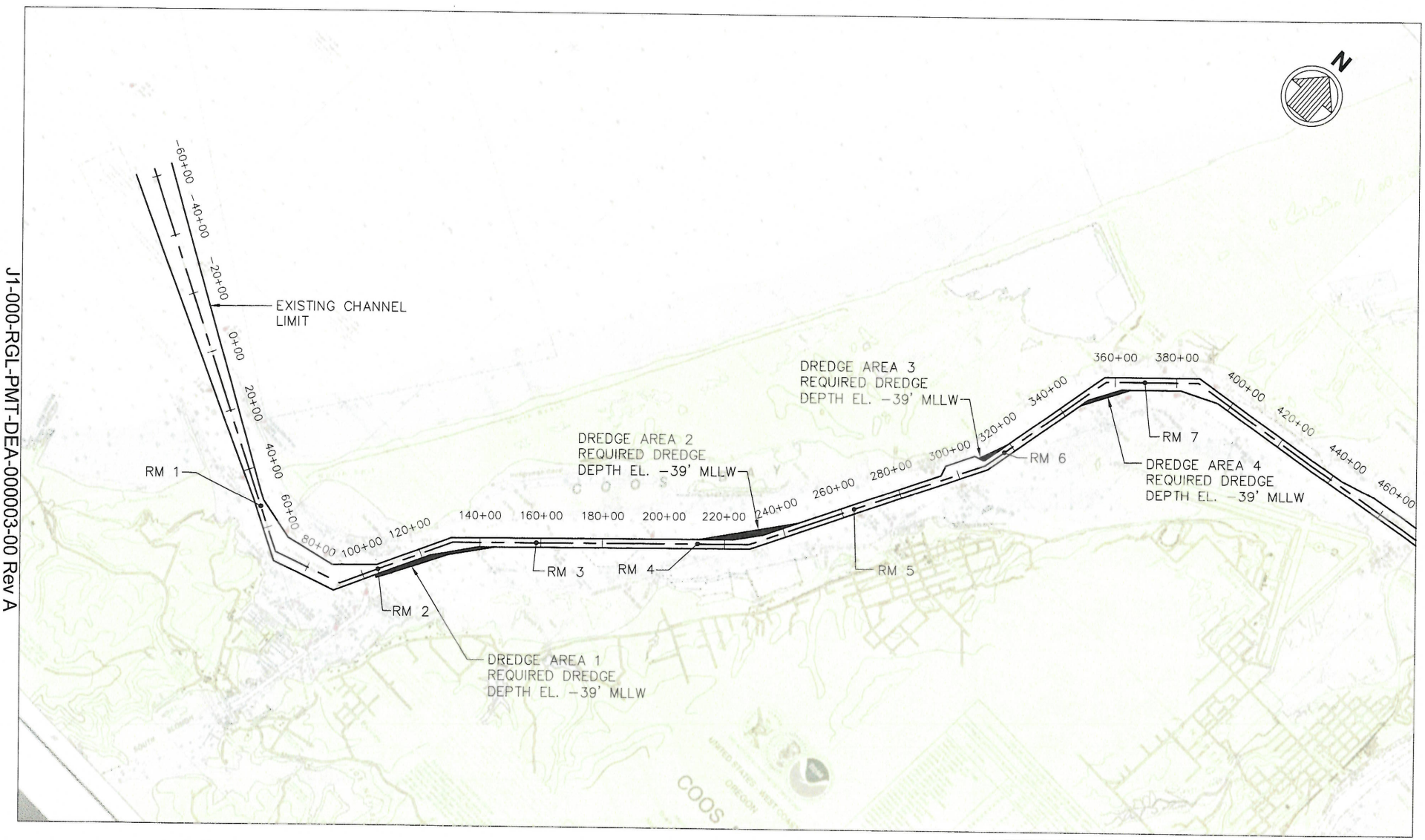
recognizes that protection of cultural, historical and archaeological sites is not only a community's social responsibility, it is also legally required by ORS 97.745. It also recognizes that cultural, historical and archaeological sites are non-renewable cultural resources.

RESPONSE: CBEMP Policy #18 is not applicable to JCEP's request for approval to complete the NRIs because this policy applies only when there are identified historical, cultural, and archaeological resources in the area of proposed development, and according to the County's Shoreland Values Inventory Map, there are no such resources in the Site area.

For the above reasons, the County should approve the Application for ACU approval for new and maintenance dredging in the DDNC-DA zone.

IV. Conclusion.

Based upon the above, the County should approve JCEP's requests: (1) to amend the CBEMP map to change the zoning designation of the NRI Sites from 2-NA, 3-DA, and 59-CA to DDNC-DA; (2) to amend the CCCP to take a reasons exception to Statewide Planning Goal ("Goal") 16 to change the zoning designation of the NRI Sites to DDNC-DA; (3) for amendments of the text of the CCZLDO to change the boundary descriptions of the DDNC-DA zoning district to reflect the contemporaneous zone change; and (4) for ACU approval for new and maintenance dredging in the County's DDNC-DA zone and accessory temporary dredge transport line in the 59-CA, 55A-CA, 2-NA, DDNC-DA, and 3-DA districts and an accessory buoy in the 5-DA district.



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moffatt & nichol
SEATTLE, WASHINGTON

NAVIGATION RELIABILITY IMPROVEMENTS
FIGURE 1 OF 9

Exhibit 22

PERKINSCOIE

1120 NW Couch Street
10th Floor
Portland, OR 97209-4128

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+1.503.727.2222
PerkinsCoie.com

November 21, 2018

Steven L. Pfeiffer
SPfeiffer@perkinscoie.com
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F. +1.503.346.2261

VIA OVERNIGHT DELIVERY

Jim Hossley, Director
Community Development Department
City of Coos Bay
500 Central Avenue
Coos Bay, OR 97420

Re: Concurrent Land Use Applications by Jordan Cove Energy Project L.P.
Coos Bay Estuary Navigation Reliability Improvements
City File Nos. _____

Dear Jim:

This office represents Jordan Cove Energy Project L.P. ("JCEP"). With this letter, please accept JCEP's concurrent land use applications to complete navigation reliability improvements for the Deep Draft Navigation Channel of the Coos Bay estuary. In support of these applications, enclosed please find the original and two copies of the following:

- Completed and signed City of Coos Bay Land Use Development Review Application
- Check payable to "City of Coos Bay" for the application fee deposit ($7,000.00)
- Narrative explaining the proposal and how it complies with applicable approval criteria, with the following exhibits:
  - Exhibit 1 - Depictions of navigation reliability improvements
  - Exhibit 2 - Pre-application conference notes
  - Exhibit 3 - Letters of support

- Exhibit 4 - U.S. Coast Guard letters dated May 10, 2018 and November 7, 2018
- Exhibit 5 - Memorandum from David Evans & Associates Inc.
- Exhibit 6 - Depiction of temporary dredge pipeline

We are also sending an electronic copy of these materials to the City. We are hopeful that, upon receipt of these materials, the City will deem the applications complete and will process them for review as soon as possible.

Seth King (SKing@perkinscoie.com) and I are PCGP's representatives in this matter. Please copy both of us on all correspondence, notices, staff reports, and decisions in this matter.

If you have any questions or need any additional information, do not hesitate to contact me. We look forward to working with the City toward approval of this request. Thank you for your courtesies in this matter.

Very truly yours,

Steven L. Pfeiffer

SLP
Enclosures

cc: Seth King (via email) (w/encls.)
Client (via email) (w/encls.)

City of Coos Bay

Community Development · 500 Central Avenue · Coos Bay, Oregon 97420
Telephone 541.269.1181 · Fax 541.269.8916 · coosbay.org

LAND USE DEVELOPMENT REVIEW APPLICATION

For Office Use Only	
STAFF CONTACT	PROJECT NO(S).

Type of Review (Please check all that apply):

- ☐ Annexation
- ☐ Appeal and Review
- ☐ Architectural Design Review
- ☐ Conditional Use
- ☐ Cultural Resources
- ☒ Estuarine Use/Activities
- ☐ Home Occupation
- ☒ Legislative/Text Amendment
- ☐ Lot Line Adjustment
- ☐ Partition
- ☐ Planned Unit Development
- ☐ Site Plan and Architectural Review
- ☐ Subdivision
- ☐ Temporary Use
- ☐ Vacation
- ☐ Variance
- ☐ Zone Change
- ☒ Other Plan amendment

Pre-Application applications require a different application form available on the City website or at City Hall.

Site Location/Address:	Assessor's Map No./Tax Lot(s):
Coos Bay Estuary	Zoning: Multiple
	Total Land Area:

Detailed Description of Proposal:

Navigation reliability improvements in Coos Bay:
(1) Map amendment for approximately 1.64 aces from 52-NA to DDNC-DA;
(2) Text amendment to City of Coos Bay Comprehensive Plan to take reasons exception to Statewide Planning Goal 16; and
(3) Estuarine and Coastal Shoreline Uses and Activities Permit to allow dredging in DDNC-DA and temporary pipeline in 52-NA, 53-CA, 54-DA, and 55-CA.

Applicant/Owner Name: Jordan Cove Energy Project L.P. (please print) — Phone:
Address: Attn: Meagan Masten, 111 SW 5th Avenue, Suite 1100 — Email: mmasten@pembina.com
City State Zip: Portland, OR 97204

Applicant's Representative: Seth King (please print) — Phone: 503.727.2024
Address: Perkins Coie LLP, 1120 NW Couch Street, Tenth Floor — Email: sking@perkinscoie.com
City State Zip: Portland, OR 97209

1. Provide evidence that you are the owner or purchaser of the property or have the written permission of owner(s) to make an application.
2. Copy of the deed for the subject property.
3. Attach (a) a certified list of names and addresses of all owners of property within designated distance of the exterior boundaries of the subject property according to the latest adopted County tax role and (b) an assessor's map showing all lots and parcels of land within that area.
4. Address the Decision Criteria or Goals/Standards outlined in the Coos Bay Municipal Code chapter(s) related to your request.
5. Additional information: Date construction is expected to begin; estimated completion date of the total project and of individual segments; and anticipated future development.
6. **Ten (10) complete hard-copy sets** (single sided) of application & submitted documents must be included with this application. **One (1) complete set** of digital application materials must also be submitted electronically or on CD in Word format. Additional copies may be required as directed by the Coos Bay Director of Community Development.

The undersigned property owner(s) hereby authorizes the filing of this application, and authorizes on site review by authorized staff. I hereby agree to comply with all code requirements applicable to my application. Acceptance of this application does not infer a complete submittal. All amendments to the Coos Bay Development Code and to other regulations adopted after the application is approved shall be enforced where applicable. Approved applications and subsequent development is not vested under the provisions in place at the time of the initial application.

Applicant's signature — Date: 11/21/18
Owner's signature ***(required)*** — See application materials — Date

BEFORE THE PLANNING COMMISSION AND

CITY COUNCIL OF THE CITY OF COOS BAY, OREGON

In the Matter of Requests to Improve the Navigation Efficiency and Reliability of the Coos Bay Deep Draft Navigation Channel Pursuant to the Following Applications: (1) Map Amendment to the Coos Bay Estuary Management Plan to Change the Designation of Approximately 3.3 Acres from 52-NA to DDNC-DA; (2) Text Amendment to the City of Coos Bay Comprehensive Plan to take a Reasons Exception to Statewide Planning Goal 16 to Authorize this Map Amendment; (3) Estuarine and Coastal Shoreline Uses and Activities Permit For "New And Maintenance Dredging" in the DDNC-DA Estuarine Zone; and (4) Estuarine and Coastal Shoreline Uses and Activities Permit to Allow an Accessory Temporary Dredge Transport Pipeline in the 52-NA, 53-CA, 54-DA, and 55-CA Estuarine Zones.	**NARRATIVE IN SUPPORT OF THE APPLICATIONS FILED BY JORDAN COVE ENERGY PROJECT L.P.**

I. Land Use Requests.

Jordan Cove Energy Project L.P. ("JCEP") proposes to make navigation efficiency and reliability improvements to the City of Coos Bay ("City")-designated Coos Bay Deep-Draft Navigation Channel ("Channel") by dredging a submerged area lying adjacent to the existing Channel.[1] This dredging will allow for vessel transit under a broader weather window to enable JCEP to export the full capacity of the optimized design

[1] JCEP is also proposing to widen and deepen the Channel in three additional locations, which are subject to the planning and zoning jurisdiction of Coos County. That request is outside the scope of these Applications. JCEP is filing a separate land use application with Coos County to obtain authorization for the navigability enhancements at these other three locations.

production of 7.8 metric tonnes per annum ("mtpa") from JCEP's liquefied natural gas ("LNG") terminal on the nearby North Spit.

JCEP submits the following concurrent applications ("Applications") to the City to seek local authorization to complete these improvements to the Channel:

(1) Post-acknowledgment amendments to the Coos Bay Estuary Management Plan ("CBEMP") map to change the zoning designation of approximately 3.3 acres located approximately 2,700 feet from the end of the North Bend airport runway within the Coos Bay estuary ("Navigation Reliability Improvement Site" or "NRI Site") from 52-NA to DDNC-DA, as further depicted in Exhibit 1;

(2) A post-acknowledgment text amendment of the CBEMP, which is part of the City of Coos Bay Comprehensive Plan ("CBCP"), to take a reasons exception to Statewide Planning Goal ("Goal") 16 to authorize the rezone of the NRI Site to DDNC-DA;

(3) Estuarine and Coastal Shoreline Uses and Activities Permit in the DDNC-DA estuarine zone to allow new and maintenance dredging at the rezoned NRI Site. The activities at the NRI Site will be referred to in this narrative as the "NRIs;"

(4) Estuarine and Coastal Shoreline Uses and Activities Permit in the 52-NA, 53-CA, 54-DA, and 55-CA estuarine zones to allow a temporary pipeline to transport the dredge spoils from the NRI Site to approved disposal sites as an accessory use to the primary dredging activity. JCEP is not seeking approval of the dredged materials disposal activity in conjunction with these Applications.

This narrative provides the evidentiary basis and related analysis demonstrating how the Application satisfies the applicable approval criteria set forth in the Statewide Planning Goals ("Goals"), the Oregon Revised Statutes ("ORS"), the CBEMP, the CBCP, and the City of Coos Bay Municipal Code ("CBMC"). Based upon this evidence and argument, the City should approve the Applications.

JCEP discussed this proposal with the City in a pre-application conference on February 2, 2017. A copy of the pre-application conference notes prepared by the City are included in Exhibit 2.

II. Description of Request.

A. Current Constraints on Utilizing the Channel.

The Channel serves a vital purpose because it provides the only safe vessel access to and from Coos Bay and the Pacific Ocean for marine terminals located along the Bayfront. The Channel was initially authorized in 1899 and since then has undergone

ten modifications. Most recently, the Channel was expanded from -35 feet to -37 feet in 1997 to allow for the safe navigation and transit of Coos Bay for the size of ships prevalent during that time period. However, over the last 20 years the dimensions and tonnage of ships serving terminals in Coos Bay has increased. The size of vessels typically calling on Coos Bay terminals has increased from an average of 45,422 Metric Tonnes to an average of 52,894 Metric Tonnes with a projected near-term vessel size of 70,400 Metric Tonnes.

Currently, environmental conditions, including wind, fog, and currents, coupled with the increasing ship size explained above, have caused the Coos Bay Pilots Association[2] ("Pilots") to impose ever more limiting restrictions on when vessels may safely transit the Channel. These restrictions, in turn, cause significant delays and increased pressure on the Pilots to navigate ships through the Channel. Delays are measured in the total transit time, from the time the vessel arrives off the coast of Coos Bay until it returns offshore after calling at its local Coos Bay destination. These delays generally decrease the efficiency and competitiveness of maritime commerce on a global scale, thereby jeopardizing continued success for maritime commerce in Coos Bay. Minimizing delay is a pressing need because companies that utilize the port of Coos Bay have identified potential new customers in Asia that desire to export cargo using bulk carriers that are slightly larger than the ships typically calling today. Various marine terminal businesses within Coos Bay require assurances that terminals can efficiently accommodate larger dimension bulk carriers in the future.

B. How NRIs will Improve Navigation Efficiency and Reliability.

Dredging to complete the NRI Sites will increase the operational window to safely transit any vessel through the Channel. The NRIs, which are described in more detail below, are designated to increase the environmental operating windows for all ships entering Coos Bay by softening critical turns, relocate aids to navigation and reduce the required Channel directional changes. The NRIs are designed to reduce entry and departure delays and allow for more efficient vessel transits through the Channel for the size of vessels entering the Port today.

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[2] The Pilots, regulated and approved by the State of Oregon, are responsible for supporting deep sea vessel Masters in navigating their vessels into and out of the Channel. Pilotage is mandatory in Oregon. The Pilots serve a vital function for maritime commerce in Coos Bay because they safely and efficiently guide vessels through the Channel (known as pilotage) using visual aids, radar, and other means. The Channel provides the only safe vessel access to marine terminals within Coos Bay. Pilots are trained to navigate the Channel and therefore have detailed knowledge of its bathymetric conditions and visual layout.

The NRIs will allow companies to secure emerging opportunities to export products with today's larger vessels, including bulk carriers of up to 299.9 meters (983.3 feet) in length and 49 meters (160.8 feet) in beam and 11.9 meters (39 feet) in draft. Although log export vessels serving the upper bay are smaller, the proposed enhancements also benefit these vessels by broadening the tidal and environmental windows for transiting the Channel, providing an enhanced margin of safety and improved efficiency in the loaded vessel departure schedule. Both Roseburg Forest Products and the Pilots have submitted letters of support for the NRIs. *See* Exhibit 3.

For JCEP and its LNG terminal, the NRI enhancements will allow for transit of LNG vessels of similar overall dimensions to those listed in the July 1, 2008 United States Coast Guard ("USCG") Waterway Suitability Report, the USCG Letter of Recommendation dated May 10, 2018 and USCG letter confirmation dated November 7, 2018 *see* Exhibit 4, but under a broader range of weather conditions, specifically higher wind speeds. As a result, JCEP estimates that, upon completion of the NRIs, JCEP will be able to export the full capacity of the optimized design production of the LNG Terminal on a consistent annual basis.

C. Description of Channel NRIs.

The NRIs are illustrated in Exhibit 1 and, in the City, consist of the following specific navigation enhancements to the Channel:

- NRI #4 (NRI #1 - #3 are subject to Coos County jurisdiction): JCEP proposes to widen the turn from Lower Jarvis Range to Jarvis Turn Range channels from the current 500 feet to 600 feet at the apex of the turn from the current 1,125 feet to about 1,750 feet, which will allow vessels to commence their turn in this area sooner.

The NRI Site would be dredged to a -37-foot MLLW elevation to match the current depth of the Channel. Dredging of the NRIs would include a two-foot over-dredge allowance and a two-foot advanced maintenance allowance (total depth: -41-feet MLLW). Channel side slopes would be constructed at a 4:1 horizontal to vertical slope. Notably, these improvements have been identified by the USCG as a required navigation risk mitigation measure for the JCEP terminal operations. *See* Letter of Recommendation from USCG dated May 10, 2018 in Exhibit 4.

D. Proposed Dredging and Accessory Dredge Transport Activities.

JCEP will accomplish the Channel enhancements by dredging at each of the NRI Sites. Dredging would be accomplished with mechanical or hydraulic methods. The specific

characteristics of the dredging are described in the memorandum from David Evans & Associates ("DEA") included in Exhibit 5.

All work associated with the NRIs will take place during the approved in-water work period for Coos Bay (October 1 to February 15).

JCEP will place initial and future dredged material derived from the NRI Sites at the APCO 1 and 2 sites near the southern terminus of the U.S. Highway 101 McCullough Bridge (Drawing 6). These sites are located in the City of North Bend; JCEP will file a separate application with that city to authorize disposal of these dredge spoils in these locations.

If dredging by hydraulic methods, JCEP will utilize a 24-inch dredge line to transport the dredged material to the disposal sites via a temporary pipeline on the bottom or horizontal extent of the Channel to reduce potential conflicts with vessel navigation. The maximum distance from the NRIs to the APCO sites is approximately 8.3-miles. The dredge line is illustrated in Exhibit 6. Booster pumps would be required to move the material to the disposal sites.

III. Applicable Approval Criteria.

The Application complies with all applicable approval criteria, as follows.

A. Comprehensive Plan Map Amendment

1. CBMC - 17.215.010 Comprehensive plan amendment.

(1) The boundaries of the comprehensive plan map designations and the comprehensive plan text may be amended as provided in CBDC 17.215.020.

(2) The city may amend its comprehensive plan and/or plan map. The approval body shall consider the cumulative effects of the proposed comprehensive plan and/or map amendments on other zoning districts and uses within the general area. Cumulative effects include sufficiency of capital facilities services, transportation, zone and location compatibility, and other issues related to public health and safety and welfare the decision making body determines to be relevant to the proposed amendment.

RESPONSE: This Application requests an amendment of the CBCP map to change the CBCP designation of the NRI Site from 52-NA to DDNC-DA. The cumulative effects of such an amendment would be to facilitate an increase in safety and efficiency of

navigation in the Channel, as described in Section II. of this narrative above. Therefore, the cumulative effect of the Application is to augment transportation in the bay. The Application is compatible with the zone because new and maintenance dredging is allowed in the DDNC-DA district (and because this Application requests a comprehensive plan map amendment to render the NRI Site with a DDNC-DA designation). The Application will not have cumulative effects on the sufficiency of capital facilities services, or health and welfare. Therefore, the City can find that the Application satisfies this criterion.

CBMC - 17.215.020 Initiation of Amendment

Amendments of the comprehensive plan text or map, zoning map, or this title may be initiated by the following:

(1) A Type III application, CBDC 17.130.100, Type III procedure, by one or more owners of the property proposed to be changed or reclassified consistent with the adopted comprehensive plan; or

(2) A Type IV legislative process, CBDC 17.130.110, Type IV procedure, by motion of the planning commission and adoption by the city council.

RESPONSE: Applicant has initiated this Application as a Type IV legislative process in accordance with CBMC 17.130.110.

CBMC - 17.215.060 Approval Criteria

1) For a Type III or Type IV review, the city council shall approve the proposal upon findings that:

(a) The proposed amendment is consistent with the applicable policies of the comprehensive plan or that a significant change in circumstances requires an amendment to the plan or map;

RESPONSE: This Application to change the CBCP designation of the NRI Site from 52-NA to DDNC-DA is consistent with the applicable policies of the comprehensive plan.

CBCP Policies

NRH.8 Coos Bay shall encourage the preservation and protection of riparian vegetation as an important fish and wildlife habitat and as a viable means of flood control by enactment of appropriate property development ordinances providing protection by establishing buffer strips along waterways, along designated HUD

floodways, with the exception of navigable waterways. This strategy recognizes that such land use practices are necessary (1) to preserve the area's natural resources, and (2) to eliminate unnecessary drainage and erosion problems often accompanying development.

RESPONSE: Applicant anticipates possible temporary, but not permanent, impacts to shoreline habitat, including to riparian vegetation, where Applicant plans to offload dredged material for processing. These temporary impacts would be limited to a corridor approximately 10 feet wide. Furthermore, Applicant would locate this corridor in the field (location by the dredging contractor) to minimize impacts to vegetation and aquatic resources. Regardless, NRH.8 does not affirmatively obligate the Applicant to take any action, but rather obligates the City to "encourage" preservation of riparian vegetation "by placing buffer strips along waterways, along designated HUD floodways, with the exception of navigable waterways." Applicant will comply with any regulations the City has implemented in accordance with its obligation to so "encourage" preservation of riparian vegetation. Therefore, the City can find that the Application complies with NRH.8.

NRH.9 **Coos Bay shall cooperation with local, state, and federal agencies in conserving and protecting fish and wildlife habitat, open spaces, and aesthetic and scenic values encompassed by areas enclosed by the Coos Bay-North Bend Water Board, Empire Lakes, and Mingus Park. This strategy is not intended to prohibit development in these areas, but rather to ensure that if development occurs it takes into consideration the ability of the land to support such development, i.e., soils, topography, habitat, natural processes, etc. This strategy recognizes that these areas are particularly sensitive and valuable resources.**

RESPONSE: This policy creates no affirmative obligations for the Applicant. Therefore, it does not apply to the Application.

Goal 6, Policies 6.1, 6.2 **Maximize the potential uses and benefits the waterfront and deep-water port offers to the city and region as a whole; Support the Port of Coos Bay in its development efforts for transportation linkage and to develop a deep-draft channel to accommodate large cargo vessels and increase shipping activities and water-dependent uses.**

RESPONSE: The purpose of this Application is to allow the NRIs, which together with other improvements for which Applicant is seeking approval from Coos County, will facilitate increased navigational safety and efficiency for large vessels in the Channel, thereby maximizing the Channel's economic benefits for the City and region as a whole by allowing increased economic input and output. Therefore, the Application complies with these policies.

For the above reasons, the City can find that the Application complies with the policies of the CBCP that apply to the Application.

(b) The proposed amendment is in the public interest; and

RESPONSE: The CBCP amendment that this Application seeks is in the public interest because it will result in increased navigational safety and efficiency for large vessels in the Channel, which will allow increased economic input and output to flow through the Channel, which in turn will be an economic boon to the City and the region. The Application complies with this criterion.

(c) Approval of the amendment will not result in a decrease in the level-of-service for capital facilities and services identified in the Coos Bay capital improvement plan(s).

RESPONSE: Approving this Application will not result in a decrease in the level-of-service for any identified capital facilities and/or services identified in the Coos Bay capital improvement plan. Therefore, the City can find that the Application complies with this criterion.

2. Statewide Planning Goals

Post-acknowledgment plan amendments must be in compliance with the Goals. ORS 197.175(2)(a); *1000 Friends of Oregon v. LCDC*, 301 Or 447, 724 P2d 268 (1986). The rezoning is a post-acknowledgment plan amendment. Therefore, the City's decision must explain why the rezoning is in compliance with the Goals. Alternatively, if a Goal is not applicable, the City must adopt findings explaining why that Goal is not applicable. *Davenport v. City of Tigard*, 22 Or LUBA 577, 586 (1992). The responses below provide findings explaining why the Applications are in compliance with the Goals, or alternatively, why the Goals are not applicable to the Applications.

Goal 1: Citizen Involvement.

To develop a citizen involvement program that insures the opportunity for citizens to be involved in all phases of the planning process.

RESPONSE: Goal 1 requires local governments to adopt and administer programs to ensure the opportunity for citizens to be involved in all phases of the planning process. The City has adopted such a program for PAPAs, and it is incorporated within the CBMC and has been acknowledged by LCDC. Among other things, the City's program requires notice to citizens, agencies, neighbors, and other interested parties followed by multiple public hearings before the City makes a decision on the Application. These procedures will provide ample opportunity for citizen involvement in all phases of these Applications. The City should find that, upon compliance with its notice and hearing procedures, the City has reviewed the Application in a manner consistent with Goal 1. *See Wade v. Lane County*, 20 Or LUBA 369, 376 (1990) (Goal 1 is satisfied as long as the local government follows its acknowledged citizen involvement program).

Goal 2: Land Use Planning.

To establish a land use planning process and policy framework as a basis for all decisions and actions related to use of land and to assure an adequate factual base for such decisions and actions.

RESPONSE: Goal 2 requires establishing a land use planning process and policy framework as a basis for all land use decisions and requires an adequate factual base for all land use decisions. In the present case, the provisions of the CBMC and the ORS establish the land use planning process and policy framework for considering the Application. Further, the enclosed materials, including this narrative, demonstrate that the Application satisfies all applicable approval criteria. As such, there is an adequate factual base for the City's decision.

Additionally, Goal 2 requires that the City coordinate its review and decision on the Application with appropriate government agencies. In its review of the Application, the City has provided notice and an opportunity to comment to affected government agencies, including nearby cities and the State Departments of Land Conservation and Development and Transportation.

The City should find that the Application is consistent with Goal 2.

Goal 3: Agricultural Lands.

To maintain and preserve agricultural lands.

RESPONSE: Goal 3 concerns agricultural lands. The NRI Site does not include any agricultural lands, and approval of the amendments will not impact any agricultural lands. Therefore, the City should find that Goal 3 is not applicable to the Application.

Goal 4: Forest Lands.

To conserve forest lands by maintaining the forest land base and to protect the state's forest economy by making possible economically efficient forest practices that assure the continuous growing and harvesting of forest tree species as the leading use on forest land consistent with sound management of soil, air, water, and fish and wildlife resources and to provide for recreational opportunities and agriculture.

RESPONSE: Goal 4 protects forest lands. The NRI Site does not include any forest lands, and approval of the amendments will not impact any forest lands. Therefore, the City should find that Goal 4 is not applicable to the Application.

Goal 5: Natural Resources, Scenic and Historic Areas, and Open Spaces.

To protect natural resources and conserve scenic and historic areas and open spaces.

RESPONSE: Goal 5 protects certain types of inventoried resources. The NRI Site does not include any inventoried Goal 5 resources, and approval of the Application will not impact any Goal 5 inventoried resources. Therefore, the City should find that Goal 5 is not applicable to the Application.

Goal 6: Air, Water and Land Resources Quality.

To maintain and improve the quality of the air, water and land resources of the state.

RESPONSE: Goal 6 requires comprehensive plans to follow multiple guidelines to conserve the quality of air, water and land resources in the state, and requires the City to make findings that it is reasonable to expect that the NRIs will comply with federal and state environmental standards. The Goal exception that this Application proposes will not undermine the CBCP's implementation of these guidelines. Applicant anticipates that completing the NRIs will have effects upon air, water and land resources in the City, but these effects will be temporary, insignificant, or both, and Applicant will construct the NRIs using methods to protect these resources.

In a post-acknowledgment plan amendment proceeding, the City is only required to find that it is reasonable to expect that federal and state environmental standards will be met in the future when permits for the dredging are sought. *Nicita v. City of Oregon City*, 74 Or LUBA 176 (2016). For two reasons, the City should find that it is reasonable to expect that JCEP's proposed dredging will satisfy federal and state environmental standards. First, JCEP has applied for state and federal approval of dredging activities at the NRI Site, and there is no indication that JCEP is precluded as a

matter of law from obtaining approval of these applications. Second, the proposed map amendments do not alter existing City protections provided by the CBEMP restricting dredging activities, which protections have been previously deemed consistent with Goal 6, and are addressed later in this narrative.

For the above reasons, the Application complies with Goal 6.

Goal 7: Areas Subject to Natural Hazards.

To protect people and property from natural hazards.

RESPONSE: Goal 7 requires local governments to identify and plan for natural hazard areas, and coordinate their natural hazard plans and programs with state agencies. This Application complies with Goal 7 because it will not increase the likelihood of damage to people or property within the City from natural hazards.

Goal 8: Recreational Needs.

To satisfy the recreational needs of the citizens of the state and visitors, and where appropriate, to provide for the siting of necessary recreational facilities including destination resorts.

RESPONSE: Goal 8 does not apply to the Application because it does not involve recreation or inventoried recreation areas, facilities, or opportunities.

Goal 9: Economic Development.

To provide adequate opportunities throughout the state for a variety of economic activities vital to the health, welfare, and prosperity of Oregon's citizens.

RESPONSE: The Application complies with Goal 9. The purpose of the Application is to complete the NRIs, which in turn will facilitate a broader operational window, and increase safety and efficiency of transit, in the Channel. This will be a boon to the economic prospects for the City and the state because it will make the Channel safer and more efficient for productive economic enterprises of the kind that provide opportunities to Oregonians.

Goal 10: Housing.

To provide for the housing needs of the citizens of the state.

RESPONSE: Goal 10 and its implementing rules require each local government to inventory the supply of buildable residential lands and to ensure that the supply of such buildable lands meets the local government's anticipated housing needs. The

Application will not affect the supply of residential lands in the City. Therefore, the City should find that the Application is consistent with Goal 10, to the extent it is applicable.

Goal 11: Public Facilities and Services.

To plan and develop a timely, orderly and efficient arrangement of public facilities and services to serve as a framework for urban and rural development.

RESPONSE: Goal 11 does not apply to the Application because the Application does not involve or affect public facilities and services as a framework for development.

Goal 12: Transportation.

To provide and encourage a safe, convenient and economic transportation system.

RESPONSE: The Application complies with Goal 12. Goal 12 directs local governments to plan transportation systems that consider all modes of transportation, including water, that facilitate the flow of goods and services so as to strengthen the local and regional economy, that conserve energy, and that avoid principal reliance on one mode of transportation. The Application furthers these goals by supporting safer and more efficient use of the Channel for water transportation. This safer and more efficient use of the Channel will conserve energy that is currently wasted when, outside the Channel's operational window, vessels wait outside the Channel, using fuel and adding time and expense to transit.

Goal 13: Energy Conservation.

To conserve energy.

RESPONSE: The Application complies with Goal 13. Goal 13 directs local governments to manage land use so as to maximize the conservation of all forms of energy. The Application will facilitate maximal energy conservation by increasing the safety and efficiency of vessel transit of the Channel, and by increasing the Channel's operational window. This will reduce the amount of time vessels spend waiting to enter and navigate the Channel, due to environmental conditions that exceed those required by the Pilots for a safe vessel transit, which will increase the efficiency of material transportation and reduce energy waste from inefficiency of transportation.

Goal 14: Urbanization.

To provide for an orderly and efficient transition from rural to urban land use.

RESPONSE: Goal 14 does not apply to the Application, which does not involve urban development on rural land.

Goal 15: Willamette River Greenway.

To protect, conserve, enhance and maintain the natural, scenic, historical, agricultural, economic and recreational qualities of lands along the Willamette River as the Willamette River Greenway.

RESPONSE: Goal 15 only applies to lands along the Willamette River. The Modification Sites are not located along the Willamette River or in the Willamette River Greenway. Approval of the amendments will not impact the Willamette River of the Willamette River Greenway. Therefore, the City should find that Goal 15 is not applicable to the Applications.

Goal 16: Estuarine Resources.

To recognize and protect the unique environmental, economic, and social values of each estuary and associated wetlands; and to protect, maintain, where appropriate develop, and where appropriate restore the long-term environmental, economic, and social values, diversity and benefits of Oregon's estuaries.

…

MANAGEMENT UNITS

Diverse resources, values, and benefits shall be maintained by classifying the estuary into distinct water use management units. When classifying estuarine areas into management units, the following shall be considered in addition to the inventories:

1. Adjacent upland characteristics and existing land uses;

2. Compatibility with adjacent uses;

3. Energy costs and benefits; and

4. The extent to which the limited water surface area of the estuary shall be committed to different surface uses.

At a minimum, the following kinds of management units shall be established:

1. Natural -- in all estuaries, areas shall be designated to assure the protection of significant fish and wildlife habitats, of continued biological productivity

within the estuary, and of scientific, research, and educational needs. These shall be managed to preserve the natural resources in recognition of dynamic, natural, geological, and evolutionary processes. Such areas shall include, at a minimum, all major tracts of salt marsh, tideflats, and seagrass and algae beds. Permissible uses in natural management units shall include the following:

a. Undeveloped low-intensity, water-dependent recreation;

b. Research and educational observations;

c. Navigation aids, such as beacons and buoys;

d. Protection of habitat, nutrient, fish, wildlife, and aesthetic resources;

e. Passive restoration measures;

f. Dredging necessary for on-site maintenance of existing functional tidegates and associated drainage channels and bridge crossing support structures;

g. Riprap for protection of uses existing as of October 7, 1977, unique natural resources, historical and archaeological values; and public facilities; and

h. Bridge crossings.

Where consistent with the resource capabilities of the area and the purposes of this management unit the following uses may be allowed:

a. Aquaculture which does not involve dredge or fill or other estuarine alteration other than incidental dredging for harvest or benthic species or removable in-water structures such as stakes or racks;

b. Communication facilities;

c. Active restoration of fish and wildlife habitat or water quality and estuarine enhancement;

d. Boat ramps for public use where no dredging or fill for navigational access is needed; and

e. Pipelines, cables, and utility crossings, including incidental dredging necessary for their installation.

f. Installation of tidegates in existing functional dikes.

g. Temporary alterations.

h. Bridge crossing support structures and dredging necessary for their installation.

A use or activity is consistent with the resource capabilities of the area when either the impacts of the use on estuarine species, habitats, biological productivity and water quality are not significant or that the resources of the area are able to assimilate the use and activity and their effects and continue to function in a manner to protect significant wildlife habitats, natural biological productivity, and values for scientific research and education.

2. Conservation -- in all estuaries, except those in the overall Oregon Estuary Classification which are classed for preservation, areas shall be designated for long-term uses of renewable resources that do not require major alteration of the estuary, except for the purpose of restoration. These areas shall be managed to conserve the natural resources and benefits. These shall include areas needed for maintenance and enhancement of biological productivity, recreational and aesthetic uses, and aquaculture. They shall include tracts of significant habitat smaller or of less biological importance than those in (1) above, and recreational or commercial oyster and clam beds are not included in (1) above. Areas that are partially altered and adjacent to existing development of moderate intensity which do not possess the resource characteristics of natural or development units shall also be included in this classification. Permissible uses in conservation management units shall be all uses listed in (1) above except temporary alterations. Where consistent with the resource capabilities of the area and the purposes of this management unit the following uses may be allowed:

a. High-intensity water-dependent recreation, including boat ramps, marinas and new dredging for boat ramps and marinas;

b. Minor navigational improvements;

c. Mining and mineral extraction, including dredging necessary for mineral extraction;

d. Other water dependent uses requiring occupation of water surface area by means other than dredge or fill;

e. Aquaculture requiring dredge or fill or other alteration of the estuary;

f. Active restoration for purposes other than those listed in 1(d).

g. Temporary alterations.

A use or activity is consistent with the resource capabilities of the area when ether the impacts of the use on estuarine species, habitats, biological productivity, and water quality are not significant or that the resources of the area are able to assimilate the use and activity and their effects and continue to function in a manner which conserves long-term renewable resources, natural biologic productivity, recreational and aesthetic values and aquaculture.

3. Development -- in estuaries classified in the overall Oregon Estuary Classification for more intense development or alteration, areas shall be designated to provide for navigation and other identified needs for public, commercial, and industrial water-dependent uses, consistent with the level of development or alteration allowed by the overall Oregon Estuary Classification. Such areas shall include deep-water areas adjacent or in proximity to the shoreline, navigation channels, subtidal areas for in-water disposal of dredged material and areas of minimal biological significance needed for uses requiring alterations of the estuary not included in (1) and (2) above. Permissible uses in areas managed for water-dependent activities shall be navigation and water-dependent commercial and industrial uses. As appropriate the following uses shall also be permissible in development management units:

a. Dredge or fill, as allowed elsewhere in the goal;

b. Navigation and water-dependent commercial enterprises and activities;

c. Water transport channels where dredging may be necessary;

d. Flow-lane disposal of dredged material monitored to assure that estuarine sedimentation is consistent with the resource capabilities and purposes of affected natural and conservation management units.

e. Water storage areas where needed for products used in or resulting from industry, commerce, and recreation;

f. Marinas.

Where consistent with the purposes of this management unit and adjacent shorelands designated especially suited for water-dependent uses or designated for waterfront redevelopment, water-related and nondependent, nonrelated uses not requiring dredge or fill; mining and mineral extraction; and activities identified in (1) and (2) above shall also be appropriate. In designating areas for these uses, local

governments shall consider the potential for using upland sites to reduce or limit the commitment of the estuarine surface area for surface uses.

RESPONSE: Goal 16 requires that local governments divide all estuaries that Goal 16 protects into, at a minimum, the above "management units"--Natural, Conservation, and Development. The CBEMP complies with Goal 16 by creating and maintaining three "Aquatic Management Units" and seven "Shoreland Management Units" including the baseline Natural, Conservation, and Development management units that Goal 16 requires. The NRI Site is currently zoned 52-NA (a natural aquatic unit). This Application seeks to amend the CBEMP to apply the DDNC-DA (a development aquatic) management unit to the NRI Site in order to allow dredging necessary to complete the NRIs. Such dredging is not allowed in natural management units. Therefore, a Goal 16 exception is required to rezone the NRI Site to DDNC-DA.

Goal 17: Coastal Shorelands.

To conserve, protect, where appropriate, develop and where appropriate restore the resources and benefits of all coastal shorelands, recognizing their value for protection and maintenance of water quality, fish and wildlife habitat, water-dependent uses, economic resources and recreation and aesthetics. The management of these shoreland areas shall be compatible with the characteristics of the adjacent coastal waters; and

To reduce the hazard to human life and property, and the adverse effects upon water quality and fish and wildlife habitat, resulting from the use and enjoyment of Oregon's coastal shorelands.

RESPONSE: Goal 17 regulates coastal shorelands. The NRI Site does not include any designated coastal shorelands. Moreover, the proposed amendments will not impact any designated coastal shorelands. Therefore, the City should find that Goal 17 is not applicable to the Application.

Goal 18: Beaches and Dunes.

To conserve, protect, where appropriate develop, and where appropriate restore the resources and benefits of coastal beach and dune areas; and

To reduce the hazard to human life and property from natural or man-induced actions associated with these areas.

RESPONSE: Goal 18 concerns beaches and dunes. The NRI Site does not include any designated beaches or dunes. Moreover, the proposed amendments will not

impact any designated beaches or dunes. Thus, the City should find that Goal 18 is not applicable to the Applications.

Goal 19: Ocean Resources.

To conserve marine resources and ecological functions for the purpose of providing long-term ecological, economic, and social value and benefits to future generations.

RESPONSE: Goal 19 calls for the conservation of ocean resources. The NRI Site does not include or abut any ocean resources, and the proposed amendments will not impact any ocean resources. Therefore, the City should find that Goal 19 is not applicable to the Application.

For the above reasons, the City can find that the Application complies with the Goals.

B. Goal 16 "Reasons" Exception:

ORS 197.732

(2) A local government may adopt an exception to a goal if:

…

(c) The following standards are met:

(A) Reasons justify why the state policy embodied in the applicable goals should not apply;

(B) Areas that do not require a new exception cannot reasonably accommodate the use;

(C) The long term environmental, economic, social and energy consequences resulting from the use at the proposed site with measures designed to reduce adverse impacts are not significantly more adverse than would typically result from the same proposal being located in areas requiring a goal exception other than the proposed site; and

(D) The proposed uses are compatible with other adjacent uses or will be so rendered through measures designed to reduce adverse impacts.

RESPONSE: The above criteria are duplicative with the same criteria set forth in OAR 660-004-0020, which implements ORS 197.732. Therefore, this Application responds to the above criteria in the section immediately below that is devoted to OAR 660-004-0020. For the reasons explained below, the proposed exception complies with the administrative rules, and compliance with these administrative rules will ensure compliance with these statutory provisions.

OAR 660-004-0020

(1) If a jurisdiction determines there are reasons consistent with OAR 660-004-0022 to use resource lands for uses not allowed by the applicable Goal or to allow public facilities or services not allowed by the applicable Goal, the justification shall be set forth in the comprehensive plan as an exception. As provided in OAR 660-004-0000(1), rules in other divisions may also apply.

RESPONSE: This Application presents "reasons" (as set forth in more detail below) consistent with OAR 660-004-0022 why Goal 16 should not apply to the NRI Site. This Application proposes that the City set forth in its comprehensive plan the justification for a Goal 16 exception at the NRI Site. Therefore, this Application satisfies this approval criterion.

(2) The four standards in Goal 2 Part II(c) required to be addressed when taking an exception to a goal are described in subsections (a) through (d) of this section, including general requirements applicable to each of the factors:

(a) "Reasons justify why the state policy embodied in the applicable goals should not apply." The exception shall set forth the facts and assumptions used as the basis for determining that a state policy embodied in a goal should not apply to specific properties or situations, including the amount of land for the use being planned and why the use requires a location on resource land;

RESPONSE: This standard requires identifying "reasons" why the state policy in Goal 16 should not apply to the NRI Site. OAR 660-004-0022 identifies the types of "reasons" that may be used to justify the exception. Applicant's responses to that rule below justify the proposed Goal 16 exception.

OAR 660-004-0022

An exception under Goal 2, Part II(c) may be taken for any use not allowed by the applicable goal(s) or for a use authorized by a statewide planning goal that cannot comply with the approval standards for that type of use. The types of reasons that may or may not be used to justify certain types of uses not allowed on resource lands are set forth in the following sections of this rule. Reasons that may allow an exception to Goal 11 to provide sewer service to rural lands are described in OAR 660-011-0060. Reasons that may allow transportation facilities and improvements that do not meet the requirements of OAR 660-012-0065 are provided in OAR 660-012-0070. Reasons that rural lands are irrevocably committed to urban levels of development are provided in OAR 660-014-0030. Reasons that may justify the establishment of new urban development on undeveloped rural land are provided in OAR 660-014-0040.

(1) For uses not specifically provided for in this division, or in OAR 660-011-0060, 660-012-0070, 660-014-0030 or 660-014-0040, the reasons shall justify why the state policy embodied in the applicable goals should not apply. Such reasons include but are not limited to the following:

(a) There is a demonstrated need for the proposed use or activity, based on one or more of the requirements of Goals 3 to 19; and either

(A) A resource upon which the proposed use or activity is dependent can be reasonably obtained only at the proposed exception site and the use or activity requires a location near the resource. An exception based on this paragraph must include analysis of the market area to be served by the proposed use or activity. That analysis must demonstrate that the proposed exception site is the only one within the market area at which the resource depended upon can be reasonably obtained; or

(B) The proposed use or activity has special features or qualities that necessitate its location on or near the proposed exception site.

RESPONSE: The Application must show a "demonstrated need" for the proposed use or activity based on the requirements of one or more of Goals 3 to 19. The "demonstrated need" for the NRIs is based primarily on Goals 9 and 12. As explained in Section II. of this narrative above, structural restrictions on the Channel cause significant transit delays and unduly increase required directional changes during transit through the Channel. Delays are measured in the total transit time, from the time the vessel

arrives off the coast of Coos Bay until it returns offshore after calling at its local Coos Bay destination. These delays decrease the efficiency and competitiveness of maritime commerce on a global scale, thereby jeopardizing continued success for maritime commerce in Coos Bay. Minimizing delay is a pressing need because companies that utilize the port of Coos Bay have identified potential new customers in Asia that desire to export cargo using bulk carriers that are slightly larger than the ships typically calling today. Various marine terminal businesses within Coos Bay require assurances that terminals can efficiently accommodate larger dimension bulk carriers in the future. The NRIs will allow companies to secure emerging opportunities to export products with today's larger vessels, including bulk carriers of up to 299.9 meters (983.3 feet) in length, 49 meters (160.8 feet) in beam, and 11.9 meters (39 feet) in draft. With respect to the Liquefied Natural Gas ("LNG") facility that JCEP proposes to develop in the lower bay, JCEP and the Pilots believe the NRIs are essential to achieve the required number of LNG vessel transits needed to lift the JCEP design annual LNG production volume. Excessive delays in LNG carrier transit in the Channel, to and from the LNG terminal, could result in a shore storage tank topping situation, requiring JCEP to curtail LNG production.

The JCEP estimate that dredging to complete navigation efficiency and reliability improvements at the NRI Sites will allow JCEP to export the full capacity of the optimized design production of 7.8 mtpa from JCEP's LNG terminal on the North Spit. To satisfy this need, JCEP proposes the NRIs to improve the navigation efficiency and reliability for vessels transiting the Channel by widening an extremely restrictive, unavoidable turn in the Channel. The NRIs will fulfill a demonstrated need for continued and enhanced shipping within the Bay; consistent with the Policy objectives of Goals 9 and 12.

The Application must also provide "reasons" that "justify why the state policy embodied in the applicable goals should not apply." OAR 660-004-0022(1)(a)(B) provides that a sufficient "reason" is that the "proposed use or activity has special features or qualities that necessitate its location on or near the proposed exception site." That is the case here. JCEP seeks to improve navigation in the Channel and to do so has selected the NRI Site that corresponds to the area of the Channel in the City that is most in need of improvement in order to facilitate safer and more efficient navigation. Therefore, this Application provides reasons why the "proposed use or activity has special features or qualities that necessitate its location on or near the proposed exception site."

(8) Goal 16 - Other Alterations or Uses: An exception to the requirement limiting dredge and fill or other reductions or degradations of natural values to water-dependent uses or to the natural and conservation

management unit requirements limiting alterations and uses is justified, where consistent with ORS chapter 196, in any of the circumstances specified in subsections (a) through (e) of this section:

RESPONSE: The Application seeks an exception to allow dredging in areas that are currently designated, in accordance with Goal 16, as natural and conservation management units. The dredging that the Application seeks to allow for enhanced mitigation efficiency of the federal navigation Channel would not otherwise be allowed in these areas. Therefore, OAR 660-004-0022(8)(e) applies to the Application, and the Application must comply with OAR 660-004-0022(8)(b).

…

(b) Dredging to maintain adequate depth to permit continuation of the present level of navigation in the area to be dredged.

RESPONSE: The size and design of the proposed use and the extent of the proposed activity are the minimum amount necessary to provide the required Channel depth on the subject locations for enhanced navigation. To make the proposed NRIs, the JCEP will use the minimum amount possible of additional area, as explained in Section II. of this narrative above. Therefore, the Application satisfies this criterion.

(f) In each of the situations set forth in subsections (7)(a) to (e) of this rule, the exception must demonstrate that the proposed use and alteration (including, where applicable, disposal of dredged materials) will be carried out in a manner that minimizes adverse impacts upon the affected aquatic and shoreland areas and habitats.

RESPONSE: JCEP will complete its proposed NRIs in a manner that minimizes adverse impacts upon the affected aquatic and shoreland areas and habitats. To complete the NRIs, JCEP will dredge within the Channel and adjacent to the Channel at the NRI Sites. JCEP will minimize adverse impacts for the reasons explained below.

JCEP plans to perform capital and maintenance dredging during the ODFW-approved in-water work window (October 1 to February 15) to reduce impacts to sensitive life stages of fish in the bay.

JCEP will use various dredging methods to minimize the effects of the NRIs on water turbidity within the Bay. JCEP will use best management practices (including cutter head suction, clamshell, and hopper dredging) associated with dredging to reduce turbidity effects, and as a result of those methods JCEP expects increased water

turbidity as a result of the NRIs to be temporary and limited to the immediate vicinity of dredging operations. Furthermore, JCEP does not anticipate oil spills or toxic discharges to occur when constructing the NRIs, and JCEP will use precautions to avoid either. Dredging and material transport vessels will carry small volumes of petroleum in comparison to large bulk carriers and Panamax vessels that regular traverse Coos Bay. JCEP will use best management practices to avoid and minimize spills or discharges during dredging operations and dredged material transport, including the implementation of spill containment plans.

Dredging equipment and material transport vessels related to the NRIs may generate temporary noise disturbances. However, the noise will be localized to the immediate dredging area. JCEP does not anticipate that noise levels will have more than temporary effects on the behavior of aquatic species in the area of the NRI Sites.

JCEP's environmental consultant has further evaluated potential adverse impacts associated with the dredging activities and describes ways by which JCEP will minimize such adverse impacts. *See* DEA memorandum in Exhibit 5.

For these reasons, the City should find that the Application satisfies this standard.

(b) "Areas that do not require a new exception cannot reasonably accommodate the use." The exception must meet the following requirements:

RESPONSE: The NRIs are location-specific. Their purpose is to improve safety and navigational efficiency in the Channel. There are no other areas that could accommodate the use. Therefore, "areas that do not require a new exception cannot reasonably accommodate the use." The Application satisfies this criterion.

(A) The exception shall indicate on a map or otherwise describe the location of possible alternative areas considered for the use that do not require a new exception. The area for which the exception is taken shall be identified;

RESPONSE: As explained above, the NRIs are location-specific and it would not be possible for JCEP to locate them anywhere that does not require a new exception. Exhibit 1 identifies the NRI Site, which is the area where JCEP proposes to locate the exception. The Application satisfies this criterion.

(B) To show why the particular site is justified, it is necessary to discuss why other areas that do not require a new exception cannot reasonably accommodate the proposed

use. Economic factors may be considered along with other relevant factors in determining that the use cannot reasonably be accommodated in other areas. Under this test the following questions shall be addressed:

(i) Can the proposed use be reasonably accommodated on resource land that would not require an exception, including the density of uses on nonresource land? If not, why not?

(ii) Can the proposed use be reasonably accommodated on resource land that is already irrevocably committed to nonresource uses not allowed by the applicable Goal, including resource land in existing unincorporated communities, or by increasing the density of uses on committed lands? If not, why not?

(iii) Can the proposed use be reasonably accommodated inside an urban growth boundary? If not, why not?

(iv) Can the proposed use be reasonably accommodated without the provision of a proposed public facility or service? If not, why not?

RESPONSE: As explained above, the NRIs are location-specific and it would not be possible for JCEP to locate them anywhere that does not require a new exception. Whether or not the NRIs can be accommodated inside a UGB, they still require a Goal 16 exception and they still must be located at the NRI sites, so this question is not applicable to an analysis of whether alternative areas that do not require an exception cannot accommodate the NRIs. Moreover, the NRIs relate to a public facility and will not require any additional public facilities or services to construct. The Application satisfies this criterion.

(C) The "alternative areas" standard in paragraph B may be met by a broad review of similar types of areas rather than a review of specific alternative sites. Initially, a local government adopting an exception need assess only whether those similar types of areas in the vicinity could not reasonably accommodate the proposed use. Site specific comparisons are not required of a local government taking an exception unless another party to the local proceeding describes specific sites that can more

reasonably accommodate the proposed use. A detailed evaluation of specific alternative sites is thus not required unless such sites are specifically described, with facts to support the assertion that the sites are more reasonable, by another party during the local exceptions proceeding.

RESPONSE: As explained above, the NRIs are location-specific and so it is not possible for JCEP to locate them anywhere that does not require a new exception. There are no "alternative areas" that can accommodate the NRIs. The Application satisfies this criterion.

(c) "The long-term environmental, economic, social and energy consequences resulting from the use at the proposed site with measures designed to reduce adverse impacts are not significantly more adverse than would typically result from the same proposal being located in areas requiring a goal exception other than the proposed site." The exception shall describe: the characteristics of each alternative area considered by the jurisdiction in which an exception might be taken, the typical advantages and disadvantages of using the area for a use not allowed by the Goal, and the typical positive and negative consequences resulting from the use at the proposed site with measures designed to reduce adverse impacts. A detailed evaluation of specific alternative sites is not required unless such sites are specifically described with facts to support the assertion that the sites have significantly fewer adverse impacts during the local exceptions proceeding. The exception shall include the reasons why the consequences of the use at the chosen site are not significantly more adverse than would typically result from the same proposal being located in areas requiring a goal exception other than the proposed site. Such reasons shall include but are not limited to a description of: the facts used to determine which resource land is least productive, the ability to sustain resource uses near the proposed use, and the long-term economic impact on the general area caused by irreversible removal of the land from the resource base. Other possible impacts to be addressed include the effects of the proposed use on the water table, on the costs of improving roads and on the costs to special service districts.

RESPONSE: The NRI Site is the only possible sites at which JCEP can make the improvements necessary to increase the safety and efficiency of vessel navigation in the

Channel. The NRI Site is a location that JCEP identified where, as explained above, there is an extremely restrictive, unavoidable turn in the Channel. This turn is responsible for significant delays in vessel transit in the Channel. Although JCEP could widen other areas of the Channel to improve navigational efficiency, the NRI Site is the site most in need of improvement to achieve the results in improved efficiency and safety of navigation, that is required within the Channel. Therefore, in order to improve the safety and efficiency of such transit, JCEP must widen the Channel at the locations of this turn (the NRI Site). There are no alternative sites requiring a Goal exception at which JCEP can make the necessary improvements. Moreover, the long-term economic, environmental, social and energy costs of widening other areas of the Channel that JCEP could feasibly widen (although doing so would not achieve the results in improved efficiency and safety of navigation that JCEP desires) are not materially different from the same consequences of making the NRIs at the NRI Site. All such areas are nearby each other and are within the Channel. Furthermore, the Channel itself is a fixed location that cannot be moved. Therefore, the City should find that the Application satisfies this criterion.

(d) "The proposed uses are compatible with other adjacent uses or will be so rendered through measures designed to reduce adverse impacts." The exception shall describe how the proposed use will be rendered compatible with adjacent land uses. The exception shall demonstrate that the proposed use is situated in such a manner as to be compatible with surrounding natural resources and resource management or production practices. "Compatible" is not intended as an absolute term meaning no interference or adverse impacts of any type with adjacent uses.

RESPONSE: The NRI Sites located immediately adjacent to the existing Channel. This criterion, therefore, requires JCEP to demonstrate that JCEP's proposal for the NRIs is designed to reduce adverse impacts on the waters of the Bay and the Channel, and to be compatible with the use of the Channel for transportation. The proposal is compatible with land uses in the Channel (including transit) because it involves dredging below the surface of the water for the purpose of increasing safety and efficiency in navigating the Channel. The proposal is compatible with land uses in the Channel because it is designed to make them easier and more effective. Furthermore, the proposal is designed to reduce adverse environmental impacts upon the waters of the bay and the Channel. *See* DEA memo included in Exhibit 5.

(3) If the exception involves more than one area for which the reasons and circumstances are the same, the areas may be considered as a group. Each of the areas shall be identified on a map, or their location otherwise described, and keyed to the appropriate findings.

RESPONSE: This Application seeks Goal 16 exceptions for three NRI sites. This Application narrative responds to the applicable Goal 16 exception criteria for those three NRI sites as a group, and because the criteria and JCEP's responses apply equally to each of the NRI sites, this narrative does not key findings to particular sites. Exhibit 1 identifies the NRI sites.

(4) For the expansion of an unincorporated community described under OAR 660-022-0010, including an urban unincorporated community pursuant to OAR 660-022-0040(2), the reasons exception requirements necessary to address standards 2 through 4 of Goal 2, Part II(c), as described in of subsections (2)(b), (c) and (d) of this rule, are modified to also include the following:

(a) Prioritize land for expansion: First priority goes to exceptions lands in proximity to an unincorporated community boundary. Second priority goes to land designated as marginal land. Third priority goes to land designated in an acknowledged comprehensive plan for agriculture or forestry, or both. Higher priority is given to land of lower capability site class for agricultural land, or lower cubic foot site class for forest land; and

(b) Land of lower priority described in subsection (a) of this section may be included if land of higher priority is inadequate to accommodate the use for any of the following reasons:

(A) Specific types of identified land needs cannot be reasonably accommodated on higher priority land;

(B) Public facilities and services cannot reasonably be provided to the higher priority area due to topographic or other physical constraints; or

(C) Maximum efficiency of land uses with the unincorporated community requires inclusion of lower priority land in order to provide public facilities and services to higher priority land.

RESPONSE: This Application does not seek to expand an unincorporated community. Therefore, these approval criteria do not apply to the Application.

C. Approval For Estuarine and Coastal Shoreland Uses and Activities Permit

1. CBMC

CBMC - 17.370.010 General

Uses and activities permitted by the Coos Bay estuary management plan are subject to general and special conditions and policies to comply with statewide planning goals and the Coos Bay Estuary Plan as adopted by the city of Coos Bay. Compliance with these conditions and policies must be verified; therefore, all uses and activities under jurisdiction of the Coos Bay estuary management plan must be reviewed.

RESPONSE: CBMC 17.370.010 makes the general and special conditions of the CBEMP approval criteria for this Application. The DDNC-DA CBEMP zone allows new and maintenance dredging, which this Application seeks approval for, subject to general conditions (CBEMP Policies #17 and #18) and a special condition (mitigation of adverse impacts - CBEMP Policy #5). Therefore, this Application addresses these conditions.

JCEP also requests approval of an accessory temporary dredge line in the 52-NA, 53-CA, 54-DA, and 55-CA CBEMP management units. The dredge line is described in the DEA memo included in Exhibit 5, and it is depicted in the figures included in Exhibit 6.

DDNC-DA Zone - General Conditions For Approval of "New and Maintenance Dredging"

CBEMP Policy #17 - Protection of "Major Marshes" and "Significant Wildlife Habitat" in Coastal Shorelands

Local government shall protect major marshes, significant wildlife habitat, coastal headlands, and exceptional aesthetic resources located within the Coos Bay Coastal Shorelands Boundary and included in the Plan inventory, except where exceptions allow otherwise. Local government shall protect:

A. "major marshes" to include areas identified in the Goal #17, "Linkage Matrix" and the Shoreland Values Inventory map;

B. "Significant wildlife habitats," coastal headlands and exceptional aesthetic resources to include those areas identified on the "Shoreland Values."

This strategy shall be implemented through:

A. plan designations and use and activity matrices set forth elsewhere in this Plan that limit uses in these special areas to those that are consistent with protection of natural values; and

b. through use of the "Shoreland Values" map that identifies such special areas and restricts uses and activities therein to uses that are consistent with the protection of natural values. Such uses may include propagation and selective harvesting of forest products consistent with the Oregon Forest Practices Act, grazing, harvesting wild crops, and low-intensity water-dependent recreation.

This strategy recognizes that special protective consideration must be given to key resources in coastal shorelands over and above the protection afforded such resources elsewhere in this Plan.

RESPONSE: According to the Shoreland Values map, there are no inventoried resources at the NRI Site for which Policy #17 requires protection. Therefore, CBEMP Policy #17 does not apply to JCEP's request for approval to complete the NRIs.

CBEMP Policy #18 - Protection of Historical and Archaeological Sites Within Coastal Shorelands

Local government shall provide protection to historic and archaeological sites located within the Coos Bay Coastal Shorelands Boundary, except where Exceptions allow otherwise. These sites are identified in the section entitled: "Coastal Shoreland Values Requiring Mandatory Protection" and on the "Special Considerations Map." Further, local government shall continue to refrain from widespread dissemination of site-specific information about identified archaeological sites.

This strategy shall be implemented by requiring review of all development proposals involving an archaeological or historical site to determine whether the project as proposed would protect the archaeological and historical values of the site.

The development proposal, when submitted, shall include a site development plan showing, at a minimum, all areas proposed for excavation, clearing and construction. Within three (3) working days of receipt of the development proposal, the local government shall notify the Coos, Siuslaw, Lower Umpqua Tribal Council in writing, together with a copy of the site development plan. The Tribal Council shall have the right to submit a written statement to the local government within thirty (10) days of receipt of such notification, stating whether the project as proposed would protect the historical and archaeological values of the site, or if not, whether the project could be modified by appropriate measures to protect those values.

"Appropriate measures" may include, but shall not be limited to the following:

a. Retaining the historic structure in situ or moving it intact to another site; or

b. Paving over the site without disturbance of any human remains or cultural objects upon the written consent of the Tribal Council; or

c. Clustering development so as to avoid disturbing the site; or

d. Setting the site aside for non-impacting activities, such as storage; or

e. If permitted pursuant to the substantive and procedural requirements of ORS 97.750, contracting with a qualified archaeologist to excavate the site and remove any cultural objects and human remains, reinterring the human remains at the developer's expense; or

f. Using civil means to ensure adequate protection of the resources, such as acquisition of easements, public dedications, or transfer of title.

If a previously unknown or unrecorded archaeological site is encountered in the development process, the above measures shall still apply. Land development activities which violate the intent of this strategy shall be subject to penalties prescribed in ORS 97.990(8) and (9). Upon receipt of the statement by the Tribal Council, or upon expiration of the Tribal Council's ten-day response period, the local government shall conduct an administrative review of the development proposal and shall:

a. approve the development proposal if no adverse impacts have been identified, as long as consistent with other portions of this plan, or

b. Approve the development proposal subject to appropriate measures agreed upon by the landowner and the Tribal Council, as well as any additional measures deemed necessary by the local government to protect the historical and archaeological values of the site. If the property owner and the Tribal Council cannot agree on the appropriate measures, then the governing body shall hold a quasi-judicial hearing to resolve the dispute. The hearing shall be a public hearing at which the governing body shall determine by preponderance of the evidence whether the

development project may be allowed to proceed, subject to any modifications deemed necessary by the governing body to protect the historical and archaeological values of the site.

This strategy recognizes that protection of historical and archaeological sites is not only a community's social responsibility, it is also legally required by Goal #17 and ORS 97.745. It also recognizes that historical and archaeological sites are non-renewable cultural resources.

RESPONSE: CBEMP Policy #18 is not applicable to the Applicant's request for approval to complete the NRIs because this policy applies only when there are identified historical, cultural, and archaeological resources in the area of proposed development, and according to the section entitled "Coastal Shoreland Values Requiring Mandatory Protection" and the "Special Considerations Map," there are no such resources in the NRI Site area.

DDNC-DA Zone - Special Condition For Approval of "New and Maintenance Dredging"

CBEMP Policy #5 - Estuarine Fill and Removal

I. Local government shall support dredge and/or fill only if such activities are allowed in the respective management unit, and:

a. The activity is required for navigation or other water-dependent use that requires an estuarine location or, in the case of fill for non-water-dependent uses, is needed for a public use and would satisfy a public need that outweighs harm to navigation, fishing, and recreation, as per ORS 541.625(4) and an exception has been taken in this Plan to allow such fill.

b. A need (i.e., a substantial public benefit) is demonstrated and the use or alteration does not unreasonably interfere with public trust rights.

c. No feasible alternative upland locations exist; and

d. Adverse impacts are minimized.

e. Effects may be mitigated by creation, restoration, or enhancement of another area to ensure that the integrity of the estuarine ecosystem is maintained.

f. The activity is consistent with the objectives of the Estuarine Resources Goal and with other requirements of state and federal law, specifically the conditions in ORS 541.615 and Section 404 of the Federal Water Pollution Control Act (P.L.92-500).

II. Other uses and activities which could alter the estuary shall only be allowed if the requirements in (b), (c), and (d) are met.

Identification and minimization of adverse impacts as required in "d" above shall follow the procedure set forth in Policy #4.

As required by Goal #16, only dredging necessary for on-site maintenance of existing functional tidegates, associated drainage channels, and bridge crossing support structures is permitted in Natural and Conservation Management Units (applies to 11 NA, 18A CA, 20 CA, 30 CA, 31 NA and 38 CA).

Dredging necessary for the installation of new bridge crossing support structures is permitted in Conservation Management Units and may be allowed in Natural Management Units where consistent with the resource capabilities of the area and the purposes of the management unit.

In the Conservation Management Unit, new dredging for boat ramps and marinas, aquaculture requiring dredge or fill or other alteration of the estuary, and dredging necessary for mineral extraction may be allowed where consistent with the resource capabilities of the area and the purposes of the management unit.

This strategy shall be implemented by the preparation of findings by local government documenting that such proposed actions are consistent with the Comprehensive Plan and with the above criteria "a", "b", "c", "d", "e" and "f"; however, where goal exceptions are included within this Plan, the findings in the exception shall be sufficient to satisfy above criteria "a" through "d". Identification and minimization of adverse impacts as required in "e" above shall follow the procedure set forth in Policy #4a. The findings shall be developed in response to a "request for comment" by the Division of State Lands (DSL), which shall seek local government's determination regarding the appropriateness of a permit to allow the proposed action.

"Significant" as used in "other significant reduction or degradation of natural estuarine values", shall be determined by: a) the U.S. Army Corps of Engineers through its Section 10.404 permit processes; or b) the Department of Environmental Quality (DEQ) for approvals of new aquatic log storage areas only; or c) the Department of Fish and Wildlife (ODFW) for new aquaculture proposals only. This strategy recognizes that Goal #16 limits dredging, fill, and other estuarine degradation in order to protect the integrity of the estuary.

RESPONSE: JCEP's new and maintenance dredging activities must be consistent with CBEMP Policy #5. The DDNC-DA zone allows new and maintenance dredging. Furthermore, because the Application includes a Goal 16 exception, Policy #5 requires only that the Application comply with criteria "e" and "f" above, because, as expressly noted within the Policy, the findings for the Goal 16 exception suffice for this Application to comply with "a" - "d."

Policy #5 directs that compliance with I.e. of Policy #5 (identification and minimization of adverse impacts) will follow the procedure set forth in CBEMP Policy #4a. Although it is not clear what this means for an application, such as this one, for ACU approval for new and maintenance dredging, Policy #4a sets forth a "procedure" for assessing resource impacts of "log storage dredging." Since that activity is the most analogous to new and maintenance dredging of the activities that Policy #4a contemplates, this Application will follow the procedure that Policy #4a sets forth for log storage dredging. JCEP acknowledges that procedure, which the City and Oregon Department of Environmental Quality will undertake. Part I.e. of Policy #5 simply allows JCEP to mitigate adverse effects of the development on estuarine resources by enhancing, creating, or restoring another area. As discussed above, JCEP does not anticipate that the NRIs will cause significant permanent adverse effects upon the estuary, and this Application sets forth myriad methods JCEP plans to employ to minimize adverse effects. Therefore, it is not necessary for JCEP to create, restore, or enhance other areas to mitigate adverse effects of the NRIs on estuarine resources.

Part I.f. of Policy #5 requires that the NRIs are "consistent with the objectives of the Estuarine Resources Goal and with other requirements of state and federal law, specifically the conditions in ORS 541.615 and Section 404 of the Federal Water Pollution Control Act (P.L.92-500)." The NRIs are consistent with Goal 16, as set forth in section III.B.1. of this narrative. The Application is consistent with other requirements of state and federal law, including the conditions in ORS 541.615 and Section 404 of the Federal Water Pollution Control Act. ORS 541.615, which is now ORS 196.810, requires a permit from the Department of State Lands to remove any material from the beds or banks of waters of the state. JCEP acknowledges this obligation, and all necessary DSL

and Federal Section 404 authorizations will be obtained as a condition of dredging commencement.

Furthermore, Special Conditions for approval of new and maintenance dredging in the DDNC-DA zone provide that such dredging is allowed only "subject to finding that adverse impacts have been minimized." JCEP will minimize adverse impacts as summarized below and as further discussed in the DEA memo included in Exhibit 5.

Maintenance dredging at the NRI sites will reduce habitat function, and this will affect benthic and epibenthic organisms such as invertebrates occupying the substrate, as well as organisms that feed on them. JCEP plans to perform capital and maintenance dredging during the ODFW-approved in-water work window (October 1 to February 15) to reduce impacts to sensitive life stages of fish in the bay.

JCEP will use various dredging methods to minimize the effects of the NRIs on water turbidity within the bay. JCEP will use best management practices (including cutter head suction, clamshell, and hopper dredging) associated with dredging to reduce turbidity effects, and as a result of those methods JCEP expects increased water turbidity as a result of the NRIs to be temporary and limited to the immediate vicinity of dredging operations. Furthermore, JCEP does not anticipate oil spills or toxic discharges to occur when constructing the NRIs, and JCEP will use precautions to avoid either. Dredging and material transport vessels will carry small volumes of petroleum in comparison to large bulk carriers and Panamax vessels that regular traverse Coos Bay. JCEP will use best management practices to avoid and minimize spills or discharges during dredging operations and dredged material transport, including the implementation of spill containment plans.

Therefore, the City should find that JCEP's proposed new and maintenance dredging activities are consistent with CBEMP Policy #5.

#4 Resource Capability Consistency and Impact Assessment

I. Local government concludes that all proposed actions (approved in this Plan) which would potentially alter the integrity of the estuarine ecosystem have been based upon a full consideration of the impacts of the proposed alteration. Except for the following uses and activities:

a. Natural Management Units ~ Aquaculture ~ Log storage ~ Bridge Crossings

b. Conservation Management Units ~ High-intensity water-dependent recreation ~ Aquaculture ~ New or expanded log storage ~ Log storage dredging ~ Dike

maintenance dredging ~ Minor navigational improvements requiring dredging or fill ~ Bulkheading ~ Water intake or withdrawal and effluent discharge ~ Riprap

c. <u>Development Management Units</u> ~ Aquaculture ~ New or expanded log storage ~ Mining and mineral extraction ~ Water-related and non-dependent, non-related uses not requiring fill ~ Dredging ~ Bulkheading (except for Aquatic Units #3DA, #5DA and #6DA) ~ Fill ~ In-water structures ~ Flow-lane disposal of dredged material and other activities which could affect the estuary's physical processes or biological resources ~ Application of pesticides

d. Any other uses and activities which require the resource capability consistency test as a condition within a particular management unit.

For uses and activities requiring the resource capabilities test, a special condition is noted in the applicable management unit uses/activities matrix. A determination of consistency with resource capability and the purposes of the management unit shall be based on the following:

i. A description of resources identified in the plan inventory;

ii. An evaluation of impacts on those resources by the proposed use (see Impact Assessment procedure, below);

iii. A determination of whether the proposed use or activity is consistent with the resource capabilities of the area, or that the resources of the area are able to assimilate the use and activity and their effects and continue to function in a manner to protect significant wildlife habitats, natural biological productivity, and values for scientific research and education.

Where the impact assessment requirement (of Goal #16 Implementation Requirements #1) has not been satisfied in this Plan for certain uses or activities (i.e., those identified above), then such uses or activities shall not be permitted until findings demonstrate the public's need and gain which would warrant any modification or loss to the estuarine ecosystem, based upon a clear presentation of the impacts of the proposed alteration, as implemented in Policy #4a.

III. An impact assessment need not be lengthy or complex, but it should give reviewers an overview of the impacts to be expected. It may include information on:

a. the type and extent of alterations expected;

b. the type of resource(s) affected;

c. the expected extent of impacts of the proposed alteration on water quality and other physical characteristics of the estuary, living resources, recreation and aesthetic use, navigation and other existing and potential uses of the estuary; and

d. the methods which could be employed to avoid or minimize adverse impacts.

This policy is based on the recognition that the need for and cumulative effects of estuarine developments were fully addressed during the preparation of this Plan and may be mitigated by the imposition, as necessary, of conditions through the administrative conditional use process.

RESPONSE: As required by CBEMP Policy #5, "[i]dentification and minimization of impacts shall follow the procedure set forth in Policy #4. JCEP has addressed the provisions of this policy in the DEA memo included in Exhibit 5.

#4a Deferral of (I) Resource Capability Consistency Findings, and (II) Resource Impact Assessments

Local government shall defer, until the time of permit application, findings regarding consistency of the uses/activities listed in Policy #4 with the resource capabilities of the particular management unit.

Additionally, the impact assessment requirement for those uses/activities as specified in Policy #4 shall be performed concurrently with resource capability findings above at the time of permit application.

I. This strategy shall be implemented through an Administrative Conditional Use process that includes local cooperation with the appropriate state agencies:

a. Where aquaculture is proposed as a use, local government shall notify the Oregon Department of Fish & Wildlife (ODFW) and Department of Agriculture in writing of the request, with a map of the proposed site;

b. Where log storage dredging is proposed as an activity local government shall notify the Oregon Department of Environmental Quality (DEQ) in writing of the request, together with a map of the proposed site.

II. Within twenty (20) days of receipt of the notification, the state agency shall submit in writing to the local government a statement as to whether the proposed use/activity will:

a. Be consistent with the resource capabilities of the management unit or,

b. If determined not to be consistent, whether the proposal can be made consistent through imposition of conditions on the permit.

III. The appropriate state agency shall also perform the impact assessment required in Policy #4. If no statement is received from the state agency by the expiration of the twenty (20) day period, local government shall:

a. Presume consistency of the proposal with the resource capabilities of the management unit; and

b. Make findings appropriate to that presumption; and

c. Perform the assessment of impacts required by Policy #4.

IV. For all other uses/activities specified above, local government shall:

a. Determine through appropriate findings whether the proposed use/activity is consistent with the resource capabilities of the management unit, and

b. Perform the assessment of impacts required by Policy #4.

V. This strategy recognizes:

a. That resource capability consistency findings and impact assessments as required by LCDC Goal #16 can only be made for the uses specified above at the time of permit application, and

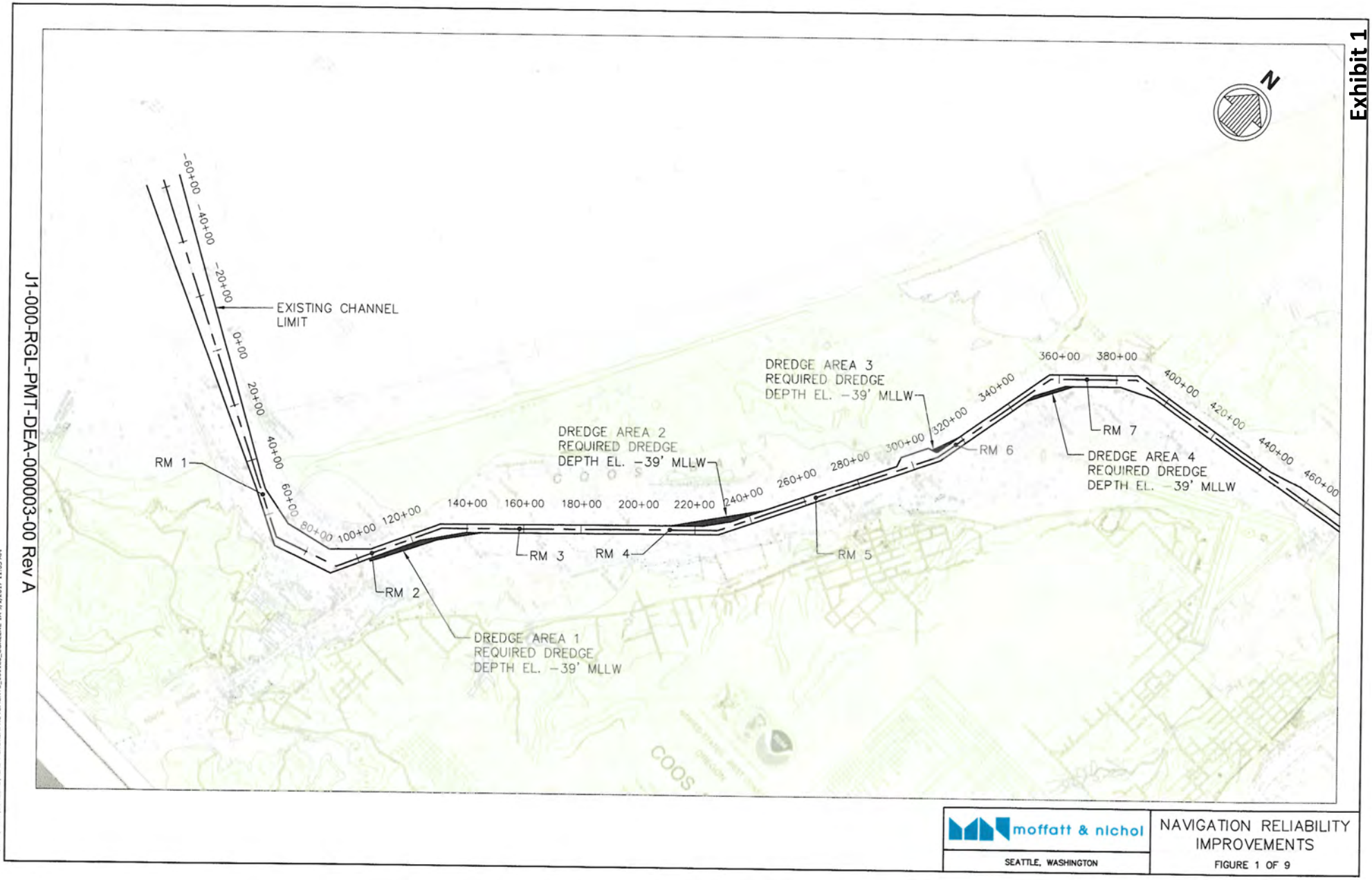
b. That the specified state agencies have expertise appropriate to assist local government in making the required finding and assessments.

This strategy is based upon the recognition that the need for and cumulative effects of estuarine developments were fully addressed during development of this Plan and that no additional findings are required to meet Implementation Requirement #1 of Goal #16.

RESPONSE: As noted above, CBEMP Policy #4 requires findings demonstrating the public's need and gain that would warrant any modification or loss to the estuarine ecosystem, based upon a clear presentation of the impacts of the proposed alteration, as implemented in Policy #4a. None of the prerequisites to providing notice to state agencies under Policy #4a are triggered. Therefore, this policy requires the City to perform the impacts assessment consistent with CBEMP Policy #4. The City has completed that assessment above.

IV. Conclusion.

Based upon the above, the City should approve JCEP's requests: (1) to amend the CBEMP map to change the zoning designation of the NRI Site from 52-NA to DDNC-DA; (2) to amend the CBCP to take a reasons exception to Goal 16 to change the zoning designation of the NRI Site to DDNC-DA; (3) for Estuarine and Coastal Shoreline Uses and Activities Permit For "New And Maintenance Dredging" in the DDNC-DA estuarine zone; and (4) Estuarine and Coastal Shoreline Uses and Activities Permit to allow a temporary dredge transport pipeline in the 52-NA, 53-CA, 54-DA, and 55-CA estuarine zones.



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moffatt & nichol
SEATTLE, WASHINGTON

NAVIGATION RELIABILITY IMPROVEMENTS
FIGURE 1 OF 9

CITY OF COOS BAY
Community Development Department

500 Central
Avenue Coos
Bay, OR 97420

541.269.8918
www.coosbay.org

PRE-APPLICATION CONFERENCE NOTES

CASE FILE#:	**187-ZON17-006**
LOCATION:	**Coos Bay Estuary, approximately 2,700 feet northwest of the end of the North Bend airport runway**
TYPE OF REQUEST:	**Comprehensive Plan and Text Amendment**
CITY STAFF ATTENDING:	**Eric Day, Tom Dixon, and Debbie Erler**
COUNTY STAFF ATTENDING:	**Jill Rolfe**
DATE OF PRE-APPLICATION:	**February 2, 2017**

All Coos Bay code chapters referenced in this report are available on the City's website at http://www.codepublishing.com/or/coosbay/.

1. TYPE OF APPLICATION

Comprehensive Plan and Text Amendments (per CBMC 17.215)
Estuarine and Coastal Shoreline Uses and Activities (per CBMC 17.370)

2. PROCESS SUMMARY

The applicant will submit Comprehensive Plan Amendment and Text Amendment applications which require a Type IV review. Per the CBDC the hearing bodies will be the Planning Commission for a recommendation and the City Council for final decision.

Review Process:

- Pre-application conference (completed).
- Application submittal.
- Staff review for completeness (up to 30 days).
- When application is determined to be technically complete, the application is considered to be vested.
- Public notices are mailed/published and hearing dates are set before the Planning Commission and the City Council.
- Staff report is prepared and made available to the applicant at least seven days before the date of the Planning Commission public hearing.
- The Planning Commission will make a recommendation to the City Council for approval

or denial based upon the staff recommendation and the criteria found in the CBMC and the City's Comprehensive Plan.
- The City Council will make a final decision after a public hearing
- A Final Order and Ordinance is provided following the City Council decision

3. COMMUNITY DEVELOPMENT CODE AND COMPREHENSIVE PLAN

The applicant must address all standards of the applicable criteria for Plan Amendments and Zone Changes per CBMC 17.215.060. For the City of Coos Bay's review, the review is only for text and plan amendments but no zone change.

The applicant must address all application submittal requirements for the Estuarine and Coastal Shoreline Uses and Activities per CBMC 17.370.030.

The applicant must also describe proposed changes to estuary segments including both existing and proposed designations.

The applicant must address elements of the Coos Bay Comprehensive Plan pertaining to this project and address relevant State of Oregon Land Use Goals including Goal 6 – Air, Water and Land Resources Quality; Goal 9 – Economic Development; Goal 12 – Transportation; and Goal 16 Estuarine Resources.

4. ADDITIONAL REVIEW MATERIAL

The applicant should include supporting information including existing graphic portrayals of the channel section being considered, dredging cross sections of both width and depth profiles for areas of expansion or alteration, the quality and quantity of materials to be excavated, and final expected bathymetric contours for area of impact. In addition, information should be shared regarding potential impacts to the marine environment and how these impacts will be mitigated.

5. DOCUMENTATION REQUIRED FOR A COMPLETE APPLICATION

The following items are required to be submitted in only in a single form, along with a digital copy, for the main application:

- Application form signed by the owner and applicant, if applicable. In place of a signed application form the property owner may submit as a part of the application that they give the applicant permission to apply for the required land use applications in their place. This permission will not preclude the property owner from withdrawing consent at any time.
- Proof of ownership (Department of State Lands).

In addition, the following items are required to be submitted in ten collated sets in addition to a digital a copy:

- Application maps and narrative information as stipulated per CBMC 17.215.040 and 17.370.030,
- A narrative of the applicable State of Oregon Land Use Goals and Comprehensive Plan Goals and Policies, and
- Additional information that will provide reviewers and decision makers sufficient basis to weigh the criteria and render a decision.

5. APPLICATION FEES

Per the City fee resolution, the City will be collecting a $70.00/hr. fee for the review of this project as it

is believed that City staff time will far outweigh the outlined fee(s) in the resolution for this type of review. The City will collect a $7,000.00 fee up front at time of application submittal. Should any additional fees be required they will be requested at that time. Should the City not exhaust the initial fee the unused portion will be returned to the applicant after the review is finalized.

The City may retain an outside land use consultant/attorney to aid in the review of this application. Should the City elect this approach the consultants fees will be passed along to the applicant for payment.

6. TIME FRAME FOR REVIEW PROCESS

Per State law, staff has 30 days to review the application submittal for technical completeness. If incomplete, the applicant will have 180 days from the date of the incomplete letter to submit additional information. Once deemed complete the application review shall not exceed 120 days for a final decision, including appeals to the City Council. Appeals to LUBA fall outside the 120 day review process.

NOTICE TO APPLICANTS:
The standards noted in this checklist are those which staff believes may be applicable to your proposal. Additional standards may also be determined applicable at the time of a development submittal. The burden is upon the applicant to review all applicable City documents and address all the relevant standards. The applicant should verify the fees prior to submitting application.

Exhibit 23

December 4, 2018

Ms. Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, D.C. 20426

Re: *Pacific Connector Gas Pipeline, LP* and *Jordan Cove Energy Project L.P.*
Docket Nos. CP17-494-000 and CP17-495-000
Request to Update Service Lists

Dear Ms. Bose:

Pursuant to Rule 2010 of the Rules of Practice and Procedure of the Federal Energy Regulatory Commission, 18 C.F.R. § 385.2010 (2018), Jordan Cove Energy Project L.P. ("JCEP") and Pacific Connector Gas Pipeline, LP ("PCGP") respectfully request that the Commission update the official service lists in the captioned dockets as shown below.

Please **add** the following individuals to the service lists:

Natalie Eades
Manager, Environment
Jordan Cove Energy Project L.P.
Pacific Connector Gas Pipeline, LP
5615 Kirby Drive, Suite 500
Houston, Texas 77005
Phone: 832-255-3841
Email: NEades@pembina.com

Michael Koski
Senior Manager, External Affairs
Jordan Cove Energy Project L.P.
Pacific Connector Gas Pipeline, LP
5615 Kirby Drive, Suite 500
Houston, Texas 77005
Phone: 971-940-7800
Email: MKoski@pembina.com

Please **remove** the following individuals from the service lists:

Elizabeth Spomer
Jordan Cove Energy Project L.P.
Pacific Connector Gas Pipeline, LP
5615 Kirby Drive, Suite 500
Houston, Texas 77005
Phone: (866) 227-9249
Email: espomer@veresenинc.com

Rose Haddon
Jordan Cove Energy Project L.P.
Pacific Connector Gas Pipeline, LP
5615 Kirby Drive, Suite 500
Houston, Texas 77005
Phone: (866) 227-9249
Email: rose.haddon@jordancovelng.com

JCEP and PCGP respectfully request that the Commission waive Rule 203(b)(3), 18 C.F.R. § 385.203(b)(3), in order to allow all designated representatives to be included on the Commission's official service lists. In addition to changing the service list, please direct future correspondence to me at the address written above. Should you have any questions, please contact me at neades@pembina.com or 832-255-3841.

Sincerely,

/s/ Natalie Eades
Natalie Eades
Jordan Cove Energy Project L.P.
Pacific Connector Gas Pipeline, LP

CERTIFICATE OF SERVICE

I hereby certify that I have this 4th day of December, 2018, served the foregoing document upon each person designated on the official service list compiled by the Secretary in these proceedings.

/s/ Victoria R. Galvez
Victoria R. Galvez
Attorney for
Jordan Cove Energy Project L.P.
Pacific Connector Pipeline, LP

Exhibit 24

Jordan Cove Energy Project, L.P.

October 2, 2018

Ms. Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, D.C. 20426

Re: *Jordan Cove Energy Project L.P.*
Docket No. CP17-495-000
Third Party Contractor Memorandum of Understanding

Dear Ms. Bose:

On September 21, 2017, Jordan Cove Energy Project L.P. ("JCEP") filed an application pursuant to Section 3(a) of the Natural Gas Act, as amended,[1] and Parts 153 and 380 of the regulations of the Federal Energy Regulatory Commission ("FERC" or the "Commission"),[2] for authorization to site, construct, and operate certain liquefied natural gas facilities. On June 28, 2018, the Commission requested JCEP consider providing a third-party contractor to assist Commission Staff with its fire protection review. On August 9, 2018, as supplemented on August 29, 2018, JCEP submitted its top three contractor proposals received in response to a Request for Proposal for Third-Party Engineering Support Services. On September 14, 2018, the Commission selected Jensen Hughes, Inc. ("Jensen Hughes") as the third-party contractor. Pursuant to that letter order, JCEP prepared a Memorandum of Understanding ("MOU") that was subsequently executed by JCEP, Commission Staff, and Jensen Hughes. JCEP submits herewith the executed MOU.

Should you have any questions, please contact Rose Haddon at rose.haddon@jordancovelng.com or (866) 227-9249.

Sincerely,

/s/ Tajvinder S. Diocee
Tajvinder S. Diocee
Vice President, Projects LNG
Jordan Cove Energy Project L.P.

Enclosures

cc: John Peconom (FERC)
Andrew Kohout (FERC)
Ghanshyam Patel (FERC)

[1] 15 U.S.C. § 717b(a) (2012).
[2] 18 C.F.R. Pts. 153 and 380 (2018).

MEMORANDUM OF UNDERSTANDING

Between the

FEDERAL ENERGY REGULATORY COMMISSION

JORDAN COVE ENERGY PROJECT, LP

And

JENSEN HUGHES, INC.

I. Background.

A. The Energy Policy Act of 1992[1] and related regulations provide for the use of third-party contracts to assist agencies in satisfying the requirements of the National Environmental Policy Act (NEPA).[2] In its "Forty Questions" issued in the Federal Register on 23 March 1981, the Council on Environmental Quality indicated the term "third-party contract" referred to contractors paid by the applicant but selected by the agency. 40 CFR 1506.5(c) further stipulates that the contractor must execute a disclosure statement prepared by the agency to avoid any conflict of interest. If the NEPA document is prepared with third-party contract assistance, the responsible agency must participate in the preparation and shall independently evaluate the NEPA document prior to its approval. The agency must also take full responsibility for the scope and contents of the NEPA document.

B. On September 21, 2017, Jordan Cove Energy Project, LP (JCEP) filed an application with the Federal Energy Regulatory Commission (FERC) in Docket No. CP17-495-000 for authorization to construct and operate the Jordan Cove Energy Project. JCEP has elected to hire a third-party contractor to work under the direction of the FERC staff to assist with the fire protection engineering review. On September 14, 2018, FERC staff selected Jensen Hughes, Inc. as the third-party contractor and requested that JCEP proceed with preparing a Memorandum of Understanding (MOU) between FERC, JCEP, and Jensen Hughes, Inc.

C. This MOU defines the roles and obligations of FERC as the federal agency responsible for the fire protection engineering review; JCEP as the private

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[1] 16 U.S.C. 797d.

[2] 42 U.S.C. §§ 4321-4370h (2012).

entity with a pending application before FERC (referred to as Applicant); and Jensen Hughes, Inc. as the independent contractor chosen by the FERC staff (referred to as Contractor).

The contract between the Applicant and the Contractor (Contract) will be executed pursuant to the third-party contracting procedures set forth in 40 CFR 1506.5(c) and as described in the FERC Handbook for using Third-Party Contractors to Prepare Environmental Documents (August 2016).

The FERC staff of the Office of Energy Projects (OEP) will direct the activities of the Contractor in the consultation, reviews, preparation, and processing of the documents within the scope of the Contract. **The Applicant will not control or direct the activities of the Contractor, except with respect to the processing of invoices.**

II. Obligations of the Applicant

The Applicant agrees to perform the following tasks:

A. Certify that the selected Contractor, to the best of its knowledge, has no financial or other interest in the outcome of the project. Specifically, the Contract or project provides no unfair competitive advantage to the Contractor.

B. The Applicant and the Contractor have no relationships that could impair the Contractor's objectivity in performing the Contract work.

C. Affirm that all communications with the Contractor will be restricted to financial components of its Contract. Communications on the merits of the Applicant's Project may only be conducted jointly with OEP staff, subject to any disclosure and ex parte requirements.

D. Be solely responsible for all Contractor and subcontractor fees, costs, and expenses.

E. Retain no rights to the products of the Contract.

F. Include the Applicant and Contractor roles and obligations outlined in this MOU as mandatory provisions in the contract between Applicant and Contractor.

III. Obligations of the Contractor (and all subcontractors, as appropriate)

A. The Contractor certifies that it has no conflict of interest in performing the work required under the Contract and certifies that it has no financial or other interest in the outcome of the FERC's review.

B. The Contractor certifies that its Organizational Conflict of Interest (OCI) Statement provided to FERC for review prior to selection is accurate.

C. The Contractor has a continuing obligation to identify conflicts of interest that may arise because of changes in corporate identity, affiliation, structure, or ownership, or changes to the Contract throughout the actual performance period of the work. Therefore, the OCI Statement must be refreshed on an annual basis, at a minimum, and more frequently if the Contractor's business relationships have changed in a manner that affects the previously submitted OCI Statement.

D. In the event an OCI is discovered after award, the Contractor certifies that it will immediately notify the OEP Environmental Project Manager and will submit a plan to mitigate the conflict. The mitigation plan will be submitted to FERC' s Office of General Counsel-General and Administrative Law for review and written determination as to whether the plan can be implemented within 30 days of the identification of an OCI.

E. The Contractor agrees to only communicate with the Applicant on financial issues related to the executed Contract, unless OEP staff is present and subject to any disclosure and ex parte requirements.

F. All work performed by the Contractor will be under the direction of and meet any timeframes established by OEP Staff. General duties of the Contractor are listed in Chapter 2.4 of the Handbook for Using Third-Party Contractors to Prepare Environmental Documents. These duties are also listed within the sample Request for Proposals included in Chapter 3 of the Handbook.

G. The Contractor shall not replace its Project Manager, assistant Project Manager, or other key employee or subcontractor personnel without the prior consultation of the OEP staff.

IV. Obligations of OEP

A. OEP will select the Contractor, based on its independent review of the technical, managerial, personnel, and OCI aspects of each proposal.

B. OEP will set the schedule for completion of the fire protection review and all associated documents.

C. OEP will be responsible for providing technical direction to the Contractor throughout the fire protection review process.

D. OEP will identify all information necessary to complete its review and will decide on the inclusion or deletion of all material in the fire protection review documents.

E. OEP staff has the right, at any time and in their sole discretion, to have any personnel of the Contractor, or the Contractor's subcontractor, either temporarily or permanently dismissed from the Project.

V. Expiration

This MOU shall become effective upon signature of all three parties and shall expire following completion of the contracted scope of work as set forth in the Contract as agreed to by the parties to the agreement.

VI. Termination

This MOU may be terminated prior to expiration with the written consent of all three parties. Each party may initiate termination upon thirty (30) days written notice to the other parties. During the intervening 30 days, the parties agree to actively attempt to resolve any outstanding disputes or disagreements.

VII. Effective Date

This MOU and any attachments hereto shall become effective upon signature of all three parties.

SIGNATURES OF AGREEMENT

Federal Energy Regulatory Commission

TJ Turpin

Signature

Terry L. Turpin

Typed Name

Director, Office of Energy Projects

Typed Title

September 26, 2018

Date

Applicant – JORDAN COVE ENERGY PROJECT, LP

Signature

Tony Diocee

Typed Name

V.P. Projects

Typed Title

September 26, 2018

Date

Contractor – JENSEN HUGHES, INC.

Signature

Todd B. Oliver, PE

Typed Name

Senior Consultant

Typed Title

September 27, 2018

Date

CERTIFICATE OF SERVICE

I hereby certify that I have this 2nd day of October, 2018, served the foregoing document upon each person designated on the official service list compiled by the Secretary in this proceeding.

/s/ Victoria R. Galvez
Victoria R. Galvez
Attorney for
Jordan Cove Energy Project L.P.

Exhibit 25

Geology of the Coos Estuary and Lower Coos Watershed

Summary:

- *Tectonic interactions between the Pacific, Gorda, Juan de Fuca, and North American plates, and the Juan de Fuca and Gorda oceanic ridges are the source of incremental , long-term coastal uplift and infrequent earthquakes when coastal lands suddenly subside.*

Landslide along the Smith River in the Oregon coast range.

- *Tectonic processes, along with long-term cyclical changes in climate and related glacial spread and retreat, have created the bedrock and soil formations found in the project area.*

Local geologic formations are revealed at Coos Head.

What's happening?

This summary describes local geology (e.g., soil and bedrock types), in the context of larger geological processes (e.g., plate tectonics) in four sections:

1. Plate Tectonics – which examines interactions between continental plates, faults, and folds, as well as earthquakes and tsunamis affecting the project area;
2. Geologic Formations – which describes the project area's geologic formations, superficial deposits, and geologic age;
3. Soils – which provides information on soil types within the project area; and
4. Landslides – which describes areas within the project area most at risk for landslides and debris flows.

These four sections are followed by a Background section which provides more in-depth information for each of the sections in this data summary.

Plate Tectonics

Plate Movement: The underlying geology of the Coos estuary and surrounding watershed results from the tectonic interactions between the Pacific, Gorda, Juan de Fuca, and North American (i.e., North American continent) tectonic plates, and oceanic spreading from two ridges (Juan de Fuca and Gorda) (Figure 1)(see also Geology Terminology sidebar). Large-scale plate movements (e.g., slip of the Juan de Fuca plate along the Blanco Transform Fault, and subduction of the Juan de Fuca plate beneath the North American plate) have been coupled with localized sea floor spreading along two ridges: the Gorda Ridge at a rate of 2.3-5.5 cm (0.9-2.2 in) per year, and the Juan de Fuca Ridge at a rate of 4.0 cm (1.6 in) per year (Komar 1997; Clague 1997). Along the Oregon coast, pressure from these tectonic movements of the earth's crust have resulted in the folded and warped outer continental shelf margin and cycles of long-term, incremental uplift of the coastal lands followed by rapid subsidence events (i.e., earthquakes)(Rumrill 2006).

Stratigraphic (i.e., study of rock layers) investigations of rock outcroppings by Nelson et al. (1996, 1998) and analysis of the composition and age of buried microfossils indicate that the South Slough tidal basin has undergone catastrophic subsidence of 0.50-1.0 m (1.64-3.28 ft) at least three times over the past 4,000 years, and possibly as many as nine times.

Geology Terminology

Tectonic Plate – The rigid outermost shell of the planet (crust and upper mantle), is broken into major (e.g., continental plates) and minor tectonic "plates".

Ocean Ridge – Underwater mountain range formed by rising magma in a zone on the ocean floor where two tectonic plates are moving apart.

Subduction Zone – An area where two tectonic plates converge causing one plate to slide beneath the other.

Cascadia Subduction Zone – The area where the Juan de Fuca Plate slides beneath the North American Plate.

Faults – Fractures in the earth's crust caused by compression, tensional, or shearing forces, often associated with the boundaries between tectonic plates.

Slip or Strike-slip Fault – Vertical fractures in the earth's crust where the blocks of land have mostly moved horizontally.

Paleoseismic Faults – Faults that were the source of significant earthquakes (magnitude 6.0 or greater) in the past 1.6 million years

Sources: USGS 2014a; DOGAMI 2009; PNSN n.d.

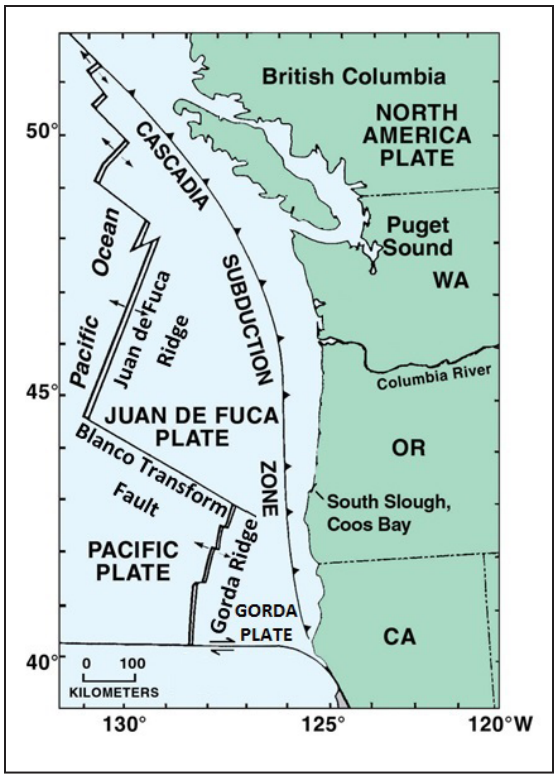

Figure 1: Tectonic components (ridges and plates) in the Pacific Northwest. Arrows on ridges indicate direction of spread. Cascadia Subduction Zone is where the Juan de Fuca Plate is pushed under the North American Plate. Amended from Rumrill 2006

Faults and Folds: The chief geological feature of the Coos estuary is the South Slough Syncline, which is an asymmetric fold with steep sandstone and shale on its western side and gently sloping marine terraces on its eastern side, all of which are offset by several minor cross faults (Rumrill 2006; McInelly and Kelsey 1990)(Figure 2). According to Rumrill (2006), "South Slough marks the point where the Cascadia fold and thrust belt comes onshore; north of Coos Bay most compressional structures occur offshore on the continental shelf and slope".

Paleoseismic faults in the project area – or faults that were the source of significant earthquakes (magnitude 6.0 or greater) in the past 1.6 million years – were found almost exclusively in the South Slough subsystem (Figure 2). Similarly, nearly all non-paleoseismic faults and folds in the project area are found

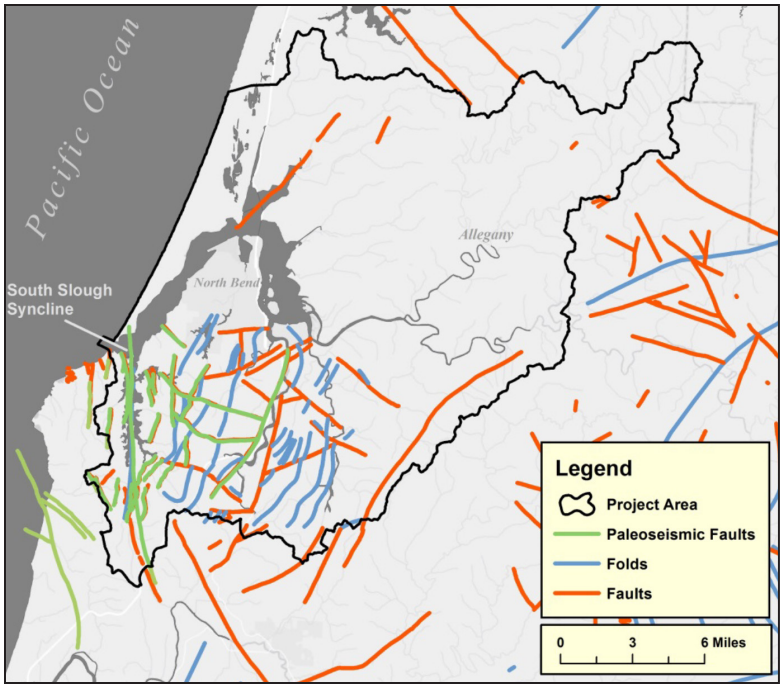

Figure 2: Faults and folds occurring within project boundaries. Paleoseismic faults are highlighted, designating faults that were the source of significant earthquake (6.0 or greater) in the past 1.6 million years. Data: USGS 2005; DOGAMI 2009.

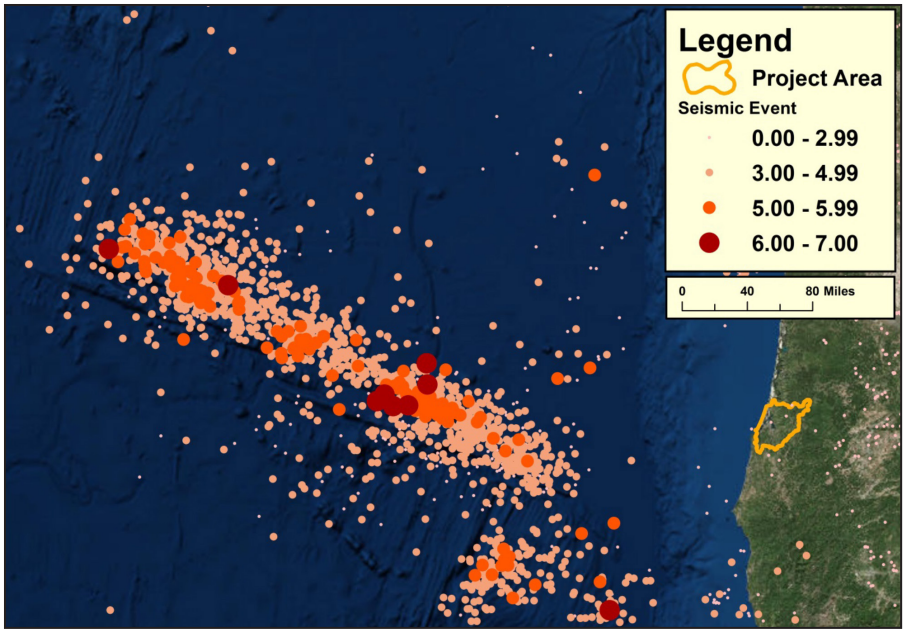

Figure 3: Seismic events between 1969 and 2015.
Data USGS 2015

Year	Month	Magnitude	Depth	Latitude	Longitude
1991	July	6.9	11	42.182	-125.641
1985	March	6.5	10	43.51	-127.561
2008	January	6.3	13	43.785	-127.264
2003	January	6.3	10	44.284	-129.024
1994	October	6.3	20	43.515	-127.427
2000	June	6.2	10	44.513	-130.081
1981	November	6.2	10	43.542	-127.706
2000	January	6.1	10	43.649	-127.257
2012	April	6.0	8	43.584	-127.638

Table 1: Seismic events (between 1969 and 2015) with magnitudes 6.0 or higher. Depth is kilometers below the earth's surface. Data USGS 2015

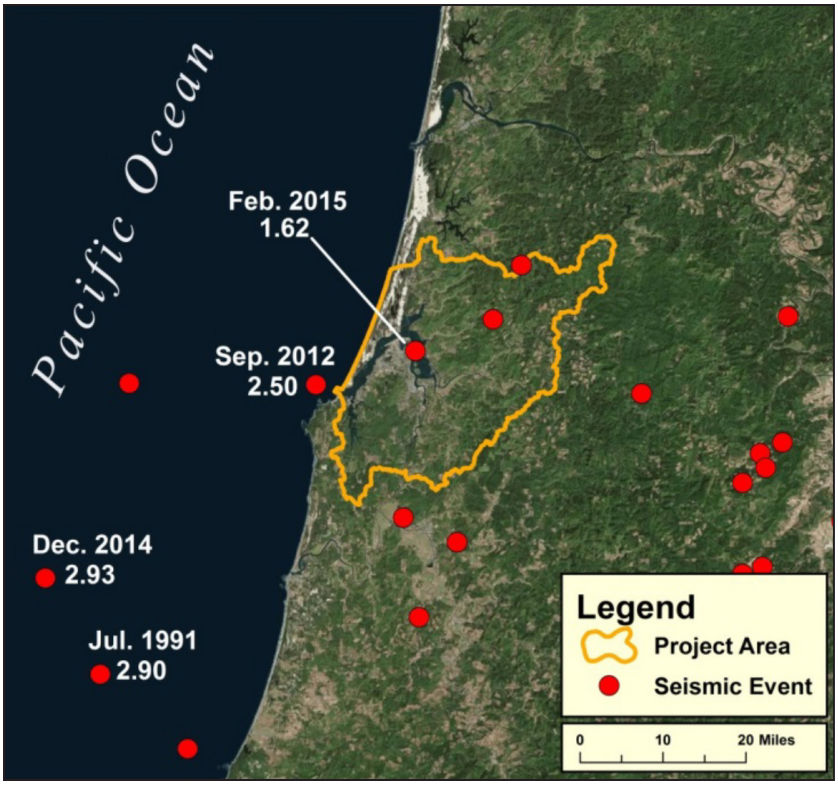

Figure 4: Seismic events (occurring between 1969 and 2015) closest in proximity to the project area. Dates and strength of the highest magnitude events are labeled. Data USGS 2015

in its southern portions (i.e., South, Isthmus and Catching Slough subsystems).

Earthquakes and Tsunamis: Of the over 2,100 earthquakes measured off the Oregon coast since 1965, only nine have been a magnitude 6.0 or higher (Figure 3). The strongest of these (magnitude 6.9) occurred in July 1991 (Table 1). The average magnitude of all earthquakes during that time period was 3.5 and the average depth was 10.7 km (6.6 mi) below the earth's surface. Many earthquakes were concentrated around the Blanco Transform Fault. In contrast, only a few earthquake events were located in close proximity to the project area and those were much smaller in magnitude during the same time period (Figure 4). The largest of these closer proximity earthquakes (2.5 magnitude) occurred just off Cape Arago in September 2012.

Stratigraphic investigations conducted over the past few decades have provided evidence that much of the Pacific Northwest coast has experienced significant (magnitude greater than 8) Cascadia megathrust earthquakes and accompanying tsunamis repeatedly over the past 5,500-6,500 years. These earthquakes occurred every 500-600 years on average (varying from a few hundred years to almost 1,000 years)(Kelsey et al. 2002; Witter et al. 2003). For example, soil cores provide evidence for historically reoccurring rapid coastal subsidence events. Cores taken from current-day tidal marshes in the project area show ancient marsh soils (full of organic materials such as march plant roots) abruptly buried by fine intertidal mud when the coastal land mass rapidly subsided during historic earthquakes. Often these abrupt transitions in the soil cores include a coarse sandy layer

full of woody debris deposited during earthquake-generated tsunamis.

The most recent Cascadia megathrust earthquake (magnitude 9) and tsunami on the Oregon coast (including the Coos estuary) occurred on January 29, 1700, caused by a sudden slip of the Juan de Fuca plate beneath the North America plate along the 1,000 km (621 mi) long Cascadia subduction zone (Satake et al. 1996; Rumrill 2006). This caused the land mass to subside an estimated 0.6 m (2.0 ft) (Leonard et al. 2004). Estimates of subsidence from future mega-thrust earthquakes in Coos Bay range from 0-1.5 m (0-4.9 ft) (Leonard et al. 2004) while maximum subsidence, modeled for this area, could be as high as 2 m (7 ft)(Witter et al. 2011). According to Rumrill (2006), "the probability of a future earthquake and coastal subsidence event is conservatively estimated at 10-20% within the next 50 years (or 20-40% within the next 100 years)".

Lately, seismic activity along the subduction zone appears to have fallen off, leaving the zone "eerily quiet" (Banse 2014). Quoted in several northwest media outlets in December, 2014, Doug Toomey, a geophysics professor at the University of Oregon, said, "all of Cascadia is quiet. It's extraordinarily quiet when you compare it to other subduction zones globally" (Banse 2014). In 2011, Toomey and other scientists began the Cascadia Initiative, a four-year study in which seismometers were deployed at 160 sites along the entire Cascadia subduction zone to help determine what that silence means. If they find the boundary between the two plates is fully locked, pressure will continue to build until another serious earthquake occurs. "If it is completely locked, it means [the Cascadia subduction zone] is increasingly storing energy and that has to be released at some point." (Toomey, on Banse 2014).

Geologic Formations and Deposits

Tyee and Coaledo formations make up the vast majority of the underlying bedrock in the project area (71% combined)(Figure 5). Both formations are sandstones with minor siltstone embedded within (Beaulieu and Hughes 1975)(see definitions in sidebars and in Table 2). Landforms surrounding most of the South Slough shoreline and eastern portions of the lower bay are composed primarily of marine terrace deposits (Figure 5). The remainder of the lower bay is made up of eolian deposits (wind-generated deposits: in this case, dune sand) and beach deposits, while alluvial deposits (river-formed) are found under and along each major tributary to the Coos estuary. Man-made fill deposits can be found under most of the project area's low-lying urban centers.

The Coos Bay Coal Field (oriented north to south and roughly 30 mi long by 12 mi wide, overlaps the Coaledo formation), lies under North Bend, Coos Bay, Isthmus Slough and Catching Slough (and their tributaries), and the Lower Coos River, and extends down to the Coquille River (DOGAMI n.d.)(Figure 5). From the late nineteenth century through the mid-twentieth century extensive coal mining and geologic testing occurred in the Coos

Geologic Formation

A geological formation is a rock unit that is distinctive enough in appearance that a geologic mapper can tell it apart from the surrounding rock layers. It must also be thick enough and extensive enough to plot on a map.

Source: Wilkerson 2001

Geologic Deposits

Geologic deposits (superficial) are recent (quaternary: 2.6 million years old or less) unconsolidated sediments, soil or rocks added to a landform, generally named according to their origin (e.g., beach deposit, landslide deposit). Older deposits are referred to as bedrock.

Source: Wikipedia 2015b

Sandstone

Sandstone (sometimes known as arenite) is a medium-grained sedimentary rock composed primarily of minerals or rock grains cemented together.

Siltstone

Siltstone is sedimentary rock made up of cemented together silt particles, similar to shale, but does not demonstrate fissility (breaking along planes into sheets).

Source: USGS 2014b

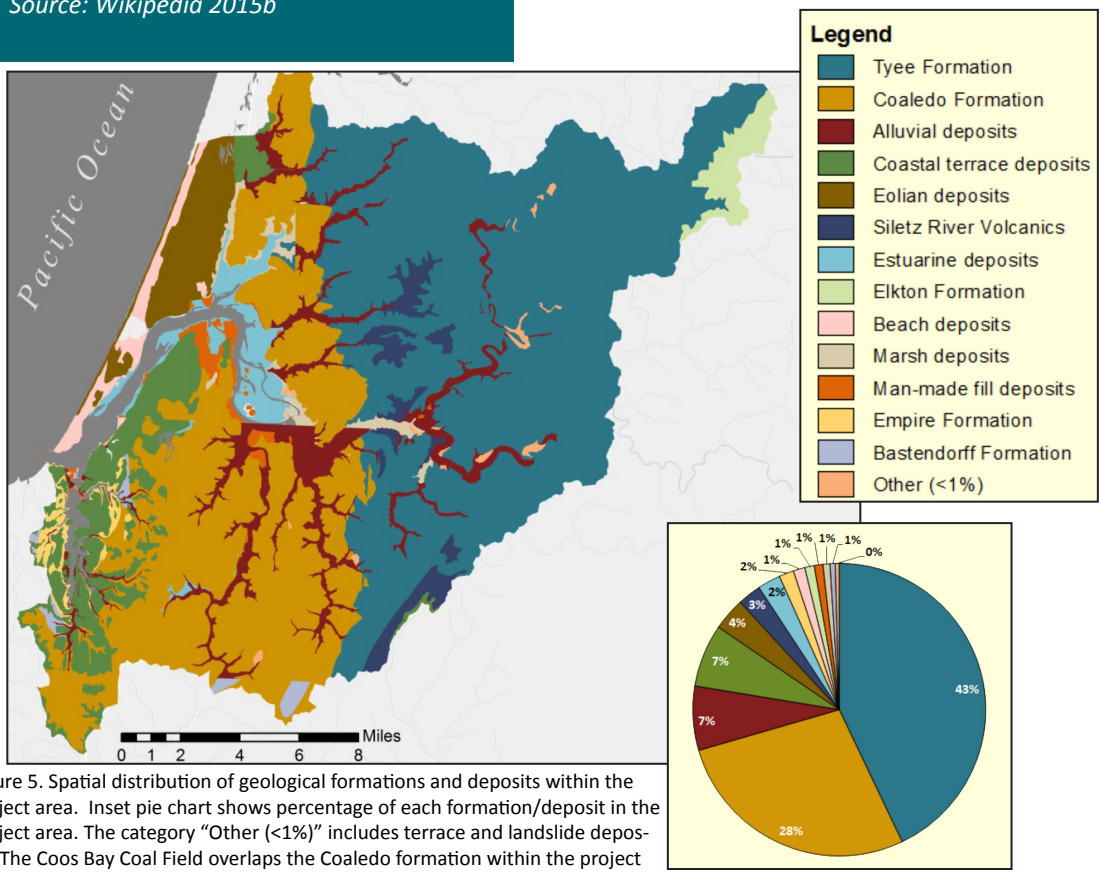

Figure 5. Spatial distribution of geological formations and deposits within the project area. Inset pie chart shows percentage of each formation/deposit in the project area. The category "Other (<1%)" includes terrace and landslide deposits. The Coos Bay Coal Field overlaps the Coaledo formation within the project area, but the coal field is not shown in its entirety. Data: DOGAMI 2009

Geologic Unit	Bedrock Description	Age	Structure
Alluvial deposits	Silt, sand, and gravel filling channels of present day streams/rivers.	Quaternary	
Bastendorff Formation	3,000 ft of shale and siltstone with thin (50') sandstone	Late Eocene	Major synclines
Beach deposits	Fine-grained sand	Holocene-present	
Coaledo Formation	Coarse to fine-grained cross-bedded, deltaic sandstone and minor siltstone	Late Eocene	Moderately to tightly folded with steep dips
Coastal terrace deposits	Compact, horizontally bedded, deeply weathered silt, sand and clay	Quaternary	
Elkton Formation	Thousands of feet of clayey siltstone with minor beds of	Mid-Eocene	Gently folded and
Empire Formation	Thick sandstone beds with very minor quantities of siltstone	Pliocene	Gently dipping folds
Eolian deposits	Fine-grained sand	variable	
Estuarine deposits	Horizontally bedded sand, silt, and clay, rich in organic material	Holocene-present	
Landslide deposits*	Unstratified mixture of bedrock fragments	Holocene	
Man-made fill deposits	Dredge spoils, sand, silt, clay, woodchips	<100 years	
Marsh deposits	Horizontally bedded sand, silt, and clay, rich in organic material	Holocene-present	
Siletz River volcanics*	Basaltic pillow lava flows composed of basaltic siltstone, sandstone, tuff and conglomerate. Originated from oceanic crust.	Eocene	
Terrace deposits	Sand, silt, clay gravel, cross-bedded	Quaternary	
Tyee Formation	Thousands of feet of thick-bedded sandstone and minor rhythmically bedded siltsone	Mid-Eocene	Gently folded

Table 2: Descriptions of geological formations and deposits in the project area. Source: Beaulieu and Hughes 1975; except those marked with an asterisk* sourced from USGS 2014b

Bay Coal Field. Nearly 2.5 million tons of coal were extracted from this coal field between 1882 and 1918 (Duncan 1953; DOGAMI n.d.). Mining ceased in the 1920's primarily due to competition from California fuel oils and higher grade coal from Utah and Wyoming (Duncan 1953; DOGAMI n.d.). Although coal mining no longer occurs in the project area, in the mid-2000s, portions of the coal field were explored to determine its potential for natural gas production using hydraulic fracturing techniques.

Geologic Age of the Project Area

The project area is composed of bedrock formed in the Cenozoic era (65 million years ago-present), most of which was created during its Eocene epoch (Figure 6; Table 3). According to Rumrill (2006), sandstone, siltstone, and shale were deposited deep in the Pacific ocean and in shallow coastal waters over the past 50 million years, from the Eocene epoch through the Quaternary period. During the marine regression in the middle to late Eocene epoch (38-45 million years ago), sea level dropped, which allowed Coos Bay to emerge as a distinct, wave-dominated (as opposed to river-dominated) deltaic coastal basin.

Beginning in the middle Eocene epoch (about 40-48 million years ago), sediments that largely form the present-day bedrock were laid down during repeating marine transgressions (period of high sea level) and regressions (period of low sea level)(Rumrill 2006). These fluctuations were caused primarily by

Geological Time Scale

Span of time since the Earth's creation, divided by major geological events, strata composition, or radiometric dating. Eon is the largest division, followed by Era, Period, Epoch and finally Age.

Source: Wikipedia 2015a

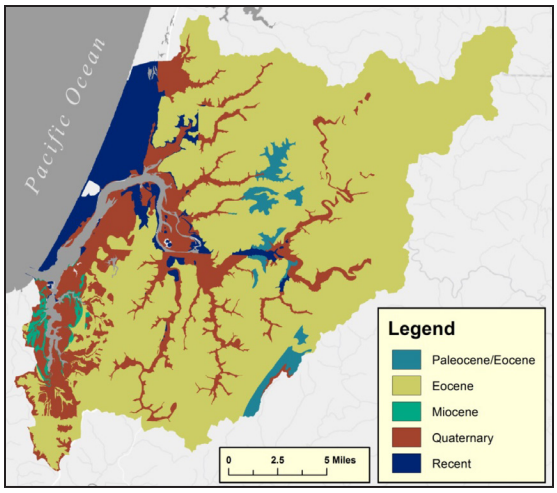

Figure 6: Spatial distribution the project area's geologic time scale. Legend ordered from oldest to most recent. Data: DOGAMI 2009

cyclical changes in climate that led to advances and retreat of continental glaciers, and subsequent rise and fall of sea level. These periods of major seal level fluctuations caused the continental shoreline to migrate back and forth tens of kilometers between the sea level extremes.

For example, beds of siltstone, mudstone, and sandstone formed in the middle Coaledo Formation beds (see "Formations" above) were laid down in deeper coastal waters during a marine transgression, while upper Coaledo beds (siltstone, mudstone, coal, and conglomerate) were deposited in shallow water during a subsequent regression (Rumrill 2006).

According to Rumrill (2006), absence of sediments for nearly 30 million years, dating from the Oligocene and early Miocene (8-36 million years ago), indicates a significant period of non-deposition, probably related to a combination of the onset of "tectonic plate deformation along the Cascadia subduction zone", glacial advance, and periods of low sea level. Rumrill (2006) discusses another gap of about four million years long occurring 6-2 million years ago, separating older formations

Era	Period	Epoch	Geologic Age (million years ago)
Cenozoic	Quaternary	Holocene	0.01-present
		Pleistocene	2.6-0.01
	Neogene	Pliocene	5.3 - 2.6
		Miocene	23.0-5.3
	Paleogene	Oligocene	33.9-23.0
		Eocene	56.0 -33.9
		Paleocene	65.0-56.0

Table 3: Definition of geological ages in the Cenozoic era.

such as the Miocene epoch's Empire formation from more recent Pleistocene marine terraces and Holocene estuarine and sand deposits.

Soils

This section discusses soil types found in the project area. Definitions of soil types discussed in this section can be found in Table 4.

Estuarine Soils

Sediments in the estuarine tidal channel vary from coarse-grained sand to fine-grained sand, silt and clay (Rumrill 2006). See "Sediment Composition" summary in "Chapter 10: Sediment" for more detail on estuary sediments.

Tide flat sediments are primarily open sand flats and mudflats, which are composed of Udorthents, a combination of sand, silt, mud or organic materials, largely devoid of emergent vegetation (Haagen 1989). Mudflats typically occur in regions of the estuary that experience low tidal energy while sand flats occur in areas of high tidal energy (Rumrill 2006).

In the South Slough estuary, sand flats frequently occur on the inside of major bends in the tidal channel. These sand flats frequently have sand ripples or waves, the patterns of which are directly related to water velocity (Rumrill 2006).

According to Rumrill (2006) tidal beaches within South Slough are generally steep (9-15% slope) and sediments increase in mean grain size with depth, and decrease in mean grain size along the estuarine gradient (i.e., sediment is more fine further away from the mouth of the estuary). Most beach sediments are well-sorted. The decrease in mean sediment grain size along the estuarine gradient (from the high-energy estuary mouth to the low-energy upper estuary) is most likely a result of the gradual decrease in velocity of tidal currents, which in turn reduces their capacity to carry larger sediment particles (Arkett 1980, in Rumrill 2006).

Tidal Wetland Soils

Soils in the tidal wetlands of the Coos estuary are predominately Fluvaquents-Histosols, which, typical of permanently or frequently saturated soils, are particularly rich in organic matter (Haagen 1989).

Rumrill (2006) described surface soils within South Slough riparian areas, forested wetlands, and emergent freshwater marshes as typically sandy loams, also rich in organic matter.

Soil Complex

Soil complex is defined as two or more soils which are so integrated that they cannot be separated at the map scale.

Soil Association

Soil association is defined as two or more soils that are intricately mixed but could still be separated at the map scale (although it's not practical to do so).

Source: Haagen 1989

Soils	Abridged Definition (Haagan 1989)
Bandon Sandy Loam	Deep, well drained soils, with a thick (1") covering of organic litter, found on dissected marine terraces. Top 5" is dark gray/brown sandy loam, followed by 25" dark red/brown sandy loam subsoil, 13" pale brown cemented sandy material and a substratum of yellow/brown loam.
Bullards-Bandon-Blacklock	Loamy and sandy soils derived from marine sediment and found on marine terraces.
Bullards (58%)	See Bullards Sandy Loam above
Bandon (20%)	See Bandon Sandy Loam above
Blacklock (18%)	Poorly drained, nearly level (0-3%) soils on depression areas of marine terraces. Black fine sandy loam surface (9") soil, with upper subsoil (2") black mucky loam, and lower subsoil (37") with a yellow/brown cemented sand. Base substratum is light olive/red or brown sand.
Bullards Sandy Loam	Deep, well drained soils, with a thick (3") covering of organic litter, found on dissected marine terraces. Surface soil (7") is dark gray/brown sandy loam, with 34" dark red/brown gravelly sandy loam subsoil beneath, under which is yellow/brown sand.
Coquille-Nestucca-Langlois	Poorly drained, silty and clayey soils found on flood plains; formed from alluvial processes.
Coquille (22%)	See Coquille Silt Loam below.
Nestucca (19%)	Poorly drained soils found in depressions with mottled dark brown silt loam on the surface (14"). Subsoil is mottled dark gray/brown silty clay loam (26"). Substratum is mottled olive brown silty clay.
Langlois (14%)	Very poorly drained soils found in depressions and old tide flats. A thick (5") dark gray/brown peat layer sits atop surface soils. Surface soils are mottled dark gray/brown silty clay loam (10") and dark gray/brown silty clay upper subsoil (20") with dark gray clay lower subsoil (60").
Other minor soils (45%)	Combination of minor elements.
Coquille Silt Loam	Deep, poor draining soils, found primarily on flood plains (formed from alluvium). Thick (14") surface layer is dark gray/brown silt loam with gray/olive silty clay loam subsoil. Substratum is dark gray silty clay loam.
Dement Silt Loam	Deep, well drained soils derived from silt or sandstone, frequently found on ridgetops. Surface is dark gray/brown silt loam (7"), followed by red/brown silty clay loam subsoil (38"). Under this is found weathered sedimentary rock.
Dune Land	Shifting fine and medium grained sand, extremely permeable.
Dune Land-Waldport-Heceta	Sandy soils found on sand dunes and deflation plains.
Dune Land (30%)	See Dune Land above
Waldport (29%)	Found on stabilized sand dunes (leeward side of deflation plains). Surface 4" is dark gray/brown fine sand with dark yellow/brown fine sand beneath.
Heceta (18%)	Deep poorly drained soils found in deflation plains and depressions between dunes. Surface layer (4") is dark gray/brown fine sand with mottled gray/brown sand beneath.
Other minor soils (23%)	Combination of minor elements.
Fluvaquents-Histosols Complex	Level (slope ≤ 1%) tidelands of bays, inlets and estuaries
Fluvaquents (50%)	Covered by mean high water. Layers of mineral and organic material in varying thicknesses. Surface layer is generally sandy, silty or clayey depending on tidal currents.
Histosols (40%)	Covered by mean higher high water. Thick (16") organic layer over alternating layers of mineral and organic matter.
Geisel Silt Loam	Deep, well drained soil found on side slopes, derived from sedimentary rock. Surface layer is dark red/brown silt loam (4" thick). Upper subsoil (26") is dark red/brown silt loam and silty clay loam, while lower subsoil (24") is dark red/brown silty clay. Weathered siltstone forms base rock.
Milbury-Bohannon-Umpcoos Association	Moderately deep and shallow, gravelly loamy soils, derived from sedimentary rock
Milbury (40%)	Derived from sandstone, moderately deep well drained soil with very gravelly black sand loam on surface (10") and dark gray brown very cobbly loam subsoil (26"). These sit atop consolidated sandstone.
Bohannon (27%)	Moderately deep, well drained soil derived from arkosic sandstone. Surface (11") is very dark brown loam and gravelly loam; subsoil is dark yellow/brown gravelly loam (20"). Base substratum is weathered fractured sandstone.
Umpcoos (22%)	Shallow, well drained soils derived from sandstone, found on rock outcrops and ridgelines. Surface (3") is dark gray/brown very gravelly sand loam. Subsoil is brown very gravelly sandy loam (13"). Hard sandstone is underneath.
Other soils (11%)	Combination of minor elements.
Millicoma-Templeton Complex	Found on ridgetops and side slopes
Millicoma (55%)	Deep well drained, derived from sandstone. Surface layer is very dark/gray brown gravelly loam (18") with very gravelly dark brown loam subsoil (17"). Underneath that is partially weathered sandstone.
Templeton (25%)	Deep well drained, derived from sandstone. Surface layer is very dark brown silt loam (16") with red/brown/yellow silty clay loam subsoil (26"). Weathered fractured siltstone is under that.
Salander and other soils (20%)	Salander - see Salander Silt Loam below; small areas of clay loam or soils with ≤ 35% rock fragment.
Preacher-Blachly Association	Found on broad ridgetops and benches.
Preacher (50%)	Found in concave areas, deep, well drained soil derived from arkosic sandstone. Surface is organic litter (4") with dark gray/brown loam (14"). Subsoil is dark yellow/brown clay loam (34"). Base substratum is yellow brown clay loam.
Blachly (35%)	Deep, well drained soil, derived from basalt or sedimentary rock. Surface is red/gray or dark red/brown silty clay loam (7"). Upper subsoil (45") is dark red or yellow/red silty clay; lower subsoil (8") is yellow/red silty clay loam.
Bohannon, Digger (15%)	See Bohannon in Milbury-Bohannon-Umpcoos above.
Preacher-Bohannon Loams	Deep gravelly and loamy soils found on broad ridgetops, benches and steep side slopes.
Preacher (50%)	See Preacher in Preacher-Blachly Association above.
Bohannon (30%)	See Bohannon in Milbury-Bohannon-Umpcoos above.
Milbury, Digger, Blachly (20%)	Milbury - see Milbury-Bohannon-Umpcoos above. Blachly - see Preacher-Blachly Association above. Digger soil is moderately deep well drained derived from sedimentary rock. Organic layer (1") thick on top has dark brown gravelly loam (6") underneath. Upper subsoil (3") is dark yellow/brown gravelly loam; bottom 18" is brown very gravelly and cobbly loam. Base rock is brown extremely cobbly loam (4") with weathered, fractured sandstone beneath.
Rinearson Silt Loam	Deep, well drained soil, found on ridgetops and side slopes, derived from sedimentary rock. Surface soils are dark red/brown silt loam (6"). Upper subsoil (12") is dark/red brown silt loam; lower subsoil (24") is red/brown silty clay loam. Base substratum is weathered sandstone.
Salander Silt Loam	Deep, well drained soil, found on side slopes, derived from sedimentary rock. Surface layer (26") and top layer of subsoil (14") is dark red/brown silt loam. Lower subsoil (25") is dark red/brown silty clay loam.
Templeton Silt Loam	Deep, well drained soil, found on ridgetops and benches, derived from sedimentary rock. Surface layer is very dark brown silt loam (16") with red/brown/yellowish red silty clay loam subsoil (26"). Soft weathered fractured siltstone makes up the base substratum.
Udorthents	Level (slope ≤ 1%) flood plains, marshes, and tidal flats on major water bodies (including filled and leveled areas). Soils are a mixture of sand, silt or clay materials; dredge spoils also consist of dune sand and wood chips.
Wintley Silt Loam	Deep well drained souls found on high terraces, derived from alluvial processes. Surface is topped with 1" undecomposed organics, followed by 4" dark brown silt loam. Upper subsoil (12") is dark brown silty clay loam; lower subsoil (31") is brown silty clay and silty clay loam. Base substratum is dark yellow/brown very gravelly loam.

Table 4: Most common soil types, soil complexes, and soil associations found in the project area.

Dune Soils

The Coos Bay Dune Sheet is a mass of sand that extends, unbroken but for the mouths of rivers and streams, from Haceta Head to Cape Arago, making it the largest dune sheet in North America and the only 'oblique-ridge dune' in the world (Cooper 1958; Crook 1979). Dune lands in Coos County are generally made up of DuneLand-Waldport-Heceta soil types. Extensive portions of the dunes have been stabilized by plantings of the invasive European beachgrass (*Ammophila arenaria*), which began in 1910 (for more information on this, see "Vegetation" summary in "Chapter 18: Non-Native/Invasive Spp.").

Upland and Lowland Soils

Fifteen principle soil types are found in the lower Coos basin (Figure 7). Of those, three predominate and are found in distinctly different areas of the landscape. Most common are Preacher-Bohannon loams (24% of total soil cover), found in a patchy, north-south oriented band of uplands east of the bay, along the western slopes and foothills of Blue Ridge, and in the Millicoma highlands. Templeton silt loam (23% of soil cover) extends from the uplands of the South Slough basin east through the drainages of Isthmus and Catching Sloughs, across the highlands of Pony Creek Reservoir, along the eastern slopes of Coos Bay and across the uplands between North

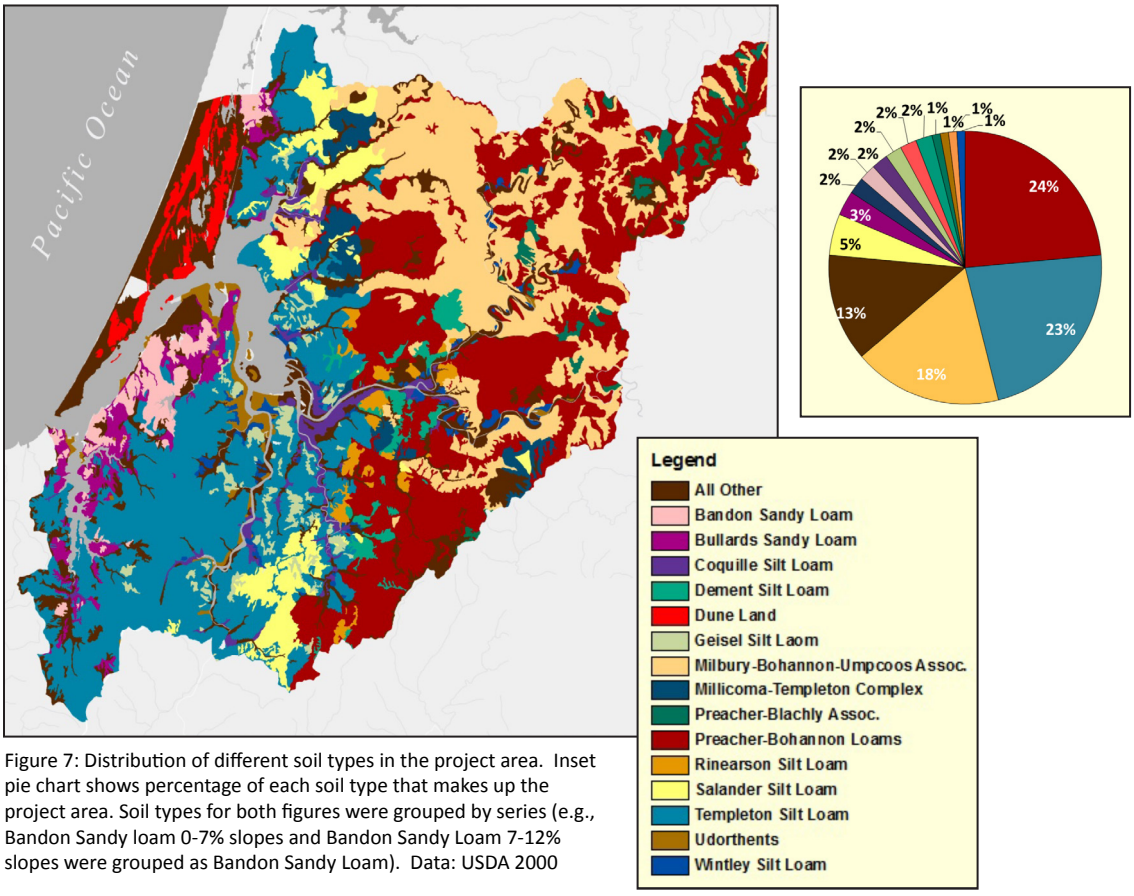

Figure 7: Distribution of different soil types in the project area. Inset pie chart shows percentage of each soil type that makes up the project area. Soil types for both figures were grouped by series (e.g., Bandon Sandy loam 0-7% slopes and Bandon Sandy Loam 7-12% slopes were grouped as Bandon Sandy Loam). Data: USDA 2000

Slough and Haynes Inlet. The Milbury-Bohannon-Umpcoos association (18% of cover) is interspersed with the Preacher-Bohannon series in the upper watershed.

Except where otherwise noted, the following soil descriptions for several major sub-basins, are taken from an assessment of Coos estuary tributary basins conducted by the Coos Watershed Association (CoosWA 2006).

North Slough

North Slough differs in its soils from other sub-basins in that it is dominated by the very soft, highly erosive sandstones of Dune Land-Waldport-Heceta and Bullards-Bandon-Blacklock soils.

Palouse and Larson Sloughs

Three general soil types dominate the Palouse and Larson Slough sub-basin: Dune land-Waldport-Heceta, which is common to dune areas, Templeton and Salander loams, common to the lowland area, and Milbury-Bohannon-Umpcoos, found in the uplands.

Kentuck Slough

Soils in the Kentuck Slough sub-basin consist of Templeton and Salander loams in the lowlands, and Preacher-Bohannon loams in the uplands. The headwaters of Kentuck Creek are on the Milbury-Bohannon-Umpcoos soil type.

Willanch Slough

General soil types in the Willanch Slough sub-basin are Templeton and Salander loams (lowlands) and Preacher-Bohannon loams, (uplands).

Echo Creek

The Echo Creek sub-basin hosts three general soil types: the Coquille-Nestucca-Langlois soil, found in level areas, areas along the bay, and Coos River; Templeton and Salander loams (lowlands), and the Preacher-Bohannon loams (uplands).

Lower Millicoma and South Fork Coos Rivers

According to CoosWA (2008), Preacher-Bohannon loams are the most prevalent soils in Lower Millicoma and South Fork Coos River sub-basin. Other soils include Milbury-Bohannon-Umpcoos on steep slopes and poorly draining, clay Coquille-Nestucca-Langlois soils along floodplains.

South Slough

Haagen (1989) shows the primary soils in this sub-basin as Templeton loams, with some Bullards-Bandon-Blacklock group.

Landslides

According to Wang et al. (2002), Oregon economic losses due to landslides exceed $10 million/year. In years with heavy storm events, losses can exceed $100 million. These losses are expected to increase as the state's human population increases, expanding current land uses.

Landslides occur frequently in the Coos region, as they do throughout much of the central Coast Range. The Oregon Department of Geology and Mineral Industries (DOGAMI)

has compiled an inventory of historic landslide locations, which helps identify areas potentially prone to future land failures (Figure 8).

Oregon Department of Forestry (ODF) developed debris flow (a type of landslide – see Background below) hazard maps, based on slopes derived from USGS digital elevation models. Slopes >40% and an area greater than 150,000 ft^2 were considered moderately hazardous. Tyee Formation slopes >65% over an area of 100,000 ft^2 or >60% for more than ⅓ the total basin area were considered a high risk for debris flows. Other formations were considered a high risk if they had a slope >70% and an area exceeding 150,000 ft^2 or ¼ total basin area. Extreme hazard values were assigned to locations where debris flows have occurred frequently over the past 35 years.

Areas of high and moderate debris flow risk have been mapped for the project area using these data (Figure 9). The hills east of the main Coos estuary are at considerably higher risk for debris flow occurrences than lands closer to the ocean. In fact, the Coos River subsystem has the highest percentage of both high (9.5%) and moderate (18%) lands at risk for debris flow events (Figure 10). When taken as a whole, 33% and 12% of the entire project area is at moderate and high risk, respectively, for debris flows.

Background

Plate Tectonics

Rumrill (2006) describes the Coos estuary as being formed by the interactions of "several coastal geomorphic processes in the recent geologic past" (thousands to tens of thousands of years ago), including "slow coastal uplift and sudden subsidence" (driven by tectonic movement of offshore crustal plates); "regional transgression and regression of the sea as a result of ice-age glacial advance and retreat"; and "fluvial erosion of a major riverine drainage system caused by differential coastal uplift".

Folds and faults

Long-term seismic shifting of the North America and Juan de Fuca plates contributed to east-west compression that formed the South Slough syncline and other folds throughout the southern Oregon coastal region. Folding and faulting cause different areas of the coast to rise at different rates, significantly altering the topography of the Coos drainage basin (Kelsey et al. 2002). For example, before the creation of the current coastal terraces (which were created by folding and faulting processes), the Coquille River drained into the Pacific Ocean through Isthmus and South Sloughs (Baldwin 1945; Nyborg 1993 as cited in Rumrill 2006). Evidence of this can be seen along several outcrops in the South Slough where Pleistocene alluvial floodplain materials (including aquatic invertebrate fossil assemblages) are identical to those found at the mouth of the Coquille River (Nyborg 1993 as cited in Rumrill 2006).

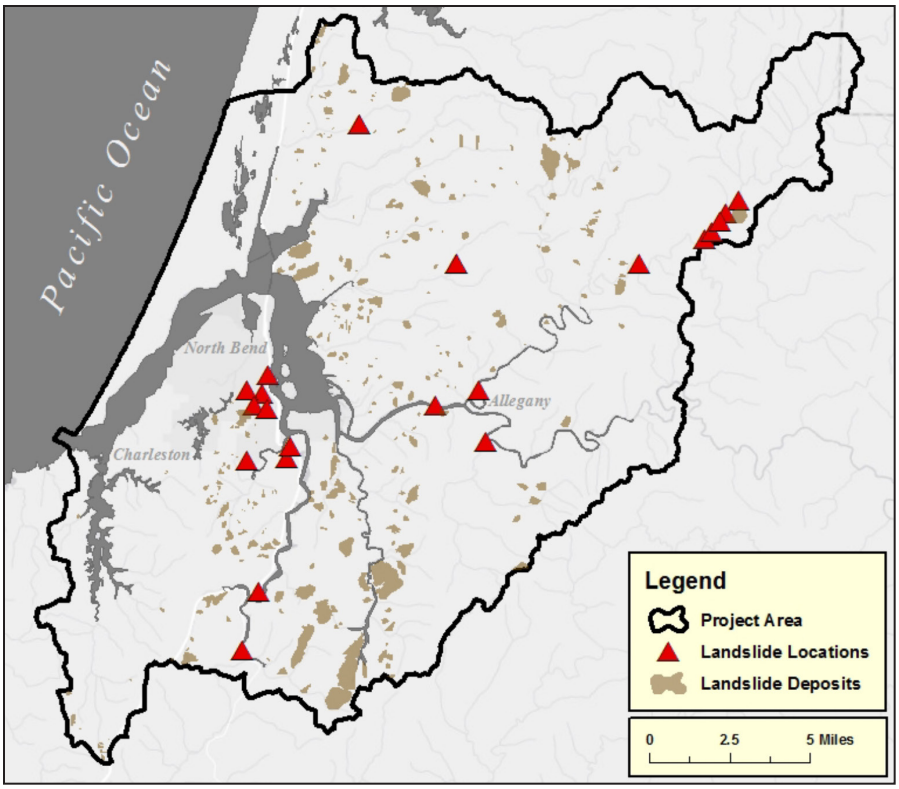

Figure 8: Inventory of historic landslides (1849-2013), identifying landslide-prone areas, which may be susceptible to future landslides. Landslide deposits include debris flow fans and talus extent. Data: DOGAMI 2014

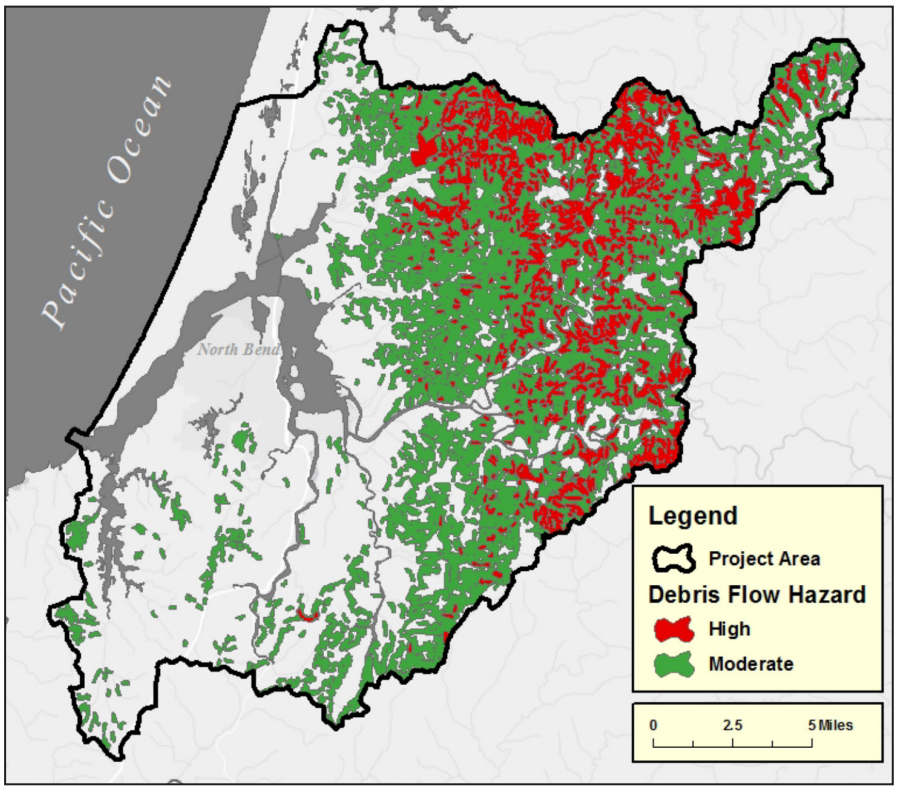

Figure 9: Distribution of lands that are highly or moderately at risk of debris flows in the project area. Data: ODF 2000.

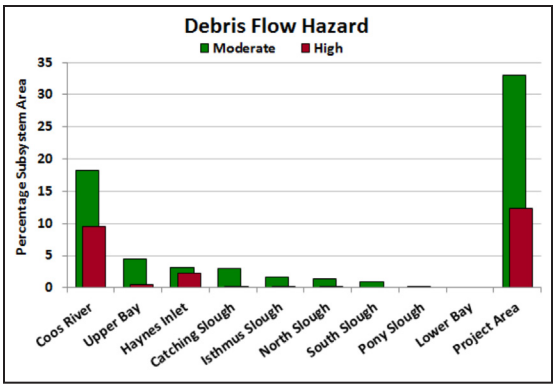

Figure 10: Percentage of each subsystem and entire project area that is at high and moderate risk for debris flow. Data: ODF 2000.

Other evidence of subduction processes were described by Witter et al. (2003), who found that stepped marine terraces occurring in the hills surrounding the Coos estuary are a result of ocean-derived sediments scraped off the Juan de Fuca plate as it slid down under the North American Plate.

Earthquakes

Pressure that accumulates in the earth as a result of forces and movements of plates is released episodically during earthquakes. Three types of earthquakes affect coastal Oregon: Cascadia megathrust, deep intraplate, and crustal earthquakes (see sidebar). The most frequently occurring of these are crustal earthquakes, which occur along active fault lines (Rumrill 2006). Seismic studies conducted near the Coos estuary's Jordan Cove indicate fewer deep intraplate earthquakes occur in the Coos Bay area compared with areas to the north and south (GRI 2013). The largest earthquakes in our area tend to occur along the Cascadia Subduction Zone boundary and can cause sudden coastal subsidence of from 0.5-2 m (1.64-6.56 ft)(Darienzo and Peterson 1990 as cited in Rumrill 2006).

According to NOAA's Pacific Northwest Seismic Network (PNSN n.d.), the Cascadia Subduction Zone is locked by friction at depths shallower than 30 km (16.6 mi). Strain continues to build slowly as the tectonic forces act (including expansion at the Juan de Fuca Ridge). Eventually, when the frictional strength is exceeded, the plates will slip past each other, causing a megathrust earthquake. The fault's frictional properties change with depth, such that immediately below the locked part is a strip (called the transition zone) that slides slowly and slips a few centimeters every year or so. These small slips relieve the stress on the plate boundary in one location, but add to the stress on the fault elsewhere. Below the transition zone geodetic evidence suggests that the faults slide continuously and silently past one another.

Tsunamis

Tsunamis are triggered when the elevation of the coastal margin suddenly changes, displacing a large volume of water. Tsunami waves propagate rapidly through the open ocean and can reverberate throughout the entire Pacific Ocean basin in the 24-hour period following a sufficiently strong earthquake. In the Pacific Ocean, tsunamis move at speeds of ~435 mph, losing little energy as they travel (Petroff n.d.).

Geologists examined sediments deposited in the Coquille River estuary (Witter et al. 2003) and those of coastal lakes (Kelsey et al. 2005)

Local Earthquake Types

Cascadia Megathrust – The most powerful recorded earthquakes in the area (magnitude 8-9 or higher), Cascadia megrathrust earthquakes are caused the by sudden release of built-up energy when the Juan de Fuca Plate (locked against the North American Plate) is suddenly released and the plates slip past each other.

Deep Intraplate – Deep intraplate earthquakes occur when the Juan de Fuca plate cracks as it is bent deep underneath the North American Plate (at depths from 30-70 km [19-43 mi]). Deep intraplate earthquakes occur about every 30 years at magnitudes as high as 7.5. Because they usually occur under the Cascade and Coastal ranges, these earthquakes can be the most damaging to population centers.

Crustal – Crustal earthquakes occur on shallow faults (to 35 km [22 mi] deep) in the North American Plate and are relatively common off the southern Oregon coast (maximum magnitudes <7).

Earthquake Magnitude (i.e., strength), originally based on the Richter Scale but now based on the moment magnitude scale (MMS), quantifies the energy released by an earthquake.

Sources: PNSN n.d.; DOGAMI 1996

for evidence of periodic tsunamis, and to improve their understanding of the impact of movements and interactions of crustal plates of the Cascadia Subduction Zone on the landforms and elevation of the southern Oregon coast, including the Coos estuary. Witter and colleagues traced 12 cycles of uplift and subsidence in the record of low-lying forests and tidal wetlands over the last 6,700 years while Kelsey and colleagues found a record of repeated local tsunamis in the sediments of Bradley Lake in Curry County.

Soils

Tidal Areas

According to Rumrill (2006), tide flats in the Coos estuary likely formed during the past 1,000-2,000 years as estuarine sediment eroded from marine terraces, filling in the Coos estuary tidal basin and creating the tide flats we see today.

Other sources of tide flat sediments are terrestrial runoff, oceanic deposition, and biotic material (Rumrill 2006). For example, much of the mud, silt, and clay within the estuarine tidal basin enters South Slough from Coos Bay and the nearshore Pacific Ocean during flood tides (Wilson 2003 in Rumrill 2006).

Sand flats are created largely from land sources, including erosion of nearby cliffs, then transported by high velocity tidal currents (Rumrill 2006).

Tide flats are often highly channelized with shallow drainage channels, which facilitate a continued cycle of erosion and deposition

as sediments are re-suspended, transported, and deposited with every tidal cycle (Rumrill 2006).

Tidal Wetlands

Tidal wetland soils can inform us about sea level rise rates. For example, Rumrill (2006) explains that "Prevalence of peat layers in the upper 1.0-1.5 m (3.28-4.92 ft) of sediment cores taken from brackish marshes in many parts of the Coos estuary suggests a reduction in the rate of sea-level rise or an increase in the rate of sedimentation over the past 1,000-1,500 years".

Landslides

Landslides are typically triggered by heavy rain. Less commonly they are caused by earthquakes, road construction, rapidly melting snow, or a combination of these and other events (DOGAMI 2008).

A particularly damaging landslide is known as a debris flow. A debris flow (synonymous with mudslide, mudflow, or rapidly moving landslide) is a fast moving (exceeding 30 mph) mixture of water, rock, soil, and vegetation. Debris flows begin as small landslides, and then, upon entering a steep sloping stream channel, gain momentum and more debris, until they finally end as massive deposits at the outlet of the channel (DOGAMI 2008; ODF 2012).

Debris flows can travel long distances, sometimes scour the channel down to bedrock, and frequently cause major structural damage to houses and roads. They are extremely hazardous, especially in populated areas (Robison et al. 1999; ODF 2012). It should be noted, however, that debris flows also deliver large wood to streams where they add complex structure that provide high quality fish habitat (ODF 2012).

In 1996, two very large storms severely affected western Oregon, one of which was a 100-year rain event that set an all-time one-day precipitation record at North Bend (6.67 inches in 24 hrs)(Robison et al. 1999). Both storms triggered large numbers of landslides in western Oregon, prompting ODF to take a closer look at activities, such as forest-road building and logging, that were thought to play a role in landslides. This report (Robison et al. 1999) examined eight locations affected by these two storms and found that lands with the highest hazards for landslides were found on slopes >70-80% steepness (depending on surface geology and landform). For example, Tyee Core formations are very susceptible to debris flows generally due to steep slopes, shallow low-cohesion soils, with an impermeable layer beneath. Lands with moderate hazard were found on slopes 50-70%. In addition, concave shaped landforms with large drainage areas were most frequently associated with landslides.

Robison et al. (1999) determined that forest cover and time since last timber harvest also influenced landslide occurrence, with lands 0-10 years post-harvest being most susceptible to landslides. However, forest stand age did not appear to affect the size of landslides.

Further, road-associated landslides were found to be four times larger (volume of earth moved) than landslides not occurring near roads. Landslides associated with abandoned logging roads ("legacy" roads) were smaller in size than those associated with active logging roads. Roads where drainage water was diverted (e.g., culvert or other relief structure), had higher landslide occurrences if the water exited on fill slopes. Roads carved out of slopes often deposit excavated fill on the downslope edge of the road, further influencing landslide hazards.

Rain-induced landslides are also thought to be more frequent during La Niña years, when the Pacific Northwest experiences increased storminess, increased precipitation and more days with measurable precipitation (UO 2012; NOAA 2002).

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Exhibit 26

13-year Cascadia study complete – and earthquake risk looms large

08/01/2012

CORVALLIS, Ore. – A comprehensive analysis of the Cascadia Subduction Zone off the Pacific Northwest coast confirms that the region has had numerous earthquakes over the past 10,000 years, and suggests that the southern Oregon coast may be most vulnerable based on recurrence frequency.

Written by researchers at Oregon State University, and published online by the U.S. Geological Survey, the study concludes that there is a 40 percent chance of a major earthquake in the Coos Bay, Ore., region during the next 50 years. And that earthquake could approach the intensity of the Tohoku quake that devastated Japan in March of 2011.

"The southern margin of Cascadia has a much higher recurrence level for major earthquakes than the northern end and, frankly, it is overdue for a rupture," said Chris Goldfinger, a professor in OSU's College of Earth, Ocean, and Atmospheric Sciences and lead author of the study. "That doesn't mean that an earthquake couldn't strike first along the northern half, from Newport, Ore., to Vancouver Island.

"But major earthquakes tend to strike more frequently along the southern end – every 240 years or so – and it has been longer than that since it last happened," Goldfinger added. "The probability for an earthquake on the southern part of the fault is more than double that of the northern end."

The publication of the peer-reviewed analysis may do more than raise awareness of earthquake hazards and risks, experts say. The actuarial table and history of earthquake strength and frequency may eventually lead to an update in the state's building codes.

"We are considering the work of Goldfinger, et al, in the update of the National Seismic Hazard Maps, which are the basis for seismic design provisions in building codes and other earthquake risk-mitigation measures," said Art Frankel, who has dual appointments with the U.S. Geological Survey and the University of Washington.

The Goldfinger-led study took four years to complete and is based on 13 years of research. At 184 pages, it is the most comprehensive overview ever written of the Cascadia Subduction Zone, a region off the Northwest coast where the Juan de Fuca tectonic plate is being subducted beneath the continent. Once thought to be a continuous fault line, Cascadia is now known to be at least partially segmented.

This segmentation is reflected in the region's earthquake history, Goldfinger noted.

"Over the past 10,000 years, there have been 19 earthquakes that extended along most of the

margin, stretching from southern Vancouver Island to the Oregon-California border," Goldfinger noted. "These would typically be of a magnitude from about 8.7 to 9.2 – really huge earthquakes.

"We've also determined that there have been 22 additional earthquakes that involved just the southern end of the fault," he added. "We are assuming that these are slightly smaller – more like 8.0 – but not necessarily. They were still very large earthquakes that if they happened today could have a devastating impact."

The clock is ticking on when a major earthquake will next strike, said Jay Patton, an OSU doctoral student who is a co-author on the study.

"By the year 2060, if we have not had an earthquake, we will have exceeded 85 percent of all the known intervals of earthquake recurrence in 10,000 years," Patton said. "The interval between earthquakes ranges from a few decades to thousands of years. But we already have exceeded about three-fourths of them."

The last mega-earthquake to strike the Pacific Northwest occurred on Jan. 26, 1700. Researchers know this, Goldfinger said, because written records in Japan document how an ensuing tsunami destroyed that year's rice crop stored in warehouses.

How scientists document the earthquake history of the Cascadia Subduction Zone is fascinating. When a major offshore earthquake occurs, Goldfinger says, the disturbance causes mud and sand to begin streaming down the continental margins and into the undersea canyons. Coarse sediments called turbidites run out onto the abyssal plain; these sediments stand out distinctly from the fine particulate matter that accumulates on a regular basis between major tectonic events.

By dating the fine particles through carbon-14 analysis and other methods, Goldfinger and colleagues can estimate with a great deal of accuracy when major earthquakes have occurred over the past 10,000 years.

Going back further than 10,000 years has been difficult because the sea level used to be lower and West Coast rivers emptied directly into offshore canyons. Because of that, it is difficult to distinguish between storm debris and earthquake turbidites.

"The turbidite data matches up almost perfectly with the tsunami record that goes back about 3,500 years," Goldfinger said. "Tsunamis don't always leave a signature, but those that do through coastal subsidence or marsh deposits coincide quite well with the earthquake history."

With the likelihood of a major earthquake and possible tsunami looming, coastal leaders and residents face the unenviable task of how to prepare for such events. Patrick Corcoran, a hazards outreach specialist with OSU's Sea Grant Extension program, says West Coast residents need to align their behavior with this kind of research.

"Now that we understand our vulnerability to mega-quakes and tsunamis, we need to develop a culture that is prepared at a level commensurate with the risk," Corcoran said. "Unlike Japan, which has frequent earthquakes and thus is more culturally prepared for them, we in the Pacific Northwest have not had a mega-quake since European settlement. And since we have no culture of earthquakes,

we have no culture of preparedness.

"The research, though, is compelling," he added. "It clearly shows that our region has a long history of these events, and the single most important thing we can do is begin 'expecting' a mega-quake, then we can't help but start preparing for it."

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SOURCE:

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AVAILABLE PHOTO(S):
(click to download)

Coos Bay bridge

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Exhibit 27

The Oregon Resilience Plan

Reducing Risk and Improving Recovery for the Next Cascadia Earthquake and Tsunami

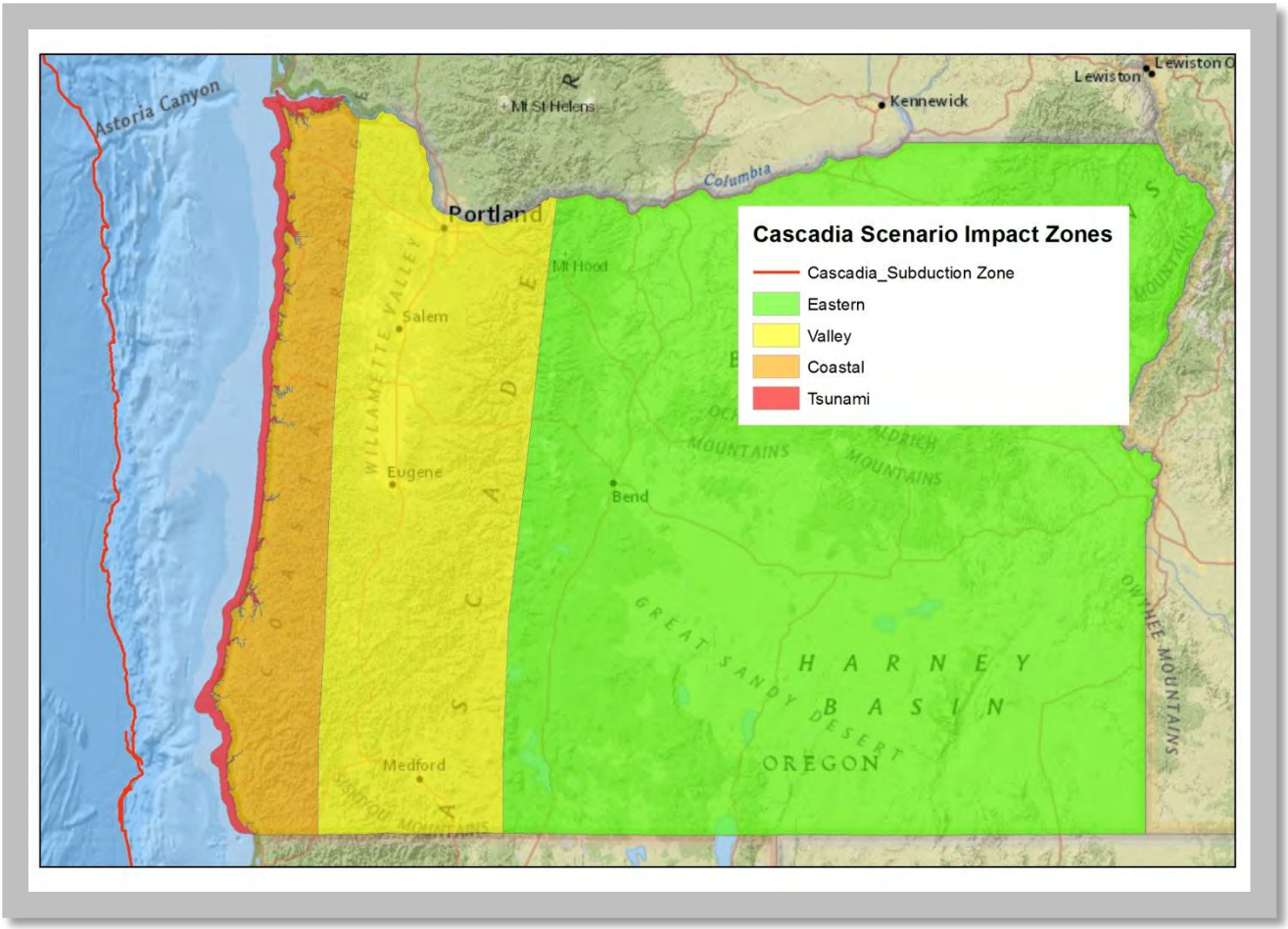
Report to the
77th Legislative Assembly

from
Oregon Seismic Safety Policy
Advisory Commission (OSSPAC)

Salem, Oregon
February 2013

Executive Summary

Very large earthquakes will occur in Oregon's future, and our state's infrastructure will remain poorly prepared to meet the threat unless we take action now to start building the necessary resilience. This is the central finding of the *Oregon Resilience Plan* requested by Oregon's 76th Legislative Assembly.



Impact zones for the magnitude 9.0 Cascadia earthquake scenario. Damage will be extreme in the Tsunami zone, heavy in the Coastal zone, moderate in the Valley zone, and light in the Eastern zone.

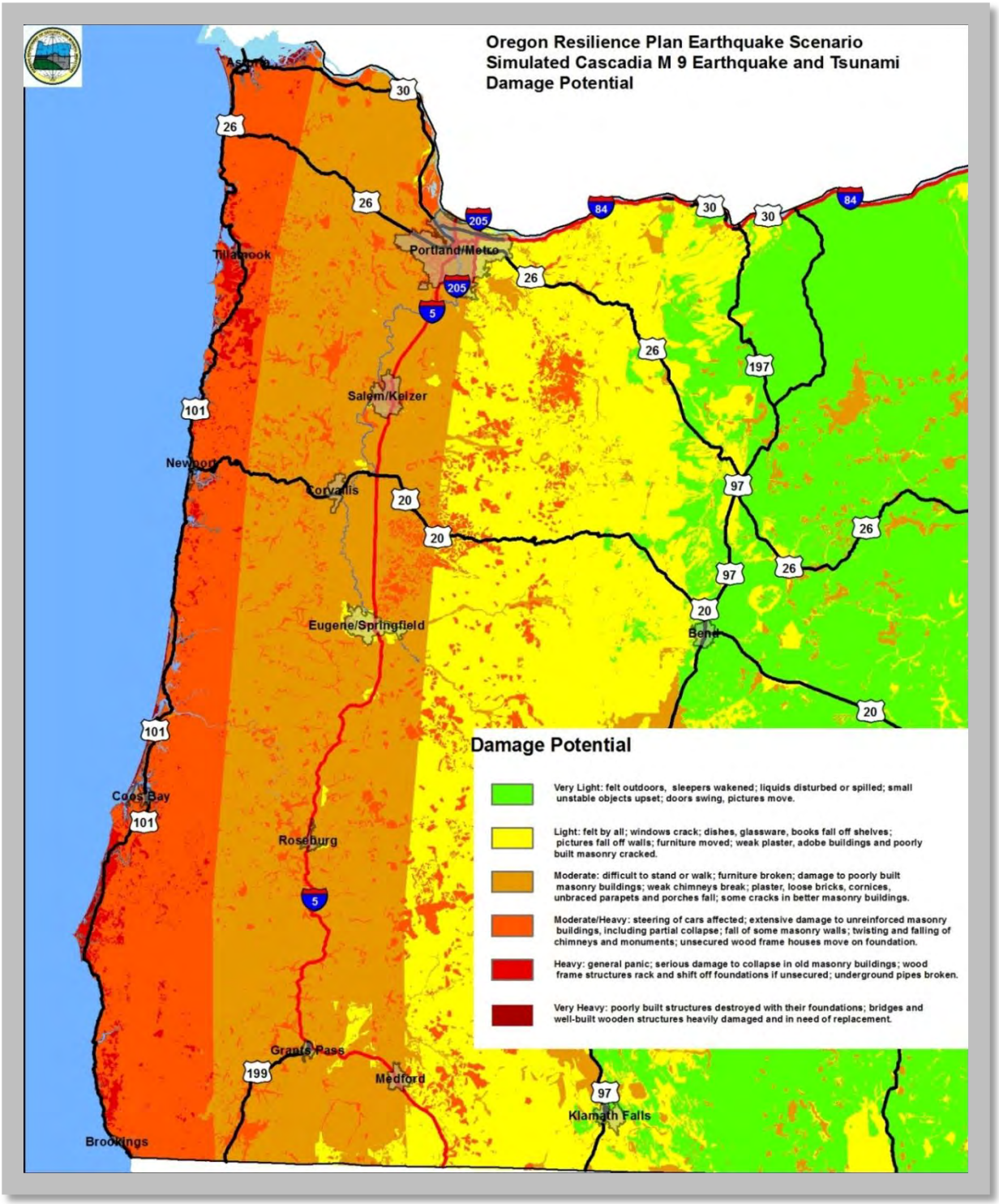


Figure 1.4: Simulated shaking for the magnitude 9.0 Cascadia scenario.

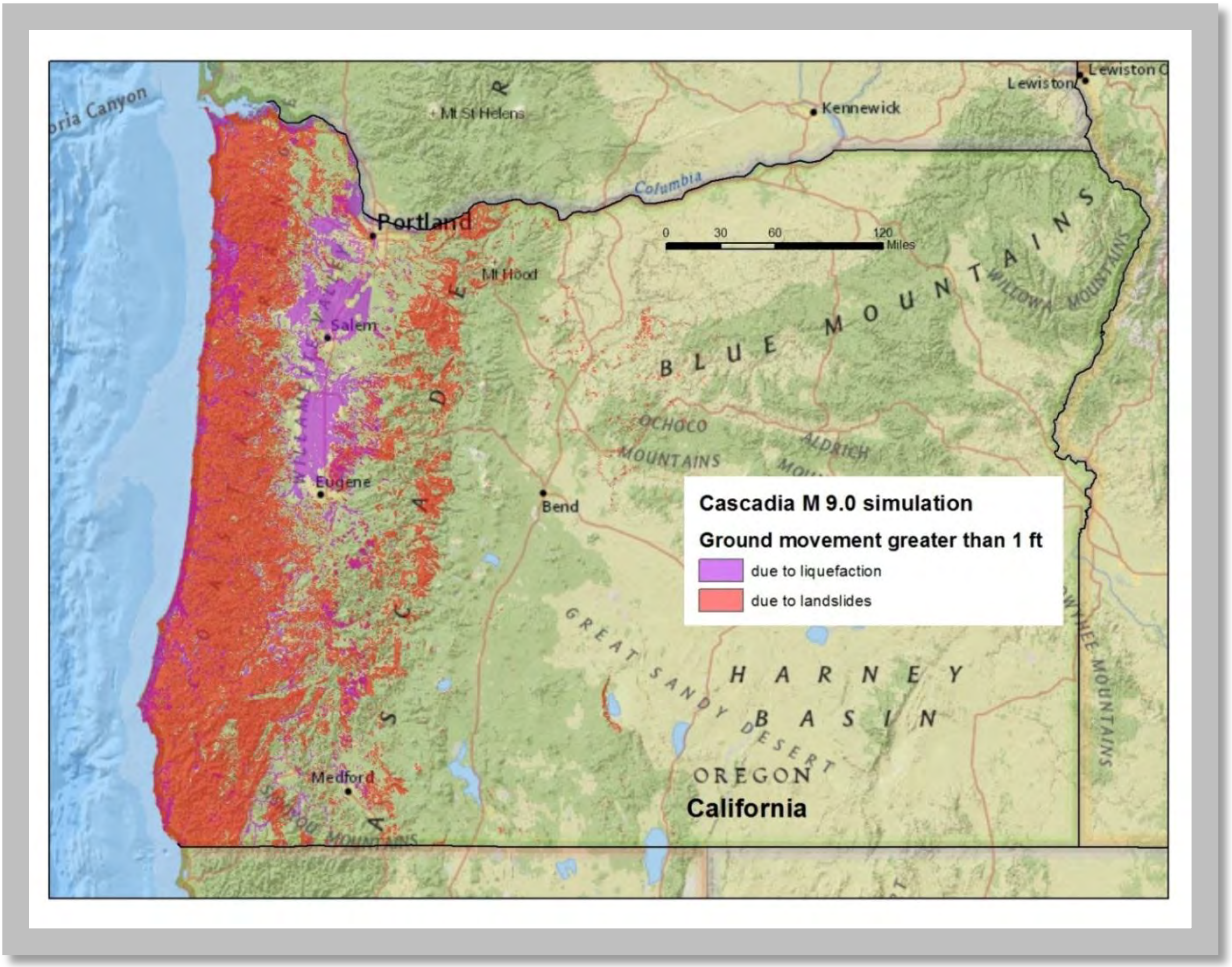


Figure 1.6: Ground failure and movement for the magnitude 9.0 Cascadia earthquake scenario. Colored areas could experience more than one foot of ground movement due to earthquake-induced landslides in steep areas and liquefaction failure in lowlands. Both forms of ground failure can cause severe damage.

The amount of tsunami inundation that would be experienced along the coast due to the scenario magnitude 9.0 earthquake is quite variable and depends on local topography. Large parts of many low-lying communities, such as Warrenton, Seaside, Rockaway Beach, and Neskowin (see Figure 1.7), will be inundated.

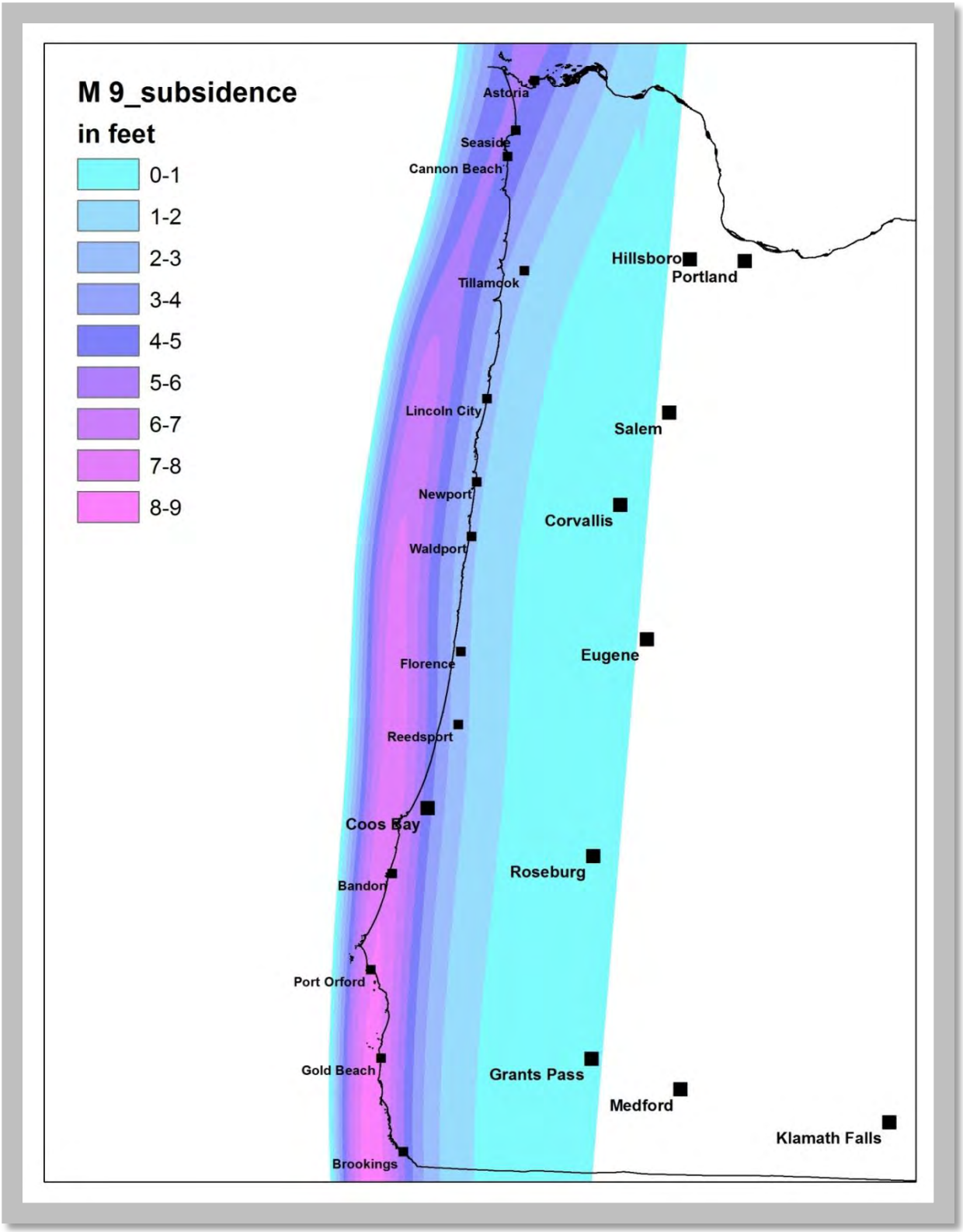


Figure 1.8: Estimated permanent land subsidence from the scenario magnitude 9.0 earthquake for the Oregon Coast. Subsidence would occur during the earthquake.

Exhibit 28

EXCESSIVE LIQUIFIED NATURAL GAS (LNG) EXPORTS TO NFTA COUNTRIES ARE NOT IN THE PUBLIC INTEREST AND INCREASE NATURAL GAS AND ELECTRICITY PRICES TO CONSUMERS

JANUARY 30, 2019

OUTLINE

1. All DOE LNG export studies say exports increase natural gas prices.

2. The DOE has already approved volumes for export that are not in the public interest and plan to approve volumes equal to 52.8 billion cubic feet per day (Bcf/d). A volume equal to 71 percent of U.S. 2017 demand. The DOE has decided to let foreign countries determine the level of exports rather than limit export volumes that provide domestic consumers a safety net.

3. The DOE has never defined public interest under the NGA. All DOE studies confirm that LNG exports create winners and losers. The winners are the producers and exporters of natural gas. The losers are consumers and the economy.

4. DOE's approval of LNG exports for 20 to 30 years is a firm legal commitment to foreign countries LNG buyers. Where is the commitment to protect U.S. consumers?

5. The international LNG market is not a free market. It is for this reason that it is sound public policy to place limits on export volumes to levels that assure LNG exports will not increase domestic prices or impact reliability.

6. DOE has not addressed vital short- and long-term risks to consumers and the economy that are core issues in considering whether an LNG export application is consistent with the public interest.

    a. Failure to consider pipeline and storage capacity risks for existing and future constraints (and at peak demand), and their cost and reliability impacts.

    b. Failure to consider resulting higher marginal prices for natural gas and electricity consumers.

    c. Failure to address cumulative demand versus availability of natural gas resources.

    d. Failure to consider the uncertain nature of technically recoverable natural gas resources.

e. Failure to consider future political decisions such as limit to acreage available for drilling, regulations on water or hydraulic fracturing that could increase costs that must be recovered in higher prices of natural gas, thereby increasing consumer risk.

f. Failure to consider that the majority of producers of natural gas do not have a positive cash flow business, which means prices have to go up.

g. Failure to consider that gas producing companies are consistently overestimating well production, which leads to higher natural gas resources estimates than are available for the future.

h. Failure to consider that foreign consumers of U.S. LNG exports are receiving the benefits of using our infrastructure that is paid for by U.S. consumers, without paying for it. Their use of this infrastructure increases our costs.

7. The United States Trade and Development Agency (USTDA) is using federal tax dollars (or taxpayer money) to fund and promote LNG exports to importing countries.

COMMENTS

1. All DOE LNG export studies say exports increase natural gas prices.

The DOE released a study entitled, "Macroeconomic Outcomes of Market Determined Levels of U.S. LNG Exports"[1] which illustrates that LNG exports would substantially increase U.S. natural prices. On page 54 of the study it states that "for all the reference supply scenarios in the more likely range, natural gas prices could be from $5.00 to $6.50 per MMBtu in 2040. These mid-range scenarios have a combined probability of 47%." This is the highest probability the study gave any scenario. Since the Henry Hub price has most often been at roughly $3.00 MMBtu, the study confirms that natural gas prices could more than double causing domestic natural gas prices to rise to a level which would harm natural gas-dependent manufacturers and every homeowner. Consumers do not have an alternative. This is clearly not in the public interest.

The DOE released an earlier study in 2015 entitled, "The Macroeconomic Impact of Increasing LNG Exports"[2] and it provides the same conclusions, but also explains that the price of goods will rise and that the manufacturing sector will be damaged, along with competitiveness and the trade balance. On page 24 it states, "Henry Hub prices are higher than they would otherwise be as U.S. LNG exports increase because producers increasingly exploit reserves with higher extraction costs. Higher natural gas prices will erode consumers' purchasing power both directly and indirectly as the impact of higher domestic natural gas prices filters through the supply chains of other sectors causing the prices of other goods and services to rise. This will negatively

[1] "Macroeconomic Outcomes of Market Determined Levels of U.S. LNG Export," U.S. Department of Energy (DOE), June 7, 2018, https://www.energy.gov/sites/prod/files/2018/06/f52/Macroeconomic%20LNG%20Export%20Study%202018.pdf.

[2] "The Macroeconomic Impact of Increasing LNG Exports," U.S. Department of Energy, October 29, 2015, https://www.energy.gov/fe/downloads/lng-export-studies

impact consumption with the energy intensive sectors being most affected. Changes in relative natural gas prices across countries will impact U.S. competitiveness. If energy prices in the United States rise relative to energy prices in the rest of the world, this raises production costs for U.S. firms relative to international competitors. This erosion in U.S. competitiveness will weigh on the U.S. trade balance. The tradable energy intensive sectors such as chemicals and steel will generally be most exposed to shifts in industrial competitiveness."

LNG exports also increase price volatility. In a recent Forbes article it states, "Truth be told, however, while U.S. gas prices have been their most volatile in around a decade over the past 10 weeks, more and more LNG exports to meet growing needs abroad would mean more ups and downs in domestic prices. We know that as the most bullish domestic demand factor, U.S. LNG exports will put a floor under our own market. LNG exports will increasingly become a baseload demand market and are not going to be easy to simply shut off if our own prices rise."[3]

In May 2018, the Commodity Futures Trading Commission (CFTC) released a report entitled, "Liquefied Natural Gas Developments and Market Impacts."[4] The report states, "Given the magnitude of U.S. exports, there is also the potential that domestic natural gas markets could become subject to global supply-demand dynamics with the potential for increased volatility." The report concludes that, "U.S. LNG export growth may put upward pressure on domestic (U.S.) natural gas prices and expose a heretofore relatively isolated North American market to global market dynamics."

2. **The DOE has already approved volumes for export that are not in the public interest and plan to approve volumes equal to 52.8 billion cubic feet per day (Bcf/d). A volume equal to 71 percent of U.S. 2017 demand. The DOE has decided to let foreign countries determine the level of exports rather than limit export volumes that provide domestic consumers a safety net.**

The DOE has already approved LNG export volumes equal to 30 percent of 2017 U.S. demand for shipment to NFTA countries, and volumes equal to 75 percent of 2017 U.S. demand to FTA countries, for periods of 20 to 30 years. NFTA countries are the largest global LNG consumers. Importantly, the DOE will consider the approval of 13 other applications to export in 2019.

Why markets should not be used to justify levels of specific LNG export applications volumes of LNG exports is illustrated with U.S. crude oil and gasoline prices. In the first half of 2018, because the U.S. crude oil price was connected to the global market, U.S. gasoline prices rose to the highest levels in over four years. Global demand from other countries dictated demand and price versus the U.S. supply and demand. The net result is that the U.S. consumer was NOT benefiting from our vast crude oil resources. This can and will happen to natural gas if our low natural gas prices are connected to the high price of global LNG markets. Today's low prices of

[3] "U.S. Liquefied Natural Gas Hits Record Highs Again," Forbes, January 6, 2019, https://www.forbes.com/sites/judeclemente/2019/01/06/u-s-liquefied-natural-gas-hits-record-highs-again/#39f174a8141e

[4] "Liquefied Natural Gas Developments and Markets," U.S. Commodity Futures Trading Commission, https://www.cftc.gov/sites/default/files/2018-05/CFTC_LNG0518_3.pdf

natural gas are attributable to the fact that prices are determined by domestic supply and demand, not the global market.

This threat is not merely hypothetical, it happened in Australia. The Australian example shows that using markets to determine levels of LNG exports is not in the public interest. They are at least ten years ahead of the U.S. in exporting LNG. Australia has vast natural gas resources. Historically, the consumer prices have been around $3.00 MMBtu. Now, because of LNG exports, the Australian consumer pays the Asian LNG netback price. This means that the Australian consumer pays the high Asian LNG price, less transportation and liquefaction costs, which has resulted in Australian domestic consumer prices at $8, $9 and $10 MMBtu.

The Australian Competition and Consumer Commission started publication of LNG netback prices in order to boost price transparency.[5] The Australian consumer netback prices have increased from 7.27 Gj in 2017 to 10.69 Gj YTD 2018, a 47 percent increase. In approving LNG export terminals, the Australian government let markets determine the volume of exports, which has now directly caused disastrous impacts to consumers and the manufacturing sector as jobs continue to decrease.

3. The DOE has never defined public interest under the NGA. All DOE studies confirm that LNG exports create winners and losers. The winners are the producers and exporters of natural gas. The losers are consumers and the economy.

Congress raised the concern of exporting to NFTA countries in the NGA and delegated the responsibility of addressing LNG export applications to the DOE. Pursuant to section 3 of the NGA 15 U.S.C. 717b exports of natural gas, including LNG, must be authorized by the DOE. Under NGA section 3(a) 15 U.S.C. 717b(a) applications that seek authority to export natural gas to NFTA countries are presumed to be in the public interest unless, after opportunity for hearing, the DOE finds that the authorization would not be consistent with the public interest.

The problem is that DOE has never defined public interest according to the Government Accountability Office report of September 2014.[6] Despite the request of the Industrial Energy Consumers of America (IECA)[7], a trade association that represents manufacturing companies in Washington, DC, the DOE has refused to do so. Instead, the DOE has conducted studies that conclude that exports create net economic benefits for the U.S and have approved every application to export.

On June 21, 2018 it states in the Federal Register, "In granting each application, DOE concluded that exports of U.S. LNG will generate net economic benefits to the broader U.S. economy and will provide energy security and environmental benefits to the global community (including emerging economies presently reliant upon more carbon intensive fuels).[8]" As consumers, we

[5] Australian Competition and Consumer Commission, October 2018,, https://www.lngworldnews.com/australian-watchdog-starts-lng-netback-price-publication/?utm_source=emark&utm_medium=email&utm_campaign=daily-update-lng-world-news-2018-10-05&uid=55872

[6] "Federal Approval Process for Liquefied Natural Gas Exports," U.S. Government Accountability Office (GAO), September 2014

[7] Industrial Energy Consumers of America homepage, www.ieca-us.org

[8] Federal Register/Vol. 83 No. 120/Thursday, June 21, 2018, page 28843

completely reject this definition. Instead, we support a Supreme Court definition of public interest. We believe that Congress had intended the public interest to be about the welfare of consumers (people) of natural gas.

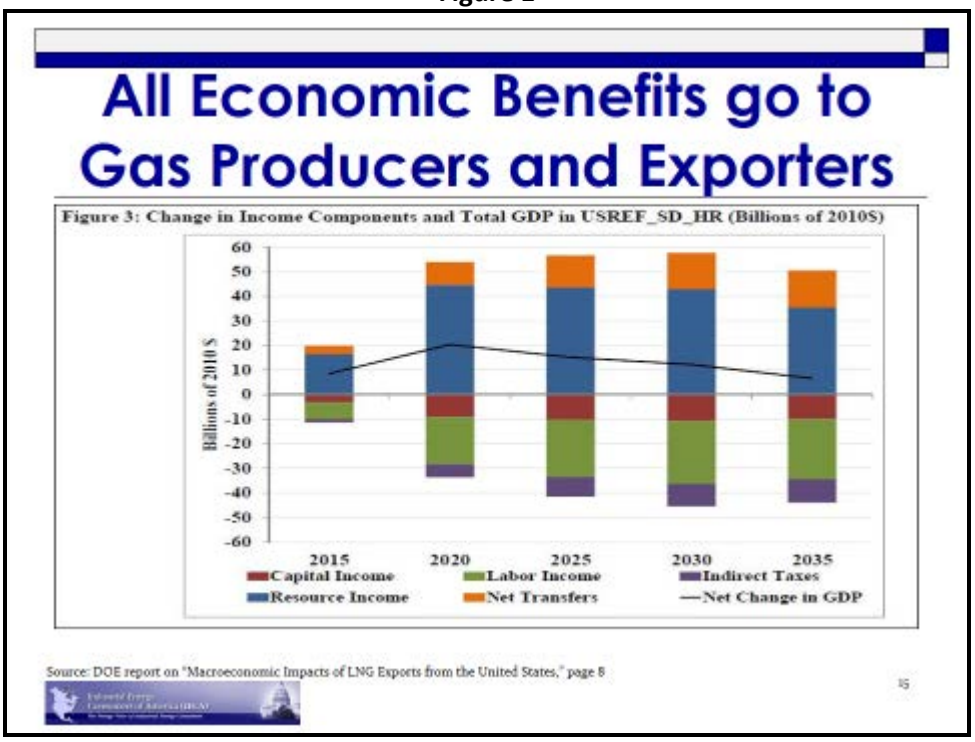
The U.S. Supreme Court has stated that "in order to give content and meaning to the words 'public interest' as used in the Federal Power and Natural Gas Acts, it is necessary to look to the purposes for which the Acts were adopted. In the case of the Power and Gas Acts it is clear that the principal purpose of those Acts was to encourage the orderly development of plentiful supplies of electricity and natural gas at reasonable prices."[9] Furthermore, the Supreme Court also stated that the "primary aim" of the NGA is "to protect consumers against exploitation at the hands of natural gas companies."[10]

To this point, in 2012, the DOE released a report entitled "Macroeconomic Impacts of LNG Exports from the United States."[11]. The report illustrates how natural gas companies exploit U.S. consumers by exporting LNG. Figure 1 below is from page 8 of the report. You will note that the only entities that benefit from LNG exports are a small sliver of the U.S. economy, namely producers and exporters of natural gas, while everyone else, while 323 million citizens are negatively impacted.

Page 7 of the report states that, "Expansion of LNG exports has two major effects on income: it raises energy costs and, in the process, depresses both real wages and the return on capital in all other industries." Please also note that for volumes of 12 Bcf/d of LNG exports, it only contributes $20 billion to the economy in 2020 and decreases each year thereafter, while the negative impacts to consumers increases through 2030 before it levels off.

[9] NAACP v. Fed. Power Comm'n, 425 U.S. 662, 669-70 (1976).
[10] FPC v. Hope Gas Co., 320 U. S. 591, 610 (1944).
[11] "Macroeconomic Impacts of LNG Exports from the United States," U.S. Department of Energy, December 3, 2012, https://www.energy.gov/sites/prod/files/2013/04/f0/nera_lng_report.pdf.

Figure 1



The vast majority of LNG is consumed by countries that do not have a free trade agreement with the U.S. It is inconsistent with the public interest to export LNG to NFTA countries.

Most U.S. shipped LNG is purchased by countries with which the U.S. does not have an FTA. From February 2016 to September 2018, 50.1 percent of U.S. LNG was shipped to NFTA countries.[12] These are countries that discriminate against U.S. manufacturing and farm products. Yet, we are shipping them a non-renewable vital resource for which every American consumer does not have an alternative. And, the DOE LNG export studies make clear that exporting LNG lowers the price of natural gas, especially to Asian countries. Page 8 of the 2015 DOE LNG report it states, "In every case, greater LNG exports raise domestic prices and lower prices internationally. The majority of the price movement (in absolute terms) occurs in Asia." Page 8 of this study also states that LNG exports creates declines in manufacturing and especially in energy-intensive industries, such as: chemicals, plastics, steel, aluminum, paper, refining, glass, cement, and food processing.

4. DOE's approval of LNG exports for 20 to 30 years is a firm legal commitment to foreign countries LNG buyers. Where is the commitment to protect U.S. consumers?

The Federal Register states, "As a preliminary matter, DOE/FE wishes to allay concerns about the security of existing (or future) non-FTA export authorizations. In this policy statement, DOE/FE affirms its commitment to all export authorizations issued under the NGA, including long-term authorizations approving the export of LNG to non-FTA countries. As indicated above, DOE/FE

[12] "LNG Reports," U.S. Department of Energy, https://www.energy.gov/fe/listings/lng-reports.

currently has issued 29 final non-FTA export authorizations, based on a thorough consideration of the public interest under section 3(a) of the NGA."[13]

> "However, DOE does not foresee a scenario where it would rescind one or more non-FTA authorizations. The United States government takes very seriously the investment-backed expectations of private parties subject to its regulatory jurisdiction. In particular, DOE understands the far-ranging economic investments and natural gas supply commitments associated with these authorizations over their full term—affecting both U.S. and global interests. DOE emphasizes that it remains committed to the durability and stability of the export authorizations it has granted under the NGA, as well as to supporting the approved export of U.S. natural gas around the world.[14]"

5. The international LNG market is not a free market. It is for this reason that it is sound public policy to place limits on export volumes to levels that assure LNG exports will not increase domestic prices or impact reliability.

Government limitations to LNG exports is in the public interest because natural gas is a non-renewable resource, U.S. consumers do not have an alternative, and the LNG market is not a free market. The LNG market buyers are countries – not companies or consumers (homeowners, farmers, businesses). The entities buying LNG are government backed state-owned enterprises (SOEs) and utilities who have automatic cost pass-through. Because they are countries, their responsibility is to ensure that sufficient supplies are purchased to keep the lights on at home and factories running. What this means is that, if necessary, they will pay any price, no matter how high, to supply their country's needs. In the future times when there are limits to supply capacity, this could pit countries against the U.S. consumer. Many countries who buy LNG also subsidize their manufacturing sector by not passing through the real costs of the purchased LNG, and regulate the price.

In December 2018, LNG World News report stated, "The major LNG buyers – CNOOC, CPC, JERA, KOGAS, PetroChina, Sinopec and Tokyo Gas – together account for more than 50 percent of the global LNG market."[15] Four out of six are Chinese SOEs.

> CNOOC (China National Offshore Oil Corporation, or CNOOC Group, is a major national oil company in China. It is the third-largest national oil company in the People's Republic of China, after CNPC and China Petrochemical Corporation.)
>
> CPC (China Petrochemical Corporation or Sinopec Group is the world's largest oil refining, gas and petrochemical conglomerate, administered by SASAC for the State Council of the People's Republic of China.)

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[13] FPC v. Hope Gas Co., 320 U. S. 591, 610 (1944).
[14] Federal Register/Vol. 83 No. 120/Thursday, June 21, 2018, page 28843
[15] "WoodMac: uncontracted demand by world's seven largest LNG buyers to quadruple," LNG World News, December 13, 2018, https://www.lngworldnews.com/woodmac-uncontracted-demand-by-worlds-seven-largest-lng-buyers-to-quadruple/?utm_source=emark&utm_medium=email&utm_campaign=daily-update-lng-world-news-2018-12-14&uid=55872

JERA (JERA Co., Inc.; Parent organizations: Tokyo Electric Power Company, Chubu Electric Power)

KOGAS (Korea Gas Corporation is a South Korean public natural gas company that was established by the Korean government in 1983. KOGAS has grown into the largest LNG-importing company in the world and operates four LNG regasification terminals and natural gas pipelines in South Korea.

PetroChina (PetroChina Company Limited is a Chinese oil and gas company and is the listed arm of state-owned China National Petroleum Corporation. It is China's second biggest oil producer.

Sinopec (China Petroleum & Chemical Corporation, or Sinopec, is a Chinese oil and gas enterprise based in Beijing, China.

Tokyo Gas (Tokyo Gas Co., Ltd., founded in 1885, is the primary provider of natural gas to the main cities of Tokyo, Kanagawa, Saitama, Chiba, Ibaraki, Tochigi, Gunma, Yamanashi, and Nagano. As of 2012, Tokyo Gas is the largest natural gas utility in Japan.)

6. DOE has not addressed vital short- and long-term risks to consumers and the economy that are core issues in considering whether an LNG export application is consistent with the public interest.

a. Failure to consider pipeline and storage capacity risks for existing and future constraints (and at peak demand), and their cost and reliability impacts.

The DOE, nor the Federal Energy Regulatory Commission (FERC), has completed a study to consider existing and future limitations in natural gas pipeline and storage infrastructure capacity and maximum deliverability capacity needed to supply the U.S. market at peak demand and export LNG. Peak demand occurs in winter and summer months. All of the DOE LNG export studies used to justify approval of LNG applications to export assume that pipeline and storage capacity will be adequate, despite the fact that constraints already exist and the ability to build-out new pipeline capacity is threatened by multiple legal and public opposition headwinds.

The question of whether there is adequate pipeline capacity at peak demand is extremely important because the majority of LNG export buying countries are located in the Northern Hemisphere. This means that they have winter when we do. Their highest demand for buying U.S. LNG is when U.S. consumers have peak demand. The largest LNG importing countries are China, South Korea, Japan, and the EU.

LNG exports reduce the availability of pipeline capacity to domestic consumers. As more and more LNG export terminals are operational, the pipeline capacity used to feed these terminals are no longer available to U.S. consumer. And, there is evidence that LNG export terminals that need bank financing to construct the export terminal are required to have firm natural gas pipeline capacity available at all times to load the LNG export ships. If this is true, it means that these companies are not releasing their firm pipeline capacity to the market when they do not need it, thereby reducing the availability of pipeline capacity to U.S. consumers.

There are recent past winters where, for example, natural gas-fired power generation units and manufacturing companies have been unable to get the gas they need to operate due to pipeline capacity limitations. For power generators, this creates a reliability issue for electric consumers. For manufacturing, cutting back or shutting down can cost tens of millions of dollars per day per facility. LNG exports can compound these events.

b. Failure to consider resulting higher marginal prices for natural gas and electricity consumers.

The DOE LNG export studies used to justify approval of LNG export applications never considered its impact on the marginal price of natural gas and electricity. This is important any time of the year, but especially at peak summer and winter demand periods. The net effect of not doing so results in lower forecasted prices under macroeconomic LNG export scenarios.

c. Failure to address cumulative demand versus availability of natural gas resources.

In March 2018, IECA released a report which compares the U.S. Energy Information Administration's (EIA) AEO 2018 cumulative demand through 2050 to EIA's estimates of technically recoverable natural gas resources in the lower 48. Doing so illustrates that this demand would consume 69 percent of all resources. And, EIA has LNG exports peaking at only 14.5 Bcf/d. A very conservative forecast. While over time resources have been increasing, forecasted demand is outstripping new resources growth. IECA did the same analysis using EIA AEO 2017 demand. That analysis concluded that 57 percent of all resources would be consumed. We anticipate that AEO 2019 will show substantially higher and faster consumption of available resources.

d. Failure to consider the uncertain nature of technically recoverable natural gas resources.

It is also important to keep in mind that *technically available* resources do not mean that they are *economical* to produce. To this point, the natural gas industry's Potential Gas Committee's most recent report of July 2017[16] states that 58 percent of all natural gas resources are classified as either possible (new fields) or speculative (frontier fields), which adds more uncertainty that these resources may not produce low-cost natural gas. All DOE LNG export reports assume that this natural gas is economical to produce when no one really knows because no one has ever drilled a well in these new fields or frontier fields.

e. Failure to consider future political decisions such as limit to acreage available for drilling, regulations on water or hydraulic fracturing that could increase costs that must be recovered in higher prices of natural gas, thereby increasing consumer risk.

We have Presidential elections every four years that can change everything. As we have seen with some past Administrations, there were regulatory actions to limit access to federal lands for drilling and regulations to control drilling processes that increase the cost of production. A

[16] "Potential Supply of Natural Gas in the United States," Potential Gas Committee, December 31, 2016, http://pttc.mines.edu/PGC_Press_Conference_2017_07-19-2017_Final.pdf

new Administration could inflict all of these and more thereby increasing natural gas costs and prices. States have and will continue to take action to limit drilling. The DOE report used to justify LNG export applications do not consider these risks to consumers.

f. Failure to consider that the majority of producers of natural gas do not have a positive cash flow business which means prices have to go up.

In September 2018, the New York Times released a story entitled, "The Next Financial Crisis Lurks Underground." It states that the fracking industry is on shaky financial ground and have not proved they can make money. The 60 biggest exploration and production firms are not generating enough cash from their operations to cover their operating and capital expenses. In aggregate, from mid-2012 to mid-2017, they had negative free cash flow of $9 billion per quarter."[17] This is not sustainable long-term. Wall Street is concerned about the indebtedness of producers. Investors demand certain ROE's to continue to invest or lend money for drilling more wells. The fact that interest rates are also increasing puts further pressure on costs. Combined, this means that the price of natural gas must rise. DOE LNG studies do not address this fundamental issue.

g. Failure to consider that gas producing companies are consistently overestimating well production, which leads to higher natural gas resources estimates than are available for the future.

In January 2019, the Wall Street Journal released a story entitled, "Fracking's Secret Problem—Oil Wells Aren't Producing as Much as Forecast."[18] The story is equally telling because it provides hard facts that data analysis reveals thousands of locations are yielding less than their owners projected to investors, illusory picture of prospects. And, well production rates are used to forecast resource estimates used by the EIA and all others.

Thousands of shale wells drilled in the last five years are pumping less oil and gas than their owners forecast to investors, raising questions about the strength and profitability of the fracking boom that turned the U.S. into an oil superpower.

The Wall Street Journal compared the well-productivity estimates that top shale-oil companies gave investors to projections from third parties about how much oil and gas the wells are now on track to pump over their lives, based on public data of how they have performed to date.

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[17] The Next Financial Crisis Lurks Underground, New York Times, September 1, 2018 https://www.nytimes.com/2018/09/01/opinion/the-next-financial-crisis-lurks-underground.html

[18] "Fracking's Secret Problem—Oil Wells Aren't Producing as Much as Forecast," Wall Street Journal, January 2, 2019, https://www.wsj.com/articles/frackings-secret-problemoil-wells-arent-producing-as-much-as-forecast-11546450162?emailToken=a83066aebe513ddd3dbf2884e46f03a2E51ZQs+dQXSXmYA/3dmjTGk92FGXvXm7YSvOKXP+yQkyys4Bhn0BJxZ8FcuVVg7cHl/sdfXzOdkDxa15Bqz5JNUhgx2GNxFLBsdMnCWf2IPz1zknNveMW3XGN8lad2VngvgXbxw79Pc8iAaMMoHQTQ%3D%3D&reflink=article_email_share

> "Two-thirds of projections made by the fracking companies between 2014 and 2017 in America's four hottest drilling regions appear to have been overly optimistic, according to the analysis of some 16,000 wells operated by 29 of the biggest producers in oil basins in Texas and North Dakota.
>
> "Collectively, the companies that made projections are on track to pump nearly 10% less oil and gas than they forecast for those areas, according to the analysis of data from Rystad Energy AS, an energy consulting firm. That is the equivalent of almost one billion barrels of oil and gas over 30 years, worth more than $30 billion at current prices. Some companies are off track by more than 50% in certain regions.
>
> "There are a number of practices that are almost inevitably going to lead to overestimates."

h. Failure to consider that foreign consumers of U.S. LNG exports are receiving the benefits of using our infrastructure that is paid for by U.S. consumers, without paying for it. Their use of this infrastructure increases our costs.

LNG exports use of U.S. infrastructure increasing the costs to all U.S. consumers. DOE has failed to consider these costs nor is this in the public interest.

7. The United States Trade and Development Agency (USTDA) is using federal tax dollars (or taxpayer money) to fund and promote LNG exports to importing countries.

We urge your support to stop the use of federal tax dollars to promote the export/import of U.S. LNG by the USTDA. This is corporate welfare and certainly not in the public interest. According to a news story entitled, "When it Comes to Natural Gas, US 'Open for Business"[19] the USTDA has funded 13 projects in 20-plus countries.

According to the story, USTDA has received more than 40 gas-related proposals this year, including a floating gas processing unit on China's east coast facility. Other spending included help to supply LNG to Morocco, Spain and Portugal, a gas-fired power plant in Egypt, and gas terminals in Honduras and Romania. If it is in the interest of those countries to import LNG, they should be willing and able to fund their own efforts.

In November of 2017, the USTDA, oil and natural gas industries, LNG export industries, and the U.S. Chamber of Commerce launched the "U.S. Infrastructure Exports Initiative."[20] We mention this only to reinforce the extremely high level of momentum behind the push to export unlimited volumes of LNG globally for which U.S. consumers are unaware and unprotected.

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[19] When I Comes to Natural Gas, US 'Open for Business', December 12, 2018, Associated Press, https://www.usnews.com/news/best-states/texas/articles/2018-12-12/when-it-comes-to-natural-gas-us-open-for-business

[20] "USTDA and U.S. Industry Launch U.S. Gas Infrastructure Exports Initiative," USTDA, November 17, 2017, https://ustda.gov/print/1501; "U.S. Gas Infrastructure Exports Initiative," https://www.ustda.gov/program/us-gas-infrastructure-exports-initiative; "General Funding Request Guidelines," https://www.ustda.gov/sites/default/files/Gas%20Proposal%20Guidelines.pdf

For all of the above reasons, we urge you to urgently act to protect the interest of the public and our economy. It is the shale gas revolution that has created the manufacturing renaissance. And, we are about to ship away our economic advantage to other countries.

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The Industrial Energy Consumers of America is a nonpartisan association of leading manufacturing companies with $1.0 trillion in annual sales, over 3,700 facilities nationwide, and with more than 1.7 million employees worldwide. It is an organization created to promote the interests of manufacturing companies through advocacy and collaboration for which the availability, use and cost of energy, power or feedstock play a significant role in their ability to compete in domestic and world markets. IECA membership represents a diverse set of industries including: chemicals, plastics, steel, iron ore, aluminum, paper, food processing, fertilizer, insulation, glass, industrial gases, pharmaceutical, building products, automotive, brewing, independent oil refining, and cement.

Exhibit 29

Limitations of the Haynes Inlet sediment transport study

by

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Nov. 13, 2011

Limitations of the Haynes Inlet sediment transport study presented in Exhibit 4:

Chapters 10 and 11 of Exhibit 4 (entitled Jordan Cove Energy Project and Pacific Connector Gas Pipeline - Volume 2) present sediment transport calculations which purport to show that sediment transport impacts of the proposed dredging project in Haynes Inlet would have minimal impacts. However, close scrutiny of Exhibit 4 shows that there are serious deficiencies in the methodology employed in the sediment transport modeling. Consequently, the finding that there would only be limited impacts is lacking a solid foundation. The most serious flaws are outlined below:

1. Use of un-validated sediment transport model to establish background conditions

According to the Department of Environmental Quality, an "impacted" area is one that suffers a dredging-related turbidity level that is 10% or greater than background. Establishing background conditions is therefore a critical part of the process of defining impacted areas. The authors of the sediment transport study indicated that little data on ambient suspended sediment concentrations was available. The limited data available near the dredging site was collected in summer time whereas the dredging would occur in the fall and winter. As a consequence, the authors decided to use a model to establish background conditions. However, the model used was not validated with measurements from the study site.

Use of an un-validated sediment transport model to establish background conditions leads one to question the reliability of the project's findings. Using turbidity calculations generated by an un-validated model to establish background conditions is not reliable since sediment transport models are notoriously inaccurate especially when they have not been calibrated with data. Figure 1 (below) compares measured and modeled sediment transport (including bedload and

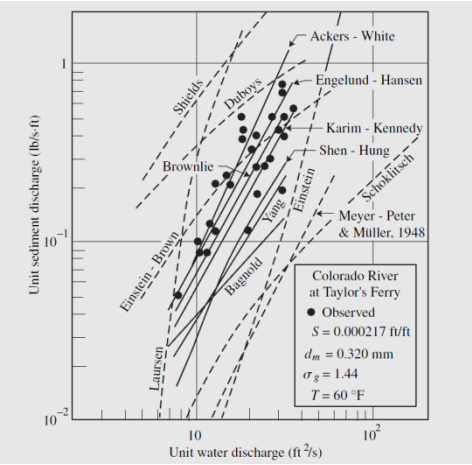

Figure 1. Plot comparing measured and calculated sediment discharge in the Colorado River as a function of water flow rate. The dashed and solid lines are calculated with various sediment transport models and the dots are measurements. The figure is from Erosion and Sedimentation, 2nd Edition, by Prof. Julien, Univ. of Colorado.

suspended sediment transport). It demonstrates the unreliable nature of sediment transport equations and models. If the authors of the Haynes Inlet sediment transport study are intent on using a model to establish ambient conditions, they should use the available data to validate their model. Model validation is a key part of peer-reviewed science and engineering work.

Use of an un-validated sediment transport model could result in an over-estimate of the background turbidity or suspended sediment concentration. This, in turn, would lead to an underestimate of the area impacted by the dredging project. For example, suppose the model calculated the background suspended sediment concentration to be 500 mg/liter (500 milligrams/liter), whereas the actual background concentration was 100 mg/liter. Based on the modeled result, the dredging-derived suspension could be as high as 50 mg/liter (10% of background) before the area was designated as impacted. However, based on the actual background condition, areas seeing dredging-derived suspension greater than 10 mg/liter should be defined as impacted. Using the actual background would clearly lead to an increase in the area that was designated as being "impacted". We can estimate the increase by extrapolating from Figure 10-5 of Exhibit 4 (reproduced below). Use of the true threshold (10 mg/liter or 2% on the y axis of Figure 10-5) would cause the linear extent of the impacted area to increase from about 350 ft to about 600 ft (for a 4 ft/s current).

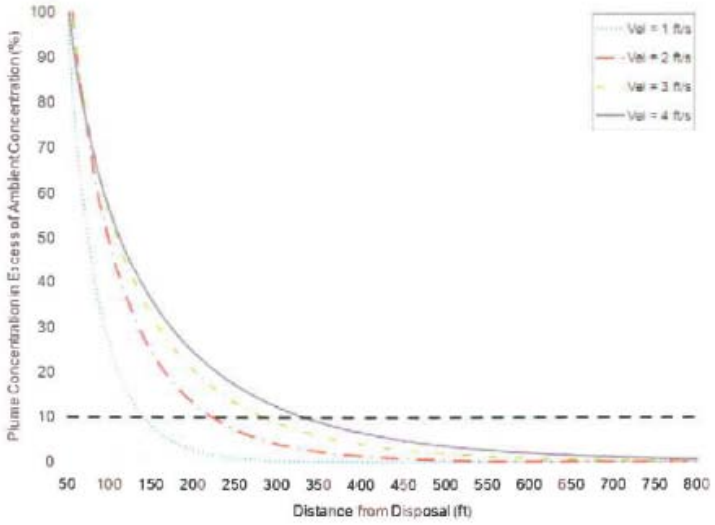

Figure 10-5. Suspended sediment concentration in excess of ambient concentration from numerical modeling results of trench stockpile placement activities in Haynes Inlet

Figure 2. Reproduction of Figure 10-5 of Exhibit 4.

2. Assumption of spatially uniform sediment size despite data indicating significant heterogeneity.

The authors of the Haynes Inlet sediment transport study conduct their modeling of background conditions and their modeling of dredging-related releases of sediment assuming that the sediment grain size is uniform throughout the study area (grain size is assumed to be 0.27 mm). However, the sediment characterization study conducted by GeoEngineers (August 2010) indicates that the sediments are significantly finer than this in large portions of the study area. GeoEngineers examined composite samples from three sections of the proposed pipeline route (DWWU-1, DWWU-2, DWWU-3, Figure 3). They found that, in section DWWU-1, the majority of the sediments were in the silt/clay size range with an overall median grain size of 0.04 to 0.05 mm (Figure 4, below).

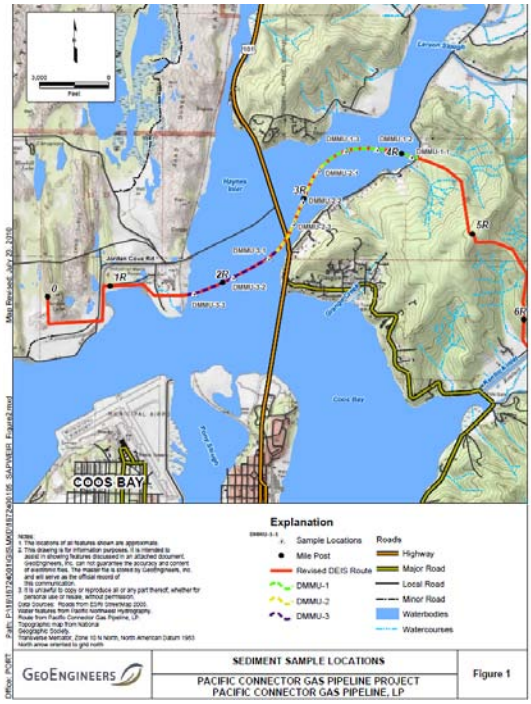

Figure 3. Map of sections of the pipeline (DWWU-1, DWWU-2, DWWU-3) from Figure 1 of the sediment characterization study of GeoEngineers.

TABLE B-1

GRAIN SIZE ANALYSIS

PACIFIC CONNECTOR GAS PIPELINE PROJECT

HAYNES INLET, OREGON

Sample Identification	Sample Depth (ft)	Percent (%)		
		Gravel	Sand	Silt/Clay
In-Place Sediment Samples				
DMMU-1-Composite	0-9	1.2	48.4	50.4
DMMU-2-Composite	0-9	0.0	67.0	33.0
DMMU-3-Composite	0-9	0.7	86.2	13.1

W:\Boise\Projects\16\16724001\05\Finals\Sediment Characterization\[16724-001-05Tables.xlsx]B-1

Figure 4. Grain size data in the various sections of the pipeline from Table B-1 of the GeoEngineers Sediment Characterization Study.

The implications of assuming a uniform grain size when in fact the grain size is spatially variable are two-fold. First, the calculation of the background turbidity distribution at the study site would be inaccurate if the wrong grain size is assumed (even if the model itself was accurate). This is because sediment transport calculations are very sensitive to grain size. To illustrate this point, the average suspended sediment concentration was estimated for three different grain sizes (0.27, 0.10, and 0.05 mm) for a particular hydraulic condition (velocity = 3.3 ft/sec, depth = 10 ft, T = 50 F), similar to that assumed in Exhibit 4. The results are summarized in Table 1 below. Sediments of grain size 0.27 and 0.10 mm were considered to be non-cohesive. Suspended sediment concentrations were estimated based on the Einstein method (Julien 2010). In this approach, a near-bottom reference concentration is estimated based on a bedload transport calculation, and the Rouse Equation is used to determine the vertical distribution of suspended sediment. For the 0.05 mm sediment, a different calculation technique was used since the sediment would likely be cohesive. With cohesive sediment, resistance to motion is controlled by inter-particle forces instead of gravitational forces. The technique of Lavelle et al. (1984) of estimating a near-bottom reference concentration based on the sediment erosion rate and fall velocity was employed. Sediment erosion rate was estimated based on a linear erosion rate model in which erosion rate constant of 0.0032 kg m^{-2} s^{-1} Pa^{-1} was assumed (following Ravens and Gschwend 1999).

Grain size (mm)	Critical shear stress	Sediment fall velocity	Average suspended sediment concentration
[mm]	[Pa]	[mm/s]	[mg/liter]
0.27	0.2	30	10
0.10	0.1	9	3000
0.05	0.1	2	200

Table 1. Estimated suspended sediment concentrations for different grain sizes assuming an average velocity of 3.3 ft/sec and a depth of 10 ft.

The second implication of assuming the wrong grain size is that the modeling of the dredging-derived turbidity would be inaccurate. The time a given dredging-derived turbidity plume is suspended can be estimated based on the ratio of depth over the fall velocity. The fall velocity for 0.27 mm and 0.05 mm sediments is about 30 mm/s and 2 mm/s, respectively. Consequently, the finer sediment would be suspended for about 15 times as long and would be dispersed over 15 times the distance.

References:

Julien, P. Y. 2010. Erosion and Sedimentation, 2nd edition, Cambridge University Press.

Lavelle, J. W., Mofjeld, H. O., and Baker, E. T. (1984). ‘‘An in situ erosion rate for a fine-grained marine sediment.’’ *J. Geophys. Res.*, 89(C4): 6543–6552.

Ravens, T. M. and P.M. Gschwend. 1999. “Flume Measurements of Sediment Erodibility in Boston Harbor.” *J. of Hydraulic Engineering*. 125(10): 998-1005.

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Oct. 14, 2011

Andrew Stamp
Hearings Officer
c/o Coos County Planning Department
225 N. Adams Street
Coquille, Oregon 97423

At the request of Mark Chernaik, expert for Citizens Against LNG, I was asked to answer the following questions relating to the modeling of sedimentation impacts of pipeline construction in Haynes Inlet.

Q1. Could you describe your qualifications for answering the following questions? How many years have you studied hydrodynamic modeling of sedimentation that results from dredging activities? What peer-reviewed scientific publications on hydrodynamic modeling of sedimentation have you authored?

I have been modeling hydrodynamics and sediment transport in estuarine environments for 18 years. Some of the work that I have done tangentially addressed sediment transport impacts of dredging. My peer-review scientific publications that address hydrodynamics and sediment transport in coastal environments include:

Ravens, T., Jones B. M., Zhang, J., Arp, C. D., and J. A. Schmutz. Process-Based Coastal Erosion Modeling for Drew Point (North Slope, Alaska). *J. of Waterway, Port, Coastal, and Ocean Engineering* (in press).

Ravens, T. M., Thomas, R. C., Roberts, K. A., and P. H. Santschi. 2009. Causes of Salt Marsh Erosion in Galveston Bay, Texas. *J. of Coastal Research,* 25(2): 265-272.

Ravens, T. M. and M. Sindelar. 2008. Flume Test Section Length and Sediment Erodibility. *J. of Hydraulic Engineering*, 134(10): 1503-1506.

Rogers, A. and T. M. Ravens. 2008. Measurement of longshore sediment transport rates in the surf zone on Galveston Island, Texas. *J. of Coastal Research, 24(2): 62-73.*

Ravens, T. M. and R. C. Thomas. 2008. Ship wave-induced sedimentation of a tidal creek in Galveston Bay. *J. of Waterway, Port, Coastal, and Ocean Engineering.* 134(1): 21-29.

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Ravens, T. M., and K. I. Sitanggang. 2007. Numerical modeling and analysis of shoreline change on Galveston Island. *J. of Coastal Research*, 23(3): 699-710.

Ravens, T. M. 2007. Comparison of two techniques to measure sediment erodibility in the Fox River, Wisconsin. *J. of Hydraulic Engineering*, 133(1): 111-115.

Ravens, T. M., and R. A. Jepsen. 2006. CFD analysis of flow in a straight flume for sediment erodibility testing. *J. of Waterway, Port, Coastal, and Ocean Engineering*, 132(6): 457-461.

Ravens, T. M., and P. M. Gschwend. 1999. Flume measurements of sediment erodibility in Boston Harbor. *J. Hydraulic Engineering* 125(10): 998-1005.

Ravens, T. M., Madsen, O. S., Signell, R. P., Adams, E. E., and P. M. Gschwend. 1998. Hydrodynamic forcing and sediment quality in Boston Harbor. *Journal of Waterway, Port, Coastal, and Ocean Engineering.* 124(1): 40-42.

I would also point out that I am a regular reviewer of peer-reviewed Journals that address hydrodynamics and sediment transport including ASCE's Journal of Hydraulic Engineering, ASCE's Journal of Waterway, Port, Coastal and Ocean Engineering, Limnology and Oceanography, etc.

I earned my Ph.D. in Civil and Environmental Engineering from MIT. I have been tenured and promoted at both Texas A&M University and the University of Alaska.

Q2. What documents have you examined about the hydrodynamic modeling of sedimentation related to dredging in Haynes Inlet in Coos Bay?

1. Haynes Inlet – Trenched Sediment Transport and Sedimentation, dated 2011-09-21

2. Letter from Vladimir Shepsis, dated 2011-10-10

3. Report of Mark Chernaik, dated 2011-10-10 (see last section)

Q3. Could you please describe what "source terms" are in hydrodynamic modeling of sedimentation? Why would the disclosure of these source terms be indispensable for evaluating the validity of predictions from hydrodynamic models of dredging impacts?

Dredging and trenching operations are notorious for generating unwanted suspended sediment concentrations and deposition. For example, the recent dredging of PCB-contaminated sediments from the Hudson River has released a huge amount of sediments and contaminants. The EPA estimates that 440 kg of PCB's (largely born by sediments) was released (see the

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Executive Summary of the EPA Phase 1 Evaluation Report, March 12 2010). Sediment transport modeling of dredging operations should generally include a sediment production term that accounts for the introduction of suspended sediment into the water column. Data such as that cited in the report by Mark Chernaik (Exhibit 7) – showing the mass rate of sediment introduction due to clam shell dredging – should be used to assess the sediment transport impacts of dredging operations. However, a close reading of the statement provided by Vladimir Shepsis indicates that such an accounting of the particle generation of the dredging operation was not undertaken.

Vladimir Shepsis states:

My analysis is limited to the question of whether flow velocities resulting from pipeline construction will cause an increase in suspended sediment concentration and deposition of sediments in Haynes Inlet.

Thus, his analysis does not address the fate and transport of particles generated by the dredging project. His modeling only calculates the changed velocities that would result following dredged material placement and the increase in suspended sediment transport due to the changed velocity and – presumably - the changed bottom morphology. Again, there is no explicit accounting of suspended particles generated by the dredging and placement operation.

Although his statements are ambiguous[a], Vladimir Shepsis implies that more particles are generated **following** placement of dredged materials than during the dredging and placement process. If this is true, it is not common knowledge among sediment transport specialists. He should provide data or references to back up this assertion.

In addition to the issues raised above, it is important to point out that the statement provided by Vladimir Shepsis does not provide sufficient information to enable a full review of his sediment transport assessment. The statement provides little or no data on the character of the sediments. For sediment transport specialists, data on particle grain size distribution and fall velocity are critical. Also, it is critical to know whether the sediments are cohesive (fine) or non-cohesive (sand/gravel). If the particles are cohesive, then it is important to know the erodibility of the sediments. All of this basic information is missing.

The statement of Vladimir Shepsis does indicate that there would in fact be some elevated suspended sediment concentrations associated with the trenching. Further, he states that those suspensions would disperse and effectively disappear. This is not credible. Small concentration of particles can lead to significant deposition over time.

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[a] The ambiguous statement by Vladimir Shepsis is provided below:

Results from our analysis on this project and many other projects indicate that turbidity during placement of dredged material on an open bottom of a water body … is significantly higher than that during the digging of the same material.

Taking this statement at face value, it would appear prudent to assess the turbidity generated "*during the placement of dredged material*". However, elsewhere in his statement (see quote at the beginning of this section), he implies that turbidity generated during dredging and placement is minor compared to that which is generated following placement.

Q4. Do any of the documents you examined about the hydrodynamic modeling of sedimentation related to dredging in in Haynes Inlet in Coos Bay reveal the source terms?

As stated above, a close reading of the statements indicate that there was no accounting of the generation of particles due to the dredging/trenching operation.

Tom Ravens, Ph.D.
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Exhibit 30

U.S. Department of Homeland Security

United States Coast Guard

Commanding Officer
United States Coast Guard
Sector Portland

6767 N. Basin Avenue
Portland, OR 97217
Phone: (503) 240-9307
Fax: (503) 240-9586

16611
July 1, 2008

Lauren O'Donnell
Director of Gas – Environmental & Engineering, PJ-11
Federal Energy Regulatory Commission
888 First Street, N.E., Room 62-45
Washington, DC 20426

WATERWAY SUITABILITY REPORT FOR THE JORDAN COVE ENERGY PROJECT

Dear Ms. O'Donnell:

This Waterway Suitability Report (WSR) fulfills the Coast Guard's commitment under the Interagency Agreement among the Federal Energy Regulatory Commission (FERC), the Research and Special Programs Administration (RSPA), and the Coast Guard for the Safety and Security Review of the Waterfront Import/Export Liquefied Natural Gas Facilities that was signed in February 2004. Under this agreement, our agencies work together to ensure that both land and maritime safety and security risks are addressed in a coordinated and comprehensive manner. In particular, the Coast Guard serves as a subject matter expert on maritime safety and security issues.

On June 11, 2008, the Coast Guard completed a review of the Waterway Suitability Assessment (WSA) for the Jordan Cove Energy Project (JCEP) that was submitted in September of 2007. This review was conducted following the guidance provided in Navigation and Vessel Inspection Circular (NVIC) 05-05 of June 14, 2005. The review focused on the navigation safety and maritime security risks posed by LNG marine traffic, and the measures needed to responsibly manage these risks. During the review, the Coast Guard consulted a variety of stakeholders including state and local emergency responders, marine pilots, towing industry representatives, members of the Ports and Waterways Safety Committee and the Area Maritime Security Committee.

Based upon this review, I have determined that Coos Bay is not currently suitable, but could be made suitable for the type and frequency of LNG marine traffic associated with this proposed project. Additional measures are necessary to responsibly manage the maritime safety and security risks. The specific measures, and the resources needed to implement them, where applicable, are described below and in a separate supplementary report which is being provided to you under the terms and conditions established for handling Sensitive Security Information (SSI). This supplemental report includes a copy of the Jordan Cove Waterway Suitability Assessment. This determination is preliminary as the NEPA analysis has not yet been completed.

The following is a list of specific risk mitigation measures that must be put into place to responsibly manage the safety and security risks of this project. Details of each measure, including adequate support infrastructure, will need further development in consultation with the Coast Guard and state and local agencies through the creation of an Emergency Response Plan as well as a Transit Management Plan that clearly spell out the roles, responsibilities, and specific procedures for the LNG vessel and all agencies responsible for security and safety during the operation.

Navigational Measures:

LNG Tanker Size Limitations: Based on the Ship Simulation Study conducted by Moffatt & Nichol on March 17-20, 2008, the maximum size LNG tanker permitted to transit through the Port of Coos Bay is a spherical containment LNG carrier with the physical dimensions of a 148,000 m^3 class vessel. The ship dimensions used in the study reflect a length overall of 950 feet, beam of 150 feet and a loaded draft of 40 feet. The channel must demonstrate sufficient adequacy to receive LNG carriers for any single dimension listed. Consequently, prior to approving the transit of an LNG ship larger than 148,000 m^3, or any increase in the physical dimensions cited, additional simulator studies must be conducted in order to assure the sufficiency of the channel.

- Safety/Security Zone: A moving safety/security zone shall be established around the LNG vessel extending 500-yards around the vessel but ending at the shoreline. No vessel may enter the safety/security zone without first obtaining permission from the Coast Guard Captain of the Port (COTP). The expectation is that the COTP's Representative will work with the Pilots and patrol assets to control traffic, and will allow vessels to transit the Safety/Security zone based on a case-by-case assessment conducted on scene. Escort resources will be used to contact and control vessel movements such that the LNG Carrier is protected.

  While the vessel is moored at the facility there shall be a 150 yard security zone around the vessel, to include the entire terminal slip. In addition, while there is no LNG vessel moored, the security zone shall cover the entire terminal slip and extend 25-yards into the waterway.

  Resource Gap: Resources required to enforce the safety/security zone are discussed under Security Measures in the supplemental report.

- Vessel Traffic Management: Due to a narrow shipping channel, navigational hazards, and the proximity to populated areas, LNG vessels will be required to meet the following additional traffic management measures:
  - A Transit Management Plan must be developed in coordination with the Coos Bay Pilot Association, Escort Tug Operators, Security Assets and the Coast Guard prior to the first transit.
  - This plan must be submitted to the COTP no less than 6 months to initial vessel arrival, and followed by an annual review to ensure that it reflects the most current conditions and procedures.
  - For at least the first six months, all transits will be daylight only, unless approved in advance by the COTP.
  - The LNG Vessel must board Pilots at least 5 miles outside the sea buoy.
    - Overtaking or crossing the LNG tanker within the security zone is prohibited for the entire transit from the Coos Bay Sea Buoy to mooring the vessel at the LNG terminal.
  - Vessel transits and bar crossings will be coordinated so as to minimize conflicts with other deep draft vessels, recreational boaters, seasonal fisheries, and other Marine Events.
  - 24 hours prior to arrival, the Coast Guard, FBI, Coos Bay Pilot Association, Escort Tug Masters, and other Escort assets will meet to coordinate inbound and outbound transit details.

Resource Gaps: The Vessel Transit Management Plan must be approved by the COTP at least 60 days prior to the first vessel arrival.

- Vessel Traffic Information System /Vessel Traffic System: The Port of Coos Bay does not have the capacity to receive Automatic Identification System (AIS) signals. AIS receiving capability must be established and must have the capacity to be used by appropriate agencies, port authorities and ship husbandry companies. Additionally, the Port does not have any means for continuous monitoring the navigable waterway. In order to ensure vessel safety and security, a robust camera system capable of monitoring the entire transit route must be established. Due to weather concerns, these cameras must be equipped with the means to adequately monitor vessel traffic in wind, rain and fog conditions.

  Resource Gaps: AIS receiver and camera systems including necessary hardware, software, staffing and training. Camera system must have complete coverage of the entire transit route, capable of detecting vessel traffic in wind, rain, fog, and dark conditions. Equipment and access to data feed of video imagery must be provided to state and local emergency operations centers impacted by the project.

- Tug Escort and Docking Assist: Due to the confined channel and high wind conditions, each LNG Carrier must be escorted by two tractor tugs, which will join the vessel as soon as safe to do so. The primary tug will be tethered at the direction of the pilot. A third tractor tug is required to assist with turning and mooring. Based on the Ship Simulation Study conducted by Moffatt & Nichol on March 17-20, 2008, vessels are limited to transiting during periods of high tide and 25 knot winds or less. While unloading, all three tugs will remain on standby to assist with emergency departure procedures.

  All three tractor tugs must be at least 80 Ton Astern Bollard Pull or larger and equipped with Class 1 Fire Fighting equipment.

  Resource Gaps: Three 80 Bollard Ton Tractor Tugs with Class 1 Fire Fighting capability.

- Navigational Aids:
  - Based on the Ship Simulation Study conducted by Moffatt & Nichol on March 17-20, 2008, four aids to navigation must be added and eight aids to navigation relocated on the waterway (pg. 12-17).

  - Physical Oceanographic Real-Time System (PORTS) must be contracted with NOAA to provide real time river level, current and weather data.

- LNG Carrier familiarization training for Pilots and Tug Operators: Prior to the arrival of the first vessel, simulator training must be provided for pilots and tug operators identified as having responsibility for LNG traffic.

Safety Measures:

Emergency Response Planning: Regional emergency response planning is limited in the region. Emergency response planning resources will need to be augmented to adequately develop

emergency response procedures and protocols as well as continuously update those plans as conditions change.

Resource Gap: To be determined in conjunction with local and regional response agencies through the Emergency Response Planning process.

- Vessel and Facility Inspections: LNG tankers and facilities are subject to (at a minimum) annual Coast Guard inspections to ensure compliance with federal and international safety, security and pollution regulations. In addition, LNG vessels and facilities are typically required to undergo a pre-arrival inspection, and transfer monitor.

  Resource Gap: Additional Coast Guard Facility and Vessel Inspectors.

- Shore-Side Fire-Fighting: Firefighting capability is limited in the area surrounding the proposed LNG terminal. Shore side firefighting resources and training will need to be augmented in order to provide basic protection services to the facility as well as the surrounding communities along the transit route.

  Resource Gap: To be determined in conjunction with local and regional response agencies through the Emergency Response Planning process.

- In-Transit Fire-Fighting: Firefighting capability is limited along the entire transit route for proposed LNG vessels.

  Resource Gap: A plan must be developed for managing underway firefighting, including provisions for command and control of tactical fire fighting decisions as well as financial arrangements for provision of mutual aid and identification of suitable locations for conducting fire fighting operations along the transit route. To be determined in conjunction with local and regional response agencies through the Emergency Response Planning process.

  Public Notification System and Procedures: Adequate means to notify the public along the transit route, including ongoing public education campaigns, emergency notification systems, and adequate drills and training are required. Education programs must be tailored to meet the various needs of all waterway users, including commercial and recreational boaters, local businesses, local residents, and tourists.

  Resource Gap: A comprehensive notification system, including the deployment of associate equipment and training, must be developed. To be determined in conjunction with local and regional response agencies through the Emergency Response Planning process.

- Gas Detection Capability: No gas detection capability exists at the Port of Coos Bay, along the transit route and at the site of the proposed facility. Emergency response personnel require appropriate gas detection equipment, maintenance, and training. Additionally, the use of fixed detection equipment will ensure accurate and expedited gas detection in the event of a large scale LNG release. The installation of these detectors at strategic points along the waterway must be developed.

Resource Gap: Gas Detectors, appropriate training, and maintenance infrastructure. To be determined in conjunction with local and regional response agencies through the Emergency Response Planning process.

Security Measures:

- Security Boardings, Waterway Monitoring, and Vessel Escorts: Extensive security measures will be required to provide adequate protection for LNG vessels in transit to and while moored at the facility. The details of these measures are SSI, and are outlined in a separate supplementary report.

- Facility Security Measures: LNG facilities are subject to the security regulations outlined in 33 CFR 105, and are required to submit a Facility Security Plan (FSP) for Coast Guard approval, and undergo (at a minimum) an annual Coast Guard security inspection. The facility shall also develop a plan to provide for appropriate security measures from the start of construction through implementation of the Coast Guard approved FSP.

- Sandia Study: The WSA proposes the potential to receive vessels with up to 217,000 m^3 cargo capacity. The Sandia Report is based on consequences of LNG breaches, spills and hazards associated with LNG vessels having a cargo capacity no greater than 148,000 m^3 and spill volumes of 12,500 m^3. There remains some question as to the size of hazard zones for accidental and intentional discharges and the potential increased risk to public safety from LNG spills on water for larger vessels. Based on these existing uncertainties, Jordan Cove must either complete a site-specific analysis for the largest sized LNG vessel or limit arrivals to vessels with a cargo capacity no greater than 148,000 m^3 until additional analysis addressing vessels with higher cargo capacities is completed. However, this requirement is contingent on the requirement for US Coast Guard approval to receive LNG tankers larger than 148,000 m^3.

In the absence of the measures described in this letter and the resources necessary to implement them or changes in Coast Guard policy upon which the resource decisions are based, Coos Bay would be considered unsuitable for the LNG marine traffic associated with the Jordan Cove LNG Terminal. The applicant shall be required to submit an annual update to the Waterway Suitability Assessment to the Coast Guard which shall be revalidated by the COTP and AMSC. For further information, please contact Mr. Russ Berg of Coast Guard Sector Portland at (503) 240-9374.

Sincerely,

F. G. Myer
Captain, U.S. Coast Guard
Captain of the Port
Federal Maritime Security Coordinator

Copy: Thirteenth Coast Guard District (dp)
Coast Guard Pacific Area (Pp)
Commandant, Coast Guard Headquarter (CG-52), (CG-522), (CG-544)
Maintenance and Logistics Command Pacific (Sm)

Exhibit 31

COOS BAY HARBOR SAFETY PLAN

Coos Bay Harbor
Safety Committee

February 2018

TABLE OF CONTENT

1. Executive Summary

1.1 Introduction

The Coos Bay Harbor Safety Committee (CBHSC) is a volunteer committee comprised of industry stakeholders; local, state and federal agencies; and waterway user groups to help improve local coordination and leadership within the harbor. The committee was created under the recommendation of the Interagency Committee for the Maritime Transportation System (ICMTS) and the MTS National Advisory Council (MRSNAC) which were created following a report to Congress from the Maritime Transportation System (MTS) Task Force in September of 1999.

The purpose of the CBHSC is to recommend actions to improve the safety, security, mobility and environmental protection of Coos Bay and its waterways through:

- Effective communication and coordination between stakeholders
- Alignment with local, state and federal laws and regulations
- Identification and mitigation of hazards to navigational safety
- Collaboration with governmental agencies to improve and promote maritime and environmental safety within the committee's area of responsibility.

The Coos Bay Harbor Safety Committee (CBHSC) is an open forum comprised of public and private stakeholders in Oregon with vital interests in assuring safe navigation to protect the environment, property, and personnel on the waterways within the Coos Bay Region.

The CBHSC stakeholders accomplish the mission by adopting or developing appropriate standards and guidelines that address environmental and operational elements of maritime operations unique to the Coos Bay Region.

The CBHSC provides an inclusive, cooperative and equitable venue for addressing waterways issues to ensure the continuation and improvement of prudent management practices for our local waterways. Throughout the process, the CBHSC strives to ensure reliable and efficient marine transportation.

The CBHSC Charter is included in this plan under Appendix A.

1.2 The Harbor Safety Plan.

The plan has been adopted by Coos Bay in an effort to maintain and promote safety among all of the harbors users and create a platform for communication and collaboration. Guidance in setting up this Harbor Safety Committee and in developing this plan was taken from the US Coast Guard Navigation Circular (NVIC) 1-00; by attending other harbor safety committee meetings and from existing harbor safety plans from the states of Washington and California. The CBHSC's area of responsibility begins at the seaward approaches into Coos Bay and continues into the bay, and includes navigable tributaries within the bay.

1.2.1 Plan Implementation

The Coos Bay Harbor Safety Plan (CBHSP) is intended to complement existing regulations by advising the mariner of unique conditions and requirements that may be encountered in the region by providing standards of care and protocols developed by local experts. The CBHSP will be implemented through consensus agreement and cooperation from industry members, state and federal agencies, pilots and the Port of Coos Bay to follow the plan to the fullest extent possible barring any unforeseen circumstance that may warrant a change. The CBHSP is not intended to replace the good judgment of a ship's master in the safe operation of his/her vessel.

1.2.2 Plan Maintenance

The CBHS Committee will review the Harbor Safety Plan on an annual basis to ensure all information is up to date. Recommendations may be made to incorporate new information or additional standards of care at any regular meeting of the CBHS Committee. Plan updates are included in Appendix L and recommendations in Appendix I.

1.3 Harbor Safety Committee

The Committee General membership is responsible for providing recommendations, direction, and support within the committee's area of responsibility.

1.3.1 Chair:

The seven (7) member Board is made up of individuals representing the following waterway users.

1. Coos Bay Pilot Association
2. Stevedoring Company
3. Marine Terminal Operator, lower bay
4. Marine Terminal Operator, upper bay
5. International Oregon Port of Coos Bay
6. Fishing Representative
7. Public Representative

Officers are nominated and elected by a vote of a simple majority of a quorum of the Managing Board. Candidates for Officers are selected from the membership of the Managing Board.
Officer Positions include Chair, Vice Chair, and Secretary.

1.3.2 Members:

Members consist of individuals from companies, organizations, state and federal agencies as defined in the Charter.

Names and contact information can be obtained by emailing the Coos Bay Harbor Safety Committee at Coosbayharborsafety@gmail.com.

2 General Information

2.1 Geographical Boundaries

The Committees geographic region of responsibility (in blue boxes) begins at the seaward approach into Coos Bay, continues into the Bay and includes navigable tributaries within the Bay.

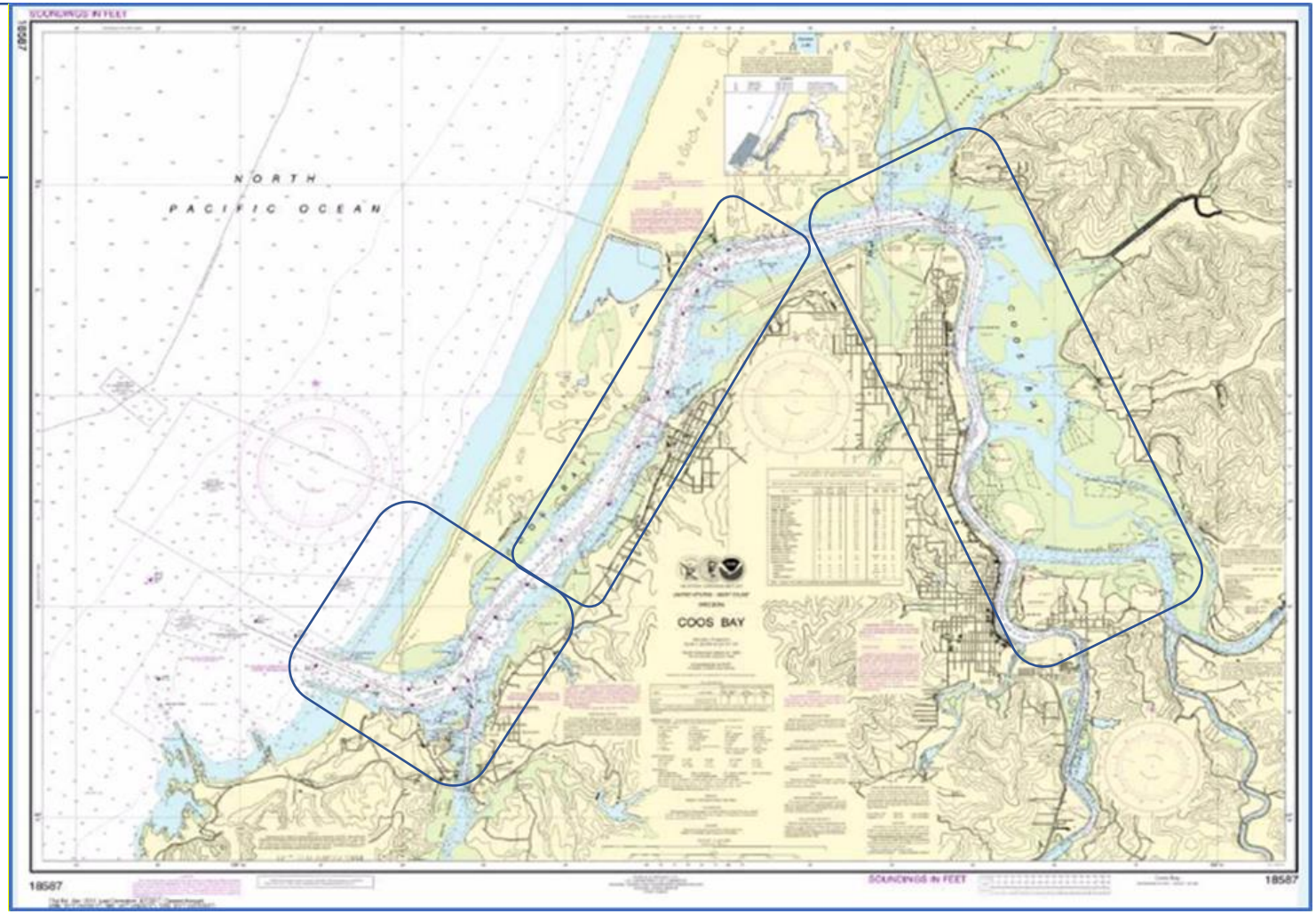


FIGURE 1 - NOAA CHART COOS BAY AND CBHSC AREA OF RESPONSIBILITY

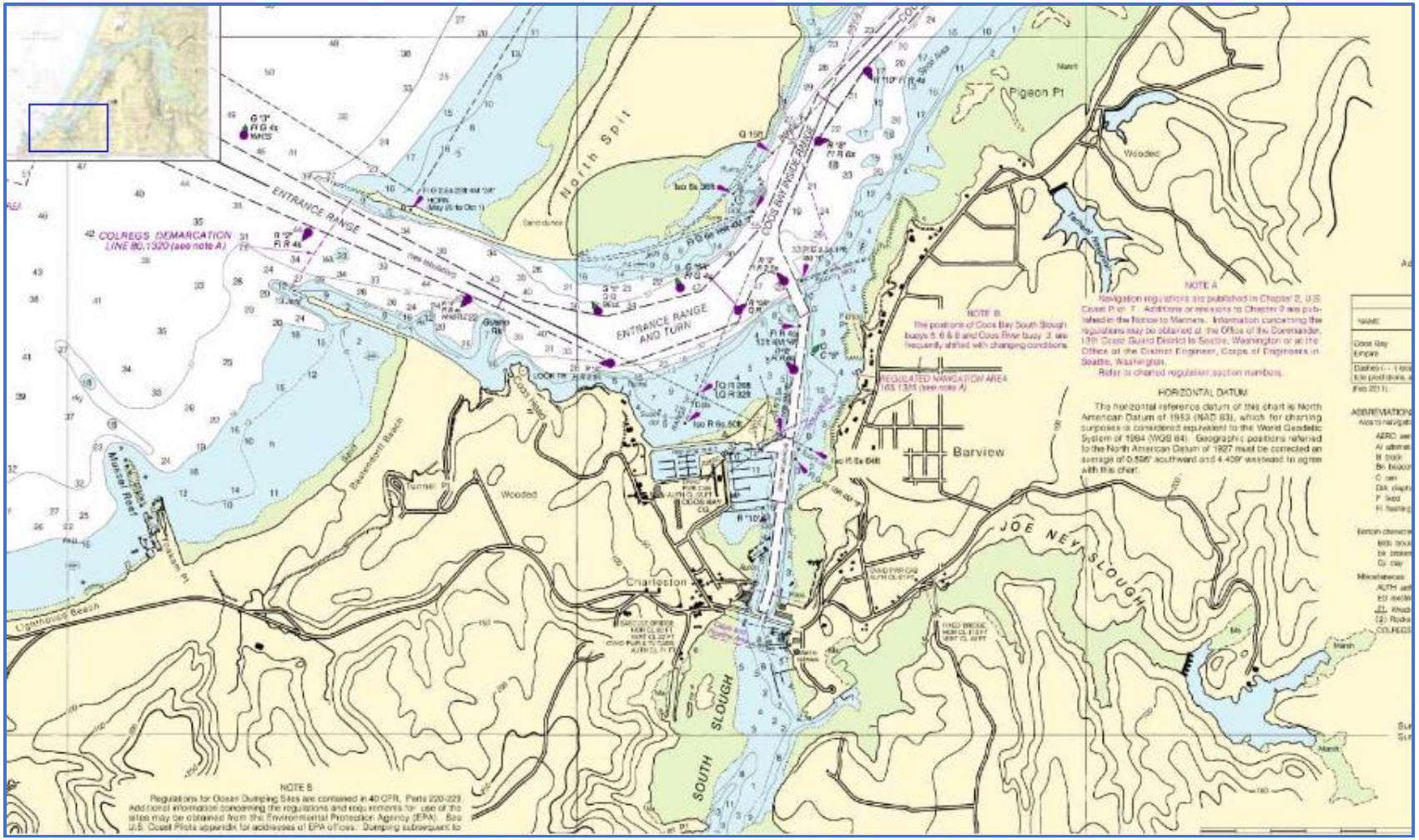


FIGURE 2 - SECTION OF CHART 18587 – ENTRANCE OF COOS BAY

This Section of Chart 18587 shows the Colreg Demarcation line and harbor entrance flanked by jetties with Charleston Channel and Boat Basin and South Slough to the south.

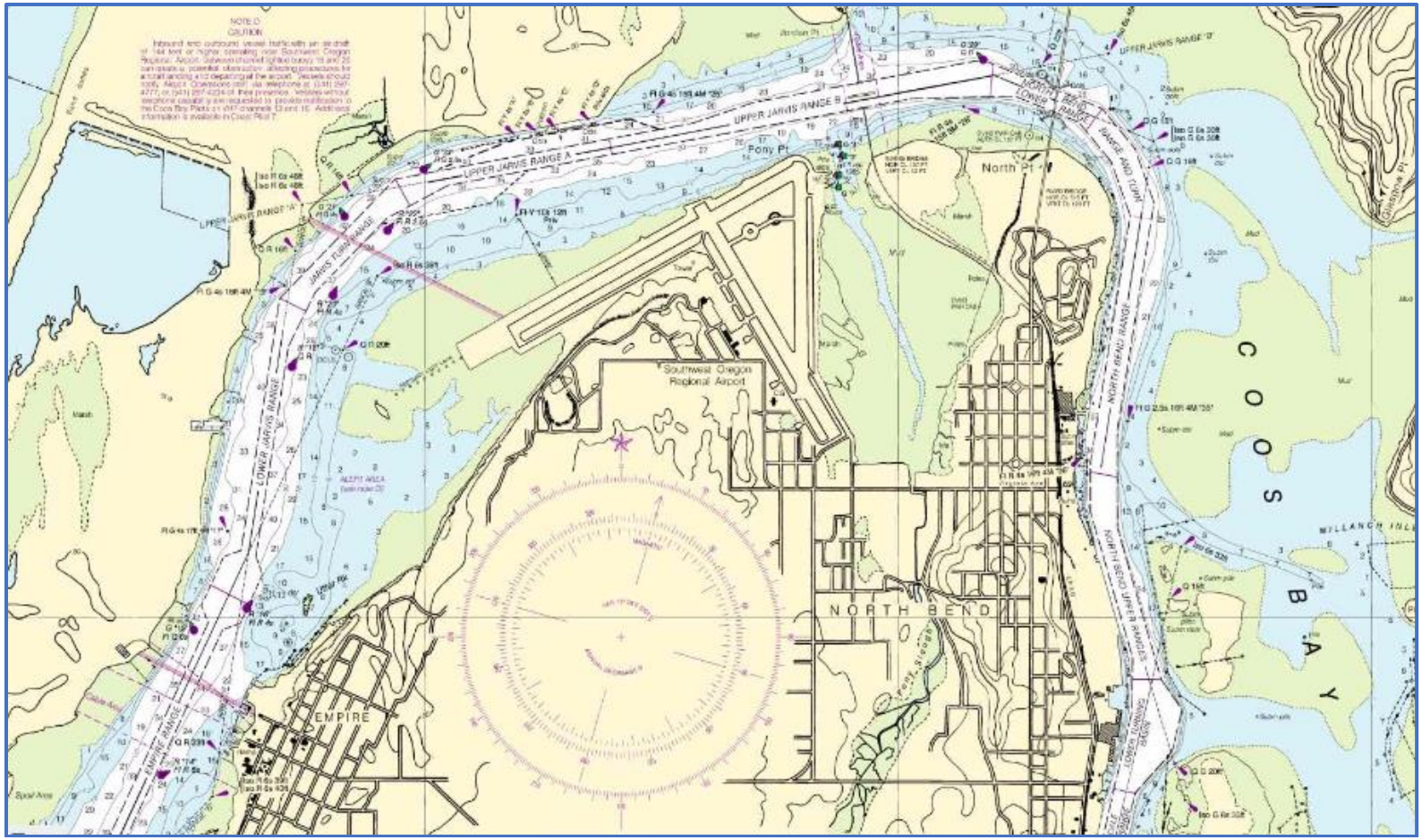


FIGURE 3 - SECTION OF CHART 18587- TOWNS OF EMPIRE AND NORTH BEND

Section of Chart 18587 showing the towns of Empire and North Bend and the airport in between.

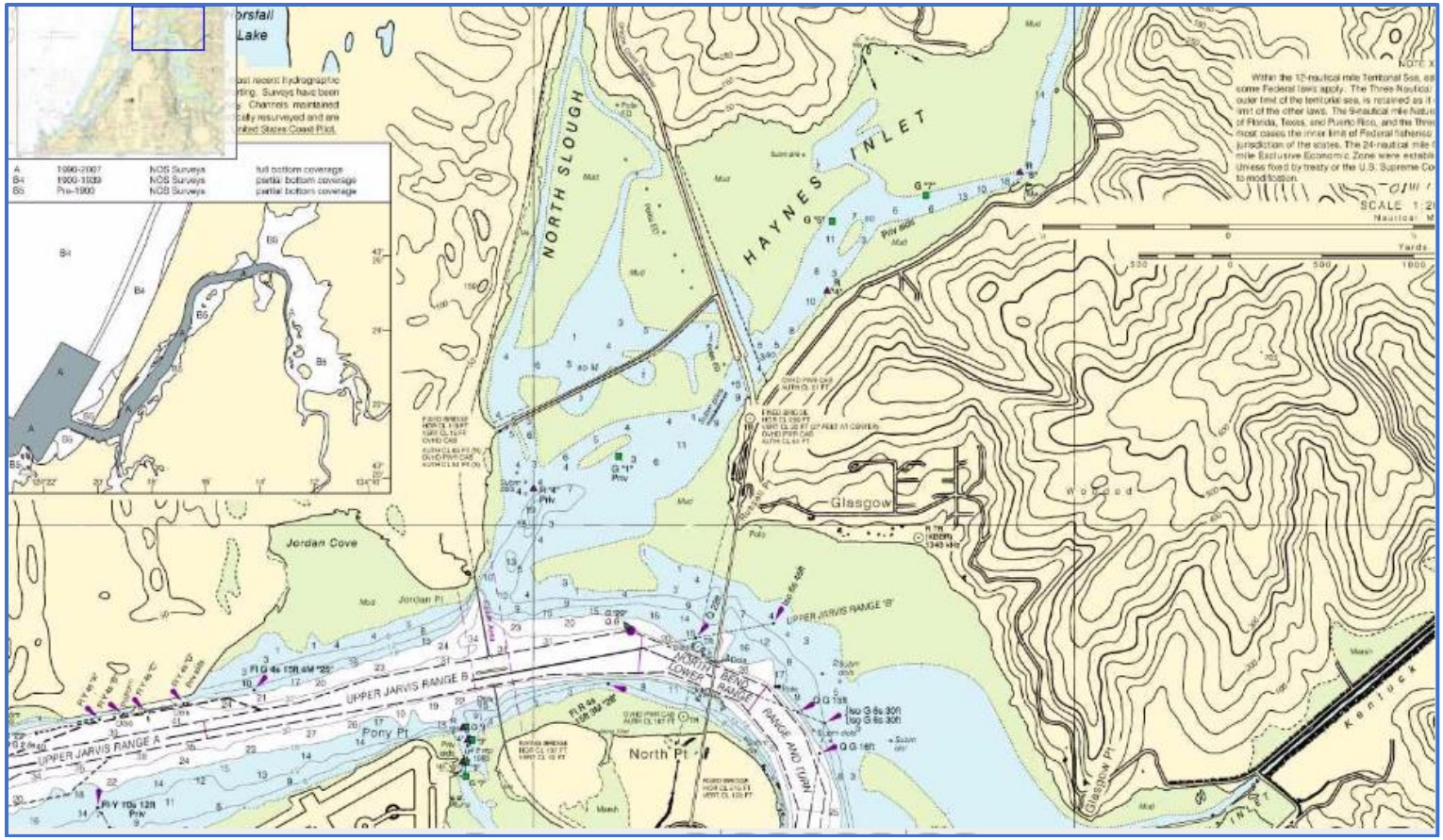


FIGURE 4 - SECTION OF CHART 18785 - JORDAN COVE TO HAYES INLET

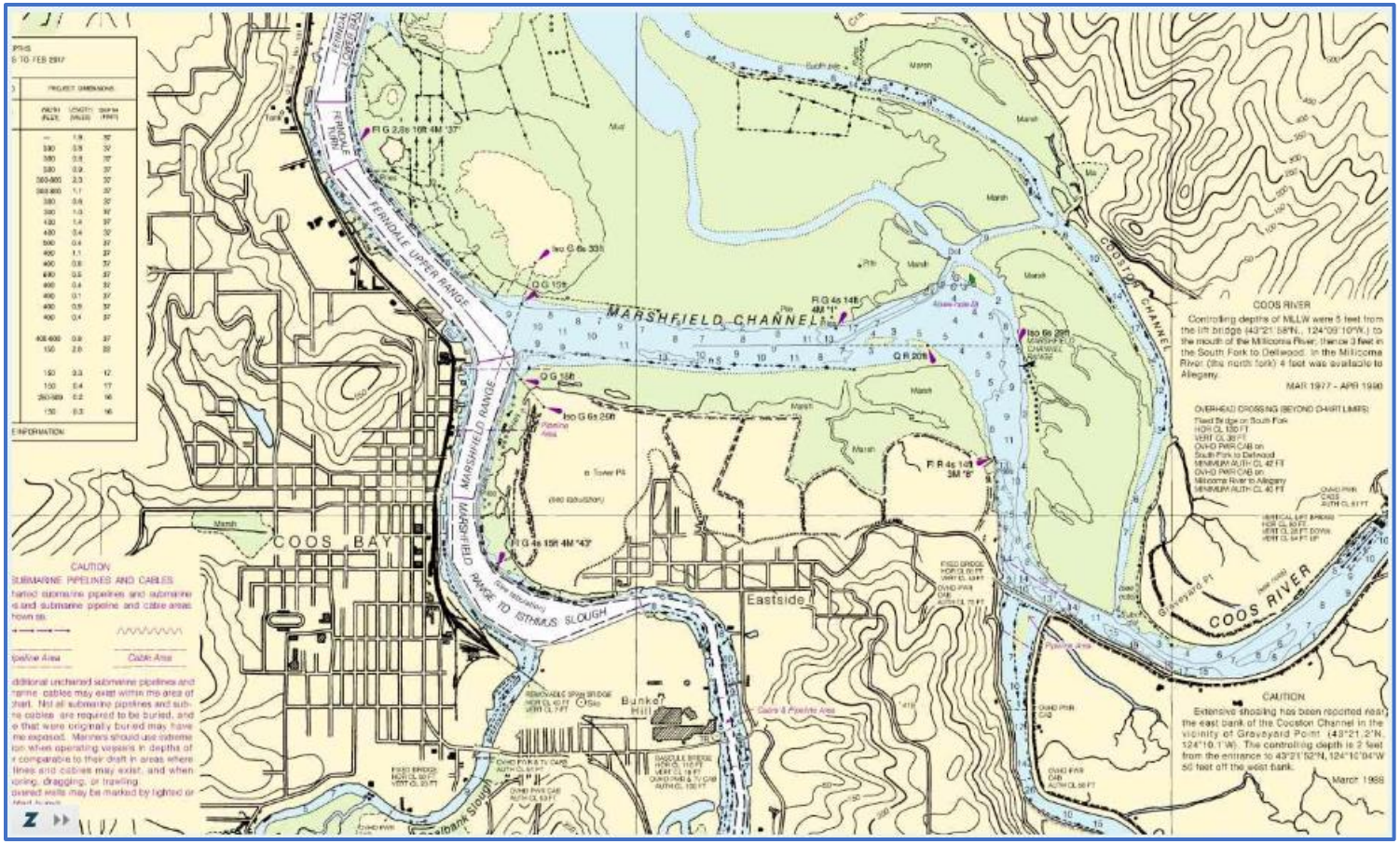


FIGURE 5 - SECTION OF CHART 18785 - TOWN OF COOS BAY, MARSHFIELD, COOSTON CHANNEL, ISTHMUS SLOUGH AND THE COOS RIVER

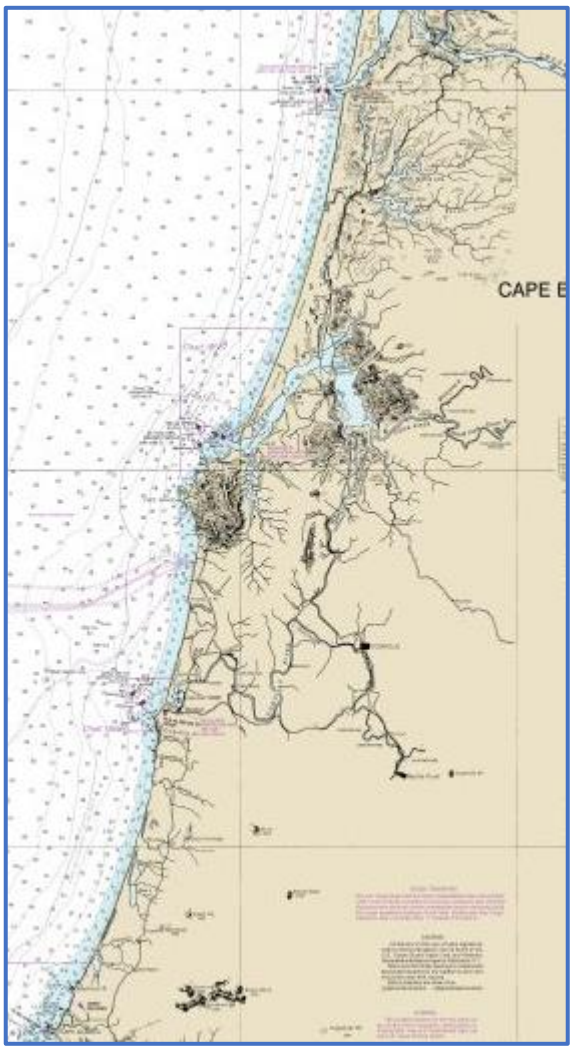


FIGURE 6 - SECTION OF CHART 18580 - OREGON COAST SHOWING COOS BAY

2.2 Economic and Historical Background

Coos Bay is the largest coastal harbor between San Francisco and Puget Sound, and Oregon's second busiest maritime port. The federally authorized and maintained deep-draft navigation channel is under the management and oversight of the US Army, Corps of Engineers. Manufactured forest products and wood fiber exported from the port's marine terminals continue to make it one of the leading wood products shipping centers of North America. The Port imports and exports logs and exports large quantities of wood chips which are used in making paper products and biomass fuels.

The port's vision is to promote the optimal use of Coos Bay's deep-water port for the enhancement of the economy and quality of life in the region.

Historically, wood products, commercial fishing, and shipping have been the mainstays of the Bay area's economy; more recently tourism has become an important segment. Though it has waned, the port is still one of the leading centers for the lumber and wood products industry. The area is also known for its 32 million pounds of seafood landed annually by crabbers (Dungeness crab), trollers and trawlers fish for chinook salmon, albacore tuna, and pink shrimp.

Oregon International Port of Coos Bay is designated a State Port; consequently, members of the Board of Commissioners are appointed by the Governor and confirmed by the Oregon Senate for 4-year terms. Commissioners must be residents of the Port District.

The Port Authority, the Oregon International Port of Coos Bay, is controlled by a Board of Port Commissioners and an Executive Director. Harbor regulations, under Oregon Revised Statute 777, are prescribed by the Port Commissioners and enforced by the Executive Director. The Port owns 700 acres of the property but they do not operate any of the maritime facilities with the exception of the Charleston Marina. The marina is located just inside the entrance to Coos Bay and is home to a fishing and recreational fleet of 400-500 boats.

3 Coos Bay

Thirty-three (33) miles north of Cape Blanco, Coos Bay is used as a harbor of refuge and can be entered at any time except in extreme weather. From the entrance, the bay extends northeast for 8 miles with widths of 0.3 to 1 mile, then bends southeast for about 4 miles to the mouth of Isthmus Slough. The dredged channel through the bay is bordered by marshland and intersected by several sloughs.

The entrance to Coos Bay is located at latitude 43° 22' North/Longitude 124 ° 22' West. The Coos Bay Sea Buoy is approximately 173 nautical miles/320 km south of the Columbia River, and 367 nautical miles/680 km north of the entrance to San Francisco Bay.

3.1 Prominent features

Coos Head is a good guide to the entrance. The sand dunes north toward Umpqua River are prominent. The entrance to the bay is protected by jetties. A light with a seasonal sound signal marks the north jetty. A lighted whistle buoy ((RW “K” MO (A) Whis)) is 1.8 miles west-north-west of the entrance. The channels are marked with lighted ranges, lights, buoys and day beacons. Although no longer lighted, Cape Arago Lighthouse is a prominent 44-foot white octagonal tower attached to a building on a rocky, partially wooded island close inshore, 2.5 miles north of the cape.

3.2 Routes

There is usually a current sweeping either north or south just off the jetties, and this current should be guarded against. The entrance ranges should be watched carefully until clear of all dangers. The south current is often encountered during the summer. With strong south winds during the winter, the current sometimes sets to the north.

Approaching from any direction in thick weather, great caution is essential. The currents are variable and uncertain. Velocities of 3 to 3.5 knots have been observed offshore between Blunts Reef and Swiftsure Bank, and greater velocities have been reported. The most favorable time for crossing the bar is on the last of the flood current, and occasionally it is passable only at this time.

3.3 Coos Bay Channel

Coos Bay’s short 15-mile Federal navigation channel helps ensure that inbound and outbound cargoes move rapidly and efficiently through the harbor's marine terminals to domestic and international markets. Travel time from ocean to land is only 90 minutes.

3.3.1 Depths and Widths

A Federal Project provides for a 37-foot deep and nominal 300-foot-wide channel across the bar to the railroad swing bridge at Pony Point, and then is 400-foot-wide to the end of the navigation channel at a point 1.1 mile above the mouth of Isthmus Slough, and thence, 22 feet to Millington, 14.7 miles above the entrance to the bay. Turning basins at North Bend and Coos Bay have depths of 37 feet.

COOS BAY ,ISTHMUS SLOUGH AND CHARLESTON CHANNEL DEPTHS
TABULATED FROM SURVEYS BY THE CORPS OF ENGINEERS • SURVEYS TO NOV 2016

	CONTROLLING DEPTHS FROM SEAWARD IN FEET AT MEAN LOWER LOW WATER (MLLW)				PROJECT DIMENSIONS		
NAME 01' CHANNEL	OUTSIDE QUARTER	HALF OF CHANNEL	OUTSIDE OUAATER	DATE OF SUAIIEY	WIDTH (FEET)	IENGTH (MILES)	DEI'Tt1 (FEET)
ENTRANCE RANGE	39	39	40	8l6	—	1.9	37
ENTRANCE RANGE AND TURN	38	44	33	11-16	300	0.8	37
COOS BAY INSIDE RANGE	38	38	38	11-16	300	0.8	37
COOS BAY RANGE	37	37	36	1116	300	0.9	37
EMPIRE RANGE	3D	37	30	10-16	300-800	2.3	37
LOWER JARVIS RANGE	S4	38	21	10l6	300-800	1.1	37
JARVIS TURN RANGE	37	41	34	1 16	300	0.6	37
UPPER JARVIS RANGE A	37	37	3S	1 16	300	1.0	37
UPPER JARVIS RANGE B	3S	37	36	1 16	400	1.4	37
NORTH BEND LOWER RANGE	36	39	36	1 16	400	0.4	37
RANGE AND TURN	34	39	38	10-16	500	0.4	37
NORTH BEND RANGE	33	38	35	10-16	400	1.1	37
NORTH BEND UPPER RANGES	35	38	37	1 16	400	0.8	37
LOWER TURNING BASIN	37	38	38	10-16	B00	0.5	37
FERNDALE LOWER RANGE	32	38	34	9 16	400	0.4	37
FERNDALE TURN	20	33	35	9-16	400	0.1	37
FERNDALE UPPEA RANGE	8	27	24	9l6	400	0.9	37
MARSHRELD RANGE	28	25	17	9-18	400	0.4	37
MARSHRELD RANGE TO ISTHMUS SLOUGH	19	17	25	9 18	400-600	0.9	37
ISTHMUS SLOUGH	19	20	19	4-85	150	2.0	22
CHARLESTON CHANNEL							
ENTRANCE	18	19	18	10-18	150	0.3	17
ENTRANCE TO BASIN	18	18	16	10-16	150	0.4	17
BASIN	15	15	16	10-16	250.000	0.2	16
BASIN TO BRIDGE	16	18	16	10-16	150	0.3	16

NOTE·CONSULT THE CORPS OF ENGINEERS FOR CHAHGES SUBSEOUENT TO THE ABOVE INFORMATION

FIGURE 7 - CHANNEL DEPTHS, 2016 SURVEY

3.3.2 Tidal Range

Tidal Ranges

- Mean 5.6 feet/1.7 meters
- Diurnal 7.3 feet/2.2 meters
- Maximum 12 feet/3.7 meters
- Tidal ebb to 3 knots

3.3.3 Dredging Plans

The USACE maintains the 15.2-mile federal navigation channel and the Charleston channel to the Bascule bridge, South Slough. Dredging for the federal projects is completed based on annual appropriations and critical needs. The Oregon International Port of Coos Bay holds and maintains a Unified dredging permit for 18 public and private terminals and marinas within the bay. This permit authorizes these facilities to fund and conduct dredging operations within their authorized dredge prism. Dredging operations can be conducted under the Unified permit during the authorized In-Water Work Period (IWWP) from October 1st to February 15th. An IWWP Variance may be requested and approved on a case-by-case basis.

3.3.4 Coos Bay Channel Modification Project

The Port of Coos Bay is proposing to deepen and widen the Federal navigation channel through a project that will expand the existing channel from -37 feet depth and a nominal 300 feet width to -45 feet depth and nominal 450 feet width from the channel entrance to river mile 8.2.

3.4 Charleston Channel

The channel is maintained 150 feet wide and 20 feet deep and starts upstream of Buoy 6A and ends at the Bascule Bride. The channel is mostly used by recreational boaters and the commercial fishing fleet.

3.5 Anchorage

Anchorage for small craft is available almost anywhere in the bay outside the dredged channels. However, there are no dedicated anchorages outside of Coos Bay or within the harbor for larger commercial vessels. The bottom conditions outside the harbor are sandy with moderate holding power. Inside the harbor within the channel, the bottom is sandstone mixed with sand/silt. While anchoring in the channel by deep draft vessels can be accomplished under certain circumstances at the Pilot's discretion, it is not frequently done.

Due to the rapid and severe onset of weather from the North Pacific Ocean, anchorage in the ocean outside of Coos Bay is reported not safe and is dangerous during the winter months. Like all unprotected areas along the Oregon coast, large swells and heavy winds characterize the area during the winter. These conditions can suddenly and unexpectedly besiege the unwary with catastrophic results. The prevailing direction of both swell and wind will drive disabled or improperly handled vessels onto the shore.

While desired, there are currently no designated anchorage areas off the coast or within the channel, primarily due to the grounding of the M/V New Carissa in 1999 off the coast of Coos Bay.

3.6 Layberths

There are no designated layberths, but vessels may request and coordinate the use of a private berth/docks with the facility in question.

3.7 Navigational Dangers

- Guano Rock, on the south side of the entrance channel and 280 yards northwest of Coos Head. It never uncovers even during extreme low tides.

- Submerged Jetties:
  - A submerged section of the north entrance jetty extends about 450 yards west of the visible jetty, and a submerged section of the south entrance jetty extends about 100 yards west of the visible jetty. Because of the submerged jetties, it is reported that there are breakers in these areas most of the time. Extreme care must be exercised at all times.
  - A submerged jetty extends 500 yards off the east shore of Coos Bay just inside the entrance, 0.8 miles northeast of Coos Head. In entering with a strong northwest wind, large vessels have difficulty in making the turn and may find themselves being set toward the submerged jetty.

- Coos Bay Rail Bridge: This is a swing bridge kept in the open position when no trains are crossing. Mariners should use extreme caution when passing through the bridge because of unpredictable changing winds, currents, and sea conditions reported in this area. The location of the Upper Jarvis ranges in relation to the bridge opening is offset 35 feet to the North, resulting in vessel passing closer to the center support of the bridge.

- Southwest Oregon Regional Airport: For safety reasons, the FAA limits the height of vessel transiting in front of the runway. Inbound and outbound vessel traffic near the Airport may affect procedures for aircraft landing and departing at the airport. Vessels with an air draft of 144 feet or greater present a potential obstruction to airspace that requires advisories be issued to aircraft by air traffic controllers, and in some cases, runway use may need to be restricted. See Special Navigational Conditions for more for more details.

- Crab Fishing Gear: Heavy concentrations of fishing gear may be expected off Coos Bay and along the coast between December 1 and August 15, from shore to about 30 fathoms. To reduce the destruction of fishing gear by vessels and to reduce the fouling of propellers and shafts by fishing gear, Washington Sea Grant, Washington State University Extension has coordinated an agreement between towboat operators and crab fishermen for the establishment of towboat lanes along the Pacific coast between San Francisco, California and Cape Flattery, Washington. Copies of the agreement showing fishing areas and towboat lanes may be obtained from Washington Sea Grant, Washington State University Extension, Box 88, South Bend, WA 98586; telephone 360–875–9331 and have been distributed to the towboat operators and the Dungeness crab fishery. This information can also be obtained on the Washington State University website:

https://wsg.washington.edu/wordpress/wp-content/uploads/Towlane-Chartlets-WA-OR-CA.pdf.

- However, despite the ongoing issue of crab gear being caught up in towboat propellers and towing gear, there are no designated tow boat lanes for the Coos Bay area during the crabbing season.

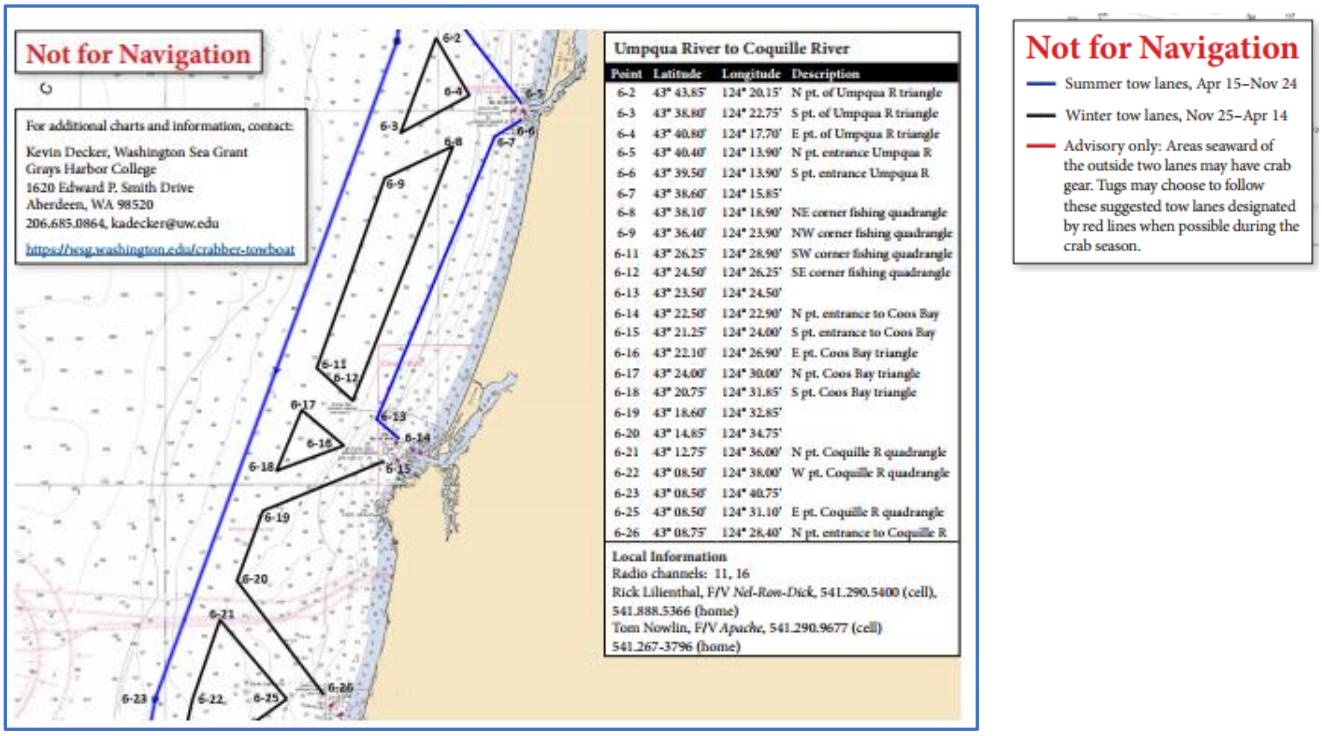


FIGURE 8 - COOS BAY TOW LANES

In June of 2017, The Oregon Dungeness Crab Commission has provided thumb drives containing the tow boat lanes along the coast in OR and WA and where the crab fisher traditionally drop their ports. These thumb drives were distributed by CBHSC to the tugboats companies (Amex, Foss, Dunlap, Brusco, Sause Brothers,). By educating both groups as to where the towing lanes and crabbing areas are, the CBHSC hopes to minimize the conflict between the two user groups.

3.8 Bridges

Coos Bay channel has three bridges running across it. Two are fixed and the other is a swing bridge for the railroad.

- The Coos Bay Link railroad bridge: This swing bridge is located 7.5 miles above the entrance, has a swing span with a vertical clearance of 12 feet in the closed position and a horizontal clearance of 197 feet in the open position. The bridgetender monitors VHF channel 18A and works on channel 13 when they are on the bridge for a train crossing. The rest of the time the bridge is unmanned and kept in the open position. For railroad status, information can be obtained from Coos Bay Rail Link at (541) 266-7245.

- The McCullough Memorial bridge is a fixed highway bridge, 8.7 miles above the entrance, has a clearance of 123 feet vertical clearance at the channel's edge and 149 feet vertical clearance at the center of the span at Mean Lower Low Water (MLLW) tide and have a horizontal clearance of 515 feet.
- 100 yards west of the McCullough bridge is an overhead power cable bridge has a vertical clearance of 167 feet.

The Charleston Channel has one bridge:

- Bascule (Charleston) Bridge: Horizontal clearance is 80 feet and vertical clearance in the closed position is 22 feet (it is a lift cantilever bridge). There are overhead power cables on the south side of the bridge with a vertical clearance of 71 feet.

3.9 Pilotage

There is no Vessel Traffic System (VTS) covering the Coos Bay area or any other harbor along the Oregon Coast.

Pilotage is compulsory for all foreign vessels and all U.S. vessels under registry (except fishing and sail vessels). Pilotage is optional for U.S. vessels in the coastwise trade that have onboard a Pilot licensed by the Federal Government for these waters. Pilotage for Coos Bay, its tributaries, and Yaquina Bay is available from the Coos Bay Pilots Association. 686 N Front Street, Coos Bay, OR 97420; Telephone (541) 267- 6555.

The pilot boats monitor VHF-FM channels 13 and 16 and use channels 12 and 18A as working frequency. The pilot boats, COOS BAY and NORTH BEND, are 76 and 72 feet respectively long tugs with black hulls, orange bands around the house, and white superstructure. The pilot boats use the standard pilot lights (red over white) at night. Vessels are handled 24-hours a day, with weather permitting. Arrangements for pilots are usually made by ships' agents or by telephone. A 24-hour notice of the time of arrival is requested. The pilots usually board vessels about 2 miles NW of Coos Bay Approach Lighted Whistle Buoy K. Vessels are requested to maintain a speed of about 6 to 7 knots and rig the ladder, without man-ropes, about 2.5 meters (8.2 feet) above the water.

The pilots were asked about emergency procedures in the event that a ship lost power or lost steering. In nearly all cases, the pilots would allow the ship to drift forward and easily set the side of the ship into the sand. In all cases, the pilots have a standby tug (the pilot boat) which is able to influence the movement of the ship. The pilot boat always moves just ahead of the ship or alongside depending upon the orders from the pilot. The Pilots would always avoid having the ship end up crossways in the channel with a bow on one side and the stern on another side of the channel.

3.10 Towage

There are seven tugs are available and are used for docking and mooring. There are no federal or state rules or guidelines establishing escort or ship assist requirements for vessels visiting Coos Bay, OR. Escort and ship assist tugs should meet classification society standards appropriate for escort and ship assist tugs.

Escort and ship assist tugs in Coos Bay which meet the requirements for large vessels operating in narrow channels shall have their bollard pull (ahead and astern) measured as provided below.

(1) Bollard pull measurements shall be verified by a member of the International Association of Classification Societies.

(2) Bollard pull measurements verified by a member of the International Association of Classification Societies in other ports of the State shall meet the requirements of this section, provided that evidence of the results of these measurements are on file with the Coos Bay Harbor Safety Committee.

(3) Companies providing escort and ship assist tugs shall provide the Coos Bay Harbor Safety Committee with the results of the bollard pull measurements verified pursuant to these provisions.

(4) Escort and ship assist tugs whose bollard pull has not been measured and verified or are not within the scope of the definition of "bona fide sister tug", shall not be used for the escort and/or ship assist of large vessels in Coos Bay.

An escort and/or ship assist tug determined by the Coos Bay Harbor Safety Committee to be a "bona fide sister tug" may be used with the same (ahead and astern) bollard pull as the certified sister tug.

The braking force shall be re-measured after any modifications and/or repairs to the main engines, hull, shaft-drive line, or steering, that could affect the bollard pull. The new measurements must be registered with the Coos Bay Harbor Safety Committee.

Notwithstanding any other provision of this plan:

(1) The vessel master remains responsible for the safe navigation and maneuvering of the vessel in all circumstances. The requirements outlined in this plan are in addition to, and not a limitation of, any other responsibilities created by custom, law, or regulation.

(2) Where an emergency exists, the vessel master may adjust the minimum escort and/or ship assist tug requirements. For purposes of this plan, an emergency is defined as any of, but is not limited to, the following:

(A) the imminent and immediate danger to the vessel, its cargo or its crew;

(B) the imminent and immediate danger to a marine terminal, ship assist or escort tug;

(C) the imminent and immediate danger to a vessel in the proximity of the escorted vessel; or

(D) any emergency declared by the United States Coast Guard, Captain of the Port which would necessitate a modification to the provisions set forth in this plan.

TABLE 1 - COOS BAY TOWING VESSELS

Vessel Name	Registered Owner	Type	Call Sign	Horsepower	Bollard Pull
Coos Bay	Coos Bay Pilots	Propeller	WY 6046	1,700	lbs
North Bend	Coos Bay Pilots	Propeller	WUR 9793	2,000	lbs
Oregon Escort	Coos Bay Pilots	Z Drive Tug	WDD 5907	6,700	lbs
Captain Louie	Knutson Towboat	Tug	WR 7513	1,750	lbs
Centennial	Knutson Towboat	Z Drive Tug	WCY 3200	3,000	lbs
Captain Harold	Knutson Towboat	Propeller	WDG4952	2,500	lbs
Casey H	Billeter Marine	Propeller	WDH 7360	2,700	lbs

Contact information for the towboat companies can be found in Appendix B of this plan.

3.11 United States Coast Guard

The US Coast Guard is present in the area providing its search and rescue, law enforcement and marine safety and pollution response services through the following units:

3.11.1 Operational Units:

U.S Coast Guard Sector North Bend: Sector North Bend is co-located with Air Station North Bend and is oversees all operations of Sector North Bend Units. They also support operational units by providing administrative, supply, medical, engineering and communication services.

Sector North Bend Units:

- Coast Guard Cutter Orcas – the 110-foot Island Class patrol boat has been stationed in Coos Bay, OR, since 1989.

- U. S. Coast Guard Aids To Navigation Team (ANT) Coos Bay was established in 1976 and is located near the mouth of Coos Bay in the fishing and tourist community of Charleston, Oregon. Their area of responsibility ranges over 240 miles of the Oregon coast and includes 5 lighthouses, 18 primary buoys, 43 secondary buoys and 156 other lights, day beacons and fog signals.

- Coos Bay Coast Guard Station: The Station located in the town of Charleston, is on the south side of Charleston Boat Basin, 0.7 miles southeast of Coos Head. and provide search and rescue operations from the Coos River to Cape Bianco. During the summer months, Station Coos Bay operates Search and Rescue Detachments Coquille River in Bandon, OR.

- North Bend Coast Guard Air Station is at the North Bend Municipal Airport.

- Coos Head Watch Tower is staffed during breaking bar season. The watchstander logs all vessels heading out who call into the tower and provides general lookout services.

Other Units are:

- Station Depoe Bay

- Station Yaquina Bay
- Station Umpqua River
- Station Siuslaw River
- Station Chetco River

3.11.2 Marine Safety Units

While the operational units are located within the Coos Bay area, the Captain of the Port is based out of Sector Columbia River, Astoria OR, providing vessel and facility inspections, pollution response and investigation services to Coos Bay.

3.12 Harbor Regulations

The port authority, Oregon International Port of Coos Bay, is controlled by a Board of Port Commissioners and an Executive Director. Harbor regulations are prescribed by the Port Commissioners and enforced by the Executive Director. The port manager's office is at 125 Central Avenue, Suite 300, Coos Bay, OR 97420.

3.13 Docks

Most of the deep-draft facilities in the Port of Coos Bay are in the cities of Coos Bay and North Bend. The following are the still **active and /or useable docks**:

3.13.1 Commercial Docks:

1. Cape Arago Dock/Sause Brothers (River Mile (RM) 5.4, utility/work dock
2. D.B. Western Inc. (RM 5.6, utility/work dock, vessel repair, and construction)
3. Southport Lumber Company/Southport Forest Products (RM 6.3, dead load barge slip)
4. Roseburg Coos Bay Shipping Terminal ("Roseburg") (RM 7.9, export woodchips)
5. Ocean Terminals Dock (RM 11, inbound and outbound logs)
6. K2 Export (RM 11.5, outbound logs)
7. Tyree Oil terminal (RM 12.5 oil dock for vessels – tug and fishing vessels)
8. Oregon Chip Terminal (RM 12.5, outbound woodchips)
9. Bayshore Dock/Sause Brothers (RM 12.7, tug and barge berths)
10. ORC Operations (RM 15, currently closed)
11. Georgia Pacific (RM 15, logs in / chips out)
12. Coastal Fibre (RM 17 chips out)

3.13.2 Government Docks:

- US Army Corps of Engineers (USACE) Coos Bay Moorage Dock and
- US Coast Guard (USCG) Orcas Dock (RM 13.2, USCG and USACE vessel berths)

Contact information these facilities are located in Appendix B of this plan.

3.14 Towns and Waterways

3.14.1 South Slough

Shoal and navigable only for small boats, extends 4 miles south from its junction with Coos Bay near the entrance. A Federal project provides for a 17-foot entrance channel extending south from the junction for about 0.6 miles to the Charleston Boat Basin, thence a 16-foot channel continues to a highway bascule bridge. The channel from the junction with Coos Bay to Charleston Boat Basin is subject to shoaling. Mariners are advised to seek local knowledge when transiting this area.

3.14.2 Charleston Boat Basin

Operated and maintained by the Port of Coos Bay, is 0.3 miles north of Charleston, across the slough from Barview. The basin is used by commercial and sports fishermen. About 500 berths with electricity, gasoline, diesel fuel, water, ice, a launching ramp, and marine supplies are available. A pump out station and wet and dry winter boat storage are available in the basin. A repair facility at the basin has a drydock that can handle vessels to 300 tons, 90 feet long, and 30 feet wide, and a marine railway that can handle craft 70 feet long, 22 feet wide, and 6 feet draft for hull and engine repairs. Electronic repairs can also be made at the basin. Four fish piers are in the basin, and three fish packing facilities are just south of the basin on South Slough. Coos Bay Coast Guard Station is on the south side of the basin.

A Coast Guard buoy storage area is in Coos Bay about 150 yards E of the channel and about 2.5 miles above the entrance jetties.

The highway bridge over South Slough, 1 mile south of the entrance, has a bascule span with a clearance of 22 feet. Power and television cables south of the bridge have a least clearance of 71 feet.

The west shore of Coos Bay as far as the bend is formed by a sandspit covered with dunes, partly wooded, and in some places as much as 90 feet high. On the E shore and above the bend are low rolling hills with houses and several prominent buildings.

3.14.3 Haynes Inlet and North Slough

Haynes Inlet and North Slough join the bay through a common entrance on the north side and are navigated by small boats. Haynes Inlet and North Slough channels are marked by private day beacons. A causeway with a fixed bridge over North Slough has a clearance of 15 feet. The causeway extends east and joins the State highway fixed bridge over Haynes Inlet, which has a clearance of 20 feet (27 feet at center).

3.14.4 North Bend

North Bend is 9.5 miles above the Coos Bay entrance and is a city that transitioned from sawmills and factories to its present tourism economy. A number of the docks where lumber is shipped are located in North Bend. The North Bend Fire Department has a small fireboat and launches from existing boat ramps. Coos Bay, 12 miles above the entrance, is the second city on the bay and is the distributing center for the area, which is primarily devoted to lumbering, fishing, and agriculture.

3.14.5 Empire District

The City of Coos Bay also includes the Empire district, which is 4 miles above the entrance. North Bend and Coos Bay form practically one continuous city extending along the shore from North Point to the mouth of Coalbank Slough.

Three sloughs empty into Coos Bay between the city of Coos Bay and Coos River.

- Coalbank Slough which is unused by boats.
- Isthmus Slough is used for logging operations to Millington. The highway bridge across the slough has a bascule span with a clearance of 18 feet. The overhead power and television cables just north of the bridge, and the overhead power cable 0.9 miles south of the bridge have clearances of 100 and 150 feet, respectively.
- Catching Slough is navigable for several miles by light-draft vessels. The fixed highway bridge across the mouth has a clearance of 40 feet. The power cable for about 1.7 miles above the bridge have a minimum clearance of 57 feet; other overhead cables upstream have clearances of 13 feet.

3.14.6 Coos River

The river empties through two channels into the bay at its head. The north unmarked channel follows the east side of the bay and empties abreast of North Bend. Marshfield Channel, marked by a lighted range, lights, and buoy, crosses the flats and empties abreast the city of Coos Bay. Coos River divides at a point 3.2 miles above Graveyard Point into South Fork and Millicoma River. A highway bridge across the river, 0.9 miles above Graveyard Point, has a lift span with clearances of 28 feet down and 54 feet up. The least clearance of the overhead power cables crossing Millicoma River is 40 feet. Allegany, 7.5 miles above the confluence, is the head of navigation on Millicoma River. Dellwood, 8.2 miles above the confluence, is the head of navigation on South Fork. A fixed highway bridge crossing South Fork 0.5 mile above the confluence has been removed; two concrete piers remain. A fixed highway bridge crossing South Fork 1.9 miles above the confluence has a clearance of 38 feet. Several overhead power and telegraph cables cross South Fork; least clearance is 42 feet

4 Coos Bay Harbor Conditions

Regional Harbor Conditions This section provides a description of existing and expected conditions of weather, tidal ranges, tidal currents and other factors which might impair or restrict visibility or impact vessel navigation.

4.1 Weather

4.1.1 Fog

The area is subject to fog conditions very similar to many west coast ports. Fog can be found anywhere within Coos Bay and its tributaries. Fog occurs mostly during summer and fall though is known to occur during other seasons too.

4.1.2 Storms

During the winter is when the port experiences heavy weather with increasing winds and storm conditions. Weather delays, driven by storms including gale and storm winds (winds in excess of 39 miles per hour), are infrequent in the area and account for only 3-10 days per year.

FIGURE 9 - HEAVY WEATHER AT THE COOS BAY BAR

4.1.3 Prevailing winds

Prevailing winds in the offshore sector are southerly winds, 15-30 knots, in the summer and most of the year but shifting to northerly winds in the winter. Prevailing NW winds and winter southerly storms.

- 25 knots winds and above affect big ship movements
- 20-25 knots winds affect commercial fishing and recreational boats
- Consistently heavier north winds during the summertime
- Winter winds from the south
- 35-knot winds typically associated with fronts
- 90-knot sheer winds once or twice a year
- Wind blows across channel out of North Slough
- Tugs and tows get set by winds onto aids to navigation

Deep draft ships are warned of anchoring offshore during winter while awaiting calmer winds to transit. The rapid and severe onset of weather may expose the vessel to the risk of dragging ashore.

Existing Mitigations:

- Pilots move ships in during the morning when it is calmer before winds pick up
- Have ample warning of approaching fronts

- The warning signs and lights at the entrance of the bay to alert operators to bar conditions
- Warning signs and lights at CG Station and boat ramps alert operators to bar conditions
- Telephone numbers available from which to obtain bar conditions
- Tune into AM radio channel 1610 as per the Bar warning sign
- Continuing education

NOAA provides weather forecast and actual weather conditions can be obtained online.

4.2 Tide and Currents

Since the tides at Coos Bay are semi-diurnal (occurring twice per day) there are two flood tides, two ebb tides, and four (4) slack tides (2 high slack and 2 low slack) in almost every 24 hour period. The times of high and low tides and the times of the tidal currents move nearly an hour forward every day.

At Coos Bay, the ebb tide is the condition which causes the most challenging conditions at the bar channel entrance. A strong ebb tide (often abetted by a strong river current) rushes out of the entrance channel. When it meets a strong onshore wind, sea, and swell, the waves can become very steep and then fall or break.

Tidal currents at the entrance are stated to travel in the direction 100° true during flood tides. This is generally an easterly direction into the harbor. During ebb tides (water moving out of the harbor) the direction of the current is 280° true. Predicted tidal currents vary from around one knot to almost 4 knots. Current observations in the entrance to Coos Bay indicated a velocity of about 2 knots. The greatest observed ebb velocity was a little over 3 knots. During long runouts, an ebb current of 5 knots has been reported at Guano Rock.

The tidal range between Mean Lower Low Water (MLLW) and mean higher high water (MHHW) is 7.5 feet near the open sea channel entrance at Charleston and 6.7 feet approximately in Empire. The lowest high tides are 4.2 to 5 feet above MLLW. Extreme low and high water are 3.0 feet below and 10.5 feet above MLLW, respectively. Based on measured tide data at Charleston, the tides are above +6 feet MLLW about 75% of the time and above +7 feet MLLW about 10% of the time.

In summary:

- Currents 3 knots and can be 5 knots at buoy #4 in jaws of jetty entrance
- Less than 3 knots in sloughs and creeks
- The tidal range of 7 feet on average
- Port area currents are tidal but during high river stages and heavy rains, the tide can be river driven
- There are cross-currents at:
    - The railroad bridge coming out of North Slough
    - Marshfield Channel junction coming down Coos River
    - Charleston coming out of South Slough

- Jarvis Turn

Existing Mitigations:

- Pilotage for required vessels
- Local knowledge of most port users
- Tide and current tables and predictions
- Tug companies have policies about what can be done on ebb and flood tides
- USACE tide gauges along the river can be used
- USCG announcements for the time of next tide change
- When the water is brown you know that somethin' ain't right
- NOAA provides river flow rate information

New ideas:
Information exchange can be improved between members of the port community through the Harbor Safety Committee. For example:

- The USACE could share tide gauge information with other users.
- The Sheriff's Department may share river height gauge information currently collected for flood prediction.
- The Sheriff's Department may include the Harbor Safety Committee membership to emergency notifications to expand information input.
- Tug companies could share policy information based on local knowledge

4.3 Other Weather Conditions

4.3.1 Crossing the Bar:

One of the main differences between Coos Bay and other harbors is the occasional occurrence of a "breaking bar" at the channel entrance. The "breaking bar" is a condition where the predominantly westerly seas and swells (often in storm conditions) meet an outgoing ebb tide which causes the waves to become quite steep, and to cascade onto the sea below. These breaking waves are very challenging to small craft and have led to several serious incidents over the years.

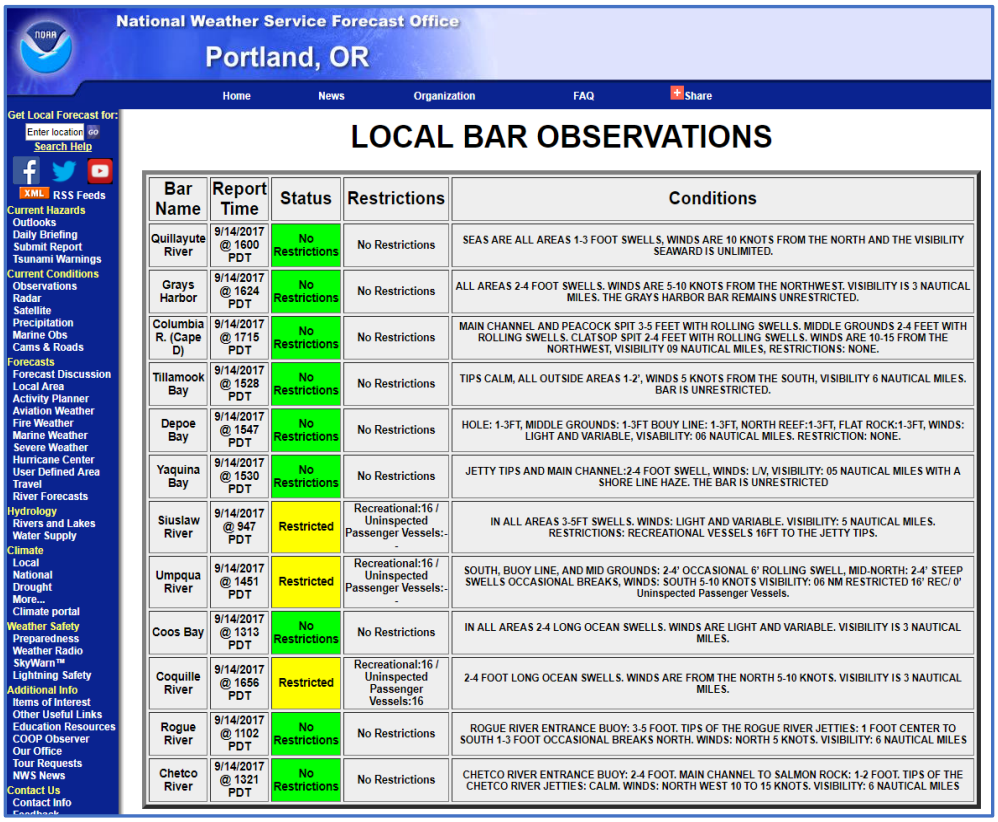
While this breaking bar can create spectacular conditions for small craft, the deep-water ship channel rarely experiences conditions closing the bar. The number of days per year when the bar channel is closed to shipping averages between 3 and 10 days per year.

The bar is the area where the deep waters of the Pacific Ocean meet with the shallower waters near the mouth of the river. Most accidents and deaths that occur on coastal bars are from capsizing. Coastal bars may be closed to recreational boats when conditions on the bar are hazardous. Failure to comply with the closure may result in voyage termination and civil and/or criminal penalties. The regulations are enforced by Coast Guard boarding teams. Improper loading and/or overloading are major causes of capsizing. Improper/overloaded boats have less stability and less freeboard, which can allow seas to break into the vessel, causing the boat to become even less stable. Boats are more likely to capsize when crossing the bar from the ocean because the seas are on the stern

and the boater may have less control over the vessel. Boaters must make sure the bar is safe prior to crossing

There are four tides each day (two high and two low) in the Pacific Northwest. Tidal currents may gain tremendous velocity, particularly when the ebb current is augmented by river runoff. It is extremely dangerous to get caught on the bar during strong ebb current. Even on days that are relatively calm, fast-moving ebb can create bar conditions that are too rough for small craft.

Observed weather and bar conditions are updated every four hours or more frequently if there is a significant change in weather. Marine Information Broadcasts on Channel 16 VHF FM are conducted by the Coast Guard when hazardous bar conditions and restrictions are put in place or are lifted. Mariners are strongly encouraged to monitor channel 16 VHF/FM for all notices and weather updates. The AM radio broadcast is audible within a 6-mile radius from the Coast Guard Station in Charleston. It provides a continual broadcast on radio station 1610 AM containing bar conditions, bar restrictions, and local weather. As a public service Radio Station KBBR (1330 kHz) broadcasts bar conditions once each hour during the summer months. Current weather advisories are also posted at the Coast Guard Station in Charleston. You can also access current bar conditions and restriction on your smartphone or handheld device by going to, http://www.wrh.noaa.gov/pqr/marine/BarObs.php, as seen above.[1]



LOCAL BAR OBSERVATIONS

Bar Name	Report Time	Status	Restrictions	Conditions
Quillayute River	9/14/2017 @ 1600 PDT	No Restrictions	No Restrictions	SEAS ARE ALL AREAS 1-3 FOOT SWELLS, WINDS ARE 10 KNOTS FROM THE NORTH AND THE VISIBILITY SEAWARD IS UNLIMITED.
Grays Harbor	9/14/2017 @ 1624 PDT	No Restrictions	No Restrictions	ALL AREAS 2-4 FOOT SWELLS. WINDS ARE 5-10 KNOTS FROM THE NORTHWEST. VISIBILITY IS 3 NAUTICAL MILES. THE GRAYS HARBOR BAR REMAINS UNRESTRICTED.
Columbia R. (Cape D)	9/14/2017 @ 1715 PDT	No Restrictions	No Restrictions	MAIN CHANNEL AND PEACOCK SPIT 3-5 FEET WITH ROLLING SWELLS. MIDDLE GROUNDS 2-4 FEET WITH ROLLING SWELLS. CLATSOP SPIT 2-4 FEET WITH ROLLING SWELLS. WINDS ARE 10-15 FROM THE NORTHWEST, VISIBILITY 09 NAUTICAL MILES, RESTRICTIONS: NONE.
Tillamook Bay	9/14/2017 @ 1528 PDT	No Restrictions	No Restrictions	TIPS CALM, ALL OUTSIDE AREAS 1-2', WINDS 5 KNOTS FROM THE SOUTH, VISIBILITY 6 NAUTICAL MILES. BAR IS UNRESTRICTED.
Depoe Bay	9/14/2017 @ 1547 PDT	No Restrictions	No Restrictions	HOLE: 1-3FT, MIDDLE GROUNDS: 1-3FT BOUY LINE: 1-3FT, NORTH REEF:1-3FT, FLAT ROCK:1-3FT, WINDS: LIGHT AND VARIABLE, VISABILITY: 06 NAUTICAL MILES. RESTRICTION: NONE.
Yaquina Bay	9/14/2017 @ 1530 PDT	No Restrictions	No Restrictions	JETTY TIPS AND MAIN CHANNEL:2-4 FOOT SWELL, WINDS: L/V, VISIBILITY: 05 NAUTICAL MILES WITH A SHORE LINE HAZE. THE BAR IS UNRESTRICTED
Siuslaw River	9/14/2017 @ 947 PDT	Restricted	Recreational:16 / Uninspected Passenger Vessels:- -	IN ALL AREAS 3-5FT SWELLS. WINDS: LIGHT AND VARIABLE. VISIBILITY: 5 NAUTICAL MILES. RESTRICTIONS: RECREATIONAL VESSELS 16FT TO THE JETTY TIPS.
Umpqua River	9/14/2017 @ 1451 PDT	Restricted	Recreational:16 / Uninspected Passenger Vessels:- -	SOUTH, BUOY LINE, AND MID GROUNDS: 2-4' OCCASIONAL 6' ROLLING SWELL, MID-NORTH: 2-4' STEEP SWELLS OCCASIONAL BREAKS, WINDS: SOUTH 5-10 KNOTS VISIBILITY: 06 NM RESTRICTED 16' REC/ 0' Uninspected Passenger Vessels.
Coos Bay	9/14/2017 @ 1313 PDT	No Restrictions	No Restrictions	IN ALL AREAS 2-4 LONG OCEAN SWELLS. WINDS ARE LIGHT AND VARIABLE. VISIBILITY IS 3 NAUTICAL MILES.
Coquille River	9/14/2017 @ 1656 PDT	Restricted	Recreational:16 / Uninspected Passenger Vessels:16	2-4 FOOT LONG OCEAN SWELLS. WINDS ARE FROM THE NORTH 5-10 KNOTS. VISIBILITY IS 3 NAUTICAL MILES.
Rogue River	9/14/2017 @ 1102 PDT	No Restrictions	No Restrictions	ROGUE RIVER ENTRANCE BUOY: 3-5 FOOT. TIPS OF THE ROGUE RIVER JETTIES: 1 FOOT CENTER TO SOUTH 1-3 FOOT OCCASIONAL BREAKS NORTH. WINDS: NORTH 5 KNOTS. VISIBILITY: 6 NAUTICAL MILES
Chetco River	9/14/2017 @ 1321 PDT	No Restrictions	No Restrictions	CHETCO RIVER ENTRANCE BUOY: 2-4 FOOT. MAIN CHANNEL TO SALMON ROCK: 1-2 FOOT. TIPS OF THE CHETCO RIVER JETTIES: CALM. WINDS: NORTH WEST 10 TO 15 KNOTS. VISIBILITY: 6 NAUTICAL MILES

FIGURE 10 - NATIONAL WEATHER SERVICE - LOCAL BAR OBSERVATIONS

Existing Mitigations:

- Check the weather and tide conditions by:
  - Monitor Marine Information Broadcasts on Channel 16 VHF FM
  - Tune in to AM radio channel 1610 and Public Radio Station KBBR (130 kHz)

[1] The US Coast Guard published a handout which addresses the hazards of crossing the bar. The content of this handout, available at https://www.uscg.mil/d13/dpw/docs/Coos_Bay_Bar_Crossing_Handout.pdf

  - Log into NOAA's website http://www.wrh.noaa.gov/pqr/marine/BarObs.php

- Check with other boaters or the Coast Guard to find out the condition of the bar.
- Always know the stage of the tide
- Cross the bar during slack water or on a flood tide, when the seas are normally calmest.

If you are caught on a rough bar running in:

- Make sure everybody aboard is wearing a personal flotation device.
- Keep the boat square before the seas.
- Keep the boat on the back of the swell. Ride the swell and stay clear of the following wave.
- Avoid sudden weight shifts from passengers, cargo or gear moving around in the boat. If possible, have passengers lie down as near the centerline of the boat as possible. Do not allow the waves to catch your boat on the side (beam). This condition is called broaching, and can easily result in capsizing.

4.4 Special Navigation Conditions

4.4.1 *North Jetty conditions*

In 2012, the Army Corps of Engineers completed a Major Maintenance Report (MMR) for the Coos Bay Jetties

Concerns (in order of greatest to least risk):

- North Jetty root and north spit sediment management (breach of North Spit)
- Structural stability of North Jetty head
- Structural stability of North Jetty trunk
- Structural stability of South Jetty root

MMR looked at 19 potential measures (individual project elements) used to create 9 alternatives (various combinations of measures). The 9 alternatives were evaluated against each other and the existing condition and the following were the preferred solutions:

Proposed mitigation:

- Buried revetment at log spiral bay (as seen by the dark blue line in Figure 12 below)
- Rebuild 400 linear feet of jetty root to +16' MLLW (light blue)
- Re-nourish log spiral bay
- Repair a low reach of north jetty root to +20' MLLW (pink)
- Repair targeted reaches of the north jetty trunk (green)
- Rubble-mound head at present location (pink)

FIGURE 11 - JETTY AND AREAS OF PROPOSED ALTERNATIVES

Engineering, Research and Design Center (ERDC) is currently conducting a physical model of the entrance to determine detailed jetty head design.

This project is currently in Detailed Design Report phase (DDR). After the DDR phase is completed, the Plans and Specifications phase (P&S) begins. After P&S phase is completed, rock procurement and construction phase begins. This is an evolving project.

Existing mitigation:

- Pilots know to proceed clearly out of the channel before turning north or south.
- Charts indicate submerged sections of the jetty

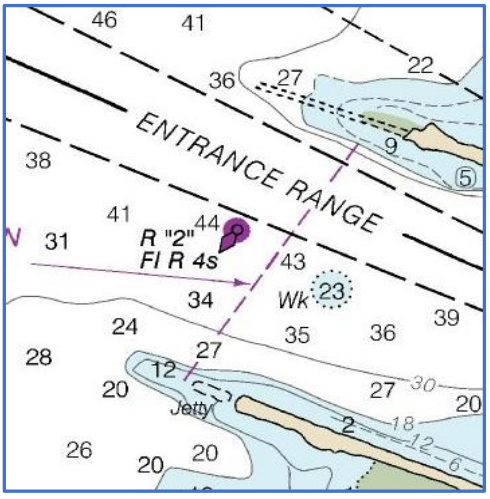


FIGURE 12 - CHART SHOWING SUBMERGED JETTIES

4.4.2 *Upper Jarvis Range Location*:

As previously mentioned with regards to the Coos Bay Rail Bridge, mariners should use extreme caution when passing through the bridge because the location of the Upper Jarvis ranges in relation to the bridge opening is offset 35 feet to the North, resulting in vessel passing closer to the center support of the bridge and potentially alliding with it. The Upper Jarvis Range, while centered in the channel is not centered to the bridge opening.

Existing Mitigation:

- Mariners need to be aware of this offset.
- Chart 18587 clearly indicates the location of range in relation to the swing bridge in its open position.

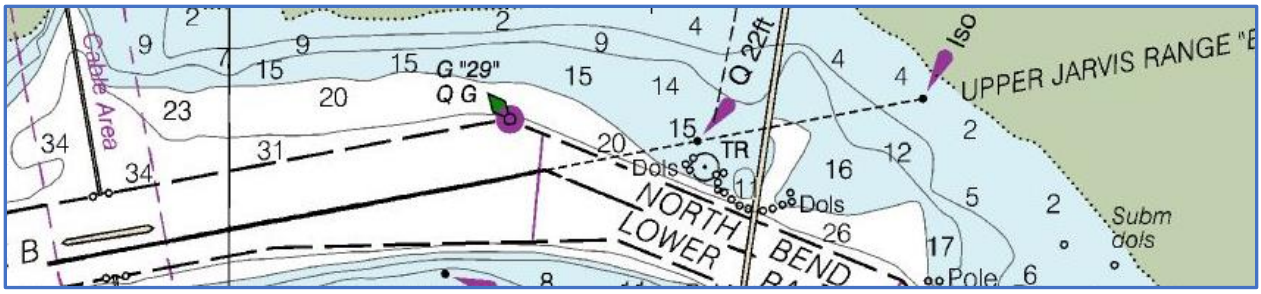


FIGURE 13 - CHART SHOWING UPPER JARVIS RANGE AND BRIDGE ALIGNMENT

4.4.3 FAA Air Draft Restrictions

NOAA recently added the following information in the Coast Pilot regarding vessels with a vertical clearance of 144ft and above.

Vessel Reporting Advisory

Operations in the Vicinity of Southwest Oregon Regional Airport

Inbound and outbound vessel traffic near Southwest Oregon Regional Airport may affect procedures for a1rcraft landing and departing at the airport. Vessels With an air draft of 144 feet or greater present a potential obstruction to airspace that require advisories be issued to aircraft by air traffic Controllers and in some case, runway use may need to be restricted. Notification by vessels exceeding 144 feet air draft (including raised cranes or other cargo gear), when operating in vicinity of the airport is essential to provide aircraft important notice of potential airspace obstruction during instrument approaches.

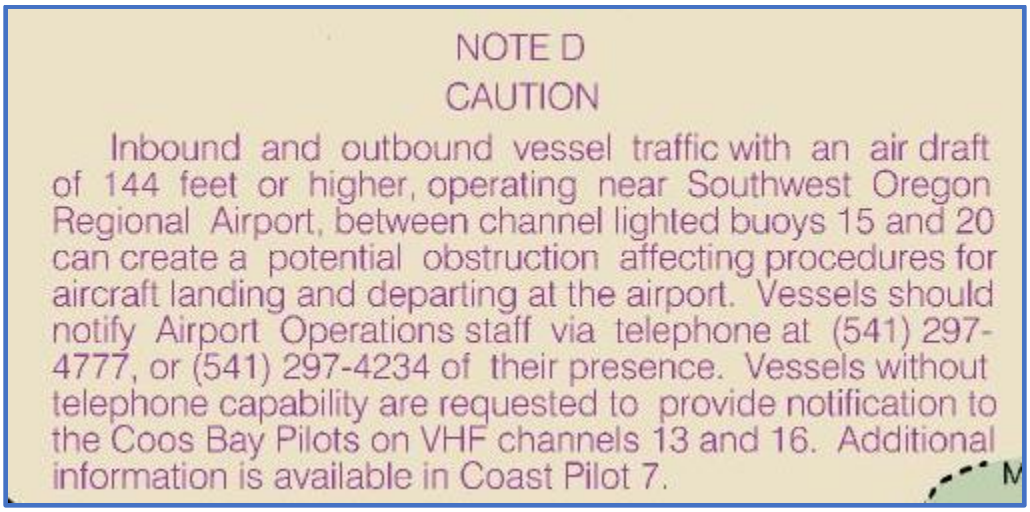
Vessels with an air draft height of 144 (44 meters) or greater are advised to report the following information:

- The vessel's name, a point of contact and a call-back method of communication to the ship.
- The vessel's maximum air draft height (including masts, cranes, antenna or other projections).
- If inbound from sea, report time of arrival at Coos Bay Channel Lighted Buoy 15 (with at least 10 minutes advance notice), and again when past Coos Bay Channel Lighted Buoy 20.
- If outbound to sea. report time of arrival at Coos Bay Channel Lighted Buoy 20 (with at least 10 minutes advance notice), and again when past Coos Bay Channel Lighted Buoy 15.

Notification can be made to the Airport Operations staff' via telephone at 541-297-4777 or 541-297-4234. Vessels without telephone capability are requested to provide notification to the Coos Bay Pilots on VHF-FM channels 13 and 16, to be relayed to the Airport operations personnel.

FIGURE 14 - FAA ADVISORY IN THE COAST PILOT

Upon notification, Airport traffic controllers will notify in and outbound aircraft, or restrict the runway until the vessel has passed. This information is also included in Chart 18587 as Note D Caution:


NOTE D
CAUTION

Inbound and outbound vessel traffic with an air draft of 144 feet or higher, operating near Southwest Oregon Regional Airport, between channel lighted buoys 15 and 20 can create a potential obstruction affecting procedures for aircraft landing and departing at the airport. Vessels should notify Airport Operations staff via telephone at (541) 297-4777, or (541) 297-4234 of their presence. Vessels without telephone capability are requested to provide notification to the Coos Bay Pilots on VHF channels 13 and 16. Additional information is available in Coast Pilot 7.

FIGURE 15 - FAA ADVISORY IN CHART 18587

NOTE: Pilots monitor VHF 13 and 16 only when on duty on vessels.

4.4.4 Upper Bay Shoaling.

The USACE has not dredged the navigation channel past RM 12.8 to 15.2 since 2010, due to lack of deep draft vessel traffic.

4.4.5 Transiting Rail Road bridge.

All vessels should ensure the Rail bridge is open, as it swings shut when trains are expected to pass over it. The train/bridge schedule is variable and not posted anywhere online or made publicly available. The bridge master can be reached via radio or telephone when they are on the bridge. Pilots onboard commercial vessels also ask the tugboats ahead of them, about the status of the bridge.

Swing bridges are required to have lights. Each swing span of every through swing bridge shall be lighted with three lanterns so that when viewed from an approaching vessel the swing span when closed will display three red lights on top of the span structure (see CFR 118.70 Lights in swing bridges).

Mariners should use extreme caution when passing through the bridge because of unpredictable changing winds, currents, and sea conditions reported in this area.

5 Conditions specific to Navigation Rule 9 - Narrow channel

This section is an assessment of current safety problems or conflicts with commercial, recreational, sailing and fishing vessels as it relates to a violation of Rule 9 (Narrow Channels Rule) of the Inland Navigational Rules Act (33 USC 2009). Each section of Rule 9 (*in italics*) has been broken down and issues for each assessed.

5.1 Keeping to starboard side outer limit of the channel

> *"(a) (i) A vessel proceeding along the course of a narrow channel or fairway shall keep as near to the outer limit of the channel or fairway which lies on her starboard side as is safe and practicable.*

There are currently no issues.

5.2 Down-bound right of way

Not applicable as the Coos River is not a Western river.

5.3 Impeding passage of vessels that only navigate in the channel

> *(b) A vessel of less than 20 meters in length or a sailing vessel shall not impede the passage of a vessel that can safely navigate only within a narrow channel or fairway.*

This has not been a major issue as most small vessels are aware to operate outside of the deep draft vessel channel when ships are approaching.

5.4 Fishing vessels impeding the passage of any other vessel

> *(c) A vessel engaged in fishing shall not impede the passage of any other vessel navigating within a narrow channel or fairway.*

5.4.1 Recreational fishing vessel

Recreational fishing vessels fish in the main channel and are known to tie up or anchor by the bridge pylons. This type of operation may create a navigational hazard for other waterway users by impeding or restricting their passage.

Recommendations:
Increase education of the waterway users to the potential hazards within the Coos Bay user community.

5.4.2 Derelict crab pots

Assessment

Some recreational fishing vessels never recover their crab pots that were either dropped in the channel or drift over into the channel. Vessels navigate over crab pots which results in their lines, and associated debris, getting caught in the propellers. This has caused multiple vessels to lose propulsion/steering and is a safety risk when vessels try to retrieve the entangled pots as they are not equipped to do so.

Recommendations
Increased education to the recreational crabbing community and commercial operators.
The Dungeness crab commission has derelict crab cop recovery program in place which involves financial incentive to fishermen to recover the pots.

5.4.3 Seasonal recreation fishermen

Assessment
The density of recreational fisherman, especially during fall salmon season, can pose hazards to navigation. The North Bend range is the most popular place for recreational salmon fishing in the Fall when there can be hundreds of small vessels in and out of the channel.

Recommendation
Increased education to the salmon fishing community regarding Rules of the Road and safe boating practices.

5.5 Crossing narrow channel

> *(d) A vessel must not cross a narrow channel or fairway if such crossing impedes the passage of a vessel which can safely navigate only within that channel or fairway. The latter vessel must use the signal prescribed in Rule 34(d) (§ 83.34(d)) if in doubt as to the intention of the crossing vessel.*

There are currently no issues.

5.6 Overtaking in a narrow channel

> *(e) (i) In a narrow channel or fairway when overtaking, the power-driven vessel intending to overtake another power-driven vessel shall indicate her intention by sounding the appropriate signal prescribed in Rule 34(c) (§ 83.34)(c)) and take steps to permit safe passing. The power-driven vessel being overtaken, if in agreement, shall sound the same signal and may, if specifically agreed to, take steps to permit safe passing. If in doubt she shall sound the danger signal prescribed in Rule 34(d) (§ 83.34)(d)). (ii) This Rule does not relieve the overtaking vessel of her obligation under Rule 13 (§ 83.13).*

There are currently no issues.

5.7 Vessel approaching a bend or area that obscures other vessels

> *(f) A vessel nearing a bend or an area of a narrow channel or fairway where other vessels may be obscured by an intervening obstruction shall navigate with particular alertness and caution and shall sound the appropriate signal prescribed in Rule 34(e) (§ 83.34(e)). (g) Any vessel shall, if the circumstances of the case admit, avoid anchoring in a narrow channel."*

There are currently no issues.

6 Aids to Navigation

This section describes the fixed navigational hazards specific to the region and the aids to navigation systems in place to minimize the risk of contact with these hazards.

6.1 Types of Aids to Navigation

6.1.1 Rough Bar Advisory Sign

Coos Bay bar is a regulated navigation area and as such, the Coast Guard has established Coos Bay South Slough Regulated Navigation Warning Sign, a rough bar advisory sign, on the east end of the breakwater at Charleston Boat Basin in about 43°20'48"N., 124°19'18"W to promote safety for small-boat operators. The sign is diamond-shaped, painted white with an international orange border, and with the words "Rough Bar" in black letters. The sign is equipped with two quick flashing amber lights that will be activated when hazardous conditions exist and the bar is restricted to recreational and uninspected passenger vessels. Boaters are cautioned, however, that if the lights are not flashing, it is no guarantee that the sea conditions are favorable.

In accordance with 33 CFR 165.1325, the U.S. Coast Guard has the authority to restrict all recreational and uninspected passenger vessels from crossing the bar when hazardous conditions exist. Failing to comply with posted bar restrictions may result in a maximum civil penalty of $25,000.00

Additional warning signs are located at the boat ramps areas in Charleston and Empire. These signs are blue in color and have amber flashing lights that read: Warning When Flashing, Bar Restrictions in Effect, Tune to 1610 AM. When the amber lights are flashing on any of the warning signs hazardous conditions are present and a bar restriction is in place and mariners should tune in to listen to the restriction information.

6.1.2 Automatic Identification System (AIS)

AIS allows ports and ships installed with the system to automatically know where ships are located as viewed on the radar screen and share pertinent information about each vessel. While not currently used by the port of Coos Bay, AIS receiving capabilities could be installed and be used to the advantage of the agencies, the port, and ship husbandry companies. Since the port does not have Vessel Traffic Management System or use AIS; vessel transiting Coos Bay are responsible for their own safe passage.

6.1.3 Differential Global Positioning System (dGPS)

Differential Global Positioning System (dGPS) is an enhancement to Global Positioning System that provides improved location accuracy, from the 15-meter nominal GPS accuracy to about 10 cm in case of the best implementations.

The United States Coast Guard (USCG) runs its National dGPS (NGDS) on the longwave radio frequencies between 285 kHz and 325 kHz near major waterways and harbors. The USCG's

NGDPS is jointly administered with U.S. Department of Transportation's Federal Highway Administration. It consists of broadcast sites located throughout the inland and coastal portions of the United States. While available in the area, it is unreliable and not frequently used.

6.2 Evaluation of Navigational Hazards

Any channel modifications will require a new review of the Aids to Navigation (ATON) needs and any changes to the positioning of ATON by the USCG should be reviewed by CBHSC. The list of ATON under review by the USCG and CBHSC is included in Appendix C of this plan.

As previously mentioned, Coos Bay has several navigational hazards most of which are outside of the Federal navigational channel and as such are more likely to be a concern to small boats that can navigate outside of the channel. Deep draft vessels should still be aware of some of these hazards as they are located close to the channel; ex: submerged jetties and Guano Rock.

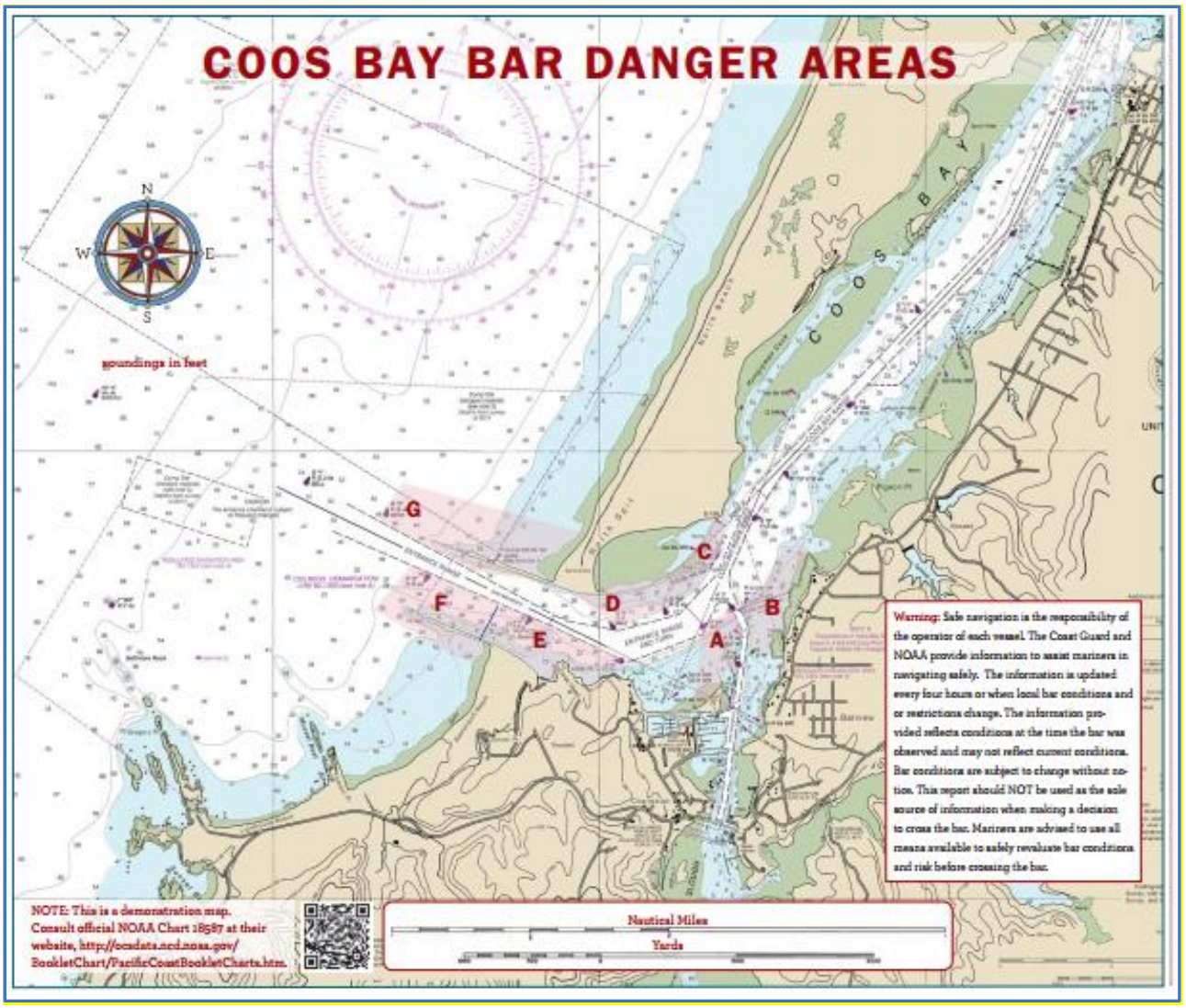


FIGURE 16 - COOS BAY BAR DANGER AREAS[2]

6.2.1 Navigational hazards affecting boats

A. South Slough Sand Spit. As you leave the Charleston Boat Basin, the South Slough Sand Spit extends north and parallel to the channel from South Slough Red Lighted Marker #8, approximately 450 yards north towards South Slough Red, Lighted Marker #4. South Slough Lighted Buoy 2 marks the north end of the sand spit. It is dangerous. DO NOT CROSS THIS AREA.

B. South Slough/Charleston Channel submerged jetty. From the entrance to the Charleston Channel from Green Lighted Marker #1, shoreward marks the end of the submerged jetty. This jetty is visible only at low water. When departing the Charleston Boat Basin, stay in the South Slough Charleston Channel to the left of Green Lighted Marker #1 at all times.

[2] https://www.uscg.mil/d13/dpw/docs/Coos_Bay_Bar_Crossing_Handout.pdf

C. Sandspit, North Beach. This area, commonly known as the cribs is located shoreward of buoy 7 and is dangerous due to its shallow depth and submerged jetties. Occasionally, on strong ebb tides, breakers will form in this area. This area should also be avoided because of the possibility of aground or striking submerged jetties and pilings. Inbound and outbound commercial tugs and deep draft vessels also pass close to channel boundaries and cannot stop for obstructions or small vessels in the channel.

D. The area north of Coos Bay Channel lighted buoy 5 and 5A. This area is shallow and can be very dangerous when there are any large swells on the bar or during ebb tide. Breakers are very common in this area, and without warning. While vessels transit this area on occasion, this area should be avoided. The main channel is the safest navigable water.

6.2.2 Navigational hazards affecting vessels

E. South Jetty, Guano Rock area. This is a very dangerous area because of shoals extending out from the south jetty to the entrance channel. Breakers are frequently experienced from Guano Rock Lighted Whistle Buoy 4 and sometimes breaks onto Coos Head extending out to sea. Exercise extreme care in this area at all times, especially on ebb tides. Submerged rock by the channel entrance only has about 10 feet of water above it at low tide. *Buoy R 4 marks the rock, but it has washed downstream from the rock and the US Coast Guard is not planning on changing it.*

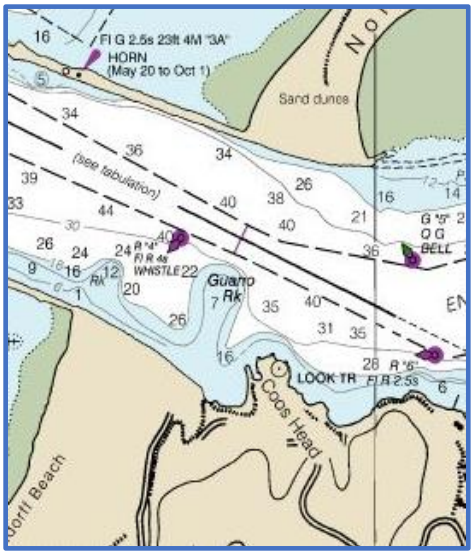


FIGURE 17 - GUANO ROCK BY COOS HEAD

F. South jetty submerged 100 yards. The outward end of the south jetty is submerged from the visible end of the jetty. NEVER CROSS THIS AREA. There are breakers in this area most of the time. When departing the bar southbound, be sure to pass seaward of Coos Bay south jetty Lighted Gong Buoy 2 before turning to the south.

G. North jetty submerged. The North Jetty extends approximately 300 yards to the West of the visible tip. The seaward end of the jetty is submerged from the visible tip towards Coos Bay North Jetty Lighted Whistle Buoy 3. NEVER CROSS THIS AREA. There are breakers in this area most of the time. When departing the bar northbound, be sure to pass seaward of Coos Bay North Jetty Lighted Whistle Buoy 3 before turning to the north."

6.3 Action Summary on Aids to Navigation

The list of ATON under review by the USCG and CBHSC is included in Appendix C of this plan.

7 Spill Response

7.1 Coos Bay Response Cooperative

The Coos Bay Response Cooperative, Inc. (CBRC) is a non-profit marine industry-owned association consisting of the terminal operators in the Coos Bay harbor. CBRC was formed in 1994 and acts as an initial responder. Additional contractors would be called out as necessary depending on the nature and duration of the response. Within 24 hours, the responsible party will bring additional contractors as necessary and reasonable.

The CBRC has developed this "Umbrella" Oil Spill Contingency Plan (Plan) to cover general commercial vessels calling at berths in Coos Bay. Oil Terminal Owner/Operators and Tank Vessels including Self Propelled Tankers and Tank Barges are covered by their respective Vessel/Facility Plans and may site the resources listed in the Plan if they are members of the CBRC and have executed appropriate Service Agreements. The geographic area covered by this Plan consists of Coos Bay from the Isthmus Slough Bridge at river mile 15 to the mouth (at river mile 0). Pollution response equipment accessible to CBRC is located at the following facilities/locations: Roseburg Coos Bay Shipping Terminal; Ocean Terminal; Carson Davis Oil, Tyree Oil, Market Avenue and SOMAR and includes, boom, boom boat, skimmers, skiffs, storage tanks, cab over truck and high-power jets.

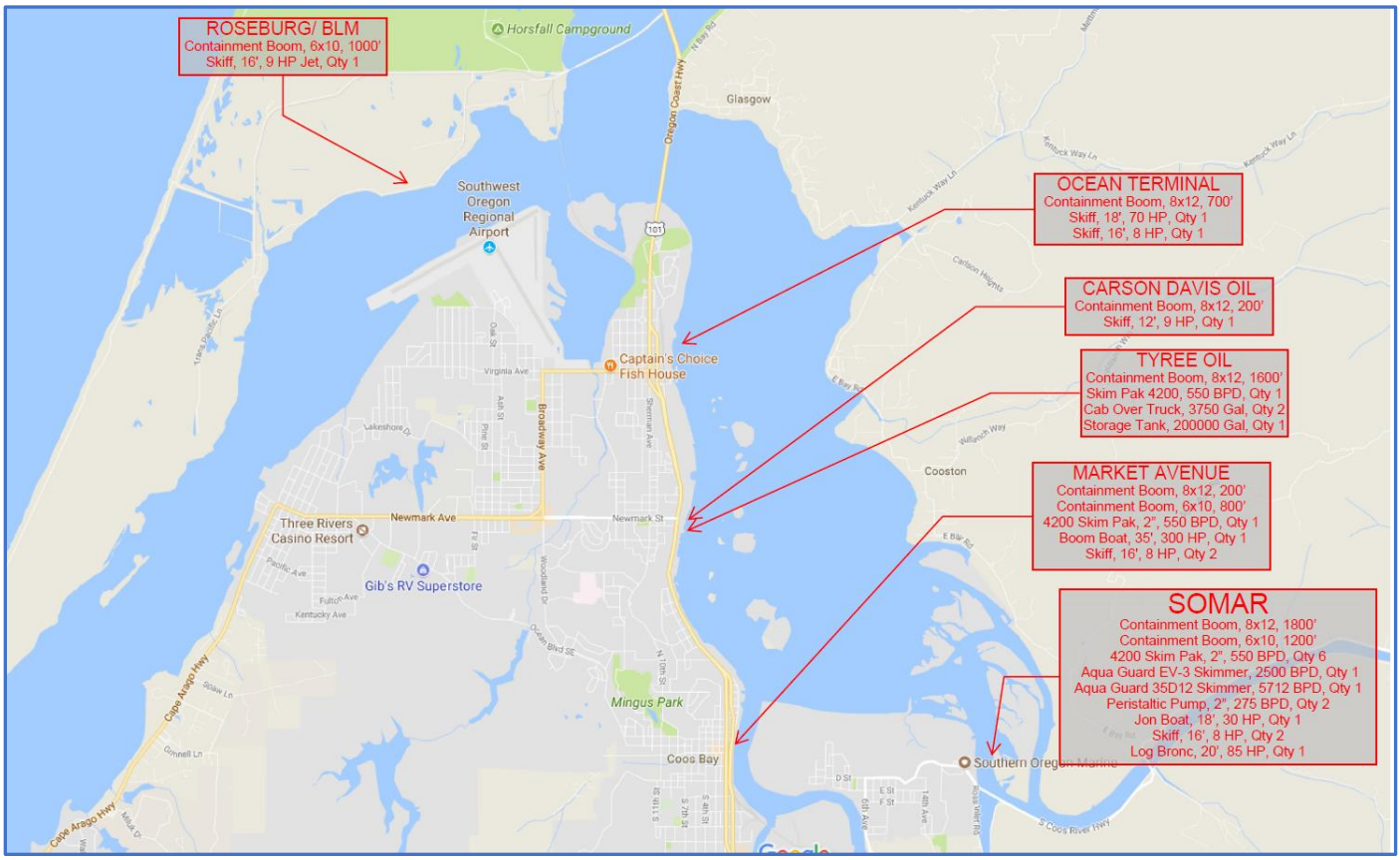


FIGURE 18 - CBRC OIL SPILL EQUIPMMENT LOCATION MAP

In response to a spill, responsible parties, Oil Spill Response Organizations as well as Federal, State and local agencies will implement an Incident Command Systems to effectively respond to the incident.

7.2 US Coast Guard

The US Coast Guard has spill response equipment located in a trailer at the Coos Bay Air Station and the Pacific Strike Team will be mobilized in response to a spill.

Response activities will follow the Coos Bay Geographic Response Plan.

8 Maritime Security Conditions

There are no current maritime security concerns and there has been no increase in Maritime Security Levels since the implementation of the Maritime Transportation Security Act, (MTSA), in 2002 and Codes of Federal Regulation (CFR) that govern ship and facility security (33 CFR 101, 103, 104 and 105).

The Act and CFR's require that facilities that receive foreign flagged vessels greater than 100 gross tons (GT), cruise ships or facilities that handle certain dangerous cargos develop and implement a security plan to help deter criminal and terrorist activities. Each Facility Security Plan (FSP) will be reviewed and approved by the Captain of the Port (COPT) and the facility audited on an annual basis.

FIGURE 19 – M/V FLORA PIONEER DEPARTING ROSEBURG COOS BAY TERMINAL

There are three maritime security levels (MARSEC), with level 1 being the lowest and 3 the highest. Facilities normally operate at MARSEC level is level 1, but this can be increased to higher levels by the Captain of the Port based on the credibility and specificity of security threats to the area, leading to the possibility of port closure when at MARSEC Level 3.

While this Harbor Safety Plan addresses safety concerns, there may be issues between safety and security, where depending on the situation, one will take a secondary position to the other. An example of this is an increase in MARSEC level where the implementation of additional security measures may affect existing safety procedures or concerns, such as closing access/exit doors to restrict and better control unauthorized access to the facility, pier or ship.

It is important to be aware of this relationship in developing any new safety procedures or recommendations.

9 Vessel Traffic and Cargos

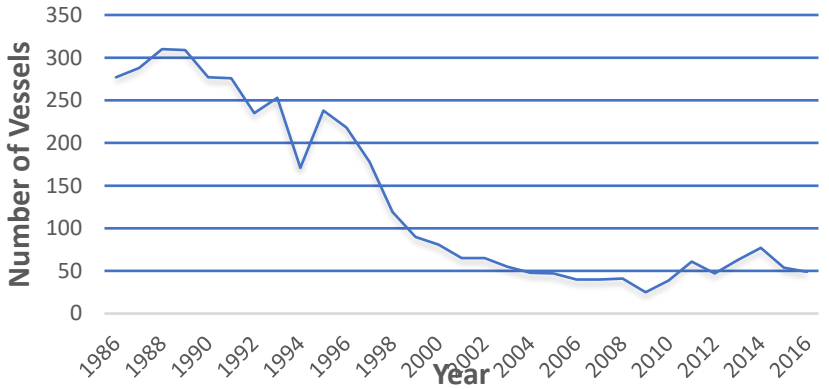
9.1 Commercial Vessels

Vessel cargo consists primarily of wood products and the number of large ships using the Coos Bay area has fallen off since the year 2000. During the past two years (2015-2016), a total of 100 ships have visited the Coos Bay Harbor complex. This equates to approximately one ship per week. While documented records were not available, tug and barge traffic has been approximately 200-400 per year.

Despite a continued drop in deep draft vessel calls since 1990, future projections indicate an increase in vessel arrivals into the port of Coos Bay.

Over the years, while the **number** of deep draft vessels typically calling on Coos Bay terminals has decreased, their size has increased from an average of 45,422 Metric Tonnes to an average of 52,894 Metric Tonnes with a projected near-term vessel size of 70,400 Metric Tonnes as seen in Appendix D.

TABLE 2 - VESSEL CALLS PER YEAR 1986-2016



This increase in vessel size creates its own set of safety concerns that the CBHSC should keep an eye on. Some of these concerns include:

- the suitability of the navigational channel (is the channel deep enough; are the turning basins large enough) and
- the maneuverability and responsiveness of these large vessels in a waterway with a projected increase in vessel traffic as well as
- the increase pollution potential of these larger vessels.

There are currently no issues that need attention from the CBHSC.

There are no vehicle or passenger ferries or cruise ships in or calling Coos Bay.

9.2 Commercial Fishing Vessels

The Coos Bay area was once a very large fishing area. Dungeness Crab, Chinook salmon are the primary commercial fisheries in Coos Bay with Albacore tuna and pink shrimp coming in second. The recent decline of the fisheries has diminished the fishing fleet, but the fleet still numbers some 85-100 vessels operating from the area. These vessels are both moored in the harbor as well as trailered to the marina for launching.

According to the US Coast Guard, in 2016, sixteen of the eighteen casualties involved commercial fishing vessels.

In addition to the commercial fishing fleet, there are five U.S. Coast Guard inspected passenger vessels which take customers out fishing during the season.

9.3 Recreational Boating

Recreational boaters are a safety concern in Coos Bay, as the operators do not always know the navigational rules of the road, keep a proper lookout or keep their boats in good operating conditions.

According to 2016 statistic collected and analyzed by the Oregon State Marine Board, the number one cause of fatal accidents this year was a 3-way tie of Force of Wave/Wake, Hazardous Waters and Operator Inexperience/Error with most of the accidents happening while crabbing/fishing and relaxing.

The US Coast Guard Auxiliary offers free vessel safety checks, boat safety training and reading material to help educate the recreational boating community regarding boating safety practices, rules of the road, Oregon boating laws and Coos Bay navigational hazards. Vessel Safety Checks are available by appointment in the Coos Bay, North Bend, Lakeside, Winchester Bay, Reedsport, and Bandon areas.

9.4 Vessel Traffic

This section provides a description of the procedures for routing vessel traffic, and any contingency or secondary routing plans which may be used during construction and dredging operations.

9.4.1 Vessel Traffic System

There is no Vessel Traffic System (VTS) in Coos Bay. The small amount of existing traffic is managed by the pilots. The larger vessels are generally handled a single ship at a time, which produces a one-way traffic pattern.

9.4.2 Notice of Arrivals

The National Vessel Movement Center (NVMC) was established to track notice of arrival information from ships entering U.S. ports. If a ship's voyage time is 96 hours or more, they must submit a Notice of Arrival (NOA) at least 96 hours before entering the U.S. port or place of destination. If a ship's voyage time is less than 96 hours, they must submit an NOA before departure, but at least 24 hours before entering the port or place of destination. This regulation applies to U.S. and foreign vessels bound for or departing from ports or places in the United States.

Notwithstanding the USCG requirement of 96 hours advance notice of arrival, the pilots request at least a 24-hour advance notice of arrival. This ensures they will be able to reach the pilot boarding station at the proper time, as well as advise the Master of the ship if there are potential delays in entering the harbor.

9.4.3 Vessel Routing

The risk of a grounding/collision generally increases the closer a vessel transits to shore. The higher risk areas were generally 25 nautical miles (nm) from land along the entire West Coast.

The West Coast of the United States has a voluntary agreement between the States, shipping companies, and the US Coast Guard. This agreement governs coastal traffic patterns. Using the Pacific States/BC Task Force Voluntary Routing Guide, tug and barges typically remain between 5-25 miles from the coast. Tank barges remaining at least 25 miles from the coast. Tank ships are obliged to stay greater than 50 miles from shore unless making port entry.

There is no specific or secondary routing for vessels transiting Coos Bay besides staying within the navigation channel as marked in NOAA Chart 18785 and following the Rules of the Road and the Law of Tonnage.

10 History of Accidents and Near Misses

This section reviews the history and types of all accidents and near-accidents which have occurred within the region during the past two years (2016-2017) and any corrective actions or programs taken to alleviate recurrences.

10.1 Statistics Year 2016

A total of 18 marine casualties were reported in 2016. Sixteen of the casualties involved commercial fishing vessels and included the following incidents: one (1) involved a grounding, one (1) involved a crewmember injury, three (3) involved vessel sinking and loss of life, described in the following section; three (3) involved loss of steering and eight (8) involved loss of propulsion. The other two marine casualties involved a crewmember injury onboard a bulk carrier and a reduction of propulsion onboard a tug.

10.2 Statistics Year 2017

A total of 6 marine casualties have been reported for 2017, as of July 7, 2017. Four of the casualties involved commercial fishing vessels and included three incidents of loss of propulsion and one incident with a loss of power. The other two casualties involved a loss of propulsion on an ATB (articulated tug and barge) and a crewmember injury onboard a bulk carrier.

10.3 Recent Accidents

Summary of recent accidents can be found in Appendix E.

10.4 Historical Accidents of Significance

10.4.1 Grounding of the M/V New Carissa

The M/V NEW CARISSA, a 639-foot bulk freight ship of Panamanian registry, was operated by TMM Co. Ltd., of Tokyo and owned by Green Atlas Shipping S.A. of Panama. On the night of 3 February 1999, there were 26 crewmen on board. The vessel carried no cargo, as it was inbound from Japan to pick up 37 thousand tons of wood chips at Coos Bay, Oregon. However, a strong ocean storm, with winds that reached 39 knots and seas up to 26 feet, was hitting the Central Oregon Coast that night. The Coos Bay pilot assigned to join the ship indicated that it would not enter the bay under those conditions and that he would join the ship the next day. During the storm, the ship dragged anchor and drifted towards shore. The crew tried to weigh anchor and move the ship, but during the early morning hours of 4 February, it went hard aground about 150 yards off a stretch of remote, undeveloped sandy beach three miles north of Coos Bay, Oregon.

The grounding of the M/V NEW CARISSA was unusual in that the ship became grounded twice, the response set a precedent by burning the ship's oil on board, and extraordinary means, including 69 rounds from a Navy destroyer and an MK-48 torpedo from a nuclear-powered submarine, were attempted to sink the ship in order to reduce the risk of a major oil spill.

The M/V NEW CARISSA casualty did not occur while entering or transiting Coos Bay. The vessel's master chose to wait out the storm at anchor instead of proceeding to sea and awaiting the pilot. Anchoring offshore has been restricted since this casualty.

10.5 Near Misses

According to the US Coast Guard, there have no records of near misses. This does not mean that they do not occur.

10.6 Loss of Propulsion/Steering

There is currently no guidance for vessels coming in and out that are having difficulty with steering/propulsion. Procedures will very much depend on how disabled the vessel is and its location in the Bay/ river.

Loss of Propulsion and Loss of Steering are reported to the US Coast Guard.

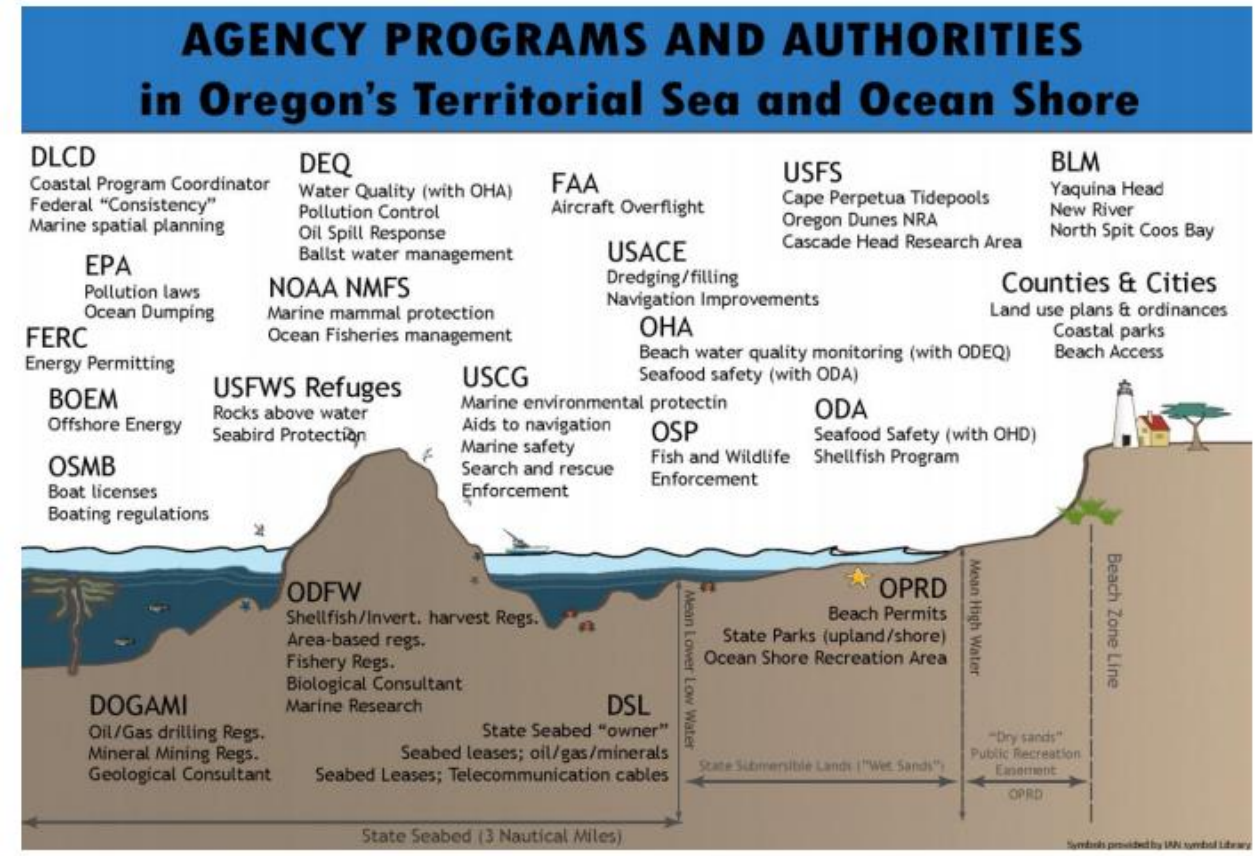
10.7 Corrective actions or programs

No corrective measures or programs have been taken or established by the CBHSC.

Boater education and information regarding weather and bar conditions continue to be distributed by the US Coast Guard, Coast Guard Auxiliary, Dungeness Crab Commission, NOAA and other agencies/entities.

11 Federal, State, And Local Agencies and Laws

As can be seen from the image below, many agencies have responsibility and authority over Oregon's territorial sea and ocean shore. However, of those listed only a few have jurisdictional authority and programs with direct impact on the maritime safety of the harbor.



Source: ODFW and Oregon Department of Land Conservation and Development (DLCD)

FIGURE 20 - JURISDICTIONAL AREAS OF OREGON AGENCY PROGRAMS AND AUTHORITIES

11.1 Federal Laws

The two Federal agencies with jurisdiction over the safety of Coos Bay Harbor are the US Coast Guard and the Army Corps of Engineers.

11.1.1 US Coast Guard (USCG)

The Captain of the Port has varying levels of jurisdiction extending to the outer limit (200 nautical miles) of the EEZ for foreign and domestic vessels.

The US Coast Guard has several lines of authority and program activities that relate to Oregon's territorial sea. The USCG (1) is the lead agency for oil-spill response and cleanup and is the on-scene coordinator for planning and response; (2) maintains search-and-rescue stations, including air stations at Warrenton (Astoria) and North Bend (Coos Bay); (3) has authority over buoys and

markers to regulate vessel operations. The USCG has a program of routine Marine Environmental Patrols along the ocean shore to locate and ensure the safe removal of any hazardous materials or debris that may be washed ashore. The USCG is also responsible Harbor Security and Investigations of marine incidents and accidents.

- Regulations regarding vessel safety fall under Title 46 Code of Federal Regulations (CFR); Shipping
- Regulations regarding safe navigation and security fall under Title 33 CFR Navigation and Navigable Waters parts 1-199

11.1.2 Army Corps of Engineers (USACE)

The Corps is responsible for building and maintaining coastal navigational projects, including jetties, navigation channels, and navigational structures under the Rivers and Harbors Act (33 USC 401 - 709b and 2201 - 2329). Material dredged from coastal ports is frequently disposed in ocean waters at sites designated by the Environmental Protection Agency (EPA). Placement of dredged materials at these ocean sites is regulated under sections 102 and 103 of the Marine Protection, Research, and Sanctuaries Act (MPRSA) administered by the EPA or the Corps under section 404 of the Clean Water Act (CWA). The Corps also has permit authority over work performed by others in navigable waters under section 10 of the Rivers and Harbors Act, Section 404 of the CWA, and section 103 of the MPRSA.

- Regulations regarding navigation fall under Title 33 CFR Navigation and Navigable Waters parts 200-399

Other Federal Agencies with jurisdiction over the maritime interests are listed in Appendix F.

11.2 State

11.2.1 Department of State Lands

The Department of State Lands is responsible for management of publicly owned submerged and submersible land. The public has rights to use the beds and banks of navigable waterways for any legal activity, such as boating, fishing, and swimming. The following are typical uses of state-owned submerged and submersible lands:

- Houseboats
- Boat ramps
- Docks, floats, and wharfs
- Marinas and moorages
- Marine industrial facilities
- Bridges
- Utilities and pipeline crossings
- Sand and gravel operations
- Remedial cleanup
- Non-water dependent commercial uses (restaurants for example)

Any of the uses described above require an authorization from the Department of State Lands. Authorizations include leases, licenses, easements, registrations and short-term access agreements. The Department of State Lands also issues two types of permits and authorizations:

- Removal-fill permits for removal or fill activity in waterways and wetlands
- Proprietary waterway authorizations for use of state-owned waterways

11.2.2 Department of Environmental Quality

Oil Spill Contingency Planning Act (ORS 468B.300) requires an oil spill prevention and emergency response plan approved by the Department of Environmental Quality prior to the operation of onshore or offshore oil or gas facilities or operation of tanker, cargo, or passenger vessels in state waters of the Pacific Ocean, estuaries to the head of tide water, the Columbia River, and the Willamette River to Willamette Falls. This act includes legislative policy, provides the DEQ with authority to adopt standards for preparing contingency plans, and lists minimum requirements for such contingency plans. The act establishes an Oil Spill Prevention Fund, creates an Oregon coast safety committee, and establishes a wildlife rescue training program.

11.3 Local Laws

There are currently no local laws in effect that pertain to ports safety.

11.4 Existing and proposed Laws and Regulations

Review of existing and proposed federal, state and local laws, regulations or ordinances affecting the region to determine a need for any change;

11.4.1 Change to state pilotage laws

House Bill 2695 does not require local knowledge for tugboat operators. The Pilots are working with the US Coast Guard to make sure this is not the case and that some local knowledge is in place. Tugs sailing under registry from Canada to Coos Bay only are not required to take a state licensed Pilot.

12 Educational Needs

An assessment of the need for establishing or upgrading existing educational or public awareness programs for all waterway users.

12.1 Seasonal and Recreational Boaters

The Coast Guard reminds boaters to adhere and pay attention to bar restrictions while traveling rivers in the area. Deaths in bar-related accidents have been reported along the coast of Oregon each year. Failure to comply with rules and regulations could result in financial penalties, imprisonment, and forfeiture of the owner's vessel and equipment.

Boaters should check weather reports and ensure they have the proper safety and communication equipment before getting underway. To check local bar conditions, call the nearest Coast Guard station or tune the radio to 1610 AM. For up to date bar status or restrictions visit:

http://www.wrh.noaa.gov/pqr/marine/bars_mover.php[3]

While information is provided to the community, accidents still happen. The CBHSC recognizes the need for additional education and outreach programs to both the recreational and commercial boating community.

[3] United States Power Squadron, Coos Bay website http://www.usps.org/lc/coos/page3.html

13 Communications

13.1 Current ship-to-ship and ship communication

Radios:

- The USCG monitors channel 16
- The USCG provides notice to mariner, navigation safety update on channel 22A
- The pilot boats monitor VHF-FM channels 13 and 16 and use channels 12 and 18A as working frequency.
- Tugboats over 26' in length are subject to the Bridge to Bridge Radio act and required to monitor Channel 16 (distress) and Channel 13 (communications). In Coos Bay, towboat operators primarily work 7A followed by 65. The Pilots work 18A.
- Coos County Sheriff boats use and monitor channel 16 when underway.

Cellular Phones:

- The use of cell phones/texting devices and phone applications aboard US Coast Guard boat force assets is not authorized without the permission of the coxswain. At no time will the operator of the boat use a cell phone or texting device.
- Cell phones are not used on the bridge by Pilots.

13.1.1 Current ship-to-shore communication systems used in the region

- Radios – VHF marine band
- Cellular Phones

13.2 Low propagation, or silent areas within the region

There are currently no low propagation or silent areas, however,

- Channel use is busy during fishing season and causes Pilot to change channels.

13.3 Strategy to address communication deficiencies.

There are currently no deficiencies that need to be addressed by the Harbor Safety Committee.

14 Bridge User Requirements

This section includes an assessment of current schedule for bridge openings, the adequacy of the ship to bridge communications and the physical limitations affecting vertical and horizontal clearances.

14.1 Rail Bridge

According to 33 CFR 117, the draw of the Port of Coos Bay railroad bridge, mile 7.5 at North Bend, shall be maintained in the fully open position, except for the crossing of trains or maintenance.

14.1.1 Schedule:

The trains do not follow a regular schedule due to the lack of demand. This is why there is no published schedule for when the Rail Bridge will be closed.

14.1.2 Communications

Bridge tenders only monitor the radio when they are on duty when a train is passing. At times, Pilots sometimes have difficulty reaching the bridgetenders on the radio and have to resort to using the landline, or the duty cell number.

Alternatively, if the Pilot cannot get hold of bridgetender, the Pilots will ask the tugs to verify the position of the bridge for them.

14.1.3 Clearances

As previously mentioned, vessels following the Upper Jarvis Range light will have to be aware of their proximity to the middle span of the open rail bridge.

15 Best Maritime Practices - TBC

15.1 Background

Best Marine Practices (BMPs) are not to be confused with regulations as they have no legal status. Instead, they provide guidance by the HSC to the maritime community on how a prudent mariner would proceed under specified circumstances. BMPs are clear and concise, as well as easily-accessed and understood by the mariner. It is hoped that such practical, hands-on safety measures will have broad appeal in the maritime community and reduce personnel, vessel and environmental casualties while facilitating the flow of maritime commerce.

Below are Best Maritime Practice "BMP" Guidelines[4]:

BMP should "NOT" be considered as follows:

1. A regulation, enforced by a regulatory agency
2. An underground regulation–it cannot be enforced by any regulatory agency

BMP should be considered as follows:

1. A common-sense measure or practice that would normally be employed by a prudent mariner
2. A useful tool that promotes safety and adds value and is not an exercise in generating paper
3. The result of "brainstorming at the grassroots level" by each HSC
4. An improved process or procedure that may originate as a recommendation from the HSC
5. "Best Maritime Practice" is an accepted and agreed upon method to conduct an operation or process that will enhance safety for vessels, personnel, dockside facilities and marine resources
6. A good example of a "Best Maritime Practice" would be the San Francisco and Los Angeles/Long Beach Harbor Safety Committees' recommended procedure with respect to bunker barge transfer operations while alongside containers vessels at terminals.
7. Include as a disclaimer that the "BMP" is not in conflict with nor do they replace existing regulations which are already in place

15.2 The BMP Process

1. Once a "BMP" is developed it should be communicated to members of the harbor community in one of or all of the following manners
    a. Incorporated into related procedure manuals or references made to the particular "BMP"
    b. Posted on the Port of Coos Bay web page for the public at large
    c. Distributed in the form of brochures
    d. Referenced in the "Coast Pilot" as appropriate
2. "BMP" should also be included in the Committee's Harbor Safety Plan

[4] The California Department of Fish and Game, Office of Spill Prevention and Response (OSPR) presented these guidelines to the California Harbor Safety Committees at their Summit on 11/3/2009

3. "BMP" should be reviewed or revisited annually to determine if they can be improved upon, or even discontinued as the case may be

15.2.1.1 Coos Bay Best Maritime Practices

BMP's adopted by the CBHSC are included in Appendix G.

16 Monitoring & Plan Enforcement

This section includes suggested mechanisms that will ensure that the provisions of the plan are fully, uniformly and regularly enforced.

The Committee developed guidelines for vessels operating in this region to ensure safe, reliable, and environmentally sound marine transportation. Although the Committee cannot enforce these guidelines under state, federal, or local law, they institutionalize sound marine operating practices as Standards of Care that responsible vessel operators follow voluntarily. The Committee depends on its members, local, state, and federal agencies and the maritime community to monitor compliance with the Standards of Care.

Observed violations or deviations from this Plan should be referred to the Committee, Coast Guard, or State or local authorities for evaluation and possible enforcement under applicable federal and state law or regulation. If the Committee finds significant deviations, it will evaluate and may recommend more stringent enforcement, and, as appropriate, state, federal, or local rulemaking.

The following briefly summarizes Plan provisions requiring enforcement and the parties who directly monitor compliance. State and/or federal regulations cover some Plan sections discussed below, while others are guidelines.

1. Aids to Navigation: Federal regulations control all Aids to Navigation. Report any problems to the Coast Guard.

2. Anchorages: Federal regulations control anchorages. Pilots and Coast Guard normally monitor compliance with anchorage requirements. Violations are to be reported to the Coast Guard.

3. Harbor Depths, Channel Design, and Dredging: Federal law and regulations govern the harbor depths and dredging. Report any problems to the U.S. Army Corps of Engineers or port authorities.

4. Contingency Routing: Pilots and the Coast Guard monitor compliance, which the Coast Guard enforces. Violations are to be reported to the Coast Guard. Appendix H is a placeholder for the Coast Guard directive for emergency dispersal.

5. History of Accidents and Near Misses in the Harbor: This chapter's provisions are maintained by the Coast Guard and the Oregon Marine Board. Questions or concerns may be directed to them.

   Oregon:
   Oregon responsibilities of a boat operator at an accident scene: (ORS 830.475, 830.480, OAR 250-010-0110). Anyone involved in a boat accident must give name, address, other required information and aid to injured person(s), including transportation to a hospital if treatment appears necessary or is requested by injured person(s).

• Leaving a boat accident scene before performing operator's duties is a Class C felony punishable by five years in jail and/or a $100,000 fine.
• Boat operators involved in an accident resulting in death, injury or property damage exceeding $2000 must report the accident to the State Marine Board on a Marine Board Accident Report Form:

–within 48 hours of an accident resulting in death or injury;
–within 10 days of an accident causing property/equipment damage only.

Occupants are responsible for making accident report when the operator is physically incapable of doing so.

In the case of immediate need of assistance, waterway boaters should call 911.

US Coast Guard:
Under the general marine casualty reporting provisions of 46 C.F.R. part 4, the owner, operator, or person in charge of a vessel must report marine casualties involving a grounding, allision (a moving vessel hitting a fixed object), or loss of propulsion that impacts the maneuverability of the vessel, impacts the vessel's seaworthiness, or fitness for service or route, loss of life, injury requiring professional medical treatment, property damage in excess of $35,000, or significant harm to the environment. 46 C.F.R. § 4.05-1.

The initial report must be made immediately by telephone to Sector Columbia River Investigations Department at 503-861-2242, followed by a written report (Form CG-2692), within five days of the marine casualty. This report must include any necessary alcohol or drug testing required by the regulations,

6. Communications: This Chapter mandates that highest quality communications standards are used in Coos Bay Harbor. Discipline programs reducing congestion, interference, unnecessary/ excessive use of high power settings, and frequency misuse. All radio users in the harbor area, as well as Committee members, can help the Coast Guard, the Oregon Department of Fish and Wildlife, and the Federal Communications Commission (FCC) monitor these standards. Violations are to be reported to the FCC and to the Harbor Safety Committee.

   Waterway users can file complaints with FCC using an online complaint form. You can also file a complaint by calling 1-888-CALL-FCC (1-888-225-5322) voice, 1-888-TELL-FCC (1-888-835-5322) TTY; faxing 1-866-418-0232, or writing to:

   Federal Communications Commission
   Consumer & Governmental Affairs Bureau
   Consumer Inquiries and Complaints Division
   445 12th St., SW
   Washington, DC 20554.

You can help FCC resolve your complaint more quickly by providing as much of the following information as possible:
(1) the date and time the material was aired;
(2) the call sign, channel, or frequency of the station;
(3) the city and state where the complaint occurs; and
(4) as many details as possible about the content of the broadcast to help the FCC determine whether the material was improper. It is also helpful to include your address, e-mail and phone numbers.

7. Bridges: Federal regulations govern bridge operations. Improper bridge management incidents are to be reported to the Coast Guard District 13 Bridge Management Section (800) 982-8813 or to Sector Columbia River, Waterway Management Division at 503-861-2242.

8. Small Craft: The main small vessel potential safety problem is a violation of the U.S. Inland Navigation Rules (1980), Rule 9: impeding the progress of large vessels within channels. Pilots and the Coast Guard monitor compliance with Rule 9. Recreational boat navigation violations are to be reported to the Coast Guard or any readily available local law enforcement authority including the Coos County Sheriffs.

9. Tug Escort/Ship Assist: There is currently no tug escort and/or ship assist regulatory requirements for Coos Bay harbor. The USCG and the Pilots have the authority to require escort and ship assist vessels on a case by case basis.

10. Pilotage: Pilots should remain in service on inbound vessels until they reach safe berth and on outbound vessels until 1mile past K buoy. The US Coast Guard and pilots monitor compliance. Report any deviations from the standard procedures or Standards of Care of this Plan made by pilots or other vessel operators to the Committee or Coast Guard.

11. Under-keel Clearance and Inclement Weather: Pilots to monitor for compliance. Violations are to be reported directly to the Coast Guard. Report violations regarding reduced visibility to USCG.

16.1 Enforcement Authorities

The Committee formally requests that its members, as well as all agencies with enforcement and monitoring authority within the scope of the Plan, monitor compliance with Plan guidelines and provisions. Furthermore, it is very important that members of the local maritime community, who regularly conduct business in the harbor area and have the strongest presence, assist in monitoring by acting as the eyes and ears of the Committee. Please report infractions of Plan guidelines, violations of state and federal regulations and any unsafe practices to the following bodies, as appropriate:

1. The Coast Guard - 24/7 Command Duty Officer: Violations of federal regulations or Plan guidelines, and unsafe practices

- (503) 861-2242

3. The Coos County Sheriff Marine Division: Violations of state laws, local ordinances;
   - (541) 396-7830
4. Oregon Department of Fish and Wildlife: NON- EMERGENCY notifications for violations of state regulations;
   - (503) 947-6000
5. Department of Environmental Quality: Violations of state law governing oil transfers at marine facilities;
   - (800) 452-4011

The Committee encourages the local maritime community and agencies that monitor regulatory compliance to notify the Committee of marine safety and environmental concerns by email at Coosbayharborsafety@gmail.com or attending the regular monthly meetings and make a report to the Committee.

Should the Committee find that Plan guidelines are not routinely followed, it will evaluate more-stringent approaches to enforcement, including, as appropriate, state, federal, and local rulemaking

17 CBHSC Recommendations and Accomplishments

17.1 Recommendations

The CBHSC has submitted recommendations to the community. These can be found in Appendix I of the plan.

17.2 Accomplishments

The CBHSC has accomplished the following:

- FAA review of the vessel transit height restriction and agreement that aircraft movements will be controlled to allow the safe passage of vessels with an air draft greater than 144 feet.
- Distribution of thumb drives to the towing and crabbing community with charts/plots showing the designated tow lanes and the crabbing areas to help both avoid operating each other's areas.

18 Implementation of CBHSC Action Items

Action items derived from Harbor Safety Committee meetings will be reviewed by the committee and assigned to an individual or to a subcommittee to execute within a given time frame.

Action Items and their status are tracked in the table found in Appendix J.

19 Applicable Regulations and Guidelines

USCG Ports and Waterways Safety Regulations, 33 CFR Subchapter P

- Part 160 Ports and Waterways General
- Part 162 Inland Waterways Navigation Rules
- Part 163 Towing of barges
- Part 164 Navigation Safety Rules
- Part 165 Regulated Navigation Areas
- Part 169 Ship Reporting Systems

USCG Pollution Regulations, 33 CFR Subchapter O

- Part 151 Vessels Carrying Oil, Chemicals, Garbage, and Ballast Water
- Part 153 Control of Pollution
- Part 154 Facilities Transferring Oil or Hazardous Material in Bulk
- Part 155 Oil/Hazardous Material Pollution Prevention Regulations for Vessels
  - Non-Tank Vessel Contingency Plan Regulations
  - Tank Vessel Contingency Plan Regulations
  - Salvage and Marine Firefighting
- Part 156 Oil/Hazardous Material Transfer Operations
- Part 158 Reception Facilities for Oil, Noxious Liquid Substances, and Garbage
- Part 159 Marine Sanitation Devices

USCG Maritime Security Regulations, 33 CRF Subchapter H

- Part 101 General
- Part 103 Area Maritime Security
- Part 104 Vessel Security
- Part 105 Facility Security

Guidelines for Under Keel Clearance in Coos Bays is on average 10% and is established by each vessel in consultation with the pilots.

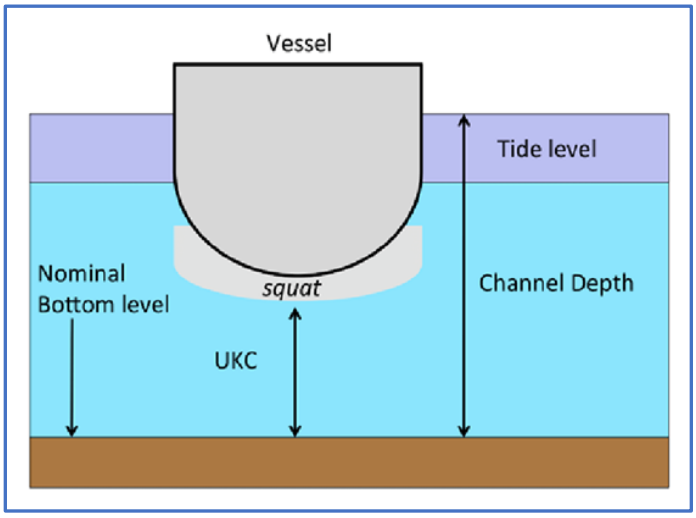


FIGURE 21 - UNDER KEEL CLEARANCE (UKC)

20 Funding

This section shall provide recommendations for funding projects that the committee intends to recommend or initiate; and consider the imposition of user fees, and assess existing billing mechanisms as potential funding sources.

There are currently no projects the committee would like to see funded nor are user fees or other mechanisms used to generate funding being considered at this stage.

21 Competitive Aspects

This section shall identify and discuss the potential economic impacts of implementing the provisions of the harbor safety plan and describe the significant differences in the restrictions that could vary from port to port within the region.

There are currently no identified economic impacts brought about by the implementation of the recommendations of the harbor safety plan, nor does the plan impose any additional restrictions that would render Coos Bay less favorable as compared to other ports in the area.

22 APPENDICES

Appendix A:	Coos Bay Harbor Safety Committee Charter	A-I
Appendix B:	Contact Information for Coos Bay	B-I
Appendix C	ATON Review	C-I
Appendix D	Historical Vessel Statistics	D-I
Appendix E:	Recent Marine Accidents	E-I
Appendix F:	Other Federal Agencies with Jurisdictional Interests	F-I
Appendix G:	Best Marine Practices	G-I
Appendix H:	US Coast Guard Regulations, Directives, Advisories and NVIC's	H-I
Appendix I:	List of Recommendations presented to the Community	I-I
Appendix J:	List of Coos Bay Harbor Safety Committee Action Items	J-I
Appendix K:	U.S. Coast Guard Waterways Analysis and Management (WAMS)	K-I
Appendix L:	List of HSP Annual Reviews and Changes	L-I

Appendix A - Coos Bay Harbor Safety Committee Charter

Separate Document

Appendix B - Contact Information for Coos Bay

Separate Document

Appendix C – ATON review

Separate Document

Appendix D - Historical Vessel Statistics

Separate Document

Appendix E – Recent Accidents

Separate Document

Appendix F – Federal Agencies and Jurisdictions

Separate Document

Appendix G – Best Marine Practices

Separate Document

Appendix H – US Coast Guard Regulations, Directives, Advisories, NVICS

Separate Document

Appendix I– List of Recommendations presented to the Community

Separate Document

Appendix J– List of Action Items

Separate Document

Appendix K– U.S. Coast Guard Waterways Analysis and Management

Separate Document

Appendix L– Annual Plan updates and changes

Separate Document

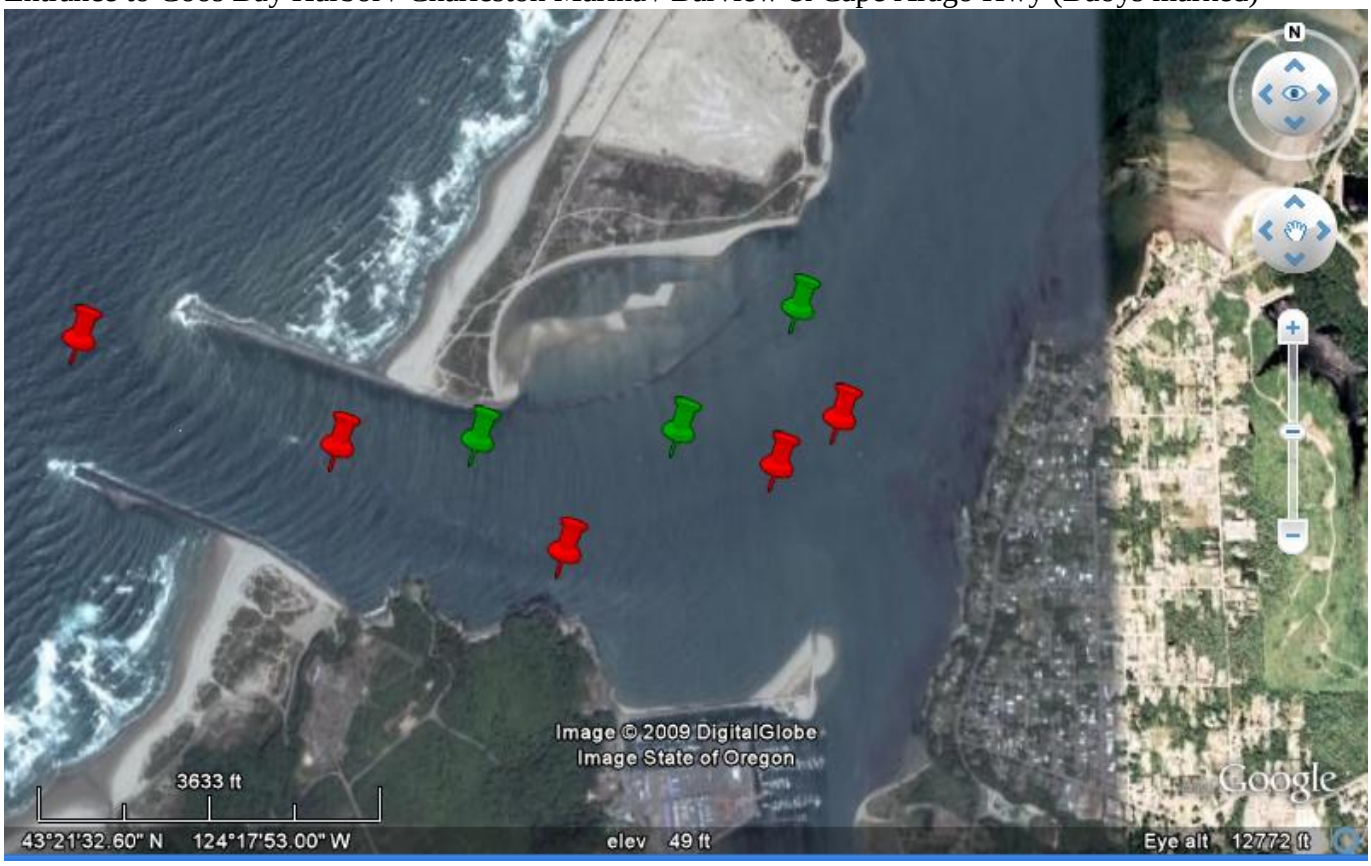
Exhibit 32

Coos Bay Channel Entrance

Distances and Buoy Markings.

Taken from Google Earth
(Buoys visually found and marked)

Entrance to Coos Bay Harbor / Charleston Marina / Barview & Cape Arago Hwy (Buoys marked)



Red Buoy to Shore .20 miles (1056 feet) (352 yards) (321.87 meters)

****

Red Buoy to shore .07 miles (369.6 feet) (123.2 yards) (112.65 meters)

****

Red Buoy to OIMB Auditorium .14 miles (739.2 feet) (246.4 yards) (225.31 meters)

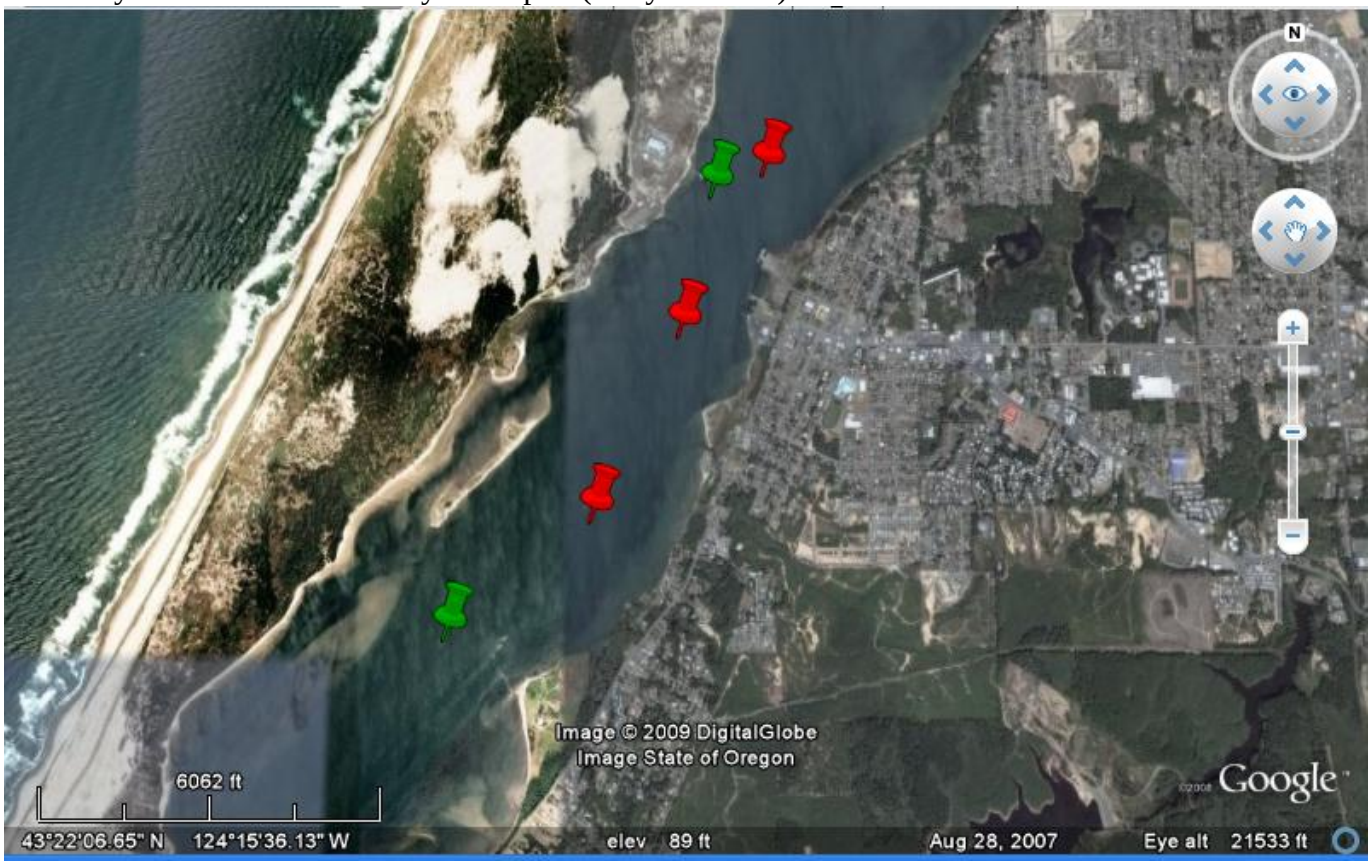
****

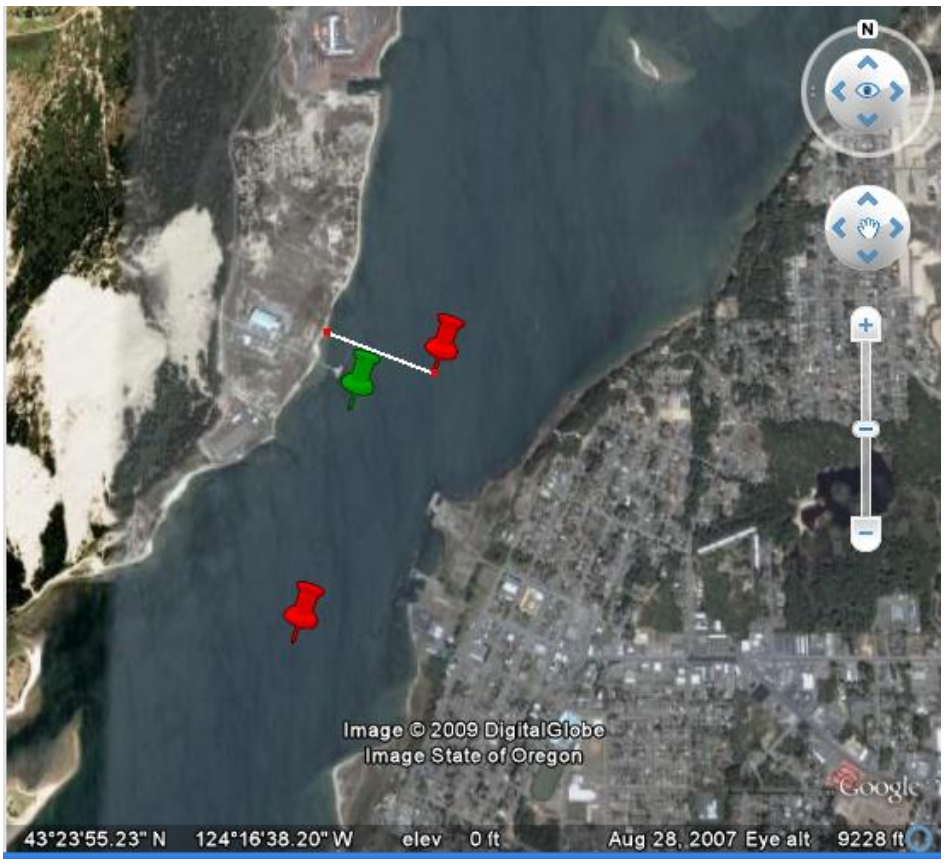
Red Buoy to Coast Guard Housing Complex -.23 miles (1214.4 feet) (404.8 yards) (370.15 meters)

****

Red Buoy to House Along Cape Arago Hwy .34 miles (1795.2 feet) (598.4 yards) (547.18 meters)
****

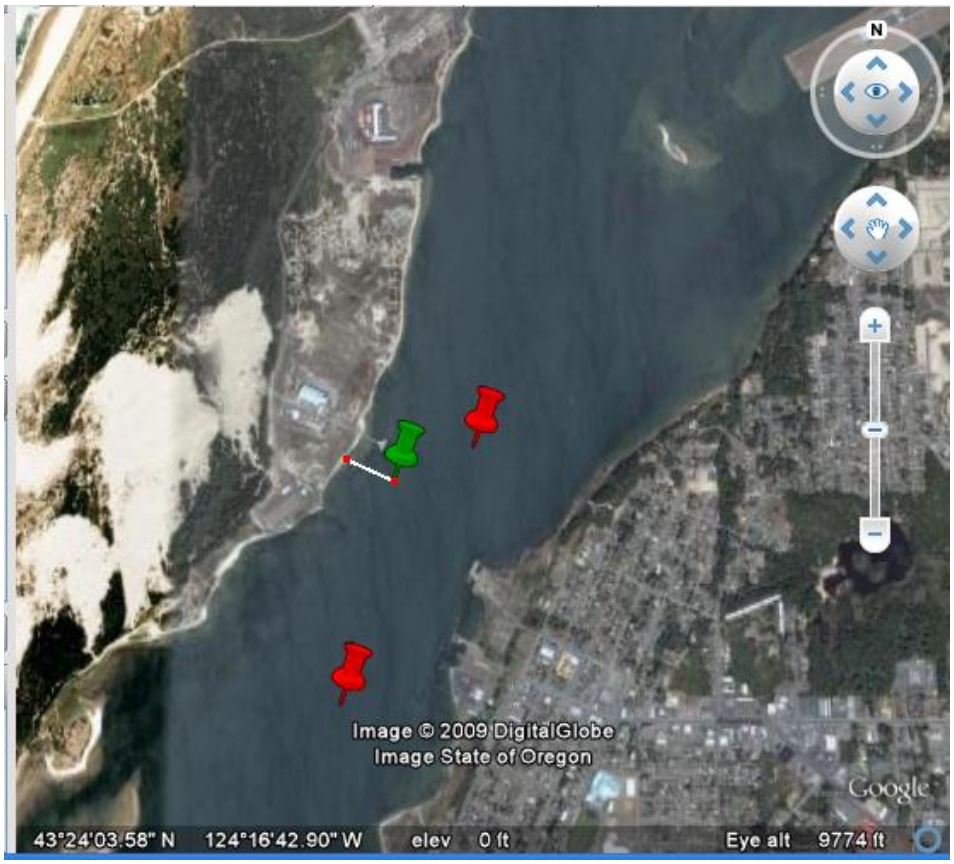
Coos Bay Channel at Community of Empire (Buoys marked)





Red Buoy to Shoreline near DB Western .25 Miles (1320 feet) (440 yards) (402.34 meters)

****



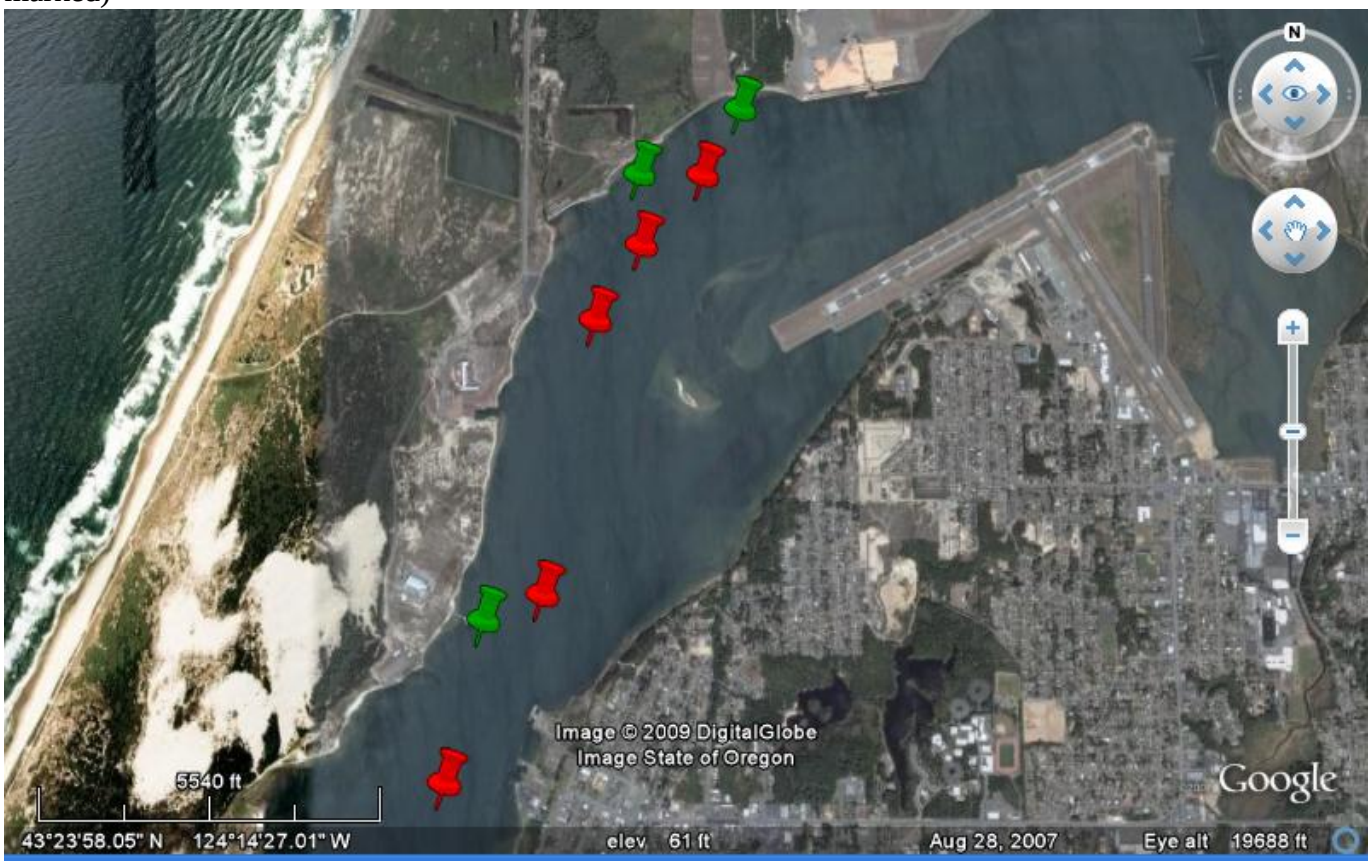
Green Buoy to Shoreline near DB Western .12 miles (633.60 feet) (211.2 yards) (193.12 meters)

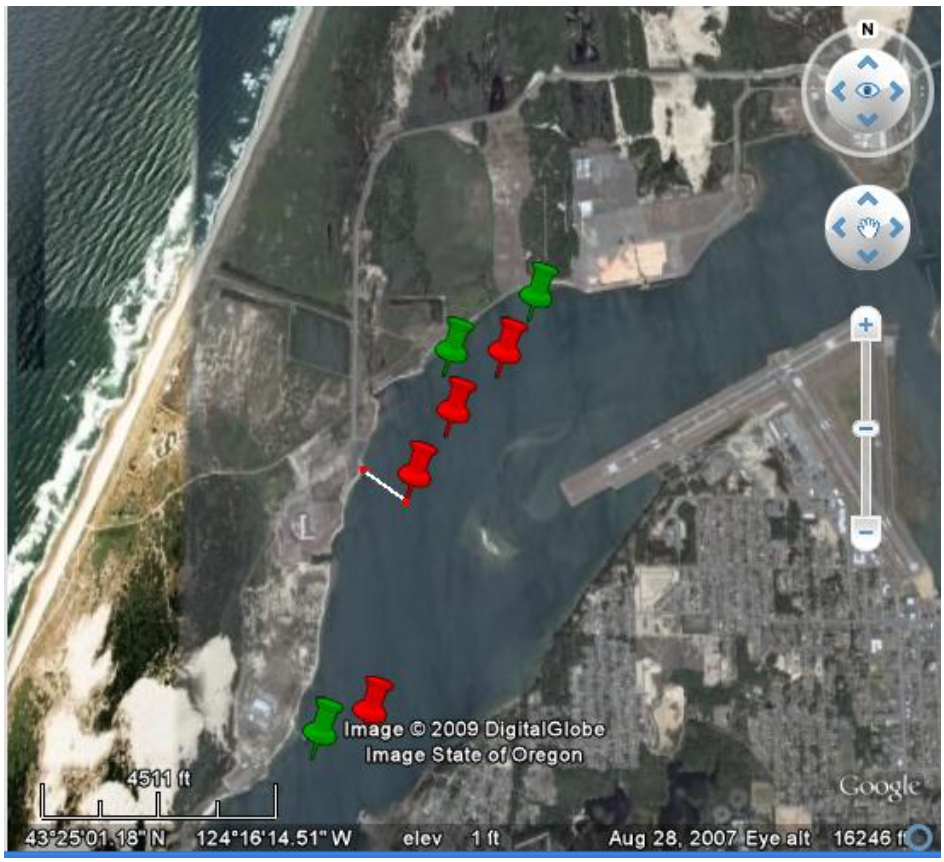
****

Red Buoy to Empire Marina Parking Lot - .25 Miles (1320 feet) (440 yards) (402.34 meters)

****

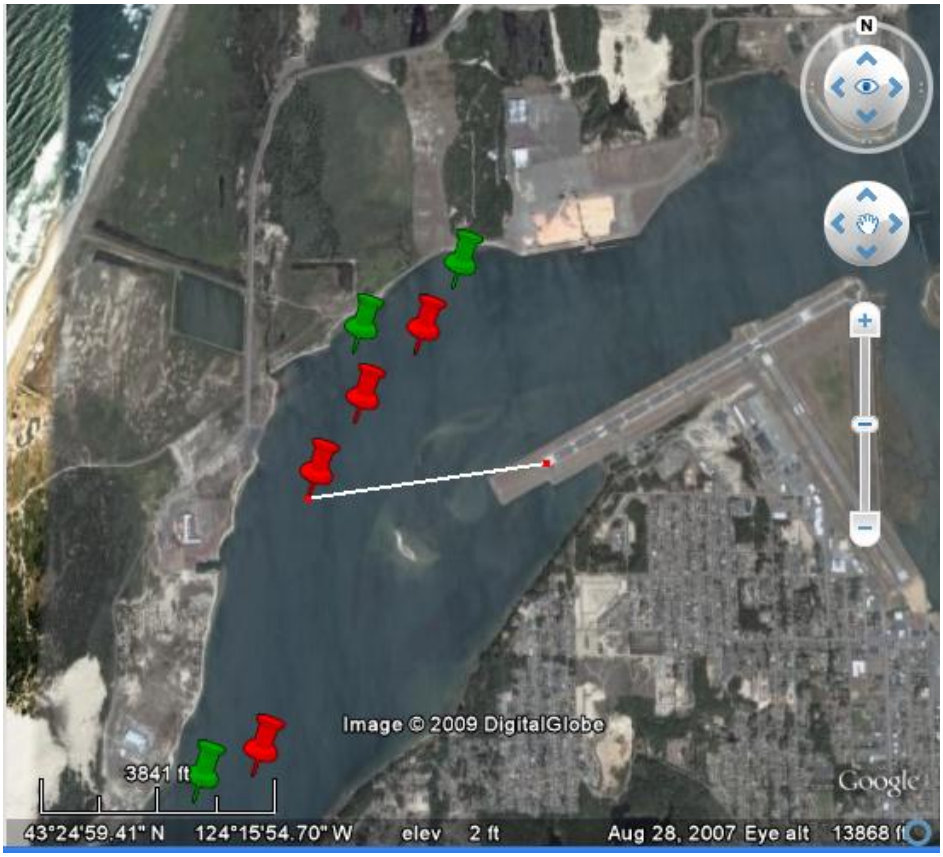
Coos Bay Channel – Jarvis Turn / Airport / City of North Bend / Industrial area on North Spit (Buoys marked)





Red Buoy to end of North Spit Boat Ramp .20 miles (1056 feet) (352 yards) (321.87 meters)

****



Red buoy to end of airport runway - .78 miles (4118.4 feet) (1372.8 yards) (1255.29 meters)

****

Exhibit 33

https://theworldlink.com/news/local/deq-hits-clausen-oysters-with-fine/article_9fb57e0c-b070-11df-8cc0-001cc4c03286.html

DEQ hits Clausen Oysters with $25,000 fine

By Gail Elber, Staff Writer Aug 25, 2010

The Oregon Department of Environmental Quality has levied $24,992 in penalties on Clausen Oysters in North Bend for wastewater violations.

According to DEQ, the business operated from 2005 to 2009 without a wastewater discharge permit, incurring penalties of $16,349.

It then violated its newly obtained permit this year by failing to monitor wastewater and report monitoring results to DEQ, incurring penalties of $5,643.

It also discharged water to the bay without screening it, incurring a $3,000 penalty.

‘Out of the blue'

Lilli Clausen, who with her husband Max has owned the company on Haynes Inlet since 1994, said that the letter from DEQ came "out of the blue."

She said that for 2003 and 2005, she paid for the permit and has the canceled checks.

For other years, she said, she never got a bill.

Her microbiological testing has been done, but the reports weren't filed due to a miscommunication, she said.

And the required screening system has long been a bone of contention between her and the DEQ.

"We're going to appeal," she said.

Spotty permits

Clausen Oysters, owned by Max and Lilli Clausen, has operated a processing facility at 66234 North Bay Road since 1994. Originally, it had a permit to discharge process wastewater - generated from washing oysters and equipment - to Haynes Inlet.

Wastewater from the company's sinks and toilets isn't at issue. It's treated in a septic tank and dispersed in a drainfield across the road from the bay.

In November 2005, the environmental agency canceled the facility's process wastewater permit because the Clausens had not renewed it.

For four years, the Clausens operated the facility without a permit, finally obtaining one in January 2010.

Reports required

But after obtaining the new permit, the Clausens didn't follow its requirements, the environmental agency said.

They didn't have equipment in place to screen solids out of their wastewater, as their permit required.

They also didn't submit monthly discharge monitoring reports with production information, microbiological test results, and amounts of waste solids produced.

Clausen said that she paid for permits in 2003 and 2005, and never saw a bill after 2005.

"I'm quite concerned about our credit, so if I had seen a bill, I would have paid it."

She said she paid for 2009 when she applied for a permit in November 2009, which she received in January 2010.

"If I had known then that I owed anything, I could have paid it then and there."

Screens a problem

Clausen has struggled with the agency's requirement to screen her process wastewater.

Regulations require a fine screen that clogs constantly, Clausen said, which caused problems in her operation.

"It is most impractical and very unnecessary," she said.

Clausen maintains that no oyster meat enters the wash water - just mud it washes off the oysters.

"The mud comes out of the bay; it goes back in the bay."

Recently they got a screen that works, she said.

But Steve Nichols of the Department of Environmental Quality's Coos Bay office, who inspects seafood processing facilities, said he hasn't seen it in action yet.

As for the missing discharge water quality reports, Clausen isn't yet sure what happened.

She said that she pays to have the North Bend wastewater treatment plant do the testing.

She thought it would send in the reports, but apparently they weren't being sent to the right place, she said.

The Clausens have until Sept. 10 to file an appeal.

Reporter Gail Elber can be reached at 541-269-1222, ext. 234; or at gelber@theworldlink.com.

Exhibit 34

Federal Aviation Administration

Memorandum

Date: JAN 21 2015

To: Regional Airports Division Managers
610 Branch Managers
620 Branch Managers
Airports District Office Managers

From: Director, Office of ~~Airport Planning~~ and Programming (APP-1)
Director, Office of Airport Safety and Standards (AAS-1)

Subject: Technical Guidance and Assessment Tool for Evaluation of Thermal Exhaust Plume Impact on Airport Operations

The Federal Aviation Administration (FAA) has received several inquiries and requests from state and local government and airport operators for guidance on the appropriate separation distance between power plants and airports where exhaust plumes from power plant smoke stacks and cooling towers may cause disruption to aircraft near Federally-obligated airports. The only related FAA regulations address the physical restrictions of the exhaust stack height. There are no FAA regulations protecting for plumes and other emissions from exhaust stacks.

In response, the FAA's Airport Obstruction Standards Committee (AOSC) was tasked to study the impact exhaust plumes may have on flight safety. The AOSC study evaluated the following:

1. How much turbulence is created by the exhaust plumes?
2. Is this turbulence great enough to cause loss of pilot control? If so, what size aircraft are impacted?
3. Is there a lack of oxygen (within a plume) causing loss of engine or danger to pilot/passengers?
4. Are there harmful health effects to the pilot or passengers from flying through the plume?

After thorough analysis, the FAA has determined the overall risk associated with thermal exhaust plumes in causing a disruption of flight is low. However, the FAA has determined that thermal exhaust plumes in the vicinity of airports may pose a unique hazard to aircraft in critical phases of flight (particularly takeoff, landing and within the pattern) and therefore are incompatible with airport operations.

Flight within the airport traffic pattern, approach and departure corridors, and existing or planned flight procedures may be adversely affected by thermal exhaust plumes[1]. The FAA-sponsored research indicates that the plume size and severity of impact on flight can vary greatly depending on several factors at a site such as:

- Stack size, number, and height; type of exhaust or effluent (e.g., coolant tower cloud, power plant smoke, etc.);
- Proximity of stacks to the airport flight paths;
- Temperature and vertical speed of the effluent;
- Size and speed of aircraft encountering exhaust plumes; and
- Local winds, ambient temperatures, stratification of the atmosphere at the plume site.

Airport sponsors and land use planning and permitting agencies around airports are encouraged to evaluate and take into account potential flight impacts from existing and planned development that produce plumes (such as power plants or other land uses that employ smoke stacks, cooling towers or facilities that create thermal exhaust plumes).

To aid these reviews the FAA contracted MITRE Corporation to develop a model to predict plume size and severity of flight impact from a site of thermal exhaust plume(s). MITRE developed the "Exhaust-Plume-Analyzer" and it is available for no cost. Access can be found for licensing and downloading from MITRE at: http://www.mitre.org/research/technology-transfer/technology-licensing/exhaust-plume-analyzer

The MITRE Exhaust-Plume-Analyzer can be an effective tool to assess the impact exhaust plumes may impose on flight operations at an existing or proposed site in the vicinity of an airport.

The FAA Advisory Circular (AC) 5190-4, A Model Zoning Ordinance to Limit the Height of Objects Around Airports (Airport Compatible Land Use Planning), is currently being updated to include comprehensive guidance to airport sponsors and local community planners on airport compatible land use issues, including evaluation of thermal exhaust plumes. The updated AC is expected to be issued in FY 2015.

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[1] On July 24, 2014, the FAA issued a change to the Aeronautical Information Manual (AIM) to update terminology and provide more detail regarding the associated hazards of exhaust plumes. See the updated AIM flight instruction to pilots at Section 5-5-15, Avoid Flight in the Vicinity of Exhaust Plumes (Smoke Stacks, Cooling Towers) at http://www.faa.gov/air_traffic/publications/atpubs/aim/aim0705.html.

In the interim, please provide this technical memorandum to airport sponsors to advise them of the availability of the Exhaust-Plume-Analyzer. Sponsors, state and local planning organizations, and permitting jurisdictions now have the opportunity to ensure that their planning and land use development decisions adequately evaluate the potential effects of thermal exhaust plumes on airport operations.

Should you have any questions concerning this memorandum please contact Rick Etter, Airport Planning and Environmental Division (APP-400) at 202-267-8773 or by email at rick.etter@faa.gov.

Exhibit 35

WILLAMETTE WEEK

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April 22nd, 2015 12:01 am NIGEL JAQUISS | News Stories

Hot Air

Pilots say the Port of Portland's plans to sell land for a power plant next to the Troutdale Airport include a fatal flaw.

FLYING SCARED: Mike Rhodes spent four years building his RV-9A plane from a kit. He says a proposed natural gas-fired power plant near the Troutdale Airport presents a "clear and present danger" to aviation. - IMAGE: Will Corwin

Mike Rhodes fell in love with flying nearly 50 years ago at the Troutdale Airport while on a school field trip, and from his first flight, he knew he wanted to be a pilot.

Today, Rhodes, 61, a nuclear engineer who lives in Gresham, keeps a two-seater plane he built himself at the Troutdale Airport, 10 miles east of Portland along I-84. He's logged more than 2,000 hours flying—always conscientious about safety for himself and his passengers.

But Rhodes says he and hundreds of other pilots who regularly use Troutdale, the state's

third-busiest airport, now fear for their safety.

“What they want to do,” Rhodes says, “will make flying in an out of Troutdale dramatically more dangerous.”

The “they” posing the threat, Rhodes says, is the airport’s owner, the Port of Portland.

The port wants to sell 38 acres directly north of the Troutdale Airport to the developer of a natural gas-fired power plant. The proposed plant, called the Troutdale Energy Center, would create a powerful heat updraft that experts say could endanger small planes flying in and out of the airport.

That development is currently the subject of a permitting dispute pitting the state’s Energy Facility Siting Council, which issues permits for new electrical generating plants, against a coalition of environmentalists and aviation groups, including the Oregon State Aviation Board and groups representing airplane owners and pilots.

“I understand the port wants to maximize revenue from the real estate it owns,” says Rhodes, “but developing this power plant is detrimental to another part of the port—and to pilots.”

Port spokeswoman Kama Simonds says the developers of the Troutdale Energy Center conducted extensive safety modeling that assured the port of the project’s safety.

“The port believes that the Troutdale Energy Center and the Troutdale Airport can successfully coexist,” Simonds says.

There’s some irony in the port finding itself at loggerheads with pilots and the aviation board. Airports are the cash cow for a port with grim financial challenges elsewhere.

Labor disputes have cost the port its marine container business. That has left the port even more focused on Portland International Airport, whose landing fees and parking revenues are the agency’s lifeblood.

The port is also in the real estate and economic development business. It bought the contaminated site of a shuttered Troutdale aluminum plant in 2007. Selling part of it to the Troutdale Energy Center (for an undisclosed price) would allow the development of the reclaimed industrial land.

The Troutdale Airport, with its 5,400-foot runway, typically handles small planes, although private jets also land and take off there. Flight instructors have moved operations to Troutdale from Hillsboro, the state’s busiest airport. The two airports will generate about $3.5 million in revenue for the port this year, most of that from Hillsboro.

Although the smaller airports generate only a tiny fraction of PDX’s revenue, they play a vital role in the port’s system. The port depends on the Hillsboro and Troutdale airports to handle

small aircraft that would otherwise need to use PDX. The smaller airports handle 50 percent more takeoffs and landings than PDX while providing training grounds for domestic and international pilots.

Initially, pilots worried that a power plant at Troutdale would hamper visibility. Gas-fired generating plants work by boiling water to produce steam that drives turbines. When the water is cooled, the steam roiling out of the plant's cooling towers could fog pilots' flight paths and create a hazard.

But the bigger concern now is heat.

Earlier this year, the Federal Aviation Administration directed Troutdale users to an independent consulting firm to analyze the potential impact of the invisible plume of hot air that the combustion of gas by the plant would produce.

"You're putting a known but invisible hazard right into the path that pilots using Troutdale must fly," says Mary Rosenblum, a Canby resident and president of the Oregon Pilots Association.

Rosenblum says modeling shows the plume could suddenly lift one wing and flip a plane upside down.

"This would happen when the plane is 1,000 feet or less off the ground," Rosenblum says. "At that altitude, you cannot recover."

The FAA consultant's initial analysis in March found that the invisible plumes could cause as many as a dozen planes to lose control and crash annually—with fatal consequences. A second run of the same model earlier this month found it could happen even more often.

Risk modeling done for the Troutdale Energy Center in 2013 found no such danger.

Rhodes scoffs at that earlier analysis. The nuclear engineer—who spends his days calculating the proper dosages of radiation for cancer patients—has reviewed the modeling and says the proposed power plant represents "a clear and present danger" to pilots.

"Engineers and mathematicians work hard to 'average out' calculated risk for their clients," Rhodes said in written testimony. "I'm an engineer. I know how the system works. Don't kid yourself, cherry-picking data to support a client's position happens all the time."

The FAA regulates only physical structures, such as towers or smokestacks that exceed 500 feet, not plumes.

But in January, the federal regulator issued guidance on hot air plumes.

"The FAA has determined that thermal exhaust plumes in the vicinity of airports may pose a

unique hazard to aircraft in critical phases of flight (particularly takeoff, landing and within the pattern)," says an FAA memo to airport managers dated Jan. 21, 2015, "and therefore are incompatible with airport operations."

That warning would seem to give pause to the Port of Portland, which owns the land where the generating plant would be built, and to the state energy siting council, which in 2013 gave tentative approval to the plant's location next to the Troutdale Airport.

Todd Cornett, an assistant director for the Oregon Department of Energy responsible for staffing the siting council, says his agency's staff recommended proceeding with the project after concluding it met all the criteria for locating a power plant.

The group financing the Troutdale Energy Center, Energy Investors Funds, builds plants all over the country—not without incident. In 2010, a plant in Middletown, Conn., similar to the one proposed for Troutdale, blew up during early testing, killing six people and resulting in a $16.6 million fine by the Occupational Safety and Health Administration—the third-largest in OSHA history. A spokesman for TEC didn't return *WW*'s calls.

The pilots' safety concerns about the Troutdale plant come on top of environmental worries about the pollution the plant would emit.

The conservation group Friends of the Gorge opposes the plant. And the U.S. Forest Service, which enforces the Columbia River Gorge National Scenic Area Act, says locating a power plant at the western gateway to the gorge is a bad idea.

Agency officials say pollutants emitted from the plant would block views in the gorge and endanger sensitive plant species.

The new safety study and the environmental concerns are part of an ongoing contested-case hearing over the permitting of the power plant. Opponents to the site forced the hearing, in which both sides will make their best case for or against the safety and environmental effects of the plant.

Rhodes says he'll be "stunned" if the state siting council proceeds with approval of the plant after the new risk study. Even if someone raises additional information affirming the plant's safety, he adds, the burden of proof still rests on the applicant.

"State agencies are supposed to work on behalf of the people of Oregon, not an applicant," Rhodes says. "In this case, they are working in the licensees' interest. That's a direct conflict of interest."

U.S. Department
of Transportation
Federal Aviation Administration

Position Paper

Safety Concerns of Exhaust Plumes

Prepared by:

Federal Aviation Administration

Airport Obstructions Standards Committee Working Group

July 8, 2014

Background:

In 2008, a safety concern was raised to Federal Aviation Administration (FAA) that in some instances exhaust plumes were causing disruption to flights. In addition, California Energy Commission and other organizations were requesting guidance from the FAA on what is the appropriate proximity power plants can be constructed near an airport. The only FAA regulations are on the physical restrictions of the exhaust stack height. There are no FAA regulations protecting for plumes and other emissions from exhaust stacks.

In September 2008, the FAA's Airport Obstruction Standards Committee (AOSC) was tasked to study the impact exhaust plumes may have on flight safety. In 2009, a task was added to an FAA support contract that evaluated the following:

- How much turbulence is created by the Exhaust Plumes?
- Is this turbulence great enough to cause loss of pilot control?
    - If so, what size aircraft are impacted?
- Is there a lack of oxygen causing loss of engine or danger to pilot/passengers?
- Are there harmful health effects to the pilot or passengers in flying through the plume?

In fall 2010, the initial Exhaust Plume Report was completed. After careful review, the AOSC determined that the information in the initial Plume Report needed to be further verified and validated.

In spring 2011, FAA's Federally Funded Research & Development Center operated by the MITRE Corp was tasked to verify and validate the initial study with an agreed upon completion in fall 2012.

MITRE completed their initial task in September 2012 and delivered a study and validated Exhaust Plume model. The study indicates exhaust plumes can create hazards for aircraft in a limited area above the stack in terms of turbulence caused by upward motion of the plume and reduced oxygen content inside the plume. The reduced oxygen is not a danger to pilots, but could cause failure of helicopter engines if hovering over the plume. It also indicated that weather conditions are an important factor in the size of the risk area. The conditions which create the largest risk area are calm winds, low temperatures, and neutral or stable stratification of the atmosphere. The reverse is also true, windy conditions (greater than eight (8) knots) and warmer temperatures, the risk area is minimized.

An industry meeting was hosted by the FAA in January 2013 in which MITRE briefed on the initial study and explained their Exhaust Plume Model. Industry recommended that the Plume Model be updated to include light sport aircraft and when an aircraft crosses over the plume while already in a turn.

The industry group also expressed a desire for the FAA to take affirmative action from the results of the plume model to declare plumes as hazards, as they do with structures under Part 77. The industry group believes preemptive planning is very important for preventing construction of plume emitting facilities in the vicinity of airports. They reiterated a desire for the FAA to declare them hazards as an aid to empower the State's position in that regard.

Final Steps:

1. The FAA Office of Airports will update Advisory Circular (AC)150/5190-4, Airport Land Use Compatibility Planning, to address the compatibility of exhaust plumes near airports; scheduled to be completed by Fall of 2014.
2. The FAA Office of Aviation Safety will further update the Aeronautical Information Manual (AIM) to provide pilots information regarding the potential hazards over exhaust plumes; scheduled to be completed in Fall of 2014.
3. The FAA tasked the MITRE Corporation to update the Exhaust Plume Model to include the industry recommendations, as well as make it a fully executable that can run on a personal computer. The Model will be available the Fall of 2014. How to access the model will be outlined in the AC 150/5190-4.

Conclusion:

After a thorough analysis, the FAA has determined the overall risk associated with thermal exhaust plumes in causing a disruption of flight is very unlikely. However, the FAA determined that thermal exhaust plumes in the vicinity of airports may pose a unique hazard to aircraft in critical phases of flight and therefore are incompatible. We recommend that airport owners, in cooperation with local communities, follow the guidance outlined in Advisory Circular (AC)150/5190-4, Airport Land Use Compatibility Planning.

The information and recommendation provided in this Position Paper supersedes any previous studies or reports on thermal exhaust plumes completed by the FAA.

Prepared by:
Federal Aviation Administration
Airport Obstructions Standards Committee Working Group
John Speckin, Regions and Center Operations
Patrick Zelechoski, Flight Standards
John Bordy, Flight Standards
Robert Bonanni, Airports
John Page, Air Traffic Organization
Ron Singletary, Air Traffic Organization

Exhibit 37

4. Protect your aircraft while on the ground, if possible, from sleet and freezing rain by taking advantage of aircraft hangars.

5. Take full advantage of the opportunities available at airports for deicing. Do not refuse deicing services simply because of cost.

6. Always consider canceling or delaying a flight if weather conditions do not support a safe operation.

c. If you haven't already developed a set of Standard Operating Procedures for cold weather operations, they should include:

1. Procedures based on information that is applicable to the aircraft operated, such as AFM limitations and procedures;

2. Concise and easy to understand guidance that outlines best operational practices;

3. A systematic procedure for recognizing, evaluating and addressing the associated icing risk, and offer clear guidance to mitigate this risk;

4. An aid (such as a checklist or reference cards) that is readily available during normal day–to–day aircraft operations.

d. There are several sources for guidance relating to airframe icing, including:

1. http://aircrafticing.grc.nasa.gov/index.html

2. http://www.ibac.org/is–bao/isbao.htm

3. http://www.natasafety1st.org/bus_deice.htm

4. Advisory Circular (AC) 91–74, Pilot Guide, Flight in Icing Conditions.

5. AC 135–17, Pilot Guide Small Aircraft Ground Deicing.

6. AC 135–9, FAR Part 135 Icing Limitations.

7. AC 120–60, Ground Deicing and Anti–icing Program.

8. AC 135–16, Ground Deicing and Anti–icing Training and Checking.

The FAA Approved Deicing Program Updates is published annually as a Flight Standards Information Bulletin for Air Transportation and contains detailed information on deicing and anti–icing procedures and holdover times. It may be accessed at the following web site by selecting the current year's information bulletins:
http://www.faa.gov/library/manuals/examiners_inspectors/8400/fsat

7–5–15. Avoid Flight in the Vicinity of Thermal Plumes (Smoke Stacks and Cooling Towers)

a. Flight Hazards Exist Around Thermal Plumes. Thermal plumes are defined as visible or invisible emissions from power plants, industrial production facilities, or other industrial systems that release large amounts of vertically directed unstable gases. High temperature exhaust plumes may cause significant air disturbances such as turbulence and vertical shear. Other identified potential hazards include, but are not necessarily limited to, reduced visibility, oxygen depletion, engine particulate contamination, exposure to gaseous oxides, and/or icing. Results of encountering a plume may include airframe damage, aircraft upset, and/or engine damage/failure. These hazards are most critical during low altitude flight, especially during takeoff and landing.

b. When able, a pilot should fly upwind of possible thermal plumes. When a plume is visible via smoke or a condensation cloud, remain clear and realize a plume may have both visible and invisible characteristics. Exhaust stacks without visible plumes may still be in full operation, and airspace in the vicinity should be treated with caution. As with mountain wave turbulence or clear air turbulence, an invisible plume may be encountered unexpectedly. Cooling towers, power plant stacks, exhaust fans, and other similar structures are depicted in FIG 7–5–2. Whether plumes are visible or invisible, the total extent of their unstable air is difficult to ascertain. FAA studies are underway to further characterize the effects of thermal plumes as exhaust effluents. Until the results of these studies are known and possible changes to rules and policy are identified and/or published, pilots are encouraged to exercise caution when flying in the vicinity of thermal plumes. Pilots are encouraged to reference the Airport/Facility Directory where amplifying notes may caution pilots and identify the location of structure(s) emitting thermal plumes.

FIG 7–5–2
Plumes

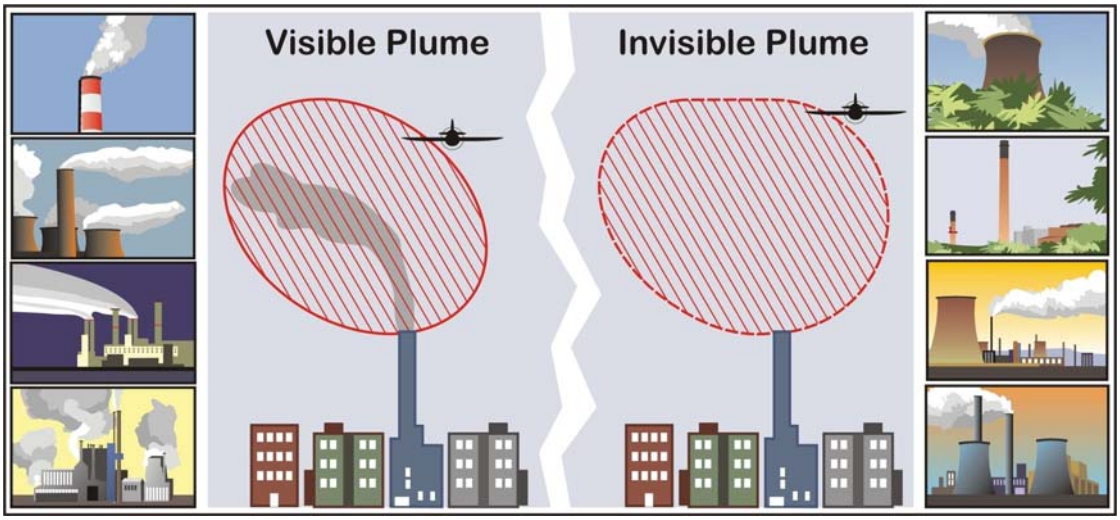


Exhibit 38

15th Annual Coos Basin SALMON DERBY

COOS BAY, OREGON

September 13th & 14th 2014

Presented by: ODFW, Coos County STEP Commission,
Eel Tenmile STEP, South Coast Anglers STEP & Douglas Timber Operators

Over $1,000 in Cash & Prizes!
Including $100 for Kids Biggest Fish

AWARDS GIVEN THROUGH 10TH PLACE

DERBY TICKETS FOR 2 DAY EVENT – $20 PER PERSON

KIDS 13 AND UNDER FISH FREE!!*

**WHEN ACCOMPANIED BY PAYING ADULT FISHERMAN*

Advance tickets at: The Bite's on Bait and Tackle, Coos Bay Marine, Y-Marina and at the kickoff BBQ.
Day-of tickets at: California Street, Eastside, Dora's Place & Myrtle Trees Boat Ramps

Why we do what we do

Teaching the next generation

Fishing heats up on the river

Kickoff BBQ & Silent Auction
Friday, September 12th 5-8 pm

Derby Tickets at Door!

NORTH BEND COMMUNITY CENTER • 2222 BROADWAY, NORTH BEND

FREE TO CONTESTANTS & TICKET HOLDERS • $5 DINNER TICKETS FOR NON-DERBY FAMILY, FRIENDS & AUCTION ATTENDEES (DINNER SERVED UNTIL 7 PM ONLY) • $5 OYSTER BAR

FANTASTIC AUCTION ITEMS!

ROD & REEL COMBOS INCLUDING ONE WITH SET-UP BY RICK HOWARD, CUSTOM ROD WITH COUNTING REEL, CARVED BEAR WITH SALMON, STAINLESS BBQ, ARTWORK, GOLF PACKAGES, AREA RUG, RECLINER, LOTS OF FISHING GEAR, RAMP PASSES, JEWELRY, DOWNRIGGERS, AND MUCH MORE.

MANY THANKS TO OUR GENEROUS DONORS!

Bandon Crossings
BiMart
Bite's On Bait & Tackle
Cabela's
Coos Head Builders Supply
Coos Bay Power Squadron
Coquille Supply
Engle's Furniture
Englund Marine
Farr's True Value Hardware
George's Gardening
Habitat for Humanity ReStore
Industrial Steel & Supply
Bill & Joan Kendrick
Modern Floors
Northwest Farm Credit Services
Pancake Mill
Oregon International Port of Coos Bay
Jim Pex
Bill Poppe
Prowler Charters
Molly Reeves
Red Lion
Julie Rumreich
Al Swanson
Les Schwab
Tenmile STEP
Tower Ford
Watson Ranch

THANK YOU TO THE 2014 ANNUAL COOS BASIN AMATEUR SALMON DERBY SPONSORS.
WE COULDN'T DO IT WITHOUT YOU!

TITLE SPONSORS

Douglas Timber Operators
Southport Forest Products
Coquille Indian Tribe
Oregon Fish & Wildlife

Major Sponsors

The Campbell Group LLC
Columbia distributing
Roseburg Resources Co.

Business Sponsors

• Port of Coos Bay • Bay Area Sportsman's Association • Al Pierce, LLC • Knife River

Supporting Sponsors

• Ace Hardware Express • Bite's On Bait & Tackle • Cabela's • Englund Marine • Sause Bros.

Friends of the Derby • Gold Coast Truck Repair

In addition, the Derby Committee wishes to thank the many dedicated volunteers who make our programs possible and all of the businesses and individuals who have given their support to Salmon Enhancement & Education programs for over 30 years. If any of the 15th Annual sponsors have been inadvertently omitted, please accept our apology.

Exhibit 39

South Coast Basin

Rivers and Streams

Flow Restoration Priorities for Recovery of Anadromous Salmonids in Coastal Basins

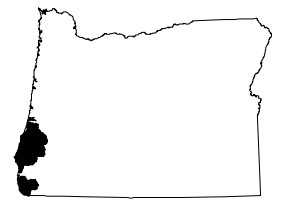
The Oregon Plan

Streamflow Restoration Priorities
Measure IV.A.8

Instream Water Right Program
Habitat Conservation Division

Field and Technical
Services Division

Location Map



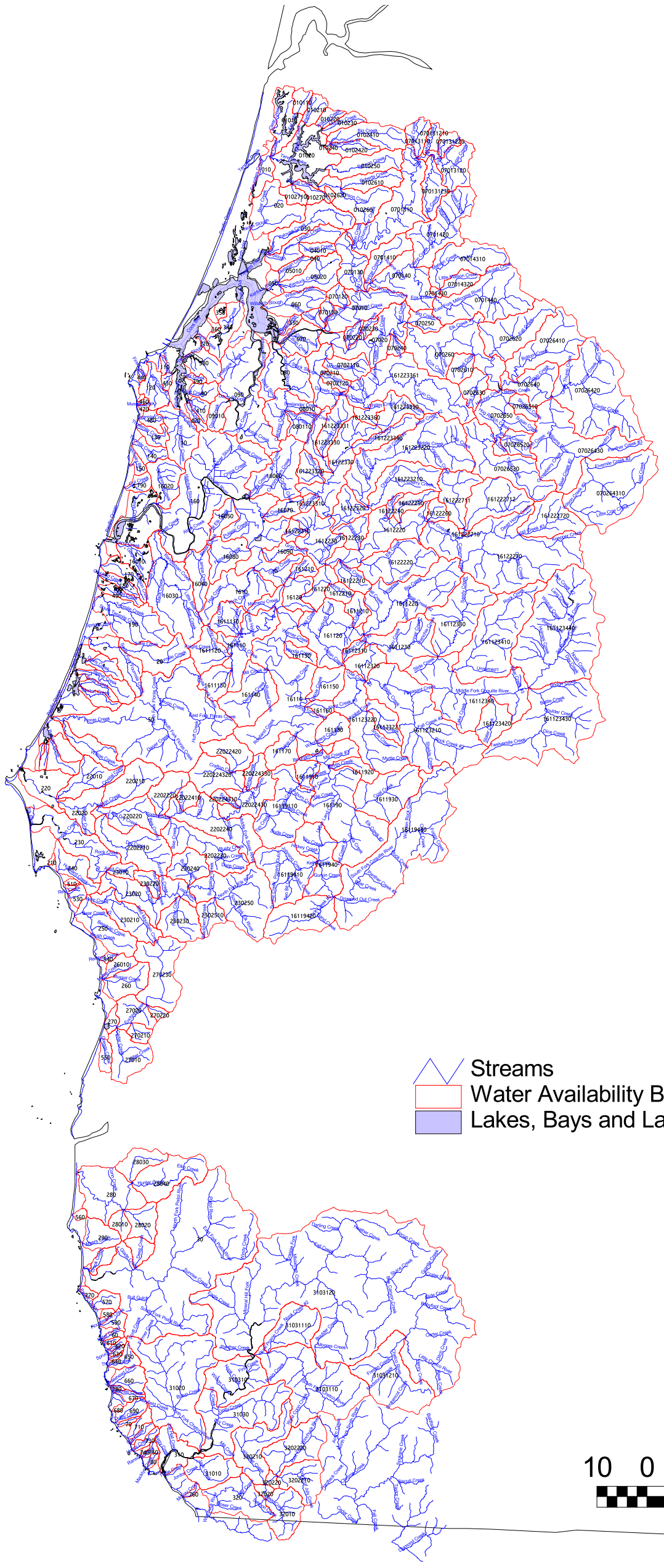


Exhibit 40

Final Environmental Impact Statement

JORDAN COVE ENERGY AND PACIFIC CONNECTOR GAS PIPELINE PROJECT

Jordan Cove Energy Project, L.P. Docket Nos. CP13-483-000
Pacific Connector Gas Pipeline, L.P. CP13-492-000

FERC/EIS – 0256F

Federal Energy Regulatory Commission

Office of Energy Projects

Washington, DC 20426

Cooperating Agencies

US Department of Agriculture Forest Service, Pacific Northwest Region
Department of the Army, Corps of Engineers, Portland District
US Department of Energy
US Environmental Protection Agency, Region 10
US Department of Homeland Security Coast Guard, Portland
US Department of the Interior Bureau of Land Management, Oregon State Office
US Department of the Interior Bureau of Reclamation, Klamath Basin Area Office
US Department of the Interior, Fish and Wildlife Service, Oregon State Office
US Department of Transportation, Pipeline and Hazardous Materials Safety Administration

September 2015

(33 CFR 151). Spills of fuel or other oils are more likely to be released into surface waters during fueling or bunkering at the dock when the hazardous materials are being transferred onto the vessel. To reduce the risk of spills during fuel transfer, procedures should be followed by the chief engineer familiar with the system to be involved in operations (78 FR 60099). With the implementation each vessel's shipboard oil pollution emergency plan, impacts resulting from the spill of fuel, or oil, or other hazardous liquids would be minimized.

Water Releases from LNG Vessels at the Terminal Berth

LNG vessels at the Jordan Cove terminal berth would release ballast water and engine cooling water into the marine slip. No wastewater would be discharged from the LNG vessels into the slip. The LNG vessels may arrange with licensed private entities for refueling, provisioning, and collection of sanitary and other waste waters contained within the vessel. The licensed private entities would transport the waste to a permitted treatment facility. Discharges from vessels are subject to regulation by EPA. EPA currently regulates discharges incidental to the normal operation of vessels operating in a capacity as a means of transportation with the Vessel General Permit. This general permit became effective December 2013 and includes general effluent limits applicable to all discharges; general effluent limits applicable to 26 specific discharge streams; narrative water-quality based effluent limits; inspection, monitoring, recordkeeping, and reporting requirements; and additional requirements applicable to certain vessel types. Vessels of 300 gross tons or more or that have the ability to hold or discharge more than 8 cubic meters of ballast must submit a notice of intent in order to receive permit coverage. Jordan Cove would provide permitting requirements to the LNG vessels calling on the Project.

Ballast Water

The Coast Guard mandates a ballast water exchange (BWE) process for vessels arriving at U.S. ports. The BWE process includes complete exchange of ballast water in the open sea at least 200 miles from U.S. waters. Therefore, the ballast water discharged by LNG vessels at the Jordan Cove terminal would have originated in the open sea rather than a foreign port.

LNG vessels at the terminal slip would discharge ballast concurrently with the LNG cargo loading. The amount of ballast water discharged must, at a minimum, be adequate to maintain the LNG ship in a positive stability condition and with an adequate operating draft while the LNG cargo is loaded. Jordan Cove expects its terminal to be visited by 90 LNG vessels per year. Each LNG vessel would discharge approximately 9.2 million gallons of ballast water during the loading cycle to compensate for 50 percent of the mass of LNG cargo loaded.[52]

The LNG loading rate is designed to be 10,000 m^3/hr (with a peak capacity of 12,000 m^3/hr), or 4,600 metric tons per hour (t/hr) (5,520 t/hr peak), consequently the ballast water discharge rate would be approximately 20,250 gpm. Typical LNG vessels have three ballast water pumps, each capable of 3,000 m^3/hr (13,210 gpm) rated capacity. The typical LNG vessel has an upper and a lower ballast water discharge on each side of the hull, referred to as sea chests. The lower unit is just above the keel, approximately 10 meters (33 feet) below the water line. The typical ballast

[52] One cubic meter of LNG is 0.46 metric tons (t), which for the maximum size of LNG vessel authorized to call on the LNG terminal (148,000 m^3) would be 68,080 t of LNG per ship. Assuming 1 t of seawater is 1.027 m^3, the amount of seawater ballast discharged (50 percent of the weight of the LNG loaded) would be approximately 34,959 m^3 (approximately 9.2 million gallons).

water discharge port or sea chest is approximately 3.5 to 4.2 square meters covered by a screen with 4.5 mm bars, spaced every 20 to 25 mm.

A potentially notable difference that may be observed in water quality could be salinity. Coos Bay is an estuary where freshwater runoff from upland rives meets seawater. According to Roye (1979), the zone of change in salinity in Coos Bay occurs at about NCM 8. The findings of the sampling conducted by OIMB (Shanks et al. 2010, 2011) in the bay near the LNG terminal indicated a wide range in salinity between seasons and tidal cycles. Salinity ranged from approximately 16 practical salinity units (psu) at low tide in winter to approximately 33 psu during high tide between May and September. On average, seawater in the world's oceans has a salinity of about 35 psu. Shanks et al. (2010, 2011) estimated the volume of water passing through Coos Bay in the vicinity of the Jordan Cove terminal during lower tidal levels to be 106 million m^3. Therefore, any increase in salinity from the 9.2 million gallons (34,825 m^3) of ballast water discharge would be approximately 0.3 percent of the water passing by the terminal. Consequently, virtually no change in salinity would occur in Coos Bay.

Another physio-chemical water quality parameter that may be influenced by the introduction of ballast water is the dissolved oxygen level. Dissolved oxygen levels are a critical component for the respiration of aquatic organisms. Among many other factors, dissolved oxygen levels in water can be influenced by water temperature, water depth, phytoplankton, wind, and current. Typical water column profiles indicate a decrease in dissolved oxygen with an increase in depth. Some factors that often influence this stratification include sunlight attenuation for photosynthetic organisms that can produce oxygen, wind, wave, and current that results in mixing. ODEQ records indicate that dissolved oxygen is rarely below the 6 mg/l standard below NCM 13 in Coos Bay (Roye 1979).

Water that is collected within the ballast tanks of a ship would lack many of these important influences and could suppress dissolved oxygen levels. However, ballast water that is discharged is not expected to be anoxic (i.e., lacking all oxygen), just lower than what levels would likely be at the surface. In addition, ballast water would be discharged near the bottom of the slip where dissolved oxygen levels may already be lower. Therefore, no significant impacts are likely to occur as a result of discharging ocean water with potentially suppressed dissolved oxygen levels.

Water temperatures and pH in Coos Bay are not likely to be significantly altered as a result of the release of ballast water by LNG vessels in the Jordan Cove marine slip. The temperature of the water in Coos Bay undergoes both seasonal and diurnal fluctuations. In December and March, the ocean and fresh water entering the estuary had similar temperatures, around 50°F. In summer, low stream flows results in a rise of temperatures in the bay, to above 60°F in September at NCM 8 (Roye 1979). Since ballast water is stored in the ship’s hull below the waterline, water temperatures are not expected to deviate much from ambient temperatures of the surrounding bay water. The pH of the ballast water (reflective of open ocean conditions) may be slightly higher as compared to that of freshwater estuaries. However, this slight variation is not expected to have any impacts on existing marine organisms.

LNG Vessel Engine Cooling Water

The LNG vessels would also re-circulate water for engine cooling while loading LNG at the berth. No chemicals would be added to the cooling water. The amount of cooling water to be re-circulated is a function of the propulsion system of the LNG vessel. For purposes of this analysis, typical cooling water flow rates were used. Cooling water flows while at the berth are approximately 1,300 m^3/hr (343,421 gallons per hour or 5,723 gpm). For a 148,000 m^3 vessel, this would total approximately 6.1 million gallons while at berth (for 17.5 hours). The intake port for this engine cooling water is approximately the same size and at the same location as the ballast water intake port, 3.5 to 4.2 square meters covered by a screen with 4.5 mm bars, spaced every 25 mm and approximately 32 feet below the water line, or 5.6 feet from the keel of the LNG vessel. The velocity across this port is approximately 0.28 ft/sec with a temperature differential of 3°C.

The effects of engine cooling water discharged by an LNG vessel at the terminal berth on the temperature of the water in the marine slip were evaluated (CHE 2011b). The engines would be running to provide power for standard hotelling activities as well as running the ballast water pumps. The activities that would require LNG vessel power and the assumptions used to develop the engine cooling water flow requirements are as follows:

- hotelling operations require the generation of 1.9 MW of power during the entire time that the LNG vessel remains in the slip. The vessel is anticipated to be within the slip for a total of 17.5 hours; and
- a typical auxiliary power unit for an LNG vessel is the Wartsila 34DF. This is a dual-fuel (liquid and natural gas) unit that is a complete primary driver/generator package capable of being sized upwards to 6.9 MW output. Fuel to power conversion is 7,700 kilojoules per kilowatt-hour (kJ/kWh) (7,305 British thermal units per kWh [Btu/kWh]). This system has an overall fuel to power efficiency of 46.7 percent, thereby resulting in the rejection of 3,893 Btu of heat into the cooling water for each kWh of power generated.

All calculations that follow are based upon the transfer of 148,000 m^3 of LNG from the LNG storage tanks to the LNG vessel. The 148,000 m^3 vessel is set as the basis because it represents the largest vessel authorized by the Coast Guard to call on the LNG terminal.

The total gross waste heat discharged into the slip from the cooling water stream would be due primarily to the hotelling operations (including the power required to run the ballast water discharge pumps) because the shore-side LNG pumps would be used to transfer the LNG from the LNG storage tanks to the LNG vessel. The hotelling operations were assumed to be as follows:

- hotelling operations – 17.5 total hours x 1,900 kW x 3,983 Btu/kWh = 132.5 MMBtu; and
- the total amount of heat discharged into the slip during each vessel call is approximately 132.5 MMBtu.

Two models (the 3-D UM3 model and the DKHW model) were used to study possible slip temperature changes resulting from the discharge of engine cooling water by an LNG vessel at the Jordan Cove berth. The models simulate hydrodynamic mixing processes of submerged discharges and predict temperature fields and dispersion of non-conserved substances in ambient waterbodies. Cooling water numerical modeling requires input of steady-state flow velocity in

the modeling domain. The results of tidal flowing modeling using the SELFE model showed that ambient current velocities inside the slip vary, depending on tidal stage. Peak current speeds in the berth only exceed approximately 0.32 fps less than 2 percent of the time. Therefore, for cooling water modeling, two steady state ambient flow velocities were assumed and used further in the analysis: high velocity = 0.32 fps and typical velocity = 0.16 fps.

The modeling assumptions are conservative in that a steam-powered ship was used. Steam-powered ships tend to be older than the newer more modern dual-fuel diesel electric ships that require lower quantities of cooling water.

Results of the modeling showed that for typical ambient flow conditions at a distance of 50 feet from the discharge point (LNG vessel sea chest), temperatures would not exceed 0.3ºC (0.54ºF) above the ambient temperature (CHE 2011b). This temperature difference would decrease with distance from the point of discharge. Considering the volume of water in the Jordan Cove marine slip (an estimated 4.8 cy), and tidal mixing in Coos Bay, the release of heated water from LNG vessel engine cooling operations would not substantially increase water temperatures.

Also ameliorating the impact of the release of warm engine cooling water from an LNG vessel at the Jordan Cove berth would be the decrease in temperature of the surrounding slip water due to the cooling effect that would occur from the addition of LNG cargo to the vessel. The cold LNG cargo could moderate effects on slip water temperature. Because of the extreme differential of the temperature of the cargo in the LNG vessel (-260°F) and that of the surrounding bay water (nominally 50°F) there is a constant uptake of heat by the LNG vessel. This heat uptake is manifested by the amount of LNG cargo that changes state from liquid to vapor on a daily basis. The typical LNG vessel sees 0.25 percent of its liquid cargo converted to the gaseous state each 24 hours because of this warming. In this process, 219 Btu of heat is absorbed for each pound of LNG converted to vapor. This results in a total of 53 MMBtu absorbed by a typical 148,000 m^3 LNG vessel during the 17.5 hours it is within the slip. It is reasonable to assume that 50 percent or more of the heat uptake by the vessel is extracted from the water.[53]

In addition, ballast water discharged from the LNG vessel would also comprise some portion of the water withdrawn for cooling and affected by its discharge. As the greatest predicted temperature increase from the release of engine cooling water is only about 0.5°F and that increase would be reduced further in proximity to the LNG vessel, we conclude that the thermal effect of LNG vessel operations at the berth would have very minimal impact on background water temperatures.

4.4.2.2 Pacific Connector Pipeline

The Pacific Connector pipeline would cross six subbasins including the Coos, Coquille, South Umpqua, Upper Rogue, Upper Klamath, and Lost River. Within the six subbasins, 19

[53] This assumption is further reinforced by the fact that the heat transfer coefficient between water and steel is significantly higher than the heat transfer coefficient between air and steel. Therefore, it is estimated that 26.5 MMBtu would be removed from the water in the slip by the LNG vessel during its stay. Thus, a portion of the 132.5 MMBtu of thermal energy discharged into the slip from the cooling water is offset by the uptake of 26 MMBtu by the LNG vessel itself, resulting in a net heat input to the slip of 106.5 MMBtu per 148,000 m^3 LNG vessel call.

Jordan Cove LNG terminal on individuals conducting those activities. Use of the crabbing and clamming areas in Coos Bay should not be any more affected by the passage of LNG vessels than they are currently affected by the passage of other deep-draft ships. However, if crabbing and clamming activities were to occur within the established security zones, those activities would be required to cease and temporarily move out of the way. Crab pots outside of the navigation channel should not be affected by LNG vessel traffic in the waterway. Passive equipment, such as crab pots, would be permitted to remain within the security zone while an LNG vessel is present, though the attending crabbing vessels would be required to vacate (Berg 2008).

However, there could be indirect impacts on clams and crabs from shoreline erosion or bottom sediment disturbed by LNG vessel traffic in the waterway. Those impacts are addressed in sections 4.4.2.1 and 4.6.2.1 of this EIS. We concluded that wakes from LNG vessels in the navigation channel would not cause major shoreline erosion much beyond natural waves, and propeller wash from LNG vessels would not greatly disturb the channel bottom.

There would also be impacts from the dredging in the bay to create the access channel for the Jordan Cove terminal. Those impacts have been addressed in sections 4.4.2.1 and 4.6.2.2 in this EIS. We concluded that dredging of the access channel would only have temporary impacts on bay water quality, and increased sedimentation from the dredging would be limited in extent. For example, if a hydraulic dredge was used, turbidity would be estimated to increase about 14 mg/l at 200 feet from the cutterhead under high water conditions. The limited time and extent of dredging siltation should not result in long-term or population wide impacts on clams and crabs near the Jordan Cove terminal. In fact, as mitigation for wetland impacts, Jordan Cove would be creating new eelgrass beds in Coos Bay that could serve as nursery habitat for crabs, would also be creating new wetlands at Kentuck Slough, and would be acquiring 3 acres of unvegetated sand as part of its habitat mitigation program. Therefore, we conclude that the Project would not have significant adverse impacts on recreational clamming and crabbing activities in Coos Bay.

Boating and Fishing

The waterway for LNG vessel traffic to and from the terminal, Jordan Cove's access channel to its marine slip, and the proposed eelgrass mitigation area would be within Coos Bay. Coos Bay is utilized for recreational boating, angling, clamming and crabbing, as well as commercial fishing, oyster farming, and commercial shipping. The Coos Bay estuary is discussed in more detail in section 4.4.1. Aquatic resources are addressed in more detail within section 4.6, and commercial shipping and fishing are discussed in section 4.9. Recreational resources located along the waterway for LNG vessel marine traffic were discussed in section 4.7.1.3 in the FERC's May 2009 FEIS for Docket Nos. CP07-441-000 and CP07-444-000. Recreational clamming and crabbing activities are discussed above, while recreational boating and fishing in Coos Bay is discussed below.

According to a 2008 study by the Oregon State Marine Board (OSMB), recreational boaters in Coos Bay took a total of 31,560 boat trips the previous year. Nearly 90 percent of the boat use-days involved fishing (including angling, crabbing, and clamming), 9 percent was for pleasure cruising, and the remainder was for sailing and water skiing. Sixty-eight percent of the boating activities in Coos Bay originated from the Charleston Marina and the Empire ramp, 19 percent at the California Avenue boat ramps, and 4 percent at the North Spit ramps. Most of the recreational boating activities in Coos Bay occur during the summer.

The most popular fish species caught by recreational anglers out of Coos Bay include coho and Chinook salmon. Other recreational catch species include various species of perch, rockfish, flatfish, sturgeon, Pacific herring, and California halibut.

Much of the recreational angling for salmon in Coos Bay occurs in late summer and fall. It usually begins in late summer at jetty areas and moves up the bay as fish move upstream. Bank angler access on the North Spit is limited. Boat angling occurs throughout the bay, but angling is limited in some areas at times by exposure to winds. For example, the Roseburg Forest Products dock area gets less boat angling use due to exposure to wind and tidal action. Much of the boat angling for Chinook and coho salmon in the fall is concentrated around the railroad bridge and downstream. Marshfield Channel can be an area of concentrated angling for fall salmon.

Perch fishing begins in Coos Bay in late February to early March, depending on freshwater runoff into the bay, and can continue through July. Rocks around bridge abutments are targeted by anglers on the outgoing tide.

Recreational fishing for sturgeon in Coos Bay generally occurs between the railroad bridge and McCullough Bridge (U.S. Highway 101), just east of the Jordan Cove terminal, and also above the McCullough Bridge. White sturgeon can be taken year-round, but the best angling is during December through March, and when there is a heavy freshwater plume in the bay.

Recreational boating in the bay would be redirected away from the access channel and terminal slip during the construction period that includes dredging within Coos Bay. Notices would be provided to boaters by the Coast Guard and the OSMB to avoid this area during the dredging activities. Signs would be posted at the shoreline as well as at the boat ramps and marinas, and on buoys in the bay, in advance of this final task to notify boaters of the planned construction activity and the duration of the activity. If the signage and notices are not sufficient to prevent recreational boating from avoiding the construction areas, some form of physical barrier, like a continuous string of highly visible soft material floats, may be extended across the mouth of the slip or around the construction area. Construction safety inspectors would also be responsible to warn any recreational boaters who progress into the construction area. Boaters could avoid the construction area by moving to the south and east side of the bay.

During construction of the terminal, material deliveries would be made by marine transit in the existing Coos Bay navigation channel. This would include visits by about 82 break bulk cargo ships and 18 barges over a two-year period in total. As discussed below, we do not believe that the equipment delivery vessels coming to the terminal would have adverse impacts on recreational bay users much beyond current commercial cargo ship and barge traffic. Currently, the Port is visited by about 60 deep-draft cargo ships and 50 barges per year.

During operation of the LNG terminal, recreational boaters would have to avoid LNG vessels in transit within the waterway. Jordan Cove believes that up to 90 LNG vessels per year would visit its terminal. Recreational boaters using the bay at the same time as an LNG vessel is in transit within the waterway may encounter delays due the moving security zone requirements around an LNG vessel, as specified in Jordan Cove's WSA and the Coast Guard's WSR and LOR. Jordan Cove estimated that it may take an LNG vessel up to 90 minutes to transit the waterway from the buoy to the terminal at speeds between 4 and 10 knots. The maximum waiting period for an LNG vessel to pass a given point would be 30 minutes. The sum of the

periods in which LNG vessels would have a potential impact on recreational and other boating activity is about 1.3 percent of all daylight hours (ECONorthwest 2012a). Pilots guiding commercial ships in the Coos Bay navigation channel currently encounter approximately six recreational boats during the transit into and out of the Port. These numbers are typically lower in winter and on weekdays than during the summer and on weekends. The Coast Guard and OSMB would continue to remind boaters of their obligation not to impede deep draft ships, regardless of the cargo.

Other Public and Special Use Areas

The LNG terminal would be approximately 0.9 mile from the Southwest Oregon Regional Airport. Potential impacts of the LNG terminal on the airport are addressed in sections 4.9 and 4.10.

4.8.1.2 Pacific Connector Pipeline

Parks and Recreational Areas or Facilities on Non-Federal Lands

Overall, the pipeline route does not cross any non-federal park lands or developed recreational facilities, and construction and operation of the pipeline should not adversely impact park users. However, construction-related activities would temporarily increase traffic on local roads used to access the parks, and park users may be able to hear construction noise while workers and equipment move through the area to install the pipeline. In addition, the pipeline route does cross a water trail, the Haynes Inlet Water Trail, as discussed below. Construction-related impacts would be temporary and short term, and should not significantly affect recreational use of parks or other recreational areas.

State Lands

Oregon Coast Trail

The Oregon Coast Trail was previously discussed above in section 4.8.1.1. The pipeline route would be within one-quarter mile of the trail where it follows Horsfall Beach road and joins the Trans-Pacific Parkway north of MP 1.5R.

Recreational users of the Oregon Coast Trail would be exposed to pipeline construction traffic along the Trans-Pacific Parkway, which is the only access road to the North Spit and the Jordan Cove Meter Station. Pacific Connector developed *Transit Management Plans* (TMP) to reduce impacts on other road travelers (see section 4.10.2). Project construction activities could be visible and audible to hikers on the Oregon Coast Trail where it joins with the Trans-Pacific Parkway, but these impacts would be temporary and short term. Furthermore, this area is adjacent to a large-scale industrial plant (i.e., Roseburg Forest Products), a railroad, and a road. There are other current noise sources such as OHVs in the ODNRA that are much louder than pipeline construction noise. Therefore, pipeline construction should not significantly affect the trail use or experience.

Haynes Inlet

Coos Bay is used for recreational boating, canoeing, kayaking, angling, clamming, and crabbing, as discussed above in section 4.8.1.1. The Pacific Connector pipeline route would cross the Haynes Inlet portion of Coos Bay between about MPs 1.7R and 4.1R. Coos Bay is a Water of the State, with the bottom managed by ODSL. The pipeline crossing of Haynes Inlet is discussed in detail in section 4.4.2.

Exhibit 41

Top 10 Beach Strolls
Sunset, October 2007

Top 10 Beach Strolls

From uninhabited and windswept to sunny and bustling, a walk for every mood

1 PACIFIC RIM NATIONAL PARK RESERVE, B.C.

LONG BEACH This 10-plus-mile stretch of pristine, surf-swept sand near the towns of Tofino and Ucluelet on Vancouver Island is a beach trekker's paradise. Flanked by rolling Pacific waves and lush temperate rain forests, Long Beach feels like the misty edge of a new world; winter visits offer storm-watching opportunities as ferocious waves pound the shoreline. $6.55 U.S., $3.27 ages 6-16; off Provincial Hwy. 4 in Pacific Rim National Park Reserve; www.pc.gc.ca/pacificrim or 250/726-7721. -KIM GRAY

2 LANAI CITY, HI

SHIPWRECK BEACH A rusting World War II-era Liberty Ship, washed up on a reef, gives the name to this 9-mile stretch of sand and lava along Lanai's northeastern shore. On calm days, the water is crystal clear; other times, you'll be buffeted by strong trade winds, but they're a boon for beachcombers. It's not unusual to come across sea-sculpted driftwood, fishing nets, lobster cages, and the

odd glass float. From Lanai City, go north on Lanai Ave. and bear right on Keomuku Rd. until the paved road ends, then follow the dirt road to the left for 2 ½ miles; 800/947-4774. -DAVID LANSING

3 MALIBU, CA

ZUMA COUNTY BEACH Whether you head southeast toward the promontory of Point Dume or northwest toward the oceanfront homes of the rich and richer at Broad Beach, you'll be treated to a sunsplashed cavalcade of surfers, dolphins, and volleyball players. Summertime or not, the living here is easy, and thanks to the well-packed sand along the shoreline, the walking is too. $6 per vehicle; off Pacific Coast Hwy., just west of Kanan Dume Rd.; www.labeaches.info or 310/305-3545. -MATTHEW JAFFE

4 PRAIRIE CREEK REDWOODS STATE PARK, CA

GOLD BLUFFS BEACH Five miles north of Orick, California's northern coast really struts its stuff. For 10 beautiful miles, Gold Bluffs Beach abuts Prairie Creek Redwoods State Park. Redwoods and Sitka spruces tower on bluffs, and agile Roosevelt elk graze behind dunes in meadows carpeted in wild strawberries. You can walk the desolate beach to Fern Canyon, where steep walls covered in ferns press in on a cobbled stream. $6 per vehicle; from US. 101 north of Orick, turn left on Davison Rd., then drive 2 miles to beach parking; parks.ca.gov or 707/465-7354. -KEN MCALPINE

5 NORTH BEND, OR

NORTH SPIT About 1 mile north of the mouth of Coos Bay, the rusting stern of the New Carissa, the most notorious of recent Oregon coast shipwrecks, looms above the surfline. It's an awesome sight best seen on a 4.2-mile round-trip walk over the

dunes and down the beach on the North Spit. From U.S. 101 north of North Bend, turn west on Trans Pacific Lane, and follow it AVi miles to the trailhead; blm.gov/or/districts/coosbay or 541/756-0100. -BONNIE HENDERSON

6 PACIFIC GROVE, CA

ASILOMAR STATE BEACH The Monterey Peninsula's beauty is breathtaking and enormous. But the Coast Trail will rein in your focus, guaranteeing a walk full of discovery, especially at low tide. ...

Questia, a part of Gale, Cengage Learning. www.questia.com
Publication information: Article title: Top 10 Beach Strolls. Contributors: Not available. Magazine title: Sunset. Volume: 219. Issue: 4 Publication date: October 2007. Page number: 34+.

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U.S. MAP INTERACTIVE

50 Best Places to Live: The Next Great Adventure Towns

Published: September 2008

Where to Live + Play Now!

The fifty next great adventure towns.

Text by Sarah Tuff and Greg Melville

A change of address can bring instant gratification. You could wake up tomorrow in Missoula and kayak off your own deck at dawn, sneak in singletrack at lunch in Chattanooga—or choose your own adventure in any one of the country's best base camps. But a move is a long-term investment. So this year we selected 50 innovative towns that aren't just prime relocation spots right now, but smart choices for the future. Not only do they have the action. They've got a plan. Now we're giving you a plan too. Inside, you'll find hometown picks that range from adventure 24/7 hubs loaded with outdoor options to urban players that offer a variety of jobs and cultural activities without sacrificing green space. You'll also hear from recent transplants who made the move and have a better quality of life to show for it. So go on—get packing. (Read the full coverage of these towns in the September 2008 issue, on newsstands August 12th.)

Plus: Take a digital tour of these towns with Nat Geo Map's Topo.com. See the maps >>

Here are the 50 next great adventure towns, presented by region and in no particular order (our top 12 picks are shown in bold). Plus: You can now post your comments on our picks in the area provided below.

Next Weekend: Instant Adventures
Use this U.S. map to find 32 out-the-backdoor escapes.

WEST

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1. Seattle, Washington

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4. Girdwood, Alaska

5. Hood River, Oregon

6. San Francisco, California

7. Joshua Tree, California

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9. Arcata, California

10. Klamath Falls, Oregon

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Exhibit 42

https://kcby.com/news/local/after-a-year-of-planning-coos-bay-has-new-marine-patrol-boat-dock

After a year of planning, Coos Bay has new marine patrol boat dock

by KCBY

Wednesday, March 16th 2016

The recently completed Coos County Marine Patrol dock near Roseburg's (formerly Roseburg Forest Products) Jordan Cove property. (March 8, 2016)

COOS BAY, Ore. -- After a year of planning the Coos County Sheriff's Office now has a marine patrol boat dock in Coos Bay.

Roseburg Forest Products helped with building and financing the new dock on the North Spit.

Sheriff's deputies now have better access to the lower bay, where water rescues happen every summer.

"For the Sheriff's marine division to have a presence out there, they would have to go all the way out to Coquille, get their boat, bring it all the way back out here to the North

Spit, launch it and by the time they get ready to get on the water, it's usually too late," says Richard Dybevik with Roseburg Forest Products. "Now they'll have the ability to have a vessel on location in the lower bay. So it's more of a rescue rather than a collection."

Sheriff Craig Zanni says they also plan to use the dock for new kinds of training.

"We're going to be upgrading the training for all our deputies in boat handling. If LNG comes, there's going to be requirements for us to be able to respond in the bay and it requires better than just being a boat operator, but operating amongst other boats and doing some routine inspections and those types of things."

Dybevik says the lower bay is always crowded with boats during the summer.

He says he's as counted as many as 100 boats in that area at one time.

Exhibit 43

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June 24, 2015

VIA U.S. MAIL & EMAIL
SDP.Comments@state.or.us

Andrea Goodwin
Oregon Department of Energy
625 Marion St. NE
Salem, OR 97301

Re: South Dunes Power Plant

Dear Ms. Goodwin:

This correspondence is being submitted on behalf of Oregon Dunes Sand Park, LLC ("Oregon Dunes") in response to the invitation for comments on the South Dunes Power Plant (the "Project") in advance of the Public Hearing to be held June 25, 2015. Oregon Dunes owns land containing The Box Car Hill Campground (the "Campground") adjacent to the proposed site for the Project. Such land might be considered "Noise Sensitive Property" under OAR 340-035-0015(38). Jordan Cove Energy Project, L.P. ("Jordan Cove") has submitted an Application for Site Certification ("ASC") in connection with its application to site, construct and operate the Project. As part of the ASC, Jordan Cove must make certain that the Campground ceases to be classified as a noise sensitive property. In order to accomplish this goal, Jordan Cove leased the Campground from Oregon Dunes.

In the ASC, Jordan Cove stated in Exhibit X, Page 2, that it leased the Campground pursuant to a 99-year lease agreement with Oregon Dunes. While this statement is accurate for the most part, it does not tell the complete story. The lease, which commenced January 1, 2015 and was set to expire on December 31, 2015, contains two options held by Jordan Cove. The first such option entitled Jordan Cove to send written notice to Oregon Dunes by March 1, 2015 extending the term of the lease to December 31, 2016. Jordan Cove exercised that option. The second option entitles Jordan Cove to send written notice to Oregon Dunes by March 1, 2016 extending the term of the lease to December 31, 2113. Jordan Cove has not yet exercised this option, however it still has the right to do so.

Thus, while Jordan Cove has the right to lease the Campground for 99 years, it is not currently obligated to do so. Currently, it is only obligated to lease the Campground until

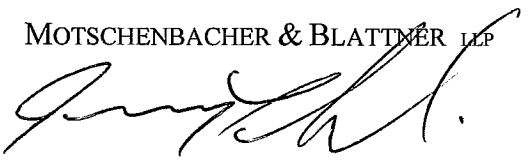
December 31, 2016. Upon exercise of the remaining option under the lease, Jordan Cove will be obligated to lease the Campground until December 31, 2113 and will have the ability to control the uses on the site. However, if Jordan Cove does not exercise the remaining option on or prior to March 1, 2016 and the lease terminates, Oregon Dunes will again be permitted to use the Campground in a manner so that the Campground could be considered a noise sensitive property.

To ensure that no noise sensitive use can be operated on the Campground for the duration of the useful life of the Project, Jordan Cove will need to control the site for the duration of the Project. Accordingly, in the event the Project goes forward, it should only be permitted to do so subject to the condition that Jordan Cove be required to lease the Box Car Hill Campground until at least December 31, 2113. This condition has not yet been satisfied.

Thank you for your attention to this matter. If you have any questions or comments, or if you need anything further from us at this time, feel free to contact me.

Very truly yours,

MOTSCHENBACHER & BLATTNER LLP



Jeremy G. Tolchin

JGT/mm
cc: Todd Goergen
H:\TONY\OREDUN.2101\LLC.001\CORRESPONDENCE\A. GOODWIN 06.24.2015.DOCX5

Exhibit 44

http://today.oregonstate.edu/archives/2015/feb/study-outlines-threat-ocean-acidification-coastal-communities-us

Feb 23, 2015

CORVALLIS, Ore. - Coastal communities in 15 states that depend on the $1 billion shelled mollusk industry (primarily oysters and clams) are at long-term economic risk from the increasing threat of ocean acidification, a new report concludes.

This first nationwide vulnerability analysis, which was funded through the National Science Foundation's National Socio-Environmental Synthesis Center, was published today in the journal Nature Climate Change.

The Pacific Northwest has been the most frequently cited region with vulnerable shellfish populations, the authors say, but the report notes that newly identified areas of risk from acidification range from Maine to the Chesapeake Bay, to the bayous of Louisiana.

"Ocean acidification has already cost the oyster industry in the Pacific Northwest nearly $110 million and jeopardized about 3,200 jobs," said Julie Ekstrom, who was lead author on the study while with the Natural Resources Defense Council. She is now at the University of California at Davis.

George Waldbusser, an Oregon State University marine ecologist and biogeochemist, said the spreading impact of ocean acidification is due primarily to increases in greenhouse gases.

"This clearly illustrates the vulnerability of communities dependent on shellfish to ocean acidification," said Waldbusser, a researcher in OSU's College of Earth, Ocean, and Atmospheric Sciences and co-author on the paper. "We are still finding ways to increase the adaptive capacity of these communities and industries to cope, and refining our understanding of various species' specific responses to acidification.

"Ultimately, however, without curbing carbon emissions, we will eventually run out of tools to address the short-term and we will be stuck with a much larger long-term problem," Waldbusser added.

The analysis identified several "hot zones" facing a number of risk factors. These include:

- The Pacific Northwest: Oregon and Washington coasts and estuaries have a "potent combination" of risk factors, including cold waters, upwelling currents that bring corrosive waters closer to the surface, corrosive rivers, and nutrient pollution from land runoff;

- New England: The product ports of Maine and southern New Hampshire feature poorly buffered rivers running into cold New England waters, which are especially enriched with acidifying carbon dioxide;

- Mid-Atlantic: East coast estuaries including Narragansett Bay, Chesapeake Bay, and Long Island Sound have an abundance of nitrogen pollution, which exacerbates ocean acidification in waters that are shellfish-rich;

- Gulf of Mexico: Terrebonne and Plaquemines Parishes of Louisiana, and other communities in the region, have shellfish economies based almost solely on oysters, giving this region fewer options for alternative - and possibly more resilient - mollusk fisheries.

The project team has also developed an interactive map to explore the vulnerability factors regionally.

One concern, the authors say, is that many of the most economically dependent regions - including Massachusetts, New Jersey, Virginia and Louisiana - are least prepared to respond, with minimal research and monitoring assets for ocean acidification.

The Pacific Northwest, on the other hand, has a robust research effort led by Oregon State University researchers, who already have helped oyster hatcheries reboundfrom near-disastrous larval die-offs over the past decade. The university recently announced plans to launch a Marine Studies Initiative that would help address complex, multidisciplinary problems such as ocean acidification.

"The power of this project is the collaboration of natural and social scientists focused on a problem that has and will continue to impact industries dependent on the sea," Waldbusser said.

Waldbusser recently led a study that documented how larval oysters are sensitive to a change in the "saturation state" of ocean water - which ultimately is triggered by an increase in carbon dioxide. The inability of ecosystems to provide enough alkalinity to buffer the increase in CO_2 is what kills young oysters in the environment.

SOURCE:
George Waldbusser, 541-737-8964;
waldbuss@coas.oregonstate.edu

Exhibit 45

Vulnerability and adaptation of US shellfisheries to ocean acidification

Article *in* Nature Climate Change · February 2015

DOI: 10.1038/nclimate2508

13 authors, including:

Julia Ekstrom
University of California, Davis
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Lisa Suatoni
Natural Resources Defense Council
9 PUBLICATIONS **424** CITATIONS
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Sarah R Cooley
Ocean Conservancy
46 PUBLICATIONS **1,625** CITATIONS
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Joshua Cinner
James Cook University
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nature climate change

PERSPECTIVE

PUBLISHED ONLINE: XX FEBRUARY 2015 | DOI: 10.1038/NCLIMATE2508

Vulnerability and adaptation of US shellfisheries to ocean acidification

Julia A. Ekstrom*†[1], Lisa Suatoni[2], Sarah R. Cooley[3], Linwood H. Pendleton[4,5], George G. Waldbusser[6], Josh E. Cinner[7], Jessica Ritter[8], Chris Langdon[9], Ruben van Hooidonk[10], Dwight Gledhill[11], Katharine Wellman[12], Michael W. Beck[13], Luke M. Brander[14], Dan Rittschof[15], Carolyn Doherty†[15], Peter Edwards[16] and Rosimeiry Portela[17]

Ocean acidification is a global, long-term problem whose ultimate solution requires carbon dioxide reduction at a scope and scale that will take decades to accomplish successfully. Until that is achieved, feasible and locally relevant adaptation and mitigation measures are needed. To help to prioritize societal responses to ocean acidification, we present a spatially explicit, multidisciplinary vulnerability analysis of coastal human communities in the United States. We focus our analysis on shelled mollusc harvests, which are likely to be harmed by ocean acidification. Our results highlight US regions most vulnerable to ocean acidification (and why), important knowledge and information gaps, and opportunities to adapt through local actions. The research illustrates the benefits of integrating natural and social sciences to identify actions and other opportunities while policy, stakeholders and scientists are still in relatively early stages of developing research plans and responses to ocean acidification.

The ocean has absorbed about 25% of anthropogenic atmospheric CO_2 emissions, progressively increasing dissolved CO_2, and lowering seawater pH and carbonate ion levels[1]. On top of this progressive global change in oceanic carbon conditions, local factors such as eutrophication[2,3], upwelling of CO_2-enriched waters[4] and river discharge[5] temporarily increase anthropogenic ocean acidification (OA)[6] in coastal waters[7–9]. Ocean acidification could primarily affect human communities by changing marine resource availability[1]. Studies have shown that, in general, shelled molluscs are particularly sensitive to these changes in marine chemistry[10–12]. Shelled molluscs comprise some of the most lucrative and sustainable fisheries in the United States[13]. Ocean acidification has already cost the oyster industry in the US Pacific Northwest nearly $110 million, and directly or indirectly jeopardized about 3,200 jobs[13]. The emergence of real, economically measurable human impacts from OA has sparked a search for regional responses that can be implemented immediately, while we work towards the ultimate global solution: a reduction of atmospheric CO_2 emissions. Yet there is little understanding about which locations and people will be impacted by OA, to what degree, and why, and what can be done to reduce the risks.

Here, we present the first local-level vulnerability assessment for ocean acidification for an entire nation, adapting a well-established framework and focusing on shelled mollusc harvests in the United States; for other evaluations of OA social vulnerability, see refs 14–16. We explored three key dimensions—exposure, sensitivity and adaptive capacity (Fig. 1, Supplementary Fig. S1)—to assess the spatial distribution of vulnerable people and places to OA. The underlying assumption guiding this assessment is that addressing existing vulnerability can reduce future vulnerability to OA, sometimes called 'human-security vulnerability'[15].

Exposure of marine ecosystems addresses acidification driven by global atmospheric CO_2 and amplified by local factors in coastal waters. We divided the coastal waters around the United States into existing National Estuary Research Reserve System bioregions[17] (Supplementary Fig. S7), and for each bioregion, examined: (1) projected changes to ocean chemistry based on a reduction in aragonite saturation state (Ω_{Ar}) (Supplementary Fig. S2), and (2) the prevalence of key local amplifiers of OA, including upwelling, eutrophication and input of river water with low-aragonite saturation state [**AU: OK?**], for each bioregion (Supplementary Figs S4–S6). Aragonite saturation state (Ω_{Ar}) is a measure of the thermodynamic stability of this mineral form of calcium carbonate that is used by bivalve larvae and other molluscs, which is also commonly used to track OA[1]. Declining Ω_{Ar} makes it more difficult and energetically costly for larval bivalves to build shells even before Ω_{Ar} becomes corrosive [**AU: is it Ω_{Ar} that becomes corrosive, or should this be OA?**], and Ω_{Ar} seems to be the important variable for the most sensitive early stage of bivalve larvae[18]. We evaluated relative exposure to anthropogenic OA as the time [**AU: i.e. 'time until', or 'the**

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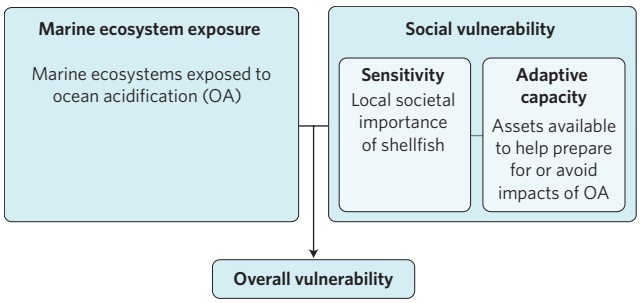

Figure 1 | Conceptual framework structuring the analysis of vulnerability to ocean acidification. Vulnerability analyses can focus on three key dimensions (exposure, sensitivity and adaptive capacity): (1) the extent and degree to which assets are exposed to the hazard of concern; (2) the sensitivity of people to the exposure; and (3) the adaptive capacity of people to prepare for and mitigate the exposure's impacts. These three dimensions together provide a relative view of a place's overall vulnerability. Adapted conceptual model components from refs 16,52–55.

extent of time for which'?] mean annual surface seawater exceeds an empirically informed absolute Ω_{Ar} threshold for several species of bivalve larvae. This indicator for disruption to the biological processes of calcification and development in larval molluscs was favoured over alternatives (for example time until the historic range of Ω_{Ar} is exceeded) because the biological mechanism was clear[19] and empirical evidence exists[20]. For comparison purposes, the Supplementary Information includes the time until the historic range of Ω_{Ar} is exceeded (Supplementary Fig. S3), but below we document the outcomes based on the Ω_{Ar} threshold projections and local amplifiers of OA.

Sensitivity of social systems was evaluated at the scale of 'clusters of coastal counties' around the United States, using three indicators of community dependence on shellfish, adapted from the National Marine Fisheries Service's fishing community vulnerability and resilience index[21]: (1) the 10-year median landed value of shellfish (including both wild and aquaculture harvests); (2) the 10-year median proportional contribution of shellfish to total value of commercial landings; and (3) the 5-year median number of licences (representing jobs) supported by shelled mollusc fishing (Supplementary Information). Sensitivity indicators were re-scaled and combined into a single index (Supplementary Information and Supplementary Fig. S8).

Adaptive capacity of social systems to cope with and adapt to OA is represented by three classes of indicators: status of state government climate and OA policies, local employment alternatives and availability of science. We examined a total of six indicators representing adaptive capacity that are derived largely from the broader economic and policy landscape, yet are directly relevant for dealing with the threat of OA (Supplementary Fig. S9). This is a deliberate departure from studies conducted at broader and finer geographic scales that use general demographic indicators (see Supplementary Information). We assessed 'potential government support for adaptation' through measures of: (1) the status of state legislative action on OA and (2) the status of state climate adaptation planning. These indicators reflect social organization and assets at the state jurisdictional level that could be used by communities to adapt to, cope with, or avoid the impacts of lost shellfish harvests. We examined aspects of employment alternatives through: (3) the diversity of shelled mollusc harvests, suggesting potential alternative shellfish that could be harvested and (4) the diversity of non-shellfish-related employment industries. These reflect the likelihood of job alternatives for shellfish harvesters and those in the aquaculture industry. Finally, we captured 'access to and availability of science' through (5) a score for marine laboratories developed to take into account the high local influence that such laboratories can have as well as the potential contribution beyond their immediate vicinity. For each county cluster, a metric based on the number of university marine laboratories (on-campus and satellite laboratories) in that county cluster was averaged with a metric based on the total number of university marine laboratories in that state (see Supplementary Information for more information) and (6) Sea Grant state budgets normalized by shoreline length. These indicators represent the availability of local scientific capacity, the potential for troubleshooting assistance, and the possibility of access to a range of tools and data products, such as available early warning information. We attributed each county cluster (as used in Sensitivity) to each variable score of the six indicators. We then combined into a single index by averaging re-scaled (0–1) overall component scores for sensitivity and adaptive capacity (Supplementary Information Fig. S9). Coincidence of high marine ecosystem exposure to OA with high sensitivity and low adaptive capacity of social systems reveals the areas at highest overall vulnerability to OA.

Places vulnerable to ocean acidification

Our results show that 16 out of 23 bioregions around the United States are exposed to rapid OA (reaching Ω_{Ar} 1.5 by 2050) or at least one amplifier (Fig. 2; Supplementary Table S1); 10 regions are exposed to two or more threats of acidification (note that Alaska and Hawaii are missing local amplifier data; Fig. 2). The marine ecosystems and shelled molluscs around the Pacific Northwest and Southern Alaska are expected to be exposed soonest to rising global OA, followed by the north-central West Coast and the Gulf of Maine in the northeast United States. Communities highly reliant on shelled molluscs in these bioregions are at risk from OA either now or in the coming decades. In addition, pockets of marine ecosystems along the East and Gulf Coasts will experience acidification earlier than global projections indicate, owing to the presence of local amplifiers such as coastal eutrophication, upwelling and discharge of low-Ω_{Ar} river water (see Supplementary Figs S4–S6, Supplementary Table S1).The inclusion of local amplifiers reveals more coastline segments around the United States that are exposed to acidification risk than when basing exposure solely on global models.

Combining sensitivity and adaptive capacity reveals that the most socially vulnerable communities are spread along the US East Coast and Gulf of Mexico (Fig. 2), yet the sources of high social vulnerability are very different between these two regions (see Supplementary Information for breakdown separated by sensitivity and adaptive capacity, Figs S8 and S9). Specifically, the East Coast is dominated by high levels of sensitivity, or economic dependence, from strong use of shellfish resources. For example, southern Massachusetts measures as having the highest sensitivity. This county cluster ranks in the top four for all three sensitivity indicators (Supplementary Fig. S8), meaning that this area has the highest mollusc harvest revenues of any coastal area in the United States, second highest number of licences and fourth highest proportion of seafood revenues coming from molluscs. In contrast, the Gulf of Mexico region is socially vulnerable from low adaptive capacity, owing to social factors such as low political engagement in OA and climate change, low diversity of shellfish fishery harvest and relatively low science accessibility (Supplementary Fig. S9).

Importantly, our visually combined overall vulnerability analysis reveals that a number of socially vulnerable communities lie adjacent to water bodies that are exposed to a high rate of OA or at least one local amplifier, indicating that these places could be at high overall vulnerability to OA (Fig. 2). The areas that are exposed to OA (including local amplifiers) and high and medium–high social vulnerability coincide include southern Massachusetts, Rhode Island, Connecticut, New Jersey and portions around the

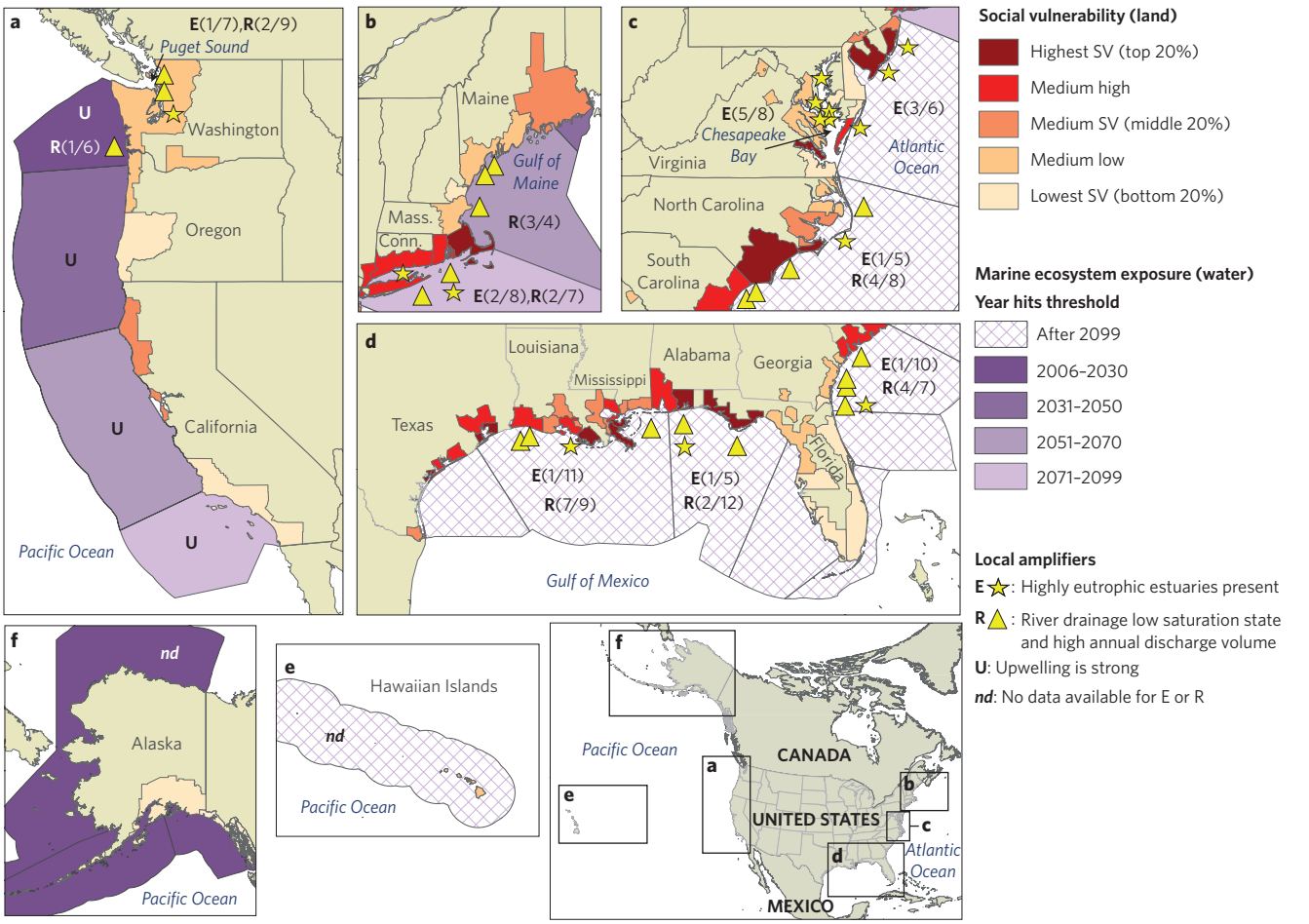

Figure 2 | Overall vulnerability of places to ocean acidification. Scores of relative social vulnerability are shown on land (by coastal county cluster) and the type and degree of severity of OA and local amplifiers to which coastal marine bioregions are exposed, mapped by ocean bioregion: (a) contiguous US West Coast; (b) Northeast; (c) Chesapeake Bay; (d) Gulf of Mexico, and Florida and Georgia's coast; (e) Hawaii Islands; and (f) Alaska. Social vulnerability (red tones) is represented with darker colours where it is relatively high. Exposure (purple tones) is indicated by the year at which sublethal thresholds for bivalve larvae are predicted to be reached, based on climate model projections using the RCP8.5 CO_2 emission scenario[27]. Exposure to this global OA pressure is higher in regions reaching this threshold sooner. Additionally, the presence and degree of exposure to local amplifiers of OA are indicated for each bioregion: E(*x*/*y*) marks bioregions [**AU: OK?**] in which highly eutrophic estuaries are documented, *x* is the number of estuaries scored as high, and *y* is the total number evaluated in each bioregion (source: ref. 56), locations of highly eutrophic estuaries are marked with a star; R(*x*/*y*) marks bioregions in which **sampled river water draining into bioregion scored** [**AU: this description is not clear grammatically: should it be 'bioregions in which... water was scored', or is something missing here? Also, does 'scoring in the top quintile' here mean top quintile of discharge volume only? Please clarify phrasing**] based on very low saturation state and high annual discharge volume (top quintile, calculated by authors from US Geological Survey[57]), *x* is the number of rivers scoring in the top quintile of those evaluated, and *y* is the total number evaluated in this study. Approximate locations of river outflows of those rivers scoring in the top quintile are marked with a delta [**AU: a yellow triangle?**]; and U marks bioregions where upwelling is very strong in at least part of the bioregion (source: ref. 58).

Chesapeake Bay, the Carolinas, and areas across the Gulf of Mexico (Fig. 2b–d). Interestingly, global ocean models that project the advance of OA, primarily as a result of atmospheric CO_2, do not reveal these areas as exposed to global OA until after 2099, based on our study's Ω_{Ar} threshold (Table 1). The marine ecosystem exposure in the areas located along the Atlantic coast and the Gulf of Mexico is from low-Ω_{Ar} conditions caused primarily by the addition of river water and eutrophication, local factors that have only more recently been considered major amplifiers of nearshore acidification[6,7]. These coastal processes are likely to tip coastal oceans past organism thresholds as atmospheric CO_2 uptake continues in the future (see ref. 22). Although the Pacific Northwest, northern California and Maine exhibit only medium and medium–low social vulnerability (Fig. 2a,b), these areas are particularly economically sensitive and lie adjacent to marine ecosystems highly exposed to global OA[23,24] (sensitivity, Supplementary Fig. S8). This profile of relatively high dependency and high exposure in these three regions has already activated significant research and local action/engagement among local scientists, government and shellfish growers (see for example refs 25,26). This engagement has driven up adaptive capacity (based on our study's indicators) in these areas, which reduces their social vulnerability relative to other regions across the United States. In comparison, the lower level of OA-related action in other regions such as the Gulf of Mexico (Fig. 2d), Massachusetts (Fig. 2b) and Mid-Atlantic (Figs 2c,d) with high overall vulnerability profiles might be partly because their marine ecosystem exposure is dominated by the presence of local OA amplifiers rather than global OA (Supplementary Fig. S2, Supplementary Table S1). At the same time, some of these areas (for example Maryland) do have strong advocates for addressing water quality which could provide an opportunity to address locally driven acidification as awareness of the issue grows.

[AU: Please indicate where Table 2 should be cited in the text.]

Table 1 | Indicators of drivers and amplifiers of ocean acidification, and the criterion for each used in this study.

Factors causing and amplifying OA (reducing Ω_{Ar})	Indicator	Scoring scale	Criterion for ranking the risk factor as 'high'
Rising atmospheric CO_2 reduces Ω_{Ar} causing chronic stress to shelled mollusc larvae	Projected year that surface water will reach $1.5\Omega_{Ar}$ (ref. 27)	Continuous scale from current year to 2099	$1.5\Omega_{Ar}$ threshold reached by 2050
Eutrophication increases pCO_2 locally via respiration, leading to reduced Ω_{Ar}	Degree of eutrophication[56]	Eutrophication scored on a five-point scale: low to high	Presence of a high-scoring eutrophic estuary in bioregion
River water can reduce Ω_{Ar} locally in coastal waters	Combined metric of river's aragonite saturation state and annual discharge volume	Rivers scored on a five-point scale: low to high	Presence of high scoring river (for low aragonite saturation and high discharge volume) in bioregion
Significant seasonal upwelling delivers water rich in CO_2 to shallow waters, leading to reduced Ω_{Ar}	Degree of upwelling[58]	Coastal zones scored on a five-point scale: low to high	Presence of high upwelling zone in bioregion

Table 2 | Indicators representing 'sensitivity' (people's dependency) on organisms expected to be affected by ocean acidification (in this study, shelled molluscs).

Indicator or measure	Source	Raw format	Processing for subindex
Landed value (median of 10 years)	Regional fisheries databases (ACCSP, GulfBase, PacFIN), and States of Alaska and Hawaii	US dollars, annual	Calculated median for years 2003–2012 Winsorized the top 10%
Percentage of shellfish by value **[AU: i.e. as percentage of all fish caught?]** (median of 10 years)		For each year: shelled molluscs value/total commercial landed value	Divided landed value of shellfish by landed value of all fish Winsorized the top 10%
Number of licences as proxy for jobs (median over 5 years)		Number of commercial licences, annual	Winsorized the top 10%

All indicators are in units of county clusters.

Robustness of analysis

To examine the robustness of these spatial patterns of vulnerability, we varied the index aggregation methodology and the selection of indicators. To test the difference in index aggregation methods for social vulnerability, we compared the output of adding and multiplying sensitivity and adaptive capacity indices and found little difference; the same set of county clusters made up the top 10 most socially vulnerable places using either aggregation method.

To explore the effect of indicator selection on adaptive capacity (and thus social vulnerability), we compared a set of commonly used generic indicators for adaptive capacity relating to income, poverty, education and age with the set of threat-specific indicators developed for this study (see Table 3 and Supplementary Figs S10 and S11). Using the generic capacity measures to calculate social vulnerability, we found that six of the same county clusters measured within the top 10 highest socially vulnerability places in the United States as those found using the threat-specific indicators (see Supplementary Information for analysis and maps). This is considerable overlap given that the two sets of variables indicate entirely different notions of adaptive capacity. Because the sensitivity indicators were developed and vetted by fisheries social science researchers[21] and alternative potentially appropriate data were not available nationwide, we did not have a useful comparison for this element from which to draw.

To explore the criterion for Ω_{Ar}, we examined one alternative for disruption of biological processes with respect to rising atmospheric CO_2: the time until average surface waters move outside the present range of Ω_{Ar} (that is, exceeding a historic envelope)[27]. The map generated by this 'historic envelope' approach shows that southern areas experience potential OA exposure earlier, which is nearly an inverse pattern to our chosen criterion of a chemical threshold when calcification and development of larval molluscs may decrease (Supplementary Fig. S3). This difference in patterns is because natural variability is much smaller in southern regions, although evidence of greater sensitivity in populations of bivalves that live in tropical and subtropical waters is lacking. This discrepancy underscores the need for targeted research integrating a physiological, ecological and evolutionary perspective on the potential and limitations of strong local biological adaptation to different carbonate regimes for commercially valuable shelled mollusc populations.

Overall, we found that variable selection has stronger effects than aggregation methods, which provides high confidence in our aggregation methods for social vulnerability. The differences found in variable selection identify research needs relating to what factors underlie vulnerability on the ground that are relevant to OA; this conversation has only just begun.

Opportunities to reduce vulnerability to ocean acidification

Social–environmental syntheses, including vulnerability analyses, can help to identify opportunities for actionable solutions to address the potential impacts of ocean acidification. Our analysis reveals where and why the overall vulnerability from OA varies among the many coastal areas of the United States, and thus identifies opportunities to reduce harm.

One way to tackle OA is by reducing marine ecosystem exposure to it. Several portions of the east coast are highly exposed to OA from high levels of eutrophication (Fig. 2b–d). In addition to releasing extra dissolved CO_2 and enhancing acidification, eutrophication can also decrease seawater's ability to buffer further acidification[3]. People in these regions are uniquely positioned to reduce exposure to OA through regional actions by curtailing eutrophication (as compared, for example, with regions exposed to upwelling). Although a significant challenge, reducing nutrient loading to the coastal zone in these areas could provide multiple benefits, making it a no-regrets option. Reducing eutrophication can decrease hypoxia and harmful algal blooms, in addition to reducing risk from fossil-fuel-derived OA at the local and regional level. Policy

Table 3 | Threat-specific indicators used to assess capacity of fishing communities to deal with impacts of ocean acidification.

Group	Indicator	Source	Raw format	Processing for subindex
Access to scientific knowledge	Budget of Sea Grant programmes	National Sea Grant	State-level total funds of budget (state and federal contributions combined, 2013)	• Re-scaled (0–1) • Attributed normalized scores to each county cluster
	Number of university marine laboratories	Direct count from registries and Internet	Latitude/longitude location of laboratories	• Combined score of laboratories per state/ shoreline length and labs per county cluster
Employment alternatives	Shelled mollusc diversity	Regional fisheries databases (ACCSP, GulfBase, PacFIN), and States of Alaska and Hawaii	Ratio of landing revenues for each taxon by county cluster	• Calculated Shannon Weiner Diversity Index
	Economic diversity	ACS Census	Proportion of county population employed in each industry	• Calculated Shannon Weiner Diversity Index for county clusters
Political action	Legislative action for OA	Keyword searches on legislature websites and follow-up calls	Established five-point scale for state's legislative progress on OA	• Re-scaled 0–1 • Attributed score to county clusters
	Climate adaptation planning	Georgetown Law School Climate programme website	Status of climate adaptation plan for state	• Re-scaled 0–1 • Attributed score to country clusters

See Supplementary Information for discussion and presentation of alternative indicators and measures.

instruments to reduce eutrophication exist in the United States[28] and can be leveraged to facilitate efforts to reduce OA[8].

Another important way to combat the effects of OA will be by reducing social vulnerability. In regions where high sensitivity (one component of social vulnerability) arises from the structure of the fishing industry, an entirely different approach to adaptation may be more appropriate than those geared to reduce marine ecosystem exposure. For example, where fishery harvest portfolios are dominated by a single species, such as in the Gulf of Mexico where mollusc production is limited to the eastern oyster (*Crassostrea virginica*), diversification of the species harvested might be a beneficial strategy.

A further way to reduce social vulnerability may be by increasing adaptive capacity of people and regions. Access and availability to science already has helped shellfish aquaculturists in the Pacific Northwest to identify and avoid some of the consequences of OA[20]. Working with local scientists, hatcheries have implemented several strategies to adapt and mitigate OA effects on bivalve seed production. Through local industry–research partnerships in the Pacific Northwest, implementation of real-time monitoring of saturation state, chemical buffering of water, changes in timing of seasonal seed production and use of selectively bred lines of oyster broodstock, this collaboration has prevented collapse of the regional oyster industry.

In every case, when developing a broader array of adaptation strategies, it is critical to work directly with the coastal communities in each region so they can develop context-appropriate and feasible adaptation options. Targeted projects to develop local adaptation plans may even require developing further regionally relevant indicators of adaptive capacity and community resilience that this nationwide study does not capture. In fact, zooming in to assess particular regions at a higher resolution would enable regional stakeholders to provide input into a possible different set of variables that defines vulnerability in their particular region based on values and social or economic context.

Barriers to and path forward for addressing OA

This study offers the first nationwide vulnerability assessment of the spatial distribution of local vulnerability from OA focusing on a valuable marine resource. But it is just a first step to understanding where and how humans and marine resources are at highest risk to OA and its local amplifiers. Another key finding of this assessment is that significant gaps in the scientific understanding of coastal ocean carbonate dynamics, organismal response and people's dependence on impacted organisms limit our ability to develop a full suite of options to prepare for, mitigate and adapt to the threats posed by OA, and these can be considered in a structured way using the framework (Fig. 3). The types of gaps identified—as commonly classified in information science and other disciplines[29,30]—range from data inaccessibility to knowledge deficiencies.

Marine ecosystem exposure. Key gaps remain in understanding how global and local processes interact to drive nearshore OA, and how this will affect marine organisms and ecological systems. Recent studies suggest that the biogeochemical interaction between global OA and local amplifiers is additive[3,22,31]; however, most ocean models used to project future OA cannot adequately resolve these processes, which are also increasingly affected by human activity[7,32]. Even though direct measurements incorporate an ever-growing global network of monitoring instruments, they are often located offshore and remain too sparse in space and time to resolve the dynamics of seawater chemistry near shore, where most shellfish live. Historically, OA monitoring has focused on offshore regions, where long-term, high-accuracy and precise measurements enabled detection and attribution of the rising atmospheric CO_2 acidification signal. But many commercially and nutritionally important organisms live in the coastal zone where they experience the combined effects of multiple processes that alter the carbonate chemistry[7]. This results in greatly variable 'carbonate weather' for a given location[33]. Characterizing this variation, including modelling how rising atmospheric CO_2 will increase the frequency, duration and severity of extreme events **[AU:OK?]**, would provide a fuller picture of how OA is unfolding within the dynamic coastal waters.

To improve our understanding of which marine ecosystems and organisms are most susceptible to ocean acidification, additional information on the Ω_{Ar} thresholds below which reproduction and survival are disrupted is needed. In the US context, the

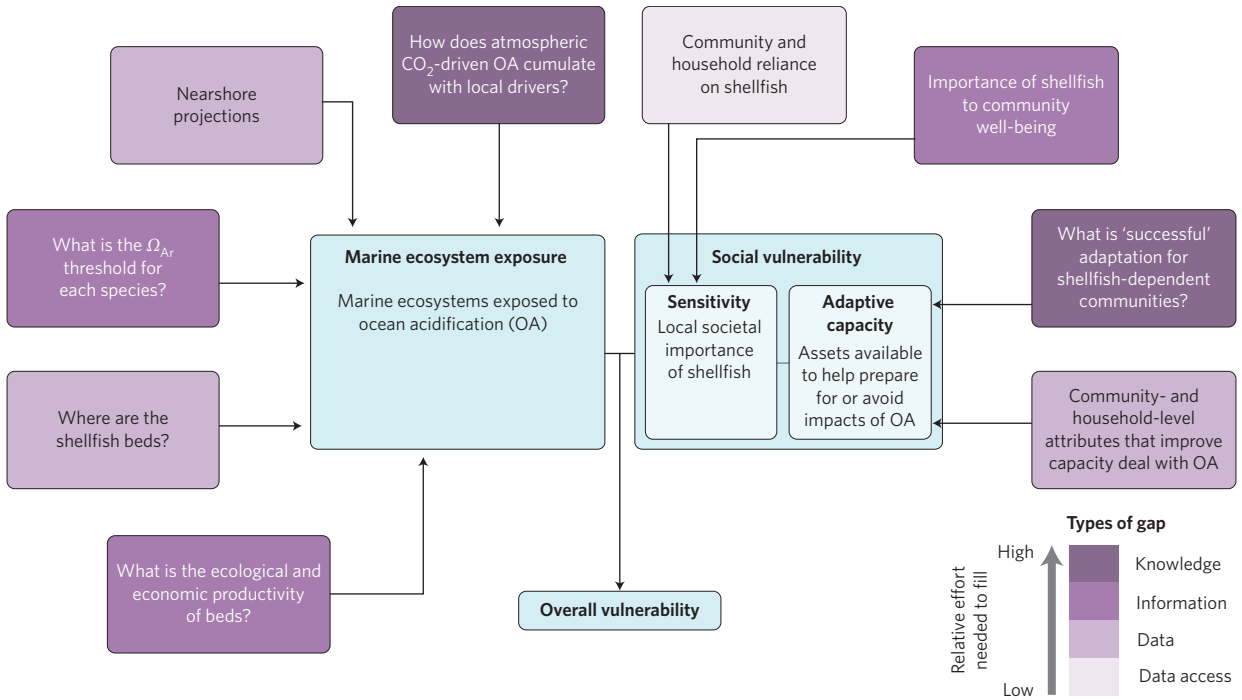

Figure 3 | Sample of gaps in knowledge related to OA vulnerability, information and data organized around components of the framework. Different types of gaps are classified by the level of effort that is required to fill them (gaining knowledge is the most challenging, whereas data access tends to be the most straightforward).

concentration of value in a limited number of shellfish species means that the identification of biologically susceptible and resistant species and populations is both prudent and feasible. Based on total landed value from 2003 to 2012, approximately 95% of shelled-mollusc revenues in the United States come from only 10 species (and 80% from five). These species include sea scallop (52.9%), eastern oyster (11.3%), Pacific geoduck (5.8%), Pacific oyster (5.2%) and six species of clam (that range from 5% to 2.6% of total value)[34]. There is some evidence of local biological adaptation of other marine taxa to varying carbonate chemistry regimes[35–37]. This potential genetic variation, if present, could be documented to aid in the development of resistant strains of cultured or other organisms.

Social vulnerability. Our study also revealed large gaps in information about mollusc-dependent communities to inform measures of social vulnerability. We do not have high-resolution nationwide data on the full cultural and societal significance of shelled molluscs. Even data on the contributions of shellfish to human nutrition, shoreline protection, and water filtration were inadequate nationwide. Incorporation of these other ecosystem services provided by molluscs could alter the social vulnerability landscape. For the commercial fisheries data that we did obtain, confidentiality constraints forced us to aggregate our analysis into county clusters, preventing county-specific or port-level analyses of social vulnerability that might have revealed more spatial heterogeneity. We also lack social science data that describe use at species-, human community-, port- or household levels. We lack data on the value chain that links threatened organisms to harvesters, processors and end-users. Finally, empirically tested adaptive capacity measures could contribute to a more rigorous evaluation of social vulnerability. This includes data on scientific spending and infrastructure directly relevant to end-users, as well as social and demographic data that are reflective of end-users (for this study, fishing and aquaculture communities) and not the general population (for example generic indicators quantifying education and income).

Beyond helping in prioritizing and developing adaptation strategies, social science is also useful to inform and guide planning for social adaptation and mitigation. As with climate change adaptation, preparing for and adapting to the impacts of OA is a social process[1,38,39]. Implementation does not occur automatically once strategies are developed, but instead must often overcome a suite of institutional (including legal), political, psychological and other types of barriers[40]. As learned from climate change initiatives, the 'softer side' of adaptation (such as coordination among stakeholders, industry and scientists) is the first step towards preparing for a threat like OA[41]. Despite its fundamental importance, this type of effort is often overlooked and remains underfunded. Social science can also help practitioners even in early stages of adaptation figure out how to engage public and policy-makers effectively in OA issues[42–44]. Farther along in adaptation processes, social science can inform the development of strategies by accounting for social values[45,46] and existing property rights in use and norms[47,48] and even helping to work out what type of information is salient for and trusted by decision-makers[49,50]. Although important for reducing its risks, social science relevant for understanding OA has been minimal thus far. A budget assessment conducted by the Interagency Working Group on Ocean Acidification reported that federal research in fiscal year 2011 allocated $270,000 of Federal funds for social science research related to OA, which represents 0.9% of the entire OA spending for that year's budget[51].

Conclusions

As with other global environmental changes, acidification of the oceans is a complex and seemingly overwhelming problem. Here we have focused only on OA (and nearshore amplifiers) as the threat to coastal species. Although other stressors also threaten coastal ecosystems, our single-threat assessment allows us to tease out where OA in isolation could hit people and organisms the hardest, which can inform research agendas and decision-making geared specifically to address OA. A vulnerability framework helps to structure our thinking about the ways in which ocean acidification will affect

ecosystems and people. The framework also helps to identify and organize the opportunities and challenges in dealing with these problems. But this study is the beginning; adaptation to OA and other global environmental change is an iterative process that requires both top-down and bottom-up processes. Our analysis of OA as it relates to [**AU: OK?**] US shelled mollusc fisheries makes clear just how much the pieces of the OA puzzle vary around the country. Marine ecosystem exposure, economic dependence and social capacity to adapt create a mosaic of vulnerability nationwide. An even more diverse set of strategies may be needed to help shellfish-dependent coastal communities adapt to OA. Rather than create and apply a nationwide solution, decision-makers and other stakeholders will have to work with fishing and aquaculture communities to develop tailored locally and socially relevant strategies. Meaningful adaptation to OA will require planning and action at all levels, including regional and local levels, which can be supported with resources, monitoring, coordination and guidance at the national level.

Over the past decade, scientists' understanding of ocean acidification has matured, awareness has risen and political action has grown. The next step is to develop targeted efforts tailored to reducing social and ecological vulnerabilities and addressing local needs. Tools like this framework can offer a holistic view of the problem and shed light on where in the social–ecological system to begin searching for locally appropriate solutions.

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Author contributions

All authors provided input into data analysis and research design, and participated in at least one SESYNC workshop; J.A.E. led the drafting of the text with main contributions from L.S., S.R.C., L.H.P., G.G.W. and J.E.C.; R.v.H. contributed projections of ocean acidification; J.A.E., L.S., S.R.C., J.R. and C.D. collected the data; J.A.E. carried out data analysis and mapping.

Additional information

Supplementary information is available in the online version of the paper. Reprints and permissions information is available online at www.nature.com/reprints. Correspondence should be addressed to J.A.E.

Competing financial interests

The authors declare no competing financial interests. [**AUTHORS: OK?**]

EXHIBIT 46

https://newfoodeconomy.org/ocean-acidification-oysters-dungeness-crabs/

The ocean is changing faster than it has in the last 66 million years. Now, Oregon oysters are being farmed in Hawaii. That fix won't work forever.

November 28th, 2017
by H. Claire Brown

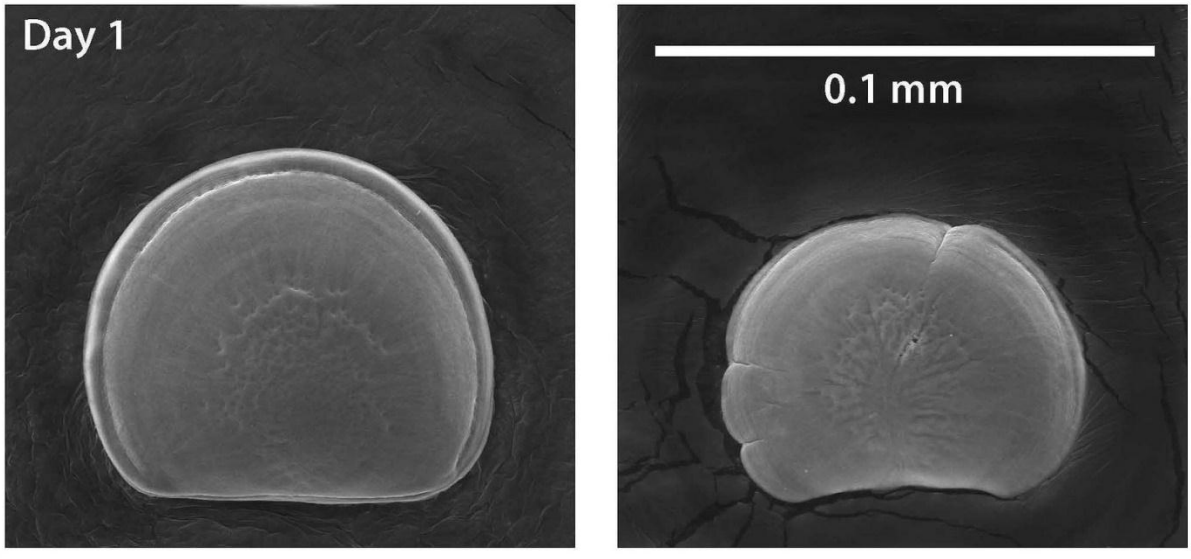
A little more than ten years ago, a mysterious epidemic wiped out baby oyster populations. It started in 2006, when Whiskey Creek shellfish hatchery in Oregon lost 80 percent of its cultured larvae. Around the same time, 200 miles north in Washington, Taylor Shellfish saw similarly high mortality rates. And oysters in the wild weren't faring much better: Oystermen who usually sourced larvae from Washington's Willapa Bay, one of the largest natural oyster-producing estuaries in the country, weren't finding enough stock to seed their beds.

It wasn't long before the epidemic migrated to the East Coast. In the Gulf of Maine, hatchery owner Bill Mook began to notice larval die-offs and slowed growth rates following big storms that pumped fresh water into his hatchery starting in 2009. Sometimes, the surviving organisms were severely deformed. No one knew exactly what had gone wrong.

After two years of massive losses, scientists discovered what was really wrong.

Suspecting bacterial infection or a problem with the feed, Whiskey Creek and Taylor Shellfish invested in machines that kill *vibrio tubiashii,* a bacteria that is a common culprit in oyster larvae die-offs. Survival rates didn't improve.

But after two years of massive losses and no answers, scientists testing the waters discovered what was really wrong: the ocean water flowing into the hatcheries had changed, and the oysters weren't able to build their shells. Without shells, they couldn't survive.



Flickr / Oregon State University

Oyster larvae in normal conditions (left) versus oyster larvae in acidified conditions (right)

Larval oysters experience a crucial phase in their life cycle where they morph from a form not unlike free-floating dust particles into lentil-sized bivalves with the beginnings of a shell. In order to start building that shell, the larvae need to use carbonate ions from their surroundings. But seemingly all of a sudden, the ocean waters flowing into the hatcheries on the Pacific Coast had a lower concentration of carbonate ions than usual, meaning the larvae missed the dust-to-lentil growth phase that turns them into tiny oysters. As a result, most of them died.

But why had the carbonate ions dipped in the first place? Researchers discovered that the underlying cause was more than a couple years of bad luck or a minor disturbance in tidal patterns. In the mid-aughts, a global shift, which had been quietly altering the ocean's chemistry for hundreds of years, had finally washed up on the shores of the Pacific Coast. And oyster larvae, some of the most vulnerable, valuable, and closely-monitored creatures in the sea, were the first recognized victims of a process that had already started to affect aquatic life across the globe: ocean acidification, a climate change-related process that is gradually lowering pH levels in the water that covers 97 percent of the earth.

The Whiskey Creek hatchery story made the front page of the *Seattle Times* in 2009. Several years later, in 2013, the Royal Swedish Academy of Sciences published a report analyzing the media's treatment of the Whiskey Creek oyster die-offs. In that paper, the authors took a look at the relationship between the hatcheries, the media, and scientific research. What they found was that, at the time of the die-offs, a "landmark" paper had already been published by researchers at Seattle's Pacific Marine Environmental Library showing that ocean acidification was impacting the Pacific Northwest. Which means scientists *knew* the problem was a real threat, but the public hadn't yet caught on. It wasn't the authoritative research paper that got people to pay attention. It was the loss of the seed stock for an entire sector of the economy.

> It took a human story to get the public and local representatives to pay attention to the problems at hand.

The researchers found that it took a human story—a $136 million industry in the United States, employing thousands of people, turned on its head—to get the public and local representatives to pay attention to the problems at hand. Years of scientific papers couldn't accomplish what the Whiskey Creek story demonstrated in short order: When people's lives are affected, legislators hear about it. Washington's then-governor Christine Gregoire soon formed a Blue Ribbon Panel on Ocean Acidification. The panel made policy recommendations, ultimately positioning Washington State as a national leader in ocean acidification research and planning.

Flickr / Louisiana Sea Grant College Program Louisiana State University

Oyster hatcheries raise larvae into seed oysters, pictured above, then sell them to farmers. Once an oyster as reached this size, it can survive in acidified conditions

But despite one state government's proactive stance on changing seas, ocean acidification-related problems have continued to creep toward other parts of the seafood industry. And now, researchers find themselves racing to grasp the implications of a tangled underwater web that includes global warming, ocean acidification, natural seawater patterns, long-term weather events like El Niño and La Niña, and changing fishery management practices.

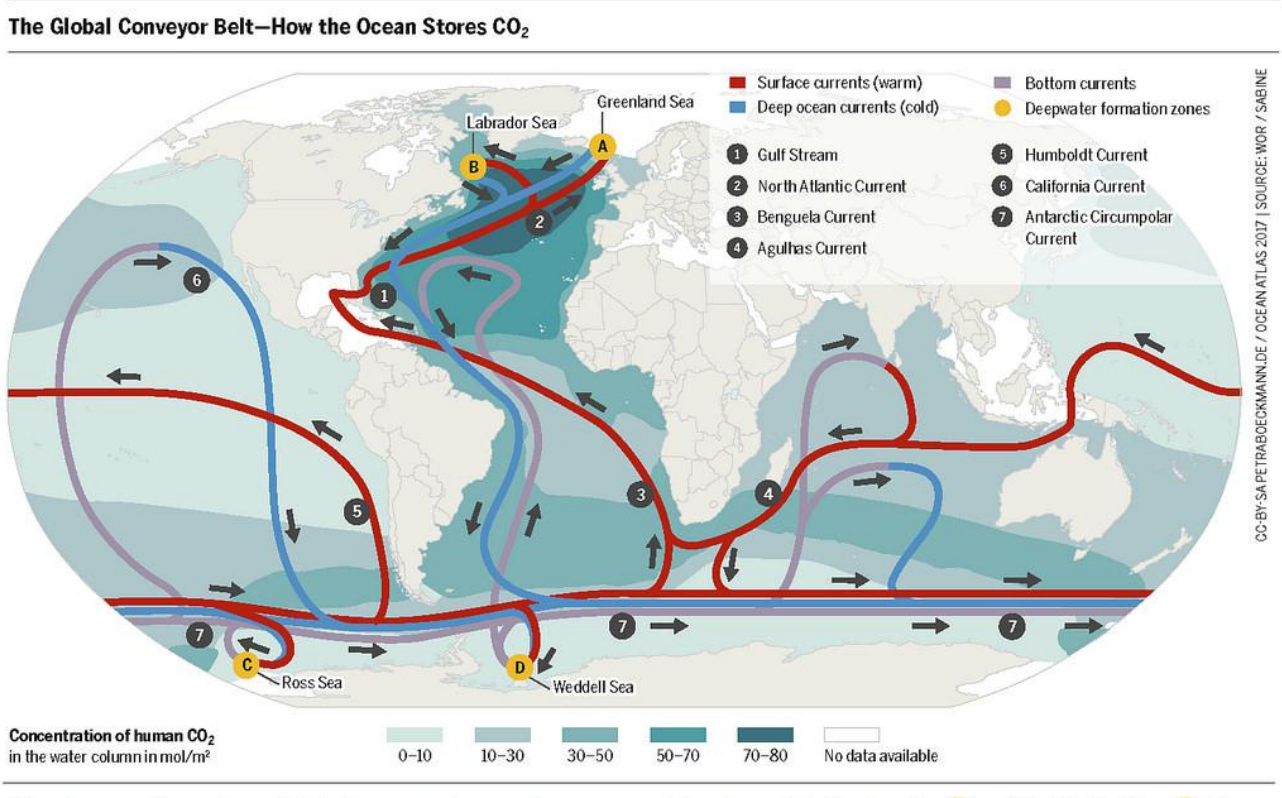
Ocean water has a birth place. It begins as melting ice somewhere in the North Atlantic, where the newly-formed cold water sinks to the bottom and floats slowly past the equator. It then falls into a rhythm, flowing along the depths and rising to the surface in a global "conveyor belt" that has carried water on the same path for millennia. It takes ten thousand years for a droplet to make its way to the end of the belt, where it emerges, marked with chemical signposts dating further back than written language, off the coast of Washington and Oregon.

As we know, the ocean itself is also changing. It absorbs about a quarter of the carbon dioxide that humans release into the atmosphere and most of the heat from human activities. Scientists have been studying the *warming* ocean for a while—that's how we learned about sea-level rise and coral bleaching—but until the mid-1990s, no one really understood that the chemical content of the ocean was being altered, too.

> The change in ocean water pH levels likely has a million different effects on marine life.

The term "ocean acidification" refers to a change in oceanic pH. Whereas the pH of the ocean used to be 8.2, it's now hovering around 8.1. And even though that doesn't *sound* like a big difference, pH is measured on a logarithmic scale—which means, for those of us who haven't thought about logs since the SATs, that the ocean is actually about 30 percent more acidic than it used to be. It's expected to hit pH 7.8 by the end of the century.

Here's another way to look at it: The ocean is currently acidifying faster than it has in the last 66 million years.



CO_2 entrapment is made possible by large oceanic currents. Working like conveyor belts, they carry warm surface water, which absorbs CO_2, from the tropics in the Atlantic towards the colder poles.
On the way, the water slowly cools and becomes saltier. When it arrives in the Greenland Sea (A), the Labrador Sea (B), and at the Antarctic coast in the Ross Sea (C) and the Weddell Sea (D), the heavy surface water sinks into the depths, taking the CO_2 with it. The CO_2-rich water then flows back towards the tropics. As it travels, the cold water slowly mixes with the warmer layers above and rises—very slowly—back to the surface.

Flickr / Heinrich-Böll-Stiftung Follow

Water moves between the surface and the ocean floor as it advances along the conveyor belt

It helps to think about pH in human terms. A healthy human body typically has a pH of around 7.4, and it fluctuates very little. A change of 0.3 or 0.4—the same amount the ocean is expected to change by the end of the century—can induce a coma. If body pH rises or falls by 0.5 or more, the results are deadly. So while we don't know exactly what's happening to the organisms that live in the ocean, we know that their environment is changing more rapidly than ever, at rates that would cause serious problems for the human body.

(It's important to note that the ocean isn't actually going to turn to acid by 2100. Shallin Busch, a scientist at NOAA, explains it this way: "The North Pole is a fundamentally cold place, but we say that it's warming. Not that it's going to get warm, but that it's warm*ing.* So you can say the same thing about ocean waters: they're acidifying or becoming more acidic, but they are not acidic themselves.")

But why did ocean acidification appear in the Pacific Northwest before it showed up in Maine?

The change in ocean water pH levels likely has a million different effects on marine life.

As I described, water moves between the surface and the ocean floor as it advances along the conveyor belt. In the Pacific Northwest, for instance, the water that welled up during the summer the oyster larvae were dying off had last seen the surface about half a century before, north of Hawaii, where it absorbed some of the atmospheric carbon being released at that time. So it's not as though the waters off Seattle are just carrying carbon emissions from the Amazon headquarters they flowed past two days ago—rather, they're carrying the carbon from all the times they welled up to the surface since the Industrial Revolution. "We know that even if all carbon dioxide emissions ceased today, the waters off the Pacific Northwest would continue to acidify for at least another 50 years, so the train is already coming," says Busch.

The water in the Pacific near Washington is at the end of the conveyor belt, and because it's so old it contains a lot of carbon dioxide from the natural decomposition of the organisms that have been dying in it for thousands of years. So when the *added* carbon dioxide from human emissions is mixed with this already-carbon-rich environment during upwelling events, the combination is enough to kill oyster larvae.

Flickr / Louisiana Sea Grant College Program Louisiana State University

The decrease in concentration of carbonate ions—the change that prevented oysters from building their shells—is the most concrete and observable effect of ocean acidification so far

Here's another way to think about it: If the waters in a hatchery are normally somewhere around pH 8.1, they may dip down to pH 7.8 during annual upwelling events when old, carbon-rich water naturally rises to the surface, as happens every summer. But when that old acidic water is mixed with *new* acidic water (the latter being the surface waters impacted by human-released carbon dioxide 50 years ago), the combination can nudge the pH down to, say, 7.7. And it's that small added difference that kills oyster larvae. The human-generated carbon nudges the water across the threshold.

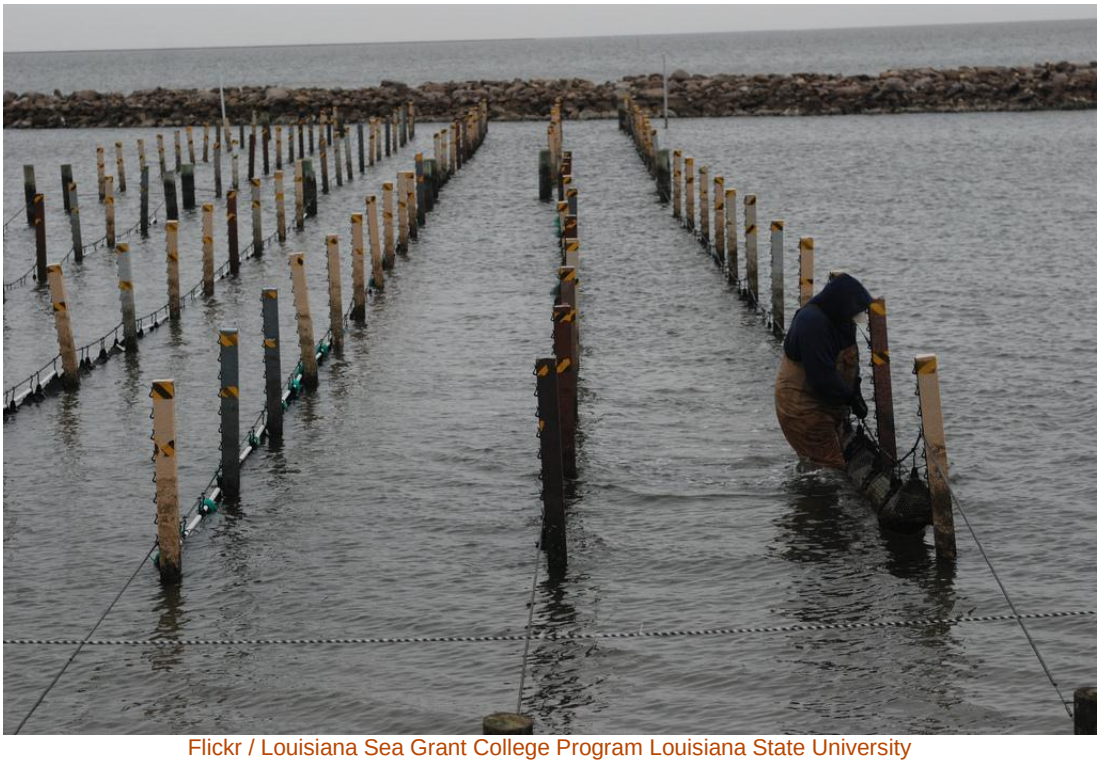
The change in ocean water pH levels likely has a million different effects on marine life, most of which we still know nothing about. The decrease in concentration of carbonate ions—the change that prevented oysters from building their shells—is the most concrete and observable effect of ocean acidification so far. But scientists and fishermen are now trying to tease out all the other, subtler changes. For instance, how a negative impact on one species could affect an entire food chain, or whether or not a change in pH can alter a fish's ability to make decisions. The predictions are all over the place—remember that *Washington Post* story about "super crabs" invading the Chesapeake Bay? (Probably not gonna happen.) But research has advanced rapidly in the last few years. Here's what we know now.

Oysters on the West Coast

"I was afraid if I didn't do something, then our business would just slowly die."

Once the West Coast hatcheries—which shepherd the larvae through the first stage of life before selling them to farmers as hardy juveniles—diagnosed the problem, they moved quickly to organize a response. The Pacific Coast Shellfish Growers Association recommended that NOAA establish water monitoring systems that give industry players real-time information about the quality of the water flowing into their farms. Hatcheries then used that information to manipulate the water flowing onto their properties—block it when it's too rich in carbon, open the floodgates when the upwelling is over. Many hatcheries have also installed pricey buffering systems that automatically add sodium carbonate to the seawater to balance its chemistry.

But manipulating the incoming water can only work for so long. To escape the West Coast upwelling events, some hatcheries are moving operations as far south as Hawaii.



Flickr / Louisiana Sea Grant College Program Louisiana State University

The oyster industry was the first to be affected by ocean acidification, and it has adapted quickly

Taylor Shellfish—one of the first farms to be impacted by the die-offs—expanded its existing Hawaii hatchery, growing seed oysters and Manila clams. The shellfish are hatched in tropical waters, then shipped northward to mature in places like the Puget Sound.

In 2012, Willapa Bay's Dave Nisbet followed suit. Unlike Taylor Shellfish, which had always relied on its own hatchery for seed oysters, Nisbet's company had depended on harvesting wild oyster seed. He took NOAA's warnings about ocean acidification to heart and decided to build his hatchery in Hawaii, even though it would have been much less expensive to build one in Washington. "I just got nervous," Nisbet told the *Seattle Times* in 2012. "I was afraid if I didn't do something, then our business would just slowly die."

Even though shellfish represent some the most vulnerable populations, they're also the easiest to fix.

Once shellfish pass through the crucial early development stages where they grow their shells, they're more impervious to changes in ocean water. Adolescent oysters, for instance, can thrive in conditions that kill larval clams. West Coast oystermen haven't yet seen acidification-triggered damage to older shellfish.

The oyster industry was the first to be affected by ocean acidification, and it has adapted quickly. In many ways, even though shellfish represent some the most vulnerable populations, they're also the easiest to fix: The infrastructure to hatch farmed shellfish was in place long before ocean acidification became a concern, and individuals can survive the trip from Hawaii to Seattle. But other species—like Dungeness crabs, which aren't farmed, and Alaskan salmon, which migrate—don't have such a simple life cycle.

California's Dungeness crabs

If larval oysters die-offs were the earliest indicator of the coastal arrival of ocean acidification, then Dungeness crabs are the species researchers and fishermen worry may struggle next. They represent the most valuable fishery on the West Coast, generating $167 million in ex-vessel value in California in 2011. Like oysters, Dungeness crabs are a key driver of the fishing industry, so lucrative that many fishermen rely on them to guarantee an annual income.

Flickr / California Department of Fish and Wildlife

Like oysters, Dungeness crabs rely on carbonate to build their shells. But carbonate isn't the primary molecule they use

Paul McElhany, a researcher at NOAA, has been testing potential impacts of lowered pH levels on Dungeness crabs. In 2016, his Seattle-based team collected egg-laying female crabs and hatched their young in treated water with varying levels of carbon dioxide.

The researchers' results would concern any fisherman. At an acidified pH level of 7.5, which has *already* been observed during upwelling events in the Puget Sound, only about a third of the Dungeness crabs survived into the juvenile stage as compared to those that survived in waters with a normal pH. (Remember, the open ocean is at about pH 8.1 now. It's expected to hit pH 7.8 by the end of the century.)

McElhany says scientists aren't quite sure *why* the acidified conditions led to such a big drop in crab survival rates. Like oysters, Dungeness crabs rely on carbonate to build their shells. But carbonate isn't the *primary* molecule they use. Which means the lower survival rate was probably caused by something other than what killed the larval oysters, something scientists have not yet identified.

Ocean acidification *could* be impacting Dungeness crab life cycles already.

And this experiment only manipulated pH levels in a controlled environment. The results, though stark, don't even come close to mimicking conditions in the wild. "Out in the field you've got multiple things going on at the same time because you've got ocean acidification, you also have temperature, climate change, and changes in fishery practice," McElhany explains. If two-thirds of Dungeness crabs are dying inside a tank that doesn't contain predators, fluctuating temperatures, or hard-to-find food, the results in the open ocean could be much worse.

Out in the field, fisherman John Mellor has been keeping an eye on the impossibly complex oceanic patterns that swirl through the crabs' habitat. And while he doesn't think he's witnessed ocean acidification impacting crab populations first hand, he's seen warming waters directly affect the crab catch.

To be clear, ocean acidification *could* be impacting Dungeness crab life cycles already. But because they aren't farmed and because their West Coast habitat has been so abnormal for the last few years—we'll get to that in a second—it's impossible to separate ocean acidification from everything else that's happening along their migration routes.

Flickr / Oregon Department of Fish & Wildlife

Unlike shellfish, which can start their lives in Hawaiian hatcheries to avoid being damaged by a bit of bad water, Dungeness crabs only grow in the wild

But there *have* been recent events that have impacted the Dungeness crab fishery, and they show how a small environmental change (in this case, so small the crabs didn't even notice) can affect the industry as a whole. It's these types of indirect impacts—problems that involve

organisms far down the food chain, not the crabs themselves—that researchers like McElhany can't yet predict in a lab. But that doesn't mean they're insignificant.

Between 2014 and 2016, a mass of warm water known as "The Blob" was hanging out along the West Coast. It hasn't been proven that the blob was a direct result of climate change, though Mellor says many people assume it was. Regardless, scientists expect blob-like conditions to become more common as ocean waters continue to warm.

The blob disrupted local environments, causing die-offs of sea lions and fur seals. It also made a certain type of algae really, really happy. That algae, *Pseudo-nitzschia australis,* produces a toxin called domoic acid. (It has "acid" in its name, but that's where its relationship to ocean acidification ends.) Humans can't eat too much domoic acid without getting sick.

The Dungeness crabs aren't bothered by domoic acid. They can eat a lot of the affected algae and it won't impact their survival rates. But when they eat the algae, the domoic acid stays in their bodies. And it can cause real problems for humans eating cooked crabs—think short-term memory loss, comas, and seizures.

> Crabs are a reminder that our knowledge of this phenomenon is far from complete.

Regulators in California don't let fishermen catch Dungeness crabs if the crabs have eaten too much algae—no one wants to pass domoic acid poisoning off on some unsuspecting diner. But those restrictions are hard on fishermen. A few years back, Mellor's season was delayed by five months as he waited for the crab tests to come back clean.

"You can't really go drive for Uber," he says, adding that he had to be ready to start fishing at any moment.

To recap: The crabs hadn't gone anywhere. They were healthy and thriving, and they hadn't moved from their normal stomping grounds. But warmer-than-usual waters meant higher-than-normal levels of algae, and that algae made the crabs poisonous to humans. This is the kind of butterfly effect that will likely impact Dungeness populations long before pH levels drop down to 7.5, and it's this type of phenomenon scientists are hoping to predict by running computer simulations of entire food webs in acidified conditions.

Jessica Fu

This year, crab fishing season in Oregon has already been delayed because of domoic acid

Shallin Busch, the scientist at NOAA who studies ocean acidification and fisheries, has been working to predict the effects of ocean-wide change on specific populations. "Basically we created a model of the West Coast food web in the computer and we put in this scenario of ocean acidification from the chemistry change," she explains. "We looked to see what might happen to fish populations that we harvest under acidification. The take-home answer is that the Dungeness crab harvest was most impacted by our scenarios," she says. "What this model work was showing was that there's also likely to be some indirect effect, kind of a food web effect of acidification as well."

> It'll take years for the gap between lab-generated conclusions and the natural world to narrow.

Unlike shellfish, which can start their lives in Hawaiian hatcheries to avoid being damaged by a bit of bad water, Dungeness crabs only grow in the wild. "The crabs walk in and out of the canyons, and then they'll walk up onto the shelf, and they feed on the clam beds and the worm beds and whatever they can eat, and then they typically will mate in February, March, April—and then after they're done mating, they eat a little more and then molt," Mellor says. All the while, they're migrating throughout different parts of the ocean floor.

This year, Mellor's fishing season started on time. Crab fishermen in Oregon weren't so lucky—their season has already been delayed because of domoic acid.

If oysters show the most direct and observable link between ocean acidification and survival rates, the crabs are a reminder that our knowledge of this phenomenon is far from complete. It'll

take years for the gap between lab-generated conclusions and the natural world to narrow. In the meantime, crab populations will continue to live in a changing habitat.

Elsewhere

Though we have the most data about oysters and Dungeness crabs, researchers are also focusing on the potential impacts of ocean acidification on other commercially-valuable species. McElhany says there's some preliminary evidence that shows elevated acidity may impact the part of a salmon's brain that helps it avoid predators—another incidence of a subtle change that could have catastrophic consequences. Earlier this month, biologists began sounding the alarm bells about Alaska's red king crabs, warning that they could be extinct in the next century. King crabs struggle to build their shells in acidified conditions, and researchers hypothesize that they simply can't generate enough energy to maintain a survivable internal pH as external pH levels continue to fall.

Unsplash / Charlotte Coneybeer

There's a little hope, though: In the king crab trials, a few of the juveniles made it out alive in lab conditions that simulated Alaskan waters a hundred years from now. Those crabs may be able to pass their traits onto their young, creating a new generation of crustaceans that can survive in changing waters.

What can we do about the impact of ocean acidification right now? "We don't have that answer for you," Busch says. "We're hoping in the future that we will. There's this massive global effort to better understand species sensitivity, better understand ecosystem changes, do better monitoring. That's one thing."

ENVIRONMENT, FARM, HEALTH, POLICYDUNGENESS CRABSOCEAN ACIDIFICATIONOYSTERSSHELLFISHWASHINGTON STATE

H. Claire Brown

A North Carolina native, Claire Brown joins The New Food Economy after working on the editorial team at *Edible Manhattan* and *Edible Brooklyn.* She won the New York Press Club's Nellie Bly Cub Reporter award in 2017. Follow her at @hclaire_brown.

Exhibit 47

https://www.oregonlive.com/pacific-northwest-news/index.ssf/2018/11/oregon_and_california_crabbers.html

Oregon and California crabbers sue fossil fuel companies

Updated Nov 27, 2018; Posted Nov 26, 2018

Dungeness crab await packing and shipping in unincorporated Coos County. (*Kevin Clark/The Register-Guard via AP/2011*)

By The Associated Press

SALEM, Ore. (AP) — Commercial crabbers in Oregon and California are suing 30 fossil fuel companies, claiming they are to blame for climate change, which has hurt their industry.

The Pacific Coast Federation of Fishermen's Associations filed the lawsuit last week in California State Superior Court in San Francisco against companies including Chevron and Exxon Mobil, news outlets reported.

"The scientific linkage between the combustion of fossil fuels and ocean warming, which leads to domoic acid impacts in our fisheries, is clear," Noah Oppenheim, executive director of the Pacific Coast Federation of Fishermen's Associations, told the San Francisco Chronicle. "We know it, and it's time to hold that industry accountable for the damage they've caused."

West Coast crabbers experienced significant losses starting in the 2015-16 season when massive algal blooms caused by warm ocean temperatures resulted in a domoic acid outbreak that reduced the length of the crabbing season.

The season was cut short again in 2016-2017 for the same reason.

In California, Dungeness crab brought in over $47 million in 2017 and $83 million in 2016; the amount was down to $17 million in 2015, during the industry's first major problem with domoic acid.

Crab is the most valuable single species commercial fishery in Oregon, with an average harvest of 16 million pounds per season, the Statesman Journal in Salem, Oregon, reported .

There are nearly 1,000 Dungeness crab permit holders in California and Oregon.

Scott J. Silvestri, corporate media relations manager of Exxon Mobil Corp., said in an email to the Chronicle that reducing greenhouse gas emissions is a global issue and requires global participation and actions.

"Lawsuits like this — filed by trial attorneys against an industry that provides products we all rely upon to power the economy and enable our domestic life — simply do not do that," he said.

In California, the cities of San Francisco and Oakland also filed lawsuits against five oil companies earlier this year, seeking to recoup the cost of paying for seawalls to fend off sea-level rise. A federal judge tossed those lawsuits in June, saying courts couldn't decide who should be held accountable for an issue as big as climate change.

In October, the Pacific Coast Federation of Fishermen's Associations successfully sued the U.S. Environmental Protection Association to protect salmon and steelhead trout populations in the Columbia River basin from warm water temperatures caused by dams and climate change.

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SUPERIOR COURT OF THE STATE OF CALIFORNIA
IN AND FOR THE COUNTY OF SAN FRANCISCO

PACIFIC COAST FEDERATION OF FISHERMEN'S ASSOCIATIONS, INC.;

Plaintiff,

vs.

CHEVRON CORP.; CHEVRON U.S.A. INC.; EXXON MOBIL CORP.; EXXONMOBIL OIL CORP.; BP P.L.C.; BP AMERICA, INC.; ROYAL DUTCH SHELL PLC; SHELL OIL PRODUCTS CO. LLC; CITGO PETROLEUM CORP.; CONOCOPHILLIPS; CONOCOPHILLIPS CO.; PHILLIPS 66; TOTAL E&P USA INC.; TOTAL SPECIALTIES USA INC.; ENI S.P.A.; ENI OIL & GAS INC.; ANADARKO PETROLEUM CORP.; OCCIDENTAL PETROLEUM CORP.; OCCIDENTAL CHEMICAL CORP.; REPSOL S.A.; REPSOL ENERGY NORTH AMERICA CORP.; REPSOL TRADING USA CORP.; MARATHON OIL CO.; MARATHON OIL CORP.; MARATHON PETROLEUM CORP.; HESS CORP.; DEVON ENERGY CORP.; DEVON ENERGY PRODUCTION CO., L.P.; ENCANA CORP.; APACHE CORP.; and DOES 1 through 100, inclusive,

Defendants.

Case No. CGC-18-571285

COMPLAINT FOR:

1. NUISANCE;
2. STRICT LIABILITY – FAILURE TO WARN;
3. STRICT LIABILITY – DESIGN DEFECT;
4. NEGLIGENCE; and
5. NEGLIGENCE – FAILURE TO WARN.

JURY TRIAL DEMANDED

TABLE OF CONTENTS

I. INTRODUCTION

1. The world's oceans are changing, and commercial fishermen and -women, their businesses, their communities, and their families are paying the price. Climate change is impacting the oceans by increasing average sea temperatures, increasing the frequency and intensity of marine heatwaves, destabilizing and disturbing marine wildlife populations, affecting ocean circulation, and increasing the frequency and severity of harmful algal blooms. These changes threaten both the productivity of commercial fisheries and safety of commercially harvested seafood products. In so doing, they also threaten those that rely on ocean fisheries and ecosystems for their livelihoods, by rendering it at times impossible to ply their trade. With this action, the largest commercial fishing industry trade group on the west coast seeks to hold responsible parties accountable for acute changes to the ocean off of California and Oregon that resulted, over the last three years, in prolonged regulatory closures of the Dungeness crab fisheries—the most lucrative and reliable fisheries on the west coast. Such closures will recur, as the conditions giving rise to them increase in frequency and magnitude as the oceans continue to warm. Accordingly, the crab fishing industry brings this action to force the parties responsible for this severe disruption to fishing opportunity, and the consequent impacts on fishing families, to bear the costs of their conduct.

2. Defendants, major corporate members of the fossil fuel industry, have known for nearly a half century that unrestricted production and use of their fossil fuel products create greenhouse gas pollution that warms the planet, changes our climate, and disrupts the oceans. They have known for decades that those impacts could be catastrophic and that only a narrow window existed to take action before the consequences would be irreversible. They have nevertheless engaged in a coordinated, multi-front effort to conceal and deny their own knowledge of those threats, discredit the growing body of publicly available scientific evidence, and persistently create doubt in the minds of customers, consumers, regulators, the media, journalists, teachers, and the public about the reality and consequences of the impacts of their fossil fuel pollution. At the same time, Defendants have promoted and profited from a massive increase in the extraction and consumption of oil, coal, and natural gas, which has in turn caused an enormous, foreseeable, and

avoidable increase in global greenhouse gas pollution and an accompanying increase in the concentration of greenhouse gases,[1] particularly carbon dioxide ("CO_2") and methane, in the atmosphere. Those disruptions of Earth's otherwise balanced carbon cycle have substantially contributed to a wide range of dire climate-related effects, including global warming, rising atmospheric and ocean temperatures, ocean acidification, melting polar ice caps and glaciers, more extreme and volatile weather, sea level rise, and marine heatwaves with concomitant harmful algal blooms. Families and businesses that depend on the health and productivity of the Dungeness crab fishery to earn their livings suffer the consequences.

3. Defendants are vertically integrated extractors, producers, refiners, manufacturers, distributors, promoters, marketers, and sellers of fossil fuel products. Decades of scientific research show that pollution from the production and use of Defendants' fossil fuel products plays a direct and substantial role in the unprecedented rise in emissions of greenhouse gas pollution and increased atmospheric CO_2 concentrations since the mid-20th century. This dramatic increase in atmospheric CO_2 and other greenhouse gases is the main driver of the gravely dangerous changes occurring to the global climate.

4. Anthropogenic (human-caused) greenhouse gas pollution, primarily in the form of CO_2, is far and away the dominant cause of global warming and the observed increase in ocean temperatures,[2] including marine heatwaves.[3] The primary source of this pollution is the extraction, production and consumption of coal, oil, and natural gas, referred to collectively in this Complaint as "fossil fuel products."[4]

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[1] As used in this Complaint, "greenhouse gases" refers collectively to carbon dioxide, methane, and nitrous oxide. Where a source refers to a specific gas or gases, or when a process relates only to a specific gas or gases, this Complaint refers to them by name.

[2] *See IPCC, Climate Change 2014: Synthesis Report*. Contribution of Working Groups I, II, and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)]. IPCC, Geneva, Switzerland (2014), at 6, Figure SMP.3, https://www.ipcc.ch/report/ar5/syr (hereinafter, "IPCC 2014 Synthesis Report").

[3] *See, e.g.*, Emanuele Di Lorenzo & Nathan Mantua, *Multi-year persistence of the 2014/15 North Pacific marine heatwave*, 6 NATURE CLIMATE CHANGE, 1 (July 11, 2016), https://www.nature.com/articles/nclimate3082; Eric C.J. Oliver et al., *The unprecedented 2015/16 Tasman Sea marine heatwave*, NATURE COMMUNICATIONS 8:16101, 1 (July 14, 2017).

[4] *See* C. Le Quéré et al., *Global Carbon Budget 2016*, EARTH SYST. SCI. DATA 8, 632 (2016), http://www.earth-syst-sci-data.net/8/605/2016. Cumulative emissions since the beginning of the industrial revolution to 2015 were 413 GtC attributable to fossil fuels, and 190 GtC attributable to land use change. *Id.* Global CO_2 emissions from fossil fuels

5. The rate at which Defendants have extracted and sold fossil fuel products has exploded since the Second World War, as have emissions from those products. The substantial majority of all anthropogenic greenhouse gas emissions in history has occurred since the 1950s, a period known as the "Great Acceleration."[5] About three quarters of all industrial CO_2 emissions in history have occurred since the 1960s,[6] and more than half have occurred since the late 1980s.[7] The annual rate of carbon dioxide emissions from production, consumption, and use of fossil fuels has increased by more than 60% since 1990.[8]

6. Defendants have known for nearly 50 years that greenhouse gas pollution from their fossil fuel products has a significant impact on Earth's climate, including a warming of the oceans. Defendants' awareness of the negative implications of their own behavior corresponds almost exactly with the Great Acceleration, and with skyrocketing greenhouse gas emissions. With that knowledge, Defendants took steps to protect their own assets from these threats through immense internal investment in research, infrastructure improvements, and plans to exploit new opportunities in a warming world.

7. Instead of working to reduce the use and combustion of fossil fuel products, lower the rate of greenhouse gas emissions, minimize the damage associated with continued high use and combustion of such products, and ease the transition to a lower carbon economy, Defendants concealed the dangers, sought to undermine public support for greenhouse gas regulation, and engaged in massive campaigns to promote the ever-increasing use of their products at ever greater volumes. Thus, each Defendant's conduct has contributed substantially to the buildup of CO_2 in the environment that drives ocean warming.

8. As an actual and proximate consequence of Defendants' conduct, the crab fishing industry has been deprived of valuable fishing opportunities, and consequently suffered severe

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and industry remained nearly constant at 9.9 GtC in 2015, distributed among coal (41%), oil (34%), gas (19%), cement (5.6%), and gas flaring (0.7%). *Id.* at 629.

[5] Will Steffen et al., *The Trajectory of the Anthropocene: The Great Acceleration*, 2 THE ANTHROPOCENE REVIEW 81, 81 (2015).

[6] R.J. Andres et al., *A synthesis of carbon dioxide emissions from fossil-fuel combustion*, 9 BIOGEOSCIENCES, 1845, 1851 (2012).

[7] *Id.*

[8] *Global Carbon Budget 2016*, *supra* note 4, at 630.

financial hardships. These injuries derive from rising ocean temperatures in the eastern Pacific Ocean generally and periodic extreme marine heatwaves—the results of anthropogenic ocean warming caused by the foreseeable and intended use of Defendants' products. Recent marine heatwaves along the United States' west coast created the ideal conditions for the toxic algal group *Pseudo-nitzschia* to increase in abundance and invade the marine regions that correspond with some of the most productive Dungeness crab fishery grounds. The massive *Pseudo-nitzschia* bloom generated unprecedented concentrations of the neurotoxin domoic acid, a compound which, when ingested by humans, causes "amnesic shellfish poisoning" which induces symptoms including vomiting, diarrhea, cramps, and other gastrointestinal upset, permanent short-term memory loss, and, in severe cases, death.

9. Rising ocean temperatures and the resultant *Pseudo-nitzschia* blooms allow domoic acid to enter the marine food web and accumulate in crab flesh, rendering it at times dangerous and unfit for human consumption.

10. In response to this public health crisis, the California Department of Fish and Wildlife ("CDFW"), in coordination with the California Department of Public Health ("CDPH"), closed—for the first time ever—significant portions of the California coast to commercial Dungeness crab fishing in the 2015–16 fishing season, and again in 2016–17. The Oregon Department of Fish and Wildlife ("ODFW") and the Oregon Department of Agriculture ("ODA") similarly closed large areas of the Oregon coast to commercial crabbing during the 2015–16, 2016–17, and 2017–18 commercial crab seasons because of domoic acid toxicity. Because of those closures, hundreds of commercial fishermen and -women holding Dungeness crab permits could not untie their boats or deploy their crab traps until crabs became safe to consume. Additional precautionary measures and stigma from negative publicity related to domoic acid contamination have deprived the crab industry of the full value of its harvests these last three seasons by depressing the market demand for crab products.

11. Plaintiff represents commercial Dungeness crab harvesters and onshore crab processors and wholesalers that have suffered, and continue to suffer, substantial economic losses due to those lost fishing opportunities. The severe curtailment of the crab fishery, which is among

the most productive, lucrative, and reliable fisheries on the west coast, had damaging ripple effects throughout California's and Oregon's fishing families and communities, creating severe hardships that many fishermen and fishing businesses, including Plaintiff's members, have struggled to overcome. The severity of the economic loss endured by the crabbing community prompted the federal government to declare the 2015–16 California crab season a federal fishery disaster under the Magnuson–Stevens Fishery Management and Conservation Act.

12. Domoic acid incidents on the west coast, and consequent injuries to the fishing industry and west coast fishing communities generally, are the new normal. These phenomena will increase in severity and frequency as the oceans continue to change with anthropogenic global warming. Indeed, California's 2018–19 crab season—set to begin on November 15, 2018—will be delayed in parts of the fishery because of domoic acid toxicity.

13. Additional crab fishery closures will occur in the future, with increasing frequency and severity, with concomitant impacts on the fishing families, fishing communities, and the west coast fishing industry at large.

14. Defendants are directly responsible for a large and substantial portion of total CO_2 emissions between 1965 and 2015. For example, based on Defendants' direct extractions of fossil fuels, they are responsible for more than two hundred gigatons of emissions representing over 15% of total emissions of that potent greenhouse gas during that period. Defendants are responsible for significantly larger shares of emissions based on their production, wholesale and retail sales of their products. Accordingly, Defendants are directly responsible for a substantial portion of elevated ocean temperatures that caused the domoic acid contamination on the west coast, which in turn caused the substantial and material economic injuries described herein.

15. Defendants' production, promotion, marketing, and use of fossil fuel products, simultaneous concealment of the known hazards of those products, and their championing of anti-regulation and anti-science campaigns, actually and proximately caused Plaintiff's injuries.

16. Accordingly, Plaintiff in its own name, in a representative capacity on behalf of its members and the west coast fishing community, and as the assignee of claims arising from domoic

acid impacts on the crab fishery, brings this action against Defendants for Nuisance, Strict Liability for Failure to Warn, Strict Liability for Design Defect, Negligence, and Negligent Failure to Warn.

17. By this action, the Plaintiff seeks to ensure that the parties responsible for the fishery closures bear the costs of its impacts, rather than Plaintiff and the men, women, families and businesses of the west coast crab industry.

II. PARTIES

A. Plaintiff

18. Plaintiff the **Pacific Coast Federation of Fishermen's Associations, Inc.** ("PCFFA") is the largest trade association of commercial fishermen on the West Coast. PCFFA has led the fishing industry in protecting the rights of west coast fishermen and fishing communities since 1976. PCFFA fights for the long-term survival of commercial fishing—including commercial Dungeness crab fishing—as a productive livelihood and way of life. PCFFA is a 501(c)(5) not-for-profit trade organization incorporated in California and headquartered in the city and county of San Francisco, California. PCFFA represents, *inter alia*, crab fishermen and local fishermen's marketing associations.

19. PCFFA brings these claims in its own name; as a representative of its members that are and will continue to be injured financially and otherwise by Defendants' conduct and consequent domoic acid incidents and domoic acid-induced crab fishery closures; and as assignee of claims assigned to it by individuals and businesses that derive income from the California and Oregon Dungeness crab fisheries that have suffered and will continue to suffer financial and other injuries because of Defendants' conduct and consequent domoic acid blooms and domoic acid-induced crab fishery closures. As used hereinafter, the term "Plaintiff" refers to PCFFA, its members, and businesses that have assigned PCFFA claims arising from the facts described herein.

20. PCFFA has diverted resources to addressing domoic acid impacts on the commercial crab fishery, including by dedicating staff time and energy to address these outbreaks in the media, working with state agencies to determine crab fishery closure and reopening procedures, sharing information on domoic acid and closures with its members, and appealing to state and federal entities for fishery disaster relief, among other activities. Domoic acid outbreaks

and resultant fishery closures have frustrated and will continue to frustrate PCFFA's mission of ensuring that commercial fishing remains a sustainable livelihood, by damaging markets and preventing trade in crab harvested on the west coast.

B. Defendants

21. Defendants are responsible for a substantial portion of the total greenhouse gases emitted since 1965. Defendants, individually and collectively, are responsible for extracting, refining, processing, producing, promoting, and marketing fossil fuel products, the normal and intended use of which has led to the emission of a substantial percentage of the total volume of greenhouse gases released into the atmosphere since 1965. Indeed, between 1965 and 2015, the named Defendants extracted enough fossil fuel materials (i.e. crude oil, coal, and natural gas) to account for more than one in every five tons of carbon dioxide and methane emitted worldwide. Accounting in addition for their wholesale and retail sales of products, as well as their wrongful promotion and marketing activities, Defendants bear a dominant responsibility for global warming generally and for Plaintiff's injuries in particular.

22. When reference in this complaint is made to an act or omission of the Defendants, unless specifically attributed or otherwise stated, such references should be interpreted to mean that the officers, directors, agents, employees, or representatives of the Defendants committed or authorized such an act or omission, or failed to adequately supervise or properly control or direct their employees while engaged in the management, direction, operation or control of the affairs of Defendants, and did so while acting within the scope of their employment or agency.

23. **Chevron Entities**

a. Chevron Corporation is a multinational, vertically integrated energy and chemicals company incorporated in the State of Delaware, with its global headquarters and principal place of business in San Ramon, California.

b. Chevron Corporation controls and has controlled companywide decisions about the quantity and extent of fossil fuel production and sales, including those of its subsidiaries.

c. Chevron Corporation controls and has controlled companywide decisions related to climate change and greenhouse gas emissions from its fossil fuel products, including those of its subsidiaries.

d. Chevron U.S.A. Inc. is a Pennsylvania Corporation with its principal place of business located in San Ramon, California. Chevron USA is a wholly owned subsidiary of Chevron Corporation that acts on Chevron Corporation's behalf and subject to Chevron Corporation's control. Chevron U.S.A. Inc. was formerly known as, and did or does business as, and/or is the successor in liability to Gulf Oil Corporation, Gulf Oil Corporation of Pennsylvania, Chevron Products Company, Chevron Chemical Company, Chevron Energy Solutions Company, ChevronTexaco Products Company, Chevron U.S.A. Production Company, and Chevron U.S.A. Products Company.

e. "Chevron" as used hereafter, means collectively, Defendants Chevron Corp. and Chevron U.S.A. Inc.

f. Chevron operates through a web of U.S. and international subsidiaries at all levels of the fossil fuel supply chain. Chevron's and its subsidiaries' operations consist of exploring for, developing, and producing crude oil and natural gas; processing, liquefaction, transportation, and regasification associated with liquefied natural gas; transporting crude oil by major international oil export pipelines; transporting, storage, and marketing of natural gas; refining crude oil into petroleum products; marketing of crude oil and refined products; transporting crude oil and refined products by pipeline, marine vessel, motor equipment and rail car; basic and applied research in multiple scientific fields including of chemistry, geology, and engineering; and manufacturing and marketing of commodity petrochemicals, plastics for industrial uses, and fuel and lubricant additives.

g. Chevron directs and has directed substantial fossil fuel-related business to California. A substantial portion of Chevron's fossil fuel products are or have been extracted, refined, transported, traded, distributed, marketed, promoted, manufactured, sold, and/or consumed in California, from which Chevron derives and has derived substantial revenue.

24. **Exxon Entities**

a. Exxon Mobil Corporation is a multinational, vertically integrated energy and chemicals company incorporated in the State of New Jersey with its headquarters and principal place of business in Irving, Texas. Exxon is among the largest publicly traded international oil and gas companies in the world. Exxon Mobil Corporation was formerly known as, did or does business as, and/or is the successor in liability to ExxonMobil Refining and Supply Company, Exxon Chemical U.S.A., ExxonMobil Chemical Corporation, ExxonMobil Chemical U.S.A., ExxonMobil Refining & Supply Corporation, Exxon Company, U.S.A., Exxon Corporation, and Mobil Corporation.

a. Exxon Mobil Corporation controls and has controlled companywide decisions about the quantity and extent of fossil fuel production and sales, including those of its subsidiaries. Exxon Mobil Corporation recently represented that its success, including its "ability to mitigate risk and provide attractive returns to shareholders, depends on [its] ability to successfully manage [its] overall portfolio, including diversification among types and locations of our projects."[9]

b. Exxon Mobil Corporation controls and has controlled companywide decisions related to climate change and greenhouse gas emissions from its fossil fuel products, including those of its subsidiaries. Exxon Mobil Corporation's Board, or an individual/sub-set of the Board, or another committee appointed by the Board, holds the highest level of direct responsibility for climate change policy within the company. Exxon Mobil Corporation's Chairman of the Board and Chief Executive Officer, its President and the other members of its Management Committee are actively engaged in discussions relating to greenhouse gas emissions and the risks of climate change on an ongoing basis. Exxon Mobil Corporation requires its subsidiaries to provide an estimate of greenhouse gas-related emissions costs in their economic projections when seeking funding for capital investments.

[9] ExxonMobil, "Factors affecting future results" (Feb. 2018), https://cdn.exxonmobil.com/~/media/global/files/investor-reports/2018/2018-factors-affecting-future-results.pdf.

c. ExxonMobil Oil Corporation is wholly-owned subsidiary of Exxon Mobil Corporation that acts on Exxon Mobil Corporation's behalf and subject to Exxon Mobil Corporation's control. ExxonMobil Oil Corporation is incorporated in the State of New York with its principal place of business in Irving, Texas. ExxonMobil Oil Corporation is qualified to do business in California. ExxonMobil Oil Corporation was formerly known as, did or does business as, and/or is the successor in liability to Mobil Oil Corporation.

d. "Exxon," as used hereafter, means collectively defendants Exxon Mobil Corporation and ExxonMobil Oil Corporation, and their predecessors, successors, parents, subsidiaries, affiliates, and divisions.

e. Exxon consists of numerous divisions and affiliates in all areas of the fossil fuel industry, including exploration for and production of crude oil and natural gas; manufacture of petroleum products; and transportation, marketing, and sale of crude oil, natural gas, and petroleum products. Exxon is also a major manufacturer and marketer of commodity petrochemical products.

f. Exxon directs and has directed substantial fossil fuel product-related business to California, and a substantial portion of its fossil fuel products are extracted, refined, transported, traded, distributed, marketed, and/or sold in California. Among other operations, more than 540 Exxon-, Mobil-, or Esso-branded gas stations operate throughout the state, and Exxon owns and operates a petroleum storage and transport facility in the San Ardo Oil Field in San Ardo, Monterey County, California. From 1966 to 2016, Exxon owned and operated an oil refinery in Torrance, Los Angeles County, California. Exxon Co. USA, an Exxon subsidiary, operated a petroleum refinery in Benicia, Solano County, California, from 1968 to 2000.

25. **BP Entities**

a. BP P.L.C. is a multi-national, vertically integrated energy and petrochemical public limited company, registered in England and Wales with its principal place of business in London, England. BP P.L.C. consists of three main operating segments: (1) exploration

and production, (2) refining and marketing, and (3) gas power and renewables.

b. BP P.L.C. is the ultimate parent company for numerous subsidiaries that find and produce oil and gas worldwide, that refine oil into fossil fuel products such as gasoline, and that market and sell oil, refined petroleum products, and natural gas worldwide. BP P.L.C.'s subsidiaries explore for oil and natural gas under a wide range of licensing, joint arrangement, and other contractual agreements.

c. BP P.L.C. controls and has controlled companywide decisions about the quantity and extent of fossil fuel production and sales, including those of its subsidiaries. BP P.L.C. is the ultimate decisionmaker on fundamental decisions about the company's core business, i.e., the level of companywide fossil fuels to produce, including production among BP P.L.C.'s subsidiaries. For instance, BP P.L.C. reported that in 2016–2017 it brought online thirteen major exploration and production projects, which contributed to a 12% increase in the BP group's overall fossil fuel product production. These projects were carried out by BP P.L.C.'s subsidiaries. Based on these projects, BP P.L.C. expects the company to deliver to customers 900,000 barrels of new product per day by 2021. BP P.L.C. further reported that in 2017 it sanctioned three new exploration projects in Trinidad, India, and the Gulf of Mexico and added 143% reserves replacement for the group of entities over which it is the ultimate parent company.

d. BP P.L.C. makes fossil fuel production decisions for the entire BP group based on a number of factors, including climate change. BP P.L.C.'s Board, an individual/subset of the Board, or a committee appointed by the Board, is the highest level within the company with direct responsibility for climate change policy. BP P.L.C.'s chief executive is responsible for maintaining the BP group's system of internal control that governs the BP group's business conduct. BP P.L.C. reviews climate change risks facing the BP group through two executive committees chaired by the group chief executive and one working group chaired by the executive vice president and group chief of staff, as part of BP group's established management structure.

e. BP P.L.C. does substantial fossil-fuel related business in the United States, by marketing through licensure; franchising its petroleum products in the U.S. under the BP,

ARCO and ARAL brands; and by operating oil and gas extraction and refining projects in the Gulf of Mexico, Alaska, Arkansas, Colorado, New Mexico, Oklahoma, Texas, and Wyoming.

f. BP America, Inc., is a wholly-owned subsidiary of BP P.L.C. that acts on BP P.L.C.'s behalf and subject to BP P.L.C.'s control. BP America Inc. is a vertically integrated energy and petrochemical company incorporated in the State of Delaware with its headquarters and principal place of business in Houston, Texas. BP America, Inc., consists of numerous divisions and affiliates in all aspects of the fossil fuel industry, including exploration for and production of crude oil and natural gas; manufacture of petroleum products; and transportation, marketing, and sale of crude oil, natural gas, and petroleum products. BP America Inc. was formerly known as, did or does business as, and/or is the successor in liability to BP Products North America Inc., Atlantic Richfield Company, BP Amoco Corporation, Amoco Corporation, Amoco Oil Company, The American Oil Company, BP Exploration & Oil Inc., Sohio Oil Company, Standard Oil of Ohio (SOHIO), Standard Oil (Indiana), BP Amoco Plc, BP Oil Inc., BP Oil Company, Atlantic Richfield Delaware Corporation, Atlantic Richfield Company (a Pennsylvania corporation), ARCO Products Company, and Arco Chemical Company, a division of Atlantic Richfield Company. BP is also a major manufacturer and marketer of commodity petrochemical products. BP America Inc. is registered to do business in the State of California and has a registered agent for service of process with the California Secretary of State.

g. Defendants BP P.L.C. and BP America, Inc. are collectively referred to herein as "BP."

h. BP does substantial fossil fuel product-related business in California, and a substantial portion of its fossil fuel products are extracted, refined, transported, traded, distributed, marketed, and/or sold in California. Among other operations, BP operates 275 ARCO-licensed and branded gas stations in California and more than 70 compressed natural gas and liquefied natural gas fueling stations, provides natural gas used to power more than 6.9 million California households, and distributes and markets petroleum-based lubricants marketed under the "Castrol" brand name throughout the state. From 2000 to 2013, BP also owned and operated an oil refinery in Carson, Los Angeles County, California. BP's marketing and trading business maintains an

office in Irvine, Orange County, California. BP maintains an energy research center in San Diego, San Diego County, California.

26. **Shell Entities**

a. Royal Dutch Shell PLC is a vertically integrated, multinational energy and petrochemical company. Royal Dutch Shell is incorporated in England and Wales, with its headquarters and principal place of business in the Hague, Netherlands. Royal Dutch Shell PLC consists of numerous divisions, subsidiaries and affiliates engaged in all aspects of the fossil fuel industry, including exploration, development, extraction, manufacturing and energy production, transport, trading, marketing and sales.

b. Royal Dutch Shell PLC controls and has controlled companywide decisions about the quantity and extent of fossil fuel production and sales, including those of its subsidiaries. Royal Dutch Shell PLC's Board of Directors in the Hague determines whether and to what extent Shell subsidiary holdings around the globe produce Shell-branded fossil fuel products. For instance, Royal Dutch Shell PLC's Board of Directors makes individual decisions on whether and when to initiate drilling in particular oil reserves.

c. Royal Dutch Shell PLC controls and has controlled companywide decisions related to climate change and greenhouse gas emissions from its fossil fuel products, including those of its subsidiaries. Overall accountability for climate change within the Shell group of companies lies with Royal Dutch Shell PLC's Chief Executive Officer and Executive Committee. Additionally, Royal Dutch Shell PLC has directed its subsidiaries to reduce the carbon footprint of all fossil fuel products produced under the Shell brand, including those of its subsidiaries, and across all upstream and downstream segments of its operations.

d. Shell Oil Products Company LLC is a wholly-owned subsidiary of Royal Dutch Shell PLC. Shell Oil Products Company LLC is incorporated in the State of Delaware and maintains its principal place of business in Houston, Texas. Shell Oil Products Company LLC is registered to do business in the State of California and has a registered agent for service of process in California. Shell Oil Products Company LLC is an energy and petrochemical company involved in refining, transportation, distribution and marketing of Shell fossil fuel products.

e. Defendants Royal Dutch Shell PLC and Shell Oil Products Company LLC are collectively referred to as "Shell."

f. Shell does substantial fossil fuel product-related business in California, and a substantial portion of its fossil fuel products are extracted, refined, transported, traded, distributed, marketed and/or sold in California. Among other endeavors, Shell operates a petroleum refinery in Martinez, Contra Costa County, California; operates a distribution center in Carson, California; and produces heavy oil and natural gas within the state. Shell also owned and operated a refinery in Wilmington (Los Angeles), Los Angeles County, California, from 1998 to 2007, and a refinery in Bakersfield, Kern County, California, from 2001 to 2005. Shell also operates hundreds of Shell-branded gas stations in California.

27. **Citgo Petroleum Corporation ("Citgo")**

a. Citgo is a direct, wholly owned subsidiary of PDV America, Incorporated, which is a wholly owned subsidiary of PDV Holding, Incorporated. These organizations' ultimate parent is Petróleos de Venezuela, S.A. ("PDVSA"), an entity wholly owned by the Republic of Venezuela that plans, coordinates, supervises and controls activities carried out by its subsidiaries. Citgo is incorporated in the State of Delaware and maintains its headquarters in Houston, Texas.

b. Citgo controls and has controlled companywide decisions about the quantity and extent of fossil fuel production and sales, including those of its subsidiaries.

c. Citgo controls and has controlled companywide decisions related to climate change and greenhouse gas emissions from its fossil fuel products, including those of its subsidiaries.

d. Citgo and its subsidiaries are engaged in the refining, marketing, and transportation of petroleum products including gasoline, diesel fuel, jet fuel, petrochemicals, lubricants, asphalt, and refined waxes.

e. Citgo is registered to do business in the State of California and has designated an agent for service of process in California. Citgo further does substantial fossil fuel product-related business in California, and a substantial portion of its fossil fuel products are extracted, refined, transported, traded, distributed, marketed, and/or sold in California. For

instance, Citgo sells significant volumes of fossil-fuel derived consumer motor oils and automobile lubricants through retail and wholesale distributers. Citgo further sells a wide variety of greases and oils for use in construction, mining, agricultural, and metalworking machinery and vehicles, and in many other industrial and commercial settings, through licensed distributors in California.

28. **ConocoPhillips Entities**

a. ConocoPhillips is a multinational energy company incorporated in the State of Delaware and with its principal place of business in Houston, Texas. ConocoPhillips consists of numerous divisions, subsidiaries, and affiliates engaged in all aspects of the fossil fuel industry, including exploration, extraction, production, manufacture, transport, and marketing.

b. ConocoPhillips controls and has controlled companywide decisions about the quantity and extent of fossil fuel production and sales, including those of its subsidiaries. ConocoPhillips' most recent annual report subsumes the operations of the entire ConocoPhillips group of subsidiaries under its name. Therein, ConocoPhillips represents that its value—for which ConocoPhillips maintains ultimate responsibility—is a function of its decisions to direct subsidiaries to explore for and produce fossil fuels: "Unless we successfully add to our existing proved reserves, our future crude oil, bitumen, natural gas and natural gas liquids production will decline, resulting in an adverse impact to our business." ConocoPhillips optimizes the ConocoPhillips group's oil and gas portfolio to fit ConocoPhillips' strategic plan. For example, in November 2016, ConocoPhillips announced a plan to generate $5 billion to $8 billion over two years by optimizing its business portfolio, including its fossil fuel product business, to focus on low cost-of-supply fossil fuel production projects that strategically fit its development plans.

c. ConocoPhillips controls and has controlled companywide decisions related to global warming and greenhouse gas emissions from its fossil fuel products, including those of its subsidiaries. For instance, ConocoPhillips' Board has the highest level of direct responsibility for climate change policy within the company. ConocoPhillips has developed and implements a corporate Climate Change Action Plan to govern climate change decision-making across all entities in the ConocoPhillips group.

d. ConocoPhillips Company is a wholly owned subsidiary of ConocoPhilliips that acts on ConocoPhillips' behalf and subject to ConocoPhillips' control. ConocoPhillips Company is incorporated in Delaware and has its principal office in Bartlesville, Oklahoma. ConocoPhillips Company is registered to do business in California and has a registered agent for service of process in California.

e. Phillips 66 is a multinational energy and petrochemical company incorporated in Delaware and with its principal place of business in Houston, Texas. It encompasses downstream fossil fuel processing, refining, transport, and marketing segments that were formerly owned and/or controlled by ConocoPhillips. Phillips 66 is registered to do business in the State of California and has a registered agent for service of process in California.

f. Defendants ConocoPhillips, ConocoPhillips Company, and Phillips 66, and their predecessors, successors, parents, subsidiaries, affiliates, and divisions are collectively referred to herein as "ConocoPhillips."

g. ConocoPhillips does substantial fossil fuel product-related business in California, and a substantial portion of its fossil fuel products are extracted, refined, transported, traded, distributed, marketed, and/or sold in California. For instance, ConocoPhillips owns and operates oil and natural gas terminals in California, owns and operates refineries in Arroyo Grande (San Luis Obispo County), Colton (San Bernardino County), and Wilmington (Los Angeles County), California, and distributes its products throughout California. Phillips 66 also owns and operates oil refineries in Rodeo (Contra Costa County), Santa Maria (Santa Barbara County), and Wilmington (Los Angeles County), California, each of which was owned and operated by ConocoPhillips and its predecessors in interest from 1997 to 2012.

29. **Total Entities**

a. Total E&P USA Inc. is a wholly owned subsidiary of Total S.A.—a French energy conglomerate—engaged in the North American segment of Total SA's fossil fuel products-related business. Total E&P USA Inc. and its subsidiaries are involved in the exploration for and extraction, transportation, research, and marketing of Total S.A.'s fossil fuel products. Total E&P

USA Inc. is registered to do business in the State of California and has designated an agent for service of process in California.

b. Total E&P USA Inc. controls and has controlled companywide decisions about the quantity and extent of fossil fuel production and sales, including those of its subsidiaries.

c. Total E&P USA Inc. controls and has controlled companywide decisions related to climate change and greenhouse gas emissions from its fossil fuel products, including those of its subsidiaries.

d. Total Specialties USA Inc., is a wholly owned subsidiary of Total S.A., involved in the marketing and distribution of Total S.A.'s fossil fuel products. Total Specialties USA Inc. is incorporated in the State of Delaware and headquartered in Houston, Texas. Total Specialties USA Inc. is registered to do business in the State of California and has designated an agent for service of process in California. Total Specialties USA Inc. does substantial fossil fuel product-related business in California, and a substantial portion of its fossil fuel products are extracted, refined, transported, traded, distributed, marketed, and/or sold in California. For instance, Total Specialties USA Inc. maintains regular distributorship relationships with several California distributors of Total fossil fuel products, including engine oils, lubricants, greases, and industrial petroleum products.

30. **Eni Entities**

a. Eni S.p.A. ("Eni") is a vertically integrated, multinational energy company focusing on petroleum and natural gas. Eni is incorporated in the Republic of Italy, with its principal place of business in Rome, Italy. With its consolidated subsidiaries, Eni engages in the exploration, development, and production of hydrocarbons; in the supply and marketing of gas, liquid natural gas, and power; in the refining and marketing of petroleum products; in the production and marketing of basic petrochemicals, plastics and elastomers; in commodity trading; and in electricity marketing and generation.

b. Eni controls and has controlled companywide decisions about the quantity and extent of fossil fuel production and sales, including those of its subsidiaries.

c. Eni controls and has controlled companywide decisions related to climate change and greenhouse gas emissions from its fossil fuel products, including those of its subsidiaries.

d. Eni Oil & Gas Inc. is incorporated in Texas, with its principal place of business in Houston, Texas. Eni Oil & Gas Inc. is a wholly owned subsidiary of Eni America Ltd., a Delaware corporation doing business in the United States. Eni America, Ltd. is a wholly owned subsidiary of Eni UHL Ltd., a British corporation with its registered office in London, United Kingdom. Eni UHL Ltd. is a wholly owned subsidiary of Eni ULT, Ltd., a British corporation with its registered office on London, United Kingdom. Eni ULT, Ltd. is a wholly owned subsidiary of Eni Lasmo Plc, a British corporation with its registered office on London, United Kingdom. Eni Investments Plc, a British corporation with its registered office in London, United Kingdom, holds a 99.99% ownership interest in Eni Lasmo Plc (the other 0.01% ownership interest is held by another Eni entity, Eni UK Ltd, a British corporation with its registered office in London, United Kingdom). Eni S.p.A owns a 99.99% interest in Eni Investments Plc. Eni UK Ltd. holds the remainder interest in Eni Investments Plc. Collectively, these entities are referred to as "Eni."

e. Eni Oil & Gas Inc. is a successor-in-interest to Golden Eagle Refining Company, Inc. ("Golden Eagle"). At times relevant to this complaint, Golden Eagle did substantial fossil fuel-related business in California. Specifically, Golden Eagle owned and/or operated oil refineries in Carson (Los Angeles County) and Martinez (Contra Costa County), California, and owned and/or operated oil pipelines in or near Long Beach (Los Angeles County), California.

31. **Anadarko Petroleum Corp.**

a. Anadarko Petroleum Corporation ("Anadarko") is incorporated in the State of Delaware and maintains its principal place of business in The Woodlands, Texas. Anadarko is a multinational, vertically integrated energy company comprised of multiple upstream and downstream segments. These include exploration, production, gathering, processing, treating, transporting, marketing, and selling fossil fuel products derived primarily from petroleum and natural gas. In the United States, Anadarko entities operate fossil fuel product exploration and production concerns in Texas, the Gulf of Mexico, Alaska, the Powder River Basin, Utah,

Colorado, and the Marcellus Shale Formation. Anadarko operates fossil fuel product production and exploration activities internationally in Algeria, Ghana, Mozambique, and Columbia, among others. Anadarko Petroleum Corporation is registered to do business in California and has designated an agent for service of process in California.

b. Anadarko Petroleum Corporation is a successor-in-interest to HS Resources Inc. ("HS"). HS was an energy company headquartered in San Francisco, California. It owned natural gas reserves in Colorado, North Dakota, South Dakota, Montana, and along the coasts of Texas and Louisiana, which it extracted and imported to California. HS was acquired by Kerr-McGee Corporation in 2001. Kerr-McGee was an energy exploration and production company owning oil and natural gas rights in the Gulf of Mexico, Colorado, and Utah, with its corporate headquarters in Oklahoma. Anadarko Petroleum Corporation acquired Kerr-McGee Corporation in 2006.

32. **Occidental Entities**

a. Occidental Petroleum Corporation is a multinational, vertically integrated energy and chemical company incorporated in the State of Delaware and with its principal place of business in Houston, Texas. Occidental's operations consist of three segments: Occidental's operations consist of three segments: (1) the exploration for, extraction of, and production of oil and natural gas products; (2) the manufacture and marketing of chemicals and vinyls; and (3) processing, transport, storage, purchase, and marketing of oil, natural gas, and power. Occidental Petroleum Corporation is registered to do business in the State of California and has designated an agent for service of process in the State of California.

b. Occidental Petroleum Corporation controls and has controlled companywide decisions about the quantity and extent of fossil fuel production and sales, including those of its subsidiaries.

c. Occidental Petroleum Corporation controls and has controlled companywide decisions related to climate change and greenhouse gas emissions from its fossil fuel products, including those of its subsidiaries.

d. Occidental Chemical Corporation, a manufacturer and marketer of petrochemicals, such as polyvinyl chloride resins, is a wholly owned subsidiary of Occidental Petroleum Corporation. Occidental Chemical Corporation is registered to do business in the State of California and has designated an agent for service of process in the State of California.

e. Defendants Occidental Petroleum Corporation and Occidental Chemical Corporation are collectively referred to as "Occidental."

f. Occidental does substantial fossil fuel product-related business in the State of California, and a substantial portion of its fossil fuel products are extracted, refined, transported, traded, distributed, marketed, and/or sold in California. For instance, Occidental has extracted and transported its fossil fuel products from approximately 30,900 drilling locations within the San Joaquin, Los Angeles, Ventura, and Sacramento Basins in California.

33. **Repsol S.A.**

a. Repsol S.A. ("Repsol") is a vertically integrated, multinational global energy company, incorporated in the Kingdom of Spain, with its principal place of business in Madrid, Spain. Repsol is involved in multiple aspects of the fossil fuel industry, including exploration, production, marketing, and trading. Repsol engages in significant fossil fuel exploration and production activities in the United States, including in the Gulf of Mexico, the Marcellus Shale in Pennsylvania, the Eagle Ford Shale in South Texas, the Mississippi Lime in Oklahoma and Kansas, the North Slope in Alaska, and the Trenton-Black River in New York.

b. Repsol controls and has controlled companywide decisions about the quantity and extent of fossil fuel production and sales, including those of its subsidiaries.

c. Repsol controls and has controlled companywide decisions related to climate change and greenhouse gas emissions from its fossil fuel products, including those of its subsidiaries.

d. Repsol does substantial fossil fuel product-related business in the State of California, and a substantial portion of its fossil fuel products are extracted, refined, transported, traded, distributed, marketed, and/or sold in California. For instance, Repsol subsidiary Repsol Energy North America Corporation, incorporated in the State of Texas and with its principal place

of business in The Woodlands, Texas, is listed as a natural gas procurement, storage, transportation, scheduling, and risk management provider by Pacific Gas and Electric Co. ("PG&E"), a California utility. Repsol Energy North America Corporation is registered to do business in California and has designated an agent for service of process in California. Repsol subsidiary Repsol Trading USA Corporation, incorporated in the State of Texas and with its principal place of business in The Woodlands, Texas, is also registered do business in California and has designated an agent for service of process in California. Additionally, Repsol represents on its website that it is engaging in strategic opportunities involving its fossil fuel products in California, which may consist of crude oil, gasoline, diesel, and/or jet fuel.

34. **Marathon Entities**

a. Marathon Oil Company is an energy company incorporated in the State of Ohio and with its principal place of business in Houston, Texas. Marathon Oil Company is registered to do business in California and has designated an agent for service of process in California. Marathon Oil Company is a corporate ancestor of Marathon Oil Corporation and Marathon Petroleum Company.

b. Marathon Oil Company is a successor-in-interest to Husky Oil Ltd. ("Husky"), which it acquired in 1984. During times relevant to this Complaint, Husky operated oil production facilities near Santa Maria (Santa Barbara County), California, where it produced nearly 1,100 barrels per day. During the period relevant to this litigation, Husky did substantial fossil fuel product-related business in California.

c. Marathon Oil Corporation is a multinational energy company incorporated in the State of Delaware and with its principal place of business in Houston, Texas. Marathon Oil Corporation consists of multiple subsidiaries and affiliates involved in the exploration for, extraction, production, and marketing of fossil fuel products.

d. Marathon Petroleum Corporation is a multinational energy company incorporated in Delaware and with its principal place of business in Findlay, Ohio. Marathon Petroleum Corporation was spun off from Marathon Oil Corporation operations in 2011. It consists of multiple subsidiaries and affiliates involved in fossil fuel product refining, marketing, retail,

and transport, including both petroleum and natural gas products.

e. Marathon Oil Corporation and Marathon Petroleum Corporation control and have controlled their companywide decisions about the quantity and extent of fossil fuel production and sales, including those of their subsidiaries.

f. Marathon Oil Corporation and Marathon Petroleum Corporation control and have controlled their companywide decisions related to climate change and greenhouse gas emissions from its fossil fuel products, including those of its subsidiaries.

g. Defendants Marathon Oil Company, Marathon Oil Corporation, and Marathon Petroleum Corporation are collectively referred to as "Marathon."

35. **Hess Corporation**

a. Hess Corporation ("Hess") is a global, vertically integrated petroleum exploration and extraction company incorporated in the State of Delaware with its headquarters and principal place of business in New York, New York. Hess is registered to do business in California and has designated an agent for service of process in California.

b. Hess controls and has controlled companywide decisions about the quantity and extent of fossil fuel production and sales, including those of its subsidiaries.

c. Hess controls and has controlled companywide decisions related to climate change and greenhouse gas emissions from its fossil fuel products, including those of its subsidiaries.

d. Hess is engaged in the exploration, development, production, transportation, purchase, marketing, and sale of crude oil and natural gas. Its oil and gas production operations are located primarily in the United States, Denmark, Equatorial Guinea, Malaysia, Thailand, and Norway. Prior to 2014, Hess also conducted extensive retail operations in its own name and through subsidiaries. Hess owned and operated more than 1,000 gas stations throughout the United States, including in California, during times relevant to this complaint. Prior to 2013, Hess also operated oil refineries in the continental United States and U.S. Virgin Islands.

36. **Devon Energy Entities**

a. Devon Energy Corporation is an independent energy company engaged in

the exploration, development, and production of oil, and natural gas. It is incorporated in the State of Delaware and maintains its principal place of business in Oklahoma City, Oklahoma. Devon is engaged in multiple aspects of the fossil fuel industry, including exploration, development, production, and marketing of its fossil fuel products.

b. Devon Energy Corporation controls and has controlled companywide decisions about the quantity and extent of fossil fuel production and sales, including those of its subsidiaries.

c. Devon Energy Corporation controls and has controlled companywide decisions related to climate change and greenhouse gas emissions from its fossil fuel products, including those of its subsidiaries.

d. Devon Energy Production Company, L.P., is a Devon subsidiary registered to do business in the State of California and with a designated agent for service of process in California. Devon Energy Production Company, L.P., does substantial fossil fuel product-related business in California.

e. Devon Energy Corporation is a successor-in-interest to the Pauley Petroleum Company ("Pauley"). At times relevant to this complaint, Pauley did substantial fossil-fuel related business in California. Specifically, this included owning and operating a petroleum refinery in Newhall (Los Angeles County), California, from 1959 to 1989, and a refinery in Wilmington (Los Angeles County), California, from 1988 to 1992. Pauley merged with Hondo Oil and Gas Co. ("Hondo") in 1987. Subsequently, Devon Energy Corp. acquired Hondo in 1992.

f. Defendants Devon Energy Corporation and Devon Energy Production Company, L.P., are collectively referred to as "Devon."

37. **Encana Corporation**

a. Encana Corporation ("Encana") is a Canadian corporation with its principal place of business in Calgary, Alberta, Canada. Encana is an extractor and marketer of oil and natural gas and has facilities including gas plants and gas wells in Colorado, Texas, Wyoming, Louisiana, and New Mexico. By approximately 2005, Encana was the largest independent owner and operator of natural gas storage facilities in North America.

b. Encana has done and continues to do substantial fossil fuel product-related business in California. Between 1997 and 2006, Encana owned and operated the Wild Goose Storage underground natural gas storage facility in Butte County, California. In 2003, Encana began transporting natural gas through a 25-mile pipeline from the Wild Goose Station to a PG&E compressor station in Colusa County, California, where gas entered the main PG&E pipeline. Encana invested in a 100 billion cubic foot expansion of the facility in 2004, bringing gas storage capacity at Wild Goose to 24 billion cubic feet.

38. **Apache Corporation**

a. Apache Corporation is a publicly traded Delaware corporation with its principal place of business in Houston, Texas. Apache is an oil and gas exploration and production company, with crude oil and natural gas exploration and extraction operations in the United States, Canada, Egypt, and in the North Sea.

b. During the time at issue, Apache extracted natural gas from wells developed on approximately seven million acres of land held in the Canadian provinces of British Columbia, Alberta, and Saskatchewan, and Apache did substantial fossil fuel product-related business in California. Apache transported a substantial volume of the natural gas extracted from its Canadian holdings to California, where it sold that gas to electric utilities, end-users, other fossil fuel companies, supply aggregators, and other fossil fuel marketers. Apache directed sales of its natural gas to California in addition to markets in Washington state, Chicago, and western Canada, to intentionally retain a diverse customer base and maximize profits from the differential price rates and demand levels in those respective markets.

39. **Doe Defendants**

a. The true names and capacities, whether individual, corporate, associate, or otherwise of Defendants Does 1 through 100, inclusive, are unknown to Plaintiff, who therefore sues said Defendants by such fictitious names pursuant to California Code of Civil Procedure Section 474. Plaintiff is informed and believes, and on that basis alleges, that each of the

fictitiously named Defendants is responsible in some manner for the acts and occurrences herein alleged, and that Plaintiff's injuries and damages were caused by such Defendants.

C. Relevant Non-Parties: Fossil Fuel Industry Associations

40. As set forth in greater detail below, each Defendant had actual knowledge that its fossil fuel products were hazardous. Defendants obtained knowledge of the hazards of their products independently and through their membership and involvement in trade associations.

41. Each Defendant's fossil fuel promotion and marketing efforts were assisted by the trade associations described below. Acting on behalf of the Defendants, the industry associations engaged in a long-term course of conduct to misrepresent, omit, and conceal the dangers of Defendants' fossil fuel products.

a. **The American Petroleum Institute (API)**: API is a national trade association representing the oil and gas industry, formed in 1919. At least the following Defendants and/or their predecessors in interest are and/or have been API members at times relevant to this litigation: Chevron, Exxon, BP, Shell, ConocoPhillips, Hess, Anadarko, Occidental, Repsol, Marathon, Devon, Encana, and Apache.[10]

b. **The Western States Petroleum Association (WSPA)**: WSPA is a trade association representing oil producers in Arizona, California, Nevada, Oregon, and Washington.[11] Its members include, and at times relevant to this Complaint, have included, at least Defendants Chevron, BP, ConocoPhillips, Shell, and Exxon.[12]

c. **The American Fuel and Petrochemical Manufacturers (AFPM)** is a national association of petroleum and petrochemical companies. At relevant times, its members included, but were not limited to, at least BP Petrochemicals, BP Products North America, Chevron U.S.A. Inc., CITGO Petroleum Corporation, Exxon Mobil Corporation, Occidental

[10] American Petroleum Institute (API), *Members*, http://www.api.org/membership/members (accessed Nov. 5, 2018).
[11] WSPA, *About*, https://www.wspa.org/about (accessed Nov. 5, 2018).
[12] *Id.*

Chemical Corporation, Phillips 66, Shell Chemical Company, and Total Petrochemicals & Refining USA, Inc.[13]

d. **The Information Council for the Environment (ICE)**: ICE was formed by coal companies and their allies, including Western Fuels Association and the National Coal Association. Associated companies included at least Pittsburg and Midway Coal Mining (Chevron),[14] and Island Creek Coal Company (Occidental).

e. **The Global Climate Coalition (GCC)**: GCC was an industry group formed to oppose greenhouse gas emission reduction policies and the Kyoto Protocol. It was founded in 1989 shortly after the first Intergovernmental Panel on Climate Change meeting was held, and disbanded in 2001. Founding members included the National Association of Manufacturers, the Edison Electric Institute, and the United States Chamber of Commerce. The GCC's early individual corporate members included Amoco (BP), API, Chevron, Exxon, Shell Oil, Texaco (Chevron) and Phillips Petroleum (ConocoPhillips). During its existence, other members and funders included ARCO (BP), the National Mining Association, and the Western Fuels Association. The coalition also operated for several years out of the National Association of Manufacturers' offices.

III. AGENCY

42. At all times herein mentioned, each of the Defendants was the agent, servant, partner, aider and abettor, co-conspirator, and/or joint venturer of each of the remaining Defendants herein and was at all times operating and acting within the purpose and scope of said agency, service, employment, partnership, conspiracy, and joint venture and rendered substantial assistance and encouragement to the other Defendants, knowing that their conduct was wrongful and/or constituted a breach of duty.

IV. JURISDICTION AND VENUE

43. This court's personal jurisdiction over Defendants named herein is proper because each Defendant maintains substantial contacts with California by and through its fossil fuel

[13] AFPM, *Membership Directory*, https://www.afpm.org/membership-directory (accessed Nov. 5, 2018).

[14] Hereinafter, parenthetical references to Defendants indicate corporate ancestry and/or affiliation.

business operations in this state, as described above, and because Plaintiff's injuries described herein arose out of and relate to those operations and occurred in California.

44. The Superior Court of California for San Francisco County is a court of general jurisdiction and therefore has subject matter jurisdiction over this action.

45. Venue is proper in San Francisco County pursuant to Code of Civil Procedure section 395.5 because Defendants are corporations and/or associations, and because a substantial portion of the injuries giving rise to Defendants' liability occurred in San Francisco County.

V. FACTUAL BACKGROUND

A. Global Land and Ocean Warming—Observed Effects and Known Cause

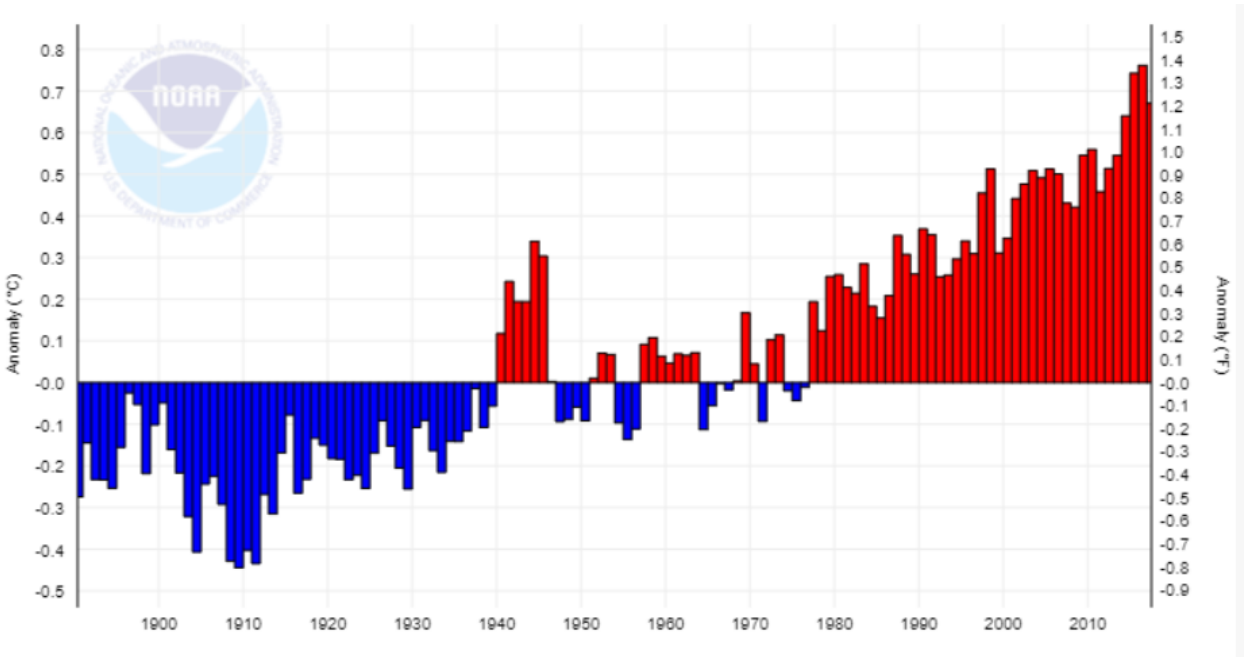
46. Warming of the climate system is unequivocal, and since the 1950s, many of the observed changes to the climate system are unprecedented over decades to millennia.

47. The average ocean temperature in 2016 was approximately 1.7° F warmer than the 20th-century baseline, which is the greatest positive anomaly observed since at least 1880.[15] The increase in hotter temperatures and more frequent positive anomalies during the Great Acceleration is occurring both globally and locally. The graph below shows the increase in global land and ocean temperature anomalies since 1880, as measured against the 1910–2000 global average temperature.[16]

[15] NOAA, National Centers for Environmental Information, *Climate at a Glance (Global Time Series)* (June 2017) https://www.ncdc.noaa.gov/cag/time-series/global/globe/land_ocean/ytd/12/1880-2016.

[16] *Id.*

Figure 1: Global Ocean Temperature Anomalies, January - December



48. The mechanism by which human activity causes the oceans to warm is well established: ocean warming, like atmospheric warming, is overwhelmingly caused by anthropogenic greenhouse gas emissions.[17]

49. When emitted, greenhouse gases trap heat within Earth's atmosphere that would otherwise radiate into space.

50. Greenhouse gases are largely byproducts of humans burning fossil fuels to produce energy, and using fossil fuels to create petrochemical products.

51. Human activity, particularly greenhouse gas emissions, is the primary cause of global ambient air and ocean warming, and associated effects on Earth's climate.

52. Prior to World War II, most anthropogenic CO_2 emissions were caused by land-use practices, such as forestry and agriculture, which altered the ability of the land and global biosphere to absorb CO_2 from the atmosphere; the impacts of such activities on Earth's climate were relatively minor. Since the beginning of the Great Acceleration, however, both the annual rate and total volume of human CO_2 emissions have increased enormously following the advent of major

[17] IPCC 2014 Synthesis Report, *supra* note 2, at 4.

uses of oil, gas, and coal. The graph below shows that while CO_2 emissions attributable to forestry and other land-use change have remained relatively constant, total emissions attributable to fossil fuels have increased dramatically since the 1950s.[18]

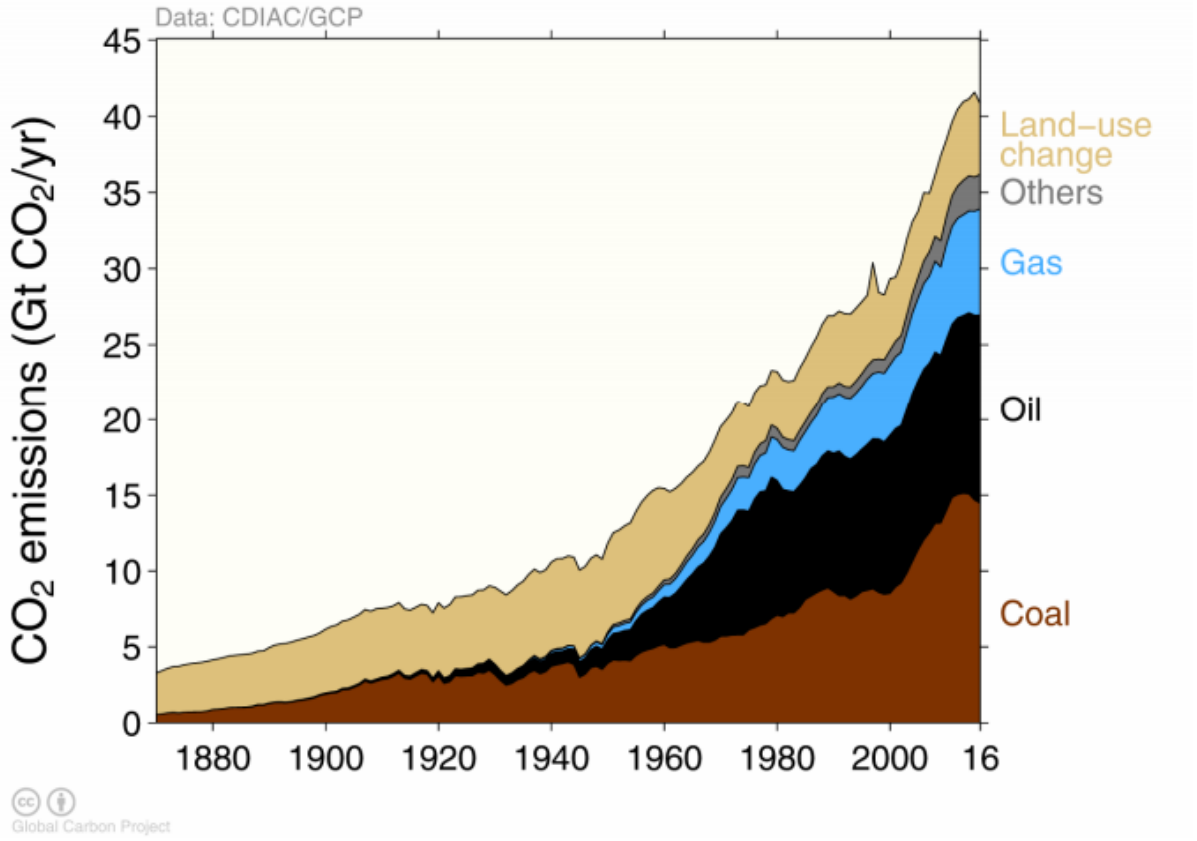


Figure 2: Total Annual Carbon Dioxide Emissions by Source, 1860–2016:

53. As human reliance on fossil fuels for industrial and mechanical processes has increased, so too have greenhouse gas emissions, especially of CO_2. The Great Acceleration is marked by a massive increase in the annual rate of fossil fuel emissions: more than half of all cumulative CO_2 emissions have occurred since 1988.[19] The rate of CO_2 emissions from fossil fuels and industry, moreover, has increased threefold since the 1960s, and by more than 60% since

[18] Global Carbon Project, Global Carbon Budget 2017 (Nov. 13, 2017), http://www.globalcarbonproject.org/carbonbudget/17/files/GCP_CarbonBudget_2017.pdf (*citing* CDIAC; R.A. Houghton & Alexander A. Nassikas, *Global and Regional Fluxes of Carbon from Land Use and Land Cover Change 1850–2015*, 31 GLOBAL BIOCHEMICAL CYCLES 3, 456 (Feb. 2017)).

[19] R.J. Andres et al., *A synthesis of carbon dioxide emissions from fossil-fuel combustion*, BIOGEOSCIENCES, 9, 1851 (2012), http://www.biogeosciences.net/9/1845/2012.

1990.[20] The graph below illustrates the increasing rate of global CO_2 emissions since the industrial era began.[21]

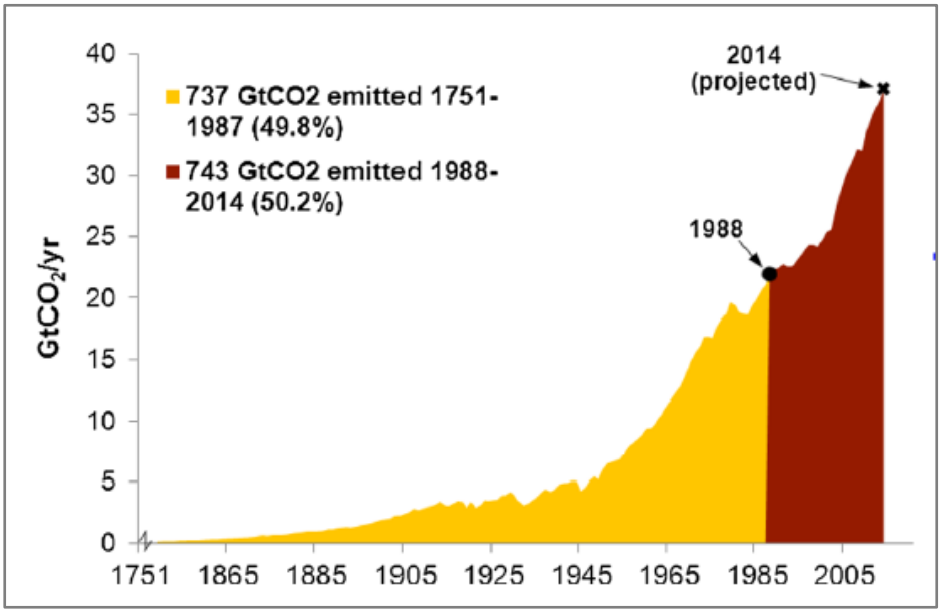


Figure 3: Cumulative Annual Anthropogenic Carbon Dioxide Emissions, 1751–2014:

54. Because of the increased use of fossil fuel products, concentrations of greenhouse gases in the atmosphere are now at a level unprecedented in at least 800,000 years.[22] The graph below illustrates the nearly 30% increase in atmospheric CO_2 concentration above pre-Industrial levels since 1960.[23]

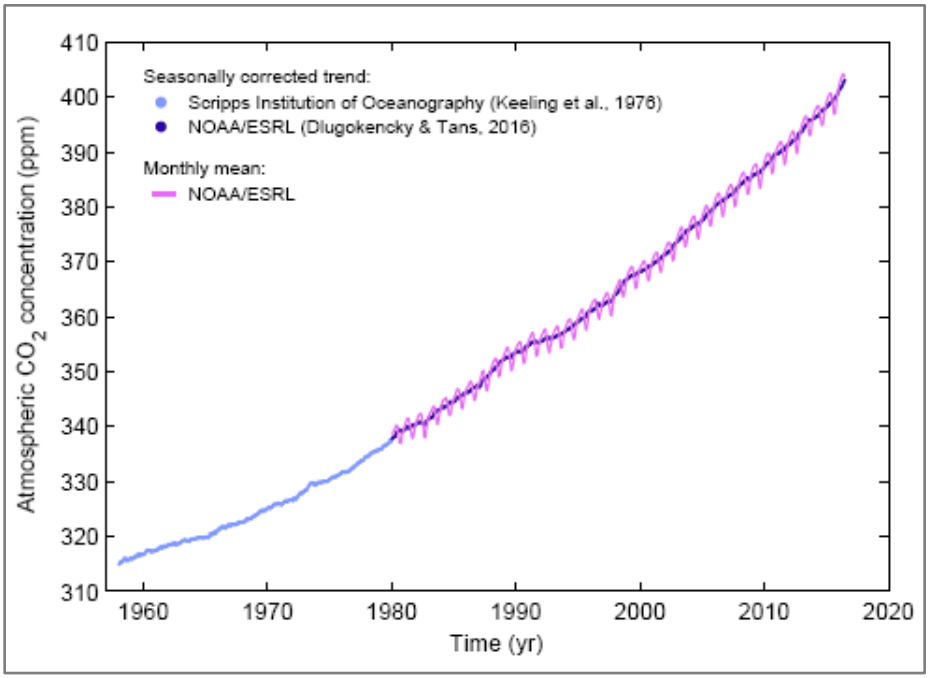
[20] *Global Carbon Budget 2016*, *supra* note 4, at 630 ("Global CO_2 emissions from fossil fuels and industry have increased every decade from an average of 3.1±0.2 GtC/yr in the 1960s to an average of 9.3±0.5 GtC/yr during 2006–2015.").

[21] Peter Frumhoff et al., *The Climate Responsibilities of Industrial Carbon Producers*, 132 CLIMATIC CHANGE 157, 164 (2015).

[22] IPCC 2014 Synthesis Report, *supra* note 2, at 4.

[23] *Global Carbon Budget 2016*, *supra* note 4, at 608.

Figure 4: Atmospheric Carbon Dioxide Concentration in Parts Per Million, 1960–2015:



55. Of the increase in energy that has accumulated in Earth's atmosphere between 1971 and 2010, more than 90% is stored in the oceans.[24]

56. In addition to the positive (increasing) trend in ocean surface temperature, marine heatwaves—prolonged, discrete, anomalously warm water events that can be described by their duration, intensity, rate of evolution, and spatial extent[25]—have become more frequent under continued anthropogenic warming.[26] This trend will continue and worsen in the future.

B. Domoic Acid Outbreaks

57. Domoic acid is a neurotoxin produced by species of marine algae, including the diatom *Pseudo-nitzschia australis*, that when ingested by humans causes "amnesic shellfish

[24] IPCC 2014 Synthesis Report, *supra* note 2, at 4.

[25] Alistair J. Hobday et al., *A hierarchical approach to defining marine heatwaves*, PROGRESS IN OCEANOGRAPHY 141, 227–38 (Feb. 2016).

[26] *See, e.g.*, Evan Weller et al., *Human Contribution to the 2014 Record High Sea Surface Temperatures Over the Western Tropical and Northeast Pacific*, BULLETIN OF THE AMERICAN METEOROLOGICAL SOCIETY, Vol. 96, No. 12, S103 (Dec. 2015).

poisoning," which induces symptoms including vomiting, diarrhea, cramps, and other gastrointestinal upset, permanent short-term memory loss, and, in severe cases, death.

58. The U.S. Food and Drug Administration ("FDA") has established a domoic acid action level in Dungeness crab viscera of 30 parts per million ("ppm"). Above that action level, crab is considered "adulterated" and illegal to sell. California and Oregon both adhere to that action level and impose precautionary measures when crabs in those states contain domoic acid at levels exceeding the action level.

59. Members of the algal genus *Pseudo-nitzschia* thrive in warming oceans.[27] In particular, *Pseudo-nitzschia australis* increases its growth rate, photosynthesis, and toxigenicity in warmer water temperatures.[28]

60. In late 2013, a sea surface temperature anomaly developed in the Northeastern Pacific Ocean, including along the California coast. Eventually dubbed "the Blob" by scientists,[29] this mass of warm water would persist through 2016,[30] extend from Alaska to Mexico,[31] and feature positive temperature anomalies of greater than 4.5º F—more than three standard deviations above the expected sea surface temperature in the area.[32]

61. Conditions within the Blob were characterized by unusually warm waters, particularly before the initiation of the upwelling season.[33]

62. The conditions brought by the Blob favored *Pseudo-nitzschia* and allowed small seed populations to become established, specifically in those temperature ranges present along the California coast.[34]

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[27] Zhi Zhu et al., *Understanding the blob bloom: Warming increases toxicity and abundance of the harmful bloom diatom Pseudo-Nitzschia in California Coastal Waters*, 67 HARMFUL ALGAE 36, 36 (2017).

[28] *Id.*

[29] *See* Nicholas A. Bond et al., *Causes and impacts of the 2014 warm anomaly in the NE Pacific*, GEOPHYSICAL RESEARCH LETTERS 42, 3414 (May 5, 2015).

[30] *See* Dr. Raphael Kudela, California Joint Committee on Fisheries and Aquaculture Hearing Testimony (Oct. 4, 2016) (Blob persisted into July 2016, causing late *Pseudo-nitzschia* bloom).

[31] Di Lorenzo & Mantua, *supra* note 3, at 1.

[32] *See* Bond et al., *supra* note 29, at 3414.

[33] "Upwelling" is the phenomenon by which the Northwest winds blowing out of the Gulf of Alaska displace surface water and bring cooler, nutrient-rich water from depth. This annual phenomenon is the principal reason that the California Current ecosystem is among the most productive, diverse marine ecosystems on the planet.

[34] *Id.*

63. With the onset of upwelling came a deluge of nutrients that caused *Pseudo-nitzschia* seed populations to explode in abundance, resulting in a harmful algal bloom unprecedented in its extent and persistence.[35] The sheer biomass and extent of *Pseudo-nitzschia* produced similarly unprecedented concentrations of domoic acid.[36] The toxin entered the marine trophic chain, where it accumulated in crabs feeding on other contaminated organisms. Domoic acid contamination persists in ocean sediments and therefore continues to impact organisms living and feeding on the bottom of the ocean floor ("benthic organisms") long after the toxin-producing algal species have dissipated.[37]

64. In response to testing showing that crabs off the west coast contained domoic acid concentrations greater than FDA's 30-ppm action level, CDFW and ODFW have closed large swaths of those states' coasts to commercial crabbing. ODFW also has imposed additional precautionary measures, such as requiring crabs harvested from areas that had been under a domoic acid-induced closure to be eviscerated (thereby removing the viscera, or guts, which typically contain the highest concentration of domoic acid) before proceeding to the retail market.

65. As the sea surface temperature warming trend continues, domoic acid outbreaks will become a recurring facet of the California Current ecosystem, [38] and will continue to impact commercial fisheries. Indeed, testing in California and Oregon ahead of the 2018–19 commercial Dungeness crab season has shown crabs that exceed the 30-ppm action level. In response, CDFW has already announced the closure of a large section of the California coast from Bodega Head to the Sonoma/Mendocino County line to commercial crabbing at the outset of the 2018–19 season. Continued ocean warming through the 21st century will promote the intensification and

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[35] Ryan M. McCabe et al., *The unprecedented coastwide toxic algal bloom linked to anomalous ocean conditions*, GEOPHYSICAL RESEARCH LETTERS 43, 10,369 (2016); *see also* S. Morgaine McKibben, *Climatic regulation of the neurotoxin domoic acid*, PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES 114, 240 (Jan. 10, 2017).

[36] McCabe et al., *supra* note 35, at 10,372.

[37] *Id.* at 10,371 (citing R.A. Horner et al., *Retention of domoic acid by Pacific Razor Clams, Siliqua patula, Preliminary Study*, 12 JOURNAL OF SHELLFISH RESEARCH 451, 451–56 (1993)).

[38] *Id.* at 10,373; Zhu, *supra* note 27, at 40 (noting that anticipated summertime sea surface temperature increases will correspond with the temperatures observed in the Blob).

redistribution of harmful algal blooms around the world,[39] including *Pseudo-nitzschia* blooms on the west coast.

C. Attribution

66. "Carbon factors" analysis, devised by the International Panel on Climate Change (IPCC), the United Nations International Energy Agency, and the U.S. Environmental Protection Agency, quantifies the amount of CO_2 emissions attributable to a unit of raw fossil fuel extracted from the ground.[40] Emissions factors for oil, coal, liquid natural gas, and natural gas are different for each material but are nevertheless known and quantifiable for each.[41] This analysis accounts for the use of Defendants' fossil fuel products, including non-combustion purposes that sequester CO_2 rather than emit it (e.g., production of asphalt).

67. Defendants' historical and current fossil fuel extraction and production records are publicly available in various fora. These include university and public library collections, company websites, company reports filed with the U.S. Securities and Exchange Commission, company histories, and other sources. The cumulative CO_2 and methane emissions attributable to Defendants' fossil fuel products were calculated by reference to such publicly available documents.

68. While it is possible to distinguish CO_2 derived from fossil fuels from other sources, it is not possible to determine the source of any particular individual molecule of CO_2 in the atmosphere attributable to anthropogenic sources because such greenhouse gas molecules do not bear markers that permit tracing them to their source, and because greenhouse gasses quickly diffuse and comingle in the atmosphere. However, cumulative carbon analysis allows an accurate calculation of net annual CO_2 and methane emissions attributable to each Defendant by quantifying the amount and type of fossil fuels products each Defendant extracted and placed into the stream of commerce, and multiplying those quantities by each fossil fuel product's carbon factor.

[39] *See* Cristopher J. Gobler, et al., *Ocean warming since 1982 has expanded the niche of toxic algal blooms in the North Atlantic and North Pacific oceans*, Proceedings of the National Academy of Sciences (March 23, 2017).

[40] *See* Richard Heede, *Tracing Anthropogenic Carbon Dioxide and Methane Emissions to Fossil Fuel and Cement Producers, 1854–2010*, CLIMATIC CHANGE 122, 232–33 (2014).

[41] *See, e.g., id.*

69. Defendants, through their extraction, promotion, marketing, and sale of their fossil fuel products, caused more than 15% of global fossil fuel product-related CO_2 between 1965 and 2015, with contributions currently continuing unabated. This constitutes a substantial portion of all such emissions in history, and the attendant increase in mean sea surface temperature; increase in frequency and intensity of marine heatwaves, including the Blob; increase in the expanse, persistence, and severity of harmful algal blooms; increase in *Pseudo-nitzschia* toxigenicity; and the associated domoic acid-related injuries.

70. By quantifying CO_2 and methane pollution attributable to Defendants by and through their fossil fuel products, ocean temperature responses to those emissions are also calculable, and can be attributed to Defendants on an individual and aggregate basis. Individually and collectively, Defendants' extraction, sale, and promotion of their fossil fuel products at the extraction, wholesale and retail levels are responsible for substantial increases in ocean temperature, harmful algal blooms, anomalous weather conditions and events, and specifically the domoic acid outbreaks and related injuries endured by Plaintiff, as described herein.

71. Marine outbreaks of domoic acid are climatically regulated.[42] The warmer the ocean conditions, the more likely domoic acid concentrations are to surpass alert thresholds during upwelling season, and the more toxic and/or widespread a domoic acid event has the potential to become.[43]

72. A marine heatwave as massive and warm as the Blob is "extremely rare" without the influence of anthropogenic climate forcing on the atmosphere.[44] Anthropogenic climate forcing has already increased the risk for extreme sea surface temperature events like the Blob by at least a factor of five.[45] Despite the known influence of normal sea surface temperature variability observed in Northeast Pacific on semi-decadal, decadal, and other relatively short timeframes, the Blob was still "significantly attributable to anthropogenic forcing."[46]

[42] McKibben, *supra* note 35, at 239–44.
[43] *Id.* at 243.
[44] Weller et al., *supra* note 26, at S103.
[45] Di Lorenzo & Mantua, *supra* note 3, at 6.
[46] Weller et al., *supra* note 27.

73. But for the Blob, caused by Defendants' actions, the California and Oregon commercial Dungeness crab fisheries would not have been closed as described herein. As ocean warming and circulation anomalies continue and domoic acid outbreaks increase in frequency and severity, such closures will continue to occur and continue to injure Plaintiff and the west coast crab industry.

74. Defendants, through their extraction, promotion, marketing, and sale of their fossil fuel products, caused a substantial portion of both those emissions and the attendant domoic acid outbreaks that forced California and Oregon to close their commercial crab fisheries during each of the last three seasons and will compel them to close the fisheries during future seasons.

75. As explained above, this analysis considers only the volume of raw material actually extracted from the earth by these Defendants. Many of these Defendants actually are responsible for far greater volumes of emissions because they also refine, manufacture, produce, market, promote, and sell more fossil fuel derivatives than they extract themselves by purchasing fossil fuel products extracted by independent third parties.

76. In addition, considering the Defendants' lead role in promoting, marketing, and selling their fossil fuels products between 1965 and 2015; their efforts to conceal the hazards of those products from consumers; their promotion of their fossil fuel products despite knowing the dangers associated with those products; their dogged campaign against regulation of those products based on falsehoods, omissions, and deceptions; and their failure to pursue less hazardous alternatives available to them, Defendants, individually and together, have substantially and measurably contributed to Plaintiff's domoic acid-related injuries.

D. Defendants Went to Great Lengths to Understand the Hazards Associated With and Knew or Should Have Known of the Dangers Associated with the Extraction, Promotion, and Sale of Their Fossil Fuel Products.

77. By 1965, concern about the risks of anthropogenic greenhouse gas emissions reached the highest level of the United States' scientific community. In that year, President Lyndon B. Johnson's Science Advisory Committee Panel on Environmental Pollution reported that by the year 2000, anthropogenic CO_2 emissions would "modify the heat balance of the atmosphere to such an extent that marked changes in climate . . . could occur," and that atmospheric warming

would create an equivalent sea temperature increase that could impact fisheries.[47] President Johnson announced in a special message to Congress that "[t]his generation has altered the composition of the atmosphere on a global scale through . . . a steady increase in carbon dioxide from the burning of fossil fuels."[48]

78. These statements from the Johnson Administration, at a minimum, put Defendants on notice of the potentially substantial dangers to people, communities, and the planet associated with unabated use of their fossil fuel products. Moreover, Defendants had amassed a considerable body of knowledge on the subject through their own independent efforts.

79. A 1963 Conservation Foundation report on a conference of scientists referenced in the 1966 World Book Encyclopedia, as well as in presidential panel reports and other sources around that time, described many specific consequences of rising greenhouse gas pollution in the atmosphere. It warned that

> a continuing rise in the amount of atmospheric carbon dioxide is likely to be accompanied by a significant warming of the surface of the earth which by melting the polar ice caps would raise sea level and by warming the oceans would change considerably the distributions of marine species including commercial fisheries.

It warned of the possibility of "wiping out the world's present commercial fisheries." The report, in fact, noted that "the changes in marine life in the North Atlantic which accompanied the temperature change have been very noticeable."[49]

80. In 1968, a Stanford Research Institute (SRI) report commissioned by the American Petroleum Institute ("API") and made available to all of its members, concluded, among other things:

[47] President's Science Advisory Committee, *Restoring the Quality of Our Environment: Report of the Environmental Pollution Panel*, at 9, 123–24 (Nov. 1965), https://hdl.handle.net/2027/uc1.b4315678.

[48] President Lyndon B. Johnson, *Special Message to Congress on Conservation and Restoration of Natural Beauty* (Feb. 8, 1965), http://acsc.lib.udel.edu/items/show/292.

[49] The Conservation Foundation, *Implications of Rising Carbon Dioxide Content of the Atmosphere: A statement of trends and implications of carbon dioxide research reviewed at a conference of scientists* (Mar. 1963), https://babel.hathitrust.org/cgi/pt?id=mdp.39015004619030;view=1up;seq=5.

> If the Earth's temperature increases significantly, a number of events might be expected to occur including the melting of the Antarctic ice cap, a rise in sea levels, warming of the oceans and an increase in photosynthesis. . . .
>
> It is clear that we are unsure as to what our long-lived pollutants are doing to our environment; however, there seems to be no doubt that the potential damage to our environment could be severe. . . .[T]he prospect for the future must be of serious concern.[50]

81. In a supplement to the 1968 report prepared for API in 1969, authors Robinson and Robbins projected that based on current fuel usage, atmospheric CO_2 concentrations would reach 370 ppm by 2000—almost exactly what it turned out to be (369.34 ppm, according to data from NASA).[51] The report also drew the connection between rising atmospheric CO_2 concentrations and the use of fossil fuels, stating that "balance between environmental sources and sinks has been disturbed by the emission to the atmosphere of additional CO_2 from the increased combustion of carbonaceous fuels" and that it seemed "unlikely that the observed rise in atmospheric CO_2 has been due to changes in the biosphere." The authors warn repeatedly of the temptations and consequences of ignoring CO_2 as a problem and pollutant:

> CO_2 is so common and such an integral part of all our activities that air pollution regulations typically state that CO_2 emissions are not to be considered as pollutants. This is perhaps fortunate for our present mode of living, centered as it is around carbon combustion. However, this seeming necessity, the CO_2 emission, is the only air pollutant, as we shall see, that has been shown to be of global importance as a factor that could change man's environment on the basis of a long period of scientific investigation.[52]

82. In 1969, Shell memorialized an ongoing, 18-month project to collect ocean data from oil platforms to develop and calibrate environmental forecasting theories related to predicting wave, wind, storm, sea level, and current changes and trends.[53] Several Defendants and/or their predecessors participated in the project, including Esso Production Research Company (Exxon), Mobil Research and Development Company (Exxon), Pan American Petroleum Corporation (BP),

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[50] Elmer Robinson & R.C. Robbins, *Sources, Abundance, and Fate of Gaseous Atmospheric Pollutants*, Stanford Research Institute (Feb. 1968), https://www.smokeandfumes.org/documents/document16.

[51] "Global Mean CO_2 Mixing Ratios (ppm): Observations," NASA Goddard Institute for Space Studies, https://data.giss.nasa.gov/modelforce/ghgases/Fig1A.ext.txt (webpage) (accessed June 16, 2018).

[52] Elmer Robinson & R.C. Robbins, *Sources, Abundance, and Fate of Gaseous Atmospheric Pollutants Supplement*, Stanford Research Institute (June 1969).

[53] M.M. Patterson, *An Ocean Data Gathering Program for the Gulf of Mexico*, Society of Petroleum Engineers (1969), https://www.onepetro.org/conference-paper/SPE-2638-MS.

Gulf Oil Corporation (Chevron), Texaco Inc. (Chevron), and the Chevron Oil Field Research Company.

83. In a 1970 report by H.R. Holland from the Engineering Division of Imperial Oil (Exxon), he stated: "Since pollution means disaster to the affected species, the only satisfactory course of action is to prevent it—to maintain the addition of foreign matter at such levels that it can be diluted, assimilated or destroyed by natural processes—to protect man's environment from man." He also noted that "a problem of such size, complexity and importance cannot be dealt with on a voluntary basis." CO_2 was listed as an air pollutant in the document.[54]

84. In 1972, API members, including Defendants, received a status report on all environmental research projects funded by API. The report summarized the 1968 SRI report describing the impact of Defendants' fossil fuel products on the environment, including global surface and ocean warming. Industry participants who received this report include: American Standard of Indiana (BP), Asiatic (Shell), Ashland (Marathon), Atlantic Richfield (BP), British Petroleum (BP), Chevron Standard of California (Chevron), Cities Service (Citgo), Continental (ConocoPhillips), Dupont (former owner of Conoco), Esso Research (Exxon), Ethyl (formerly affiliated with Esso, which was subsumed by Exxon Mobil), Getty (Exxon), Gulf (Chevron, among others), Humble Standard of New Jersey (Exxon/Chevron/BP), Marathon, Mobil (Exxon), Pan American (BP), Phillips (ConocoPhillips), Shell, Standard of Ohio (BP), Texaco (Chevron), Union (Chevron), Edison Electric Institute (representing electric utilities), Bituminous Coal Research (coal industry research group), Mid-Continent Oil & Gas Association (presently the U.S. Oil & Gas Association, a national trade association), Western Oil & Gas Association, National Petroleum Refiners Association (presently the American Fuel and Petrochemical Manufacturers Association, a national trade association), Champlin (Anadarko), Skelly (Exxon), Colonial Pipeline (ownership has included BP, Citgo, Exxon, ConocoPhillips, Chevron entities, among others) and Caltex (Chevron), among others.[55]

[54] H.R. Holland, "Pollution is Everybody's Business," Imperial Oil (1970), https://www.desmogblog.com/sites/beta.desmogblog.com/files/DeSmogBlog-Imperial%20Oil%20Archive-Pollution-Everyone-Business-1970.pdf.

[55] American Petroleum Institute, *Environmental Research, A Status Report*, Committee for Air and Water Conservation (Jan. 1972), *available at* http://files.eric.ed.gov/fulltext/ED066339.pdf.

85. In a 1977 presentation and again in a 1978 briefing, Exxon scientists warned the Exxon Corporation Management Committee that CO_2 concentrations were building in Earth's atmosphere at an increasing rate, that CO_2 emissions attributable to fossil fuels were retained in the atmosphere, and that CO_2 was contributing to global warming.[56] The report stated:

> There is general scientific agreement that the most likely manner in which mankind is influencing the global climate is through carbon dioxide release from the burning of fossil fuels . . . [and that] Man has a time window of five to ten years before the need for hard decisions regarding changes in energy strategies might become critical.[57]

The report concluded that "doubling in CO_2 could increase average global temperature 1°C to 3°C by 2050 A.D. (10°C predicted at poles)."[58]

86. Thereafter, Exxon engaged in a research program to study the environmental fate of fossil fuel-derived greenhouse gases and their impacts, which included publication of peer-reviewed research by Exxon staff scientists and the conversion of a supertanker into a research vessel to study the greenhouse effect and the role of the oceans in absorbing anthropogenic CO_2. Much of this research was communicated in a variety of industry fora, symposia, and papers shared through trade associations and directly with other Defendants.

87. Exxon scientists made the case internally for using company resources to build corporate knowledge about the impacts of the promotion, marketing, and consumption of Defendants' fossil fuel products. Exxon climate researcher Henry Shaw wrote in 1978: "The rationale for Exxon's involvement and commitment of funds and personnel is based on our need to assess the possible impact of the greenhouse effect on Exxon business. Exxon must develop a credible scientific team that can critically evaluate the information generated on the subject and be able to carry bad news, if any, to the corporation."[59] Moreover, Shaw emphasized the need to

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[56] Memo from J.F. Black to F.G. Turpin, *The Greenhouse Effect*, Exxon Research and Engineering Co. (June 6, 1978), http://www.climatefiles.com/exxonmobil/1978-exxon-memo-on-greenhouse-effect-for-exxon-corporation-management-committee.

[57] *Id.*

[58] *Id.*

[59] Memo from Henry Shaw to Edward David Jr., *The "Greenhouse Effect,"* Exxon Research and Engineering Company (Dec. 7, 1978), http://insideclimatenews.org/sites/default/files/documents/Credible%20Scientific%20Team%201978%20Letter.pdf.

collaborate with universities and government to more completely understand what he called the "CO_2 problem."[60]

88. In 1979, API and its members, including Defendants, convened a Task Force to monitor and share cutting edge climate research among the oil industry. The group was initially called the CO_2 and Climate Task Force, but changed its name to the Climate and Energy Task Force in 1980 (hereinafter referred to as "API CO_2 Task Force"). Membership included senior scientists and engineers from nearly every major U.S. and multinational oil and gas company, including Exxon, Mobil (Exxon), Amoco (BP), Phillips (ConocoPhillips), Texaco (Chevron), Shell, Sunoco, Sohio (BP) as well as Standard Oil of California (BP) and Gulf Oil (Chevron, among others). The Task Force was charged with assessing the implications of emerging science on the petroleum and gas industries and identifying where reductions in greenhouse gas emissions from Defendants' fossil fuel products could be made.[61]

89. In 1979, API sent its members a background memo related to the API CO_2 and Climate Task Force's efforts, stating that CO_2 concentrations were rising steadily in the atmosphere, and predicting when the first clear effects of climate change might be felt.[62]

90. Also in 1979, Exxon scientists advocated internally for additional fossil fuel industry-generated research in light of the growing consensus that consumption of fossil fuel products was changing the planet's climate:

> "We should determine how Exxon can best participate in all these [atmospheric science research] areas and influence possible legislation on environmental controls. It is important to begin to anticipate the strong intervention of environmental groups and be prepared to respond with reliable and credible data. It behooves [Exxon] to start a very aggressive defensive program in the indicated areas of atmospheric science and climate because there is a good probability that legislation affecting our business will be passed. Clearly, it is in our interest for such legislation to be based on hard scientific data. The data obtained from research

[60] *Id.*

[61] American Petroleum Institute, *AQ-9 Task Force Meeting Minutes* (Mar. 18, 1980), http://insideclimatenews.org/sites/default/files/documents/AQ-9%20Task%20Force%20Meeting%20%281980%29.pdf (AQ-9 refers to the "CO_2 and Climate" Task Force).

[62] Neela Banerjee, *Exxon's Oil Industry Peers Knew About Climate Dangers in the 1970s, Too*, INSIDE CLIMATE NEWS (Dec. 22, 2015), https://insideclimatenews.org/news/22122015/exxon-mobil-oil-industry-peers-knew-about-climate-change-dangers-1970s-american-petroleum-institute-api-shell-chevron-texaco.

> on the global damage from pollution, e.g., from coal combustion, will give us the needed focus for further research to avoid or control such pollutants."[63]

91. That same year, Exxon Research and Engineering reported that: "The most widely held theory [about increasing CO_2 concentration] is that the increase is due to fossil fuel combustion, increasing CO_2 concentration will cause a warming of the earth's surface, and the present trend of fossil fuel consumption will cause dramatic environmental effects before the year 2050."[64] According to the report, "ecological consequences of increased CO_2" to 500 ppm (1.7 times 1850 levels) could mean that "marine life would be markedly changed;" and, by way of example, that "maintaining runs of salmon and steelhead and other subarctic species in the Columbia River system would become increasingly difficult."[65] With a doubling of the 1860 CO_2 concentration, "ocean levels would rise four feet" and "the Arctic Ocean would be ice free for at least six months each year, causing major shifts in weather patterns in the northern hemisphere."[66]

92. Further, the report stated that unless fossil fuel use was constrained, there would be "noticeable temperature changes" associated with an increase in atmospheric CO_2 from about 280 parts per million before the Industrial Revolution to 400 parts per million by the year 2010.[67] Those projections proved remarkably accurate—atmospheric CO_2 concentrations surpassed 400 parts per million in May 2013, for the first time in millions of years.[68] In 2015, the annual average CO_2 concentration rose above 400 parts per million, and in 2016 the annual low surpassed 400 parts per million, meaning atmospheric CO_2 concentration remained above that threshold all year.[69]

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[63] Henry Shaw, *Exxon Memo to H.N. Weinberg about "Research in Atmospheric Science"*, Exxon Inter-Office Correspondence (Nov. 19, 1979), https://insideclimatenews.org/sites/default/files/documents/Probable%20Legislation%20Memo%20(1979).pdf.

[64] W.L. Ferrall, *Exxon Memo to R.L. Hirsch about "Controlling Atmospheric CO_2"*, Exxon Research and Engineering Co. (Oct. 16, 1979), http://insideclimatenews.org/sites/default/files/documents/CO2%20and%20Fuel%20Use%20Projections.pdf.

[65] *Id.*

[66] *Id.*

[67] *Id.*

[68] Nicola Jones, *How the World Passed a Carbon Threshold and Why it Matters*, YALE ENVIRONMENT 360 (Jan. 26, 2017), http://e360.yale.edu/features/how-the-world-passed-a-carbon-threshold-400ppm-and-why-it-matters.

[69] *Id.*

93. In 1980, API's CO_2 Task Force members discussed the oil industry's responsibility to reduce CO_2 emissions by changing refining processes and developing fuels that emit less CO_2. The minutes from the Task Force's February 29, 1980, meeting included a summary of a presentation on "The CO_2 Problem" given by Dr. John Laurmann, which identified the "scientific consensus on the potential for large future climatic response to increased CO2 levels" as a reason for API members to have concern with the "CO_2 problem" and informed attendees that there was "strong empirical evidence that rise [in CO_2 concentration was] caused by anthropogenic release of CO_2, mainly from fossil fuel combustion."[70] Moreover, Dr. Laurmann warned that the amount of CO_2 in the atmosphere could double by 2038, which he said would likely lead to a 2.5° C (4.5º F) rise in global average temperatures with "major economic consequences." He then told the Task Force that models showed a 5°C (9º F) rise by 2067, with "globally catastrophic effects."[71] A taskforce member and representative of Texaco leadership present at the meeting posited that the API CO_2 Task Force should develop ground rules for energy release of fuels and the cleanup of fuels as they relate to CO_2 creation.

94. In 1980, the API CO_2 Task Force also discussed a potential area for investigation: alternative energy sources as a means of mitigating CO_2 emissions from Defendants' fossil fuel products. These efforts called for research and development to "Investigate the Market Penetration Requirements of Introducing a New Energy Source into World Wide Use." Such investigation was to include the technical implications of energy source changeover, research timing, and requirements.[72]

95. By 1980, Exxon's senior leadership had become intimately familiar with the greenhouse effect and the role of CO_2 in the atmosphere. In that year, Exxon Senior Vice President and Board member George Piercy questioned Exxon researchers on the minutiae of the ocean's role in absorbing atmospheric CO_2, including whether there was a net CO_2 flux out of the ocean

[70] American Petroleum Institute, *AQ-9 Task Force Meeting Minutes*, *supra* note 59 (AQ-9 refers to the "CO_2 and Climate" Task Force).

[71] *Id.*

[72] *Id.*

into the atmosphere in certain zones where upwelling of cold water to the surface occurs, because Piercy evidently believed that the oceans could absorb and retain higher concentrations of CO_2 than the atmosphere.[73] This inquiry aligns with Exxon supertanker research into whether the ocean would act as a significant CO_2 sink that would sequester atmospheric CO_2 long enough to allow unabated emissions without triggering dire climatic consequences. As described below, Exxon eventually scrapped this research before it produced sufficient data to derive a conclusion.[74]

96. Also in 1980, Imperial Oil (Exxon) reported to Esso and Exxon managers and environmental staff that increases in fossil fuel usage aggravates CO_2 in the atmosphere. Noting that the United Nations was encouraging research into the carbon cycle, Imperial reported that "[t]echnology exists to remove CO_2 from [fossil fuel power plant] stack gases but removal of only 50% of the CO_2 would double the cost of power generation."

97. Exxon scientist Roger Cohen warned his colleagues in a 1981 internal memorandum that "future developments in global data gathering and analysis, along with advances in climate modeling, may provide strong evidence for a delayed CO_2 effect of a truly substantial magnitude," and that under certain circumstances it would be "very likely that we will unambiguously recognize the threat by the year 2000."[75] Cohen had expressed concern that the memorandum mischaracterized potential effects of unabated CO_2 emissions from Defendants' fossil fuel products: "[I]t is distinctly possible that the . . . [Exxon Planning Division's] scenario will produce effects which will indeed be catastrophic (at least for a substantial fraction of the world's population)."[76]

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[73] Neela Banerjee, *More Exxon Documents Show How Much It Knew About Climate 35 Years Ago*, INSIDE CLIMATE NEWS (Dec. 1, 2015), https://insideclimatenews.org/news/01122015/documents-exxons-early-co2-position-senior-executives-engage-and-warming-forecast.

[74] Neela Banerjee et al., *Exxon Believed Deep Dive Into Climate Research Would Protect Its Business*, INSIDE CLIMATE NEWS (Sept. 17, 2015), https://insideclimatenews.org/news/16092015/exxon-believed-deep-dive-into-climate-research-would-protect-its-business.

[75] Roger W. Cohen, *Exxon Memo to W. Glass about possible "catastrophic" effect of CO_2*, Exxon Inter-Office Correspondence (Aug. 18, 1981), http://www.climatefiles.com/exxonmobil/1981-exxon-memo-on-possible-emission-consequences-of-fossil-fuel-consumption.

[76] *Id.*

98. In 1981, Exxon's Henry Shaw, the company's lead climate researcher at the time, prepared a summary of Exxon's current position on the greenhouse effect for Edward David Jr., president of Exxon Research and Engineering, stating in relevant part:

- "Atmospheric CO_2 will double in 100 years if fossil fuels grow at 1.4%/ a^2.
- 3^oC global average temperature rise and 10^oC at poles if CO_2 doubles.
  - Major shifts in rainfall/agriculture
  - Polar ice may melt"[77]

99. In 1982, another report prepared for API by scientists at the Lamont-Doherty Geological Observatory at Columbia University recognized that atmospheric CO_2 concentration had risen significantly compared to the beginning of the industrial revolution from about 290 parts per million to about 340 parts per million in 1981 and acknowledged that despite differences in climate modelers' predictions, all models indicated a temperature increase caused by anthropogenic CO_2 within a global mean range of 4º C (7.2° F). The report advised that there was scientific consensus that "a doubling of atmospheric CO_2 from [] pre-industrial revolution value would result in an average global temperature rise of (3.0 ± 1.5)°C [5.4 ± 2.7° F]." It went further, warning that "[s]uch a warming can have serious consequences for man's comfort and survival since patterns of aridity and rainfall can change, the height of the sea level can increase considerably and the world food supply can be affected."[78] Exxon's own modeling research confirmed this, and the company's results were later published in at least three peer-reviewed scientific papers.[79]

100. Also in 1982, Exxon's Environmental Affairs Manager distributed a primer on climate change to a "wide circulation [of] Exxon management . . . intended to familiarize Exxon

[77] Henry Shaw, *Exxon Memo to E. E. David, Jr. about "CO_2Position Statement"*, Exxon Inter-Office Correspondence (May 15, 1981), https://insideclimatenews.org/sites/default/files/documents/Exxon%20Position%20on%20CO2%20%281981%29.pdf.

[78] American Petroleum Institute, *Climate Models and CO_2 Warming: A Selective Review and Summary*, Lamont-Doherty Geological Observatory (Columbia University) (Mar. 1982), https://assets.documentcloud.org/documents/2805626/1982-API-Climate-Models-and-CO2-Warming-a.pdf.

[79] *See* Roger W. Cohen, *Exxon Memo summarizing findings of research in climate modeling*, Exxon Research and Engineering Co. (Sept. 2, 1982), https://insideclimatenews.org/sites/default/files/documents/%2522Consensus%2522%20on%20CO2%20Impacts%20(1982).pdf (discussing research articles).

personnel with the subject."[80] The primer also was "restricted to Exxon personnel and not to be distributed externally."[81] The primer compiled science on climate change available at the time, and confirmed fossil fuel combustion as a primary anthropogenic contributor to global warming. The report estimated a CO_2 doubling around 2090 based on Exxon's long-range modeled outlook. The author warned that "there are some potentially catastrophic events that must be considered," including increased sea surface temperatures, and the loss of Antarctic ice sheets.[82] It noted that some scientific groups were concerned "that once the effects are measurable, they might not be reversible."[83]

101. In a summary of Exxon's climate modeling research from 1982, Director of Exxon's Theoretical and Mathematical Sciences Laboratory Roger Cohen wrote that "the time required for doubling of atmospheric CO_2 depends on future world consumption of fossil fuels." Cohen concluded that Exxon's own results were "consistent with the published predictions of more complex climate models" and "in accord with the scientific consensus on the effect of increased atmospheric CO_2 on climate."[84]

102. At the fourth biennial Maurice Ewing Symposium at the Lamont-Doherty Geophysical Observatory in October 1982, attended by members of API, Exxon Research and Engineering Company president E.E. David delivered a speech titled: "Inventing the Future: Energy and the CO_2 'Greenhouse Effect.'"[85] His remarks included the following statement: "[F]ew people doubt that the world has entered an energy transition away from dependence upon fossil fuels and toward some mix of renewable resources that will not pose problems of CO_2 accumulation." He went on, discussing the human opportunity to address anthropogenic climate change before the point of no return:

[80] M. B. Glaser, *Exxon Memo to Management about "CO_2 'Greenhouse' Effect"*, Exxon Research and Engineering Co. (Nov. 12, 1982), http://insideclimatenews.org/sites/default/files/documents/1982%20Exxon%20Primer%20on%20CO2%20Greenhouse%20Effect.pdf.

[81] *Id.*

[82] *Id.*

[83] *Id.*

[84] Cohen, *Exxon Memo summarizing findings of research in climate modeling*, *supra* note 77.

[85] E. E. David, Jr., *Inventing the Future: Energy and the CO_2 Greenhouse Effect: Remarks at the Fourth Annual Ewing Symposium, Tenafly, NJ* (1982), *available at* http://sites.agu.org/publications/files/2015/09/ch1.pdf.

> It is ironic that the biggest uncertainties about the CO_2 buildup are not in predicting what the climate will do, but in predicting what people will do. . . .[It] appears we still have time to generate the wealth and knowledge we will need to invent the transition to a stable energy system.

103. Throughout the early 1980s, at Exxon's direction, Exxon climate scientist Henry Shaw forecasted emissions of CO_2 from fossil fuel use. Those estimates were incorporated into Exxon's 21st century energy projections and were distributed among Exxon's various divisions. Shaw's conclusions included an expectation that atmospheric CO_2 concentrations would double in 2090 per the Exxon model, with an attendant 2.3–5.6º F average global temperature increase. Shaw compared his model results to those of the U.S. EPA, the National Academy of Sciences, and the Massachusetts Institute of Technology, indicating that the Exxon model predicted a longer delay than any of the other models, although its temperature increase prediction was in the mid-range of the four projections.[86]

104. During the 1980s, many Defendants formed their own research units focused on climate modeling. The API, including the API CO_2 Task Force, provided a forum for Defendants to share their research efforts and corroborate their findings related to anthropogenic greenhouse gas emissions.[87]

105. During this time, Defendants' statements express an understanding of their obligation to consider and mitigate the externalities of unabated promotion, marketing, and sale of their fossil fuel products. For example, in 1988, Richard Tucker, the president of Mobil Oil, presented at the American Institute of Chemical Engineers National Meeting, the premier educational forum for chemical engineers, where he stated:

> [H]umanity, which has created the industrial system that has transformed civilities, is also responsible for the environment, which sometimes is at risk because of unintended consequences of industrialization. . . . Maintaining the health of this life-support system is emerging as one of the highest priorities. . . .[W]e must all be environmentalists.
>
> The environmental covenant requires action on many fronts…the low-atmosphere ozone problem, the upper-atmosphere ozone problem and the greenhouse effect, to

[86] Banerjee, More Exxon Documents Show How Much It Knew About Climate 35 Years Ago, *supra* note 77.

[87] Banerjee, *Exxon's Oil Industry Peers Knew About Climate Dangers in the 1970s, Too*, *supra* note 620.

> name a few. . . .Our strategy must be to reduce pollution before it is ever generated – to prevent problems at the source.
>
> Prevention means engineering a new generation of fuels, lubricants and chemical products…. Prevention means designing catalysts and processes that minimize or eliminate the production of unwanted byproducts. . . .Prevention on a global scale may even require a dramatic reduction in our dependence on fossil fuels—and a shift towards solar, hydrogen, and safe nuclear power. It may be possible that—just possible—that the energy industry will transform itself so completely that observers will declare it a new industry. . . .Brute force, low-tech responses and money alone won't meet the challenges we face in the energy industry.[88]

106. Also in 1988, the Shell Greenhouse Effect Working Group issued a confidential internal report, "The Greenhouse Effect," which acknowledged global warming's anthropogenic nature: "Man-made carbon dioxide released into and accumulated in the atmosphere is believed to warm the earth through the so-called greenhouse effect." The authors also noted the burning of fossil fuel as a primary driver of CO_2 buildup and warned that ocean warming would impact marine species populations and that "shifts in ranges and migration patterns could result in local losses of food source revenues, and could require [fishing] operations in other (more distant) grounds."[89]

107. Similar to early warnings by Exxon scientists, the Shell report notes that "by the time the global warming becomes detectable it could be too late to take effective countermeasures to reduce the effects or even to stabilize the situation." The authors mention the need to consider policy changes on multiple occasions, noting that "the potential implications for the world are…so large that policy options need to be considered much earlier" and that research should be "directed more to the analysis of policy and energy options than to studies of what we will be facing exactly."[90]

108. In 1991, Shell produced a film called "Climate of Concern." The film advises that while "no two [climate change projection] scenarios fully agree…[they] have each prompted the same serious warning. A warning endorsed by a uniquely broad consensus of scientists in their

[88] Richard E. Tucker, *High Tech Frontiers in the Energy Industry: The Challenge Ahead*, AIChE National Meeting (Nov. 30, 1988), *available at* https://hdl.handle.net/2027/pur1.32754074119482?urlappend=%3Bseq=522.

[89] Shell Internationale Petroleum Greenhouse Effect Working Group, *The Greenhouse Effect* (May 30, 1988), https://www.documentcloud.org/documents/4411090-Document3.html#document/p9/a411239.

[90] *Id.*

report to the UN at the end of 1990." The video concludes with a stark admonition: "Global warming is not yet certain, but many think that the wait for final proof would be irresponsible. Action now is seen as the only safe insurance."[91]

109. The fossil fuel industry, including Defendants, was at the forefront of carbon dioxide research for much of the latter half of the 20th century. They developed cutting edge and innovative technology and worked with many of the field's top researchers to produce exceptionally sophisticated studies and models. For instance, in the mid-nineties Shell began using scenarios to plan how the company could respond to various global forces in the future. In one scenario published in a 1998 internal report, Shell paints an eerily prescient scene:

> In 2010, a series of violent storms causes extensive damage to the eastern coast of the U.S. Although it is not clear whether the storms are caused by climate change, people are not willing to take further chances. The insurance industry refuses to accept liability, setting off a fierce debate over who is liable: the insurance industry or the government. After all, two successive IPCC reports since 1995 have reinforced the human connection to climate change….Following the storms, a coalition of environmental NGOs brings a class-action suit against the US government and fossil-fuel companies on the grounds of neglecting what scientists (including their own) have been saying for years: that something must be done. A social reaction to the use of fossil fuels grows, and individuals become 'vigilante environmentalists' in the same way, a generation earlier, they had become fiercely anti-tobacco. Direct-action campaigns against companies escalate. Young consumers, especially, demand action.[92]

110. Climate change research conducted by Defendants and their industry associations frequently acknowledged uncertainties in their climate modeling—those uncertainties, however, were merely with respect to the magnitude and timing of climate impacts resulting from fossil fuel consumption, not that significant changes would eventually occur. The Defendants' researchers and the researchers at their industry associations harbored little doubt that climate change was occurring and that fossil fuel products were, and are, the primary cause.

111. Despite the overwhelming information about the threats to people and the planet posed by continued unabated use of their fossil fuel products, Defendants failed to act as they

[91] Jelmer Mommers, *Shell made a film about climate change in 1991 (then neglected to heed its own warning)*, DE CORRESPONDENT (Feb. 27, 2017), https://thecorrespondent.com/6285/shell-made-a-film-about-climate-change-in-1991-then-neglected-to-heed-its-own-warning/692663565-875331f6.

[92] Royal Dutch/Shell Group, *Group Scenarios 1998–2020*, 115 (1998), http://www.documentcloud.org/documents/4430277-27-1-Compiled.html.

reasonably should have to mitigate or avoid those dire adverse impacts. Defendants instead adopted the position, as described below, that the absence of meaningful regulations on the consumption of their fossil fuel products was the equivalent of a social license to continue the unfettered pursuit of profits from those products. This position was an abdication of Defendants' responsibility to consumers and the public, including Plaintiff, to act on their unique knowledge of the reasonably foreseeable hazards of unabated production and consumption of their fossil fuel products.

E. Defendants Did Not Disclose Known Harms Associated with the Extraction, Promotion, and Consumption of Their Fossil Fuel Products and Instead Affirmatively Acted to Obscure Those Harms and Engaged in a Concerted Campaign to Evade Regulation.

112. By 1988, Defendants had amassed a compelling body of knowledge about the role of anthropogenic greenhouse gases, and specifically those emitted from the normal use of Defendants' fossil fuel products, in causing global warming, increased mean sea surface temperature, marine heatwaves, harmful algal blooms, and the attendant consequences for human communities and the environment. On notice that their products were causing global climate change and dire effects on the planet, Defendants were faced with the decision of whether to take steps to limit the damages their fossil fuel products were causing and would continue to cause for virtually every one of Earth's inhabitants, including Plaintiff.

113. Defendants at any time before or thereafter could and should reasonably have taken any of a number of steps to mitigate the damages caused by their fossil fuel products, and their own comments reveal an awareness of what some of these steps may have been. Defendants should have made reasonable warnings to consumers, the public, and regulators of the dangers known to them of the unabated consumption of their fossil fuel products, and they should have taken reasonable steps to limit the potential greenhouse gas emissions arising out of those products.

114. But several key events during the period 1988–1992 appear to have prompted Defendants to change their tactics from general research and internal discussion on climate change to a public campaign aimed at evading regulation of their fossil fuel products and/or emissions therefrom. These include:

a. In 1988, National Aeronautics and Space Administration ("NASA") scientists confirmed that human activities were actually contributing to global warming.[93] On June 23 of that year, NASA scientist James Hansen's presentation of this information to Congress engendered significant news coverage and publicity for the announcement, including coverage on the front page of the New York Times.

b. On July 28, 1988, Senator Robert Stafford and four bipartisan co-sponsors introduced S. 2666, "The Global Environmental Protection Act," to regulate CO_2 and other greenhouse gases. Four more bipartisan bills to significantly reduce CO_2 pollution were introduced over the following ten weeks, and in August, U.S. Presidential candidate George H.W. Bush pledged that his presidency would "combat the greenhouse effect with the White House effect."[94] Political will in the United States to reduce anthropogenic greenhouse gas emissions and mitigate the harms associated with Defendants' fossil fuel products was gaining momentum.

c. In December 1988, the United Nations formed the Intergovernmental Panel on Climate Change ("IPCC"), a scientific panel dedicated to providing the world's governments with an objective, scientific analysis of climate change and its environmental, political, and economic impacts.

d. In 1990, the IPCC published its First Assessment Report on anthropogenic climate change,[95] in which it concluded that (1) "there is a natural greenhouse effect which already keeps the Earth warmer than it would otherwise be," and (2) that

> emissions resulting from human activities are substantially increasing the atmospheric concentrations of the greenhouse gases carbon dioxide, methane, chlorofluorocarbons (CFCs)

[93] *See* Frumhoff et al., *The Climate Responsibilities of Industrial Carbon Producers*, *supra* note 211.

[94] N.Y. TIMES, *The White House and the Greenhouse* (May 9, 1998), http://www.nytimes.com/1989/05/09/opinion/the-white-house-and-the-greenhouse.html.

[95] *See* IPCC, *Reports*, http://www.ipcc.ch/publications_and_data/publications_and_data_reports.shtml.

> and nitrous oxide. These increases will enhance the greenhouse effect, resulting on average in an additional warming of the Earth's surface. The main greenhouse gas, water vapour, will increase in response to global warming and further enhance it.[96]

The IPCC reconfirmed these conclusions in a 1992 supplement to the First Assessment Report.[97]

e. The United Nations began preparation for the 1992 Earth Summit in Rio de Janeiro, Brazil, a major, newsworthy gathering of 172 world governments, of which 116 sent their heads of state. The Summit resulted in the United Nations Framework Convention on Climate Change ("UNFCCC"), an international environmental treaty providing protocols for future negotiations aimed at "stabiliz[ing] greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system."[98]

115. These world events marked a shift in public discussion of climate change, and the initiation of international efforts to curb anthropogenic greenhouse emissions—developments that had stark implications for, and would have diminished the profitability of, Defendants' fossil fuel products.

116. But rather than collaborating with the international community by acting to forestall, or at least decrease, their fossil fuel products' contributions to global warming, increased mean sea surface temperature, marine heatwaves, harmful algal blooms, and marine toxin outbreaks, and consequent injuries to Plaintiff, Defendants embarked on a decades-long campaign designed to maximize continued dependence on their products and undermine national and international efforts to rein in greenhouse gas emissions.

[96] IPCC, *Climate Change: The IPCC Scientific Assessment*, "Policymakers Summary" (1990), http://www.ipcc.ch/ipccreports/far/wg_I/ipcc_far_wg_I_spm.pdf.

[97] IPCC, *1992 Supplement to the First Assessment Report* (1992), http://www.ipcc.ch/publications_and_data/publications_ipcc_90_92_assessments_far.shtml.

[98] United Nations, *United Nations Framework Convention on Climate Change*, Article 2 (1992), https://unfccc.int/resource/docs/convkp/conveng.pdf.

117. Defendants' campaign, which focused on concealing, discrediting, and/or misrepresenting information that tended to support restricting consumption of (and thereby decreasing demand for) Defendants' fossil fuel products, took several forms. The campaign enabled Defendants to accelerate their business practice of exploiting fossil fuel reserves, and concurrently externalize the social and environmental costs of their fossil fuel products. These activities stood in direct contradiction to Defendants' own prior recognition that the science of anthropogenic climate change was clear and that the greatest uncertainties involved responsive human behavior, not scientific understanding of the issue.

118. Defendants took affirmative steps to conceal, from Plaintiff and the general public, the foreseeable impacts of the use of their fossil fuel products on Earth's climate and associated harms to people and communities. Defendants embarked on a concerted public relations campaign to cast doubt on the science connecting global climate change to fossil fuel products and greenhouse gas emissions, in order to influence public perception of the existence of anthropogenic global warming. The effort included promoting their hazardous products through advertising campaigns and the initiation and funding of climate change denialist organizations, designed to influence consumers to continue using Defendants' fossil fuel products irrespective of those products' damage to communities and the environment.

119. For example, in 1988, Joseph Carlson, an Exxon public affairs manager, described the "Exxon Position," which included among others, two important messaging tenets: (1) "[e]mphasize the uncertainty in scientific conclusions regarding the potential enhanced Greenhouse Effect;" and (2) "[r]esist the overstatement and sensationalization [sic] of potential greenhouse effect which could lead to noneconomic development of non-fossil fuel resources."[99]

120. A 1994 Shell report entitled "The Enhanced Greenhouse Effect: A Review of the Scientific Aspects" by Royal Dutch Shell environmental advisor Peter Langcake stands in stark contrast to the company's 1988 report on the same topic. Whereas before, the authors recommended consideration of policy solutions early on, Langcake warned of the potentially

[99]Joseph M. Carlson, *Exxon Memo on "The Greenhouse Effect"* (Aug. 3, 1988), https://assets.documentcloud.org/documents/3024180/1998-Exxon-Memo-on-the-Greenhouse-Effect.pdf.

dramatic "economic effects of ill-advised policy measures." While the report recognized the IPCC conclusions as the mainstream view, Langcake still emphasized scientific uncertainty, noting, for example, that "the postulated link between any observed temperature rise and human activities has to be seen in relation to natural variability, which is still largely unpredictable." The Group position is stated clearly in the report: "Scientific uncertainty and the evolution of energy systems indicate that policies to curb greenhouse gas emissions beyond 'no regrets' measures could be premature, divert resources from more pressing needs and further distort markets."[100]

121. In 1991, for example, the Information Council for the Environment ("ICE"), whose members included affiliates, predecessors and/or subsidiaries of Defendants, including Pittsburg and Midway Coal Mining (Chevron), and Island Creek Coal Company (Occidental), launched a national climate change science denial campaign with full-page newspaper ads, radio commercials, a public relations tour schedule, "mailers," and research tools to measure campaign success. Included among the campaign strategies was to "reposition global warming as theory (not fact)." Its target audience included older less-educated males who are "predisposed to favor the ICE agenda, and likely to be even more supportive of that agenda following exposure to new information."[101]

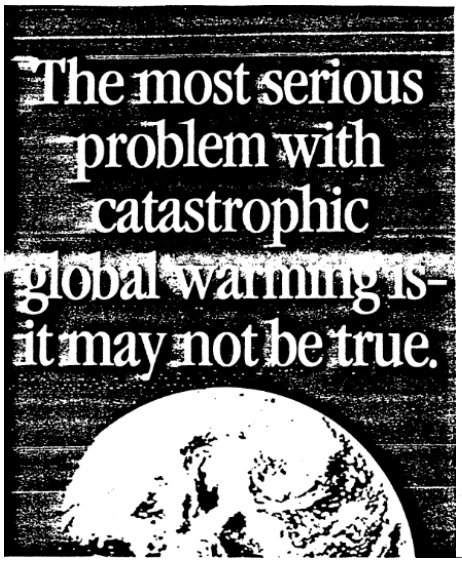
122. An implicit goal of ICE's advertising campaign was to change public opinion and avoid regulation. A memo from Richard Lawson, president of the National Coal Association asked members to contribute to the ICE campaign with the justification that "policymakers are prepared to act [on global warming]. Public opinion polls reveal that 60% of the American people already believe global warming is a serious environmental problem. Our industry cannot sit on the sidelines in this debate."[102]

[100] P. Langcake, *The Enhanced Greenhouse Effect: A review of the Scientific Aspects*, (Dec. 1994), https://www.documentcloud.org/documents/4411099-Document11.html#document/p15/a411511.

[101] Union of Concerned Scientists, *Deception Dossier #5: Coal's "Information Council on the Environment" Sham*, (1991), http://www.ucsusa.org/sites/default/files/attach/2015/07/Climate-Deception-Dossier-5_ICE.pdf.

[102] Naomi Oreskes, *My Facts Are Better Than Your Facts: Spreading Good News about Global Warming* (2010), in Peter Howlett et al., *How Well Do Facts Travel?: The Dissemination of Reliable Knowledge*, 136–66. Cambridge University Press. doi:10.1017/CBO9780511762154.008.8

123. The following images are examples of ICE-funded print advertisements challenging the validity of climate science and intended to obscure the scientific consensus on anthropogenic climate change and induce political inertia to address it.[103]



124. In 1996, Exxon released a publication called "Global Warming: Who's Right? Facts about a debate that's turned up more questions than answers." In the publication's preface, Exxon CEO Lee Raymond stated that "taking drastic action immediately is unnecessary since many scientists agree there's ample time to better understand the climate system." The subsequent article described the greenhouse effect as "unquestionably real and definitely a good thing," while ignoring the severe consequences that would result from the influence of the increased CO_2 concentration on Earth's climate. Instead, it characterized the greenhouse effect as simply "what makes the earth's atmosphere livable." Directly contradicting their own internal reports and peer-reviewed science, the article ascribed the rise in temperature since the late 19th century to "natural fluctuations that occur over long periods of time" rather than to the anthropogenic emissions that Exxon and other scientists had confirmed were responsible. The article also falsely challenged the computer models that projected the future impacts of unabated fossil fuel product consumption, including those developed by Exxon's own employees, as having been "proved to be inaccurate." The article contradicted the numerous reports circulated among Exxon's staff, and by the API, by

[103] Union of Concerned Scientists, *Deception Dossier #5*, *supra* note 98.

stating that "the indications are that a warmer world would be far more benign than many imagine . . . moderate warming would reduce mortality rates in the US, so a slightly warmer climate would be more healthful." Raymond concluded his preface by attacking advocates for limiting the use of his company's fossil fuel products as "drawing on bad science, faulty logic, or unrealistic assumptions"—despite the important role that Exxon's own scientists had played in compiling those same scientific underpinnings.[104]

125. API published an extensive report in the same year warning against concern over CO_2 buildup and any need to curb consumption or regulate the industry. The introduction states that "there is no persuasive basis for forcing Americans to dramatically change their lifestyles to use less oil." The authors discourage the further development of certain alternative energy sources, writing that "government agencies have advocated the increased use of ethanol and the electric car, without the facts to support the assertion that either is superior to existing fuels and technologies" and that "policies that mandate replacing oil with specific alternative fuel technologies freeze progress at the current level of technology, and reduce the chance that innovation will develop better solutions." The paper also denies the human connection to climate change, saying that no "scientific evidence exists that human activities are significantly affecting sea levels, rainfall, surface temperatures or the intensity and frequency of storms." The message the report repeatedly sends is clear: "Facts don't support the arguments for restraining oil use."[105]

126. In a speech presented at the World Petroleum Congress in Beijing in 1997 at which many of the Defendants were present, Exxon CEO Lee Raymond reiterated these views. This time, he presented a false dichotomy between stable energy markets and abatement of the marketing, promotion, and sale of fossil fuel products known to Defendants to be hazardous. He stated:

> Some people who argue that we should drastically curtail our use of fossil fuels for environmental reasons…my belief [is] that such proposals are neither prudent nor practical. With no readily available economic alternatives on the horizon, fossil fuels will continue to supply most of the world's and this region's energy for the foreseeable future.

[104] Exxon Corp., *Global warming: who's right?* (1996), https://www.documentcloud.org/documents/2805542-Exxon-Global-Warming-Whos-Right.html.

> Governments also need to provide a stable investment climate…They should avoid the temptation to intervene in energy markets in ways that give advantage to one competitor over another or one fuel over another.
>
> We also have to keep in mind that most of the greenhouse effects comes from natural sources.…Leaping to radically cut this tiny sliver of the greenhouse pie on the premise that it will affect climate defies common sense and lacks foundation in our current understanding of the climate system.
>
> Let's agree there's a lot we really don't know about how climate will change in the 21st century and beyond.…It is highly unlikely that the temperature in the middle of the next century will be significantly affected whether policies are enacted now or 20 years from now. It's bad public policy to impose very costly regulations and restrictions when their need has yet to be proven.[106]

127. Imperial Oil (Exxon) CEO Robert Peterson falsely denied the established connection between Defendants' fossil fuel products and anthropogenic climate change in the Summer 1998 Imperial Oil Review, "A Cleaner Canada":

> [T]his issue [referring to climate change] has absolutely nothing to do with pollution and air quality. Carbon dioxide is not a pollutant but an essential ingredient of life on this planet…. [T]he question of whether or not the trapping of 'greenhouse' gases will result in the planet's getting warmer…has no connection whatsoever with our day-to-day weather.
>
> There is absolutely no agreement among climatologists on whether or not the planet is getting warmer, or, if it is, on whether the warming is the result of man-made factors or natural variations in the climate….I feel very safe in saying that the view that burning fossil fuels will result in global climate change remains an unproved hypothesis.[107]

128. Mobil (Exxon) paid for a series of "advertorials," advertisements located in the editorial section of the New York Times and meant to look like editorials rather than paid ads. These ads discussed various aspects of the public discussion of climate change and sought to undermine the justifications for tackling greenhouse gas emissions, referring to it as unsettled

[106] Lee R. Raymond, *Energy – Key to growth and a better environment for Asia-Pacific nations*, World Petroleum Congress (Oct. 13, 1997), https://assets.documentcloud.org/documents/2840902/1997-Lee-Raymond-Speech-at-China-World-Petroleum.pdf.

[107] Robert Peterson, *A Cleaner Canada in Imperial Oil Review* (1998), http://www.documentcloud.org/documents/2827818-1998-Imperial-Oil-Robert-Peterson-A-Cleaner-Canada.html.

science. The 1997 advertorial below[108] argued that economic analysis of emissions restrictions was faulty and inconclusive and therefore a justification for delaying action on climate change.

When facts don't square with the theory, throw out the facts

That seems to characterize the administration's attitude on two of its own studies which show that international efforts to curb global warming could spark a big run-up in energy prices.

For months, the administration—playing its cards close to the vest—has promised to provide details of the emission reduction plan it will put on the table at the climate change meeting in Kyoto, Japan, later this year. It also promised to evaluate the economics of that policy and measure its impact. Those results are important because the proposals submitted by other countries thus far would be disruptive and costly to the U.S. economy.

Yet, when the results from its own economic models were finally generated, the administration started distancing itself from the findings and models that produced them. The administration's top economic advisor said that economic models can't provide a "definitive answer" on the impact of controlling emissions. The effort, she said, was "futile." At best, the models can only provide a "range of potential impacts."

Frankly, we're puzzled. The White House has promised to lay the economic facts before the public. Yet, the administration's top advisor said such an analysis won't be based on models and it will "preclude . . . detailed numbers." If you don't provide numbers and don't rely on models, what kind of rigorous economic examination can Congress and the public expect?

We're also puzzled by ambivalence over models. The administration downplays the utility of economic models to forecast cost impacts 10–15 years from now, yet its negotiators accept as gospel the 50–100-year predictions of global warming that have been generated by climate models—many of which have been criticized as seriously flawed.

The second study, conducted by Argonne National Laboratory under a contract with the Energy Department, examined what would happen if the U.S. had to commit to higher energy prices under the emission reduction plans that several nations had advanced last year. Such increases, the report concluded, would result in "significant reductions in output and employment" in six industries—aluminum, cement, chemical, paper and pulp, petroleum refining and steel.

Hit hardest, the study noted, would be the chemical industry, with estimates that up to 30 percent of U.S. chemical manufacturing capacity would move offshore to developing countries. Job losses could amount to some 200,000 in that industry, with another 100,000 in the steel sector. And despite the substantial loss of U.S. jobs and manufacturing capacity, the net emission reduction could be insignificant since developing countries will not be bound by the emission targets of a global warming treaty.

Downplaying Argonne's findings, the Energy Department noted that the study used outdated energy prices (mid-1996), didn't reflect the gains that would come from international emissions trading and failed to factor in the benefits of accelerated developments in energy efficiency and low-carbon technologies.

What it failed to mention is just what these new technologies are and when we can expect their benefits to kick in. As for emissions trading, many economists have theorized about the role they could play in reducing emissions, but few have grappled with the practicality of implementing and policing such a scheme.

We applaud the goals the U.S. wants to achieve in these upcoming negotiations—namely, that a final agreement must be "flexible, cost-effective, realistic, achievable and ultimately global in scope." But until we see the details of the administration's policy, we are concerned that plans are being developed in the absence of rigorous economic analysis. Too much is at stake to simply ignore facts that don't square with preconceived theories.

Mobil The energy to make a difference.

http://www.mobil.com

[108] Mobil, *When Facts Don't Square with the Theory, Throw Out the Facts*, N.Y. TIMES, A31 (Aug. 14, 1997), https://www.documentcloud.org/documents/705550-mob-nyt-1997-aug-14-whenfactsdontsquare.html.

129. In 1998, API, on behalf of Defendants, among other fossil fuel companies and organizations supported by fossil fuel corporate grants, developed a Global Climate Science Communications Plan that stated that unless "climate change becomes a non-issue . . . there may be no moment when we can declare victory for our efforts." Rather, API proclaimed that "[v]ictory will be achieved when . . . average citizens 'understand' (recognize) uncertainties in climate science; [and when] recognition of uncertainties becomes part of the 'conventional wisdom.'"[109] The multi-million-dollar, multi-year proposed budget included public outreach and the dissemination of educational materials to schools to "begin to erect a barrier against further efforts to impose Kyoto-like measures in the future."[110]

130. Soon after, API distributed a memo to its members identifying public agreement on fossil fuel products' role in climate change as its highest priority issue.[111] The memorandum illuminates API's and Defendants' concern over the potential regulation of Defendants' fossil fuel products: "Climate is at the center of the industry's business interests. Policies limiting carbon emissions reduce petroleum product use. That is why it is API's highest priority issue and defined as 'strategic.'"[112] Further, the API memo stresses many of the strategies that Defendants individually and collectively utilized to combat the perception of their fossil fuel products as hazardous. These included:

a. Influencing the tenor of the climate change "debate" as a means to establish that efforts to reduce greenhouse gas emissions were not necessary to responsibly address climate change;

b. Maintaining strong working relationships between government regulators and communications-oriented organizations like the Global Climate Coalition, the Heartland Institute, and other groups carrying Defendants'

[109] Joe Walker, *E-mail to Global Climate Science Team, attaching the Draft Global Science Communications Plan* (Apr. 3, 1998), https://assets.documentcloud.org/documents/784572/api-global-climate-science-communications-plan.pdf.

[110] *Id.*

[111] Committee on Oversight and Government Reform, *Allegations of Political Interference with Government Climate Change Science*, page 51 (Mar. 19, 2007), https://ia601904.us.archive.org/25/items/gov.gpo.fdsys.CHRG-110hhrg37415/CHRG-110hhrg37415.pdf.

[112] *Id.*

message minimizing the hazards of the unabated use of their fossil fuel products and opposing regulation thereof;

c. Building the case for (and falsely dichotomizing) Defendants' positive contributions to a "long-term approach" (ostensibly for regulation of their products) as a reason for society to reject short term fossil fuel regulations, and engaging in climate change science uncertainty research; and

d. Presenting Defendants' positions on climate change in domestic and international forums, including by preparing rebuttals to IPCC reports.

131. Additionally, Defendants mounted a campaign against regulation of their business practices in order to continue placing their fossil fuel products into the stream of commerce, despite their own knowledge and the growing national and international scientific consensus about the hazards of doing so. These efforts came despite Defendants' recognition that "risks to nearly every facet of life on Earth . . . could be avoided only if timely steps were taken to address climate change."[113]

132. The Global Climate Coalition (GCC), on behalf of Defendants and other fossil fuel companies, funded advertising campaigns and distributed material to generate public uncertainty around the climate debate, with the specific purpose of preventing U.S. adoption of the Kyoto Protocol, despite the leading role that the U.S. had played in the Protocol negotiations.[114] Despite an internal primer stating that various "contrarian theories" [i.e., climate change skepticism] do not "offer convincing arguments against the conventional model of greenhouse gas emission-induced climate change," GCC excluded this section from the public version of the backgrounder and instead funded efforts to promote some of those same contrarian theories over subsequent years.[115]

133. A key strategy in Defendants' efforts to discredit scientific consensus on climate change and the IPCC was to bankroll scientists who, although accredited, held fringe opinions that

[113] Banerjee, *Exxon's Oil Industry Peers Knew About Climate Dangers in the 1970s, Too*, *supra* note 60.

[114] *Id.*

[115] Gregory J. Dana, *Memo to AIAM Technical Committee Re: Global Climate Coalition (GCC) – Primer on Climate Change Science – Final Draft*, Association of International Automobile Manufacturers (Jan. 18, 1996), http://www.webcitation.org/6FyqHawb9.

were even more questionable given the sources of their research funding. These scientists obtained part or all of their research budget from Defendants directly or through Defendant-funded organizations like API,[116] but they frequently failed to disclose their fossil fuel industry underwriters.[117]

134. Creating a false sense of disagreement in the scientific community (despite the consensus that its own scientists, experts, and managers had previously acknowledged) has had an evident impact on public opinion. A 2007 Yale University-Gallup poll found that while 71% of Americans personally believed global warming was happening, only 48% believed that there was a consensus among the scientific community, and 40% believed there was a lot of disagreement among scientists over whether global warming was occurring.[118]

135. 2007 was the same year the IPCC published its Fourth Assessment Report, in which it concluded that "there is *very high confidence* that the net effect of human activities since 1750 has been one of warming."[119] The IPCC defined "very high confidence" as at least a 9 out of 10 chance.[120]

136. Defendants borrowed pages out of the playbook of prior denialist campaigns. A "Global Climate Science Team" ("GCST") was created that mirrored a front group created by the tobacco industry, known as The Advancement of Sound Science Coalition, whose purpose was to sow uncertainty about the fact that cigarette smoke is carcinogenic. The GCST's membership included Steve Milloy (a key player on the tobacco industry's front group) for Exxon; an API public relations representative; and representatives from Chevron and Southern Company that drafted API's 1998 Communications Plan. There were no scientists on the "Global Climate

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[116] Willie Soon & Sallie Baliunas, *Proxy Climatic and Environmental Changes of the Past 1000 Years*, 23 CLIMATE RESEARCH 88, 105 (Jan. 31, 2003), http://www.int-res.com/articles/cr2003/23/c023p089.pdf.

[117] Newsdesk, *Smithsonian Statement: Dr. Wei-Hock (Willie) Soon*, SMITHSONIAN (Feb. 26, 2015), http://newsdesk.si.edu/releases/smithsonian-statement-dr-wei-hock-willie-soon.

[118] *American Opinions on Global Warming: A Yale/Gallup/Clearvision Poll*, Yale Program on Climate Change Communication (July 31, 2007), http://climatecommunication.yale.edu/publications/american-opinions-on-global-warming.

[119] IPCC, 2007: Summary for Policymakers, page 3 (emphasis in original), *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (2007), https://www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-spm.pdf.

[120] *Id.*

Science Team." GCST developed a strategy to spend millions of dollars manufacturing climate change uncertainty. Between 2000 and 2004, Exxon donated $110,000 to Milloy's efforts and another organization, the Free Enterprise Education Institute and $50,000 to the Free Enterprise Action Institute, both registered to Milloy's home address.[121]

137. Defendants by and through their trade association memberships, worked directly, and often in a deliberately obscured manner, to evade regulation of the emissions resulting from use of their fossil fuel products.

138. Defendants have funded dozens of think tanks, front groups, and dark money foundations pushing climate change denial. These include the Competitive Enterprise Institute, the Heartland Institute, Frontiers for Freedom, Committee for a Constructive Tomorrow, and Heritage Foundation. From 1998 to 2014 Exxon spent almost $31 million funding numerous organizations misrepresenting the scientific consensus that Defendants' fossil fuel products were causing climate change. Several Defendants have been linked to other groups that undermine the scientific basis linking Defendants' fossil fuel products to climate change, including the Frontiers of Freedom Institute and the George C. Marshall Institute.

139. Exxon acknowledged its own previous success in sowing uncertainty and slowing mitigation through funding of climate denial groups. In its 2007 Corporate Citizenship Report, Exxon declared: "In 2008, we will discontinue contributions to several public policy research groups whose position on climate change could divert attention from the important discussion on how the world will secure the energy required for economic growth in an environmentally responsible manner."[122] Despite this pronouncement, Exxon remained financially associated with several such groups after the report's publication.

140. Today, Defendants, including Exxon, Chevron, BP, Shell, and ConocoPhillips publicly purport to accept the consensus embodied in the most recent IPCC reports, that global warming is occurring, and that human activity has been the dominant cause of global warming and

[121] Seth Shulman et al. *Smoke, Mirrors & Hot Air: How ExxonMobil Uses Big Tobacco's Tactics to Manufacture Uncertainty on Climate Science*, Union of Concerned Scientists, 19 (Jan. 2007), http://www.ucsusa.org/sites/default/files/legacy/assets/documents/global_warming/exxon_report.pdf.

[122] ExxonMobil, *2007 Corporate Citizenship Report* (Dec. 31, 2007), http://www.documentcloud.org/documents/2799777-ExxonMobil-2007-Corporate-Citizenship-Report.html.

related climactic changes since the beginning of the Great Acceleration. At the same time, however, Defendants continue to play up the uncertainty of future climate modeling, and the purported historic uncertainty, imprecision, and inconsistency of climate science to disguise and distract from their own knowledge and intensive research dating back to at least 1960s. While Defendants claim to accept the scientific consensus on climate change, moreover, they still continue to promote and expand their exploration, production, promotion, marketing, and sale of fossil fuels that are the dominant cause of anthropogenic global warming.

141. Defendants could have contributed to the global effort to mitigate the impacts of greenhouse gas emissions by, for example, delineating practical policy goals and regulatory structures that would have allowed them to continue their business ventures while reducing greenhouse gas emissions and supporting a transition to a lower carbon future. Instead, Defendants undertook a momentous effort to evade international and national regulation of greenhouse gas emissions to enable them to continue unabated fossil fuel production.

142. As a result of Defendants' tortious, false and misleading conduct, reasonable consumers of Defendants' fossil fuel products, members of the public, and policy-makers, have been deliberately and unnecessarily deceived about: the role of fossil fuel products in causing ocean warming and consequent harmful algal blooms and domoic outbreaks; the acceleration of global warming since the mid-20th century and the continuation thereof; and about the fact that the continued increase in fossil fuel product consumption creates severe environmental threats and significant economic costs for members of the ocean-dependent economy. Reasonable consumers and policy makers have also been deceived about the depth and breadth of the state of the scientific evidence on anthropogenic climate change, and in particular, on the strength of the scientific consensus demonstrating the role of fossil fuels in causing climate change and its potentially destructive impacts.

F. In Contrast to Their Public Statements, Defendants' Internal Actions Demonstrate Their Awareness of and Intent to Profit from the Unabated Use of Fossil Fuel Products.

143. In contrast to their public-facing efforts challenging the validity of the scientific consensus about anthropogenic climate change, Defendants' acts and omissions evidence their

internal acknowledgement of the reality of climate change and its likely consequences. These actions include, but are not limited to, making multi-billion-dollar infrastructure investments for their own operations that acknowledge the reality of coming anthropogenic climate-related change. These investments included (among others), raising offshore oil platforms to protect against sea level rise; reinforcing offshore oil platforms to withstand increased wave strength and storm severity; and developing and patenting designs for equipment intended to extract crude oil and/or natural gas in areas previously unreachable because of the presence of polar ice sheets.[123]

144. For example, in 1973 Exxon obtained a patent for a cargo ship capable of breaking through sea ice[124] and for an oil tanker[125] designed specifically for use in previously unreachable areas of the Arctic.

145. In 1974, Chevron obtained a patent for a mobile arctic drilling platform designed to withstand significant interference from lateral ice masses,[126] allowing for drilling in areas with increased ice floe movement due to elevated temperature.

146. That same year, Texaco (Chevron) worked toward obtaining a patent for a method and apparatus for reducing ice forces on a marine structure prone to being frozen in ice through natural weather conditions,[127] allowing for drilling in previously unreachable Arctic areas that would become seasonally accessible.

147. Shell obtained a patent similar to Texaco's (Chevron) in 1984.[128]

148. In 1989, Norske Shell, Royal Dutch Shell's Norwegian subsidiary, altered designs for a natural gas platform planned for construction in the North Sea to account for anticipated sea

[123] Amy Lieberman & Suzanne Rust, *Big Oil braced for global warming while it fought regulations*, L.A. TIMES (Dec. 31, 2015), http://graphics.latimes.com/oil-operations.

[124] Patents, *Icebreaking cargo vessel*, Exxon Research Engineering Co. (Apr. 17, 1973), https://www.google.com/patents/US3727571.

[125] Patents, *Tanker vessel*, Exxon Research Engineering Co. (July 17, 1973), https://www.google.com/patents/US3745960.

[126] Patents, *Arctic offshore platform*, Chevron Research & Technology Co. (Aug. 27, 1974) https://www.google.com/patents/US3831385.

[127] Patents, *Mobile, arctic drilling and production platform*, Texaco Inc. (Feb. 26, 1974) https://www.google.com/patents/US3793840.

[128] Patents, *Arctic offshore platform*, Shell Oil Co. (Jan. 24, 1984) https://www.google.com/patents/US4427320.

level rise. Those design changes were ultimately carried out by Shell's contractors, adding substantial costs to the project.[129]

a. The Troll field, off the Norwegian coast in the North Sea, was proven to contain large natural oil and gas deposits in 1979, shortly after Norske Shell was approved by Norwegian oil and gas regulators to operate a portion of the field.

b. In 1986, the Norwegian parliament granted Norske Shell authority to complete the first development phase of the Troll field gas deposits, and Norske Shell began designing the "Troll A" gas platform, with the intent to begin operation of the platform in approximately 1995. Based on the very large size of the gas deposits in the Troll field, the Troll A platform was projected to operate for approximately 70 years.

c. The platform was originally designed to stand approximately 100 feet above sea level—the amount necessary to stay above waves in a once-in-a-century strength storm.

d. In 1989, Shell engineers revised their plans to increase the above-water height of the platform by 3–6 feet, specifically to account for higher anticipated average sea levels and increased storm intensity due to global warming over the platform's 70-year operational life.[130]

e. Shell projected that the additional 3–6 feet of above-water construction would increase the cost of the Troll A platform by as much as $40 million.

G. Defendants' Actions Prevented the Development of Alternatives That Would Have Eased the Transition to a Less Fossil Fuel Dependent Economy.

149. The harms and benefits of Defendants' conduct can be balanced in part by weighing the social benefit of extracting and burning a unit of fossil fuels against the costs that a unit of fuel imposes on society, known as the "social cost of carbon" or "SCC."

[129] *Greenhouse Effect: Shell Anticipates A Sea Change*, N.Y. TIMES (Dec. 20, 1989) http://www.nytimes.com/1989/12/20/business/greenhouse-effect-shell-anticipates-a-sea-change.html.

[130] *Id.*; Lieberman & Rust, *Big Oil braced for global warming while it fought regulations*, *supra* note 123.

150. Because climatic responses to atmospheric temperature increases are non-linear, and because greenhouse gas pollution accumulates in the atmosphere, some of which does not dissipate for potentially thousands of years (namely CO_2), there is broad agreement that SCC increases as emissions rise, and as the climate warms. Relatedly, as atmospheric CO_2 levels and surface temperature increase, the costs associated with remediating environmental injuries—such as the domoic acid outbreaks described herein—also increases. In short, each additional ton of CO_2 emitted into the atmosphere will have a greater net social cost as emissions increase, and each additional ton of CO_2 will have a greater net social cost as global warming accelerates.

151. A critical corollary of the non-linear relationship between atmospheric CO_2 concentrations and SCC is that delayed efforts to curb those emissions have increased environmental harms and increase the magnitude and cost to remediate harms that have already occurred or are locked in by previous emissions. Therefore, Defendants' campaign to obscure the science of climate change and to expand the extraction and use of fossil fuels greatly increased and continues to increase the harms and rate of harms suffered by Plaintiff.

152. The consequences of delayed action on climate change, exacerbated by Defendants' actions, has already drastically increased the cost of mitigating further harm. Had concerted action begun even as late as 2005, an annual 3.5% reduction in CO_2 emissions to lower atmospheric CO_2 to 350 ppm by the year 2100 would have restored Earth's energy balance[131] and halted future global warming, although such efforts would not forestall committed sea level rise already locked in.[132] If efforts do not begin until 2020, however, a 15% annual reduction will be required to restore Earth's energy balance by the end of the century.[133] Earlier steps to reduce emissions would have led to smaller—and less disruptive—measures needed to mitigate the impacts of fossil fuel production.

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[131] "Climate equilibrium" is the balance between Earth's absorption of solar energy and its own energy radiation. Earth is currently out of equilibrium due to the influence of anthropogenic greenhouse gases, which prevent radiation of energy into space. Earth therefore warms and move back toward energy balance. Reduction of global CO_2 concentrations to 350 ppm is necessary to re-achieve energy balance, if the aim is to stabilize climate without further global warming. *See* James Hansen et al., *Assessing "Dangerous Climate Change": Required Reduction of Carbon Emissions to Protect Young People, Future Generations and Nature*, 8 PLOS ONE 1, 4–5 (Dec. 3, 2013).

[132] Hansen et al., *Assessing "Dangerous Climate Change": Required Reduction of Carbon Emissions to Protect Young People, Future Generations and Nature*, *supra* note 1310, at 10.

[133] *Id.*

153. The costs of inaction and the opportunities to confront anthropogenic climate change caused by normal consumption of their fossil fuel products, were not lost on Defendants. In a 1997 speech by John Browne, Group Executive for BP America, at Stanford University, Browne described Defendants' and the entire fossil fuel industry's responsibility and opportunities to reduce use of fossil fuel products, reduce global CO_2 emissions, and mitigate the harms associated with the use and consumption of such products:

> A new age demands a fresh perspective of the nature of society and responsibility. We need to go beyond analysis and to take action. It is a moment for change and for a rethinking of corporate responsibility. . . .
>
> [T]here is now an effective consensus among the world's leading scientists and serious and well informed people outside the scientific community that there is a discernible human influence on the climate, and a link between the concentration of carbon dioxide and the increase in temperature.
>
> The prediction of the IPCC is that over the next century temperatures might rise by a further 1 to 3.5 degrees centigrade [1.8º – 6.3º F], and that sea levels might rise by between 15 and 95 centimetres [5.9 and 37.4 inches]. Some of that impact is probably unavoidable, because it results from current emissions. . . .
>
> [I]t would be unwise and potentially dangerous to ignore the mounting concern.
>
> The time to consider the policy dimensions of climate change is not when the link between greenhouse gases and climate change is conclusively proven … but when the possibility cannot be discounted and is taken seriously by the society of which we are part. . . .
>
> We [the fossil fuel industry] have a responsibility to act, and I hope that through our actions we can contribute to the much wider process which is desirable and necessary.
>
> BP accepts that responsibility and we're therefore taking some specific steps.
>
> To control our own emissions.
>
> To fund continuing scientific research.
>
> To take initiatives for joint implementation.
>
> To develop alternative fuels for the long term.
>
> And to contribute to the public policy debate in search of the wider global answers to the problem.[134]

154. Despite Defendants' knowledge of the foreseeable, measurable harms associated

[134] John Browne, *BP Climate Change Speech to Stanford*, Climate Files (May 19, 1997), http://www.climatefiles.com/bp/bp-climate-change-speech-to-stanford.

with the unabated consumption and use of their fossil fuel products, and despite the existence and Defendants' knowledge of technologies and practices that could have helped to reduce the foreseeable dangers associated with their fossil fuel products, Defendants continued to market and promote heavy fossil fuel use, dramatically increasing the cost of abatement. At all relevant times, Defendants were deeply familiar with opportunities to reduce the use of their fossil fuel products, reduce global CO_2 emissions associated therewith, and mitigate the harms associated with the use and consumption of such products. Examples of that recognition include, but are not limited to the following:

a. In 1963, Esso (Exxon) obtained multiple patents on technologies for fuel cells, including on the design of a fuel cell and necessary electrodes,[135] and on a process for increasing the oxidation of a fuel, specifically methanol, to produce electricity in a fuel cell.[136]

b. In 1970, Esso (Exxon) obtained a patent for a "low-polluting engine and drive system" that used an interburner and air compressor to reduce pollutant emissions, including CO_2 emissions, from gasoline combustion engines (the system also increased the efficiency of the fossil fuel products used in such engines, thereby lowering the amount of fossil fuel product necessary to operate engines equipped with this technology).[137]

155. Defendants could have made major inroads to mitigate Plaintiff's injuries through technology by developing and employing technologies to capture and sequester greenhouse gases emissions associated with conventional use of their fossil fuel products. Defendants had knowledge dating at least back to the 1960s, and indeed, internally researched and perfected many such technologies. For instance:

[135] Patents, *Fuel cell and fuel cell electrodes*, Exxon Research Engineering Co. (Dec. 31, 1963), https://www.google.com/patents/US3116169.

[136] Patents, *Direct production of electrical energy from liquid fuels*, Exxon Research Engineering Co. (Dec. 3, 1963), https://www.google.com/patents/US3113049.

[137] Patents, *Low-polluting engine and drive system*, Exxon Research Engineering Co. (May 16, 1970), https://www.google.com/patents/US3513929.

a. The first patent for enhanced oil recovery technology, a process by which CO_2 is captured and reinjected into oil deposits, was granted to an ARCO (BP) subsidiary in 1952.[138] This technology could have been further developed as a carbon capture and sequestration technique;

b. Phillips Petroleum Company (ConocoPhillips) obtained a patent in 1966 for a "Method for recovering a purified component from a gas" outlining a process to remove carbon from natural gas and gasoline streams;[139] and

c. In 1973, Shell patented a process to remove acidic gases, including CO_2, from gaseous mixtures.

156. Despite this knowledge, Defendants' later forays into the alternative energy sector were largely pretenses. For instance, in 2001, Chevron developed and shared a sophisticated information management system to gather greenhouse gas emissions data from its explorations and production to help regulate and set reduction goals.[140] Beyond this technological breakthrough, Chevron touted "profitable renewable energy" as part of its business plan for several years and launched a 2010 advertising campaign promoting the company's move towards renewable energy. Despite all this, Chevron rolled back its renewable and alternative energy projects in 2014.[141]

157. Similarly, ConocoPhillips' 2012 Sustainable Development report declared developing renewable energy a priority in keeping with their position on sustainable development and climate change.[142] Their 10-K filing from the same year told a different story: "As an independent E&P company, we are solely focused on our core business of exploring for,

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[138] James P. Meyer, *Summary of Carbon Dioxide Enhanced Oil Recovery (CO_2EOR) Injection Well Technology*, American Petroleum Institute, at 1, http://www.api.org/~/media/Files/EHS/climate-change/Summary-carbon-dioxide-enhanced-oil-recovery-well-tech.pdf.

[139] Patents, *Method for recovering a purified component from a gas*, Phillips Petroleum Co. (Jan. 11, 1966), https://www.google.com/patents/US3228874.

[140] Chevron, *Chevron Introduces New System to Manage Energy Use* (press release) (Sept. 25, 2001), https://www.chevron.com/stories/chevron-introduces-new-system-to-manage-energy-use.

[141] Benjamin Elgin, *Chevron Dims the Lights on Green Power*, BLOOMBERG (May 29, 2014), https://www.bloomberg.com/news/articles/2014-05-29/chevron-dims-the-lights-on-renewable-energy-projects.

[142] ConocoPhillips, *Sustainable Development* (2013) http://www.conocophillips.com/sustainable-development/Documents/2013.11.7%201200%20Our%20Approach%20Section%20Final.pdf.

developing and producing crude oil and natural gas globally."[143]

158. Likewise, while Shell orchestrated an entire public relations campaign around energy transitions towards net zero emissions, a fine-print disclaimer in its 2016 net-zero pathways report reads: "We have no immediate plans to move to a net-zero emissions portfolio over our investment horizon of 10–20 years."[144]

159. BP, appearing to abide by the representations Lord Browne made in his speech described in paragraph 153 above, engaged in a rebranding campaign to convey an air of environmental stewardship and renewable energy to its consumers. This included renouncing its membership in the GCC in 2007, changing its name from "British Petroleum" to "BP" while adopting the slogan "Beyond Petroleum," and adopting a conspicuously green corporate logo. However, BP's self-touted "alternative energy" investments during this turnaround included investments in natural gas, a fossil fuel, and in 2007 the company reinvested in Canadian tar sands, a particularly high-carbon source of oil.[145] The company ultimately abandoned its wind and solar assets in 2011 and 2013, respectively, and even the "Beyond Petroleum" moniker in 2013.[146]

160. After posting a $10 billion quarterly profit, Exxon in 2005 stated that "We're an oil and gas company. In times past, when we tried to get into other businesses, we didn't do it well. We'd rather re-invest in what we know."[147]

161. Even if Defendants did not adopt technological or energy source alternatives that would have reduced use of fossil fuels, reduced global greenhouse gas pollution, and/or mitigated the harms associated with the use and consumption of such products, Defendants could have taken other practical, cost-effective steps to reduce the use of their fossil fuel products, reduce global greenhouse gas pollution associated therewith, and mitigate the harms associated with the use and

[143] ConocoPhillips Form 10-K, U.S. Securities and Exchange Commission Webpage (Dec. 31, 2012), https://www.sec.gov/Archives/edgar/data/1163165/000119312513065426/d452384d10k.htm.

[144] *Energy Transitions Towards Net Zero Emissions*, Shell (2016), https://drive.google.com/file/d/0B_L1nw8WLu0Bbi1QWnJRcHlZblE/view (accessed Nov. 6, 2018).

[145] Fred Pearce, *Greenwash: BP and the Myth of a World 'Beyond Petroleum'*, THE GUARDIAN (Nov. 20, 2008), https://www.theguardian.com/environment/2008/nov/20/fossilfuels-energy.

[146] Javier E. David, *'Beyond Petroleum' No More? BP Goes Back to Basics*, CNBC (Apr. 20, 2013), http://www.cnbc.com/id/100647034.

[147] James R. Healy, *Alternate Energy Not in Cards at ExxonMobil*, USA TODAY (Oct. 28, 2005), https://usatoday30.usatoday.com/money/industries/energy/2005-10-27-oil-invest-usat_x.htm.

consumption of such products. These alternatives could have included, among other measures:

a. Accepting scientific evidence on the validity of anthropogenic climate change and the damages it will cause people and communities, including Plaintiff, and the environment. Mere acceptance of that information would have altered the debate from *whether* to combat global warming to *how* to combat it; and avoided much of the public confusion that has ensued over nearly 30 years, since at least 1988;

b. Forthrightly communicating with Defendants' shareholders, banks, insurers, the public, regulators, and Plaintiff about the global warming and ocean temperature increase hazards of Defendants' fossil fuel products that were known to Defendants, would have enabled those groups to make material, informed decisions about whether and how to address climate change vis-à-vis Defendants' products;

c. Refraining from affirmative efforts, whether directly, through coalitions, or through front groups, to distort public debate, and to cause many consumers and business and political leaders to think the relevant science was far less certain that it actually was;

d. Sharing their internal scientific research with the public, and with other scientists and business leaders, so as to increase public understanding of the scientific underpinnings of climate change and its relation to Defendants' fossil fuel products;

e. Supporting and encouraging policies to avoid dangerous climate change, and demonstrating corporate leadership in addressing the challenges of transitioning to a low-carbon economy;

f. Prioritizing alternative sources of energy through sustained investment and research on renewable energy sources to replace dependence on Defendants' inherently hazardous fossil fuel products;

g. Adopting their shareholders' concerns about Defendants' need to protect their businesses from the inevitable consequences of profiting from their fossil fuel products. Over the period of 1990–2015, Defendants' shareholders proposed hundreds of resolutions to change Defendants' policies and business practices regarding climate change. These included increasing renewable energy investment, cutting emissions, and performing carbon risk assessments, among others.

162. Despite their knowledge of the foreseeable harms associated with the consumption of Defendants' fossil fuel products, and despite the existence and fossil fuel industry knowledge of opportunities that would have reduced the foreseeable dangers associated with those products, Defendants wrongfully and falsely promoted, campaigned against regulation of, and concealed the hazards of use of their fossil fuel products.

H. Defendants Caused Plaintiff's Injuries

163. Defendants individually and collectively extracted a substantial percentage of all raw fossil fuels extracted globally since 1965.

164. CO_2 emissions that are attributable to fossil fuels that Defendants extracted from the earth and injected into the market are responsible for a substantial percentage of greenhouse gas pollution since 1965.

165. Defendants' individual and collective conduct—including, but not limited to, their extraction, refining, and/or formulation of fossil fuel products; their introduction of fossil fuel products into the stream of commerce; their wrongful promotion of their fossil fuel products and concealment of known hazards associated with use of those products; and their failure to pursue less hazardous alternatives available to them—is a substantial factor in causing the increase in global mean sea surface temperature, marine heatwaves, harmful algal blooms, marine toxin outbreaks, and related injuries, among other consequences.

166. Defendants have actually and proximately caused the increase in mean sea surface temperature, marine heatwaves, harmful algal blooms, and domoic acid outbreaks; and the

consequent social and economic injuries associated with those physical and environmental impacts, which are the causes of Plaintiff's injuries and damages as described herein.

167. Plaintiff has already incurred, and will foreseeably continue to incur, injuries and damages because of domoic acid outbreaks caused by Defendants' conduct.

168. California's commercial Dungeness crab fishery is seasonal and normally runs for eight months (from November 15 to June 15 south of the Sonoma/Mendocino County line and from December 1 to July 1 north of that line to the California/Oregon border). In Oregon, the season runs from December 1 to August 14 under normal conditions. The early part of crab season is by far the most productive because at that time there are the most crabs on the crab grounds, the crabs' meat content (the ratio of meat weight to total weight) is at its highest, and the demand for crab spikes around the Thanksgiving, Christmas, New Year and Lunar New Year holidays, and the Super Bowl.

169. As a precaution to avoid poisoning humans with domoic acid, the State of California delayed opening the Dungeness crab season at the beginning of the 2015–16 and 2016–17 commercial seasons, and will delay the beginning of the 2018–19 season:

a. In 2015–16, the fishery south of the Sonoma/Mendocino County line opened approximately four-and-a-half months late; the fishery north of the Sonoma/Mendocino County line did not fully open until nearly six months after the normal opening date;

b. In 2016–17, the fishery opened piecemeal, with a large section of the southern management area and a portion of the northern management area from the Oregon border to Redwood Creek opening on time, and six distinct areas north of Point Reyes in Marin County opening either on time, or with a delay in the range of 18 days to one-and-a-half months.

c. The area from Bodega Head to the Sonoma/Mendocino County line will be closed to commercial crabbing indefinitely; the season will not open as scheduled on November 15, 2018. Sampling farther north has shown that crabs at fishing grounds accessible from ports in Crescent City and

Trinidad, in Del Norte and Humboldt Counties, have levels of domoic acid that exceed the action threshold.

170. As a precaution to avoid poisoning humans with domoic acid, the State of Oregon delayed the opening of the Dungeness crab season at the beginning of the 2015–16, 2016–17, and 2017–18 commercial Dungeness crab seasons:

a. In 2015–16, the entire coast of Oregon was closed to commercial crabbing until nearly five weeks after the normal season opening date.

b. In 2016–17, the commercial crabbing season was delayed by approximately one month. After being open for approximately one month, the season was interrupted when domoic acid was again identified in crab at levels exceeding the action threshold. In response, ODFW and ODA curtailed the fishery in several ways, including by closing large areas of the ocean to crabbing and by issuing mandatory evisceration orders, which prohibit crab wholesalers from purveying live crabs or any crab product containing the crab viscera.

c. In 2017–18, the statewide commercial crab season was again delayed over six weeks in response to domoic acid contamination. ODFW and ODA also imposed mandatory evisceration orders for certain times and areas.

d. As of this writing, the 2018 Oregon recreational crab fishery (which operates on a different schedule than the commercial fishery) is closed from Cape Blanco to the Oregon/California border due to high levels of domoic acid in crab.

171. Additional domoic acid-induced Dungeness crab fishery closures will occur in the future, with increasing frequency and severity, and with concomitant impacts on and injuries to Plaintiff and west coast fishing families, communities and businesses.

172. Due to domoic acid contamination and the resultant crab fishery closures, commercial fishermen were deprived of valuable opportunities to fish for Dungeness crab during substantial portions of the 2015–16, 2016–17, and 2017–18 crab seasons, and will be deprived of

crabbing opportunities in the 2018–19 crab season and future seasons. Fishermen and fishery-dependent businesses, including Plaintiff, were therefore deprived of a substantial portion of their annual revenue from the Dungeness crab fishery for those seasons, and many suffered additional financial injuries by incurring debt to pay for operating and living expenses during the closures. Fishermen and fishery-dependent businesses, including Plaintiff, will continue to suffer such injuries during future domoic acid-induced fishery closures.

173. Because fisheries are seasonal, fishermen often pursue multiple different fisheries throughout the year. The delayed opening of the crab fishery in 2015–16, 2016–17, and 2017–18, caused many fishermen, including Plaintiff, to delay their entry into other fisheries they would normally have pursued earlier, including salmon, coonstripe shrimp, albacore, and others. Because those other fisheries are open only for limited portions of the calendar year, those fishermen were deprived of valuable fishing opportunities, thereby diminishing their earnings in those fisheries. Fishermen and fishery-dependent businesses, including Plaintiff, were therefore deprived of a substantial portion of their annual revenue from those other fisheries during years impacted by domoic acid-induced crab fishery closures, and will continue to suffer such injuries during future domoic acid-induced fishery closures.

174. Onshore crab wholesalers and processors, including Plaintiff, were deprived of a substantial portion of their annual revenue during the 2015–16, 2016–17, and 2017–18 crab seasons, and will continue to suffer such injuries during future domoic acid-induced fishery closures. That revenue substantially depends on the supply of Dungeness crab and other species harvested by commercial fishermen, which were not available due to the crab fishery delays that curtailed and will continue to curtail fishing opportunity.

175. The market for crab products, including Plaintiff's, was and during future crab seasons will be artificially depressed because of the stigma that Plaintiff's crab products were and are unsafe for human consumption, which adversely affects Plaintiff and its members. That depressed market has caused Plaintiff and its members a substantial loss of income, and will continue to do so as long as domoic acid outbreaks threaten the crab fishery.

176. Due to domoic acid contamination and the resultant past and future fishery closures, Plaintiff and west coast fishing families, communities, and businesses have suffered and will continue to suffer other harms beyond direct economic harms, including, but not limited to, the loss of the iconic west coast commercial fishing lifestyle, loss of a regional commercial fishing culture and identity, and loss of public confidence in the safety and quality of west coast Dungeness crab products and the fishery itself.

177. Defendants' conduct as described herein is therefore an actual, substantial, and proximate cause of Plaintiff's domoic acid-related injuries.

178. Future injuries arising out of domoic acid contamination in the crab fishery are abatable. Examples of technologies that could be used to prevent or mitigate to Plaintiff and the crab industry include, but are not limited to, monitoring and testing technologies that could permit real-time domoic acid testing, which would permit fishermen to separate contaminated crabs from clean ones at the time of harvest, thereby assuaging the public health concerns that currently induce fishery closures;[148] or "depuration," the process by which crabs in an environment and food free of domoic acid will naturally rid themselves of domoic acid.[149] Given large enough depuration facilities, commercially harvested crabs could be depurated on an industrial scale, and thereafter brought to market even if they contain domoic acid at the time of harvest.

VI. CAUSES OF ACTION

FIRST CAUSE OF ACTION

(Nuisance)

(Against All Defendants)

179. Plaintiff incorporates by reference each and every allegation contained above, as though set forth herein in full.

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[148] *See, e.g.*, Nat'l Ctrs. For Coastal Ocean Science, "Fast Tool to Detect Toxic Shellfish" (2017) (announcing development of an antibody-based test kit for domoic acid that provides quick results), https://coastalscience.noaa.gov/project/fast-tool-detect-toxic-shellfish; Nat'l Science & Tech. Council Subcommittee on Ocean Science & Tech., *Harmful Algal Blooms and Hypoxia – Comprehensive Research Plan and Action Strategy; An Interagency Report* (Feb. 2016), http://www.whoi.edu/fileserver.do?id=230904&pt=10&p=19132 (discussing how development of a toxin test-kit enabled fishermen to determine when and where clams were safe to harvest, re-enabling access to valuable shellfish resources).

[149] *See, e.g.*, J.A.K. Lund, et al., *Domoic acid uptake and depuration in dungeness crab (Cancer magister Dana 1852)*, 16 JOURNAL OF SHELLFISH RESEARCH 225 (1997).

180. Defendants, and each of them, by their acts and omissions, created a condition and permitted that condition to persist, which constitutes a nuisance in the form of increased mean sea surface temperature and intense marine heatwaves, which caused recurring *Pseudo-nitzschia* algal blooms unprecedented in their range and toxicity, which caused and will continue to cause domoic acid to contaminate Dungeness crabs at potentially dangerous concentrations, all of which resulted in past injuries and will cause future injuries to Plaintiff.

181. The condition created by Defendants substantially and negatively affects the interests of the public at large. In particular, increased mean sea surface temperature, marine heatwaves, harmful algal blooms, and domoic acid contamination: (1) are harmful and dangerous to human health; (2) are indecent and offensive to the senses of the ordinary person; and (3) obstruct and threaten to obstruct the free use of natural resources held in the public trust, so as to interfere with the comfortable enjoyment of life and property.

182. The condition created by Defendants affected, and will continue to affect, Plaintiff, because the economic impacts of fishery closures cascaded to impact entire fishery-dependent communities and businesses, and because the public was deprived of safe, local, and sustainable seafood.

183. The seriousness of the harms to Plaintiff caused by increased mean sea surface temperature, marine heatwaves, harmful algal blooms, and domoic acid contamination are extremely grave, and outweigh the public benefit of Defendants' wrongful over-marketing and overpromotion of their dangerous fossil fuel products with knowledge of the harm that would result, and their long-standing efforts to sow doubt about the science surrounding the effects of their products on the world's climate and oceans, and campaigns to avoid regulation. The seriousness of the harm to Plaintiff outweighs the public benefit of Defendants' and each of their conduct, because

a. the interference with natural resources held in the public trust are expected to become regular, recurrent, and increasingly severe, so as to become a permanent ecological feature of the crab fishery;

b. the nature of the harm is the deprivation of the right to use and enjoy natural resources held in the public trust, as well as potential physical injury to consumers, rather than mere annoyance;

c. the interference borne by Plaintiff is the deprivation of the right to obtain and use natural resources held in the public trust, deprivation of the right to use commercial fishing privileges, the loss of normal and expected revenue from the use of those resources and privileges, and the deprivation of a livelihood that depends on those resources;

d. The natural resources contaminated with domoic acid as a direct consequence of Defendants' conduct are not suitable for such contamination because those resources are consumed by humans and other organisms;

e. the burden on Plaintiff to mitigate and prevent the interference with the natural resources held in the public trust, fishing privileges, and the right to use and enjoy those resources and privileges to pursue fishing community livelihoods, is significant and severe, as costs associated with preventing such interference or contamination are prohibitive;

f. the social benefit of placing fossil fuels into the stream of commerce, if any, is outweighed by the availability of other sources of energy that could have been placed into the stream of commerce that would not have caused increased mean sea surface temperature, marine heatwaves, harmful algal blooms, and domoic acid contamination; Defendants, and each of them, knew of the external costs of placing their fossil fuel products into the stream of commerce, and rather than striving to mitigate those externalities, instead acted affirmatively to obscure them from public consciousness; and Defendants' over-promotion and over-marketing of their products with knowledge of the harm that would result, and their long-standing efforts to sow doubt about the science surrounding the effects of their products on the

world's climate and oceans, and campaigns to avoid regulation, have no social utility;

g. the social cost of each ton of CO_2 emitted into the atmosphere increases as total global emissions increase, so that unchecked extraction and consumption of fossil fuel products is more harmful and costly than moderated extraction and consumption; and

h. it was practical for Defendants, and each of them, in light of their extensive knowledge of the hazards of placing fossil fuel products into the stream of commerce and extensive scientific engineering expertise, to develop better technologies and to pursue and adopt known, practical, and available technologies, energy sources, and business practices that would have mitigated their greenhouse gas pollution and eased the transition to a lower carbon economy.

184. In addition to the harms suffered by the public at large, Plaintiff has suffered, and will continue to suffer, special injuries that are different in kind. Among other harms, Plaintiff suffered economic losses due to the prohibition on harvesting and transacting in Dungeness crabs, which constitute a substantial and significant portion of Plaintiff's revenue. Additionally, the markets for Plaintiff's products were artificially depressed because of public health concerns over the potential presence of domoic acid in those products. The public at large has not suffered the same deprivation of a livelihood as has Plaintiff.

185. Defendants' wrongful conduct was oppressive, malicious, and fraudulent, in that their conduct was willful, intentional, and in conscious disregard for the rights of others. Defendants' conduct was so vile, base, and contemptible that it would be looked down upon and despised by reasonable people, justifying an award of punitive and exemplary damages in an amount subject to proof at trial, and justifying equitable disgorgement of all profits Defendants obtained through their unlawful and outrageous conduct.

186. As a direct and proximate result of Defendants' conduct, as set forth above, Plaintiff has been unreasonably interfered with because Defendants knew or should have known that their

conduct would create a continuing problem with long-lasting significant negative effects on the rights of the public.

187. Defendants' actions are a direct and legal cause of the public nuisance.

188. Defendants' acts and omissions as alleged herein are substantial and indivisible causes of Plaintiff's injuries and damages as alleged herein.

189. Plaintiff is entitled to recover damages and other appropriate relief for the foregoing public nuisance.

190. Wherefore, Plaintiff prays for relief as set forth below.

SECOND CAUSE OF ACTION

(Strict Liability – Failure to Warn)

(Against All Defendants)

191. Plaintiff incorporates by reference each and every allegation contained above, as though set forth herein in full.

192. Defendants, and each of them, extracted raw fossil fuel products, including crude oil, coal, and natural gas from the earth, and placed those fossil fuel products into the stream of commerce.

193. Defendants, and each of them, extracted, refined, formulated, designed, packaged, distributed, tested, constructed, fabricated, analyzed, recommended, merchandised, advertised, promoted and/or sold fossil fuel products, which were intended by Defendants, and each of them, to be burned for energy, refined into petrochemicals, and refined and/or incorporated into petrochemical products including fuels and plastics.

194. Defendants, and each of them, heavily marketed, promoted, and advertised fossil fuel products and their derivatives, which were sold or used by their respective affiliates and subsidiaries. Defendants received direct financial benefit from their affiliates' and subsidiaries' sales of fossil fuel products. Defendants' role as promoter and marketer was integral to their respective businesses and a necessary factor in bringing fossil fuel products and their derivatives to the consumer market, such that Defendants had control over, and a substantial ability to influence, the manufacturing and distribution processes of their affiliates and subsidiaries.

195. Throughout the times at issue, Defendants individually and collectively knew or should have known, in light of the scientific knowledge generally accepted at the time, that fossil fuel products, whether used as intended or misused in a foreseeable manner, release greenhouse gases into the atmosphere that inevitably cause *inter alia* global warming, increased mean sea surface temperature, marine heatwaves, and harmful algal blooms with a capacity for producing marine toxins.

196. Throughout the times at issue and continuing today, fossil fuel products presented and still present a substantial risk of injury to Plaintiff through the climate and ocean temperature effects described above, whether used as intended or misused in a reasonably foreseeable manner.

197. Throughout the times at issue, the ordinary consumer would not recognize that the use or foreseeable misuse of fossil fuel products causes global and localized changes in climate and the world's oceans, including those effects described herein.

198. Throughout the times at issue, Defendants individually and in concert widely disseminated marketing materials, refuted the generally accepted scientific knowledge at the time, and advanced pseudo-scientific theories of their own, and developed public relations campaigns and materials that prevented reasonable consumers from recognizing the risk that fossil fuel products would cause grave climate changes, including those described herein.

199. Defendants, and each of them, failed to adequately warn customers, consumers, elected officials and regulators of known and foreseeable risk of climate change and the consequences that inevitably follow from the normal, intended use and foreseeable misuse of Defendants' fossil fuel products.

200. Defendants' wrongful conduct was oppressive, malicious, and fraudulent, in that their conduct was willful, intentional, and in conscious disregard for the rights of others. Defendants' conduct was so vile, base, and contemptible that it would be looked down upon and despised by reasonable people, justifying an award of punitive and exemplary damages in an amount subject to proof at trial, and justifying equitable disgorgement of all profits Defendants obtained through their unlawful and outrageous conduct.

201. As a direct and proximate result of the defects previously described, fossil fuel products caused and will continue to cause Plaintiff to sustain the injuries and damages set forth in this Complaint, including economic loss, damage to natural resources held in the public trust, deprivation of the right to use fishing privileges, and the creation and maintenance of a nuisance that interferes with the rights of Plaintiff and commercial fishery-dependent communities along the west coast.

202. Defendants' acts and omissions as alleged herein are indivisible causes of Plaintiff's injuries and damages as alleged herein.

203. Plaintiff is entitled to recover damages and other appropriate relief for the foregoing failure to warn of product defects.

204. Wherefore, Plaintiff prays for relief as set forth below.

THIRD CAUSE OF ACTION

(Strict Liability – Design Defect)

(Against All Defendants)

205. Plaintiff incorporates by reference each and every allegation contained above, as though set forth herein in full.

206. Defendants, and each of them, extracted raw fossil fuel products, including crude oil, coal, and natural gas from the earth and placed those fossil fuel products into the stream of commerce.

207. Defendants, and each of them, extracted, refined, formulated, designed, packaged, distributed, tested, constructed, fabricated, analyzed, recommended, merchandised, advertised, promoted and/or sold fossil fuel products, which were intended by Defendants, and each of them, to be burned for energy, refined into petrochemicals, and refined and/or incorporated into petrochemical products including but not limited to fuels and plastics.

208. Defendants, and each of them, heavily marketed, promoted, and advertised fossil fuel products and their derivatives, which were sold or used by their respective affiliates and subsidiaries. Defendants' received direct financial benefit from their affiliates' and subsidiaries' sales of fossil fuel products. Defendants role as promoter and marketer was integral to their

respective businesses and a necessary factor in bringing fossil fuel products and their derivatives to the consumer market, such that Defendants had control over, and a substantial ability to influence, the manufacturing and distribution processes of their affiliates and subsidiaries.

209. Throughout the time at issue, fossil fuel products have not performed as safely as an ordinary consumer would expect them to because greenhouse gas emissions from their use cause numerous global and local changes to Earth's climate. In particular, ordinary consumers did not expect that:

a. fossil fuel products are the primary cause of global warming since the dawn of the industrial revolution, and by far the primary cause of global warming acceleration in the 20th and 21st centuries;

b. fossil fuel products would cause increase mean sea surface temperature;

c. fossil fuel products would cause increased frequency and intensity of marine heatwaves;

d. unmitigated use of fossil fuel products causes increased frequency and intensity of harmful algal blooms;

e. fossil fuel products cause increased frequency and intensity of marine toxin outbreaks and contamination of natural resources held in the public trust, including Dungeness crabs, necessitating commercial fishery closures and concordant economic injuries;

f. the social cost of each ton of CO_2 emitted into the atmosphere increases as total global emissions increase, so that unchecked extraction and consumption of fossil fuel products is more harmful and costly than moderated extraction and consumption; and

g. for these reasons and others, the unmitigated use of fossil fuel products present significant threats to the environment and human health and welfare, especially to coastal and ocean-dependent communities.

210. Throughout the times at issue, Defendants individually and in concert widely disseminated marketing materials, refuted the generally accepted scientific knowledge at the time,

advanced pseudo-scientific theories of their own, and developed public relations materials, among other public messaging efforts, that prevented reasonable consumers from forming an expectation that fossil fuel products would cause grave climate changes, including those described herein.

211. Additionally, and in the alternative, Defendants' fossil fuel products are defective because the risks they pose to consumers and to the public, including and especially to Plaintiff, outweigh their benefits.

a. The gravity of the potential harms caused by fossil fuel products is extreme; global warming and its attendant consequences are guaranteed to occur following the use or foreseeable misuse of fossil fuel products because fossil fuel products inherently release greenhouse gases into the atmosphere; and global warming would continue to occur for decades even if all greenhouse gas emissions ceased.

b. The social benefit of the purpose of placing fossil fuels into the stream of commerce is overshadowed by the availability of other sources of energy that could have been placed into the stream of commerce that would not have caused increased mean sea surface temperature, marine heatwaves, harmful algal blooms, and marine toxin outbreaks, and accordingly Plaintiff's injuries; Defendants, and each of them, knew of the external costs of placing their fossil fuel products into the stream of commerce, and rather than striving to mitigate those externalities, instead acted affirmatively to obscure them from public consciousness.

c. Defendants' campaign of disinformation regarding global warming and the climatic effects of fossil fuel products prevented customers, consumers, regulators, and the general public from taking steps to mitigate the inevitable consequences of fossil fuel consumption, and incorporating those consequences into either short-term decisions or long-term planning.

d. The cost to society of each ton of CO_2 emitted into the atmosphere increases as total global emissions increase so that unchecked extraction and

consumption of fossil fuel products is more harmful and costly than moderated extraction and consumption.

e. It was practical for Defendants, and each of them, in light of their extensive knowledge of the hazards of placing fossil fuel products into the stream of commerce, to pursue and adopt known, practical, and available technologies, energy sources, and business practices that would have mitigated their greenhouse gas pollution and eased the transition to a lower carbon economy, reduced global CO_2 emissions, and mitigated the harms associated with the use and consumption of such products.

212. Defendants' individual and aggregate fossil fuel products were used in a manner for which they were intended to be used, or misused in a manner foreseeable to Defendants and each of them, by individual and corporate consumers, the result of which was the addition of CO_2 emissions to the global atmosphere with attendant global and local consequences.

213. As a direct and proximate result of the defects in fossil fuel products described herein, Plaintiff sustained and will continue to sustain the injuries and damages set forth in this Complaint, including, but not limited to, economic losses due to commercial fishery closures.

214. Defendants' wrongful conduct was oppressive, malicious, and fraudulent, in that their conduct was willful, intentional, and in conscious disregard for the rights of others. Defendants' conduct was so vile, base, and contemptible that it would be looked down upon and despised by reasonable people, justifying an award of punitive and exemplary damages in an amount subject to proof at trial, and justifying equitable disgorgement of all profits Defendants obtained through their unlawful and outrageous conduct.

215. Defendants' acts and omissions as alleged herein are indivisible causes of Plaintiff's injuries and damages as alleged herein.

216. Plaintiff is entitled to recover damages and other appropriate relief for the foregoing design defects.

217. Wherefore, Plaintiff prays for relief as set forth below.

FOURTH CAUSE OF ACTION

(Negligence)

(Against All Defendants)

218. Plaintiff incorporates by reference each and every allegation contained above, as though set forth herein in full.

219. Defendants knew or should have known of the climate effects inherently caused by the normal use and operation of their fossil fuel products, including the likelihood and likely severity of increased mean sea surface temperature, marine heatwaves, harmful algal blooms, and marine toxin outbreaks, and including Plaintiff's injuries and damages alleged herein.

220. Defendants, collectively and individually, had a duty to use due care in developing, designing, testing, inspecting and distributing their fossil fuel products. That duty obligated Defendants collectively and individually to, *inter alia*, prevent defective products from entering the stream of commerce, and prevent reasonably foreseeable harm that could have resulted from the ordinary use or reasonably foreseeable misuse of Defendants' products.

221. Defendants, and each of them, breached their duty of due care by, *inter alia*:

a. allowing fossil fuel products to enter the stream of commerce, despite knowing them to be defective due to their inevitable propensity to cause increased mean sea surface temperature, marine heatwaves, harmful algal blooms, marine toxin outbreaks, and related injuries;

b. failing to act on the information and warnings they received from their own internal research staff, as well as from the international scientific community, that the unabated extraction, promotion and sale of their fossil fuel products would result in material dangers to the public, including to Plaintiff;

c. failing to take actions including but not limited to pursuing and adopting known, practical, and available technologies, energy sources, and business practices that would have mitigated their greenhouse gas pollution and eased the transition to a lower carbon economy; shifting to non-fossil fuel

products, and researching and/or offering technologies to mitigate CO_2 emissions in conjunction with sale and distribution of their fossil fuel products; and pursuing other available alternatives that would have prevented or mitigated the injuries to Plaintiff caused by increased mean sea surface temperature, marine heatwaves, harmful algal blooms, and marine toxin outbreaks that Defendants, and each of them, knew or should have foreseen would inevitably result from use of Defendants' fossil fuel products;

d. engaging in a campaign of disinformation regarding global warming and the climatic effects of fossil fuel products that prevented customers, consumers, regulators, and the general public from staking steps to mitigate the inevitable consequences of fossil fuel consumption, and incorporating those consequences into either short-term decisions or long-term planning.

222. Defendants' individual and collective acts and omissions were actual, substantial causes of increased mean sea surface temperature, marine heatwaves, harmful algal blooms, marine toxin outbreaks, and related consequences, including Plaintiff's injuries and damages set forth herein, because the oceanographic conditions that caused Plaintiff's injuries would not have happened, or would not have reached expanse and toxicity that they did, but for Defendants' introduction of their fossil fuel products into the stream of commerce.

223. Defendants' individual and collective acts and omissions were proximate causes of increased mean sea surface temperature, marine heatwaves, harmful algal blooms, marine toxin outbreaks, and their consequences, including Plaintiff's injuries and damages set forth herein. No other act, omission, or natural phenomenon intervened in the chain of causation between Defendants' conduct and Plaintiff's injuries and damages, or superseded Defendants' breach of their duties' substantiality in causing Plaintiff's injuries and damages.

224. As a direct and proximate result of Defendants' and each of their acts and omissions, Plaintiff sustained and will continue to sustain injuries and damages as set forth herein.

225. Defendants' acts and omissions as alleged herein are indivisible causes of Plaintiff's injuries and damages as alleged herein.

226. Defendants' wrongful conduct was oppressive, malicious, and fraudulent, in that their conduct was willful, intentional, and in conscious disregard for the rights of others. Defendants' conduct was so vile, base, and contemptible that it would be looked down upon and despised by reasonable people, justifying an award of punitive and exemplary damages in an amount subject to proof at trial, and justifying equitable disgorgement of all profits Defendants obtained through their unlawful and outrageous conduct.

227. Plaintiff is entitled to recover damages and other appropriate relief for the foregoing negligent conduct.

228. Wherefore, Plaintiff prays for relief as set forth below.

FIFTH CAUSE OF ACTION

(Negligence – Failure to Warn)

(Against All Defendants)

229. Plaintiff incorporates by reference each and every allegation contained above, as though set forth herein in full.

230. Defendants knew or should have known, based on information passed to them from their internal research divisions and affiliates and/or from the international scientific community, of the climate effects inherently caused by the normal use and operation of their fossil fuel products, including global warming, and the likely increases in frequency and severity of increased mean sea surface temperature, marine heatwaves, harmful algal blooms, marine toxin outbreaks, and the consequences of those phenomena, including Plaintiff's injuries and damages described herein.

231. Defendants knew or should have known, based on information passed to them from their internal research divisions and affiliates and/or from the international scientific community, that the climate effects described above rendered their fossil fuel products dangerous, or likely to be dangerous, when used as intended or misused in a reasonably foreseeable manner.

232. Throughout the times at issue, Defendants failed to adequately warn any consumers or any other party of the climate effects that inevitably flow from the use or foreseeable misuse of their fossil fuel products.

233. Throughout the times at issue, Defendants individually and in concert widely disseminated marketing materials, refuted the generally accepted scientific knowledge at the time, advanced pseudo-scientific theories of their own, and developed public relations materials that prevented reasonable consumers from recognizing the risk that fossil fuel products would cause grave climate changes, undermining and rendering ineffective any warnings that Defendants may have also disseminated.

234. Given the grave dangers presented by the climate effects that inevitably flow from the normal use or foreseeable misuse of fossil fuel products, a reasonable extractor, manufacturer, formulator, seller, or other participant responsible for introducing fossil fuel products into the stream of commerce, would have warned of those known, inevitable climate effects.

235. Defendants' conduct was a direct and proximate cause of Plaintiff's injuries and a substantial factor in the harms suffered by Plaintiff as described in this Complaint.

236. Defendants' acts and omissions as alleged herein are indivisible causes of Plaintiff's injuries and damages as alleged herein.

237. Defendants' wrongful conduct was oppressive, malicious, and fraudulent, in that their conduct was willful, intentional, and in conscious disregard for the rights of others. Defendants' conduct was so vile, base, and contemptible that it would be looked down upon and despised by reasonable people, justifying an award of punitive and exemplary damages in an amount subject to proof at trial, and justifying equitable disgorgement of all profits Defendants obtained through their unlawful and outrageous conduct.

238. Plaintiff is entitled to recover damages and other appropriate relief for the foregoing negligent failure to warn.

239. Wherefore, Plaintiff prays for relief as set forth below.

VII. PRAYER FOR RELIEF

WHEREFORE, Plaintiff prays for judgment against Defendants as follows:

1. Compensatory damages in an amount according to proof;

2. Equitable relief, including abatement of the nuisance described herein;

3. Reasonable attorneys' fees pursuant to California Code of Civil Procedure 1021.5 or otherwise;

4. Punitive damages;

5. Disgorgement of profits;

6. Costs of suit; and

7. For such and other relief as the court may deem proper.

Dated: November 14, 2018

SHER EDLING LLP

By: _____

VICTOR M. SHER
MATTHEW K. EDLING
TIMOTHY R. SLOANE
KATIE H. JONES
MARTIN D. QUIÑONES
MEREDITH S. WILENSKY

Attorneys for Pacific Coast Federation of Fishermen's Associations Inc.

VIII. JURY DEMAND

Plaintiff demands a jury trial on all issues so triable.

Dated: November 14, 2018

SHER EDLING LLP

By: _____

VICTOR M. SHER
MATTHEW K. EDLING
TIMOTHY R. SLOANE
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Attorneys for Pacific Coast Federation of Fishermen's Associations Inc.

UNITED STATES DISTRICT COURT
WESTERN DISTRICT OF WASHINGTON
AT SEATTLE

COLUMBIA RIVERKEEPER, et al., Plaintiffs, v. SCOTT PRUITT, et al., Defendants.	Case No. C17-289RSM ORDER RE: MOTIONS FOR SUMMARY JUDGMENT

This matter comes before the Court on the Parties' Cross Motions for Summary Judgment. Dkts. #19 and #31. For the reasons stated below, the Court GRANTS IN PART Plaintiffs' Motion and DENIES Defendant's Motion.

I. BACKGROUND

A. Salmon and Other At-risk Fish of the Columbia and Snake Rivers

The Columbia River is the largest river in the Pacific Northwest, with the Snake River as its largest tributary. The Columbia flows more than 1,200 miles from its source in the Canadian Rockies to the Pacific Ocean. *See* Dkt. #1 at 9. The Snake River forms in Wyoming and flows over 1,000 miles across Southern Idaho, along the Idaho-Oregon border, and through Eastern Washington. Dkt. #1 at 9. The drainage basin of the Columbia and Snake Rivers extends into

seven U.S. states and up into Canada, encompassing an area roughly the size of France. *See* Dkt. #31 at 16-17.

Today, the Columbia and lower Snake Rivers are native habitat to multiple species of salmon and steelhead trout. Dkts. #1 at 9, #19 at 9-11, and #31 at 17. The Columbia River Basin once held the largest salmon populations in the world, with the Snake River historically sustaining at least a third of those salmon runs. *See* Dkt. #31 at 9. However, populations of these salmon and steelhead have since declined, with 13 species or populations in the Columbia and Snake River now being listed as "endangered" or "threatened" under the Endangered Species Act, and several populations having now gone extinct. Dkt. #19 at 11. Currently, 65 percent of remaining populations are listed at "high risk" of extinction, while only 6.5 percent are listed as "viable" or "highly viable." *Id.*

Salmon and steelhead native to the Columbia and Snake Rivers hatch in fresh water and migrate downstream to the Pacific Ocean as juveniles, returning as adults to the same river tributaries to spawn. Dkt. #1 at 9. These fish species are generally suited to cold-water, and depend on cold water temperatures for migration, spawning, and rearing. Dkt. #31 at 17. During their trips up and down the Columbia and Snake Rivers, these salmon and steelhead are particularly vulnerable to harm caused by warm water temperatures, specifically as the water reaches or exceeds 68° Fahrenheit ("F") for extended periods. Dkts. #19 at 6 and #31 at 18. When water temperatures approach 68° F, adult salmon have difficulty migrating upstream, and at 72-73° F, migration stops altogether. *Id*. Salmon that have stopped or slowed in their migration may end up staying in the warm water, where they are at risk of death, disease, decreased spawning productivity, and delayed spawning. Dkt. #27-14 at 23-25.

The parties agree that much of the focus for potential causes of increases in water temperature in both the Columbia and Snake Rivers appropriately lies on the presence of dams and point source dischargers located on both rivers. *See* Dkt. #31 at 17. There are a number of federal and non-federal dams on both rivers, with the federal dams operating for a variety of purposes, including hydroelectric power, flood risk management, navigation, and fish and wildlife conservation. *Id*. In addition, as of 2003, there were around 100 point source dischargers on the two rivers. *Id*.

In recent years, water temperature in the Columbia and Snake Rivers has consistently exceeded 68° F, especially during the summertime salmon and steelhead runs, presenting a problem for the continued survival of those native fish populations. Dkts. #1 at 10 and #19 at 7 and 9-10. Temperature issues are projected to worsen as the effects of human activities and climate change continue to increase water temperatures, negatively impacting the ability of salmon and steelhead to successfully migrate to and from the Pacific Ocean to spawn. *Id*. The presence of these high water temperatures led the states of Washington and Oregon to place and maintain both rivers on their respective Clean Water Act ("CWA") § 303(d) lists of impaired waters. Dkt. #27-22 at 10 and 24.

B. Washington and Oregon States' 303(d) Programs

The State of Washington prepared its first 303(d) list in 1994, placing segments of the Columbia and lower Snake Rivers on that list in 1998. *See* Dkt. #31 at 14-15. Presently, 40 of 77 segments of the Columbia River and 9 of 19 segments of the Snake River are listed as having an impaired water temperature under Washington's current water temperature standards. *Id*. at 15. The current Washington water temperature standards require that temperatures must stay below 60.8-68° F depending upon the time of year, location, and fish present. *Id*.

The State of Oregon first listed segments of the Columbia and lower Snake Rivers on its own 303(d) list in 1996. *Id*. at 16. At present, the entire length of the Columbia River in Oregon is listed as impaired by temperature. *Id*. Oregon's current water temperature standards range from 55.4° F for some fish spawning areas from the months of October to April, to 68° F year-round. *Id*.

Both Washington and Oregon's water temperature standards include "natural conditions criteria" for temperature, which provide that "if the natural temperatures in the water body exceed the numeric biologically-based criteria, then the natural temperatures constitute the applicable temperature criteria for that water body." *Id*. at 15-16. While the Environmental Protection Agency ("EPA") approved both states' natural condition criteria in the past, that EPA approval was overruled in part after litigation in Oregon, and is currently involved in pending litigation in Washington. *Id*.

C. The 2000 Memorandum of Agreement and State-EPA Agreements on TMDL Responsibilities

After both Washington and Oregon listed the Columbia and Snake Rivers on their respective 303(d) lists, the EPA, Washington, Oregon, and Idaho signed a Memorandum of Agreement ("MOA"). Dkt. #27-15. The MOA was signed on October 16, 2000, and outlined a cooperative multi-state and federal approach to address temperature related impairments in the two rivers. *Id*.

The main focus of the MOA was to "document a mutual understanding on the approach and roles among Idaho [Department of Environmental Quality], Washington [Department of Ecology], Oregon [Department of Environmental Quality], EPA Region X, and the Columbia Basin Tribes to complete a total dissolved gas and temperature Total Maximum Daily Load

(TMDL) for the mainstem[1] Columbia and Snake Rivers." *Id.* at 5. Further describing the approach to be taken, the MOA outlines that the EPA "will produce," a TMDL for temperature for the Snake/Columbia Mainstem in cooperation with the States. *Id*. at 8. Each state, under the MOA, is required to produce the TMDL for total dissolved gas ("TDG") in cooperation with the dam operators for their water-ways within their boundaries. *Id*. Additionally, each state is designated to assist the EPA with the production of "significant portions" of the implementation plans for the temperature TMDL, particularly with regards to those sections related to non-point sources. *Id*. at 9.

On April 16, 2001, the EPA prepared a Work Plan designed to outline the key dates associated with drafting and finalizing the TMDL in accordance with the MOA, as well as the roles of the EPA and the States in that process. Dkt. #27-17. In the Work Plan, the EPA outlined that the EPA would take the lead for developing the temperature TMDL, and the States would be responsible for issuing that TMDL. *Id*. at 5. The States, on the other hand, would be solely responsible for taking the lead in developing and issuing the TDG TMDL for their waters. *Id*.

Further, while the EPA "oversees the entire 303(d)/TMDL process with responsibility for approving or disapproving state issued 303(d) lists and TMDLs," under the Work Plan "[i]f EPA disapproves a State TMDL, EPA is required to develop a TMDL to replace the disapproved one." *Id*. The Work Plan set the date for the submission of the draft TMDL at February 1, 2002, and the release of the final TMDL in July or August of 2002. *Id*. at 3.

[1] Mainstem is defined in common-usage as a "main channel," such as, the "main course of a river or stream." *See Definition of Main Stem*, MERRIAM-WEBSTER.COM, https://www.merriam-webster.com/dictionary/main%20stem (last visited October 16, 2018).

D. The 2003 Draft Temperature TMDL and Current Developments

On September 4, 2001, Washington State, through its Department of Ecology, wrote to EPA Region X seeking clarification on which agencies would lead, develop, and produce the temperature and TDG TMDLs. Dkt. #27-18 at 2. In that letter Washington sought to clarify its expectations that the EPA would lead the development of, and issue the TMDLs for Washington, so that Washington state could then implement those EPA-issued TMDLs. *Id*. Oregon State submitted its own letter to the EPA on October 4, 2001, echoing the Washington State letter and requesting that the EPA issue the TMDL, so that the state could then implement that EPA-issued TMDL in Oregon. Dkt. #27-20 at 2-3.

In a January 15, 2002, letter written to the Columbia River Inter-Tribal Fish Commission, the EPA responded to a request regarding the status of the TMDLs, indicating that its role in that process was to conduct technical analysis, issue a federal TMDL, and approve or disapprove the TDG TMDLs submitted by Oregon and Washington. Dkt. #27-21 at 2. The EPA letter specially addressed the requests of the two states in defining its actions, stating: "at the request of the states of Oregon and Washington, EPA will be doing the technical analysis and issuing temperature TMDLs for the Columbia/Snake River Mainstem in Oregon and Washington." *Id*.

Just under one month later, on February 12, 2003, Washington and Oregon wrote a joint letter to the Council on Environmental Quality, a federal executive administrative agency, expressing the understanding of both States that they would be taking the lead on the TDG TMDL, while the EPA would be taking the lead on the temperature TMDL. Dkt. #27-23 at 2. In a March 18, 2003, document entitled "EPA Strategy for Consultation and Coordination with Indian Tribal Government for Completing Mainstem Columbia River and Snake River

TMDLs," the EPA included a section noting that it was currently working in coordination with the states of Oregon and Washington to develop TDG and temperature TMDLs in the Columbia and Snake Rivers. Dkt. #27-24 at 2. The document specifically states, "at the request of the states of Oregon and Washington, EPA will be doing the technical analysis and issuing temperature TMDLs for the Columbia/Snake River Mainstem in Oregon and Washington." *Id*.

Finally, in July 2003, the EPA released a "Preliminary Draft" of the temperature TMDL for the Columbia and Snake Rivers. Dkt. #27-22. In the draft, the EPA noted that while the responsibility for development of TMDLs generally falls to the States, because of the interstate and international nature of the waters, its relationship with tribal-trust duties, and the technical expertise required, the EPA had agreed to take responsibility in this case. *Id*. at 7. Outlining further steps in the plan toward issuing the final TMDL, the draft states that after being released it would undergo a 90 day public comment period, where, after consideration of public comments and appropriate changes, the EPA would issue the final temperature TMDL for the Columbia and Snake River Mainstem. *Id*.

Since July 2003, the EPA has not issued a final temperature TMDL, indicating in an internal EPA document that the EPA worked "extensively on a draft TMDL until late 2003," with that work then suspended due to disagreements between federal agencies at the national level. Dkt. #27-25 at 2. In a February 20, 2007, letter from the EPA to the U.S. Army Core of Engineers, the EPA acknowledged that it remained responsible for development of the temperature TMDL for the mainstem Columbia and Snake Rivers. Dkt. #27-26 at 2.

Since 2003, the native salmon and steelhead populations of the Columbia and Snake Rivers have continued to be affected by warm water temperatures. In 2015, warm water temperatures in the Columbia and Snake Rivers were responsible for the deaths of roughly

250,000 migrating adult sockeye salmon. Dkt. #12 at 2. Of those migrating salmon, upper Columbia River sockeye had the lowest survival rate in the past six years, and endangered Snake River sockeye had a survival rate of only four percent, down from the 44-77 percent survival rates of the past five years. Dkt. #27-9 at 4. Native steelhead populations have been similarly affected, with predictions on the 2017 run indicating that it had "collapsed," and with the Idaho Department of Fish and Game for the first time prohibiting anglers from taking Snake River steelhead. Dkts. #22 at 5 and #25 at 5.

After the instant litigation had begun, the EPA sent a letter to the states of Oregon, Washington, and Idaho, dated August 10, 2017, requesting a modification of the MOA, so that direct work on the final TMDL could be resumed. Dkt. #18-1 at 2. In its letter, the EPA states that changed circumstances involving technology, natural conditions, and legal challenges to previous EPA and state standards necessitate a modification to the MOA prior to the EPAs ability to issue any final temperature TMDL. *Id*. at 2-7.

II. DISCUSSION

A. Legal Standard for Summary Judgment

Summary judgment is appropriate where "the movant shows that there is no genuine dispute as to any material fact and the movant is entitled to judgment as a matter of law." Fed. R. Civ. P. 56(a); *Anderson v. Liberty Lobby, Inc.*, 477 U.S. 242, 247 (1986). Material facts are those which might affect the outcome of the suit under governing law. *Anderson*, 477 U.S. at 248. In ruling on summary judgment, a court does not weigh evidence to determine the truth of the matter, but "only determine[s] whether there is a genuine issue for trial." *Crane v. Conoco, Inc.*, 41 F.3d 547, 549 (9th Cir. 1994) (citing *Federal Deposit Ins. Corp. v. O'Melveny & Meyers*, 969 F.2d 744, 747 (9th Cir. 1992)).

On a motion for summary judgment, the court views the evidence and draws inferences in the light most favorable to the non-moving party. *Anderson*, 477 U.S. at 255; *Sullivan v. U.S. Dep't of the Navy*, 365 F.3d 827, 832 (9th Cir. 2004). The Court must draw all reasonable inferences in favor of the non-moving party. *See O'Melveny & Meyers*, 969 F.2d at 747, *rev'd on other grounds*, 512 U.S. 79 (1994). However, the nonmoving party must make a "sufficient showing on an essential element of her case with respect to which she has the burden of proof" to survive summary judgment. *Celotex Corp. v. Catrett*, 477 U.S. 317, 323 (1986).

B. Clean Water Act

The Court will address Plaintiffs' Motion for Summary Judgment first. Plaintiffs argue that the EPA has violated the CWA, 33 U.S.C. § 1313(d)(2), by failing to issue a TMDL for the Columbia and lower Snake Rivers. Plaintiffs contend that Washington and Oregon have made a "constructive submission" to the EPA under the CWA by clearly and unambiguously indicating that they will not produce a TMDL. Dkt. #19 at 11 (citing *Sierra Club v. McLerran*, No. 11-cv-1759-BJR, 2015 WL 1188522 at *7 (W.D. Wash. Mar. 16, 2015). Evidence of this can be found in the 2000 MOA, which provided that "EPA will produce" the temperature TMDL, *see* Dkt. #27-15 at 7, and subsequent letters to the EPA in the fall of 2001 where Washington and Oregon requested the EPA to issue the TMDL, *see* Dkts. #27-18 and #27-20. Once a constructive submission occurs, the EPA has a mandatory duty under the CWA to disapprove the constructively submitted TMDL within 30 days and to issue a TMDL within 30 more days; if the EPA fails to take these steps, the courts can order the EPA to prepare a TMDL under the CWA. *Id.*; *Alaska Ctr. for Env't v. Reilly*, 762 F. Supp. 1422, 1429 (W.D. Wash. 1991) ("*ACE I*"). Plaintiffs assert that the 2000 MOA and the other correspondence above serve as evidence

of this constructive submission, and that the EPA has therefore violated the CWA by failing to issue a timely TMDL.

The EPA argues that the constructive submission theory does not apply here. Dkt. #31 at 25.[2] The agency argues that this judicial theory has been adopted by the Ninth Circuit "only with respect to wholesale programmatic failures by a state to submit any TMDLs." *Id*. (citing *Baykeeper v. Whitman*, 297 F.3d 877, 882 (9th Cir. 2002)). The EPA also cites to *Friends of the Wild Swan, Inc. v. EPA*, 130 F. Supp. 2d 1184, 1190-91 (D. Mont. 1999), *Idaho Sportsmen's Coal. v. Browner*, 951 F. Supp. 962, 967-968 (W.D. Wash. 1996), and several out of circuit cases. *Id*. at 29–30. The EPA argues that finding a constructive submission of a single, particular TMDL "would run counter to the intent of Congress – which allowed states to set priorities – and to the implicit limitations recognized by courts in adopting and applying the theory over the last three decades." *Id*. at 31. The EPA points out that Washington and Oregon have been busy issuing 2,800 other TMDLs during this time period. *Id.* at 32. The EPA further argues that Plaintiffs are citing dicta in *Sierra Club v. McLerran*. *Id*. at 32–33. Citing *Alaska Center for Environment v. Browner*, 20 F.3d 981, 985 (9th Cir. 1994), the EPA states:

> The Ninth Circuit has, therefore, already weighed the question at bar here: whether the constructive submission theory allows individual plaintiffs or interest groups to pick and choose particular TMDLs that they determine are of the highest priority, notwithstanding express statutory language giving state officials the authority to set that prioritization to best advance the interests of all their citizens. The Ninth Circuit concluded that it does not. Because the *McLerran* dicta is at odds with the Ninth Circuit's conclusion that compelling particular TMDLs impermissibly interferes with state prioritization, it must be rejected.

[2] The EPA also argues that the constructive submission theory is a legal fiction, an exercise in judicial lawmaking, contrary to the intent of Congress, and unlawful except as applied in *Baykeeper, infra*. The Court acknowledges these arguments, but will rely on Ninth Circuit precedent permitting the application of this theory. *See City of Arcadia v. U.S. EPA*, 411 F.3d 1103 (9th Cir. 2005); *Sierra Club*, 2015 WL 1188522 at *6.

Id. at 35. The EPA argues that "Plaintiffs have failed to identify a single court that has found a constructive submission triggering EPA's obligations under Section 303(d)(2) as to a particular TMDL." *Id*. at 36. The EPA goes on, "[t]he theory, to the extent it is lawful, is an extraordinary and extra-statutory gloss reserved for only the most egregious instances of state refusal to participate in the Clean Water Act's statutory scheme." *Id*. The EPA also argues that, even if the Court were to apply the constructive submission theory to this case, Plaintiffs' claims fail as a factual matter because "the state's actions [do not] clearly and unambiguously express a decision not to submit TMDLs." *Id*. at 36 (quoting *Baykeeper*, 297 F.3d at 882). The EPA goes through the documents and communications cited by Plaintiffs and detailed above. *Id*. at 36–46. Finally, the EPA argues that "should this Court find merit in Plaintiffs' non-discretionary duty claim, the relief afforded must be limited to an order to approve or disapprove the constructive submissions and may not extend to an order to issue the TMDL." *Id*. at 50. As stated previously, the EPA has a duty under the CWA to disapprove the constructively submitted TMDL within 30 days and to issue a TMDL within 30 more days, only if those deadlines are missed can the Court order the EPA to issue the TMDL

Plaintiffs retort that "every court that has specifically considered this issue has concluded that the [constructive submission] doctrine applies to individual TMDLs." Dkt. #33 at 7. Plaintiffs rely on *Scott v. City of Hammond*, 741 F.2d 992 (7th Cir. 1984); *City of Arcadia, supra*; *Hayes v. Whitman*, 264 F.3d 1017, 1023 (10th Cir. 2001); *Sierra Club*, *supra*; *Ohio Valley Envt'l. Coal. v. McCarthy*, No. 3:15-0271, 2017 WL 600102, *9–*10 (S.D. W.Va. Feb. 14, 2017) (*OVEC I*); *Ohio Valley Envt'l. Coal. v. Pruitt*, No. 3:15-0271, 2017 WL 1712527 (S.D. W.Va. May 2, 2017) (*OVEC II*); and *Las Virgenes Municipal Water District v. McCarthy*, C 14-01392 SBA, 2016 WL 393166 (N.D. Cal. Feb. 1, 2016). Plaintiffs say that, despite

"Washington's and Oregon's otherwise-robust TMDL programs," "the temperature TMDL is not on, and has not been on, Washington's or Oregon's mandatory TMDL development schedules" for a reason—the States asked the EPA to prepare and issue the TMDL previously. *Id*. at 14. Plaintiffs argue that the 19-year delay since Washington and Oregon placed temperature-impaired segments of the Columbia and lower Snake Rivers on their CWA 303(d) "impaired waters" lists is itself sufficient evidence of a "prolonged failure" amounting to constructive submission. *Id*. at 15 (citing *City of Arcadia*, 411 F.3d at 1105–06; *ACE I*, 762 F. Supp. at 1429).

The EPA also filed a Reply brief in support of their cross-motion, largely repeating previous arguments. Dkt. #35. The EPA contends that the Ninth Circuit's view on the constructive submission theory is "apparent" and that it "does not allow a plaintiff to compel issuance of a specific TMDL where a state is otherwise engaged in TMDL development and complying with Congress' command that it issue TMDLs 'from time to time.'" Id. at 3–4. The EPA requests supplemental briefing in a footnote. *Id*. at 12 n.4.

Plaintiffs filed a surreply moving to strike the EPA's request for additional briefing. Dkt. #38. The Court agrees that, procedurally speaking, the EPA's request is improperly contained in a reply brief and contrary to the joint litigation schedule. Accordingly, the Court will not consider this request.

The CWA and Ninth Circuit law provide for the constructive submission doctrine to apply when a state completely fails to issue TMDLs. *See Baykeeper, supra*. However, the Court is convinced that the EPA is misconstruing *Baykeeper* by arguing that a "complete failure by [the states] to submit TMDLs" is required. *See Baykeeper*, 297 F.3d at 881–882. The following dicta in *Sierra Club v. McLerran* provides the correct analysis of the instant situation:

Defendants assert that a constructive submission occurs only when a state produces few or no TMDLs for the whole state over a substantial period of time: If a state has a robust TMDL program, its decision to abandon a particular TMDL does not trigger the EPA's non-discretionary duty. Doc. No. 91 at 27. The Court questions this narrow interpretation of the doctrine for the reasons set forth below.

In making this argument, Defendants rely on *BayKeeper*'s holding and language, which focused on the state-wide TMDL program. This reliance is misplaced. The issue in *BayKeeper* was whether California's failure to produce a significant number of TMDLs constituted a programmatic failure for the entire state. *Id*. at 880–82. Clearly, California's producing several TMDLs and committing to more demonstrates that California had not abandoned its TMDL program. *See id*. However, the question here is whether Washington has abandoned a specific component of its CWA obligations—a question that was not before the *BayKeeper* court and one not resolved by looking to a state's general compliance. Accordingly, the Court finds it insignificant that the Ninth Circuit did not address an issue not raised by the facts of the case. Moreover, far from foreclosing the application of the constructive submission doctrine to a particular pollutant or waterbody segment, the *BayKeeper* court cited with approval to *Scott*, which applied the constructive submission doctrine to TMDLs for a particular waterbody segment, Lake Michigan. *See BayKeeper*, 297 F.3d at 882 (characterizing ruling as "consistent" with *Scott*).

….

Applying the constructive submission doctrine to individual TMDLs does not invade state prioritization. A constructive submission occurs only when a state has clearly and unambiguously abandoned its obligation to produce a TMDL or TMDLs. *See, e.g., San Francisco BayKeeper*, 297 F.3d at 883; *see also Alaska Ctr. for the Env't*, 762 F.Supp. at 1427(constructive submission when Alaska clearly and unambiguously abandoned its TMDL obligation). It does not occur merely because a state has prioritized one TMDL over another. *See Hayes*, 264 F.3d at 1024.

….

More importantly, while a state's failure to produce any TMDLs is perhaps the clearest indication that it has abandoned its statutory obligations, the Court finds nothing in the text of the CWA or its

> purpose to support Defendants' contention that a state's abandonment of a specific statutory obligation should be treated differently from a state's wholesale failure. To the contrary, a state's discretion to prioritize TMDLs over other TMDLs does not remove its ultimate obligation to produce a TMDL for each water pollutant of concern in every 303(d) water segment. *See* 33 U.S.C. § 1313(d)(2). In light of this statutory obligation, it would be absurd for the Court to hold that a state could perpetually avoid this requirement under the guise of prioritization; such an administrative purgatory clearly contravenes the goal and purpose of the CWA. 33 U.S.C.A. § 1251(a)(1) ("it is the national goal that the discharge of pollutants into the navigable waters be eliminated by 1985").

Sierra Club v. McLerran, 2015 WL 1188522 at 6–7. The Court adopts this analysis and finds that the constructive submission doctrine does apply when a state abandons an individual TMDL.

Turning to the particular facts of this case, the Court agrees with Plaintiffs that the EPA has violated the CWA by failing to issue a TMDL for the Columbia and lower Snake Rivers. Considering the 2000 MOA and all the subsequent communications between the states and the EPA, cited above, the Court concludes that Washington and Oregon have clearly and unambiguously indicated that they will not produce a TMDL for these waterways. Whether rightly or wrongly, they placed the ball in the EPA's court, and the subsequent 17-year delay is strong evidence that the states have abandoned any initial step the EPA could possibly be awaiting. Recent communication between the EPA and the states indicates a desire to further delay this process. The Court agrees with Plaintiffs that there are key factual differences between this case and *Sierra Club v. McLerran*, including an insufficient basis for the states and the EPA to pivot away from issuing a temperature TMDL in 2003 and the sheer number of years that have elapsed in this case. *See* Dkt. #33 at 16–20. Accordingly, a constructive submission of "no TMDL" has occurred, but the EPA has failed to undertake its mandatory duty

to issue a temperature TMDL under the CWA. *See* 33 U.S.C. § 1313(d)(2). The Court will grant summary judgment on Plaintiffs' first claim.

C. Unreasonable Delay under the APA

Plaintiffs next contend that the EPA has violated the Administrative Procedure Act ("APA") by failing to act for over 17 years. Dkt. #19 at 14–20. The Court need not address this claim, having found that the EPA has violated the CWA.

D. Defendant EPA's Cross-Motion for Summary Judgment

Having reached the rulings above, the Court finds it can deny EPA's Motion at this time.

E. Requested Relief

Plaintiffs request that the Court order the EPA to issue a temperature TMDL by a date certain, preferably within one year of this Order. Dkt. #19 at 20 (citing to 33 U.S.C. § 1365(a)(2); 5 U.S.C. § 706(1)). The Court agrees with the EPA that Plaintiffs are limited to the remedy provided under the applicable and specific waiver of sovereign immunity, and that the Court can only order the EPA to perform "any act or duty . . . which is not discretionary with the Administrator." Dkt. #31 at 47 (citing 33 U.S.C. § 1365(a)(2)). The Court thus agrees with the EPA's requested relief, and the applicable law; the EPA thus has 30 days from the date of this Order to approve or disapprove the constructively submitted TMDL, and, if disapproved, 30 days after the disapproval to issue a new TMDL. *See* 33 U.S.C. § 1313(d)(2). The Court does not see how the EPA can approve the constructively submitted TMDL consistent with its obligations under the CWA. Plaintiffs warn the Court that "based on EPA's track record and its August 2017 letter inviting further delay, it is unlikely EPA would take such prompt action and would instead try to further delay critical work on temperature in the Columbia and Snake

Rivers." Dkt. #33 at 37. The Court believes that the parties can and should work together to resolve this issue and avoid further Court action.

III. CONCLUSION

Having reviewed the relevant briefing and the remainder of the record, the Court hereby finds and ORDERS that:

1) Plaintiffs' Motion for Summary Judgment, Dkt. #19, is GRANTED IN PART. The EPA has 30 days from the date of this Order to approve or disapprove the constructively submitted TMDL at issue in this case, and 30 days after a disapproval to issue a new TMDL.

2) Defendant EPA's Motion for Summary Judgment, Dkt. #31, is DENIED.

DATED this 17 day of October, 2018.

RICARDO S. MARTINEZ
CHIEF UNITED STATES DISTRICT JUDGE

Exhibit 48

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PRIMARY RESEARCH ARTICLE

WILEY Global Change Biology

Elevated CO_2 impairs olfactory-mediated neural and behavioral responses and gene expression in ocean-phase coho salmon (*Oncorhynchus kisutch*)

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Abstract

Elevated concentrations of CO_2 in seawater can disrupt numerous sensory systems in marine fish. This is of particular concern for Pacific salmon because they rely on olfaction during all aspects of their life including during their homing migrations from the ocean back to their natal streams. We investigated the effects of elevated seawater CO_2 on coho salmon (*Oncorhynchus kisutch*) olfactory-mediated behavior, neural signaling, and gene expression within the peripheral and central olfactory system. Ocean-phase coho salmon were exposed to three levels of CO_2, ranging from those currently found in ambient marine water to projected future levels. Juvenile coho salmon exposed to elevated CO_2 levels for 2 weeks no longer avoided a skin extract odor that elicited avoidance responses in coho salmon maintained in ambient CO_2 seawater. Exposure to these elevated CO_2 levels did not alter odor signaling in the olfactory epithelium, but did induce significant changes in signaling within the olfactory bulb. RNA-Seq analysis of olfactory tissues revealed extensive disruption in expression of genes involved in neuronal signaling within the olfactory bulb of salmon exposed to elevated CO_2, with lesser impacts on gene expression in the olfactory rosettes. The disruption in olfactory bulb gene pathways included genes associated with GABA signaling and maintenance of ion balance within bulbar neurons. Our results indicate that ocean-phase coho salmon exposed to elevated CO_2 can experience significant behavioral impairments likely driven by alteration in higher-order neural signal processing within the olfactory bulb. Our study demonstrates that anadromous fish such as salmon may share a sensitivity to rising CO_2 levels with obligate marine species suggesting a more wide-scale ecological impact of ocean acidification.

KEYWORDS
GABA, ocean acidification, olfactory bulb, olfactory rosette, salmon

1 | INTRODUCTION

The substantial rise in atmospheric CO_2 observed over the past 100 years has led to increased concentrations of dissolved CO_2 in marine waters, resulting in lowered pH, a process known as ocean acidification (OA). The degree of pH change and the rate at which these changes are occurring may ultimately exceed many marine organism's ability to adapt to this changing environment (Hoegh-Guldberg & Bruno, 2010). Marine biota have evolved to live in ocean waters with a consistent range in chemical composition, and therefore, even small changes in mineral content, pH, and/or temperature outside of the normal range can have large impacts on marine organisms at different life stages (Fabry, Seibel, Feely, & Orr, 2008; Kroeker et al., 2013; Marshall et al., 2017). Hard corals, hard-shelled mollusks, and plankton are among the more well-known examples of marine organisms that are sensitive to shifts in water chemistry induced by elevated CO_2 (Busch, Maher, Thibodeau, & McElhany, 2014; Hofmann et al., 2010; Orr et al., 2005).

While the effects of elevated CO_2 on calcifying organisms such as corals and mollusks have received considerable attention, the possible effects of elevated CO_2 on the neurophysiology and behavior of marine fish are an increasing concern (Ashur, Johnston, & Dixson, 2017). Elevated CO_2 has been linked to abnormal neuronal and behavioral responses in several species of marine fish including effects on auditory function (Simpson et al., 2011), vision (Chung, Marshall, Watson, Munday, & Nilsson, 2014; Ferrari et al., 2012), lateralization (Domenici, Allan, McCormick, & Munday, 2011), and elevated anxiety (Hamilton, Holcombe, & Tresguerres, 2014). In particular, a number of studies have implicated changes in CO_2 and pH levels on altered olfactory-mediated behaviors in marine fish from both tropical and temperate environments (Chivers et al., 2014; Cripps, Munday, & McCormick, 2011; Devine, Munday, & Jones, 2012; Dixson, Munday, & Jones, 2010; Ferrari et al., 2012; Hamilton et al., 2014; Leduc, Munday, Brown, & Ferrari, 2013; Miller, Watson, Donelson, McCormick, & Munday, 2012; Porteus et al., 2018).

The olfactory system is critical for many aspects of a fish's life including locating appropriate habitat, finding prey, avoiding predators, social and reproductive interactions with conspecifics, orientation, and navigation (Dittman & Quinn, 1996; Gerlach, Atema, Kingsford, Black, & Miller-Sims, 2007; Hara, 1992; McIntyre, Baldwin, Beauchamp, & Scholz, 2012; Quinn, 2011; Yambe et al., 2006). Fish rely on their olfactory system for survival, and any olfactory impairment may have profound effects on wild fish populations (Baldwin, Sandahl, Labenia, & Scholz, 2003; Sandahl, Baldwin, Jenkins, & Scholz, 2007). The olfactory system in most fish consists of a peripheral sensory epithelium (olfactory rosette) that connects directly to the olfactory bulb. Odorants in the environment bind to receptors on olfactory sensory neurons in the sensory epithelia, eliciting axon potentials that send a signal to the olfactory bulb. At the olfactory bulb, the signal is modulated and relayed to secondary neurons and higher brain centers, ultimately leading to behavioral responses (Hamdani & Doving, 2007). Neural signaling within this complex process, from odorant detection to behavioral outcome, is highly dependent upon tightly controlled ion gradients across neuronal membranes (Schild & Restrepo, 1998) and is highly sensitive to changes in water chemistry (Tierney et al., 2010).

Elevated CO_2-mediated interference of olfactory function could have profound effects on marine fish survival. For example, tropical reef fish exposed to CO_2 concentrations predicted to occur within the next 50–100 years demonstrated altered responses to odors that allowed fish to discriminate healthy reef habitat and that facilitated homing and dispersal (Devine et al., 2012; Munday et al., 2009). Furthermore, elevated CO_2 levels altered normal avoidance responses of fish to predator odors and chemical alarm cues (Dixson et al., 2010; Welch, Watson, Welsh, McCormick, & Munday, 2014) and interfered with prey detection abilities in reef predators (Cripps et al., 2011) and sharks, a group of fish known for their reliance on their highly sensitive olfactory system (Dixson, Jennings, Atema, & Munday, 2014). Finally, OA-related conditions interfered with the process of olfactory learning by reef fish (Ferrari et al., 2012). Several studies have extended these findings to directly demonstrate that CO_2-mediated interference of olfactory function may have direct effects on survival (Dixson et al., 2010; Ferrari et al., 2015). However, if a fish is exposed to elevated CO_2 and survives to successfully reproduce, recent research on multigenerational effects of parental exposure to elevated CO_2 has shown that offspring can exhibit enhanced resistance to the effects of elevated CO_2 (Allan, Miller, McCormick, Domenici, & Munday, 2014; Murray, Malvezzi, Gobler, & Baumann, 2014; Schunter et al., 2017; Welch & Munday, 2017; Welch et al., 2014).

Pacific salmon are a critical component of Pacific Northwest coastal ecosystems (Quinn, 2011). Anadromous (rear in saltwater but spawn in freshwater) salmon populations may be particularly impacted by ecosystem changes (Crozier et al., 2008) because they rely on both the freshwater and marine environment for different life cycle stages (Quinn, 2011). In this respect, salmon, and other anadromous fishes, may be particularly interesting species to study in the context of the sensitivity or resistance to the effects of elevated CO_2 because elevated CO_2 is likely to have different physiological effects in freshwater and saltwater. Some obligate marine fish species (e.g., benthic dwellers) have displayed a potential resistance to the effects of elevated CO_2 on neuronal function and behavior due to the seawater chemistry of their preferred habitat (Hamilton et al., 2017; Jutfelt & Hedgärde, 2015; Schmidt et al., 2017). While some initial studies have examined the effects of elevated CO_2 on salmon in freshwater (Ou et al., 2015), there are no studies to date that have investigated the neural and behavioral responses of ocean-phase, juvenile salmon to elevated CO_2 in the marine environment. In this study, we examined the potential effects of elevated CO_2 on olfactory-mediated behaviors and the potential mechanisms underlying these behavioral changes in coho salmon (*Oncorhynchus kisutch*) adapted to saltwater. Proper olfactory function is critical for all aspects of a salmon's life cycle, especially during their extraordinary homing migrations, wherein they use olfactory cues to identify their natal stream (Dittman & Quinn, 1996). Therefore, even minor impairment of olfactory function due to OA may ultimately have profound

effects on salmon survival and population sustainability in the Pacific Ocean. We hypothesized that elevated CO_2, at levels predicted to occur over the next 50–100 years, would significantly alter behaviors, neuronal signaling, and gene expression in the olfactory system of coho salmon.

2 | MATERIALS AND METHODS

2.1 | Animals and housing

Coho salmon for these experiments were the offspring of anadromous adults spawned at the Washington Department of Fish and Wildlife's Issaquah Creek Hatchery, Issaquah, WA, USA. Experimental fish were transferred as embryos from the Issaquah Hatchery in January 2016 and 2017, reared in freshwater at the Northwest Fisheries Science Center until undergoing the parr–smolt transformation (1.5 year of age; 15.0 g ± 5.7 g), and then transferred to saltwater at the Northwest Fisheries Science Center's Mukilteo Marine Research Station (Mukilteo, WA, USA) on May 5, 2016, and May 24, 2017. After transfer to saltwater, fish were maintained under a natural photoperiod and fed BioVita Fry Feed (Bio-Oregon, Longview, WA). Water quality, fish health, and water delivery systems were monitored daily in fresh and salt water. All animal care and procedures were in accordance with University of Washington's Institutional Animal Care and Use Committee rules and approval, protocol # 4097-1.

2.2 | Seawater chemistry/exposures

Maintenance of seawater CO_2 concentrations followed previously described methodologies (Busch et al., 2014). Exposures consisted of three different CO_2 concentrations, including a control (ambient) nominal concentration of 700 μatm, which approximates the present-day average value of CO_2 in Puget Sound Marine Waters (Reum et al., 2015), a medium CO_2 level (nominal concentration of 1,600 μatm) predicted to periodically occur over the next 50 years, and a high CO_2 level (nominal concentration of 2,700 μatm) predicted to periodically occur over the next 100 years (Busch et al., 2014). Duplicate exposure tanks (2 foot diameter × 2 foot high, 178-L cylindrical tanks) for each treatment were maintained as a flow-through system, supplied by a unique head tank for each exposure tank (Supporting Information Figure S1). Water turnover rate was approximately once every hour. Source water for the head tanks was pumped from a depth of 60 feet from Puget Sound, degassed, and filtered prior to CO_2 manipulation. A Honeywell universal data analyzer controller and Durafet pH probe monitored and maintained the pH via CO_2 injection within each head tank. Target pH levels (as measured on a total pH scale) were 7.8 for control, 7.5 for medium, and 7.2 for high CO_2 exposure levels. To ensure proper water chemistry was maintained throughout exposures, water samples were collected from each exposure tank three times during each experiment (day 0, day 7, and day 14) for measurement of total alkalinity (TA) and dissolved inorganic carbon (DIC). Water samples were analyzed at the NOAA Pacific Marine Environmental Laboratory using standard test procedures for all analyses (Dickson, Sabine, & Christian, 2007). Water temperature, pH, and salinity were checked daily throughout the experiment. Water temperature in the exposure tanks remained at 12°C for the duration of the exposures. The ambient water temperature of the source water from Puget Sound averaged 11–12°C at the time of the exposures.

The start of the exposures was staggered over a month for logistical reasons to allow for behavioral and neurophysiological testing following each of the 14-day exposures. To begin the experiment, fish were transferred from their rearing tanks to their exposure tanks (n = 4 fish/tank) and acclimated for 24 hr in 700 μatm CO_2 control water. After acclimation, fish were exposed to experimental CO_2 levels for 14 days and tested for behavioral responses (n = 48 fish/treatment). A subset of these fish (n = 24) was used for electro-olfactogram (EOG)/electroencephalogram (EEG) neurophysiological and RNA-Seq (n = 8 fish per treatment) analysis.

2.3 | Odorant preparation

To investigate the effects of elevated CO_2 on olfactory-mediated salmon behavior, we used salmon skin extract, a prototypical predation odor that elicits a reliable and measurable avoidance response (Brown & Smith, 1997; Sandahl et al., 2007; Williams et al., 2016). Salmon skin extract was prepared as described previously with minor modifications (Williams et al., 2016). Briefly, skin tissue collected from coho salmon was homogenized in artificial seawater (Instant Ocean, Blacksburg, VA), filtered, and centrifuged to remove particulates. Protein content of the skin extract was determined using the Bradford assay (Bio-Rad, Hercules, CA), and stock concentrations were normalized to 2.4 mg/ml protein concentration in artificial seawater and stored at −80°C until needed. Working stocks of L-alanine and L-serine (Sigma-Aldrich, St. Louis, MO) for use in the EOG and EEG analysis were prepared on the day of use in artificial seawater. Working concentrations of the odorants were as follows: 10 μg/L skin extract (behavioral analysis), 2.4 mg/L skin extract (EOG and EEG analysis), and 10^{-2} M L-alanine and L-serine (EOG and EEG analysis). A higher concentration of the skin extract was used for electrophysiological analysis than for behavioral analysis due to the fact that measurable neuronal signal intensity is reduced in ocean-phase salmon due to the effect of high saltwater conductivities on electrophysiological recording (Sommers, Mudrock, Labenia, & Baldwin, 2016).

2.4 | Behavioral analysis

Following the 14-day exposure, behavioral analysis was conducted as previously described (Williams & Gallagher, 2013) using two-choice mazes surrounded by a black curtain and illuminated from below with infrared light to minimize stress. Each maze (100 × 40 × 25 cm) consisted of two arms (50 cm long and 20 cm wide) that terminated at a holding chamber (40 × 40 cm). A perforated gate separated the arms from the holding chamber. A dye test

confirmed that no mixing between the arms occurred. The maze received water (flow rate of 3 L/min) from the same head tanks used to generate the exposure water, thus ensuring that salmon were tested in the same water chemistry they experienced during exposures. Individual coho salmon from each CO_2 treatment (n = 48) were allowed to acclimate for 10 min in the holding chamber, and then behaviors were recorded for 10 min prior to odorant addition. After the 10-min pre-odor period, skin extract (10 µg/L) was delivered into one arm (randomized each trial) using a peristaltic pump and behaviors were recorded for an additional 10 min. An overhead infrared light-sensitive video camera (EverFocus® EQ900, Duarte, CA) provided video recordings of the behavioral responses. Proportion of time spent on odor side of the maze was analyzed using EthoVision XT 10 behavioral software (Noldus, Leesburg, VA). Following each behavioral trial, each maze was flushed with exposure water (without odorants) for 20 min.

Differences in response to CO_2 exposure were evaluated with a beta regression model that included CO_2 exposure and pre-odor period movement as covariates using the "betareg" R package (Zeileis, Cribari-Neto, Gruen, & Kosmidis, 2016). We selected a final model based on Akaike information criterion (AIC) comparison of models with CO_2 exposure and pre-odor fraction alone and as interactions. Bootstrap 95% prediction intervals on the beta regression-modeled treatment means were calculated based on 5,000 resamples using the "boot" R package (Canty & Ripley, 2017).

2.5 | Neurophysiological analysis

EOG and EEG recordings were performed the day after behavioral testing using methods previously described with minor modifications (Baldwin & Scholz, 2005). Fish were anesthetized with 50 mg/L tricaine methanesulfonate (MS-222; Western Chemicals Inc., WA) and injected intramuscularly with gallamine triethiodide (0.3 mg/kg body weight; Sigma-Aldrich, MO). A small tube inserted in the fish's mouth delivered artificial seawater (10°C) containing MS-222 (50 mg/L) to their gills. A gravity-fed glass capillary tube perfused the rosette with artificial seawater at a rate of 2 ml/min. Fish were acclimated for 5 min before the start of electrophysiological recordings. The recording microelectrode was placed at the midline of the rosette at the base of the posterior lamella for EOGs, and against the surface of the right mediodorsal cluster of the olfactory bulb for EEGs (Figure 1). Because there is spatial variation in responsiveness to different odorants in the olfactory bulb, before the start of the experimental recording, the location of the maximal EEG responses to the odorants was determined for each individual by positioning the microelectrode at different points across the olfactory bulb. The two regions that gave the most consistent signal were used as the recording sites for the entire experiment. A reference electrode was placed on the midline of the posterior-dorsal surface of the head, and a ground electrode was placed in the caudal muscle during recordings. Odorant-induced neural signals were acquired and filtered with an AC/DC amplifier (A-M Systems Inc.® Model 3000, Sequim, WA). Seawater/odors were delivered to the rosette using gravity-assisted flow, regulated by electronic valves and into a single manifold output through a thermoelectric chiller (temp 10°C). Fish received three pulses of each odorant (skin extract, L-serine, and L-alanine) with 2-min intervals between pulses. Based on an averaged and integrated recorded response curve, the amplitude of each EOG response was measured in microvolts (µV) as the maximum evoked peak minus the prestimulus basal activity level. Based on an averaged and integrated recorded response curve, the maximum odorant-evoked response for the EEG was the peak signal amplitude minus the prestimulus basal activity level. Signal duration for the EEG responses was calculated from the moment an odorant-induced signal was detected until the moment the signal returned to basal (pre-odor) levels. Triplicate responses to each odorant were averaged to produce a single response value for each odorant. EEGs were not performed on the medium CO_2 exposure group due to the logistics of the procedure, that is, length of time needed for each fish on the rig and number of fish that could be

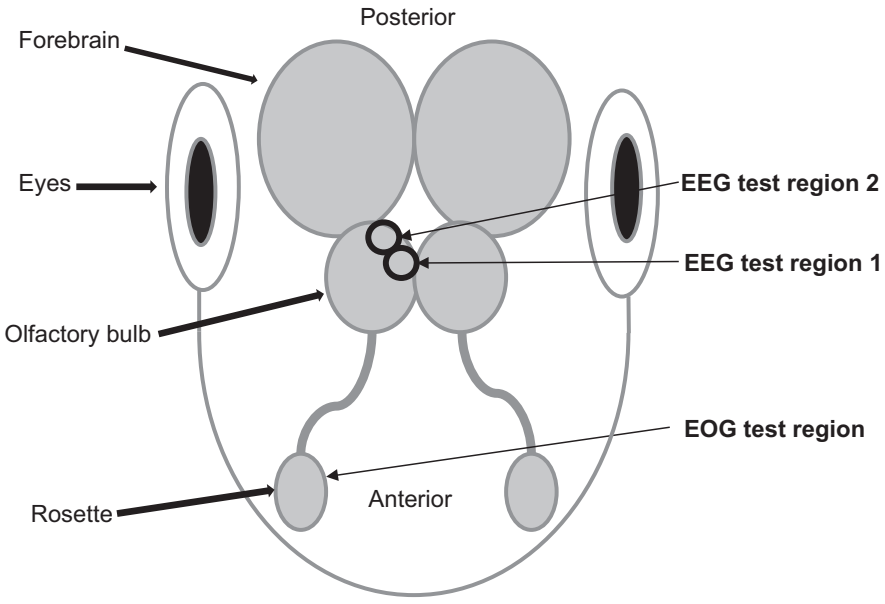

FIGURE 1 Diagram of salmon olfactory system and test sites used for EOG and EEG analysis of odorant-induced signals following exposures to varying levels of CO_2

recorded each day. Example EOG and EEG traces are located in Supporting Information Figure S2.

For the EOG analysis, a one-way ANOVA was used to test for significant differences between control and exposure groups, followed by a Dunn's multiple comparison test. For the EEG analysis, a *t* test was used to test for differences between control and high exposure groups. All analyses were done using GraphPad Prism 5 software. Differences were considered significant at $p < 0.05$.

2.6 | RNA-Seq analysis

Olfactory rosette and bulb tissues were collected from $n = 5$ individuals from the control, medium, and high CO_2 exposure groups following EOG analysis. Tissues were immediately stored in RNA*later*® before being frozen at −80°C (Thermo Fisher Scientific, Waltham, MA).

2.6.1 | RNA QC

RNA purity was assessed measuring $OD_{260/280}$ and $OD_{260/230}$ ratios with a NanoDrop ND-1000 Spectrophotometer (Thermo Fisher Scientific, Waltham, MA). RNA integrity was determined using the Agilent RNA 6000 Nano Kit with an Agilent 2100 Bioanalyzer (Agilent Technologies, Santa Clara, CA). All RNA samples were of appropriate size, quantity, and quality ($OD_{260/280}$ and $OD_{260/230}$ ratios of 1.8–2.1) and were used for RNA-Seq analysis ($n = 5$ for each exposure group/tissue).

2.6.2 | Sample processing and sequencing

cDNA libraries were prepared from 1 μg of total RNA using the TruSeq Stranded mRNA kit (Illumina, San Diego, CA) and the Sciclone NGSx Workstation (Perkin Elmer, Waltham, MA). Prior to cDNA library construction, ribosomal RNA was removed by means of poly-A enrichment. Each library was uniquely barcoded and subsequently amplified using a total of 13 cycles of PCR. Library concentrations were quantified using Qubit fluorometric quantitation (Life Technologies, Carlsbad, CA). Average fragment size and overall quality were evaluated with the DNA 1000 assay on an Agilent 2100 Bioanalyzer. Each library was sequenced with paired-end 100 bp reads to a minimum depth of 30 million reads on an Illumina HiSeq 4000. The average number of reads was 44.99 ± 6.47 million (mean ± *SE*) from olfactory rosette samples and 46.11 ± 4.41 million from olfactory bulb samples (Supporting Information Table S1).

We aligned the reads for each sample to the Atlantic salmon (*Salmo salar*) transcriptome (NCBI ICSASG_v2 build, downloaded 9/29/2017) using the Salmon aligner, accounting for GC, and sequencing bias (Patro, Duggal, & Kingsford, 2015; Patro, Duggal, Love, Irizarry, & Kingsford, 2017). Although there is a completed genome and transcriptome for coho salmon available (https://www.ncbi.nlm.nih.gov/genome/13127?genome_assembly_xml:id=309046), the functional Gene Ontology (GO) annotation for this species is not well developed relative to that for Atlantic salmon. Therefore, we chose to align the RNA-Seq data against the Atlantic salmon transcriptome, because the alignment results were similar between the two species (*S. salar*—60% of reads mapped; *O. kisutch*—73% of reads mapped). The aligned counts were imported into R (r-project.org) using the Bioconductor tximport package and then summarized at the gene level (Soneson, Love, & Robinson, 2015). We excluded any gene that was not expressed in at least four samples (i.e., any gene that had fewer than ten counts in less than four samples), to remove any data that were likely to be primarily noise. We then fit a generalized linear model with a negative binomial link function using the Bioconductor edgeR package and made comparisons between groups using likelihood ratio tests. We selected differentially expressed genes based on a false discovery rate (FDR) of 0.1 (i.e., we expect that at most 10% of the selected genes are false positives). To identify biological function that may have been perturbed due to changes in CO_2 exposure, we computed Fisher's exact tests based on GO terms, selecting those terms with a *p*-value <0.05.

3 | RESULTS

3.1 | Exposure water chemistry

Measured pH values for each exposure were consistent across the experiments and varied little within each exposure over the course of each experiment (standard deviation ≤0.03; Table 1). pH values from the Durafet sensors were consistent with discrete spectrophotometric measurements of pH from each exposure tank. Alkalinity in all exposure conditions, within and across experiments, was similar. Mean temperature in the exposure tanks ranged from 11.9–12.8°C, with small variation in each treatment over each experiment (standard deviation ≤0.2°C).

3.2 | Effects of elevated CO_2 on salmon behaviors

Using AIC analysis, the beta regression model containing only the interaction term between the CO_2 treatment and the pre-odor behavior covariate was selected ($p < 0.001$; pseudo-$R^2 = 0.24$) (Figure 2, Supporting Information Figure S3). This model indicated that fish exposed to control CO_2 levels avoided the side of the maze scented with skin extract (Figure 2, 26.7% ± 3.6% of time in odor (mean ± *SE*)), while fish that experienced the medium (Figure 2, 35.0% ± 4.5% of time in odor) and high (Figure 2, 52.3% ± 5.5% of time in odor) CO_2 treatments did not show a significant attraction or avoidance to the alarm odor. Individual fish from the medium and high CO_2 treatments tended to move around the maze less during the 20-min trials compared to controls. Conversely, fish in the control CO_2 treatment did not show a reduced tendency to explore the maze during the trial.

3.3 | Effects of elevated CO_2 on olfactory neurophysiological function

Neuronal responses in the olfactory epithelium to skin extract, L-alanine, and L-serine, as measured by EOG, were not affected by prior

TABLE 1 Water chemistry parameters

Exposure	Dates	Head tank	Salinity (psu)	Temperature (°C)	System pH		(µatm)pCO_2*	Ω_a*	TA (µmol/kg)	DIC (µmol/kg)
					Durafet setting	Spec				
1	8/18–9/23/16	A	29.9 ± 0.2	12.9 ± 0.4	7.2	7.2 ± 0.01	2,848.6 ± 143.9	0.31 ± 0.02	2,055.8 ± 11.4	2,127.4 ± 6.9
		B	29.9 ± 0.2	12.7 ± 0.2	7.8	7.8 ± 0.03	807.2 ± 16.2	0.98 ± 0.00	2,058.3 ± 12.4	2,001.4 ± 15.7
		A + B	29.9 ± 0.2	12.9 ± 0.3	7.5	7.4 ± 0.01	1,739.8 ± 28.3	0.49 ± 0.01	2,057.4 ± 12.1	2,083.1 ± 16.2
		C	29.9 ± 0.2	12.8 ± 0.3	7.2	7.3 ± 0.09	2,728.4 ± 15.6	0.32 ± 0.00	2,058.0 ± 11.9	2,137.9 ± 20.1
		D	29.9 ± 0.2	12.8 ± 0.2	7.8	7.8 ± 0.03	748.0 ± 72.0	1.05 ± 0.07	2,057.7 ± 11.9	1,994.5 ± 23.6
		C + D	29.9 ± 0.2	12.9 ± 0.2	7.5	7.4 ± 0.02	1,679.9 ± 83.1	0.51 ± 0.02	2,057.1 ± 11.8	2,078.7 ± 26.4
2	7/12–8/29/17	A	29.4 ± 0.3	11.9 ± 0.4	7.8	7.8 ± 0.03	630.1 ± 38.2	1.10 ± 0.03	2,017.5 ± 34.2	1,932.3 ± 37.3
		B	29.4 ± 0.2	12.0 ± 0.4	7.2	7.2 ± 0.08	2,698.4 ± 47.2	0.30 ± 0.01	2,016.7 ± 36.9	2,089.6 ± 29.8
		A + B	29.4 ± 0.2	12.0 ± 0.4	7.5	7.5 ± 0.05	1,424.3 ± 27.4	0.54 ± 0.00	2,019.0 ± 34.5	2,014.5 ± 34.3
		C	29.4 ± 0.2	11.7 ± 0.3	7.8	7.8 ± 0.03	636.9 ± 70.3	1.10 ± 0.08	2,005.2 ± 48.8	1,931.3 ± 40.3
		D	29.4 ± 0.2	11.8 ± 0.2	7.2	7.2 ± 0.00	2,587.7 ± 75.5	0.31 ± 0.00	2,015.4 ± 32.5	2,087.1 ± 29.0
		C + D	29.4 ± 0.2	11.9 ± 0.2	7.5	7.4 ± 0.01	1,565.9 ± 65.9	0.50 ± 0.00	2,018.4 ± 35.2	2,032.0 ± 39.3

Notes. DIC: dissolved inorganic carbon; Spec.: spectrophotometer; TA: total alkalinity.
*Ω_a and pCO_2 values were calculated via the "seacarb" package in R studio using data from DIC analysis and pH measured via spectrophotometry.

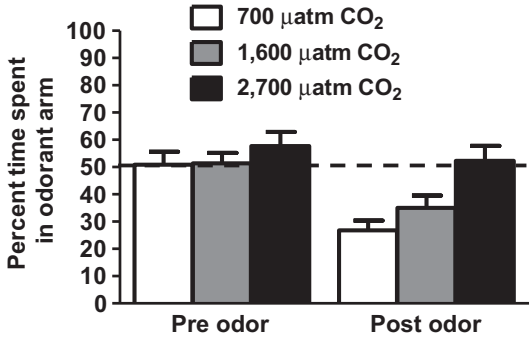

FIGURE 2 Behavioral responses to skin extract (alarm odor) odorant following CO_2 exposures. 700 µatm is the control CO_2 exposure level, 1,600 µatm is the medium CO_2 exposure level, and 2,700 µatm is the high CO_2 exposure level. Percent time juvenile coho salmon spent in the side of a two-choice maze receiving skin extract odorant before (pre-odor) and after (post-odor) introduction of the odorant. Dashed line indicates 50% level. All data represent mean ± *SEM* of n = 48 individuals

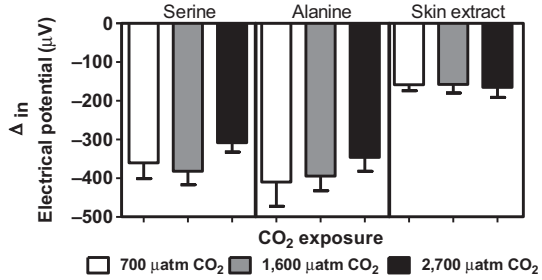

FIGURE 3 Electro-olfactogram (EOG) recorded responses of odorant-induced signaling within the olfactory rosettes of coho salmon exposed to three levels of CO_2. 700 µatm is the control CO_2 exposure level, 1,600 µatm is the medium CO_2 exposure level, and 2,700 µatm is the high CO_2 exposure level. Bars indicate the magnitude of the odorant-induced response relative to background water recorded from the olfactory epithelium. All data represent a mean ± *SEM* of n = 12 individuals

exposure to elevated CO_2 (Figure 3). However, EEG recordings revealed significant differences in peak odor-induced signaling in the right mediodorsal cluster (Figure 1, test region 1) of the olfactory bulbs of control and high CO_2 exposure coho salmon (p = 0.0068 and F = 4.754, Figure 4). High CO_2 exposure increased the mean peak signal amplitude of responses in this bulb region to skin extract (49.6% ± 39.1% increase (mean ± *SD*) and L-alanine (59.1% ± 78.7% increase) relative to responses in control fish (Figure 4a). Furthermore, the duration of EEG responses to skin extract and L-alanine tended to be longer in coho salmon exposed to high CO_2 levels compared to control fish (20.1 ± 4.0 s vs. 16.2 ± 6.5 s and 18.5 ± 4.4 s vs. 14.1 ± 5.0 s, respectively), but this difference was not significant (Figure 4b). Peak odor signal (skin extract: 0.024 ± 0.014 vs. 0.028 ± 0.015; L-alanine: 0.017 ± 0.008 vs. 0.021 ± 0.013) and duration (skin extract: 15.7 ± 4.8 s vs. 19.59 ± 5.9 s; L-alanine: 14.1 ± 4.4 s vs. 16.9 ± 9.5 s) in the right mediodorsal cluster test region 2 did not significantly differ between high CO_2 and control fish for either test odor (Figure 5) suggesting that CO_2 effects are specific to discrete bulbar regions and neurons.

3.4 | Effects of elevated CO_2 on gene expression in the salmon olfactory system

There were significant changes in gene expression in the olfactory system of coho salmon exposed to elevated CO_2. In particular, we observed considerable change in gene expression within the olfactory bulbs following exposure to the high CO_2 level (over 800 differentially expressed genes) relative to controls (Figure 6, Supporting

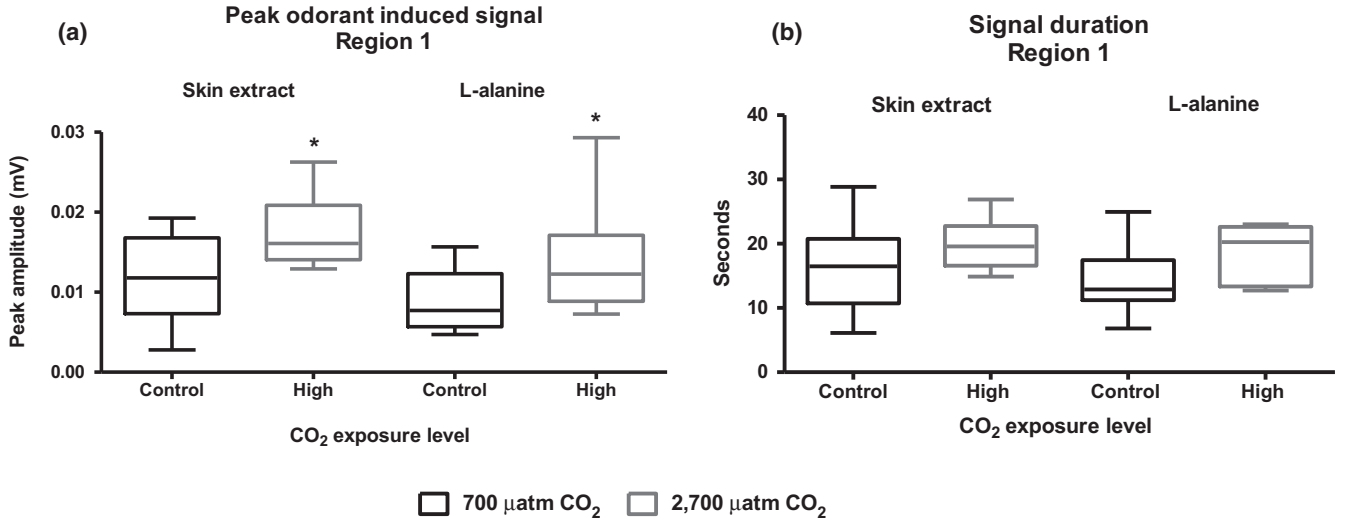

FIGURE 4 Electroencephalogram (EEG) recording data of odorant-induced signaling in test region one of the olfactory bulb from salmon exposed to two levels of CO_2. Data represented as a box and whisker plot showing median peak amplitude with whiskers representing the 5th and 95th percentile. 700 µatm is the control CO_2 exposure level, and 2,700 µatm is the high CO_2 exposure level. (a) Peak odorant-induced signaling by L-alanine and skin extract (alarm odor). (b) Duration of odorant-induced signaling by L-alanine and skin extract (alarm odor). Asterisks indicate significant differences between control and high exposure groups ($p \leq 0.05$)

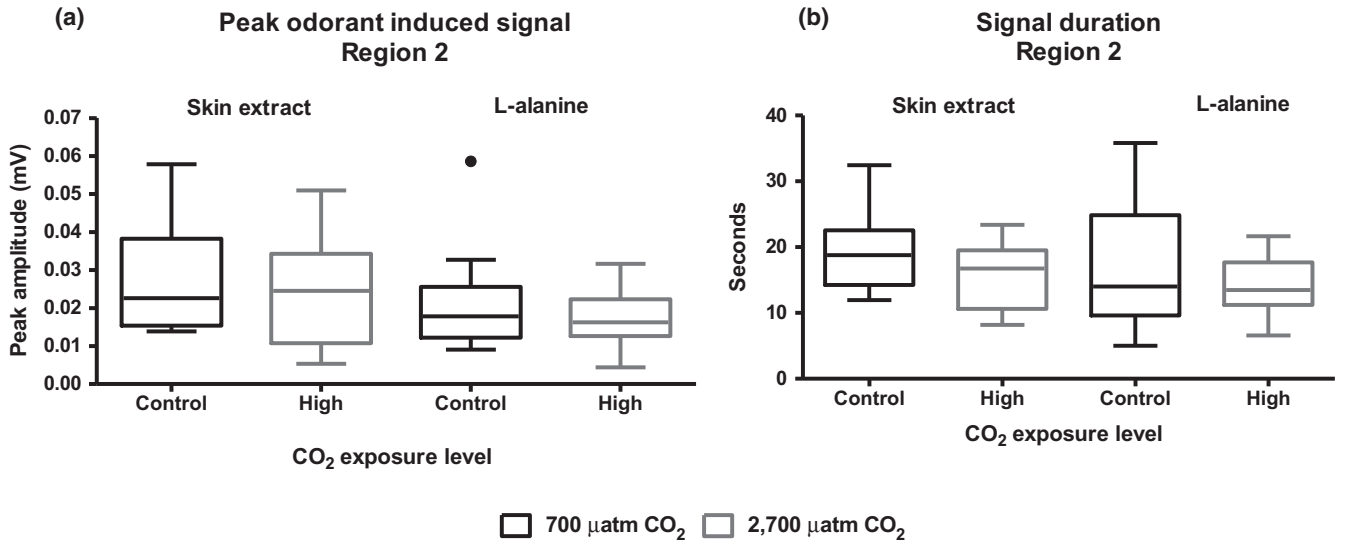

FIGURE 5 Electroencephalogram (EEG) recording data of odorant-induced signaling in test region two of the olfactory bulb from salmon exposed to two levels of CO_2. Data represented as a box and whisker plot showing median peak amplitude with whiskers representing the 5th and 95th percentile. 700 µatm is the control CO_2 exposure level, and 2,700 µatm is the high CO_2 exposure level. (a) Peak odorant-induced signaling by L-alanine and skin extract (alarm odor). (b) Duration of odorant-induced signaling by L-alanine and skin extract (alarm odor). The black dot indicates an outlier data point

Information Figure S4). A large number of these genes were involved in neural signaling/signal transduction, ion transport, and energy homeostasis (Supporting Information Figure S5). There were also significant differences in gene expression in the olfactory bulbs of medium CO_2 exposure fish relative to controls (61 differentially expressed genes) although these genes were predominantly associated with cytoskeletal function and not relevant to neural signaling. In contrast, there were relatively fewer changes in gene expression in the olfactory rosettes between control and medium (50 differentially expressed genes) or high exposure groups (20 differentially expressed genes) (Figure 6). None of the genes were significantly associated with olfactory neural signaling pathways.

We did not observe significant changes in gene expression of the GABA type A receptor, which has been hypothesized to play a role in CO_2-linked disruption of neuronal and behavioral signaling in marine fish (Schunter et al., 2017). Interestingly, however, the

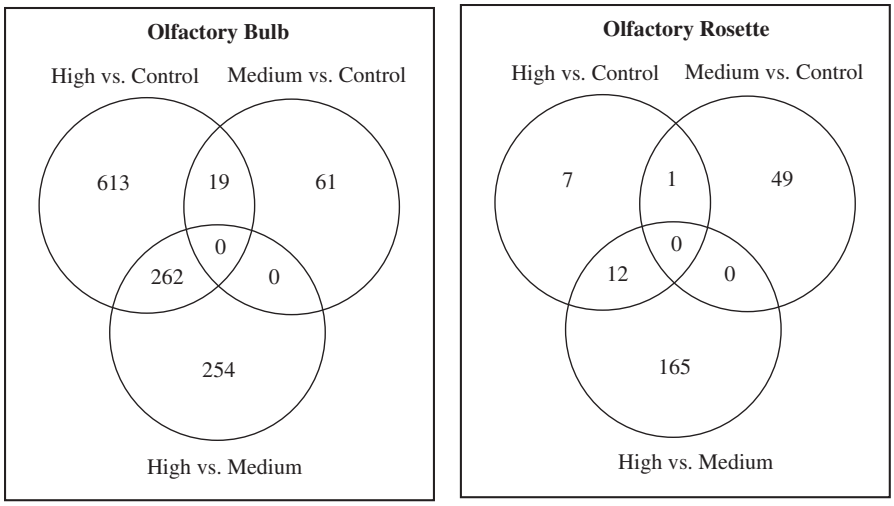

FIGURE 6 Venn diagram of RNA-Seq analysis of olfactory bulb and olfactory rosette gene expression in coho salmon exposed to three levels of CO_2. Venn diagrams show the number of significantly changed genes between each exposure group comparison. Numbers of genes listed in overlapping portion of the circles indicate number of significantly changed genes shared between each exposure comparison. Control = 700 μatm CO_2 exposure, Medium = 1,600 μatm CO_2 exposure, High = 2,700 μatm CO_2 exposure

expression of the GABA type B receptor subunit 2 (*gaba*$_{b2}$) was significantly elevated in the olfactory bulb following the high CO_2 exposure (Table 2, FDR <0.1). We also observed CO_2-induced changes in many other genes associated with GABA signaling, including increases in *hcn2*, *snap25*, and *kcc1*, which are associated with GABA-linked ion transport and synaptic activity, and significant decreases in expression of *slc6a13* and *aldh9a1*, two genes involved in GABA uptake and synthesis, respectively (Table 2). In addition to GABA signaling genes, other genes linked to neurotransmitter function (including glutamate and serotonin signaling), ion transport (*slc26a6*), G protein receptor function, neural differentiation, and melatonin production (*asmt* and *aanat*) displayed altered gene expression after elevated CO_2 exposure (Table 2). Genes important in neural energy production were also significantly altered following elevated CO_2 exposures, including a downregulation of the gene *slc22a16* (l-carnitine transport), and an upregulation of *slc2a6*, involved in glucose transport.

Interestingly, we also observed changes in gene expression of many genes associated with the photoreception system in the olfactory bulb of high exposure fish (Supporting Information Figure S5). Some of these genes included rhodopsin, parapinopsin, and various voltage-dependent ion channel genes. The reason for the inclusion of photoreception-related genes within the expression profile of the olfactory bulbs remains unclear; however, it is likely that genes involved in the olfactory and photoreception systems may share similar signal transduction function in both tissues. This hypothesis is supported by at least two other studies that reported the expression of olfactory genes in the visual system (Jovancevic et al., 2017; Pronin et al., 2014).

4 | DISCUSSION

Collectively, our results indicate that elevated CO_2 concentrations altered neural signaling pathways within the olfactory bulb and impaired olfactory-mediated behavioral responses of ocean-phase coho salmon. Given the primary need for a functional olfactory system for salmon living in the ocean to find prey, avoid predators, and ultimately find their natal stream during homing migrations, these results suggest that future predicted CO_2 concentrations in the ocean may have a profound effect on Pacific salmon and their ecosystems. Our behavioral results indicated that ocean-phase coho salmon were sensitive to acute exposures to elevated CO_2 concentrations that have been predicted to occur within the next 50–100 years. The strong avoidance behavior elicited by skin extract in the control group was decreased or eliminated in coho salmon exposed to either the medium (1,600 μatm) or high (2,700 μatm) CO_2 treatments. These results indicate that anadromous salmon may be just as sensitive to the effects of elevated CO_2 as obligate marine species that have shown behavioral impairments at similar [CO_2] levels (Chung et al., 2014; Devine et al., 2012; Hamilton et al., 2017, 2014; Munday et al., 2009; Porteus et al., 2018). While future oceanic CO_2 concentrations may not reach such high steady-state levels, exposures to transient CO_2 concentrations at these levels may already occur in some regions and will likely be more common. Juvenile coho salmon spend up to a year rearing in freshwater (Quinn, 2011) before migrating downstream to the ocean, undergoing the physiological transformation of smoltification that prepares them for life in seawater, including changes in osmoregulation and ion balance regulation (Maryoung et al., 2015; McCormick, 2012; Quinn, 2011). Our results suggest that despite having an adaptable olfactory system that functions in both marine and freshwater environments with very different pHs and water chemistries, the relative sensitivity of these anadromous fish to elevated CO_2 in the ocean is similar to other marine fish.

Tightly controlled ion balances play a key role in proper olfactory neuronal signaling, and it has been hypothesized that elevated CO_2-induced changes in transmembrane ionic gradients impair neuronal signaling and, ultimately, olfactory-mediated behaviors (Heuer, Welch, Rummer, Munday, & Grosell, 2016; Tresguerres & Hamilton, 2017). This is consistent with our analysis of neuronal signaling in the olfactory epithelium and the olfactory bulb. Elevated CO_2 did not alter neuronal responses to odorants in the olfactory epithelium suggesting that odorant-induced signaling within olfactory sensory neurons was not impacted following a shift in CO_2 concentration

TABLE 2 Significantly changed genes of relevance to neural function and signaling within the olfactory bulbs from coho exposed to high CO_2 vs. control CO_2

ENTREZID	Accession number	Gene name	Putative name	log_2 fold change	FDR
106562041	LOC106562041	Guanine nucleotide-binding protein subunit alpha-14-like	*gna14*	3.307	2.81197E−10
106574723	LOC106574723	Gamma-aminobutyric acid type B receptor subunit 2-like	*gabbr2*	2.645	9.1231E−06
106575665	LOC106575665	Cyclic nucleotide-gated channel cone photoreceptor subunit alpha-like	*cnga3*	2.660	0.000141938
106611384	LOC106611384	Synaptosomal-associated protein 25-B-like	*snap25*	1.883	0.000460991
106588157	LOC106588157	Potassium/sodium hyperpolarization-activated cyclic nucleotide-gated channel 2-like	*hcn*	3.968	0.00053587
106603743	LOC106603743	Glutamate receptor ionotropic, kainate 4-like	*grik4*	1.012	0.001089553
106569207	LOC106569207	Solute carrier family 12 member 7-like	*kcc1*	1.368	0.001601933
106602119	LOC106602119	Neuronal acetylcholine receptor subunit alpha-3-like	*chrna3*	2.201	0.001653337
106592065	LOC106592065	Neuronal acetylcholine receptor subunit alpha-3	*chrna3*	2.227	0.001665897
106573978	LOC106573978	Excitatory amino acid transporter 5-like	*slc1a7*	1.792	0.001803254
106577203	LOC106577203	Potassium voltage-gated channel subfamily H member 1-like	*kcnh7*	2.466	0.001981873
106584365	LOC106584365	Diencephalon/mesencephalon homeobox protein 1-like	*dmbx1*	4.100	0.002118515
106583073	LOC106583073	Guanine nucleotide-binding protein G(t) subunit alpha-2-like	*gnai2b*	2.588	0.002170767
106573780	LOC106573780	Solute carrier organic anion transporter family member 3A1-like	*slc21a11*	0.860	0.003012925
106572933	LOC106572933	Voltage-dependent L-type calcium channel subunit alpha-1D-like	*cacna1d*	2.282	0.003645407
106567981	LOC106567981	Neuropeptide Y receptor type 1-like	*npy1r*	−0.649	0.004204007
106605869	LOC106605869	Gamma-aminobutyric acid type B receptor subunit 2-like	*gabbr2*	1.773	0.004302948
106613596	LOC106613596	Excitatory amino acid transporter 5-like	*slc1a7*	3.902	0.004457749
106571997	LOC106571997	Guanine nucleotide-binding protein G(I)/G(S)/G(T) subunit beta-1	*gbb1*	0.574	0.004760336
106578273	LOC106578273	Vesicular glutamate transporter 1-like	*vglut1*	1.625	0.005044121
106607367	LOC106607367	Serotonin *N*-acetyltransferase-like	*aanat*	4.020	0.005443605
106600164	LOC106600164	Aldehyde dehydrogenase family 9 member A1-like	*aldh9a1*	−5.891	0.005486887
106573635	LOC106573635	Large neutral amino acids transporter small subunit 1-like	*slc7a5*	1.072	0.008210081
106572937	LOC106572937	Voltage-dependent L-type calcium channel subunit alpha-1F-like	*cacna1f*	1.879	0.008455018
106612651	LOC106612651	Sodium-dependent serotonin transporter-like	*slc6a4*	1.050	0.009377377
106587671	LOC106587671	Guanine nucleotide-binding protein subunit beta-5-like	*gnb5*	2.359	0.009479934
106561149	LOC106561149	Solute carrier organic anion transporter family member 3A1-like	*slc21a11*	1.019	0.011541751
106613200	LOC106613200	Short transient receptor potential channel 2-like	*trpc2*	−1.432	0.011879951
106572934	LOC106572934	Voltage-dependent L-type calcium channel subunit alpha-1D-like	*cacna1d*	1.807	0.01216225
106562494	LOC106562494	Guanine nucleotide-binding protein subunit beta-5-like	*gnb5*	1.104	0.012539596
106568477	cplx4	Complexin 4	*cplx4*	4.491	0.012892164
106611148	LOC106611148	Neurexin-1a	*nrxn1*	−0.464	0.015068892
106592915	LOC106592915	Regulator of G protein signaling 9-like	*rgs9*	3.017	0.015068892
106585038	LOC106585038	Phosphatidylinositol 4-phosphate 5-kinase type-1 beta-like	*pip5k1b*	−0.538	0.015068892
106560428	LOC106560428	Excitatory amino acid transporter 5-like	*slc1a7*	3.492	0.01547044
106612376	LOC106612376	Protein phosphatase 1A-like	*pp1*	2.488	0.017048588
106581568	LOC106581568	Guanylyl cyclase-activating protein 1-like	*guca1a*	3.316	0.018566427
106587958	LOC106587958	Sodium/potassium/calcium exchanger 1-like	*slc24a1*	2.005	0.019726988
106605751	LOC106605751	Neuronal pentraxin-1-like	*nptx1*	2.216	0.021659612
106561698	LOC106561698	Solute carrier organic anion transporter family member 1C1-like	*slco1c1*	3.137	0.022324012
106580796	slc6a4	Solute carrier family 6 member 4	*slc6a4*	2.050	0.022324012
106572384	LOC106572384	Sodium-coupled neutral amino acid transporter 3-like	*slc38a3*	2.164	0.023464354
106574495	LOC106574495	Guanine nucleotide-binding protein subunit alpha-11-like	*gna11*	−0.285	0.025017626
106579173	LOC106579173	Synaptotagmin-2-like	*syt2*	4.003	0.02540081

(Continues)

TABLE 2 (Continued)

ENTREZID	Accession number	Gene name	Putative name	log_2 fold change	FDR
106605091	LOC106605091	Guanine nucleotide-binding protein G(I)/G(S)/G(T) subunit beta-3-like	*gnb3*	2.403	0.026220179
106583542	LOC106583542	Sodium- and chloride-dependent GABA transporter 2-like	*slc6a13*	0.972	0.028452986
106603834	LOC106603834	Solute carrier family 22 member 5-like	*slc22a5*	−1.252	0.029247296
106587942	LOC106587942	Sodium/potassium/calcium exchanger 1-like	*slc24a1*	2.012	0.030142477
106561912	LOC106561912	Cyclic nucleotide-gated cation channel beta-1-like	*cngb1*	3.621	0.032324991
106607984	LOC106607984	Solute carrier family 22 member 16-like	*slc22a16*	1.073	0.03395494
106561031	gpr37	G protein-coupled receptor 37	*gpr37*	1.019	0.035891712
106564793	LOC106564793	Sodium/calcium exchanger 1-like	*slc8a1*	1.535	0.037274497
106597363	LOC106597363	Guanylyl cyclase-activating protein 2-like	*gcap2*	3.478	0.037274497
106566781	LOC106566781	Solute carrier family 26 member 6-like	*slc26a6*	1.458	0.042405183
106594011	LOC106594011	Sodium/potassium/calcium exchanger 1-like	*slc24a1*	2.008	0.045357056
106577267	LOC106577267	Neuronal pentraxin-1-like	*np1*	1.727	0.047487725
106581084	LOC106581084	G protein-activated inward rectifier potassium channel 3-like	*girk3*	3.466	0.048892792
106561886	kcnk5	Potassium two-pore domain channel subfamily K member 5	*kcnk5*	1.098	0.051870554
106591467	LOC106591467	Neuronal pentraxin receptor-like	*nptxr*	−0.435	0.054754969
106570824	LOC106570824	Neuroligin-3-like	*nlgn3*	−0.609	0.068821378
106561537	slc27a4	Solute carrier family 27 member 4	*slc27a4*	−0.341	0.06932593
106610602	slc4a1ap	Solute carrier family 4 member 1 adaptor protein	*slc4a1ap*	−0.254	0.070027446
106572936	LOC106572936	Voltage-dependent L-type calcium channel subunit alpha-1S-like	*cacna1s*	1.622	0.073257288
106600499	LOC106600499	Excitatory amino acid transporter 5-like	*slc1a7*	3.387	0.075511344
106564801	LOC106564801	Potassium voltage-gated channel subfamily H member 1-like	*kcnh1*	1.124	0.076952544
106586510	asmt	Acetylserotonin O-methyltransferase	*asmt*	4.053	0.078732281
106573300	LOC106573300	Guanylyl cyclase inhibitory protein-like	—	4.062	0.079046904
106588065	LOC106588065	Synaptic vesicle glycoprotein 2B-like	*sv2b*	3.356	0.079105596
106585781	slc2a6	Solute carrier family 2 member 6	*slc2a6*	−1.210	0.08829066
106584763	LOC106584763	Potassium voltage-gated channel subfamily C member 1-like	*kcnc1*	−0.601	0.097240875

Notes. Selected based on a FDR <0.1.
FDR: false discovery rate.

that was sufficient to cause behavioral impairments. These results differ from those recently reported for European sea bass (Porteus et al., 2018). The robustness of the EOG responses to altered CO_2 levels may reflect the ability of olfactory sensory neurons to modulate ionic balances while in direct contact with the ambient water because they must be able to detect odorants in the presence of shifting ion concentrations and water chemistries. In contrast, neurons in the olfactory bulb have evolved to function in the tightly controlled fluid chemistry of the central nervous system and may be more sensitive to potential changes in extracellular fluid chemistry (Abbott, Patabendige, Dolman, Yusof, & Begley, 2010; Somjen, 2002). Our EEG recordings support this hypothesis, as elevated CO_2 exposures increased the amplitude, and tended to increase the duration of odorant-induced responses within specific regions of the olfactory bulb. This CO_2-induced increase in excitatory signaling is consistent with the hypothesis that disruption of neuronal signaling in marine fish is associated with disruption of inhibitory GABA signaling (Nilsson et al., 2012; Tresguerres & Hamilton, 2017). Specific odorant-generated signals in the olfactory bulb guide odorant perception and downstream behaviors. Alteration of this odorant specific signal, via dysregulation of the GABA signaling pathway, could lead fish to perceive odorants in an inappropriate way and thus lead to altered behavioral responses.

It has been hypothesized that the main mechanism of behavioral disruption by elevated CO_2 exposure is via alteration of GABA signaling in the central nervous system, driven by a reversal of the Cl^-/HCO_3^+ membrane gradient and a linked disruption of the normal inhibitory action of the $GABA_A$ receptor (Nilsson et al., 2012). The reversal of the Cl^-/HCO_3^+ neuronal membrane gradient results in a reversal of the intended GABA signaling. Therefore, GABA receptor activation results in hyperpolarization of the neuron rather than depolarization. This could potentially lead to inappropriate or overactivation of neurons. CO_2-induced increases in the amplitude of neuronal responses in the mediodorsal olfactory bulb in response to odorants are consistent with this hypothesis. Inhibitory GABAergic neurons in the olfactory bulb play a critical role in synchronization

and regulation of neuronal signals required for appropriate odor discrimination (Lizbinski & Dacks, 2017; Tabor, Yaksi, & Friedrich, 2008). The lack of observed effects of CO_2 in the olfactory epithelium and some discrete regions of the olfactory bulb may be due to differential spatial distribution of GABAergic neurons and GABA receptors within these tissues and the role of GABAergic neurons in regulating signaling of specific odorants and mixtures (Cocco et al., 2017; Lizbinski & Dacks, 2017; McGann, 2013; Tabor et al., 2008). For example, while G protein-coupled $GABA_B$ receptors are present in the axonal presynaptic region of the olfactory sensory neurons within the olfactory bulbs, $GABA_A$ receptors are broadly present on mitral/tufted cell secondary neurons within the olfactory bulb (McGann, 2013; Tan, Savigner, Ma, & Luo, 2010).

Consistent with the hypothesis that CO_2 effects on olfactory behaviors involve GABA signaling, our RNA-Seq analysis found that several genes involved in GABA signaling were altered at a CO_2 concentration shown to cause neurobehavioral disruption. These results are largely similar to studies that examined elevated CO_2 effects on mRNA expression of $GABA_A$ receptor genes in other fish species (Lai, Fagernes, Jutfelt, & Nilsson, 2016; Schunter et al., 2017). Interestingly, while we found no change in expression of the $GABA_A$ receptor mRNA in the olfactory bulb under high CO_2 conditions, we did observe a significant increase in *gaba*$_{B2}$ receptor mRNA expression. The metabotropic $GABA_B$ receptor is involved in a distinct inhibitory pathway compared to ionotropic $GABA_A$ receptor and works to modulate neural activity via presynaptic and postsynaptic signaling pathways. However, $GABA_A$ and $GABA_B$ receptors play complementary and distinct roles in modulating olfactory signaling. The $GABA_B$ receptor is a G protein-coupled receptor that, upon activation, inhibits calcium channel function (which can in turn reduce neural excitability and neurotransmitter release) and activates potassium channels to hyperpolarize neurons (Bettler, Kaupmann, Mosbacher, & Gassmann, 2004). Neuronal hyperpolarization via $GABA_A$ receptor modulation of Cl^- influx is quicker than the $GABA_B$ pathway as it does not rely on slower secondary messengers.

To our knowledge, we are the first to report changes in $GABA_B$ gene expression under elevated CO_2, which presents an interesting new component to the list of signaling molecules involved in behavioral alterations under elevated CO_2. Increased expression of the $GABA_B$ receptor could indicate a response by salmon olfactory bulb neurons to compensate for the loss of normal function of the $GABA_A$ receptor pathway. Increased expression of $GABA_A$ receptor mRNA, as a potential compensation for loss of function under elevated CO_2 conditions, is also found in three-spined sticklebacks (Lai et al., 2016). This theory is supported by the fact that several other genes associated with GABA signaling were also significantly altered in coho salmon in the present study. The significant increase in *hcn2*, which plays critical roles in membrane excitability, integration of synaptic inputs, and the generation of membrane potential oscillations within the olfactory bulb, suggests alterations in signal modulation under elevated CO_2 conditions (He, Chen, Li, & Hu, 2014). Two other genes associated with synaptic transmission and modulation of neuronal GABA signaling through Cl^- transport, *snap25* and *kcc1*, also showed significant increases in expression further suggesting altered neuronal signaling within the olfactory bulbs (Abe, Minowa, & Kudo, 2018; Delgado-Martínez, Nehring, & Sørensen, 2007; Delpire, 2000; Wang et al., 2005). The increases in *slc6a13* and *slc38a3*, which can serve roles in taurine/GABA uptake and glutamate uptake needed for GABA synthesis, respectively, potentially indicate increased production or uptake of GABA as a compensatory response by the bulb neurons (Chan et al., 2016; Scimemi, 2014). There was also a significant decrease in *aldh9a1*, which is involved in the production of GABA, and was reported to be overexpressed in fish tolerant of elevated CO_2 exposures (Schunter et al., 2016). Furthermore, the significant changes in expression of the multitude of other genes involved in signal transduction, ion transport (such as *slc26a6* which serves a vital role in transporting HCO_3^+/Cl^-), and machinery related to neurotransmitters such as glutamate, serotonin, and acetylcholine also indicate a potential compensatory response to restore normal neural signaling within the olfactory bulbs.

We found increased expression of major genes involved in melatonin and the circadian rhythm, *asmt* and *aanat*, genes that play key roles in the production of melatonin and its precursor *N*-acetylserotonin. Melatonin production has been linked to modulation of ion regulation in rainbow trout in response to changes in salinity (López-Patiño, Rodríguez-Illamola, Gesto, Soengas, & Míguez, 2011). Schunter et al. (2016) found similar results in damselfish wherein offspring from parents sensitive to elevated CO_2 also had elevated levels of *asmt* mRNA expression, as opposed to offspring from CO_2-tolerant parents. GABA signaling has also been linked to circadian rhythm regulation, and the alteration of expression of genes central to $GABA_B$ function could be driving these changes in genes linked to the circadian rhythm as well (DeWoskin et al., 2015). In total, the RNA-Seq data indicate that olfactory bulb neural signaling pathways experienced major changes on a wide scale in response to the elevated CO_2 exposure, potentially as a mechanism to restore normal function, albeit unsuccessful during the exposure window given our behavioral and neurophysiology results.

The results of our study highlight the fact that salmon, once acclimated to saltwater, are susceptible to neurophysiological changes that can influence behavioral function under shifts in pH similar to those expected with OA. These results are worrisome as the native range of coho salmon in the North East Pacific Ocean is characterized by strong upwelling currents and is predicted to be impacted by elevated CO_2 and low pH projected for the foreseeable future. Indeed, many areas in the Salish Sea (encompassing the Strait of Georgia, Strait of Juan de Fuca, and Puget Sound in Washington State, USA, and British Columbia, CDN) already experience CO_2 and pH levels, at certain times of the year, that are similar to those affecting fish in our study (Feely et al., 2010). Olfaction plays a central role in the salmon life history, and the impairment of normal olfactory-driven behaviors in juvenile salmon can jeopardize their survival. Furthermore, the GABA signaling system hypothesized to be impaired under elevated CO_2 conditions is critical in many other areas of the central nervous system, including vision, mechanoreception, and control of anxiety. However, the effects of elevated CO_2

on these critical neuronal systems, remain to be investigated and are largely unknown in salmon (Ou et al., 2015).

While future real-world exposures to CO_2 concentrations at 2,700 μatm are likely to only occur in a transient scenario similar to our exposure paradigm, longer term exposures would be informative to investigate a potential for salmon to acclimate to the changed chemistry and regain normal neural function. Furthermore, while our study did not investigate recovery of normal behavioral function following cessation of the exposures, there is evidence that such recovery does happen in fish (Chivers et al., 2014; Jarrold, Humphrey, McCormick, & Munday, 2017). The environment that salmon reside in (i.e., open ocean vs. nearshore environment, time of year they reside in each environment, and the water depth they reside at) is important to consider going forward as the degree of neural impairment driven by elevated CO_2 could vary (Jarrold et al., 2017; Pacella, Brown, Waldbusser, Labiosa, & Hales, 2018).

In conclusion, juvenile ocean-phase coho salmon are sensitive to neurobehavioral disruption induced by exposure to elevated CO_2 associated with climate change predictions in the Puget Sound region. Salmon are a keystone species in many aquatic ecosystems in the North Eastern Pacific Ocean and already face substantial pressure from other anthropogenic and nonanthropogenic factors. The potential effects of elevated CO_2 on their mortality will only add to this pressure for long-term survivorship of Pacific salmon.

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CONFLICT OF INTEREST

The authors declare no competing interests.

AUTHOR CONTRIBUTIONS

C.W., A.D., E.G., P.M., T.B., and S.B. all participated in the design of the experiment. C.W. and M.M. conducted the study. T.B. and J.M. conducted the bioinformatics. C.W. wrote the paper with editorial input from A.D., E.G., P.M., S.B., T.B., J.M., and M.M.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of the article.

How to cite this article: Williams CR, Dittman AH, McElhany P, et al. Elevated CO_2 impairs olfactory-mediated neural and behavioral responses and gene expression in ocean-phase coho salmon (*Oncorhynchus kisutch*). *Glob Change Biol*. 2018;00:1–15. https://doi.org/10.1111/gcb.14532

Exhibit 49

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

Pacific Connector Gas Pipeline, LP
Docket No. CP17-494-000
PF17-4-000

MOTION TO INTERVENE OF
SENECA JONES TIMBER COMPANY, LLC

Pursuant to 18 C.F.R. § 385,214, Seneca Jones Timber Company, LLC hereby respectfully moves to intervene in the September 21, 2017 application of Pacific Connector Gas Pipeline, L.P. in the above referenced dockets. In support hereof, Seneca Jones Timber Company, LLC states the following:

I. Identity/Contact Information

Seneca Jones Timber Company, LLC is an Oregon Limited Liability Corporation who owns real property consisting of forestland in Coos and Douglas Counties, Oregon. All communication can be forwarded to:

Seneca Jones Timber Company, LLC
P.O. Box 10265
Eugene, OR 97440
ATTN: Monica Jelden
Phone: (541)461-6216
e-mail: mjelden@senecasawmill.com

II. Declaration of Interest

Seneca Jones Timber Company, LLC is a family owned company that owns forest land to supply fiber to its sawmill facilities located near Eugene and Noti, Oregon, as well as a renewable energy cogeneration plant located near Eugene, Oregon on a sustained yield basis. These facilities provide living wage jobs for over 300 employees, while our business operations extend and employ a multitude of independent contractors and contribute importantly to the local economies in Lane, Douglas and Coos counties.

The proposed pipeline route directly dissects nine tax lot parcels of Seneca Jones Timber Company, LLC property, affecting nearly 2,600 acres of our forest land. Additionally, the pipeline will utilize, construct and improve transportation routes on Seneca Jones Timber Company, LLC property, affecting another eight tax lot parcels, consisting of 1,000 acres. Pacific Connector Gas Pipeline's transportation routes across the Bureau of Land Management and Forest Service also affect the ability to move and transport timber from these forest lands. As a result, we have a direct and substantial interest in the outcome of this proceeding.

III. Basis for Intervention

Our concerns include, but are not limited to, the following direct social, economic and environmental impacts placement of this pipeline will have on Seneca Jones Timber Company, LLC's forests.

- Our forest is managed on a long-term sustained yield rotational basis and an annual harvest level is derived based on the number of timber growing acres. Any reduction in these acres will reduce harvest levels, while our mill facilities still require the same level of fiber to maintain both customer needs and employee positions. Over the years, the timber industry in Oregon has experienced devastating effects due to reduced harvest levels on public lands. This requires that we maintain adequate private timber growing ground for our facilities. A reduction in timber growing ground is a serious concern for our operations. Although, Pacific Connector Gas Pipeline indicates they can adequately compensate our loss; our sawmills and cogeneration facility need fiber rather than cash to operate on a long-term continual basis without negative economic impacts. We approached Pacific Connector Gas Pipeline at the onset of this project seeking an opportunity to trade lands and maintain the economic viability of our business. On May 9, 2013, we received official notification from Pacific Connector Gas Pipeline on their lack of interest in such a proposal. Obviously, Pacific Connector Gas Pipeline places a greater emphasis on their business venture versus Seneca Jones Timber Company, LLC's business, which has served Oregon well for over 60 years. The allowance of one business venture to succeed should not be at the detriment of other established local businesses.

- In addition to the direct installation of the pipeline, our forest land operations will be impacted by temporary extra work areas. These temporary extra work areas come in two types, one is to mobilize equipment and conduct construction work, while the other is a rock fall area. On steep slopes, Pacific Connector Gas Pipeline's project takes into account and anticipates rock falls. Human safety, both to our employees and the public, is a weighty concern in these areas that are identified as rock fall areas, not to limit and consider the added liability risk.

- The placement of gas pipelines located on forest properties requires the timber industry to modify and employ atypical harvest methods, as characteristically the gas pipeline is located on the same ridge line in which a forest landowner must place its equipment or construct access. Topographical features, such as soils and slopes, can limit the number of viable equipment placement sites. In many circumstances, only one location may be available and/or feasible. Finding new alternatives can be costly to a business and will consequently increase operational costs. Long-term experience shows that gas pipeline installers are extremely reluctant to allow forest yarding operations and/or the hauling of heavy equipment across underground gas lines. Pacific Connector Gas Pipeline requests that landowners identify alternatives or determine in advance potential crossing locations in order to bolster these areas, placing the burden on the landowner without adequate cost recovery. Our forestlands and access routes are prominently impacted in a search for alternative solutions, which comes at an increased operational cost.

- The timber industry and the government have entered into access agreements to provide mutual utilization of transportation systems. Pacific Connector Gas Pipeline's

use of these transportation systems are likely to impede and perhaps hamper Seneca Jones Timber Company, LLC's ability to move its timber, an economic concern that is difficult to measure. Placement of the pipeline facilities crossing both these lands and roads is another concern, which will place unnecessary obstructions in our requests for additional construction, tailhold requests and use of existing roads on public lands under existing, established agreements. We have already seen significant disparity on the construction and proposed use of public lands by Pacific Connector Gas Pipeline versus requests by the timber industry. For example, due to environmental concerns, the construction of new roads on public lands outside of an agreement is virtually impossible and deemed as ground disturbing activities. The ardent process is so difficult and time consuming, we seldom make such a request and explore whatever alternatives might be available, despite increased cost and potentially greater environmental concerns. While the timber industry has a long standing cooperative relationship with both public agencies, United States Forest and the Bureau of Land Management, the Pacific Connector Gas Pipeline is essentially a new entity locally, however, both of these public agencies are modifying their Region Management Plans to accommodate the project in sensitive environmental areas. Neither public agency would go to this measure to accommodate the timber industry's needs.

- Pipeline construction will likely require significant aggregate resources. Local aggregate resources are a non-renewable resource, which are at a premium. The pipeline construction needs will likely generate an increase in prices to forestland owners, who will be competing for the same product without economic reimbursement.

- Construction of the proposed pipeline will create substantial ground disturbing activities. While much of the excavated material will be returned to resurface the pipeline, significant portions will require creation of "waste areas" in stable areas. Stable areas suitable for waste sites are extremely limited in the forest. With the pipeline project utilizing what sites are available, the timber industry will be faced with fewer sites available in the future, increasing our costs and requiring movement of this material in greater distances.

- Pipeline corridors quickly become brushy areas with a high level of invasive species, such as scotch broom and blackberries. This project proposes reestablishing the pipeline right-of-way with grass. During the dry season, these grasses and brush varieties can contribute a substantial slash component that will be susceptible to forest fires. Fire behavior in these types of fuel loads can spread quickly and will increase the risk to Seneca Jones Timber Company, LLC's forest land. The potential for invasive species to spread to our property requires mitigation to maintain tree growing sites and increases our operational costs.

- Pipeline corridors encourage off highway vehicle traffic and year round public entry into private forest lands. Unwanted traffic can lead to sedimentation issues and increased risk of fire on adjacent forestlands.

- Our experience with catastrophic wildfires clearly demonstrates that scorching of subsoils can occur to depths as much as three feet, along with retainage of perceptible temperatures in these soils. To suppress fire, often times heavy equipment is utilized to dig and turn over soils to adequately distribute the heat and suppress the fire. These normal suppression efforts will be impeded with the placement of a gas pipeline. The

risk of fire in these proposed pipeline locations is a very potential reality in forested areas and a serious concern, both economically and more importantly, from a safety perspective.

- Given the high pressure content, pipeline construction standards through forest land properties should match urban construction standards to prevent and minimize possible pipeline breach and/or ruptures due to heavy equipment operation or other natural phenomena, such as earthquakes or landslides, as an added effort to protect the valuable timberland resource lying adjacent to the located pipeline. Additionally, it is important to minimize re-entry and repairs in order to minimize loss of growth to our continually growing resource. The perception of less risk can be countered with resources to prevent damage in the forest are often miles away and any measures that can be employed to minimize damage should be considered a necessity at the onset of the project.

- Recent studies suggest that gas pipeline installations emit methane, a greenhouse gas. Our discussions with the Pacific Connector Gas Pipeline have failed to address either the quantity or direct and indirect impacts of methane gas releases on our sustainable forestry practices and how this will impact the resource on a long-term basis.

- Placement of a pipeline on Seneca Jones Timber Company, LLC's forest land will diminish land values and have a potential to negatively impact resale. Disturbance of existing seedlings and tree stock within unintended timeframes contributes to significant loss of growth and affects our timber inventory modeling.

- As a traditional example, when an operator approaches Seneca Jones Timber Company, LLC for use of its land on a commercial basis, as in the case of miscellaneous products, typically a fee is charged based on the revenue received by the operator, customarily 10-20%. In this case, Pacific Connector Gas Pipeline is offering a one-time payment while continuing to derive profit from the use of our property for many years to come as the pipeline will be capable of delivering up to 1,200,000 dekatherms per day of natural gas to the proposed Jordon Cove LNG Export Terminal. However, the underlying landowner is still responsible for property taxes on the pipeline area, despite an inability to effectively use the property as zoned. Assuming operational capacity, at $2.83/dekatherm, equates to potential revenue of $3,396,000 per day or $1,239,540,000 annually. Realizing that only approximately 5 miles of the proposed pipeline will cross Seneca Jones Timber Company, LLC property, or approximately 2.18% of the total project ($27,022,000); at the customary rate of 10-20% we would be traditionally looking at revenues of $2,702,000 to $5,404,000 annually for use of our land, subject to negotiation and reasonable market escalation overtime.

- Most recently, Pacific Connector Gas Pipeline elected to locate approximately 20% additional pipeline on our lands than originally projected. This is just an election on their part with no valid empirical evidence or documented studies to suggest this decision was a necessity, rather than to further negatively impact our forest lands. To add insult to injury, the marking and staking of these lands occurred without proper authorization or permission from Seneca Jones Timber Company and we discovered the situation after the fact.

IV. Conclusion

No other party will or can adequately represent Seneca Jones Timber Company, LLC interests as an affected private landowner. Accordingly, we request that we be made a party to this proceeding and be permitted to intervene in this proceeding, with all rights attendant to such status.

Respectfully submitted this 16th of October, 2017.

Seneca Jones Timber Company, LLC.

Todd A. Payne
Chief Executive Officer

CERTIFICATE OF SERVICE

We certify that on the 16th day of October, 2017, we filed by electronic filing this Motion to Intervene and ensured that it was served either electronically or by first class mail to each person designated on the official service list compiled by the Commission in the above-captioned proceeding.

Exhibit 50

MESSERLE
& SONS

94881 STOCK SLOUGH LANE
COOS BAY, OREGON 97420
(541) 267-2997
FAX (541) 269-1042

June 10, 2010

Coos County Planning Department
Attn: Patty Evernden
250 N. Baxter Street
Coquille, OR 97423

Re: HBCU 10-1

Dear Ms. Evernden:

Please forward the following discussion to Mr. Stamp for his consideration concerning the above referenced matter.

SIGNIFICANT CHANGES TO FORESTRY PRACTICES AND COSTS RELATIVE TO THE PROPOSED PIPELINE

The following is intended to provide the County with information requested relative to the proposed PCGP application. Specifically this information addresses the applicant's compliance with Section 4.8.400, 4.8.300 and 4.8.350.

Section 4.8.400 Review Criteria for Conditional Uses in Section 4.8.300 and Section 4.4.400

The use authorized by Section 4.8.300 and 4.8.350 may be allowed provided the following requirements are met.

A. The proposed use will not force a significant change in, or significantly increase the cost of, accepted farming or forest practices on agriculture or forest lands.

Note: The proposed use will force a significant change and a significant cost increase in accepted forest practices.

OVERVIEW
As a 150 year old Coos County farming and forest family owned business, we operate over 1800 acres of intensity managed timberland. Our operation is

based on owning and holding the timberlands for the full term (rotation) from growth to harvest and re-plantation of the timber crop. Therefore, the applicants proposed use does significantly change and significantly increase the cost of our accepted practices in the following ways.

1. The value of the timber.
   The price of timber over the last 40 years has gone up 8% per year. Timber value has increased from an average of $30.00 per 1000 board feet to today's value of $600.00 per 1000 board feet (a multiplier of 20x).

   Based on the increase in worldwide demand and the decrease in supply of softwood (Douglas Fir) timber from Federal land we anticipate the rate of valuation increase to remain the same over the next 40 years.

   Therefore, we expect 40 year old Douglas Fir which has been intensively managed to increase in value to $12,000.00 per 1000 board feet.

   Note: This will result in a gross value of $240,000.00 per acre for 40 year old timber in 2050.

   IN OTHER WORDS
   We can produce now 20,000 board feet per acre at the end of a 40 year rotation.

2. The wind loss exposure (and expense) in today's accepted forest practice is limited by the number of and/or the distance of the "hard edge" in each "stand" of timber.

   IN OTHER WORDS
   Cutting and maintaining an extended "hard edge" in an existing and/or new stand of timber will dramatically increase the wind loss over the 40 year rotation and thus increase cost and decrease yield.

3. The current accepted practice on our managed forest lands includes severely restricted access to anyone. This restricted access is enforced to:

   a. Reduce the potential for the spread of soil born pathogens.

Specifically we are trying to stop:

- Port Orford Cedar root rot.
- Douglas Fir root rot.

Note: These diseases produce a 100% mortality rate and once in the soil can never be gotten rid of.

FURTHER
These diseases are typically spread by vehicle and foot traffic thus the increased access, and stated requirement by the applicant, to "walk and maintain the right of way" will significantly change the accepted practices involved in raising a 40 year crop and or, in a worst case, eliminates the value of the land all together for timber production.

Special Note: Every timber company has "locked up" their land for these risks and or fire risks. The applicants proposed use completely changes the current practice of restricted access.

4. Noxious weeds

   An open right of way (vector) through an existing or new stand of timber creates an area for infestation of noxious weeds, once established (even as small populations) are very difficult to get rid of.

   FURTHER
   Douglas Fir creates a "canopy" of shade that reduces the viability of noxious weeds. This open vector along the proposed right of way will require a significant increase in our costs and time to eliminate noxious weeds on our timber lands.

5. An open vector (Right of Way) with dry grass and or brush creates a path for fire to "run on".

   There is no question that this vector (right of way) will increase our fire hazard exposure and or risk in the event of a fire.

6. Accepted logging practices.

   The applicant's proposed route is generally on ground that would allow mechanized equipment to perform the logging or thinning of the mature stand (i.e., feller buncher, cat, rubber tire skidder).

   Our land was specifically acquired and has been developed for this type of ground based operation. The proposed pipeline would change the "established harvest layout" and thus increase the cost to harvest.

   Specifically, we cannot "yard" and or drive our equipment (which would be dragging logs) across the right of way. Therefore, we have to go down or around or airlift to log.

   IN OTHER WORDS
   Each stand of timber has a specific way that we log it. Any breakup (by a right of way) significantly changes and or increases the costs of accepted practices.

   Note: Today's logging costs for us run about $400.00 per 1000 board feet. We expect this cost to increase to at least $500.00 to $600.00 per 1000 board feet due to the proposed right of ways impact on accepted forest harvesting practices.

   FURTHER
   We expect the cost of logging to run parallel to the value of the timber "on the stump" over the next 40 years (8% increase per year on average).

   FINALLY
   Timber harvesting (logging) has always had a very "thin margin" of profit. Logging is not a "get rich quick" proposition. Any change to accepted logging practices will increase costs, decrease margins and significantly change the cost of accepted forest practices.

7. Valuation of existing stands of timber with the proposed pipeline versus valuation without the proposed pipeline.

IN GENERAL
The valuation of the land will be reduced and appreciation of the land will be in some way restricted.

IN OTHER WORDS
There is no way that a tract of land for timber production is more valuable with the pipeline going through it than a similar tract without a pipeline. In fact, two parcels of similar timber, one with the pipeline and one without, will see a higher value to the parcel without the pipeline.

Actual value reduction:
We do not know but it will be significant. It depends on a variety of things such as:

i. FERC restrictions and or any increase in the size of the vector if and when they choose to do so.
ii. Accidents, risks and or other requirements that result from incidents throughout the world.
iii. The value of timber land without a pipeline running through it.

8. The <u>real width of the right of way relative to timber</u>.

A 40 year stand of Douglas Fir timber will require a distance from the base of one tree on one side of the right of way to the base of the tree on the other side of 80' to maintain a 50' <u>visible</u> right of way.

IN OTHER WORDS
Two trees 80' apart will create an open strip that is 50' wide.

<u>Note</u>: *We are being "told" that we can plant trees 30' apart across the proposed right of way. From the air in 20 years you will not be able to see the ground across that 30'.*

Therefore, we expect to lose 80 feet by whatever length the pipeline is (in timber production) when all the dust settles.

9. <u>Trespass and or vandalism</u>.

In forestry practices trespass and fire is a big concern. The ATV path that the right of way will create is an irresistible temptation to the ATV or walking trespassers. And, no short fence or gate at the road is going to stop them. Therefore, the right of way, in its visibly open vector form, significantly increases fire hazard and fire suppression costs.

10. The cost to cope with the applicants proposed construction and ongoing oversight.

    In general, our oversight and monitoring of the proposed construction and ongoing operation of the pipeline through our farm and forest land significantly changes our practices and increases our costs.

    We will spend more time and more money than we do now.

    Currently we have no third party construction going on in any of our lands and we have no power or pipeline routes through any of our forestry lands either.

    It is difficult enough for a small family owned operation to monitor and oversee its base operation. This proposed addition will change our practices and increase our costs.

CONCLUSION

The county must find that the proposed use relative to Section 4.8.300, Section 4.8.350 and 4.8.400 not be allowed because the requirement for the use and its compatibility with forest operations and agriculture has not been met.

Specifically, the proposed use will significantly change and increase the cost of accepted tree farming and forestry practices on agricultural and forest lands.

EXCEPTION SHORTEST ROUTE (Mr. Stamp's letter indicates that the applicant is taking the shortest route).

The proposed route is not the shortest route. The Amended Blue Ridge Route is approximately 2 ½ miles shorter and it dramatically reduces the miles of private timber right of way required.

Therefore, the effect and cost on accepted forest practices can be reduced by a shorter route such as the Amended Blue Ridge Route.

Specifically, we are correcting the statement made by Mr. Stamp in second paragraph of Mr. Stamp's 6/6/10 Pg. 8 letter to Patty Everden.

The applicant by not proposing the shortest route has not met the intention of the provision. The Amended Blue Ridge Route causes less impact to many specific properties because:

a. It reduces the private landowners affected from 37 to 18.
b. Shortens the pipeline by 2.5 miles.
c. Changes the percentage of private to public land affected from:
   Current Route - 10.65% Federal Land
   Blue Ridge - 76.32% Federal Land

We appreciate the opportunity to provide further comment on this matter.

Fred Messerle & Sons, Inc.

Fred R. Messerle
Secretary-Treasurer

Exhibit 51

7 June 2010

Coos County Planning Dept.
Attn: Hearings Officer, Mr. Andrew Stamp
250 N. Baxter Street
Coquille, OR 97423

Re: *HBCU 10-01*

Mr Stamp;

I am writing you concerning the land use application submitted by Pacific Gas and Connector Pipeline for permission to construct a natural gas transmission pipe line across Coos Co. I may have stated some of my personal information during the verbal testimony portion of the hearing. Please forgive the repetition. I am a private consulting forester with 10 years experience and an operation base of the southwestern portion of Oregon. I have written forest management plans for over 2500 acres of private forest ground, and wrote the forest management plan for 5000 acres of forest at South Slough Reserve while employed for Oregon Dept of State Lands. I have also designed harvest lay out for commercial operations on both private and Federal forests. I have resided in Coos Co for the past 2 years at 94961 Stock Slough ln. This property would be crossed by the proposed pipeline route. I rent and am not the property owner.

The following comments are specific to **Coos Co Zoning Land Develop Ordinance (CCZLDO) 4.8.400** concerning forestry operations on lands zoned forestry. I believe that the proposed pipeline would significantly impact landowner's ability to practice timber stand maintenance and harvest on their lands. Most of these land owners rely heavily on periodic proceeds from timber harvest, for some it is a primary source of income. Logging is, in the best of times, a decent living. Under current conditions it is marginal at best. There are several issues which I will raise in regard to impacts. Any one of these impacts could be the difference between a profitable harvest and a break even project, combined they would make it very difficult to continue to economically harvest timber on land which is designated for that purpose.

- Increased costs associated with timber harvests; Most of the private timber ground along the pipeline route is under 35% slopes which makes it suitable for ground based harvesting. The applicants have proposed creating a limited number of 'hard crossings' across an otherwise 'no entry' easement. Having only a limited number of crossings will significantly increase logging costs because of changes to proposed harvest lay-out, increased length of skidding turns and haul routes, and reduced harvestable acreage within the stand. Ground based timber harvests require freedom of access, very little is done with long winch lines due to the inefficiency. Machinery is literally driven up to each and every tree. The cost increases would be different for different stands depending on amount if the stand the pipeline crossed, but it could easily range from 5-20%. Logging costs for a ground based operation would be $200-300 per thousand board feet(mbf). A 12% harvest cost increase at $200mbf for a 40 acre stand, with 20mbf per acre would work out to a loss of **$19,200**. This 40 acres is the typical annual harvest amount for local

private forest owners, and $20,000 is probably close to the expected income. The timber ground in this area is expected to produce roughly 20mbf per acre at 40 years, which in the established rotational age.

- The creation of a ± 100' working easement and a 50' permanent easement would fragment some forest stands to the point which made harvest financially restrictive. The increased cost to access an isolated portion of a stand would mean that the planned harvest would be changed to either harvest the patch early or late depending on the age of the adjacent stand. Depending on the restriction of access this would affect patches >5 acres, a small but significant value at $20mbf per acre.
- Most of the private forest ground along the proposed route is intensively managed on a 40 year rotation. These trees have been planted on a ±11' spacing resulting in 360 trees per acre. Within Coos Co, wind is the dominant disturbance type, both periodic gusts and episodic storm events. Since these stands have grown up under dense conditions, the structural integrity of the stand it based on the uniformity of the stand and individual trees are supported and buffered by their neighbors. The proposed route would create a 'hard edge' through the middle of the forest stands. This hard edge would inevitably create blowdown within the adjacent stands, especially those over 20 years old. The amount of wind damage would be tough to calculate, it would be based upon aspect, slope, age of the stand and, in some cases, pure chance.
- Opening up a corridor within these private forests will inevitably promote trespass, both vehicular and foot traffic. Either will have a negative effect on forestry operations. The applicant has discussed mitigation efforts such as gates, obstacles, and fencing. None of these will have a 100% success rate. You yourself mentioned piano wire as an effective deterrent. The Oregon Dept of Forestry lists humans as the dominant cause of forest fires within the state. I looked at a 5 year trend (2002-2006), **70-80%** of all fires were human caused. (http://www.oregon.gov/ODF/FIRE/fire.shtml) These corridors will also provide a vector for the spread and establishment for noxious weeds, both during and after the consrtuction. Even if access is successfully limited to just the contract crews who will be preforming the maintance, the spread of soil borne pathogens will be increased as easliy as mud on a boot. Port Orford Cedar Root Rot, *Phytophthora lateralis*, and Douglas Fir Laminated Root Rot, *Phellinus weirii*, are both local soil borne pathogens, which, once introduced to a stand, can effectively kill all host stems as they radiate out from the infection source. *P. lateralis* in particular has devastated a once very valuable timber species in Coos and Curry county. Once established, these organisms cannot be removed from the stand without removing all host species stems for a period of at least ten years. If you throw in vandalism, un-authorized hunting, mushroom picking, bough collection and dumping, it is easy to see why all industrial private timber lands in the state are attempting to severely reduce access to their crop.
- The proposed pipeline would have a ±100' construction right of way, followed by a 50' permanent right of way. This would mean that the applicant proposes to replant the 20-25' on either side to return it to productive timber. Once established these two 25'wide swaths of trees would constitute un-harvestable ground. They would be of a significantly different age class then the surrounding timber and would have absolutely no access do to restriction on equipment operation within the permanent right of way. Also the trees, especially within the interior of the corridor, would be of poor quality due to the amount of limbs growing on the inside edge. Generally speaking, a landowner could expect 5-15% of the timber harvested to be of poor

quality due to it's limbiness, mills want straight trees with few knots. The proposed 'mini-stands' would not only have very limited access, they would also have at least 50% of the trees deducted due to limbs. Currently Doug Fir saw logs graded 1-3p (good) are $600/mbf, while limby poorer quality logs (2-3s) are $450/mbf, **a 25% decrease**.
http://www.oregon.gov/ODF/STATE_FORESTS/TIMBER_SALES/logP110.shtml

- The proposed pipeline would significantly reduce the landowner or local response team's ability to fight forest fires, especially if they occur as result of trespass along the cleared right of way. One of the most effective methods for stopping the spread of forest fire is to run a 'cat line' above the leading edge of the fire with a bulldozer. Most if not all of the long time loggers in Coos Co have had to do this at one time or another. If access is restricted to hard-crossings then you have the combination of a forest fire which you cannot get to on top of a 3' gas pipeline. The idea of a 'cleared right of way' is somewhat misleading. Having utilized powerline right of ways to access timber land to survey, I can say that they generally have high surface fuel loads. Mulching of the entire pipeline is not possibly, so hand slashing and spraying will be utilized frequently, creating lots of small diameter fuels with direct exposure to the sun making them even drier. This ribbon of dried fuels could easily hasten the spread of a wildfire across the property.
- Though not as common or as profitable as intensively managed timber harvesting, setting forest land aside for conservation easements, watershed benefits and the sale of sequestered carbon is becoming more and more prevalent. Certified forestry (Forest Stewardship Council) and government funding provides the landowner with some funding for these projects. None of these activities would be possible with a permanent easement across the property. This is even more restrictive for wetland mitigation projects within the lower grazing grounds. The applicant will be utilizing wetland mitigation banks to offset the loss of wetlands during the proposed terminal construction. The proposed pipeline would significantly reduce landowners rights to develop potential non-traditional funding sources.

Coos Co Zoning Land Develop Ordinance 4.8.400 states "*The proposed use will not force a significant change in, or significantly increase the cost of, accepted farming or forest practices on agriculture or forest lands.*" Most of the impacted forest lands within Coos Co are private, non-industrial timber lands. These landowners do not have the land-base to absorb the increased costs of timber operations which I described above, yet they often rely on the timber proceeds for some if not all of their income. These properties are some of the most productive timber lands in the nation, that is why they were zoned as such. Even with the high level of productivity, making money of off trees is marginal at best. The market fluctuations require a successful timber land owner to have enough options to ride out the lows and save from the high times. The proposed pipeline project could effectively end a livelihood for impacted properties by increasing the costs of doing business while increasing the associated risks.

Please feel free to contact me with any questions

Thanks

Jake Robinson
Yankee Creek Forestry
94961 Stock Slough Rd
Coos Bay, OR 97420
541 941 1822

Exhibit 52

Susan Jane M. Brown (OSB #054607)
Western Environmental Law Center
4107 N.E. Couch Street
Portland, Oregon 97232
Tel: 503-914-1323
Fax: 541-485-2475
brown@westernlaw.org

Attorney for Applicants-in-Intervention/Defendants

UNITED STATES DISTRICT COURT
DISTRICT OF OREGON
EUGENE DIVISION

PACIFIC CONNECTOR GAS PIPELINE, LP, a Delaware limited partnership; Plaintiff, vs. LOUISE SOLLIDAY, in her official capacity as Director of the Oregon Department of State Lands; and RICHARD WHITMAN, in his official capacity as Director of the Oregon Department of Land Conservation and Development; Defendants, and BOB BARKER, JOHN CLARKE, BILL GOW, RUSS LYON, and MARY MARGARET MUENCHRATH, individuals; and OREGON WOMEN'S LAND TRUST, a nonprofit corporation; Applicants-in-Intervention/Defendants.	Case No. CV-10-6279-HO **DECLARATION OF BILL GOW**

I, BILL C. GOW, do hereby declare and state:

1. My name is Bill Gow, and I make this declaration based on my own knowledge and belief.

2. My property is located at 4993 Clarks Branch Road, Roseburg, Oregon, 97470.

3. I originally purchased a large portion of the land in 1991, and have added additional parcels to it since then. Bureau of Land Management (BLM) land borders my property.

4. The Pacific Connector pipeline would cross through my property, along about milepost 73.3 to MP 75. About 1,635 acres of my property are in the proposed pipeline right-of-way. This is a contiguous piece of property, although I own other scattered parcels in the area that are not directly affected by the pipeline.

5. I am a rancher and run a cow/calf operation on my property, where I raise cows and calves, and then sell the calves. I am a first generation rancher, and bought this property not for investment purposes, but to live and raise a family. I selected this property because of the privacy and tranquility that it offered. My land is remote and away from urban life, but yet close enough to town that I have access to the urban services that I need.

6. While my property is mostly used for ranching, there is also timber on my property that I cut and sell.

7. Importantly, though, this property is my home. My wife and I have raised our two children on this land, and someday the ranch will be passed down to my son for future generations of my family. As a family, we spend a great deal of time recreating on our property, enjoying the forests and streams and other areas of our land.

8. This is our home. It is not for sale, and it is not to be used for any other purposes other than what I and my family want to use it for.

9. I have never given Pacific Connector access to my property, for several reasons that I talk about later. Because I have never given the company the right to come onto my land, I'm not completely sure where the pipeline will exactly go across my property. But, the information that

I have gotten from the company indicates that the right-of-way will go through what we call the "lake end" of my property, which is the south end of my land.

10. The lake end is a very marshy area, which is full of wetlands and other swampy areas. I don't know how the pipeline will go through this area, because it's so wet.

11. I've also been told that Pacific Connector is planning to construct two hydrostatic testing stations on my property. They will need 58 million gallons of water to test the pipeline. This is just crazy, because a lot of that water will be pumped out onto my property. That dirty water is going to have to go somewhere, either into one of my creeks or the lake end area, or just over the surface of the land. That much water will definitely foul my creeks, and will destroy any surface soils and/or vegetation. Either way, it will cause a huge mess that I will have to deal with.

12. I have built roads on my property that are the only access to any of the land. Pacific Connector wants to use these roads for construction and maintenance of the pipeline once it is built. Not only do I not want Pacific Connector on my property to begin with, but I also don't want to have to put up with their intrusions to inspect something that I don't want on my land in the first place. This would be an extreme invasion of privacy for me and my family, and would prevent my quiet use and enjoyment of my land.

13. One of the biggest problems that I have with the pipeline is that the right-of-way will open up my property, again, to poaching and trespassers. I've had a problem with poachers especially over the years, but also trespassers who have come on to my property from the Bilger Creek side. For example, I've put in huge heavy steel gates set in concrete, but people have just cut through the gates with cutting torches. I've had to run people off my land, and I know that some think I'm an unfriendly landowner. But its my land, and I don't want people hunting

wildlife or trashing my property, and I've managed to really cut down on the poaching and trespassing in recent years.

14. Creating a 100 foot clear cut through my property will open up this area again to trespassers, and make enforcing my private property rights impossible. I won't be able to keep people out once the access is there. More access means I can't control who comes on to my property. I believe that more trespassers will ruin my place as I know it.

15. I have heard that Pacific Connector would put fences up, but I know that those don't work, because they haven't in the past. We would need human surveillance, but I know that the company won't pay for that.

16. Once the pipeline is constructed, Pacific Connector will be gone. I will have to deal with the trespassers and any problems with the pipeline or my property. I suppose we could sue the company for anything trespassers do to my land, but I don't have money to do that, and it wouldn't fix the problems with my land anyway.

17. I'm also very concerned about the safety of the pipeline. The gas that is going to be in the pipeline is highly pressurized, and won't be odorized. So, we won't know until its too late if there's a problem with the line. I've seen the news about pipeline explosions like the one in California, and it makes me sick. That accident in San Bruno happened in a residential area, and killed a lot of people and destroyed a lot of homes. But what happens when an explosion happens in a rural area that is surrounded by forestland? It will all burn up, and law enforcement and firefighters won't be able to stop it.

18. I cannot believe that in America, anyone has the right to go on someone else's property without their permission. This seems unconstitutional to me. Pacific Connector does <u>not</u> have

my permission to come on my land! Where does it end? Who gets to decide who can come on my land? This is just unimaginable! It makes me very angry.

19. The landowner signature requirement makes a lot of sense to me. Visitors should have to get the permission of the owner to come on to their property. If I say no, then that should be the end of it. It's my right as a private landowner to say no. But this pipeline company doesn't seem to be able to take no for an answer.

20. I believe that Pacific Connector is using the threat of eminent domain to circumvent constitutional protections and intimidate private property owners so that the company gets what it wants. I've never given the company access to my land, and I've run them off in the past. Just this summer they sent me a letter thanking me for my permission – but I've never given it to them! What were they thinking? That I'd forget that I said no? That company is playing dirty and tricky.

21. I don't have a problem with eminent domain generally. I can see where it might be necessary for some things like building a highway, but not for a project like this that no one other than the company wants. We have natural gas in this country that can be shipped to California through the Ruby pipeline. But this Pacific Connector pipeline is being proposed just for private company profits. It isn't in the public interest, in my opinion.

22. I know that this fight against the pipeline has been going on for years. I didn't get involved because I didn't want Pacific Connector to think that they had control over me, or any credibility. But now I've gotten involved, because the work fighting this project shouldn't be done by just a few. I wanted to join my neighbors and fight this project, and protect my land.

/// /// ///

/// /// ///

I declare under penalty of perjury that the foregoing is true and correct. Dated this 10th day of September, 2010.

/s/ Bill Gow .
Bill C. Gow
4993 Clarks Branch Road
Roseburg, OR. 97470

(Original signature on file with Applicants' Counsel of Record)

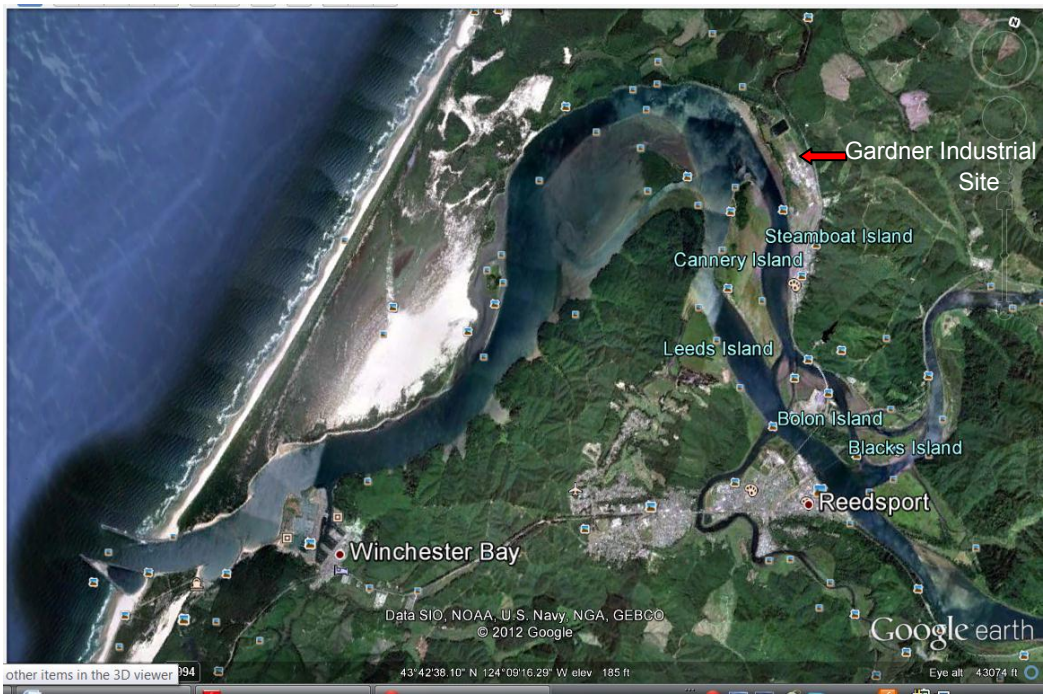
Exhibit 53

Alternative Jordan Cove Facility Siting / Pacific Connector Pipeline Route #1

A variety of Natural Gas pipeline infrastructure to West Coast Ports already exists. A detailed explanation as to why the Jordan Cove Energy Project did not look at utilizing these already existing pipelines and Ports in order to develop their LNG Export terminal should be analyzed in the EIS. A detailed explanation as to why PG & E is no longer a partner in this project should also be included.

Alternative Jordan Cove LNG Export Terminal Siting Locations (#2)

An explanation as to why other siting locations such as the Jerden Cove just north of Winchester Bay and/or the Industrial Site in Gardner, Oregon, were not analyzed as siting locations for the Jordan Cove LNG terminal, should be included in the EIS review.



Example #3
Pipeline Transportation and Terminal Location

Example #4

Pacific Trail Pipeline Project

PACIFIC TRAIL PIPELINES

MOVING NATURAL GAS FROM WESTERN CANADA TO ASIAN MARKETS

Pacific Trail Pipelines will provide a direct connection between the Spectra Energy Transmission pipeline system and the Kitimat LNG terminal for the transportation of natural gas from Western Canada to Asian markets.

Click to enlarge

Quick Facts:

- Pipeline location: Summit Lake to Kitimat, British Columbia
- Pipeline length: Approximately 463 km
- Pipeline capacity: Up to approximately 1,000 MMcf/d
- Compressor station: 1
- Diametre of pipe: 42 inches

Latest News

25/Feb/2013

Pacific Trail Pipelines Limited Partnership sign $200 million commercial agreement with 15 First Nations regarding the pipeline component of the Kitimat LNG Project
Read More »

11/Feb/2013

Apache, Chevron complete Chevron Canada's entry into Kitimat LNG
Read More »

Overview of Proposed Energy Operations of Jordan Cove Export Project

The proposed Jordan Cove Energy Project is located at Coos Bay in southern Oregon. JCEP received FERC approval in Docket No. CP07-444 to construct an LNG import facility. FERC also approved the construction of the Pacific Connector Pipeline. JCEP has received authorization from the Department of Energy in Docket No. 11-127-LNG to export LNG from the site to FTA countries. It intends to file applications in 2012 to export to non-FTA countries and to amend its FERC authorization to include authority to construct a dual-use import-export facility.

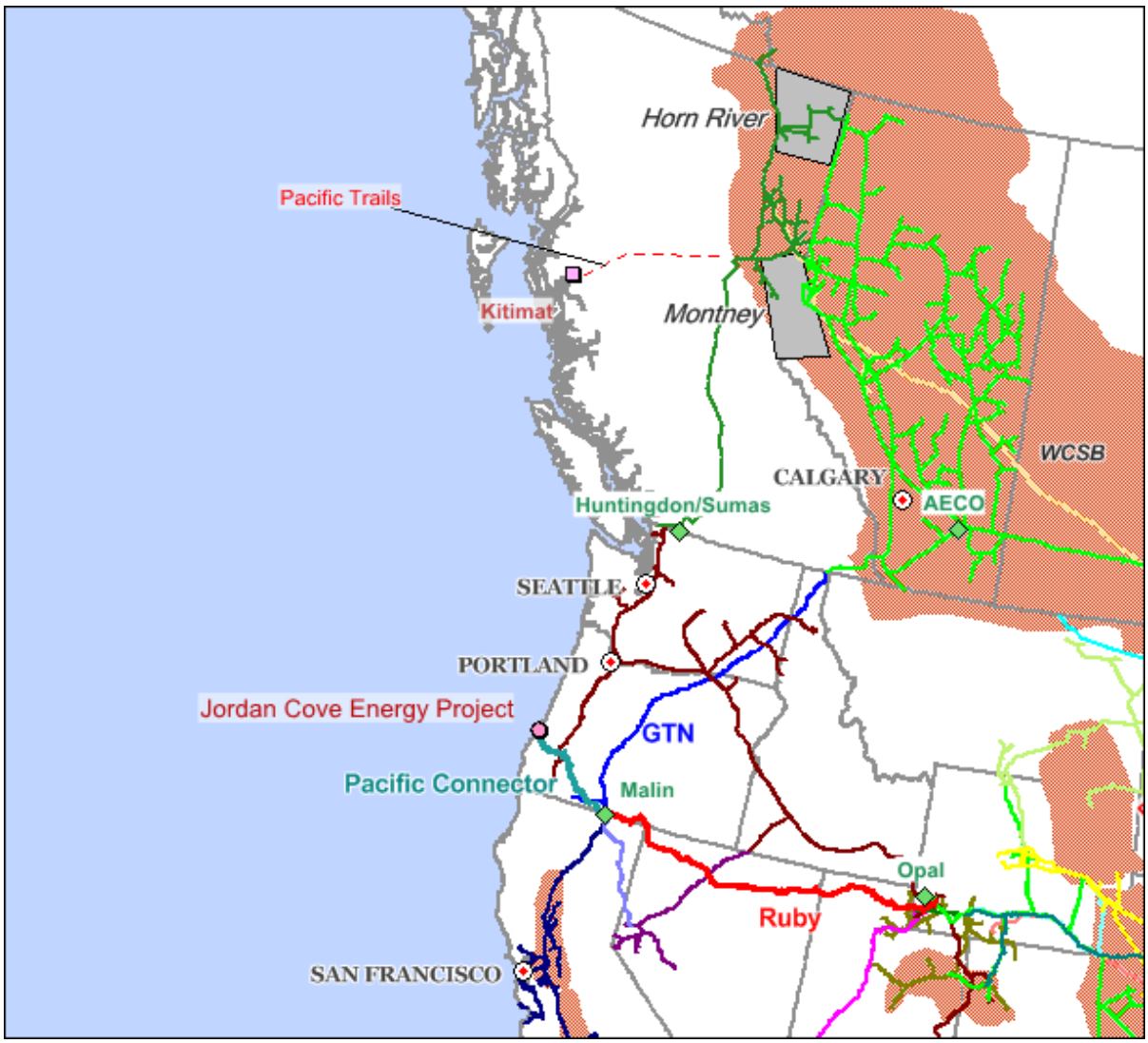


Figure 15: Jordan Cove Energy Project Location Map

Exhibit 54

http://business.financialpost.com/commodities/energy/pembina-pipelines-new-purpose-get-canadas-oil-and-gas-to-the-rest-of-the-world

Pembina Pipeline's new purpose: Get Canada's oil and gas to the rest of the world

CEO shifts to getting hydrocarbons to the U.S. and Asia, especially in light of Canada's infrastructure problems, which he thinks will only get worse

By Claudia Cattaneo
February 16, 2018
Last Updated
February 20, 2018

Political priorities come and go, especially when it comes to energy these days, and Pembina Pipeline Corp. has been adding value one piece of infrastructure at a time since the days of Louis St. Laurent.

Its most recent growth spurt, much of it through the oil and gas downturn, has boosted its enterprise value to $26.7 billion, from $14.4 billion in 2014 when current chief executive Mick Dilger took over, and from $3 billion 10 years ago.

With that kind of pedigree, you could do worse than pay attention to Dilger, who believes it would be better for governments to help improve the value of existing resources rather than chase new energy sources.

Canada, he points out, sits on some of the world's best and largest deposits of natural gas, which could be the bridge fuel to both help solve the climate change challenge by replacing coal and turn the country into a green superpower.

"How bad does it have to get in Canada before people care?" Dilger said in an interview in the company's Calgary headquarters. "Monies don't come from governments. They come from adding value, and maybe parts of Canada have had it too good and we need some pain before people start to wake up. It's also frustrating to me because I am mindful of the environment."

Pembina is little known outside Western Canada, partly because it rarely seeks publicity, partly because much of its business has been in energy-friendly Alberta.

It grew from a single oil pipeline built in 1954 by Alberta's Mannix dynasty to transport oil from the Pembina oil discovery in Drayton Valley, Alta. The company is now widely held — the Mannix family remains a shareholder — and is now Canada's third-largest pipeline company after Enbridge Inc. and TransCanada Corp.

Pembina has achieved its lofty position by building or buying infrastructure to serve its oil and gas customers in Western Canada, specifically pipelines linked to the oilsands in Alberta and shale discoveries such as the Montney and the Duvernay, storage tanks, fractionation plants that separate light hydrocarbon mixtures into individual substances, and gas-processing facilities.

The next projects in its core geography continue to reflect its time-tested mantra: do the most with the molecules you have.

The projects include a proposed $4-billion petrochemical plant in Sturgeon County in Alberta's Heartland with equal partner Petrochemical Industries Co. of Kuwait, and a $250-million liquefied petroleum gas export terminal in Prince Rupert, B.C.

"We think we have a purpose beyond what we have done, which is to play our part alongside other sector companies to **get our hydrocarbons to the rest of the world**," Dilger said.

But its next game-changing project could be in the United States. Pembina is making progress on reviving the US $10-billion Jordan Cove Energy Project, a liquefied natural gas export terminal on the Oregon coast to process Western Canadian gas, which is in great demand in Asia, but prices have languished because of a lack of export infrastructure.

> "*We think we have a purpose beyond what we have done, which is to play our part alongside other sector companies to get our hydrocarbons to the rest of the world*"
> -Mick Dilger-

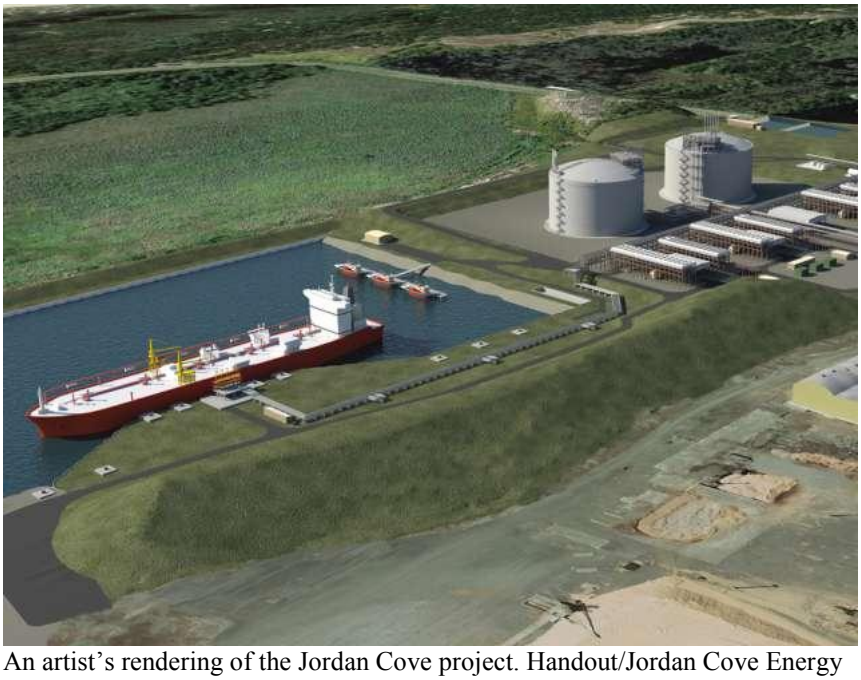
Jordan Cove was part of Pembina's acquisition of Veresen Inc. last year, part of a $100-billion U.S. buying spree by Canada's top three pipeline companies over the past three years.

In addition to Pembina's purchase of Veresen, whose assets are half in the U.S., Enbridge bought Spectra Energy Corp. and TransCanada purchased Columbia Pipeline Group Inc.

The U.S. is where Pembina's larger competitors have already spread out to get around Canada's infrastructure gridlock and to take advantage of the more favourable business environment down south.

"That is $100-billion worth of money that could have been spent in Canada," said Dilger, a 54-year-old accountant by trade. "Think about that: the royalties, the jobs. The trend is, as their economy gets more pro business and pro-development, and ours goes the other way, capital will flee Canada. Those are all irrefutable conclusions to the way we are going, versus the way they are going."

The struggling but advanced Jordan Cove LNG project was denied an export permit by the U.S. Federal Energy Regulatory Commission two years ago because of a lack of customers even during a period of weak LNG prices, but Pembina has since filed a new permit application and expects a ruling this November.


An artist's rendering of the Jordan Cove project. Handout/Jordan Cove Energy

"We believe (the project) filed a winning application this time," Dilger said. "They had tremendous local support and federal support. I am not trying to predict what is going to happen in 2023 with commodity prices. But today, the price of gas in Tokyo is US $11. The price of gas in Alberta on a bad day is like $1. It costs you $5 to $6 to get it there. So there is a massive arbitrage today. I don't know what it's going to be in 2023, but there is a lot of interest right now."

Pembina is trying to secure customers and finish pipeline engineering, but if everything works out, the company will be in a position to make a final investment decision as soon as the end of 2018, Dilger said, which might mean the project could be completed in 2023.

"Pembina was smart to keep the project alive because the LNG market is coming to them now," said Dan Tsubouchi, chief market strategist at Stream Asset Financial Management, who believes global LNG demand is recovering a lot faster than previously anticipated.

Buying Veresen also gave Pembina two strategic Canadian gas export assets: a 50 per cent interest in the Alliance natural gas pipeline from Western Canada to Chicago (the rest is owned by Enbridge), and a roughly 43 per cent stake in a natural-gas-processing venture, Aux Sable.

But Dilger worries Canada's energy infrastructure problems will only get worse because of reforms announced by Ottawa last week to modernize the regulatory and environmental reviews of energy projects.

For example, allowing anyone in Canada to have an opinion on whether a major project should go ahead politicizes reviews and puts the country down a "very dangerous" path, he said.

There are three LNG projects making progress on the B.C. coast — LNG Canada led by Royal Dutch Shell PLC with partners PetroChina, Korea Gas Corp. and Mitsubishi Corp. of Japan; Woodfibre LNG, owned by the RGE Group of companies based in Singapore; and Kitimat LNG, a joint venture between Chevron Corp. and Australia's Woodside Petroleum Ltd. — but politics and high costs have been a long-running challenge.

Jordan Cove, meanwhile, would process up to 1.3 billion cubic feet a day of both Western Canadian gas or U.S. Rockies gas into LNG for export to Asia, but it's not the only energy export project that could take Canadian energy in the U.S. to reach Asian markets.

The proposed Eagle Spirit oil pipeline is also moving forward with plans to establish a tanker terminal in Alaska to export Canadian oil and get around the federal Liberal government's tanker ban.

Dilger believes Jordan Cove has a higher chance of success under Pembina than it had under Veresen because it has the money to finance it, the expertise to build both the plant and a 400-kilometre pipeline through tough terrain, and the relationships with Western Canadian producers and Asian customers to make it viable.

Some day, Pembina would like to build an LNG facility on the B.C. coast, too, Dilger said, but Jordan Cove has key advantages: it is cheaper to build a pipeline to receive Western Canadian gas from existing networks than build over the Canadian Rockies; its location near larger population centres means there is labour available to build it; and shorter travel time to Asian markets versus the U.S. Gulf Coast means lower transportation costs for its LNG.

Another priority is the expansion of the Alliance pipeline, one of Canada's large gas export highways into the Chicago hub.

Pembina will move ahead with Veresen's plans to expand the system by up to 500 million cubic feet a day, adding to the current level of 1.8 billion cubic feet a day, by using compression. A binding open season for interested shippers is under way.

"The best market in North America right now is Chicago," Dilger said, "I'd like to see Canadian gas get there and get some higher netbacks."

The Veresen acquisition diversified Pembina's assets into gas and into a new region, he said, but it also fits with the company's integrated business model, which he said is better than having disparate energy businesses geographically.

As for moving into new energy sources such as wind and solar, Dilger doesn't see the value proposition for his company, adding: "How's that working for Ontario so far?"

Financial Post

• Email: ccattaneo@nationalpost.com

Exhibit 55

OILCHANGE INTERNATIONAL

JANUARY 2018

JORDAN COVE LNG AND PACIFIC CONNECTOR PIPELINE GREENHOUSE GAS EMISSIONS BRIEFING

FACTS AT A GLANCE

Total Annual GHG Emissions:	**36.8 million metric tons**
Emissions Equivalent:	**15.4 times the 2016 emissions of Oregon's last remaining coal-fired power plant (the Boardman plant) – or 7.9 million passenger vehicles**
Pipeline Project Name:	Pacific Connector Gas Pipeline
LNG Export Terminal Project Name:	Jordan Cove Energy Project
Ownership:	Pembina Pipeline Corporation
Operator:	TBD
Pipeline Length:	229 miles
Pipeline Diameter:	36 inches
Pipeline Capacity:	1.2 billion cubic feet per day (cf/d)
LNG Export Capacity:	7.8 million metric tons of gas per year (MMT/Y)
Project Cost:	$10 billion
Land Affected:	5,146 acres
States Directly Affected:	Oregon
Counties Affected:	Coos, Douglas, Jackson, and Klamath
Gas Source:	The Rocky Mountain states of Utah, Wyoming, and Colorado and the Montney Basin in British Columbia
Claimed Destination Markets:	Primarily Asia – Japan and China
Intended Permit and Project Schedule (Est.):	Final Environmental Impact Statement (August 2018); FERC order granting authorization and state permits (November 2018); Construction (first half of 2019); In-service date (first half of 2024)

SUMMARY

The proposed Pacific Connector Gas Pipeline and Jordan Cove Energy Project would transport and process into liquefied natural gas (LNG) around 430 billion cubic feet of fossil gas annually.[a] The greenhouse gas (GHG) emissions triggered by the project will be significant, but to date the scope of these emissions has not been well understood.

This paper provides an estimate of the full lifecycle emissions of the project, calculating a reference and high case estimate using the best available information. It finds that the project would add significantly to greenhouse gas emissions both globally and within the state of Oregon.

The emissions estimate includes an estimated range of methane leakage along the supply chain and finds that even a conservative estimate of methane leakage undermines claims that the gas supplied to global markets via the project would lead to a net reduction in GHG emissions. The paper also finds that there is no evidence to support an assumption that gas supplied by the project would replace coal in global markets.

In order to address the global climate crisis, emissions from all sources of fossil fuel must be reduced to zero by mid-century. Building and operating this project will undermine that goal. This paper provides the clear climate rationale against the project going ahead.

a We use the term fossil gas to mean natural gas produced from fossil fuel sources.

Above: LNG Tanker ©Smit Ebro , Grace Dahlia & Fairplay 21

PACIFIC CONNECTOR GAS PIPELINE MAP

PROJECT OVERVIEW

The Pacific Connector Gas Pipeline (PCGP) is a proposed 36-inch fracked gas pipeline that would run 229 miles across southern Oregon to a proposed liquefied natural gas export terminal at Jordan Cove, near Coos Bay, OR. The pipeline would start in southern Klamath County in the farming community of Malin, OR.

The proposed route of the pipeline crosses the Cascade mountains, threatening public and private lands, traditional tribal territories, and more than 2,000 acres of forest. Close to 400 rivers and streams would be crossed, including the Rogue, Klamath, Umpqua, Coos, and Coquille Rivers.

The project is facing significant opposition from indigenous communities along the pipeline route, including the Klamath Tribes, as well as the Yurok and Karuk Tribes along the Klamath River. The construction of the pipeline and the terminal would disturb sacred sites, burial grounds, and cultural resources and could also impact critical runs of salmon and steelhead. The Jordan Cove LNG export terminal would be built on traditional Coos tribal territory. There are also over 500 landowners along the pipeline route that would be impacted by the pipeline, and many will face eminent domain proceedings for the private project if it moves forward. More than 400 landowners, organizations, tribal members, and concerned citizens have filed motions to intervene with the Federal Energy Regulatory Commission (FERC) in opposition to the project, with only five interventions filed in support.[1]

The project backer is the Canadian company Pembina Pipeline Corporation, a fossil fuel giant that recently merged with Veresen, the original proponent of the pipeline proposal. The pipeline would be fed by either of two existing pipelines – the Ruby Pipeline that runs from the Rocky Mountains in Wyoming to Malin, or the Gas Transmission Northwest pipeline that runs from British Columbia. Each pipeline is capable of carrying 100 percent of Pacific Connector's capacity of 1.2 billion cubic feet per day. This creates a unique situation in which Canadian and U.S. fracked gas could compete for export, and opens the possibility that Jordan Cove could provide export service for 100 percent Canadian-sourced fracked gas.

The Pacific Connector Pipeline and the Jordan Cove Energy Project were first proposed in 2005 as a gas import project. The original project was vacated in 2012 and replaced with a LNG export proposal in 2013. In a rare federal decision, FERC denied the project application in 2016, stating that, "because the record does not support a finding that the public benefits of the Pacific Connector Pipeline outweigh the adverse effects on landowners, we deny Pacific Connector's request for certificate authority to construct and operate its project."[2] In early 2017, project backers reapplied under the Trump administration, which has stacked FERC with new appointees.

Pembina plans to complete the federal and state permit process by November 2018. It plans to begin construction in the first half of 2019 and bring the export terminal online by the first half of 2024.

Proposed path of pipeline through Umpqua National Forest, south of Tiller, MP 109.

FOSSIL GAS AND CLIMATE CHANGE

Climate science clearly indicates the need to reduce consumption of all fossil fuels and make a just transition to a clean energy economy.[3] Building major fossil gas infrastructure today undermines action to protect our climate. Increasing access to fossil gas spurs its use, locking us into releasing more emissions when we must progressively produce and use less of all fossil fuels, including gas.

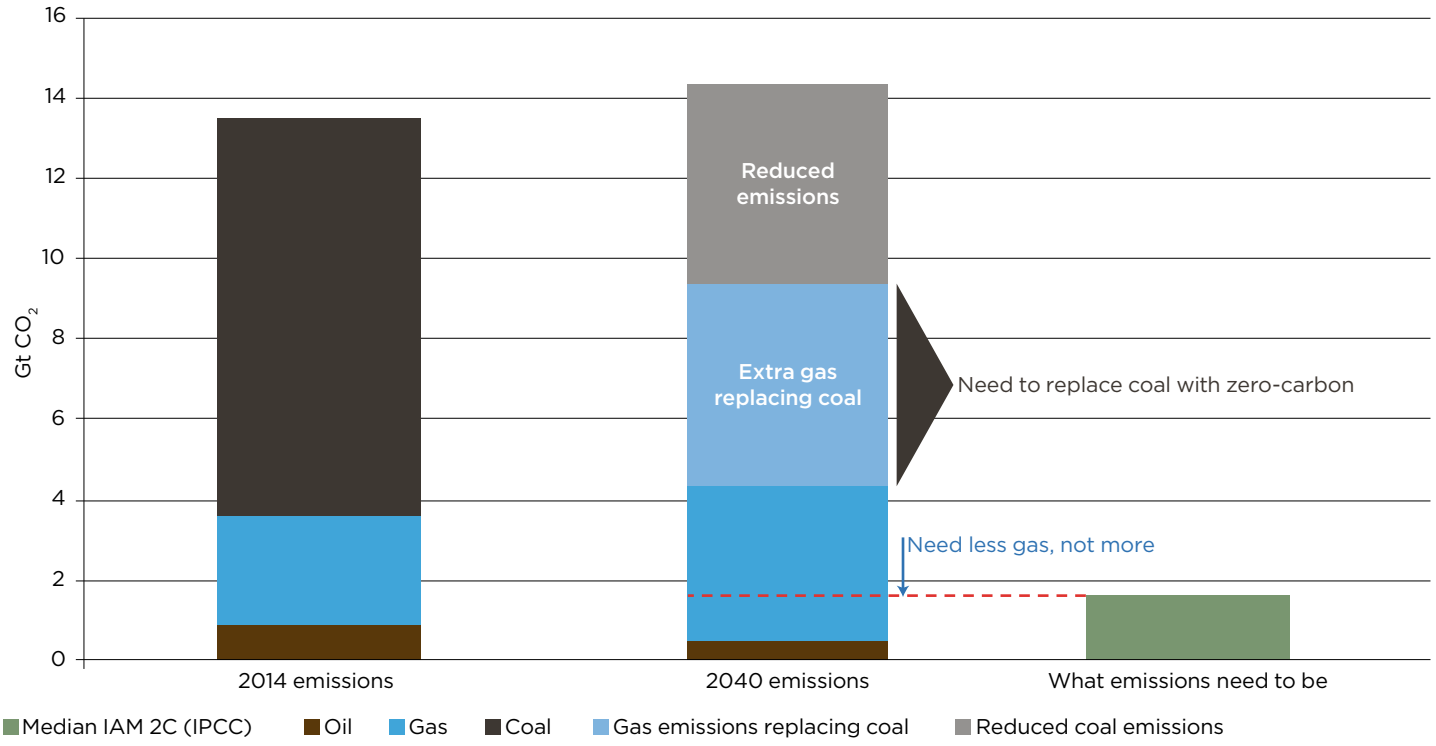
Much of the debate on fossil gas and climate has focused on measuring and reducing the leakage of methane, a potent greenhouse gas, to the atmosphere. But focusing on methane leakage alone distracts from the core issue at hand. To meet climate goals, fossil gas production and consumption must, like that of other fossil fuels, be phased out. Reducing methane leakage, even to zero, does not alter that fact.

Fossil gas proponents also argue that more gas capacity is needed to complement renewable energy sources. Several factors undermine this case, summarized as follows:[4]

1. **No Room for New Fossil Gas:** Climate goals require the power sector to be decarbonized by mid-century. This means gas use must be phased out, not increased (see Figure 1).
2. **New Gas is Holding Back Renewable Energy:** Wind and solar are now cheaper than coal and gas in many regions. This means new gas capacity often displaces new wind and solar rather than old coal.
3. **The Wrong Gas at the Wrong Time:** Claims that gas supports renewable energy development are false. The cheapest gas generation technology, Combined Cycle Gas Turbines (CCGT), is designed for base load operation, not intermittent peaking. In any case, most grids are a long way from renewable energy penetration levels that would require back up. Storage and demand response will be ready to step in by the time they are really required.
4. **New Gas Locks in Emissions for 40+ Years:** Companies building multibillion-dollar gas infrastructure today expect to operate their assets for around 40 years. Emissions goals mean this expectation cannot be met.
5. **Too Much Gas Already:** The coal, oil, and gas in the world's currently producing and under construction projects, if fully extracted and burned, would take the world far beyond safe climate limits. Opening new gas fields is inconsistent with the Paris climate goals.

The fact that methane leakage cannot be reduced to zero, and therefore emissions from fossil gas are in fact higher than is often accounted for, only makes the phasing out of fossil gas more urgent. By enabling an increase in production and consumption of fossil gas, the Jordan Cove LNG terminal and Pacific Connector Gas pipeline will contribute significant amounts of greenhouse gas emissions that will exacerbate climate change.

Figure 1: We Need Less Gas, Not More: Global Emissions from Power Generation (2014 and projected 2040 in IEA New Policies Scenario) Compared to Median IPCC 2040 Power Emissions Consistent With a Likely 2°C Scenario



Source: Oil Change International analysis, see Endnote 4.

PROJECT EMISSIONS ESTIMATED AT 36.8 MILLION METRIC TONS ANNUALLY

The lifecycle greenhouse gas emissions of the project depend on the amount of gas exported through it, and the methane and carbon emissions associated with extracting, piping, processing, transporting, and burning that volume of gas.

The Jordan Cove LNG terminal is expected to export 7.8 million tons of LNG per year.[5] This would require around 85 percent of the 1.2 billion cf/d capacity of the Pacific Connector pipeline.[6] However, the Jordan Cove Energy Project has signed agreements to use 95.8 percent of the pipeline's capacity. This allows for an additional 10 percent of pipeline capacity for seasonal fluctuations and to carry gas to run equipment at the LNG terminal. The greenhouse gas emissions estimate is therefore based on delivering 1.15 billion cf/d to Jordan Cove.

In our reference case, which utilizes a mean methane leakage rate of 1.77 percent across the gas supply chain, we estimate the total lifecycle emissions caused by the project to be over 36.8 million metric tons (MMT) of carbon dioxide equivalent (CO_2e) per year. This is equivalent to over 15.4 times the 2016 emissions from Oregon's only remaining coal plant, the Boardman coal plant, or equivalent to the annual emissions from 7.9 million passenger vehicles. The Boardman plant is scheduled to close in 2020 because of climate and air pollution concerns.[7]

Based on a peer-reviewed study of methane leakage for gas production in three Rocky Mountain states,[8] a high-end estimate brings the overall leakage rate to just over 4 percent. This would raise the annual lifecycle emissions from the project to nearly 52 million metric tons. This would be nearly 22 times the emissions from the Boardman coal plant, or equivalent to the annual emissions from 11.1 million passenger vehicles.

Annual emissions within Oregon would be over 2.2 MMT, which is slightly less than the 2016 emissions from the Boardman plant. For Oregon's emissions inventory, emissions savings from shutting down Boardman will be cancelled out by this project. In fact, in-state emissions could be higher if the project leads to additional gas being transported on the GTN pipeline from Canada. This would increase emissions at GTN compressor stations located in Oregon.

Outside of Oregon, emissions come from fracked gas production and processing, pipeline transport to the state line, tanker transport from Jordan Cove to destinations in Asia, transmission, distribution, and storage between the regasification facility

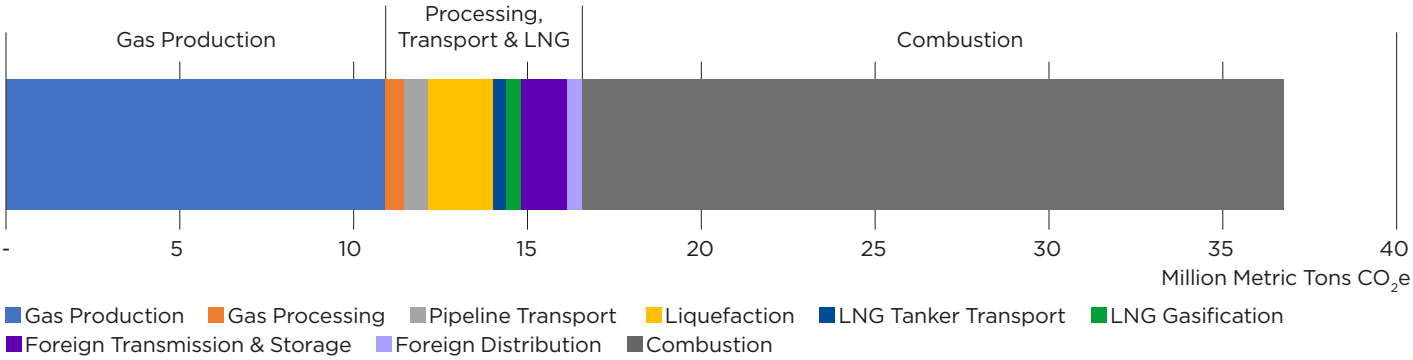
For Oregon's emissions inventory, emissions savings from shutting down Boardman will be cancelled out by this project.

Table 1: Lifecycle GHG Emissions from Jordan Cove LNG and Pacific Connector Pipeline

Lifecycle Stage	Reference Case (MMT/Y)	High Case (MMT/Y)
Gas Production	10.9	26.0
Gas Processing	0.51	0.52
Pipeline Transport to Jordan Cove	0.78	0.78
Gas Liquefaction	1.8	1.8
Tanker Transport	0.44	0.44
LNG Gasification	0.40	0.40
Foreign Transmission & Storage	1.3	1.3
Foreign Distribution	0.43	0.43
Combustion	20.2	20.2
Total	36.8*	52.0*

*Figures may not add due to rounding.
Source: Oil Change International – See Appendix for details.

Figure 2: Full Lifecycle Emissions from Jordan Cove LNG and Pacific Connector Pipeline - Reference Case



Source: Oil Change International – See Appendix for details.

and points of final use, and finally the combustion of gas.

For methane leakage rates in the production zone, we reference a study published in *Environmental Science & Technology* in June 2017 by researchers from University of Wyoming and Colorado State University. That study quantified atmospheric methane emissions from active natural gas production sites in normal operation in four major U.S. basins/plays: Upper Green River (Wyoming), Denver-Julesburg (Colorado), Uintah (Utah), and Fayetteville (Arkansas).[9] The difference between our reference and high case estimates is primarily based on the difference between the middle and high measurements in the range of figures presented in this paper. However, we did make some downward adjustments to leakage rates in Colorado in both cases, in acknowledgment of new methane regulations in that state (see the Appendix for more details on leakage rates).[10]

For the pipeline and liquefaction emissions of the Jordan Cove and Pacific Connector project, we used emissions data from the latest project application.[11] Elsewhere in the supply chain, we used methane leakage rates based on EPA national averages where we did not have project-specific data. These figures likely underestimate leakage, leading to a conservative estimate of total emissions in our analysis.

We used a 20-year global warming potential factor of 86 to convert methane to carbon dioxide equivalent. For more details on methane assumptions and full details of sources and methods, please see the Appendix.

LNG EXPORTS WOULD HAVE NO EMISSIONS ADVANTAGE OVER COAL

As climate science indicates we must move as quickly as possible toward zero emissions, replacing coal with gas is clearly not a climate solution.[12] Nonetheless, the gas industry and its supporters continue to use this as a talking point, claiming that doing so would lead to a net reduction in emissions. However, even in the hypothetical scenario that every molecule of gas exported from Jordan Cove replaces coal in the destination market, the emissions associated with this project suggest that no net saving in greenhouse gas emissions would occur. In fact, the project could lead to higher net greenhouse gas emissions.

In 2014, the U.S. Department of Energy (DOE) released a "Life Cycle Greenhouse Gas Perspective on Exporting Liquefied Natural Gas from the United States."[13] The report, conducted by the National Energy Technology Laboratory (NETL), found that "compared to domestically produced and combusted gas, there is a significant increase in the lifecycle GHG emissions that are attributed to the LNG supply chain, specifically from liquefaction, tanker transport, and regasification processes."

Domestically, the current climate "break-even" point for lifecycle methane leakage is about 2.7 percent when switching from coal to gas for electricity over a 20-year lifecycle. That means that new gas combined cycle power plants reduce climate impacts compared to coal plants only when leakage remains under 2.7 percent.[14] Other estimates have put the domestic break-even point at 2.8 percent.[15]

When exporting LNG to Asia, the methane leakage rate must be significantly lower to have a "break-even" climate impact. The DOE/NETL report found that when comparing the climate impacts of LNG to coal-fired electricity in China, the lifecycle methane leakage rate would have to stay below 1.4 percent – when exporting LNG from New Orleans to Shanghai – to produce benefits over a 20-year timeframe.

NETL did not model lifecycle greenhouse gas emissions resulting from exporting LNG from the West Coast of the United States to Asian markets. Presumably, the climate break-even point would be slightly higher when exporting LNG from Oregon's Jordan Cove to Asia, given the closer geographic proximity. For comparison, the report found that the break-even point for LNG exports from New Orleans to Europe is 1.9 percent. Therefore, based on the DOE/NETL estimates, the climate break-even point for LNG exported from Jordan Cove to Asia is likely somewhere between 1.4 and 1.9 percent.

Our reference case estimate of methane leakage along the project's entire chain of supply is 1.77 percent. This is likely a conservative estimate as a number of factors could mean the real leakage rate is significantly higher (see Appendix). Even at this relatively low methane leakage rate, claims that greenhouse gas emissions are reduced by replacing coal in Asia with LNG exports from Jordan Cove are unsubstantiated, in part because the methane leakage associated with the project will likely be above the break event point.

FERC'S INADEQUATE CLIMATE ANALYSIS

The Federal Energy Regulatory Commission (FERC) is the primary federal agency that assesses the need for and impacts of interstate gas pipelines and LNG facilities, and it issues permits for construction and operation.[16]

FERC has yet to conduct an updated analysis of the Jordan Cove project, but we know FERC has repeatedly failed to fully assess and analyze the greenhouse gas emissions of the projects it permits. In August 2017, the Sierra Club together with landowners successfully overturned FERC's approval of the Southeast Market Pipelines Project, an interstate fossil gas pipeline project proposed through Alabama, Georgia, and Florida, based on inadequate information on greenhouse gas emissions in the project's environmental impact statement (EIS).[17] Although the project is already completed, the U.S. Court of Appeals vacated and remanded FERC's permits and ordered the agency to issue a supplemental EIS (SEIS) quantifying the project's downstream emissions.

FERC issued a draft of the SEIS in September 2017[18] and the Sierra Club filed detailed and scathing comments on the draft in November.[19] The Sierra Club comments not only call out the continuing inadequacy of FERC's climate emissions analysis, but also add clarity to the case for fully accounting for the entire emissions profile of fossil gas projects.

As in many of FERC's EIS documents, FERC preempts its discussion of greenhouse gas emissions and climate change in the draft SEIS with an assertion that the gas delivered by the project will replace dirtier fossil fuels, namely coal-fired power generation. The Sierra Club raises a number of points regarding this assumption that have salience for Jordan Cove LNG and similar proposed fossil gas infrastructure.

The Sierra Club argues that, to demonstrate that a project is instrumental to the retirement of other fossil fuel capacity, FERC must compare future scenarios with and without the project, rather than simply "juxtapos(ing) past conditions with a future in which the pipeline is built."[20]

A paper published in the international journal *Energy* in November 2017 discussed this issue in detail, specifically examining scenarios in which U.S. LNG is exported to Asia.[21] The paper found that the displacement of coal by LNG exports is far from a given, and that, as a result of U.S. exports of LNG, "emissions are not likely to decrease and may increase significantly due to greater global energy consumption, higher emissions in the US, and methane leakage."[22]

The Sierra Club comments also point out that accelerating projections of renewable energy adoption indicate that retiring coal capacity is not necessarily replaced with gas. Further, much of the coal generation capacity slated for retirement is old and inefficient. It is therefore typically operating far below capacity and likely to be retired whether a new gas pipeline is built or not. In this way, comparisons between retiring installed coal capacity and building new gas-fired capacity are misleading. For power plant emissions to be reduced by retiring coal and adding gas, new gas capacity would have to be run at similarly low utilization rates, which would likely not be economical. With no concrete analysis to back up its assumptions, FERC's attempt to discount gas pipeline emissions based on the offset of dirtier energy sources has no basis in fact.

The Jordan Cove Energy Project makes similar assertions regarding gas replacing coal, claiming that, "(n)atural gas is the cleanest-burning hydrocarbon available, and its transportation to other markets will allow consumers to move away from higher-emission fuels such as coal."[23] The company provides no evidence to support this.

Finally, as the "Climate and Fossil Gas" section explains, the premise that replacing coal with gas leads to positive climate outcomes is flawed. Emissions from fossil fuels need to be close to zero by mid-century to ensure a safe climate. Therefore, any new gas infrastructure built today will need to be replaced with zero emissions energy sources before it reaches the end of its economic life. With Jordan Cove currently scheduled to come online in 2024, investors would expect it to still be operating long after the transition to clean energy should be complete.

There is no evidence that the project would reduce emissions in line with the climate goals established by science - in fact, existing analyses point to the opposite. The 36.8 million tons of annual GHG emissions associated with the project must therefore be viewed as additional pollution that cannot be squared with any greenhouse gas reduction strategy.

There is no evidence that the project would reduce emissions in line with the climate goals established by science - in fact, existing analyses point to the opposite.

OREGON'S CLIMATE GOALS

In 2007, the Oregon legislature adopted goals to reduce climate pollution to 10 percent below 1990 levels in 2020 and at least 75 percent below 1990 levels by 2050.[24] According to these goals, Oregon's greenhouse gas emissions should be below 14.1 MMT in 2050. The state legislature is currently considering the "Clean Energy Jobs Bill," which creates a mechanism to reduce climate pollution in line with state goals.

These goals may fall below the targets set in the UNFCCC's Paris Agreement, which Governor Kate Brown committed to after President Donald Trump withdrew in 2017. The Paris Agreement commits to keeping global temperature rise "well below" 2 degrees Celsius (C) compared to pre-industrial levels and aims for a maximum temperature rise of 1.5°C. The latter goal requires global greenhouse gas emissions to fall to zero by around 2050, while the former (2°C) goal requires emissions to reach zero by about 2065.[25] According to the Oregon Global Warming Commission 2017 Report, Oregon is currently not on track to reach statutorily mandated emission reduction goals in 2020 or 2050.[26]

The total in-state annual emissions of the Jordan Cove Project, which only includes emissions from the LNG terminal, compressor stations, and leakage along the pipeline route, would be over 2.2 MMT, while the total lifecycle emissions of this project are over 36.8 MMT. The LNG terminal alone would emit over 1.8 MMT of greenhouse gas pollution a year, becoming the largest single source of climate pollution in the state of Oregon after 2020. If Oregon reaches its 2050 climate reduction goals, the in-state emissions of Jordan Cove will be equal to 16 percent of Oregon's total emissions, while the lifecycle greenhouse gas emissions will be over 261 percent.

The project's in-state emissions will constitute an increasingly large proportion of remaining allowable emissions, while providing no actual energy supply for the state.

In 2016, the Oregon legislature passed SB-1547, which requires investor-owned utilities to eliminate coal-fired power from Oregon by 2035 because of pollution and climate concerns. Only considering in-state emissions, the Jordan Cove LNG Export Terminal and the Pacific Connector Pipeline would be roughly equivalent to the Boardman coal plant, which is set to close in 2020 in order to meet emissions goals. Considering the total life cycle emissions, this project would be equivalent to over 15.4 Boardman coal plants.

If the state of Oregon's climate policies progress toward alignment with the goals of the Paris Agreement, as Governor Brown has stated she intends,[27] then the project's in-state emissions will constitute an increasingly large proportion of remaining allowable emissions, while providing no actual energy supply for the state. By mid-century, the project will have to be shut down – decades before investors expect the project's economic life to end. Finally, Oregon's commitment to climate leadership would be undermined by hosting a facility that supports unsustainable global emissions and undermines climate action in other regions.

Table 2: GHG Emissions of the Jordan Cove Energy Project as a Percentage of Oregon's GHG Emissions

		Jordan Cove Energy Project		
		LNG Terminal Emissions	Total Project In-State Emissions	Total Project Lifecycle Emissions
	MMT CO_2e per year	1.8	2.2	36.8
Oregon 2015 Emissions	63.4	2.9%	3.5%	58%
Oregon 2050 Goals (75% below 1990)	14.1	13%	16%	261%
Under 2 MOU[b] (2 MT per capita by 2050[c])	11.2	16%	20%	329%

Source: Oil Change International

b The Under 2 MOU, signed by Oregon Gov. Kate Brown in 2015, is a commitment by sub-national governments to reduce GHG emissions towards net-zero by 2050. Central to this is the public commitment by all signatories to reduce GHG emissions by 80-95% below 1990 levels, or to 2 metric tons of carbon dioxide-equivalent per capita, by 2050.
c Based on 5,588,500 Oregon estimated population in 2050. http://www.oregon.gov/das/OEA/Pages/forecastdemographic.aspx

CONCLUSIONS

This briefing provides a calculation and discussion of the greenhouse gas emissions of the Pacific Connector Gas Pipeline and Jordan Cove LNG Export Terminal proposed in the state of Oregon. It clearly shows that the project would add significantly to greenhouse gas emissions both in the state of Oregon and globally.

The analysis shows that methane leakage along the project's supply chain undermines any claim that the project would supply destination markets with cleaner fuel. In addition, the remaining global carbon budget has no room to replace coal with gas, even if methane leakage were zero. In fact, the expansion of fossil gas undermines renewable energy development.

The project would increase the flow of fossil gas to the global market and in doing so would run counter to the goals of the Paris Agreement on climate change. The project would undermine Oregon's potential to play a leadership role in addressing global climate change.

APPENDIX: METHODS AND SOURCES FOR ESTIMATING JORDAN COVE LNG GREENHOUSE GAS EMISSIONS

GENERAL OVERVIEW OF LIFECYCLE EMISSIONS

Lifecycle greenhouse gas emissions include a combination of combustion emissions from burning fossil gas, emissions from producing, processing, and transporting the gas, and methane leakage – the intentional or unintentional leakage of fossil gas into the atmosphere along the full supply chain. In the case of liquefied natural gas export, additional combustion and leakage emissions from liquefaction, tanker transport, regasification, and transport from the import terminal to the ultimate point of consumption must also be included.

Developing any estimate of potential lifecycle greenhouse gas emissions from a proposed project requires using a variety of sources and assumptions. An emissions factor of 117.1 pounds of CO_2 per thousand cubic feet for the combustion of fossil gas is well established and this comprises the largest proportion of total emissions.[28]

Estimates of emissions occurring upstream of the proposed project include the production and processing of fossil gas and are based on available peer-reviewed and government data. For the Pacific Connector pipeline and Jordan Cove terminal, emissions estimates for equipment to be installed, such as compressors and engines, or electricity to be consumed, are supplied in the project applications and environmental impact statement. Emissions occurring downstream or after the defined project's parameters must be determined using other available sources.

The production, processing, and transport of fossil gas requires energy. For example, diesel, gasoline, fossil gas, or electricity are consumed to run drilling rigs, trucks for materials transport, compressors for pipeline pressure, and many other processes that require engines, turbines, and other equipment. Much of the emissions estimates for these stages are derived from expectations of the fuel such equipment is expected to consume based on projected utilization rates and operating times.

In addition to these fuel-based emissions, the production and handling of fossil gas leads to significant quantities of the gas being emitted to the atmosphere uncombusted. Some of this is emitted as part of standard processes such as the blow down of pipelines during maintenance. These intentional emissions of fossil gas are considered 'venting.' Some gas escapes from valves and seals as a result of equipment wear and tear or malfunction and these emissions are considered 'fugitive.'

Fossil gas is primarily made up of methane (CH_4), a hydrocarbon that, pound for pound, is a more powerful heat-trapping gas than carbon dioxide (CO_2), the primary GHG that is causing global temperatures to rise and the climate to change. Because the measurement and analysis of GHGs is based on much more abundant CO_2, the impact of methane on the atmosphere is expressed as a carbon dioxide equivalent (CO_2e) according to its global warming potential (GWP).

CALIBRATING CH_4 WITH CO_2

The study of methane's impact on warming has evolved in the past decade and estimates of the GWP of methane have increased as more has been learned. Methane lasts about 12 years in the atmosphere while CO_2 lasts for centuries. To calibrate methane's impact with that of CO_2, two time horizons have been used: 20 years and 100 years.

We use the 20-year GWP timeframe and 86 GWP for methane from the Intergovernmental Panel on Climate Change's (IPCC) most current *Assessment Report 5* (AR5), because whereas CO_2 accumulates in the atmosphere over the long term, the impact of methane is felt in the short term. Its most important contribution to total warming occurs at the time of peak atmospheric CO_2 concentrations (i.e. net zero CO_2 emissions) – that is, when CO_2 has its greatest warming effect, and methane potentially adds to that maximum amount of warming. According to analyses of IPCC scenarios, net CO_2 emissions need to reach zero around 2050 to have a 50 percent chance of limiting warming to 1.5 degrees Celsius, and around 2065 to have a likely chance of staying below 2 degrees Celsius of warming.[29]

With those scenarios in mind, if the Jordan Cove plant operates from 2024 to 2064, the average molecule of methane will be emitted in 2044 – respectively six years or twenty-six years before peak CO_2 concentrations. As those molecules will have their greatest impact in the period immediately prior to or beyond the point at which CO_2 concentrations should peak, the shorter range GWP is the more relevant measure for the project's methane emissions.[30]

The 100-year GWP is most commonly used by government and industry. It calibrates the GWP of methane at 34 times that of CO_2. However, according to the IPCC: "There is no scientific argument for selecting 100 years compared with other choices. The choice of time horizon is a value judgement because it depends on the relative weight assigned to effects at different times."[31]

The U.S. Environmental Protection Agency (EPA) generally uses the 100-year metric.[32] We strongly urge the EPA and all federal government agencies assessing the impact of fossil gas systems to use the 20-year GWP to properly measure the impact of methane leaked to the atmosphere. This is particularly important at a time when the production of gas is growing so fast, driving increased gas consumption.

STAGES AND SOURCES FOR THE JORDAN COVE GHG ESTIMATE

The estimate of lifecycle emissions begins with fossil gas production and runs the entire journey of the gas through to combustion. In the case of the Jordan Cove LNG terminal, gas would be primarily produced from shale plays in either the Canadian or U.S. Rockies and be transported by pipeline to Malin on the southern Oregon border where the Pacific Connector pipeline would begin.

Project application documents were used for the emissions estimates for the Pacific Connector pipeline and the Jordan Cove LNG plant. The only change we made to these estimates was to convert CH_4 to CO_2e using the 20-year GWP discussed in the previous section.

Methane leakage estimates at the production stage were based on the latest available peer-reviewed science for gas produced in the Rocky Mountain states of Colorado, Utah, and Wyoming.[33] While gas for the project may also be sourced from Canada, data for Canadian production were not available.

The stages, rounded figures, emissions assessed, and data sources for the full lifecycle GHG emissions of the Jordan Cove Energy Project are summarized in Table A1. Calculations are based on producing 7.8 million tons of LNG per year (374.4 Bcf/y), the maximum the project can produce. Fossil gas reaching the project was set to 431.4 Bcf/y, or 95.8% of the maximum 1.2 Bcf/d capacity of the Pacific Connector pipeline, which is how much capacity the company has reserved. The initial volume of gas needed from the wellhead to supply that volume of gas to the project is 437.7 Bcf/y (after factoring in methane leakage). All GHG emissions are shown in million metric tons per year (MMT/Y).

The leakage rates from Table A3 and Table A4 were applied to the Production, Gas Processing, Foreign Transmission and Storage, and Foreign Distribution stages, and resulting emissions are shown as 'Reference Case' and 'High Case' emissions per lifecycle stage in Table A1. Data for combustion and leakage emissions for the Pacific Connector Pipeline and Jordan Cove liquefaction facility were taken from the respective FERC applications. Emissions from the Ruby Pipeline, which would feed gas to the Pacific Connector, were based on 77 percent (1.15 Bcf/d) of the total estimated emissions (0.523 MMT/Y) described in the project's FERC order.[34]

METHANE LEAKAGE RATE ESTIMATE

The gas arriving for liquefaction at Jordan Cove would be delivered by the proposed Pacific Connector Pipeline, which would connect to the Ruby and Gas Transmission Northwest Pipelines. While it is not known at this point exactly where that gas would come from, for purposes of estimating methane leakage, this analysis assumes that 100 percent of the gas will be sourced from the Rocky Mountains region – specifically from Colorado, Wyoming, and Utah, the three most productive Rocky Mountain states for natural gas.[35] This choice was made because, while gas could also come from the Montney Basin in British Columbia, there is a lack of peer-reviewed data sources about fugitive methane emissions from natural gas production in British Columbia.

Table A1: Lifecycle Stages, Emissions, and Sources for the Pacific Connector Pipeline and Jordan Cove Energy Project

Lifecycle Stage	Reference Case (MMT/Y)	High Case (MMT/Y)	Emissions Assessed	Sources
Gas Production	10.9	26.0	Methane emissions resulting from normal operations, routine maintenance, and system upset – mainly from gathering stations, pneumatic controllers, liquids unloading, and offshore platforms; and CO_2 emissions from fuel combustion.	Methane Leakage: Robertson, et al. in *Environmental Science & Technology*, June 2017. http://pubs.acs.org/doi/abs/10.1021/acs.est.7b00571 CO_2: International Institute for Sustainability Analysis and Strategy. http://iinas.org/tl_files/iinas/downloads/GEMIS/2014_Fracking_analysis_comparison.pdf
Gas Processing (dry-wet gas separation)	0.51	0.52	Methane emissions resulting from normal operations, routine maintenance, and system upsets – mainly fugitive emissions from compressors and seals.	Based on national EPA data in "Inventory of U.S. Greenhouse Gas Emissions and Sinks": https://www.epa.gov/sites/production/files/2017-02/documents/2017_complete_report.pdf
Transmission to Jordan Cove	0.78	0.78	CO_2, CH_4, and N_2O emissions from compressor station, pipeline, and meter stations associated with Pacific Connector and Ruby pipelines. Includes fugitive emissions, venting, and combustion-related emissions.	Emissions for PCGP based on project application. http://pacificconnectorgp.com/wp-content/uploads/2017/09/1.1-PCGP-Application-and-Exhibit.pdf For Ruby pipeline, estimate based on FERC certificate order. https://www.ferc.gov/CalendarFiles/20100405150436-CP09-54-000.pdf
LNG Liquefaction	1.8	1.8	CO_2, CH_4, and N_2O emissions from liquefaction operations, fugitive emissions, and on-site vessel fuel combustion.	Figures from Jordan Cove application. http://pacificconnectorgp.com/wp-content/uploads/2017/09/1.1-PCGP-Application-and-Exhibit.pdf
Tanker Transport	0.44	0.44	CO_2 emissions from fuel combustion.	Based on distance to Tokyo and Shanghai, and Jaramillo et al. http://www.ce.cmu.edu/~gdrg/readings/2005/10/12/Jaramillo_LifeCycleCarbonEmissionsFromLNG.pdf
LNG Gasification	0.40	0.40	CO_2 emissions from fuel combustion.	Based on: Jaramillo et al http://www.ce.cmu.edu/~gdrg/readings/2005/10/12/Jaramillo_LifeCycleCarbonEmissionsFromLNG.pdf
Foreign Transmission & Storage	1.3	1.3	Methane emissions resulting from normal operations, routine maintenance, and system upsets – fugitive emissions from compressor stations and venting from pneumatic controllers account for most of the emissions from this stage.	Based on EPA estimates in U.S. "Inventory of U.S. Greenhouse Gas Emissions and Sinks": https://www.epa.gov/sites/production/files/2017-02/documents/2017_complete_report.pdf
Foreign Distribution	0.43	0.43	Methane emissions resulting from normal operations, routine maintenance, and system upsets – mainly from fugitive emissions from pipelines and stations.	Based on EPA estimates in U.S. "Inventory of U.S. Greenhouse Gas Emissions and Sinks": https://www.epa.gov/sites/production/files/2017-02/documents/2017_complete_report.pdf
Combustion	20.2	20.2	CO_2 emissions from fuel combustion.	EPA Fuel Emissions Factors Assumptions https://www.epa.gov/sites/production/files/2015-08/documents/chapter_11_other_fuels_and_fuel_emission_factors.pdf
Total	36.8*	52.0*		

*Figures may not add due to rounding

Table A2: EPA Methane Leakage Rate Estimates from 2017 U.S. GHG Inventory

Lifecycle Stage	Leakage Rate
Field Production leakage	0.79%
Processing leakage	0.08%
Transmission and Storage leakage	0.25%
Distribution leakage	0.08%
Total leakage	1.20%

Source: Oil Change International

Table A3: Reference Methane Leakage Rate for Jordan Cove GHG Lifecycle Analysis

Lifecycle Stage	Leakage Rate
Field Production leakage	1.36%
Processing leakage	0.08%
Transmission and Storage leakage	0.25%
Distribution leakage	0.08%
Total leakage	1.77%

Source: Oil Change International

Table A4: High-End Methane Leakage Rate for Jordan Cove GHG Lifecycle Analysis

Lifecycle Stage	Leakage Rate
Field Production leakage	3.66%
Processing leakage	0.08%
Transmission and Storage leakage	0.25%
Distribution leakage	0.08%
Total leakage	4.08%

Source: Oil Change International

For stages of the process for which we did not have access to project-specific estimates for leakage – Processing, Foreign Transportation and Storage, and Foreign Distribution (see Table A1) – we used national level data from the U.S. EPA. Data from the EPA's latest GHG inventory would indicate that the U.S. national methane leakage rate is 1.2%.[36] That figure is a blended composite of all fossil gas production nationally, and does not account for regional variation. Table A2 shows the breakdown of EPA's methane emission estimates from all stages of the domestic fossil gas lifecycle.

For U.S. Rocky Mountain-specific methane leakage figures, this analysis looked to a recent peer-reviewed study published in *Environmental Science & Technology* in June 2017. The study was conducted by researchers from University of Wyoming and Colorado State University and quantified atmospheric methane emissions from active gas production sites in normal operation in four major U.S. basins/plays: Upper Green River (Wyoming), Denver-Julesburg (Colorado), Uintah (Utah), and Fayetteville (Arkansas) (Robertson et al. 2017).[37]

The emissions were measured within the basins on randomly chosen days in 2014 and 2015 from the University of Wyoming Mobile Laboratory utilizing the EPA's Other Test Method (OTM) 33a. The median methane leakage rates measured from the three Rocky Mountain basins during the field production stage were 0.18 percent (0.12–0.29%) in Wyoming, 2.1 percent (1.1–3.9%) in Colorado, and 2.8 percent (1.0–8.6%) in Utah.

The mean average of those field production leakage rates is 1.69 percent, with a high-end average of 4.26 percent, but it was determined for this study to make an adaptation. Since 2014, Colorado has implemented rules to reduce oil and gas methane emissions through air pollution control practices and technologies, including leak detection and repair (LDAR) requirements.[38] Therefore, the low-end of the range measured by the study in Colorado may be a fairer assessment of expected methane emissions for fossil gas production in the Denver-Julesburg basin than the median rate used for the other two states. Using the low end of the methane leakage range for Colorado, the average field production leakage rate in the Rocky Mountain states, as reported in Robertson et al., would be 1.36 percent, with a high-end average of 3.66 percent. The high end for Colorado was assumed to be the median leakage rate in the study (2.1 percent).

Based on national EPA data, but regionalized to account for field production methane emissions measured in the Rocky Mountains, the reference methane leakage rate for gas exported from Jordan Cove is 1.77 percent. The high-end methane leakage rate for gas exported from Jordan Cove is 4.08 percent.

CONSERVATIVE ASSUMPTIONS BAKED INTO LEAKAGE ESTIMATE

The leakage rate estimates presented in the preceding section are conservative in at least two ways. First, several studies have found that EPA emissions factors for leakage from existing fossil gas systems are too low. For example, a July 2015 study published in *Environmental Science & Technology* by researchers from University of Arkansas – Fayetteville, University of Houston, Purdue University, Aerodyne Research, Inc., Colorado State University, Carnegie Mellon University, and Environmental Defense Fund found that anthropogenic methane emissions from the oil and gas industry were 50 percent higher than estimates derived from the EPA inventory.[39]

More recent studies have measured leakage rates of between 4.2 and 8.4 percent in the Bakken shale region.[40] If domestic fossil gas processing and transmission emissions are higher than EPA estimates, the lifecycle leakage rate for Jordan Cove's LNG would be higher than this paper presents.

Second, this analysis used EPA's relatively low domestic leakage rate estimates for the transmission and storage and distribution stages, rather than rates in Asia, where those two stages of the fossil gas lifecycle would take place in the case of the Jordan Cove project. If the pipelines in Asian countries importing Jordan Cove's gas leak at higher rates than the EPA estimates for U.S. pipelines, the actual lifecycle leakage rate for Jordan Cove's LNG would be higher than our estimate.

Tanker emissions estimates were based on a paper from the Civil and Environmental Engineering Faculty at Carnegie Mellon University and amended based on the shipping distance between Jordan Cove and Shanghai and Tokyo. We assumed a 50/50 split of shipments between these two ports.

ENDNOTES

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The full calculations can be found in the spreadsheet available at http://bit.ly/JCLNG-GHGs.

Researched and written by Lorne Stockman of Oil Change International. Lifecycle emissions estimate by James McGarry.

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Allie Rosenbluth: Allie@RogueClimate.org or impacted landowner Deb Evans: debron3@gmail.com

Exhibit 56

IGU
INTERNATIONAL GAS UNION
UNION INTERNATIONALE DU GAZ

2018 World LNG Report

27th World Gas Conference Edition

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Photo courtesy of Chevron

2. State of the LNG Industry[1]

293.1 MT
Global trade in 2017

Global Trade: For the third consecutive year, global LNG trade set a record, reaching 293.1 million tonnes (MT). This marks an increase of 35.2 MT (+12%) from 2016; the second largest ever, only behind the 40 MT increase of 2010. The increase in trade was supported by a corresponding increase in LNG supply, driven by Australian and US projects. With additional trains at Australia Pacific LNG, Gorgon LNG, and higher production from existing trains, Australia added 11.9 MT of production in 2017. United States production gains of 10.2 MT were driven entirely by Sabine Pass LNG, which added two new trains in 2017. Asia continued to be the driver of global demand, with China growing by 12.7 MT – the largest annual growth by a single country ever. This was driven by the strong environmental policy designed to promote coal-to-gas switching. The other key countries driving global LNG growth include South Korea, Pakistan, Spain, and Turkey for a combined 11.9 MT. The Pacific Basin continues to be the key driver of trade growth, with intra-Pacific trade flows reaching a record 125 MT, shaped by Australian production and Chinese demand.

88 MT
Non long-term trade, 2017

Short and Medium Term LNG Market (as defined in Chapter 8): Non long-term LNG trade reached 88.3 MT in 2017, an increase of 16 MT year-on-year (YOY) and accounted for 30% of total gross LNG trade. The substantial increase in short-term trade in 2017 can be attributed to growing LNG supply and demand elasticity. New short-term supply largely came from ramp-ups in the Atlantic Basin, where new liquefaction capacity added during the year was contracted mostly to short-term traders and aggregators. Nearly 70% of exports from Sabine Pass LNG were traded on the non long-term market in 2017, and 100% of exports from the newly-restarted Angola LNG were sold under either spot or short-term contracts. Although China continues to receive volumes under new long-term contracts, the scale of its growth in 2017 meant that the country also had a substantial increase in short-term imports as well; the market's non long-term growth of 4.7 MT in 2017 was the largest of any importer.

$6.85/MMBtu
Average Northeast Asian spot price, 2017

Global Prices: Average Asian LNG prices (both spot and contracted) increased by $1.33 per million British thermal units (MMBtu) over 2016 owing to rising oil prices and stronger Pacific Basin demand, but most price markers experienced significant variation during the year. As new supply came online and slightly overwhelmed demand, LNG prices fell across the globe into the summer season, only to rise steadily in the second half of the year. After falling to $5.28/MMBtu in August 2017, landed Northeast Asian spot prices reached an average $9.88/MMBtu by January 2018 owing to the effects of a cold winter and strong demand from Chinese environmental regulation. The United Kingdom National Balancing Point (NBP) also experienced significant variation during the year, climbing from a low of $4.46/MMBtu in June to a high of $7.76/MMBtu in December. As prices rose globally, differentials between basins were similar to their level in 2016, with Asian spot prices spending a few notable months in the middle of the year at a discount to NBP again. However, by January 2018, Asian spot prices had climbed back to a $2.91/MMBtu premium to NBP.

[1] The scope of this report is limited only to international LNG trade, excluding small-scale projects, unless explicitly stated. Small-scale projects are defined as anything less than 0.5 MTPA for liquefaction, 1.0 MTPA for regasification, and 60,000 cm for LNG vessels. Domestic trade between terminals is also not included.

369 MTPA
Global nominal liquefaction capacity, March 2018

Liquefaction Plants: Global liquefaction capacity remains in the extended phase of build-out that began in 2016, driven largely by capacity in Australia and the United States. Between January 2017 and March 2018, 32.2 MTPA of liquefaction capacity was added. In engineering progress, the first floating liquefaction (FLNG) project came online in Malaysia, with additional FLNG projects set to come online during 2018 and beyond. Although no new liquefaction capacity had been added in Russia since Sakhalin 2 LNG T2 in 2010, the first train of Yamal LNG achieved commercial operations in March 2018 and is expected to ultimately add 17.4 MTPA of liquefaction capacity. Looking forward, Australia and the United States will continue to represent the majority of liquefaction capacity additions in the short term; including Wheatstone LNG, Prelude FLNG, and Ichthys LNG in the former; and Cove Point LNG, Freeport LNG, and Elba Island LNG in the latter. As of March 2018, 92.0 MTPA of liquefaction capacity was under construction. Only one project reached a final investment decision (FID) during 2017, Coral South FLNG (3.4 MTPA) – the first project to be sanctioned in Mozambique. While progress was made on other proposals, FID activity globally remains low in comparison to previous years.

875 MTPA
Proposed liquefaction capacity, March 2018

New Liquefaction Proposals: Although reaching FID has become a challenging prospect over the past few years, continued resource discovery and strong reserves have underpinned a growing list of proposed projects. As of March 2018, the total liquefaction capacity of proposed projects reached 875.5 MTPA, with the majority in the United States and Canada. Despite the large amount of proposed capacity in those two countries, the announcement in early 2017 by Qatar that it would lift the moratorium on production of its North Field to underpin new liquefaction trains, provides further potential supply. With many under-construction projects expected to contribute to strong global supply over the next few years, many developers have moved on to the early-2020s as the next available window in which to bring a new liquefaction project online.

851 MTPA
Global nominal regasification capacity, March 2018

Regasification Terminals: Global regasification capacity has continued to increase, rising to 851 MTPA by March 2018, out-pacing increases in liquefaction capacity. A total of 45 MTPA of regasification capacity was added during 2017, most of it during January 2017, as terminals that had been completed during 2016 began commercial operations. The key additions made during the second half of 2017 were all in Asia, including Pakistan, Thailand, and Malaysia. No new markets added large-scale regasification capacity during the year, for the first time in ten years[2]. Along with the rapid increase in liquefaction capacity expected through the end of the decade, additional regasification capacity is expected to be constructed. Additions will be in both mature markets which are experiencing increased gas demand, as well as in new markets where governments have made developing gas demand a priority. There remains an additional 87.7 MTPA of regasification capacity under construction as of March 2018. This includes capacity across several new markets, such as Bahrain, Bangladesh, Panama, the Philippines, and Russia. Of under-construction capacity, 37.7 MTPA of capacity is anticipated online during 2018, much of it in China.

84 MTPA[3]
FSRU capacity, March 2018

Floating Regasification: Three FSRU projects came online during 2017, boosting total regasification capacity of floating projects to 84 MTPA. A terminal at Pakistan's Port Qasim added 5.7 MTPA, and Turkey's first floating project, the Etki terminal, began operations in January 2017. As of March 2018, seven FSRUs were under construction. Many of these projects are in new markets, including Bahrain, Bangladesh, and Panama, showing the continued use of floating technologies to access new sources of demand. Other projects, such as those in India and Turkey, highlight the use of FSRUs in quickly addressing growing demand. As of January 2018, nine FSRUs were on the order book of shipbuilding yards. Furthermore, several FSRUs were open for charter, with some being used as conventional LNG carriers, indicating no immediate shortage of vessels for floating terminals.

478 Vessels
LNG fleet, end-2017

Shipping Fleet: The global LNG shipping fleet consisted of 478 vessels at the end of 2017, including conventional vessels and ships acting as FSRUs and floating storage units. In 2017, a total of 27 newbuilds (including three FSRUs) were delivered from shipyards. Relative to the previous year, this was a much more balanced addition relative to liquefaction capacity, but the accumulation of the tonnage buildout from the previous years kept short-term charter rates low for most of 2017. However, toward the end of the year, an increase in Asian spot purchases led short-term charter rates to rise; by December 2017, rates for dual-fuel diesel electric/tri-fuel diesel electric (DFDE/TFDE) tankers reached an average $81,700/day.

9.8% of Supply
Share of LNG in global gas supply in 2016[4]

LNG in the Global Gas Market: Natural gas accounts for just under a quarter of global energy demand, of which 9.8% is supplied as LNG. Although LNG supply previously grew faster than any other natural gas supply source – averaging 6.0% per annum from 2000 to 2016 – its market share growth has stalled since 2010 as indigenous production and pipeline supply have competed well for growing global gas markets. Despite the lack of market share growth in recent years, the large additions of LNG supply through 2020 mean LNG is poised to resume expansion.

[2] While Malta began LNG imports in 2017, its regasification terminal is small-scale at 0.4 MTPA of capacity, and thus is not included in regasification capacity totals, but is included in the trade balance.
[3] This 84 MTPA is included in the global regasification capacity total of 851 MTPA quoted above.
[4] Data for pipeline trade and indigenous gas production comes from the BP Statistical Review. Data for 2017 is not yet available.

Exhibit 57

Current Applications

Coos County

Application files are in TIF and PDF format Need Help? [More info...]

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Applications Available for Comment:

Applicant (Click name for details & Full Application)	Application Number	Status	Waterbody	Location	Activity Type (Click for descriptions)	Comments
Coquille Watershed Association	APP0061819	Technical Review	Coquille R	28S13W18	R/F (Culv,RemFill,Tidegate)	View | Add
Coquille Watershed Association	APP0061820	Technical Review	Baker Cr	31S12W03	R/F (FishHabit,RemFill)	View | Add
Robinson Concrete Pumping	APP0061288	Technical Review	Tenmile Lk	23S12W20CD	R/F (Dock,OverWater,Piling)	View | Add

Applications Not Yet Available for Comment:

Applicant (Click name for details & Full Application)	Application Number	Status	Waterbody	Location	Activity Type (Click for descriptions)
AT&T Corp.	APP0061818	Application Review	Pacific O	27S14W08	R/F (Cbl,Removal)
Southport Forest Products LLC	APP0061629	Application Review	Coos Bay	25S13W07DD	R/F (Piling,RemFill)
Sugarman Stan	APP0060181	App. - Awaiting App/Notif Revision	Fishtrap Cr	28S13W33	R/F (ErosionCon,Fill,Road)
Tenmile Lakes Basin Partnership	APP0061806	App. - Awaiting App/Notif Revision	Shutter Cr	23S12W29BC	GP ()

Applications No Longer Available for Comment:

Applicant (Click name for details & Full Application)	Application Number	Status	Waterbody	Location	Activity Type (Click for descriptions)	Comm
Coos Bay City of	APP0061778	Technical Review	Coal Bank Sl	25S13W34DD	R/F (ErosionCon,Pipeline,RemFill,Util)	Vie
Jordan Cove Energy Project LP	APP0060697	App. - Extension	Wetland/Coos R/Rogue R/Klamath R	25S13W04	R/F (Pipeline,RemFill)	Vie
Lyon Construction LLC	APP0061291	App. - Extension	Tenmile Lk	23S12W21CB	R/F (Dock,OverWater,Piling,RemFill)	Vie

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Current Applications

Coos County

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Applications Available for Comment:

Applicant (Click name for details & Full Application)	Application Number	Status	Waterbody	Location	Activity Type (Click for descriptions)	Comments
Jordan Cove Energy Project LP	APP0060697	Technical Review	Wetland/Coos R/Rogue R/Klamath R	25S13W04	R/F (Pipeline,RemFill)	View | Add

Applications Not Yet Available for Comment:

Applicant (Click name for details & Full Application)	Application Number	Status	Waterbody	Location	Activity Type (Click for descriptions)
Ballard Shellfish Co.	APP0061387	App. - Awaiting App/Notif Revision	Coos Bay	25S13W08	R/F (Fill,FloatStruc,Other ,OverWater)
Robinson Concrete Pumping	APP0061288	App. - Awaiting App/Notif Revision	Tenmile Lk	23S12W20CD	R/F (Dock,OverWater,Piling)
Southport Forest Products LLC	APP0061629	App. - Awaiting App/Notif Revision	Coos Bay	25S13W07	R/F (Piling,RemFill)
Sugarman Stan	APP0060181	App. - Awaiting App/Notif Revision	Fishtrap Cr	28S13W33	R/F (ErosionCon,Fill,Road)

Applications No Longer Available for Comment:

Applicant (Click name for details & Full Application)	Application Number	Status	Waterbody	Location	Activity Type (Click for descriptions)	Comments
Bandon Port of	APP0061566	Technical Review	Coquille R	28S14W30	R/F (Fill,OverWater)	View
Georgia Pacific West LLC	APP0061457	App. - Extension	Isthmus Sl	25S13W35	R/F (Piling,RemFill)	View
Lyon Construction LLC	APP0061291	Technical Review	Tenmile Lk	23S12W21CB	R/F (Dock,OverWater,Piling)	View
North Bend City of	APP0061371	Technical Review	Wetland/Coos Bay	25S13W15AA	R/F (BoatRamp,Dock,Piling,PublicUse,RemFill)	View

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Applicant (Click name for details & Full Application)	Application Number	Status	Waterbody	Location	Activity Type (Click for descriptions)
Lyon Construction LLC	APP0061725	Application Review	Tenmile Lk	23S12W09BA	GA (OverWater)
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Recent NSP (Voluntary Restoration) Notifications:

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Exhibit 58

CP13-483

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue, Suite 900
Seattle, WA 98101-3140

OFFICE OF
ECOSYSTEMS,
TRIBAL AND PUBLIC
AFFAIRS

ORIGINAL

August 18, 2015

The Honorable Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E., Room 1A
Washington, DC 20426

Dear Ms Bose:

The U.S. Environmental Protection Agency (EPA) is providing comments about the Jordan Cove Liquefaction and Pacific Connector Pipeline Project (EPA Project Number 12-0042-FRC), which specifically pertain to the management of dredged material excavated during maintenance of the proposed facility (FERC Docket: CP13-483-000).

The purpose of this letter is to provide detail and clarity on expectations for analysis and management of Coos Bay Dredged Material Disposal Sites. These comments support and expand EPA's previous comments as they have pertained to EPA's responsibilities under Section 102 and Section 103 of the Marine Protection, Research, and Sanctuaries Act (MPRSA). The EPA provided comments to the Federal Energy Regulatory Commission (FERC) and the U.S. Army Corps of Engineers (USACE) on this topic on October 29, 2012 (National Environmental Protection Act scoping letter), January 12, 2015 (USACE Public Notice), and February 11, 2015 (Draft Environmental Impact Statement).

Jordan Cove's Dredged Material Management Plan (May 2013) provides a cursory analysis of volume, grain size, and disposal options for the maintenance dredged material. Although the Dredged Material Management Plan discusses these three variables, there will continue to be uncertainty about whether material would be suited for Coos Bay Ocean Dredged Material Disposal Site F (Site F), Coos Bay Ocean Dredged Material Disposal Site H (Site H), or both. Also, there will be uncertainty about the volume of dredged material that would need to be disposed during each maintenance event, and when the first maintenance dredging event would occur. Given these uncertainties, EPA has not been provided sufficient information to state that Site H and/or Site F is a suitable disposal site for the duration of the FERC license. The analysis and assumptions provided in the Dredged Material Management Plan are potentially sufficient for the first maintenance dredging event as long as the assumptions, i.e., grain size and volumes, do not change.

When considering the disposal options for dredged material beyond the first maintenance event, the project proponent should understand that Site F and Site H do not have unlimited capacity. Capacity of these two sites depends upon several factors, all of which change through time (most notably, the volume of material dumped at the sites and winter storm events which move the material offsite). Thus, it is imperative that the project proponent conduct a thorough analysis of the ability of these two disposal sites to accept the volumes of maintenance dredged material, the consequences of disposal on the physical conditions of the site(s), and the consequences for those entities that currently use the sites

for disposal of dredged material. The primary user of Site F and Site H is the USACE for their maintenance of the Federal Navigation channels in Coos Bay. The Oregon International Port of Coos Bay also has requested and received a permit from USACE, with EPA concurrence, to dispose of dredged material at both Site F and H, as appropriate.

Prior to formally initiating a request for a MPRSA Section 103 permit from the USACE, the project proponent must complete site capacity assessments for both Site F and Site H. The project proponent must include the EPA and the USACE Ocean Dumping Coordinators in the development of the assessments. A site capacity assessment includes, at a minimum: 1) a timeframe upon which to conduct an analysis. This would range between 10-20 years; 2) an analysis of how the proposed disposal changes the bathymetry and sediment dynamics at the ODMDSs; 3) an analysis as to how the proposed disposal affects the longevity of the ODMDS; and 4) an analysis of the how the proposed disposal alters the availability of the ODMDSs for the current users.

This analysis would determine whether Site F and/or Site H is appropriate for disposal of Jordan Cove's maintenance dredged material. Should the analysis conclude that Site F and/or Site H could not accommodate the maintenance dredged material, the project proponent would need to coordinate with EPA to designate a new ODMDS. The EPA's designation process for an ocean disposal site (40 CFR Part 228) is an approximately 5 year process. Thus, the project proponent would need to begin discussions with EPA and the USACE at least 7 years prior to the anticipated second maintenance dredging event.

Please feel free to contact me at (206) 553-1601 or by email at reichgott.christine@epa.gov, or you may contact Bridgette Lohrman of my staff at (503) 326-4006 or by email lohrman.bridgette@epa.gov if you have any questions about the content of this letter.

Sincerely,

Christine B. Reichgott, Manager
Environmental Review and Sediment Management Unit

cc: Paul Friedman, FERC
Wendy Briner, USACE
Kate Groth, USACE
Tyler Krug, USACE

Exhibit 59

Continental Shelf Research 95 (2015) 1–14

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Research paper

The impact of channel deepening and dredging on estuarine sediment concentration

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ABSTRACT

Many estuaries worldwide are becoming more urbanised with heavier traffic in the waterways, requiring continuous channel deepening and larger ports, and increasing suspended sediment concentration (SSC). An example of a heavily impacted estuary where SSC levels are rising is the Ems Estuary, located between the Netherlands and Germany. In order to provide larger and larger ships access to three ports and a shipyard, the tidal channels in the Ems Estuary have been substantially deepened by dredging over the past decades. This has led to tidal amplification and hyper concentrated sediment conditions in the upstream tidal river. In the middle and outer reaches of the Ems Estuary, the tidal amplification is limited, and mechanisms responsible for increasing SSC are poorly understood. Most likely, channel and port deepening lead to larger SSC levels because of resulting enhanced siltation rates and therefore an increase in maintenance dredging. Additionally, channel deepening may increase up-estuary suspended sediment transport due to enhanced salinity-induced estuarine circulation.

The effect of channel deepening and port construction on SSC levels is investigated using a numerical model of suspended sediment transport forced by tides, waves and salinity. The model satisfactorily reproduces observed water levels, velocity, sediment concentration and port deposition in the estuary, and therefore is subsequently applied to test the impact of channel deepening, historical dredging strategy and port construction on SSCs in the Estuary. These model scenarios suggest that: (1) channel deepening appears to be a main factor for enhancing the transport of sediments up-estuary, due to increased salinity-driven estuarine circulation; (2) sediment extraction strategies from the ports have a large impact on estuarine SSC; and (3) maintenance dredging and disposal influences the spatial distribution of SSC but has a limited effect on average SSC levels.

1. Introduction

Many estuaries worldwide have been modified in the past decades to centuries, in order to reclaim land and to allow ever larger ship access to inland waterways. These interventions include channel deepening and straightening as well as reclamation of the intertidal area, frequently leading to a combination of tidal amplification, increasing estuarine circulation, and increasing flood-dominance of tidal asymmetry (Winterwerp and Wang, 2013; Winterwerp et al., 2013). All of these mechanisms lead to increased residual transport. Tidal amplification strengthens the ebb and the flood tide transports, and consequently also the difference between ebb and flood (in case of an asymmetric tide). For example, a flood-dominant estuary will then become more flood-dominant. An increase in the flood dominance of the tides strengthens the flood flow velocities and weakens ebb flow velocity. Sediment transport increases non-linearly with the flow, leading to larger flood tide transport. Estuarine circulation leads to up-estuary transport; any increase herein therefore enlarges the up-estuary sediment transport. Which of these mechanisms is more important is site-specific, depending on the tidal regime, fresh water supply and sediment type. As a result of larger up-estuary sediment transport, in most (if not all) estuarine systems, the suspended sediment concentration has strongly increased. Some examples are the Ems River (Winterwerp et al., 2013; de Jonge et al., 2014), the Elbe (Kerner, 2007; Winterwerp et al., 2013), the Weser (Schrottke et al., 2006), and the Loire (Walther et al., 2012; Winterwerp et al., 2013).

The response of estuarine suspended sediment concentrations caused by anthropogenic influences is still poorly known. Decadal time-series documenting long-term changes in suspended sediment concentrations are rare (Fabricius et al., 2013). Additionally, many of these anthropogenic measures took place gradually and

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concurrently, and the response of estuarine suspended sediment dynamics to these changes may be slow (Winterwerp et al., 2013) and difficult to separate. Lastly, estuarine suspended sediment dynamics are complex, with up-estuary transport usually dominated by a combination of different physical mechanisms. Up-estuary decreasing salinity gradients generate an up-estuary directed near-bed flow velocity and down-estuary directed surface flow (estuarine circulation: Hansen and Rattray, 1965) which, combined with typical higher near-bed sediment concentrations, generates up-estuary sediment transport. This type of vertical circulation is relevant for fine sediment transport when this mechanism maintains (partial) stratification; in well-mixed estuaries horizontal circulation tends to develop at the expense of vertical circulations (Dyer, 1994). Estuarine circulation may be strengthened by tidal straining (differential advection of salinity by a vertical velocity shear; Simpson et al., 1990), demonstrated by Burchard and Baumert (1998) to enhance up-estuary transport, as well as by tidal asymmetry in internal mixing (Jay and Musiak, 1994). An asymmetry in the tidal velocity field may also lead to up-estuary sediment transport when the duration of High Water (HW) slack exceeds the period of Low Water (LW) slack or when the duration of the flood is shorter than that of the ebb (Friedrichs and Aubrey, 1988). Spatial variations further contribute, with settling lag generating landward sediment transport in response to landward decreasing flow velocities (Postma, 1961) or water depth (van Straaten and Kuenen, 1957). A time-variation in sediment properties (mainly due to flocculation and consolidation) further adds to the complexity (Scully and Friedrichs, 2007; Winterwerp, 2011). The relative contribution of these mechanisms differs per estuary, but may also change in time as a response to human interventions (Winterwerp, 2011).

In addition to influencing hydrodynamics and thereby long-term sediment transport processes, deepening (and port construction) in turbid estuaries will also increase siltation rates and, as a result, maintenance dredging needs and disposal. On the short term, maintenance dredging leads to increasing concentration levels in the direct vicinity of the dredging vessel (e.g. Collins, 1995; Pennekamp et al., 1996; Mikkelsen and Pejrup, 2000; Smith and Friedrichs, 2011). In the long-term, the effects of dredging on SSC is dominated by more complex mechanisms related to the water–bed interaction such as buffering of fines in the sandy seabed (van Kessel et al., 2011a), which is more difficult to quantify (van Kessel and van Maren, 2013). Most studies related to the effect of dredging originate from coral reef and seagrass environments, where their impact is most detrimental; see reviews by Erftemeijer and Lewis, 2006 (seagrass) and Erftemeijer et al., 2012 (corals). However, the question remains, to what extent dredging influences a long-term increase in suspended sediment concentrations (apart from its short-term impact), for the Ems Estuary and other systems. Finally, deepening allows larger ship access and often also to more intense ship traffic. Therefore resuspension by ships is likely to enhance suspended sediment concentrations further (van Houtan and Pauly, 2007; Aarninkhof, 2008).

Given the scarcity of available data over sufficiently long timescales, the wide range of human impacts, and the non-linear behaviour associated with sediment transport processes, a quantitative assessment of changes in suspended sediment concentration in an estuary caused by human activities is challenging. In this paper we use a numerical model to systematically investigate the individual contributions of deepening and dredging on suspended sediment dynamics in a heavily influenced estuary (the Ems Estuary) for which a reasonably large amount of data (recent and historical) exists. Existing process studies focussed on the tidal river draining into the larger estuary (the lower Ems River), in which changes in tidal dynamics are dominant and the suspended sediment concentrations increased several orders of magnitude in the past 3 decades. The conclusions of these studies are based on (semi-) analytical idealised models, revealing the role of sediment-induced density currents (Talke et al., 2009) settling lag (Chernetsky et al., 2010), deepening and hydraulic roughness (Winterwerp et al., 2013) and the potential role of the length (Schuttelaars et al., 2013) and depth (de Jonge et al., 2014) of the tidal river. Observations by de Jonge (1983) in the Ems Estuary suggest an increase in SSC as a result of dredging activities, but available data is limited, and collected in a period when construction work simultaneously took place. Despite large amounts of dredging, knowledge on the effect of deepening in the outer estuary as well as the effect of dredging and subsequent release on long-term SSC remains limited. A model approach to simulate long-term sediment dynamics, recently developed by van Kessel et al. (2011a), provides a tool to obtain better insight in the relative importance of dredging and subsequent disposal (van Kessel and van Maren, 2013), in the short term as well as the long-term.

This paper aims to better understanding the relative role of deepening and dredging on the sediment dynamics in the Ems Estuary in quantitative terms. We will first introduce the Ems Estuary, and describe the historical changes in suspended sediment concentration during dredging and deepening of the estuary. In the following section, the model is introduced and calibrated (Section 3) with which the effect of dredging and deepening is further quantified and analysed (Section 4).

2. The EMS estuary

The Ems estuary, situated on the Dutch–German border (Fig. 1), is an estuary which has undergone large anthropogenic changes in the past decades to centuries. Land reclamations carried out in the past 500 years have greatly reduced the intertidal area. Since 1650, the size of the Ems Estuary (the subtidal, intertidal and intratidal area) up to Eemshaven (between km 35 and 70; see Fig. 1 for location) decreased by 40% from 435 to 258 km^2 (Herrling and Niemeyer, 2007). The combined intertidal and supratidal area decreased by 45% from 285 to 156 km^2. Infilling is mostly of marine origin (the Wadden Sea and/or North Sea); the sediment load carried by the Ems River or smaller local rivers is very small. Human interferences in the estuary have accelerated in the past 50 years, with the construction/extension of three ports (Eemshaven, Delfzijl and Emden) and a large shipyard (Papenburg). The present-day approximate maintenance depths of the approach channels to the ports are 12 m (Eemshaven), 10 m (Delfzijl) and 11 m (Emden), requiring regular maintenance dredging. The tidal channels in the Ems Estuary were historically organised as distinct ebb- and flood-channels (van Veen, 1950). Some of these channels have degenerated as a result of channel deepening, effectively transforming parts of the estuary (especially its middle reaches; see Fig. 1 for location) into a single-channel system. Channel deepening affects tidal propagation, typically increasing the tidal range; which in turn leads to higher turbidity levels (Uncles et al., 2002). Deepening, but especially port construction, leads to more maintenance dredging and subsequent sediment dispersal; de Jonge (1983, 2000) suggests that this has significantly influenced the average turbidity levels. In this section, we will illustrate changes in bathymetry, sediment concentrations, and dredging in more detail.

The impact of human activities is most pronounced in the lower Ems River, a tidal river draining into the Ems estuary (see Fig. 1). The water depth increased from 4 m below MHW (circa 1960) up to 7.5 m below MHW (present day), leading to a strong tidal amplification and increasing suspended sediment concentrations. While suspended sediment concentrations were typically 10s to 100s of mg/l in the 1950's (Postma, 1961) and 1970s

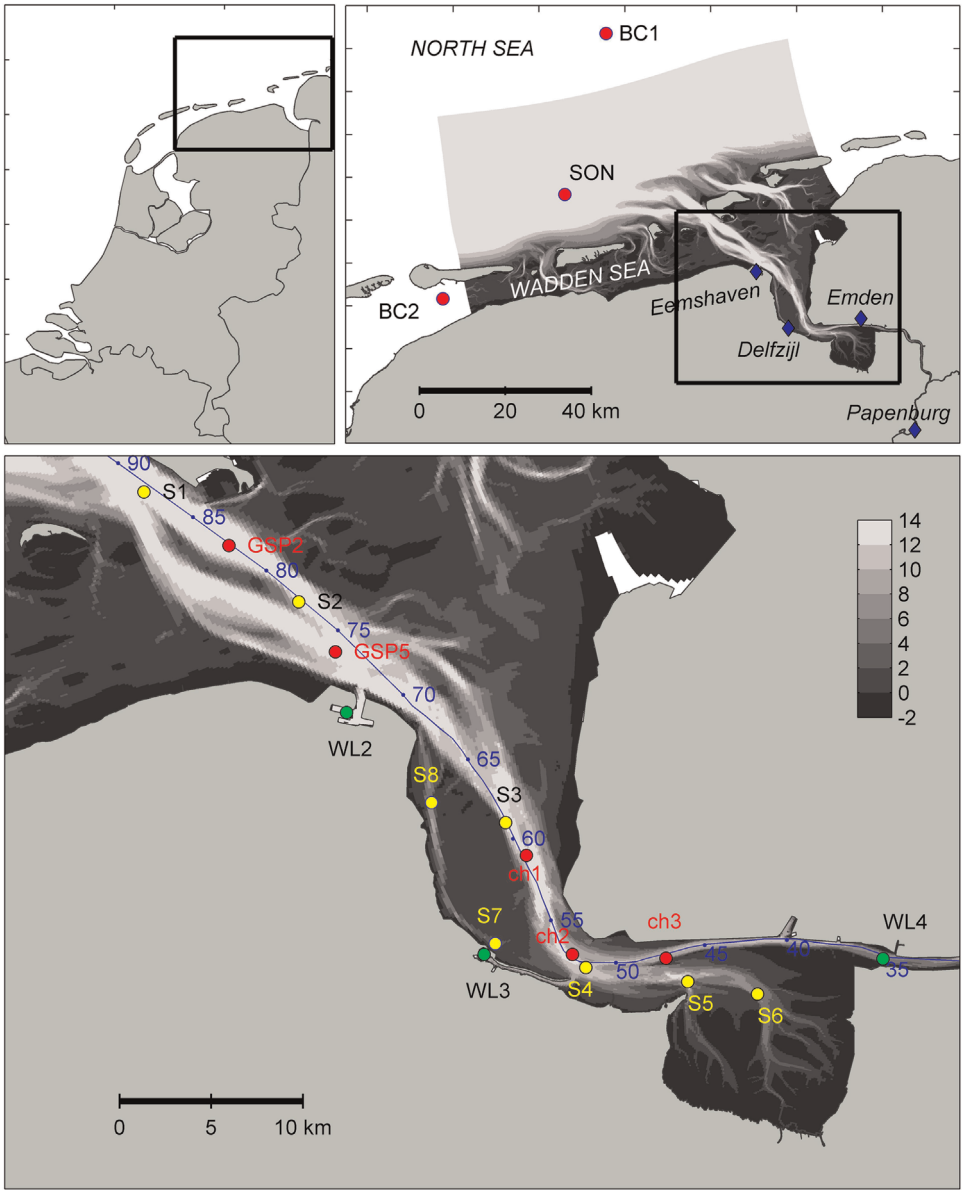

Fig. 1. Top right: map of the Ems estuary and model domain with the ports of Emden, Delfzijl, and Eemshavenand observation stations for waves (SON) and salinity (BC1 and BC2). Lower panel: more detailed map with observation stations Yellow dots stations indicate suspended sediment concentration observation points, green dots are water level observation points, and red dots represent flow velocity observations and model output. The blue markers and numbers are Ems kilometres, a standard reference in the estuary. Only the bed level between −2 and 14 m is shown to highlight the difference in tidal flats and channels, but the channels and offshore sea may be up to 30 m deep. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

(de Jonge et al., 2014), the present-day lower Ems River is characterized by thick fluid mud deposits with concentrations in the order of 10s to 100s of g/l (Talke et al., 2009; Wang, 2010; Papenmeier et al., 2013). Large quantities of fine sediment are transported from the Ems estuary into the lower Ems River by a combination of density-driven flow (Talke et al., 2009, Donker and de Swart, 2013), lag effects (Chernetsky et al., 2010) and various types of tidal asymmetry (Winterwerp, 2011), possibly strengthened by tidal resonance after construction of an up-estuary weir (Schuttelaars et al., 2013). However, it remains unclear to what extent changes in the lower Ems River affect the Ems estuary. The high turbidity zone of the lower Ems River may be partly flushed into the Ems estuary during large winter discharge events (Postma, 1981, de Jonge et al., 2014). On the other hand over 1 million tons of fine sediment are extracted annually from the lower Ems River (Krebs and Weilbeer, 2008) potentially reducing the suspended sediment concentration in the Ems estuary.

Four standardized measurement locations exist in the Ems estuary, which are regularly sampled as part of the standard Dutch Monitoring Programme (hereafter called MWTL, see locations in Fig. 1). Measurements started in the early 1970s, but before 1990 the sampling strategies and methods regularly changed. Since 1990, the suspended matter is clearly increasing (Fig. 2) – statistical analyses reveal that this increase is statistically significant at the 95% confidence level (Vroom et al., 2012).

The most dramatic changes that took place in the estuary itself (excluding the lower Ems River) were deepening of the tidal channels and changes in dredging volumes and strategy. North of km 610 (Fig. 3), the morphological change is mainly reflected in laterally migrating channels. However, in the narrow section (between km 595 and 605), the main navigation channel became consistently deeper, whereas a degenerated tidal channel west of the main channel continually filled up with sediment (both with several metres).

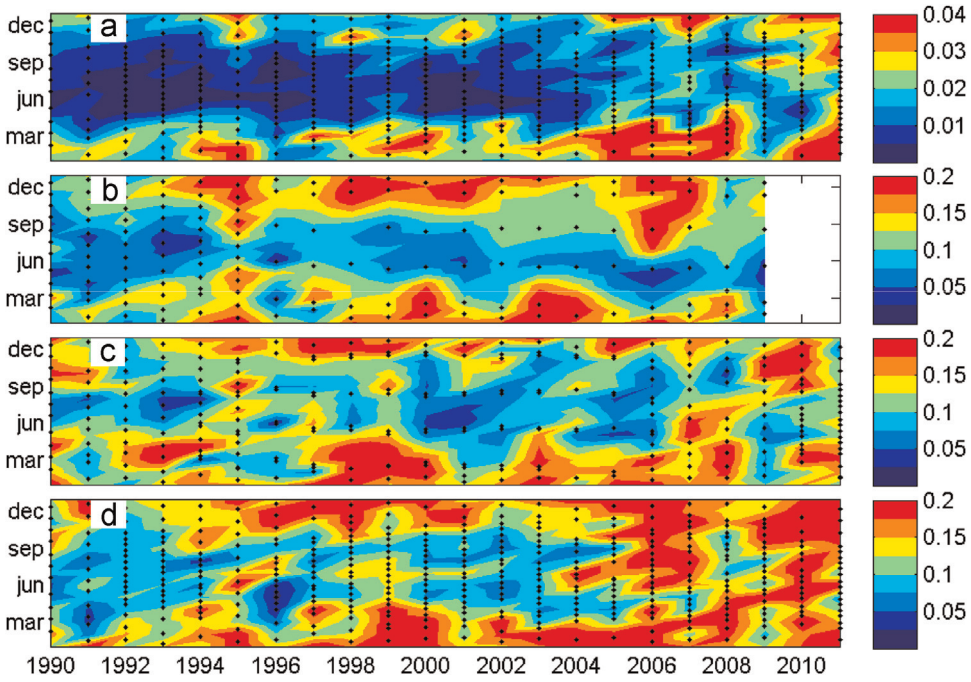

Fig. 2. Timestack plot of suspended sediment concentration in kg/m^3 in S1 (a; most seaward station), S8 (b), S7 (c), and S6 (d; most landward station); see Fig. 1 for locations. Observations at S8 were discontinued in 2010.

Since the 1960s the dredging activities in the Ems estuary have increased significantly (Fig. 4). The dredging volume is the amount of sediment that is removed from the seabed. This sediment can be extracted (when sediment is brought on land) or dispersed (when the sediment is disposed on dumping grounds elsewhere in the estuary). Sediment can be extracted for navigational purposes or for sand mining; the latter by definition meaning extraction. There have also been several changes in dredging strategies over the past decades. Most of the dredged sediment is muddy (Mulder, 2013).

An important observation is that the total dredging volume was at its peak in the 1970s and 1980s ($\sim$18 million m^3), but has decreased since then to $\sim$10 million m^3. Surprisingly, the amount of dispersed sediment has remained fairly constant (at $\sim$8 million m^3). The main change is related to sediment extraction. Between 1960 and 1994, 5.1 million m^3/year on average was extracted from the port of Emden (1.5 million m^3/year) and fairway (3.6 million m^3/year). Since 1994, sediment is no longer dredged from the port of Emden, but instead regularly re-aerated, thereby preventing consolidation. The resulting poorly consolidated bed remains navigable, and consequently the port no longer requires maintenance dredging (Wurpts and Torn, 2005). Sediment is still extracted from the lower Ems River. Since the early 1980s, the yearly dredged volume in the lower Ems River is disposed on land and has been steadily increasing from around 200,000 m^3/yr (Krebs and Weilbeer, 2008) to 1.5–2 million m^3/yr since 1993 (Weilbeer and Uliczka, 2012). Initially, the dredged sediment was sandy but is now predominantly muddy (Krebs and Weilbeer, 2008).

Sediment originating from the Emden fairway and the ports of Delfzijl and Eemshaven are dispersed in the Ems Estuary. Six million m^3/yr is dredged from the Emden fairway (Ems-km 40–53), and disposed seaward of Ems-km 64 (see Fig. 1 for the Ems km, but Section 4 for the location of the disposal grounds). An additional 2.8 million m^3/yr is dredged from the ports of Delfzijl and Eemshaven (Mulder, 2013), half of which is locally re-suspended through water injection dredging (Port of Delfzijl). About 1 million m^3/yr is dredged from the Eemshaven and disposed locally, whereas 0.3 million m^3/yr is dredged from the port of Delfzijl and disposed in the Dollard basin.

The rapid rise in required dredging volumes in the lower Ems River (around 1993) coincided with deepening of the lower Ems River from 5.7 to 7.3 m (1991–1994). However, in the same period the port of Emden ended its annual extraction of $\sim$5 million m^3/yr, increasing the amount of sediment available for transport into the lower Ems River. The increase in dredging requirements may therefore be the result of deepening, but also of the changing dredging strategies.

The main human interventions can be summarised as follows. Over centuries, the size of the intertidal areas has been gradually reduced, resulting in increasingly less natural sediment sinks. In the past decades, several ports have been constructed and extended, requiring deepening of the approach channels and dredging and disposal of sediment. In the port of Emden, sediment was not disposed of, but $\sim$5 million m^3 of sediment was annually extracted. This extraction strategy ended in 1994, simultaneously with a substantial deepening of the lower Ems River. The effect of tidal channel deepening in the Ems Estuary and sediment extraction from the port of Emden will be investigated in more detail in the next section.

3. Numerical model setup and calibration

3.1. Hydrodynamics

In order to quantify the individual impacts of dredging and deepening on the suspended sediment dynamics, a 3D numerical model was setup using the Delft3D software. The 8 vertical σ-layers increase logarithmically in thickness from the bed to the surface (2, 3, 5, 8, 13, 19, 25 and 25% respectively). The model bathymetry is based on surveys by the Dutch Ministry of Public Works in 2005 (Fig. 1). The model is forced at the seaward boundaries by water levels, salinity and temperature. The water level time series were derived from a larger operational model available online (http://opendap-matroos.deltares.nl/thredds/catalog/maps/normal/hmcn_kustfijn/catalog.html), in which tidal and storm-induced water level variations are modelled. The salinity is

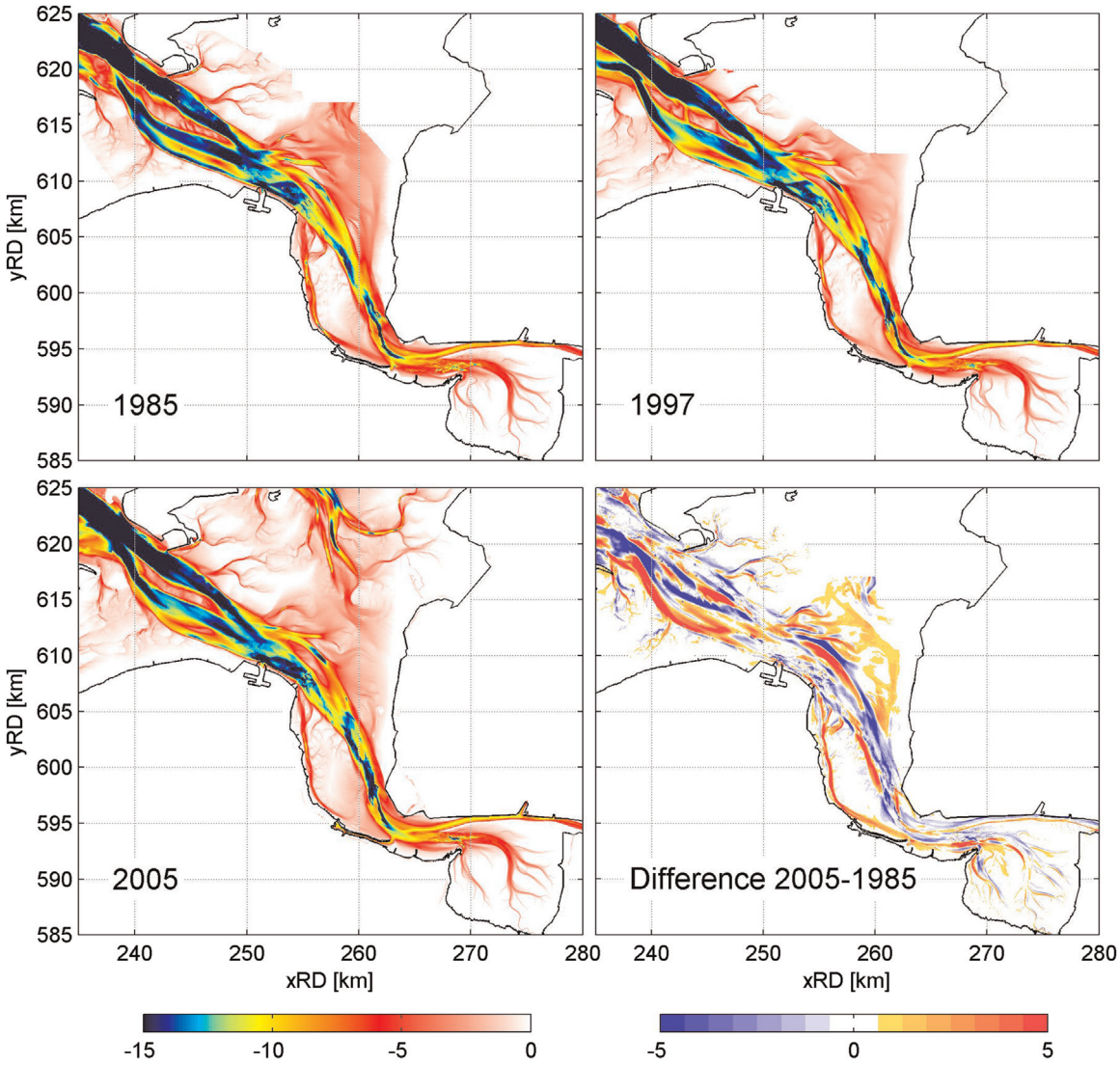

Fig. 3. Bathymetry in the Ems estuary in 1985, 1997, and 2005 (in metres relative to Dutch ordnance datum, based on soundings by the Dutch ministry of public works), and the difference between 1985 and 2005 (in metres).

derived from a nearby observation station measured every 4 weeks (live.waterbase.nl). Six rivers drain into the model of which the discharge of the largest (the Ems River) varies between 30 and 300 m^3/s (Fig. 5). The other rivers are typically an order of magnitude smaller, but also prescribed in the model. The effect of waves is computed with a SWAN wave model (Booij et al., 1999) run in online mode to include wave–current interaction. The wave model is forced by wave parameters (significant wave height, direction and the representative wave period) observed at an offshore wave buoy (Fig. 5) assuming a JONSWAP-spectrum (Hasselmann et al., 1973), and a spatially varying wind field (HIRLAM).

The computed water levels are compared with one-year observations in the frequency domain (using harmonic analysis; Pawlowicz et al., 2002) at 4 selected water level stations covering the estuary (Table 1). Typically, the error in computed water level amplitudes A_h and phases ϕ_h of the individual constituents is less than 5%, with even higher accuracy in the outer reaches of the estuary. From the most seaward station (S1) to the most up-estuary station shown here (WL3) the tides (observed as well as computed) are amplified by ~50%. Flow velocity has been observed for a period of 5 months at two stations (GSP2 and GSP 5) located in the estuary mouth. The amplitudes and phases of the modelled flow velocity (Table 2) are within 20% of observations at the most seaward station (GSP2) and in slightly better agreement deeper into the estuary (GSP5).

The type of asymmetry is determined by the flow velocity phase inclination θ_u of M_4 with M_2, given by $\theta_u = 2\phi_{u,M2} - \phi_{u,M4}$. The modelled and observed θ_u is 279 and 298° respectively using results from Table 2 at station GSP 5 (GSP 2 is not used to compute θ_u because of the small flow velocity amplitude $A_{u,M4}$). Tides with θ_u between 225° and 315° have equal ebb and flood flow velocities, but a longer duration of high water (HW) slack than low water (LW) slack. Such a slack tide asymmetry generates landward sediment transport by the settling lag (Postma, 1961); especially fine sediment is sensitive to local asymmetries in the duration of slack tide (Friedrichs, 2011). For short tidal basins, a phaselag θ_u of 270° corresponds to a phaselag in water levels θ_h of 180° (Friedrichs and Aubrey, 1988). The phaselag θ_h (with $\theta_h = 2\phi_{h,M2} - \phi_{h,M4}$) is typically between 160 and 180° in the four selected water level stations (Table 1, for both observations and model results), therefore in line with the velocity asymmetry. Both the water levels and the velocity data therefore show that the duration of HW slack exceeds the duration of LW slack (promoting tide-driven up-estuary sediment transport) which is reproduced by the model.

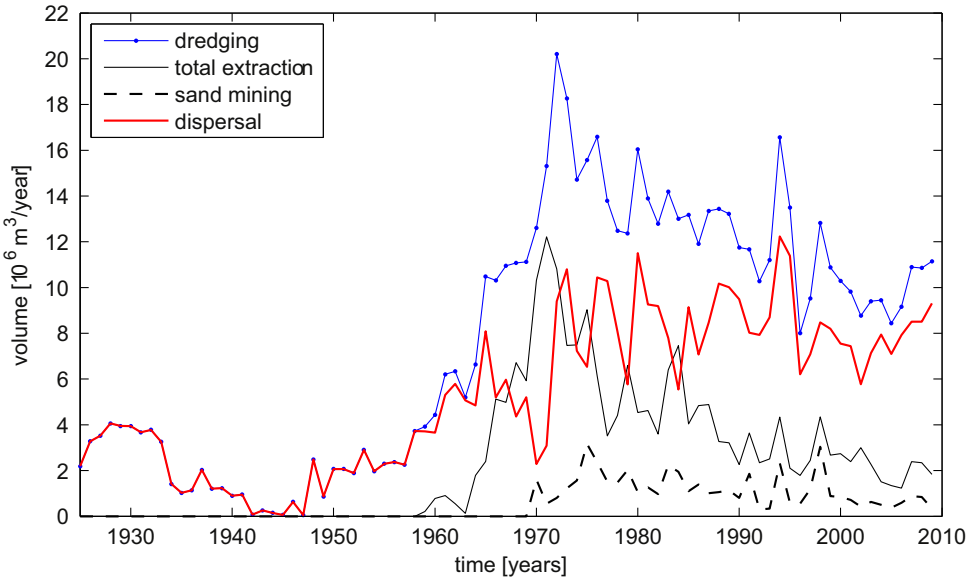

Fig. 4. Dredging volumes for the Ems estuary since 1925. Dredging volumes before 1960 are from de Jonge (1983) and exclude sand mining. Dredging volumes after 1960 is from Mulder (2013) for the Ems estuary (including sand mining) and from Krebs (2006) in the lower Ems River (until 2006; after 2006 a constant value of 1.5 million m^3 is assumed). Total extraction includes sand mining and dredge spill. Before 1994, this sediment was mainly from the port of Emden and approach channel (Mulder, 2013), averaging 5 million m^3/yr. After 1994, mostly sediment dredged in the lower Ems River is brought on land (~1.5 million m^3; Weilbeer and Uliczka, 2012). Sediment dispersal is the difference between dredging and total extraction.

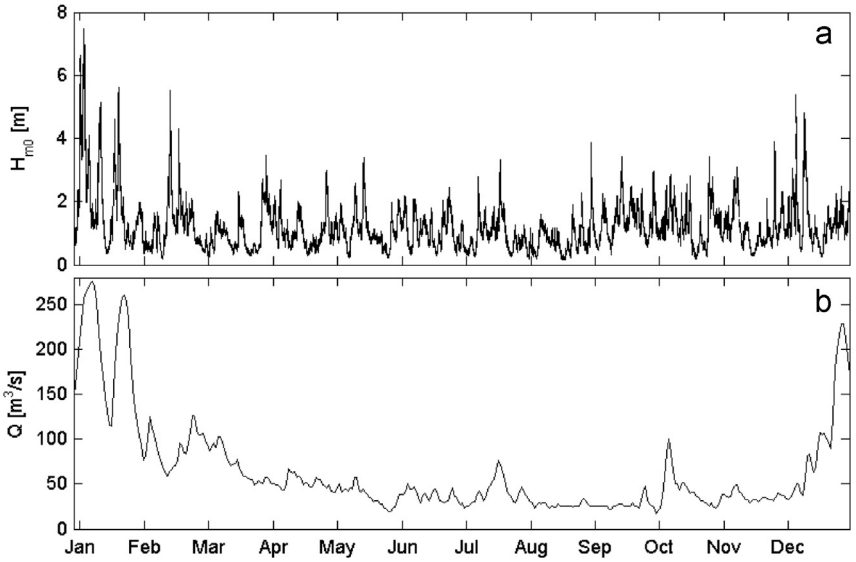

Fig. 5. Wave height (a) observed in an offshore wave station (SON, see Fig. 1 for location), and daily discharge (b) of the main river draining into the Ems Estuary (the Ems river at Herbrum), in 2012.

Table 1
Observed/modelled water level amplitudes (A_h) and phases (ϕ_h) of the 4 largest tidal constituents at stations S1 and WL1 – WL3. See Fig. 1 for the location of stations.

Constituent	Parameter	Station			
		S1	WL2	WL3	WL4
M_2	A_h [cm]	104/102	124/122	141/138	156/147
	ϕ_h [°]	248/247	281/275	300/295	313/313
S_2	A_h [cm]	31/30	35/35	40/39	42/44
	ϕ_h [°]	327/325	5/359	234/272	43/45
N_2	A_h [cm]	13/13	17/16	20/18	23/20
	ϕ_h [°]	236/235	275/269	298/294	312/314
M_4	A_h [cm]	9/9	10/10	18/17	18/13
	ϕ_h [°]	336/334	39/34	70/74	114/96

Table 2
Observed/modeled major flow velocity amplitudes (A_u) and phases (ϕ_u) of the 4 largest tidal constituents at stations GSP2 and GSP5. See Fig. 1 for the location of stations. Observed flow velocity amplitudes of 5 cm/s or less are shaded grey.

Constituent	Parameter	Station	
		GSP2	GSP5
M_2	A_u [cm/s]	80/96	87/99
	ϕ_u [°]	13/23	32/32
S_2	A_u [cm/s]	22/26	22/26
	ϕ_u [°]	85/96	103/103
N_2	A_u [cm/s]	17/17	17/18
	ϕ_u [°]	351/6	10/14
M_4	A_u [cm/s]	2/6	11/13
	ϕ_u [°]	325/327	126/145

3.2. Sediment transport

Next, a sediment transport model has been setup incorporating the effect of the buffering of fine sediments in the seabed (applying the algorithms developed by van Kessel et al., 2011a) and accounting for deposition in, and dredging and dispersal of sediments from the three estuarine ports. These algorithms are coupled offline with the hydrodynamics, and have been applied previously in the North Sea (van Kessel et al., 2011a), the Western Scheldt (van Kessel et al., 2011b), and Singapore (van Maren et al., 2014). This model distinguishes two bed layers: an upper layer (S_1) which rapidly accumulates and erodes, and a deeper layer (S_2) in which sediment accumulates gradually and from which it is only eroded during energetic conditions (spring tides or storms). This S_2 layer represents a sandy layer in which fine sediment accumulates during calm conditions. When the bed shear stress exceeds a critical value the sandy layer becomes mobile, and fine sediment that infiltrated earlier into this layer is slowly released. However, the transport of the sand layer itself is not modelled, but prescribed as a layer of a constant, and user-defined, thickness. Most sediment is stored (buffered) in this S_2 layer; S_1 represents the typically thin fluff layer consisting of mud, which rapidly erodes.

The erosion rate E_1 of S_1 depends linearly on the amount of available sediment below a user-defined threshold M_0/M_1:

$$E_1 = mM_1\left(\frac{\tau}{\tau_{cr,1}} - 1\right), \quad m < \frac{M_0}{M_1}$$

$$E_1 = M_0\left(\frac{\tau}{\tau_{cr,1}} - 1\right), \quad m > \frac{M_0}{M_1}$$

Here m is the mass of sediment in layer S_1 (in kg/m^2). This has the important consequence that also in dynamic environments the equilibrium sediment mass on the bed is non-zero, contrary to standard Krone-Partheniades (KP) models. Typically, this results in smoother and more realistic model behaviour in mixed sand–mud environments ($m < M_0/M_1$). For completely muddy areas ($m > M_0/M_1$), the buffer model switches to standard KP formulations for erosion of bed layer S_1. Hence, M_0 is the standard zero-order erosion parameter (kg/m^2/s) whereas M_1 (1/s) is the erosion parameter for limited sediment availability.

The erosion E_2 of S_2 scales with the excess shear stress to the power 1.5, in line with empirical sand transport pick up functions, assuming that fines trapped within the sandy bed are released when sand is mobilised:

$$E_2 = p_2 M_2\left(\frac{\tau}{\tau_{cr,2}} - 1\right)^{1.5}$$

Here, p_2 is the fines fraction in S_2 (computed by the model) and M_2 is the resuspension parameter for S_2 (kg/m^2/s).

The deposition flux D is the settling velocity w_s times the near-bed sediment concentration C:

$$D = w_s C$$

The deposition flux D is divided between layers S_1 and S_2 with a burial parameter α:

$$D_1 = (1 - \alpha) w_s C$$

$$D_2 = \alpha w_s C$$

The value for α is based on calibration (van Kessel and van Maren, 2013), and is typically 0.05–0.2. A low value for α implies a slow exchange with buffer layer S_2. In combination with settings for M_2 and $\tau_{cr,2}$ it also determines the residence time of fines in the buffer layer.

We use two sediment fractions, IM1 with a large settling velocity (1.2 mm/s) and IM2 with a small (0.25 mm/s) settling velocity. The settling velocity of IM1, representing fairly large and rapidly settling flocs, is based on observed settling velocities of flocs in the Ems estuary typically between 1 and 2 mm/s (van Leussen and Cornelisse, 1996). The IM2 settling velocity corresponds to the minimum settling velocity observed by van Leussen and Cornelisse (1996). The spatial distribution of IM1 and IM2 is determined by the model: all sediment in the model domain entered through the open boundaries, where IM1 and IM2 were prescribed at equal sediment concentrations.

Spatially uniform values for the critical shear stress for erosion τ_{cr} are prescribed for the S_1 layer and the S_2 layer. Sediment which does not or only marginally consolidates has a critical shear stress for erosion τ_{cr} of several 0.01 to ~0.1 Pa (e.g. Widdows et al., 2007). Therefore the critical shear stress for the fluff layer is very low ($\tau_{cr,1} = 0.05$ Pa), implying that sediment in the top layer is easily resuspended. Sediment in S_2 is assumed to erode during more energetic conditions only, when a substantial amount of sand is brought in suspension and the mud trapped in the sand layer is released. This occurs at larger shear stresses than the initiation of motion of sand particles; earlier studies (van Kessel et al., 2011a) suggested a value around 1 Pa. In this study, $\tau_{cr,2}$ is set to 0.9 Pa. The thickness of the sand bed (layer S_2) is set to 10 cm, representing the zone where active mixing by biological activity and (bedform-related) sediment transport takes place. The erosion parameters M_0, M_1, and M_2 (see Table 3) are obtained through calibration (van Kessel and van Maren, 2013). Flocculation and consolidation are not modelled. The use of 2 bed layers represents model behaviour similar to consolidation: during low energy conditions sediment is progressively buried in layer 2 (and is therefore no longer regularly resuspended). Also the effect of biology (influencing the erodibility of the intertidal mud deposits) is not accounted for in the model.

The boundary conditions at the North Sea and Wadden Sea are set at 10 mg/l and 100 mg/l for IM1 and IM2 respectively, based on long-term observation stations (similar to the observations in Fig. 2). A sediment concentration of 10 mg/l is also prescribed to all fresh water sources. An equilibrium bed condition (the amount of sediment in S_1, S_2, and in suspension) is obtained by: running the model with a thin S_2 bed layer (for faster adaptation time) for a number of years; then increasing the thickness of the S_2 layer to 10 cm (a typical active layer depth); and finally running the model repetitively with cyclic hydrodynamic forcing until dynamic equilibrium is achieved (where the suspended sediment concentration and sediment availability vary with tidal and seasonal timescales, but not over the years). Depending on the settings of the model, a dynamic equilibrium for both the distribution of mud on the bed and suspended in the water column is achieved within several years (Five years using the settings in Table 3). The bed level in the sediment transport model is kept constant, so it is not a morphological model: erosion and deposition influences the available mass of sediment below a bed level which is constant in time.

Nine areas are defined from which sediment is dredged once

Table 3
Sediment transport model settings.

Parameter	Description	IM1	IM2
$w_{s,0}$ [mm/s]	Settling velocity	1.2	0.25
M_0 [kg/m^2/s]	Erosion parameter	2.5×10^{-3}	2.5×10^{-3}
M_1 [/s]	Erosion parameter	1.2×10^{-4}	1.2×10^{-4}
M_2 [kg/m^2/s]	Erosion parameter	1.2×10^{-3}	1.2×10^{-3}
$\tau_{cr,1}$ [Pa]	Critical bed shear stress	0.05	0.05
$\tau_{cr,2}$ [Pa]	Critical bed shear stress	0.9	0.9
α [−]	Burial rate	0.1	0.1
Thickness S_2 [m]	Thickness of sand bed	0.1	

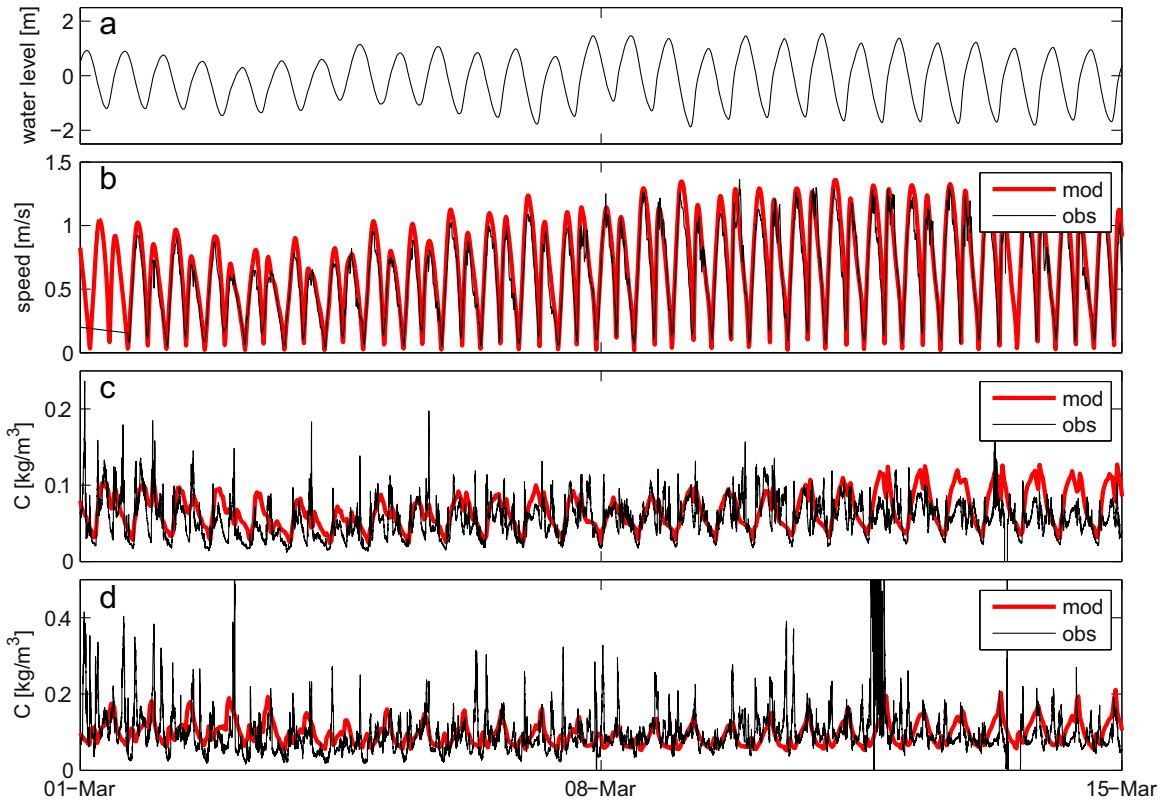

Fig. 6. Computed water level (a); observed (black) and computed (red) depth-averaged flow velocity (b); near-surface sediment concentration 4 m below the water surface, (c); and near-bed sediment concentration (d) at location GSP5, from 1 to 15 March 2012. See Fig. 1for the location. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

every week (from layer S_1 and layer S_2), and disposed in the dumping locations designated to the dredging sites. Dredging is instantaneous, but disposal is distributed over 3 days to avoid unrealistic peaks in the suspended sediment concentrations. Given the large dredging volumes in the area, discretization of dredging and dumping in different areas provides a more realistic description of sediment transport in the estuary. Additionally, the computed deposition rates in the ports can be compared with observed dredging volumes, providing validation of the sediment transport model. An added value of such a dredging module is that it allows for a quantitative insight in the long-term effects on dredge spoil dispersal.

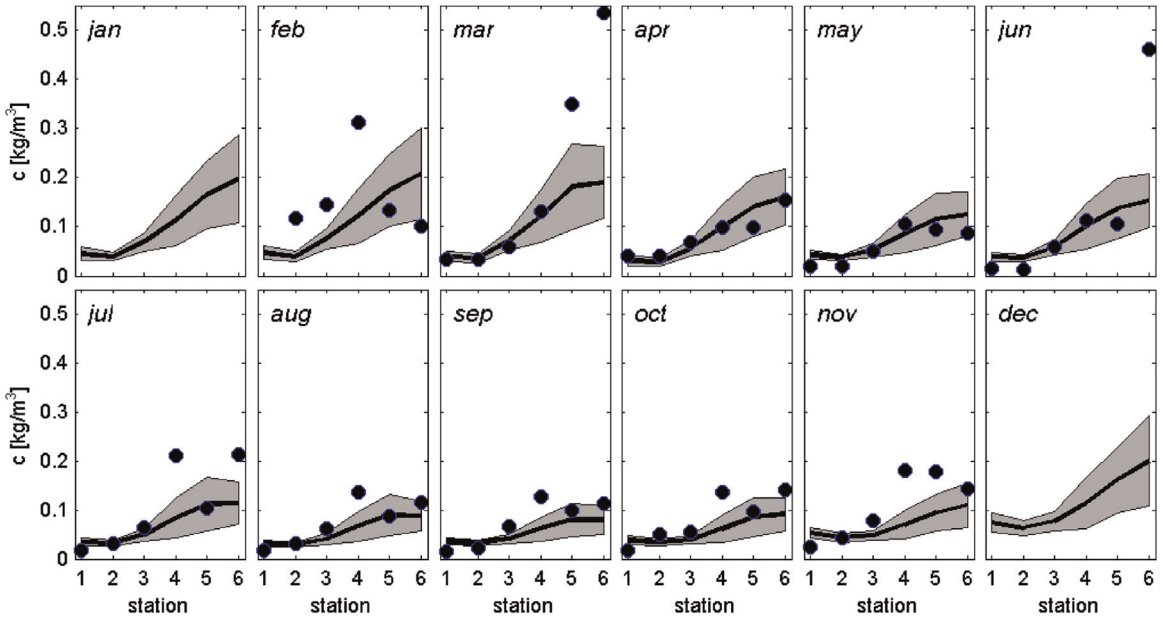

Fig. 7. Monthly averaged computed surface sediment concentration (black line, with grey shading indicating the standard deviation) and observed surface sediment concentration (black dots, February through November) in 2012 at stations S1–S6 (in kg/m^3). See Fig. 1 for the location of stations.

A time-series comparison of the computed and observed suspended sediment concentration at station GSP5 (Fig. 6) reveals that the intra tidal and spring neap variation in SSC are well reproduced. The computed near-bed sediment concentration is typically two times larger than the near-surface sediment concentration, which is in line with field observations, suggesting that the vertical sediment concentration gradients are reproduced. The along-estuary gradient in SSC is evaluated by comparing the model against snapshot surface samples collected every 2–4 weeks at 6 stations (S1–S6, see Fig. 1 for location). The model reproduces the observed up-estuary increase in the surface sediment concentration, and the seasonal variation of the sediment concentration with larger sediment concentrations during the winter months (Fig. 7). The largest deviations between observations and model results occur in February and November. An explanation for this could be that sediment flushed from the lower Ems River is underestimated by the model: the largest deviations occur at stations halfway the estuary. This flushing is underestimated because the sediment transport processes in the Ems River are very complex – see the end of this section. Nevertheless, even though two-weekly snapshot measurements only provide an indicative value for comparison with a sediment transport model, the reasonable correspondence suggests the model reproduces the actual estuarine suspended sediment concentration gradient.

The model also reproduces the pronounced up-estuary increase in mud content in the bed (Fig. 8). The highest mud content is observed and computed in the Dollard bay and the approaches to the port of Delfzijl. In line with observations, the computed mud content increases in the landward direction of the Wadden Sea (the coastal lagoon adjacent to the Ems Estuary) as well. The computed siltation in the three ports in the estuary is typically around 0.5–0.8 million tons/yr. The computed deposition in the ports of Eemshaven and Delfzijl are within 10% of the long-term observed deposition rates (Table 4). However, deposition in the port of Emden and its approach channel is strongly underestimated. This is probably related to the hyper turbid conditions in the lower Ems River, which drains into the Ems estuary close to the port of Emden.

The sedimentary conditions in this reach of the river require a different modelling approach with more complex formulations to account for flocculation, sediment-induced density effects, and consolidation. These processes demand for more detailed and short time scale simulations which conflict with the multi-year objectives of this study. Therefore a more accurate description of the sediment dynamics in the lower Ems River is beyond the scope of this paper.

Table 4
Estimated and computed deposition rates.

Port/area	Estimated deposition (million tons/yr)	Computed deposition (million tons/yr)
Eemshaven	0.5	0.44
Delfzijl	0.8	0.76
Emden port and fairway	1.6	0.55

4. Effect of sediment extraction sediment disposal and deepening

The developed model is subsequently used to experiment with historic scenarios. This reference model reflects the present-day conditions (i.e. the 2005 bathymetry and no extraction of sediment). It was hypothesised earlier in this paper that discontinuing sediment extraction (dredging the ports and bringing sediment on land) has led to a pronounced increase in SSC. Therefore the reference model with dredging is re-run with extraction (instead of dredging and dumping) of all sediment depositing in the port of Emden and its approach channel. With respect to this scenario with extraction, the reference model (with dredging from Emden) leads to an increase of 0–50 mg/l in SSC in the outer reaches, but up to 100 mg/l within the estuary (Fig. 9a). The typical concentrations in these up-estuary sections are 100–300 mg/l (Fig. 7), implying the impact of dredging strategy is substantial. However, it was also concluded that the model strongly underestimates deposition rates in the port of Emden and its approach channel (Table 4). Therefore, although historically as much as 2.5 million tons were extracted on an annual basis, only 0.5 million tons/yr is extracted in the model. To better approximate the effect of extracting such a large sediment mass, the model is also run with extraction from all ports (totalling a mass of 1.75 million tons, see Table 4). This leads to a two-fold larger suspended sediment concentration change (Fig. 9b).

The most realistic way to evaluate the effect of the presence of ports (excluding their approach channels) is by comparing the model including ports and subsequent dredging and disposal activities (the reference model), with a scenario without ports (and therefore also without deposition in ports nor related dredging and disposal activities). Including ports raises the suspended sediment concentration in the vicinity of disposal sites, but decreases the sediment concentration further away from the disposal sites (Fig. 9c). This follows from the large sediment accumulation rates in the ports, extracting sediment from the estuary and hence lowering the ambient suspended sediment concentration.

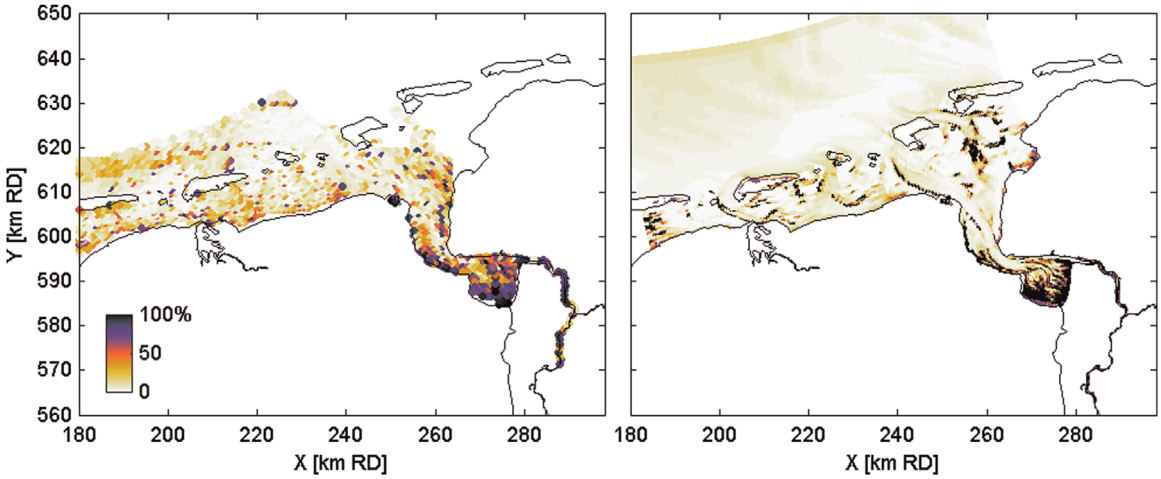

Fig. 8. Observed (left, based on surveys from 1989) and computed (right, S1 and S2) mud content in the bed (in %).

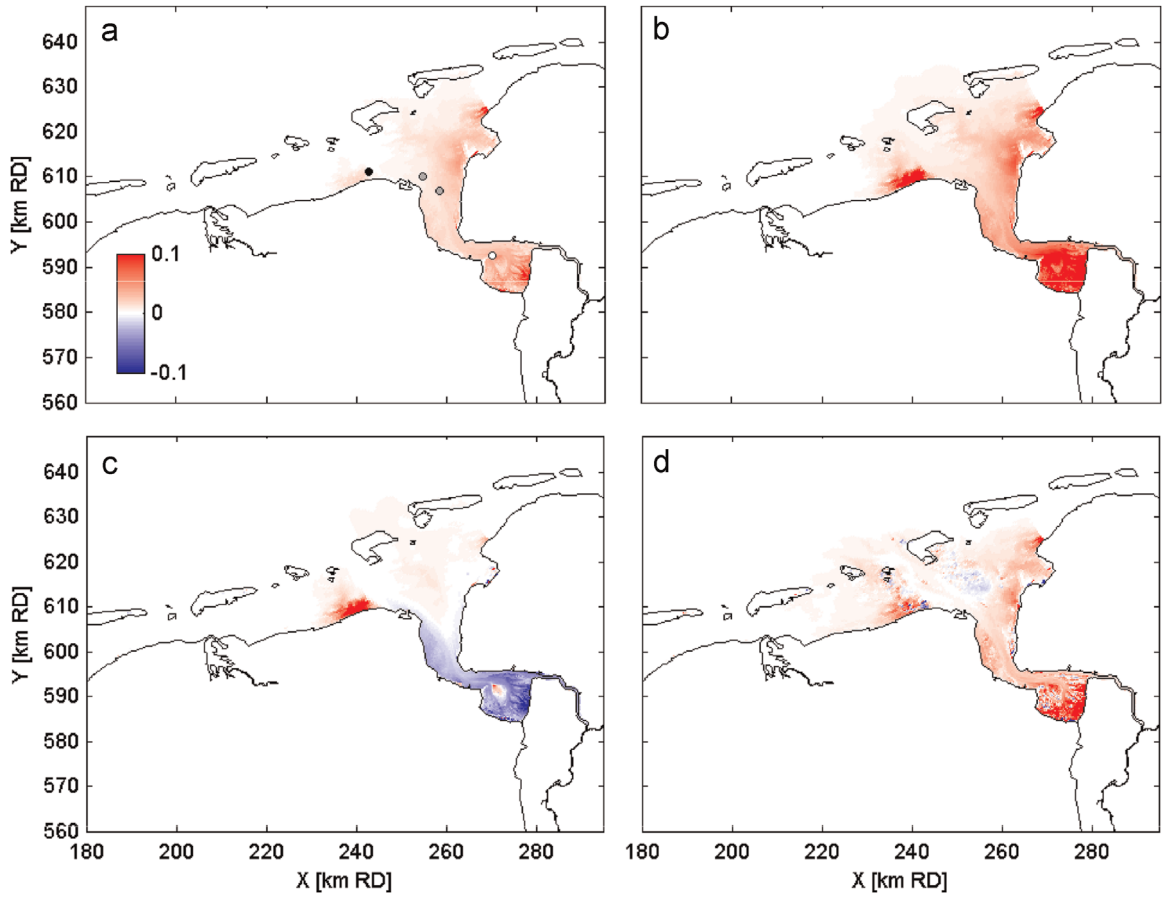

Fig. 9. Computed increase of yearly averaged surface suspended sediment concentration (in kg/m^3) for 4 scenarios. The increase is defined as the difference of the annual means, computed for Scenario (a): dredging and dumping of all ports, compared with extracting from Emden; Scenario (b): dredging and dumping from all ports, compared with extraction from all ports; Scenario (c) construction of ports and resulting dredging and disposal of sediment, compared with no ports nor dredging activities; Scenarios (d) extraction from Emden with the 1985 bathymetry compared to dumping from Emden and 2005 bathymetry. The disposal grounds are visualised in panel (a) with circles, with a colour depending on the origin of the disposed sediment (black for Eemshaven, grey for Emden, and white for Delfzijl).

In order to allow ships to enter the ports, tidal channels are frequently deepened. The tidal channels in the Ems estuary have been deepened with several metres (Fig. 3). As a consequence, a model with the 1985 bathymetry was setup. The closest approximation of the change from the 1980s to the 2000s is by comparing the reference model with a scenario including the 1985 bathymetry model and extraction from the port of Emden (Fig. 9d). Compared to extraction only (Fig. 9a), the increase in suspended sediment concentration is larger. Therefore the impact of deepening alone is evaluated in more detail.

The model is run with the 1985 and 2005 bathymetry (with all other settings equal). The year 2005 is simulated with a baroclinic model (including density-induced effects due salinity) and a barotropic model (without density effects) in order to separate the change in SSC due to estuarine circulation. Deepening of the estuarine channels alone leads to an increase of more than 50 mg/l

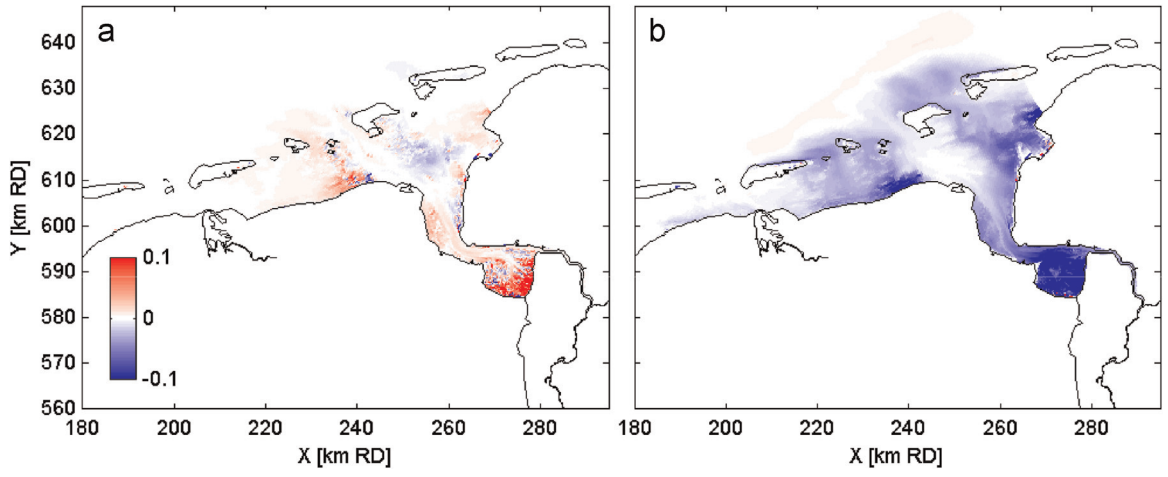

Fig. 10. Computed increase in surface sediment concentration (in kg/m^3) due to deepening from 1985 to 2005 (a) and a reduction in surface sediment concentration by running the model without density effects (b).

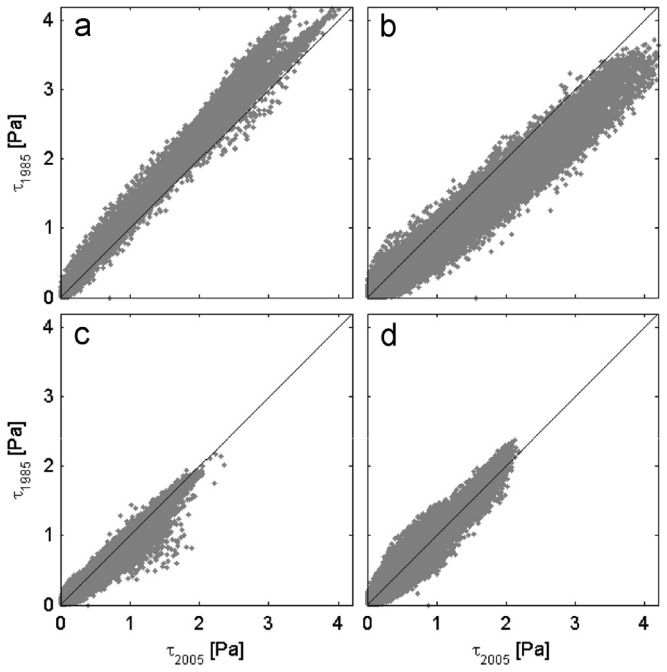

Fig. 11. Bed shear stress computed every 10 minutes at GSP2 (a), ch1 (b), ch2 (c), and ch3 (d) for 2005 (*x*-axis) and 1985 (*y*-axis): plotted values cover the full year. See Fig. 1 for the location of stations.

in the up-estuary parts (Fig. 10a). The tide-induced bed shear stresses differ slightly between 1985 and 2005 (Fig. 11) because of small phase shifts in the propagation of the tides, but there is no overall trend. At station GSP2, the bed shear stress was slightly larger in 1985 whereas the bed shear stress at ch1 was slightly larger in 2005. Such relatively small changes do not have an effect on turbidity as large as in Fig. 10a.

A more realistic mechanism for this change therefore is estuarine circulation. Estuarine circulation is a residual flow component (superimposed on the oscillating tidal currents) which develops in the presence of a horizontal salinity gradient, and increases in strength with larger water depth. The surface flow velocity is directed towards the area of higher salinity, the near-bed velocity is directed towards the freshwater source. Since the near-bed sediment concentration is higher than the near-surface sediment concentration (see also Fig. 6), estuarine circulation generates up-estuary sediment transport. For the 2005 bathymetry, estuarine circulation is a key mechanism for up-estuary transport, which is demonstrated with a model excluding density effects. The suspended sediment concentration in this barotropic model is much lower than the reference model (Fig. 10b), demonstrating the importance of estuarine circulation.

The effect of salinity is therefore further explored with residual flow velocity profiles at 4 stations throughout the main channel of the Ems estuary (Fig. 12, see Fig. 1 for the location). Without density effects, the residual flow velocity is low and displays a logarithmic vertical profile. In contrast, for both 1985 and 2005 (with density effects) the residual near-bed flow velocity is typically directed up-estuary. However, the magnitude of the near-bed flow velocity is typically two times larger in 2005, compared to 1985. It is therefore concluded that the deepening of the tidal channels in the estuary in the period 1985 to 2005 has strengthened density-induced estuarine circulation patterns, which subsequently substantially raised the suspended sediment concentration.

5. Discussion

5.1. Long-term effects of dredging on SSC

With a few exceptions such as de Jonge (1983), the long-term impact of dredging on suspended sediment concentrations has received fairly limited attention in scientific literature. The long-term morphological effects of dredging are fairly well known due to the relatively large amount of (historic) topographic data in heavily modified estuaries (e.g. Jeuken and Wang, 2010; Monge-Ganuzas et al., 2013). Most commonly, studies related to dredging-induced turbidity focus on the sediment dynamics in the direct vicinity of the dredger (Pennekamp et al., 1996; Mikkelsen and Pejrup, 2000; Spearman et al., 2011; Smith and Friedrichs, 2011), on the fate or deposition of dredged sediment (e.g. Bai et al., 2003; Van den Eynde, 2004; Cronin et al., 2011; Hayter et al., 2012; Alba et al., 2014), or on the impact on sensitive ecosystems (Erftemeijer

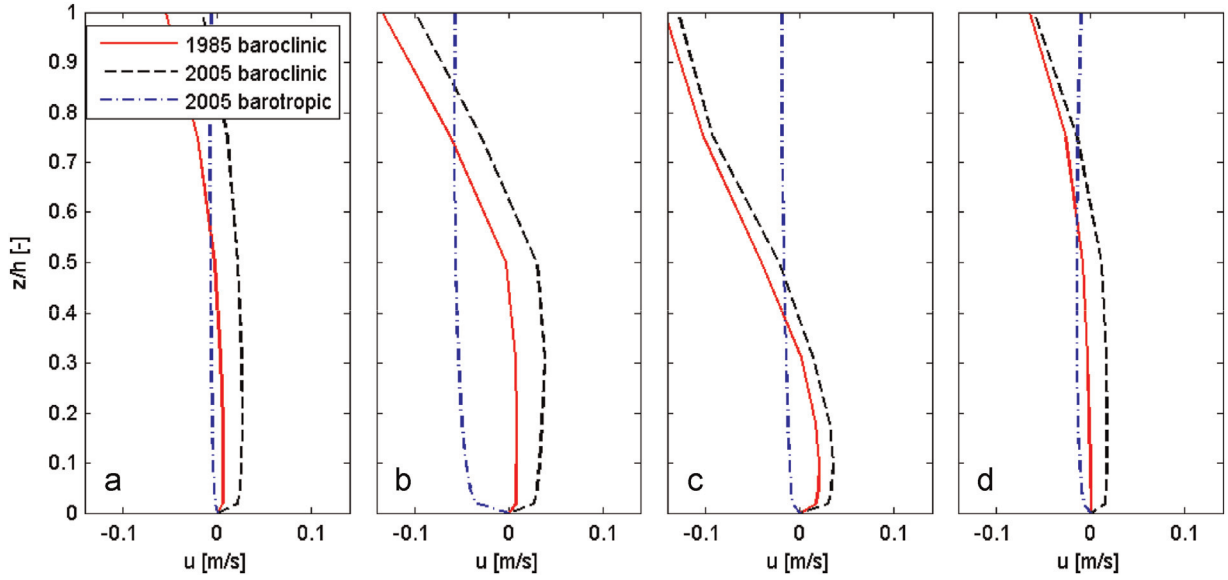

Fig. 12. Residual flow velocity profiles, with positive values directed up-estuary, computed at GSP2 (a), ch1 (b), ch2 (c), and ch3 (d) for 1985 and 2005 (baroclinic mode) and 2005 (barotropic mode, i.e. no density effects). The averaging period is January through March, the period during which the fresh water discharge is largest. See Fig. 1 for the location of stations.

and Lewis, 2006; Erftemeijer et al., 2012). When carefully executed, the impact of dredged sediment disposal on turbidity may be limited to the short-term and near-field (Fredette and French, 2004). Often the dispersion of individual plumes is considered, whereas it is the long term cumulative effect of a large number of individual plumes that determines the impact. Over longer timescales resuspension of dredged material from the seabed may become the dominant factor contributing to turbidity (van Kessel and van Maren, 2013). Fettweis et al. (2011) observed a long-term increase in the suspended sediment concentration and formation of fluid mud. Fluid mud formation is not included in our model, even though fluid mud forms in the entrance of the Emden navigation channel. Regular resuspension of this fluid mud layer contributes to elevated sediment concentration levels. As indicated earlier, the underestimated sediment concentrations in February and November are possibly related to the complex suspended sediment dynamics in the navigation channel, which are not captured by the model. If any long-term increase in SSC is related to fluid mud formation, this will not be properly accounted for in the model applied here.

In our simulations, the effect of dredging and disposal is large when comparing the present-day situation (a scenario in which dredged sediment is disposed) to a scenario in which sediment is not disposed but sediment is still allowed to settle in ports (equivalent to extraction, see Fig. 9b). However, a more appropriate scenario to estimate the effect of dredging and disposal is to compare the present-day situation to a scenario without ports (and hence no dredging and disposal). This reveals a much more limited effect of dredging and disposal: the sediment concentration increases near the disposal sites but slightly decreases elsewhere (Fig. 10c). Our results are difficult to compare with de Jonge (1983), who concluded that the suspended sediment concentrations in the Ems Estuary in a specific year depended on the distance dredged during that year. This relationship was strongly influenced by capital dredging for construction of the Eemshaven, and it remains unclear how much of the dredged sediment in the analyses is extracted or disposed. Moreover, although the distance dredged and sediment concentration is correlated in de Jonge's data, both also increase in time: hence the increase may also be the result of channel deepening.

5.2. Effects of deepening on SSC

It is well known that salinity-induced density currents lead to up-estuary transport of sediment (e.g. Meade, 1969; Uncles et al., 1985). In our model, this effect of salinity-induced residual currents is demonstrated by the pronounced difference between the computed sediment concentration in barotropic (excluding salinity-induced residual currents) and baroclinic (including salinity-induced residual currents) simulations (Fig. 11b). The magnitude of the residual flow velocity u in the tidal channel scales with the cubed water depth h as in Hansen and Rattray (1965):

$$u_z \equiv h^3\left(1 - 9\left(\frac{z}{h}\right)^2 + 8\left(\frac{z}{h}\right)^3\right)$$

As a result of this strong depth-dependence, deepening of tidal channels leads to strengthening of the residual current. For a 10 m deep channel, deepening by 2–4 m leads to a 1.7–2.7-fold increase in salinity-induced residual flow (assuming the horizontal salinity gradient is unaffected by deepening). In very few (if any) estuaries worldwide, observational evidence exists for the impact of deepening on estuarine circulation. The reason for this is that the residual flow velocity is very sensitive to the observational technique and exact location. Channel deepening is often accomplished over many years or even decades. Identical data collection programs before and after channel deepening are therefore few or non-existent. A reliable alternative to assess the impact of deepening on residual currents is a scenario analysis using a well-calibrated process-based numerical model.

Our model strongly suggests that baroclinic processes influence the estuarine suspended sediment dynamics, and that the magnitude of estuarine circulation increased as a result of deepening. As a result, the modelled response to channel deepening is an up-estuary increase in SSC. It should be realised that the computed effect of different scenarios (dumping/extraction, 1985/2005, barotropic/baroclinic) is influenced by the parameter settings and process formulations of the numerical sediment transport model. Therefore, while the trends remain valid, the absolute values or details in the spatial patterns of changes in suspended sediment concentration computed with process-based numerical models as used here should be interpreted carefully.

5.3. Other impacts

The change in dredging strategy and deepening is likely not the only contributor to increased suspended sediment concentration. In the Ems Estuary, and the lower Ems River, the loss of tidal flats may influence long-term changes in the suspended sediment dynamics. Deepening of the lower Ems River (the main river draining into the Ems Estuary) has strongly amplified the tides and increased the suspended sediment concentrations within the tidal river (e.g. de Jonge et al., 2014). One million tons of sediment is annually extracted from the lower Ems River (Krebs and Weilbeer, 2008), and on the long term the tidal river may therefore reduce the sediment concentration in the estuary. However, regular flushing of the tidal river during high discharge events (Spingat and Oumeraci, 2000) transports sediments from the river into the estuary, and the long-term effect of the tidal river on the estuary remains poorly known. Additionally, many of the intertidal areas that existed in the Ems estuary have been reclaimed in the past centuries. These intertidal areas provided a natural sink for sediment to accumulate.

Since 1650, the size of the Ems Estuary has decreased by 40% (177 km,see Section 2) due to infilling with fine sediments. Most of this accumulation took place in the Dollard, which used to be much larger: the present-day intertidal area used to be tidal channels. In some areas, deposition must therefore have been many metres. These sediment deposits are well consolidated, and therefore have a dry density of $\sim$1500 kg/m^3. Assuming an average thickness in deposition of 3 m yields an average annual accumulation rate of 2.3 million tons (partly consisting of sand), between 1650 and present. This number is a very crude estimate for the yearly siltation rates, and more research is needed to further quantify it. Nevertheless, the long-term loss of sediments by deposition is probably comparable to the extraction rates from the port of Emden ($\sim$2.5 million tons/yr). With a constant supply of sediments, removal of this natural sink inevitably leads to a rise in suspended sediment concentrations. It therefore seems likely that apart from deepening and port construction, the suspended sediment concentration has already been slowly increasing for centuries. Compared to the large dredging volumes, and especially the impact of extraction, the impact of changing ship traffic (hypothesized in Section 1) is probably a minor effect

This leads to the following hypothesis for the increasing suspended sediment concentrations in the Ems Estuary:

1. The potential sediment supply to the Ems estuary by the North Sea and Wadden Sea has always been large.
2. The large-scale reclamation of intertidal areas increased the suspended sediment concentrations in the past centuries.

3. Large-scale port construction but especially deepening of the tidal channels in the 1960s increased the up-estuary sediment transport; however.
4. The increase in suspended sediment concentration remained limited because of large-scale sediment extraction (on average ~2.5 million tons/yr) in and near the port of Emden until the early 1990s.
5. After 1990, sediment was no longer extracted, and as a result the suspended sediment concentrations increased substantially.

5.4. Relevance for other estuaries

Many estuaries worldwide are heavily modified. Channels are deepened to accommodate larger ships, and intertidal areas are reclaimed to for need of land. These changes have led to tidal amplification and to increasing suspended sediment concentrations (Winterwerp and Wang, 2013; Winterwerp et al., 2013). The role of dredging on the suspended sediment concentration and the impact of deepening on turbidity through enhanced estuarine circulation (both addressed in this paper), have so far received little scientific attention. This is probably because (1) many of these human interventions occur concurrently, and therefore it is difficult to distinguish individual contributions, and (2) long-term data documenting changes in suspended sediment concentration are rare (Fabricius et al., 2013). Although the impact of dredging is often monitored and modelled on short timescales (especially during capital dredging works), long-term effects have so far only been established to a limited degree (van Kessel and van Maren, 2013).

Some aspects of the results presented here on the Ems Estuary are very site-specific, such as the sediment extraction. However, most other aspects are probably typical for estuaries in populated areas: (1) intertidal areas are reclaimed, leading to a loss of sediment sinks, (2) channels are deepened, resulting in more up-estuary transport of sediment. We therefore believe that the results presented here apply to a wide range of turbid estuaries in which tidal channels have been deepened for port construction, and tidal flats reclaimed for land use.

6. Conclusions

A calibrated suspended sediment transport model has been setup to simulate suspended sediment dynamics in the Ems Estuary. This model suggests that the observed increase in the suspended sediment concentration can be mainly related to the increase in up-estuary transport of sediment due to estuarine circulation caused by deepening of tidal channels. It is also possible that the large-scale reclamation of intertidal areas increased the suspended sediment concentrations in the past centuries. Discontinuing the large-scale sediment extraction from the port of Emden produced an additional pronounced increase in SSC because the imported sediment was not further removed from the system. The effect of the ports themselves, including dredging and dumping, is lower than deepening and consequent extraction. Compared to an estuary without ports, the sediment concentration in the present-day estuary is higher near disposal sites, but lower elsewhere in the estuary (because the ports act as sinks). The Ems estuary provides an example of a heavily impacted estuary for which a relatively large amount of data is available, but may be representative for many estuaries worldwide.

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Exhibit 60

Marine Pollution Bulletin

Volume 32, Issues 8–9, August–September 1996, Pages 615-622

Report

The effects of marine gravel extraction on the macrobenthos: Results 2 years post-dredging

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Available online 25 February 1999.

https://doi.org/10.1016/0025-326X(96)00024-0

Abstract

An offshore experimental dredging study was initiated off North Norfolk (UK) in 1992 to investigate the impacts of marine gravel extraction on the macrofauna. A dredged ‘treatment’ and a non-dredged ‘reference’ site were selected to evaluate the initial impacts and subsequent processes of recolonization. A survey of the benthos was conducted prior to the removal of 50 000 t of marine aggregate from the treatment site. Thereafter annual monitoring surveys were conducted commencing immediately after the dredging episode. Results indicated that whilst the dominant species recolonized quickly following dredging many rarer species did not. Evidence from sidescan sonar records and underwater cameras indicated a considerable amount of sediment transport during the first two winters following dredging and the once well-defined dredge tracks have now become infilled with sand and gravel. The substantially reduced biomass at the treatment site some 24 months after dredging is thought to be due to a local increase in sediment disturbance caused by tide and wave action over the winter period. Finally, the biological findings of this study are discussed in relation to their wider environmental significance.

Previous Next

Recommended articles Citing articles (78)

Exhibit 61

Estuarine, Coastal and Shelf Science

Volume 39, Issue 1, July 1994, Pages 75-91

Regular Article

Seagrasses, Dredging and Light in Laguna Madre, Texas, U.S.A.

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Available online 25 May 2002.

https://doi.org/10.1006/ecss.1994.1050

Abstract

Light reduction resulting from maintenance dredging was the suspected cause of large-scale loss of seagrass cover in deep parts of Laguna Madre between surveys conducted in 1965 and 1974. Additional changes to 1988, together with an analysis of dredging frequency and intensity for different parts of the laguna, were consistent with this interpretation. Intensive monitoring of the underwater light regime and compilation of detailed environmental data for 3 months before and 15 months after a dredging project in 1988 revealed reduced light attributable to dredging in four of eight subdivisions of the study area, including the most extensive seagrass meadow in the study area. Dredging effects were strongest close to disposal areas used during this project but still were detectable on transects >1·2 km from the nearest dredge disposal area. In the subdivision of the study area where most of the dredge disposal occurred, light attenuation was increased throughout the 15 months of observation after dredging. In the seagrass meadow and the transition zone at the outer edge of the meadow, effects were evident up to 10 months after dredging. Resuspension and dispersion events caused by wind-generated waves are responsible for the propagation of dredge-related turbidity over space and time in this system.

Previous Next

Keywords

light attenuation; dredging; seagrasses; coastal lagoon; Texas coast

Recommended articles Citing articles (97)

Exhibit 62

Marine Pollution Bulletin

Volume 58, Issue 6, June 2009, Pages 832-840

Dredging related metal bioaccumulation in oysters

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Available online 3 March 2009.

https://doi.org/10.1016/j.marpolbul.2009.01.020

Abstract

Bivalves are regularly used as biomonitors of contaminants in coastal and estuarine waters. We used oysters to assess short term changes in metal availability caused by the resuspension of contaminated sediments. Sydney Rock Oysters, *Saccostrea glomerata*, were deployed at multiple sites in Port Kembla Harbour and two reference estuaries for 11 weeks before dredging and for two equivalent periods during dredging. *Saccostrea* experienced large increases in accumulation of zinc, copper and tin during dredging in the Port relative to oysters deployed in reference estuaries. Lead and tin were found to be permanently elevated within Port Kembla. We present a clear and un-confounded demonstration of the potential for dredging activities to cause large scale increases in water column contamination. Our results also demonstrate the usefulness of external reference locations in overcoming temporal confounding in bioaccumulation studies.

Previous Next

Keywords

Saccostrea; Sediments; Bioavailability; Resuspension; BACI

Recommended articles Citing articles (58)

Exhibit 63

http://theworldlink.com/news/local/shell-shock/article_389a9be8-77dc-11df-9127-001cc4c03286.html

Shell shock

June 14, 2010
By Nate Traylor, Staff Writer - The World

Images of the oil slick devastating the Gulf of Mexico's seafood industry bring back nightmarish memories for Max and Lilli Clausen.

In 1999, Clausen Oysters in North Bend was the victim of a fuel spill that ruined millions of dollars of product.

That spill, caused by a grounded freighter, was an ink blot compared with the massive eruption of crude spewing off the coast of Louisiana. The local disaster wreaked similar havoc, though on a much smaller scale.

The Clausens, both well past retirement age, sympathize with their Gulf Coast colleagues, some of whom they know from lobbying functions and industry events.

Authorities are failing to take quick, effective action to mop up BP's mess, just as they underperformed here 11 years ago, Lilli Clausen said.

"What upsets me is the politics," she said. "They're doing too much talking and not taking enough action."

In February 1999, a freighter carrying 400,000 gallons of diesel fuel and bunker oil ran aground a mile north of the North Spit. Its name, New Carissa, soon would become famous.

Tug boats were unavailable to tow the ship out to sea. Meanwhile, inclement weather continued to drive the vessel toward shore.

Eventually the hull cracked. Oil leaked. The ship was declared a total loss. Officials blew it up.

"After that ship broke apart, that oil just came in," Lilli Clausen recalls.

Oil from the New Carissa killed more than 200 birds and did immeasurable damage to local sea organisms.

The Coast Guard set out booms to prevent oil from reaching the South Slough National Estuarine Reserve. But little was done to protect private oyster beds. Fuel touched all 600 acres of the Clausens' farm, wiping out about $2 million to $3 million in product.

"We lost 70 to 75 percent of our oysters," Max Clausen said.

"We asked for booms," Lilli Clausen said. "They promised us."

The booms didn't come. Oil spread into the bay. Tar balls and sheen on the water prompted state health officials to shut down all commercial oyster operations. The Clausens laid off half of their crew.

Likewise, Louisiana health officials have closed some oyster production and canceled shrimp season on the central coast. Even those that are still operating are battling the misconception that their product is unsafe for consumption.

"They're losing their markets," Lilli Clausen said. "We did, too."

Lilli Clausen recalled an embarrassing article published in a trade magazine, reporting Coos Bay was serving oily oysters.

"People quit buying," she said.

The Clausens fought a nearly 5-year legal battle with their insurer. The company was reluctant to pay, arguing rain, not oil, had killed their crop.

After an appeal, the Clausens won a $1.2 million settlement, but recovering from the disaster took nearly a decade. They would have retired years ago had it not occurred.

Similarly, some Louisiana oyster farmers can expect a long, uphill battle before they see financial reparations, Lilli Clausen said.

GRI-00/0189

A MODEL FOR SIZING HIGH CONSEQUENCE AREAS ASSOCIATED WITH NATURAL GAS PIPELINES

TOPICAL REPORT

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C-FER Report 99068

Prepared for:

GAS RESEARCH INSTITUTE
Contract No. 8174

GRI Project Manager

Keith Leewis,
Pipeline Business Unit

October 2000

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13. ABSTRACT (*Maximum 200 words)*

This report developed a simple and defendable approach to sizing the ground area potentially affected by a worst-case ignited rupture of a high-pressure natural gas pipeline. Based on this model, a simple equation has been developed that relates the diameter and operating pressure of a pipeline to the size of the area likely to experience high consequences in the event of an ignited rupture failure. Pipeline incident reports, located in the public domain, were reviewed and provide the basis for evaluating the validity of the proposed affected area equation. The correlation suggests that the simple equation provides a credible estimate of affected area.

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RESEARCH SUMMARY

Title	A Model for Sizing High Consequence Areas Associated with Natural Gas Pipelines
Contractor(s)	C-FER Technologies
GRI-Contract Number	8174
Principal Investigator(s)	Mark J. Stephens
Report Type	Topical Report
Objective State	To develop a simple and defendable approach to sizing the ground area potentially affected by the failure of a high-pressure natural gas pipeline.
Technical Perspective	The rupture of a high-pressure natural gas pipeline can lead to outcomes that can pose a significant threat to people and property in the immediate vicinity of the failure location. The dominant hazard is thermal radiation from a sustained fire and an estimate of the ground area affected by a credible worst-case event can be obtained from a model that characterizes the heat intensity associated with rupture failure of the pipe where the escaping gas is assumed to feed a fire that ignites very soon after line failure.
Technical Approach	An equation has been developed that relates the diameter and operating pressure of a pipeline to the size of the affected area in the event of a credible worst-case failure event. The model upon which the hazard area equation is based consists of three parts: 1) a fire model that relates the rate of gas release to the heat intensity of the fire; 2) an effective release rate model that provides a representative steady-state approximation to the actual transient release rate; and 3) a heat intensity threshold that establishes the sustained heat intensity level above which the effects on people and property are consistent with the adopted definition of a High Consequence Area (HCA).
Results	For methane with an HCA threshold heat intensity of 5,000 Btu/hr ft^2, the hazard area equation is given by: $$r = 0.685\sqrt{p\,d^2}$$ where r is the hazard area radius (ft), d is the line diameter (in), and p is the maximum operating pressure (psi).
Project Implications	Natural gas transmission line operators will provide periodic assurances that their pipelines are safe. The Federal code 49CFR192 mandates increased wall thickness thereby reducing the corrosion and mechanical damage risks as the population density increases. The definition of High Consequence Areas is expected to require additional protection for people with limited mobility such as day care centers, old age homes, and prisons. This report suggests the definition for the HCA area of increased protection be set by two parameters, the pipe diameter and it's operating pressure.

TABLE OF CONTENTS

1. INTRODUCTION

1.1 Scope and Objective

This report summarizes the findings of a study conducted by C-FER Technologies (C-FER), under contract to the Gas Research Institute (GRI), to develop a simple and defendable approach to sizing the ground area potentially affected by the failure of a high-pressure natural gas pipeline. This work was carried out at the request of the Integrity Management and Systems Operations Technical Advisory Group (IM&SO TAG), a committee of GRI.

1.2 Technical Background

The failure of a high-pressure natural gas pipeline can lead to various outcomes, some of which can pose a significant threat to people and property in the immediate vicinity of the failure location. For a given pipeline, the type of hazard that develops, and the damage or injury potential associated with the hazard, will depend on the mode of line failure (*i.e.*, leak vs. rupture), the nature of gas discharge (*i.e.*, vertical vs. inclined jet, obstructed vs. unobstructed jet) and the time to ignition (*i.e.*, immediate vs. delayed). The various possible outcomes are summarized in Figure 1.1.

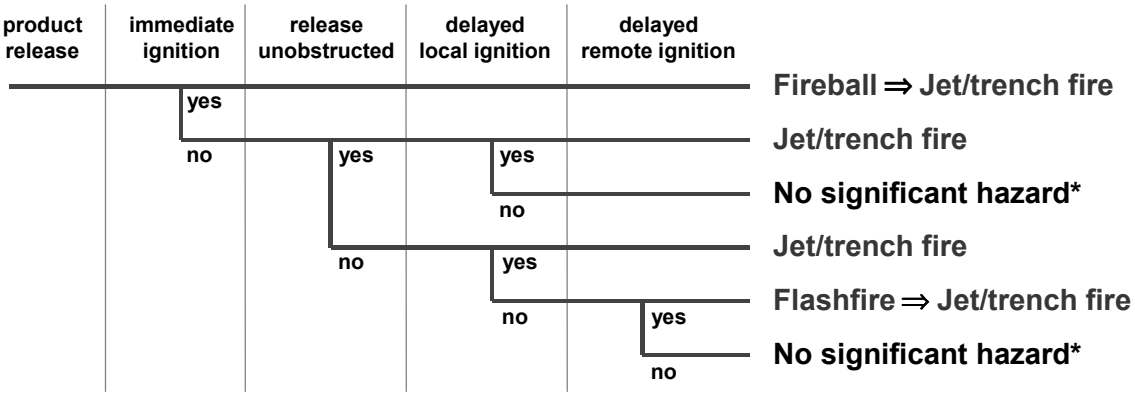

Figure 1.1 Event tree for high pressure gas pipeline failure (adapted from Bilo and Kinsman 1997).

For gas pipelines, the possibility of a significant flash fire resulting from delayed remote ignition is extremely low due to the buoyant nature of the vapor, which generally precludes the formation of a persistent flammable vapor cloud at ground level. The dominant hazard is, therefore, thermal radiation from a sustained jet or trench fire, which may be preceded by a short-lived fireball.

In the event of line rupture, a mushroom-shaped gas cloud will form and then grow in size and rise due to discharge momentum and buoyancy. This cloud will, however, disperse rapidly and a quasi-steady gas jet or plume will establish itself. If ignition occurs before the initial cloud

disperses, the flammable vapor will burn as a rising and expanding fireball before it decays into a sustained jet or trench fire. If ignition is slightly delayed, only a jet or trench fire will develop. Note that the added effect on people and property of an initial transient fireball can be accounted for by overestimating the intensity of the sustained jet or trench fire that remains following the dissipation of the fireball.

A trench fire is essentially a jet fire in which the discharging gas jet impinges upon an opposing jet and/or the side of the crater formed in the ground. Impingement dissipates some of the momentum in the escaping gas and redirects the jet upward, thereby producing a fire with a horizontal profile that is generally wider, shorter and more vertical in orientation, than would be the case for a randomly directed and unobstructed jet. The total ground area affected can, therefore, be greater for a trench fire than an unobstructed jet fire because more of the heat-radiating flame surface will typically be concentrated near the ground surface.

An estimate of the ground area affected by a credible worst-case failure event can, therefore, be obtained from a model that characterizes the heat intensity associated with rupture failure of the pipe, where the escaping gas is assumed to feed a sustained trench fire that ignites very soon after line failure.

Because the size of the fire will depend on the rate at which fuel is fed to the fire, it follows that the fire intensity and the corresponding size of the affected area will depend on the effective rate of gas release. The release rate can be shown to depend on the pressure differential and the hole size. For guillotine-type failures, where the effective hole size is equal to the line diameter, the governing parameters are, therefore, the line diameter and the pressure at the time of failure. Given the wide range of actual pipeline sizes and operating pressures, a meaningful fire hazard model should explicitly acknowledge the impact of these parameters on the area affected.

1.3 Report Organization

The hazard model developed to relate the area potentially affected by a failure to the diameter and pressure of the pipeline is described in Section 2.0. Validation of the proposed hazard area model, based on historical data from high-pressure gas pipeline failure incidents in the United States and Canada, is presented in Section 3.0.

2. HAZARD MODEL

2.1 Overview

An equation has been developed that relates the diameter and operating pressure of a pipeline to the size of the area likely to experience high consequences in the event of a credible worst-case failure event. The hazardous event considered is a guillotine-type line rupture resulting in double-ended gas release feeding a trench fire that is assumed to ignite soon after failure.

The hazard model upon which the hazard area equation is based consists of three parts: 1) a fire model that relates the rate of gas release to the heat intensity of the fire as a function of distance from the fire source; 2) an effective release rate model that provides a representative steady-state approximation to the actual transient release rate; and 3) a heat intensity threshold that establishes the sustained heat intensity level above which the effects on people and property are consistent with the definition of a high consequence area. Note that in the context of this study, an HCA is defined as the area within which the extent of property damage and the chance of serious or fatal injury would be expected to be significant in the event of a rupture failure.

The basis for each model, and any underlying assumptions, are described in Sections 2.2 through 2.4. The hazard area equation obtained by combining the model components is described in Section 2.5.

2.2 Fire Model

A jet flame can be idealized as a series of point source heat emitters spread along the length of the flame (see Figure 2.1). Each point source can be is assumed to radiate an equal fraction of the total heat with the heat flux I_i at a given location resulting from point source *i* being given by (Technica 1988):

$$I_i = \frac{\eta X_g Q_{eff} H_c}{4 n_p \pi x_i^2} \qquad [2.1]$$

where H_c = heat of combustion (constant for given product) ≅ 50,000 kJ/kg for methane;
η = combustion efficiency factor = 0.35;
X_g = emissivity factor = 0.2;
n_p = number of point sources;
Q_{eff} = effective gas release rate; and
x_i = radial distance from heat source *i* to the location of interest.

The total heat flux reaching a given point is obtained by summing the radiation received from each point source emitter.

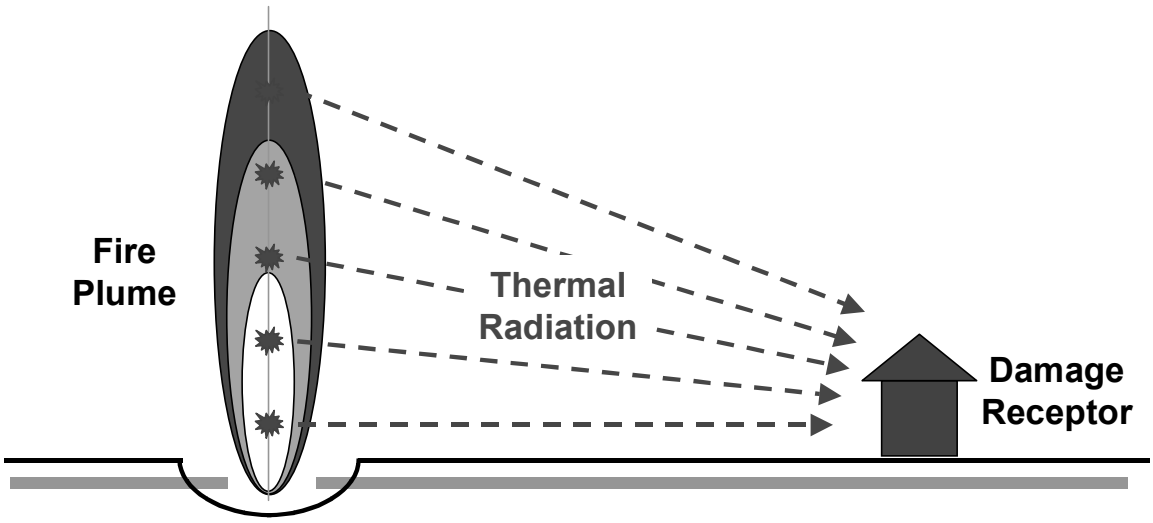

Figure 2.1 Conceptual fire hazard model.

A simplifying assumption, that generally yields a conservative estimate of the total heat flux received by ground level damage receptors, involves collapsing the set of heat emitters into a single point source emitter located at ground level (see Figure 2.2).

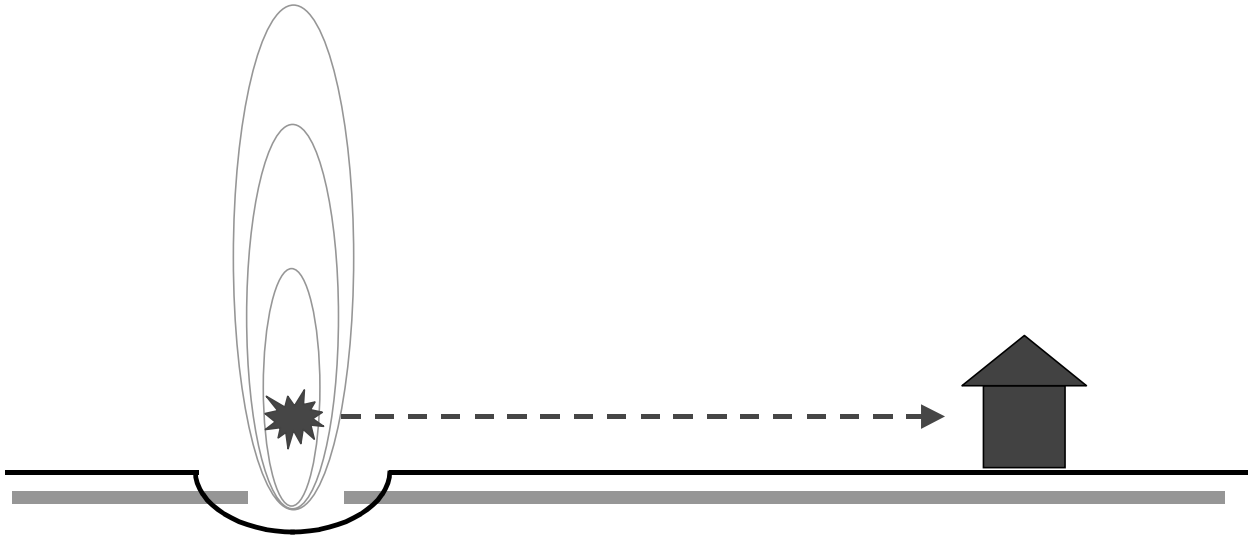

Figure 2.2 Simplified fire hazard model.

The resulting equation for the total heat flux I at a horizontal distance of r from the fire center is given by:

$$I = \frac{\eta X_g Q_{eff} H_c}{4\pi r^2} \qquad [2.2]$$

This simplification is, in some respects, more consistent with the geometry of a trench fire which, due to the jet momentum dissipation (see Section 1.2), concentrates more of the heat-radiating flame surface near ground level. Note, however, that while a ground-level point source model represents a conservative approximation to a vertically-oriented jet flame or trench fire, this conservatism is partially offset by the fact that the model does not explicitly account for the possibility of laterally-oriented jets and/or the effects of wind on the actual position of the fire center relative to the center of the pipeline.

Note, also, that for a single point source emitter located at ground level directly above the pipeline, the locus of points receiving a heat flux of I defines a circular area of radius r centered on the pipeline. Thermal radiation hazard zones of increasing impact severity are, therefore, described by concentric circles centered on the pipeline having radii that correspond to progressively higher heat fluxes.

The adopted heat flux versus distance relationship given by Equation [2.2] represents an extension of the widely recognized flare radiation model given in API RP 521 (API 1990). It can be shown to be less conservative than the API flare model (*i.e.*, it gives lower heat intensity estimates at a given distance) but this should not be considered surprising since the API model is widely recognized to be conservative (Lees 1996).

The adopted model is also preferred over some of the more generic, multi-purpose models available for industrial fire hazard analysis because it acknowledges factors, ignored by other models, that play a significant role in mitigating the intensity of real-world jet fire events. In particular, it accounts for the incomplete combustion of the escaping gas stream (through the combustion efficiency factor η), and it acknowledges (through the emissivity factor X_g) that a significant portion of the radiant heat energy will be absorbed by the atmosphere before it can reach targets at any significant distance from the flame surface.

2.3 Effective Release Rate Model

The rate of gas release from a full-bore line rupture varies with time. Within seconds of failure, the rate of release will have dropped to a fraction of the peak initial value and over time the release rate will decay even further. This tendency for rapid release rate decay is illustrated in Figure 2.3, which shows how the rate would be expected to vary with time for two representative line diameter and operating pressure combinations. The relative release rate estimates shown in the figure were calculated using a non-dimensional rate decay model presented in a study by the Netherlands Organization of Applied Scientific Research, Division of Technology for Society (TNO 1982) which is based on realistic gas flow and decompression characteristics and which acknowledges both the compressibility of the gas and the effects of pipe wall friction.

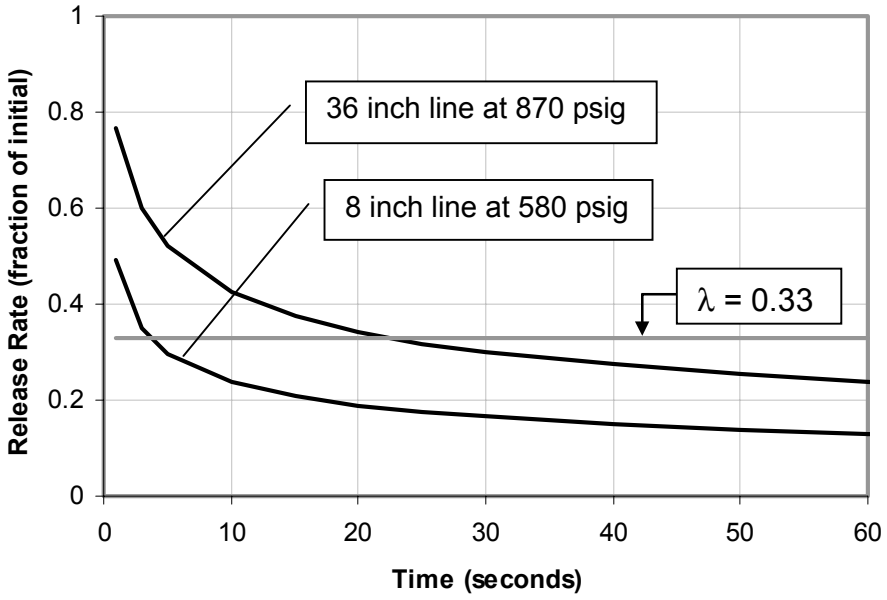

Figure 2.3 Release rate decay.

The peak initial release rate from the single end of a full-bore line rupture can be estimated using the widely recognized gas discharge equation given by the Crane Co. (1981) for sonic or choked flow through an orifice:

$$Q_{in} = C_d \frac{\pi d^2}{4} p \frac{\varphi}{a_0} \qquad [2.3a]$$

where φ = flow factor = $\gamma \left(\frac{2}{\gamma+1} \right)^{\frac{\gamma+1}{2(\gamma-1)}}$; [2.3b]

a_0 = sonic velocity of gas = $\sqrt{\frac{\gamma R T}{m}}$; [2.3c]

C_d = discharge coefficient ≅ 0.62;
γ = specific heat ratio of gas ≅ 1.306 for methane;
R = gas constant = 8,310 J/(kg mol)/K;
T = gas temperature ≅ 288 K or 15 C;
m = gas molecular weight ≅ 16 kg/mol for methane;
d = effective hole diameter ≅ line diameter; and
p = pressure differential ≅ line pressure.

Given that the release rate is highly variable, it follows that the size and intensity of the associated fire will also vary with time and the peak intensity of the fire will depend on exactly

when ignition occurs. The hazard model developed herein accounts for the above by approximating the transient jet or trench fire as a steady state fire that is fed by an *effective* release rate. The effective release rate is a fractional multiple of the peak initial release rate that can be used to obtain estimates of sustained heat flux that are comparable to those obtained from a more realistic transient fire model that assumes a slight delay in ignition time.

For a guillotine-type failure of a pipeline resulting in double-ended release, the effective release rate that is assumed to feed a steady-state fire is given by:

$$Q_{eff} = 2\lambda Q_{in} = 2\lambda C_d \frac{\pi d^2}{4} p \frac{\varphi}{a_0} \qquad [2.4]$$

where λ is the release rate decay factor and the factor of 2 acknowledges that gas will be escaping from both failed ends of the pipeline.

In general, the most appropriate value for the release rate decay factor will depend on the size of pipeline being considered, the pressure in the line at the time of failure, the assumed time to ignition, and the time period required to do damage to property or cause harm to people. Given that even immediate ignition will require several seconds for the establishment of the assumed radiation conditions and given further that a fatal dose of thermal radiation can be received from a pipeline fire in well under 1 minute (see Section 2.4), it follows from Figure 2.3 that a rate decay factor in the range of 0.2 to 0.5 will likely yield a representative steady state approximation to the release rate for typical pipelines.

In a study of the risks from hazardous pipelines in the United Kingdom conducted by A. D. Little Ltd. (Hill and Catmur 1995), the authors report using a release rate decay factor of 0.25. A slightly more conservative value for λ of 0.33 has been adopted herein to ensure that the sustained fire intensity associated with nearly immediate ignition of fires associated with large diameter pipelines will not be underestimated (see Figure 2.3). Given that anecdotal information on natural gas pipeline failures suggests that the time to ignition may typically be in the range of 1 to 2 minutes (as in the Edison, New Jersey incident of 1994), the adopted release rate decay factor will likely yield an effective release rate estimate that overestimates the actual rate for the full duration of a typical gas pipeline rupture fire.

2.4 Heat Intensity Threshold

For people, the degree of harm caused by thermal radiation is usually estimated using a model that relates the chance of burn injury or fatality to the thermal load received where the thermal load L_p is given by an equation of the form (Lees 1996):

$$L_p = t\, I^n \qquad [2.5]$$

where t is the exposure duration, I is the heat flux and n is an index.

Various recognized thermal load vs. effect models based on Equation [2.5] are summarized in Table 2.1 together with calculated estimates of the exposure times required to reach various

conditions of injury and mortality for persons exposed to specified heat intensity levels. If it is assumed that within a 30 second time period an exposed person would remain in their original position for between 1 and 5 seconds (to evaluate the situation) and then run at 5 mph (2.5 m/s) in the direction of shelter, it is estimated that within this period of time they would travel a distance of about 200 ft (60 m). On the further assumption that, under typical conditions, a person can reasonably be expected to find a sheltered location within 200 ft of their initial position, a 30 second exposure time is considered credible and is, therefore, adopted as the reference exposure time for people outdoors at the time of failure.

Radiation Intensity or Heat Flux (Btu/hr ft^2)	Radiation Intensity or Heat Flux (kW/m^2)	Time to Burn Threshold (Eisenberg et al. 1975) $t^*I^{1.15} = 195$	Time to Blister Threshold - lower[1] (Hymes 1983)[2] $t^*I^{1.33} = 210$	Time to Blister Threshold - upper[1] (Hymes 1983)[2] $t^*I^{1.33} = 700$	Time to 1% Mortality (Hymes 1983)[2] $t^*I^{1.33} = 1060$	Time to 50% Mortality (Hymes 1983)[2] $t^*I^{1.33} = 2300$	Time to 100% Mortality[3] (Bilo & Kinsman 1997) $t^*I^{1.33} = 3500$
1600	5.05	30.3	24.4	81.3	123.1	267.1	406.4
2000	6.31	23.5	18.1	60.4	91.5	198.5	302.1
3000	9.46	14.7	10.6	35.2	53.4	115.8	176.2
4000	12.62	10.6	7.2	24.0	36.4	79.0	120.2
5000	15.77	8.2	5.4	17.9	27.0	58.7	89.3
8000	25.24	4.8	2.9	9.6	14.5	31.4	47.8
10000	31.55	3.7	2.1	7.1	10.8	23.3	35.5
12000	37.85	3.0	1.7	5.6	8.4	18.3	27.9

Note:
1) Hymes gives a thermal load range (210 to 700) rather than a single value for blister formation
2) the thermal load values given by Hymes are based on a revised interpretation of the results obtained by Eisenberg et al.
3) Bilo and Kinsman assume that 100% mortality corresponds to a lower bound estimate of the thermal load associated with the spontaneous ignition of clothing

Table 2.1 Effects of thermal radiation on people.

The exposure time estimates closest to this reference time are highlighted in Table 2.1 for each different thermal load effect. Note that the onset of burn injury within the reference exposure time is associated with a heat flux in the range of 1,600 to 2,000 Btu/hr ft^2 (5 to 6.3 kW/m^2), depending on the burn injury criterion. The chance of fatal injury within the reference exposure time becomes significant at a heat flux of about 5,000 Btu/hr ft^2 (15.8 kW/m^2), if the significance threshold is taken to be a 1% chance of mortality (*i.e.,* 1 in 100 people directly exposed to this thermal load would not be expected to survive).

For property, as represented by a wooden structure, the time to both piloted ignition (*i.e.,* with a flame source present) and spontaneous ignition (*i.e.,* without a flame source present) can also be estimated as a function of the thermal load received. For buildings, the thermal load L_b is given by an equation of the form (Lees 1996):

$$L_b = (I - I_x)t^n \qquad [2.6]$$

where I_x is the heat flux threshold below which ignition will not occur.

Models based on Equation [2.6], developed from widely cited tests as re-interpreted by the UK Health and Safety Executive (Bilo and Kinsman 1997), are summarized in Table 2.2 together with calculated estimates of the exposure times required for both piloted and spontaneous ignition at selected heat intensity levels.

Radiation Intensity or Heat Flux (Btu/hr ft^2)	Radiation Intensity or Heat Flux (kW/m^2)	Time to Piloted Ignition[1] (Bilo & Kinsman 1997) $(I-14.7)*t^{0.667}=118.6$	Time to Spontaneous Ign.[1] (Bilo & Kinsman 1997) $(I-25.6)*t^{0.8}=167.6$
4000	12.62	no ignition	no ignition
5000	15.77	1162.3	no ignition
8000	25.24	37.8	no ignition
10000	31.55	18.7	65.0
12000	37.85	11.6	26.3
Note: 1) based on experiments on American whitewood			

Table 2.2 Effects of thermal radiation on wooden structures.

From Table 2.2 it can be seen that 5,000 Btu/hr ft^2 (15.8 kW/m^2), corresponds to piloted ignition after about 20 minutes (1,200 seconds) of sustained exposure. The table further shows that spontaneous ignition is not possible at this heat intensity level. It is therefore assumed that this heat intensity represents a reasonable estimate of the heat flux below which wooden structures would not be destroyed, and below which wooden structures should afford indefinite protection to occupants.

Note that the model employed for estimating the effects of thermal radiation on property explicitly considers the duration of exposure required to cause ignition. Some earlier wood ignition models, which appear to be the basis for the often cited 4,000 Btu/hr ft^2 (12.6 kW/m^2) threshold for piloted wood ignition, are in fact associated with an almost indefinite time to ignition and are, therefore, considered to be overly conservative given the transient (decaying) nature of real pipeline rupture fires.

In light of the above, if a high consequence area is defined as the area within which both the extent of property damage and the chance of serious or fatal injury would be expected to be significant, it follows that this area can reasonably be defined by a heat intensity contour corresponding to a threshold value below which:

- property, as represented by a typical wooden structure, would not be expected to ignite and burn;
- people located indoors at the time of failure would likely be afforded indefinite protection; and
- people located outdoors at the time of failure would be exposed to a finite but low chance of fatality.

The information presented on thermal load effects suggests that below 5,000 Btu/hr ft^2, a wooden structure would not be expected to burn and it, thereby, affords indefinite protection to sheltered persons. Also, this heat intensity level corresponds to approximately a 1 percent chance of fatality for persons exposed for a credible period of time before reaching shelter. A heat flux of 5,000 Btu/hr ft^2 has, therefore, been adopted as the threshold heat intensity for the purpose of sizing a high consequence area.

2.5 Hazard Area Equation

Substituting the expression developed for the effective release rate (Equation [2.4]) into the heat intensity versus distance formula (Equation [2.2]), replacing all constants and rearranging gives the following expression for the radial distance to locations where the heat flux is equal to the threshold value:

$$r = \sqrt{\frac{2348\, p\, d^2}{I_{th}}} \quad \text{(ft)} \qquad [2.7]$$

where I_{th} = threshold heat intensity (Btu/hr/ft^2);
p = line pressure (psi); and
d = line diameter (in).

For a threshold heat intensity of 5,000 Btu/hr ft^2, the above expression reduces to:

$$r = 0.685\sqrt{p\, d^2} \qquad [2.8]$$

Equation [2.8] can, therefore, be used to estimate the radius of a circular area surrounding the assumed point of line failure within which the impact on people and property would be expected to be consistent with the adopted definition of a high consequence area.

Hazard area radii, as calculated using Equation [2.8] are plotted in Figure 2.4 as a function of line diameter and operating pressure. The figure shows that, for pipelines operating at pressure levels in the range of 600 to 1,200 psi, the calculated hazard area radius ranges from under 100 ft for small diameter lines to over 1,100 ft for large diameter lines.

Note that the concept of relating the potential hazard area to the line diameter and operating pressure is not new. An approach similar to that described herein has been an integral part of the high pressure gas transmission pipeline code in the United Kingdom since 1977 (Knowles *et al*. 1978 and IGE 1993). The standard as developed in the United Kingdom incorporates the concept of a Building Proximity Distance (BPD), multiples of which serve to define development exclusion zones and establish the pipeline corridor width for the purpose of determining Location Class. The BPD is calculated directly from the line diameter and the maximum operating pressure.

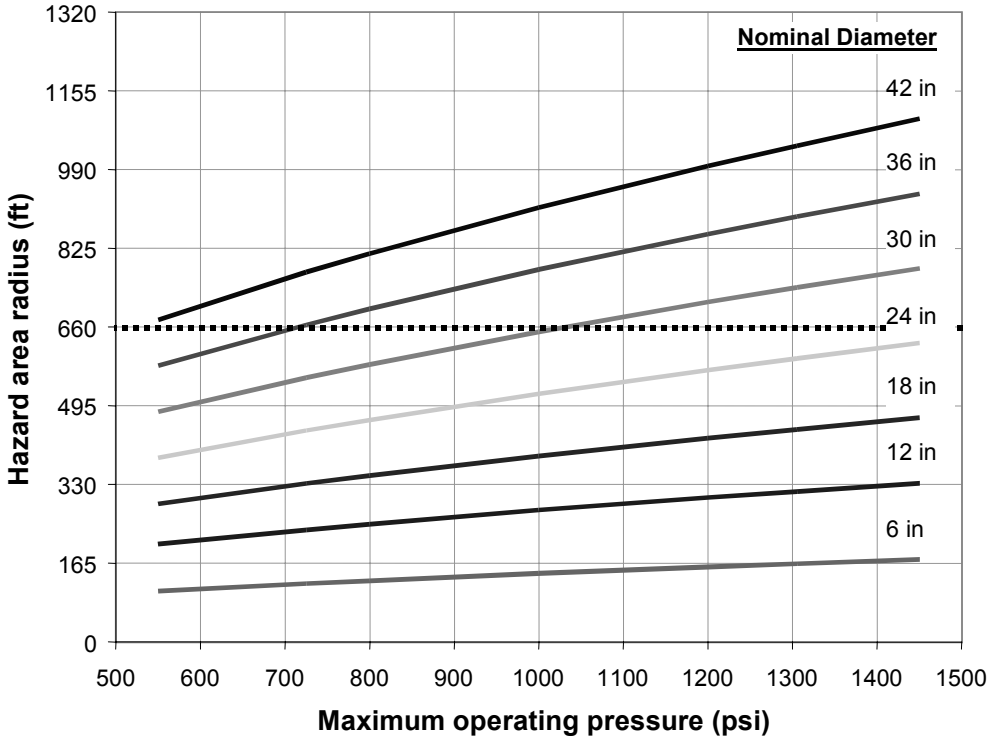

Figure 2.4 Proposed hazard area radius as a function of line diameter and pressure.

3. MODEL VALIDATION

Pipeline incident reports, located in the public domain, were reviewed to provide a basis for evaluating the validity the proposed hazard area model given by Equation [2.8]. The data sources reviewed included reports on pipeline incidents in the United States prepared by the National Transportation Safety Board (NTSB) going back to 1970, and similar reports on incidents in Canada prepared by the Transportation Safety Board (TSB) going back to 1994. Note that the information extracted from these reports required some interpretation due to differences in the way the information was reported. The processed data together with hazard area estimates obtained using Equation [2.8] are summarized in Figure 3.1. A summary of the information that forms the basis for Figure 3.1 is given in Table 3.1.

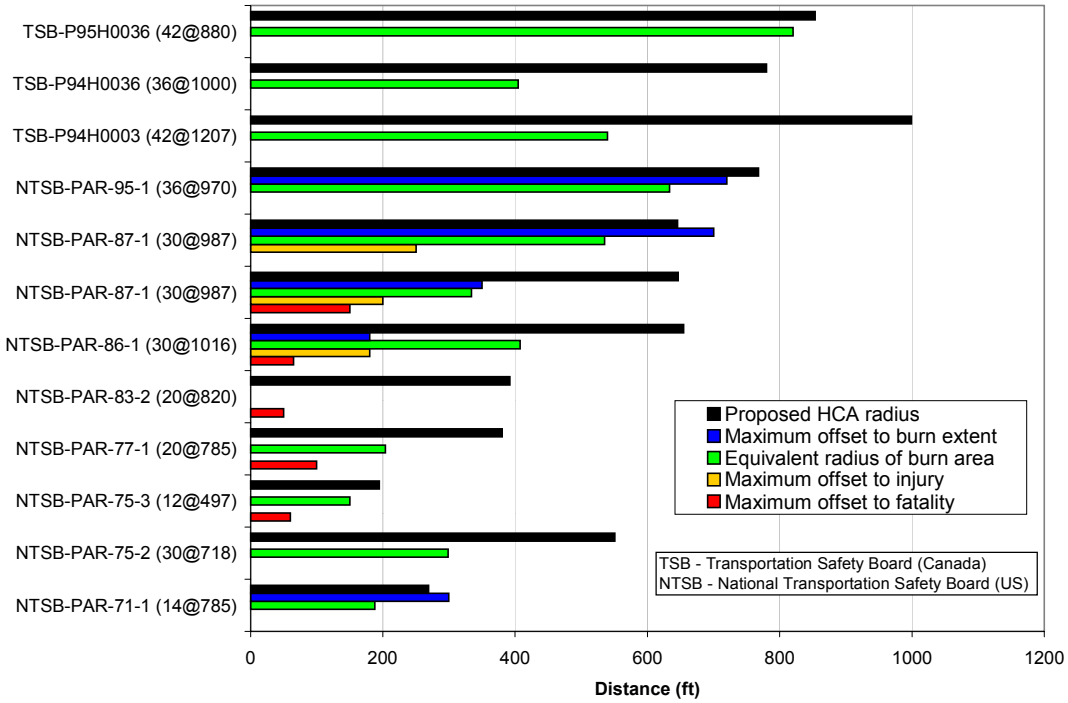

Figure 3.1 Comparison between actual incident outcomes and the proposed hazard area model.

In interpreting the incident outcomes summarized in Figure 3.1 note the following:

- the *equivalent radius of burn area* is the radius of a circle having an area equal to the reported area of burnt ground;
- the *maximum offset to burn extent* is the maximum reported of inferred lateral extent of burnt ground measured perpendicular to a line tracing the alignment of the pipeline prior to failure; and
- the *maximum offset to injury/fatality* is the maximum reported or inferred distance to an injury/fatality again measured perpendicular to a line tracing the alignment of the pipeline prior to failure.

Figure 3.1 shows that in every case the hazard area calculated using the proposed equation is greater than the actual reported area of burnt ground. In addition, with the sole exception of one of the incidents reported in NTSB-PAR-87-1, the radius obtained from the hazard area equation conservatively approximates the maximum lateral extent of the burn zone. Finally, in all cases the calculated hazard zone radius significantly exceeds the maximum reported offset distance to injury or fatality.

Note, however, that whereas the interpretation of reported burn areas and burn distances is obvious, caution should be exercised in interpreting maximum offset distances to injury and fatality. Given that most of the incidents occurred in sparsely populated areas, the reported injury and fatality offsets are more indicative of where people happened to be at the time of failure rather than being representative of the maximum possible distances to injury or fatality for the incident in question.

Acknowledging the uncertainty associated with interpreting reported offsets to injury and fatality, the balance of information still overwhelmingly indicates that the proposed hazard area radius equation provides a reasonable, if somewhat conservative, estimate of the zone of high consequence.

It is thought that one of the main reasons for the apparent conservatism in the proposed hazard area model is that it is based on an effective sustained release rate that is consistent with the assumption of almost immediate ignition. The actual time to ignition for many of the reported incidents is probably longer (see incident notes in Table 3.1) making the effective release rate approximation conservative.

Date	Report	Location	Incident	Damage	Maximum Burn Distance	Diameter (in)	Pressure (psi)
1969	NTSB-PAR-71-1	near Houston, Texas	Rupture at 3:40 p.m. on September 9th, explosive ignition 8 to 10 minutes after failure.	Burned area 370 ft long by 300 ft wide (all to one side). Houses destroyed by blast to 250 ft, heat damage to 300 ft, 106 homes damaged, 9 injuries, and 0 fatalities.	300 ft	14	789
1974	NTSB-PAR-75-2	near Bealeton, Virginia		Burned area 700 ft by 400 ft.		30	718
1974	NTSB-PAR-75-3	near Farmington, New Mexico	Rupture at 3:45 a.m. on March 15th, ignition soon after failure.	Earth charred within a 300 ft diameter circle, 3 fatal injuries (within 60 ft offset)		12.75	497
1976	NTSB-PAR-77-1	Cartwright, Louisiana	Rupture at 1:05 p.m. on August 9th, ignited within seconds	Burn area 3 acres (implies a 200 ft radius circle), 6 fatalities (within about 100 ft offset) and 1 injury.		20	770
1982	NTSB-PAR-83-2	Hudson, Iowa		5 fatalities (within 150 ft, less than 50 ft offset).		20	820
1984	NTSB-PAR-86-1	near Jackson, Louisiana	Rupture at 1:00 p.m. on November 25th, ignition soon after failure.	Burned area 1450 ft long by 360 ft wide (furthest fire extent 950 ft), 5 fatalities (within 65 ft, 0 ft offset), and 23 injuries (within 800 ft,180 ft offset).	Offset 180 ft. Distance 950 ft.	30	1016
1985	NTSB-PAR-87-1	near Beaumont, Kentucky	Rupture at 9:10 p.m. on April 27th, ignition soon after failure.	Burned area 500 ft wide by 700 ft long. 2 houses, 3 house trailers and numerous other structures and equipment destroyed. 5 fatalities due to smoke inhalation in house 318 ft from rupture (150 ft offset), 3 people burned running from house 320 ft from rupture (200 ft offset) one hospitalized with 2nd degree burns.	Offset 350 ft. Distance 500 ft.	30	990
1986	NTSB-PAR-87-1	near Lancaster Kentucky	Rupture at 2:05 a.m. on February 21st, ignition soon after failure.	Burned area 900 ft by 1000 ft. 2 houses, 1 house trailer and numerous other structures and equipment destroyed. 3 people burned running from house 280 ft from rupture (requiring hospitalization), 5 others received minor burn injuries running from dwellings between 200 and 525 ft from rupture (250 ft offset).	Offset 700 ft. Distance 800 ft.	30	987
1994	NTSB-PAR-95-1	Edison, New Jersey	Rupture at night on March 23rd, ignition within 1 to 2 minutes after failure.	Burned area 1400 ft long by 900 ft wide. Fire damage to dwelling units up to 900 ft from rupture, dwelling units at 500 ft and beyond caught fire between 7 to 10 minutes after failure, no fatalities but 58 injuries.	Offset 720 ft. Distance 960 ft.	36	970
1994	TSB Report No. P94H0003	Maple Creek, Saskatchewan	Rupture at 7:40 p.m. on February 14th, ignition soon after failure.	Fire burn area 21.0 acres (8.5 hectares).		42	1207
1994	TSB Report No. P94H0036	Latchford, Ontario	Rupture at 7:13 a.m. on July 23rd, ignition soon after failure.	Fire burn area 11.8 acres (4.77 hectares), heat-affected area 18.6 acres (7.52 hectares).		36	1000
1995	TSB Report No. P95H0036	Rapid City, Manitoba	Rupture of 42 inch line at 5:42 a.m. on July 29th, ignition soon after failure leading to rupture and fire on adjacent 36 inch line at 6:34 a.m.	Fire burn area 48.5 acres (19.6 hectares), heat-affected area 198 acres (80 hectares).		42	880

Table 3.1 Summary of relevant North American pipeline failure incident reports.

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Exhibit 65

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DEPARTMENT OF JUSTICE
GENERAL COUNSEL DIVISION

December 1, 2017

Ms. Kimberly D. Bose, Secretary
888 First Street, N.E., Room 1A
Washington, DC 20426

Re: *Jordan Cove LP Pacific Connector Gas Pipeline LP*
Docket Nos. PF17-4-000, CP17-494-000, and CP17-495-000

Dear Ms. Bose:

Please find the attached comments, submitted by the Oregon Department of Energy on behalf of the Oregon Department of Geology and Mineral Industries, in the above-referenced matters.

Sincerely,

/s/ Jesse D. Ratcliffe

Jesse D. Ratcliffe
Assistant Attorney General
Natural Resources Section

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Jordan Cove Analyst
Oregon Department of Energy
550 Capitol St NE, 1st floor
Salem, OR 97301

Re: DOGAMI Comments Related to Geologic Hazards and the Proposed Jordan Cove LNG Terminal and Pacific Gas Connection Pipeline

Dear Mr. Mole:

The Oregon Department of Geology and Mineral Industries (DOGAMI) reviewed the materials relating to geologic hazards in:

- Resource Report 6 – Geological Resources Jordan Cove Energy Project, dated April 2017
- Resource Report 6 – Pacific Connector Gas Pipeline Project, dated May 2017
- Draft Resource Report 13 – Engineering and Design Material, Chapter 13.3 Natural Hazards and Conditions, Jordan Cove Energy Project, dated May 2017, which includes:
    - Appendix I.13 Natural Hazard Design Investigations and Forces, and
    - Appendix J.13 Site Investigation and Conditions, and Foundation Design

DOGAMI finds the information in the Resource Reports submitted by the Applicant to be incomplete, has comments about possible deficiencies in the scientific and engineering analyses related to geologic hazards; and at this point is not satisfied that geologic hazards will be adequately addressed to ensure public safety. Please see attached: 1) General Review comments, and 2) comments on the Resource Reports.

While DOGAMI has regulatory and statutory authority on mining operations and building in the tsunami regulatory zone, this letter is not intended to address those specific requirements. The Applicant must meet Oregon building code requirements and Oregon laws, including Section 1803.2.1 Tsunami Inundation Zone of the Oregon Structural Specialty Code (Oregon Revised Statutes [ORS] 455.446 and 455.447).

Thank you for the opportunity to assist with this project. If you have any questions, please contact me at 971-673-1555 (brad.avy@oregon.gov) or Yumei Wang at 971-673-1551 (yumei.wang@oregon.gov).

Sincerely,

Brad J. Avy
Director and State Geologist

cc: Jon Allan, Tsunami Lead
Bill Burns, Natural Hazards Section Supervisor
Laura Gabel, Geologist
Ian Madin, Deputy Director and Chief Scientist
Jed Roberts, Geological Survey and Services Program Manager
Yumei Wang, Engineer

General Review Comments

This proposed project is in a high seismic hazard area due to the Cascadia Subduction Zone, which can produce a magnitude 9 earthquake, and the proposed Liquefied Natural Gas (LNG) Terminal facility is located in the Cascadia tsunami inundation zone. Some specific concerns related to the performance of the proposed facilities and public safety include:

1. The long duration of shaking expected with a magnitude 9 earthquake and how it might impact the proposed facilities and safety of people;
2. Ground failure of the softer and looser soils in the nearby area and how it may impact the proposed facilities and safety of people;
3. How the proposed facilities may negatively impact the tsunami hazards in the surrounding areas and safety of people;
4. Tsunami scour in the nearby area and how the Maximum Considered Tsunami (MCT), that is, the design tsunami, may impact the local landforms, including the dunes, and proposed facilities and safety of people;
5. Dynamic erosion of the North Spit dunes in response to the design tsunami and how it may impact tsunami runup at the proposed facilities and safety of people;
6. Tsunami debris impacting the nearby area and how it may impact the local landforms, including the dunes, proposed facilities and safety of people;
7. Dependencies on existing infrastructure that may fail, such as roads and levees; and
8. Lack of discussion of instrument monitoring safety programs related to potential ground failures, including ground settlement of soft soils and movement of landslides.

DOGAMI encourages designing and building for disaster resilience and future climate using science, data and community wisdom to protect against and adapt to risks. This will allow people, communities and systems to be better prepared to withstand catastrophic events and future climate—both natural and human-caused—and be able to bounce back more quickly and emerge stronger from shocks and stresses.

Applicant should follow existing regulations (e.g., State of Oregon's Oregon Revised Statutes, Oregon Administrative Rules, Oregon building codes, federal laws, and local regulations):

- Use best practices supporting public safety;
- Use a long-term view to protect citizens, property, environment, and standard of living;
- Integrate resilience, where possible, by avoiding high risk areas or embracing higher performance standards than may be required by building codes and regulations. This will lessen damage and speed recovery after disasters, and improve continuity of operations.

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DOGAMI Comments on Resource Reports

DOGAMI's comments pertain to the specific resource reports as presented by the Applicant. It is possible that some of the comments on Resource Report 6 are addressed in Resource Report 13; however, the Applicant has not explained nor organized the information in a manner that can be readily reviewed.

Resource Report 6 – Jordan Cove Energy Project

9. The Resource Report 6 Jordan Cove Energy Project is incomplete. For example, none of the Appendices for have been provided in Resource Report 6, including:
   - Appendix A.6 – Geotechnical Data Report, Jordan Cove LNG Project
   - Appendix B.6 – Seismic Ground Motion Hazard Study, Jordan Cove LNG Project
   - Appendix C.6 – Geotechnical Report, Jordan Cove LNG Project
   - Appendix D.6 – Estuary Flood Risk and Hazard Study, Jordan Cove LNG Project
   - Appendix E.6 – Tsunami Hydrodynamic Modelling, Jordan Cove LNG Project
   - Appendix F.6 – Tsunami Maximum Run-up Modelling, Jordan Cove LNG Project
   - Appendix G.6 – Tsunami Wave Amplitude Analysis, Jordan Cove LNG Project
   - Appendix H.6 – Design Wind Speed Assessment, Jordan Cove LNG Project

10. Section 6.4.1.1 Earthquakes of the Resource Report 6 – Jordan Cove Energy Project provides seismic ground motions that are both incomplete and unclear. For example, the Applicant states that there is a "comparison in Table 6.4.1 includes values for soft rock site conditions as well as the anticipated site soil conditions after construction." Please provide this information in a clear manner that includes informative labels for the reviewer.

11. Section 6.4.1.1 Earthquakes of the Resource Report 6 – Jordan Cove Energy Project provides seismic ground motions that have not used new building code reference documents, namely American Society of Civil Engineers (ASCE) 7-16. Please discuss why ASCE 7-16 has not been used, or provide and discuss design values using ASCE 7-16.

12. Section 6.4.1.3 Soil Liquefaction of the Resource Report 6 – Jordan Cove Energy Project refers to Appendix C.6, however, this appendix was not provided. As requested earlier, please provide information that is referenced.

13. Section 6.4.1.3 Soil Liquefaction of the Resource Report 6 – Jordan Cove Energy Project does not include information on the method used for the liquefaction triggering analyses. DOGAMI recommends that the Applicant conduct analyses consistent with the National

Academies Liquefaction Study Report (2016), available at https://www.nap.edu/catalog/23474/state-of-the-art-and-practice-in-the-assessment-of-earthquake-induced-soil-liquefaction-and-its-consequences.

For all of the liquefaction analyses, the assumptions, methods used, and uncertainties associated with them should be explicitly stated and presented for each step of the analysis. This includes the uncertainties associated with field investigations, lab testing, triggering analyses, settlement analyses, lateral spreading analyses, and proposed mitigation. This should also be a part of any future analyses including soil-structure interaction and other modeling of the structural responses to the hazards and for proposed mitigation. Results should be summarized so that it is clear which resulting values are being used for design purposes.

14. Section 6.4.1.4 Tsunamis of the Resource Report 6 – Jordan Cove Energy Project states: "The modeled rupture scenario XL1 has an estimated period longer than the 10,000-year event discussed in Volume 2, Section 13.I.2.4 of FERC's Guidance Manual for Environmental Report Preparation (February 2017)." DOGAMI's XL1 is a deterministic scenario. The DOGAMI XL1 scenario is not associated with a period longer than the 10,000-year event.

    Since 2016, there has been a national standard for tsunami resilient design in the American Society of Civil Engineers (ASCE) 7-16 Chapter 6 Tsunami Loads and Effects. This is the consensus-based engineering standard that is a referenced requirement in the latest (2018) International Building Code (IBC). The IBC is a model code that is widely adopted throughout the country including by the State of Oregon. ASCE 7-16 was extensively vetted by the American Society of Civil Engineers using an accredited and audited consensus process.

    DOGAMI recommends the Applicant comply with ASCE 7-16. DOGAMI recommends that the Applicant meet or exceed the inundation limit and other design parameters in the ASCE 7 Tsunami Design Geodatabase and select design procedures and parameters, such as design inundation depths and flow velocities, which would result in a proposed facility that will protect human safety. Any modeling procedure for determining site-specific tsunami design inundation and velocities should follow Section 6.7 of ASCE 7-16 and demonstrate that the tsunami input meets the Probabilistic Tsunami Hazard Analysis Offshore Tsunami Amplitude of the ASCE Tsunami Design Geodatabase. Maps and criteria in the ASCE 7-16 design standard are based on engineering risk analysis and reliability targets. The ASCE 7-16 Maximum Considered Tsunami (MCT) has a 2% probability of being exceeded in a 50-year period, or a 2,475 year average return period. The ASCE 7-16 MCT is a design basis event,

characterized by the inundation depths and flow velocities at the stages of inflow and outflow most critical to the structure(s).

The Applicant should clearly present each step of the multiple tsunami analyses in a manner suitable for peer review by qualified professionals. All analyses, methods, assumptions and final values used for the structural design procedures for tsunami effects should be clearly documented so that results are reproducible. This includes, but is not limited to, identifying debris impact loads, foundation design factors, uplift forces, scour forces, and loads for all Tsunami Risk Category III and IV Nonbuilding Structures and designated nonstructural components.

15. Section 6.4.1.4 Tsunamis of the Resource Report 6 – Jordan Cove Energy Project refers to the existing Trans Pacific Parkway/US- 101 Intersection as being in the tsunami inundation zone. The Applicant states "To maintain grades, improvements to the intersection will not remove the intersection from the tsunami inundation zone." There appears to be only one access road for the proposed Jordan Cove LNG facility. This access road is in the tsunami inundation zone. In order for the access road to be reliably useable for safety purposes after a future tsunami disaster, it would need to incorporate both earthquake and tsunami resistant designs. These designs would need to factor in potential cyclic strain, liquefaction and lateral spreading from ground shaking. In addition, the designs would need to account for tsunami forces, including flooding, velocities, scour, buoyancy and debris impact. Has this roadway and access to the proposed facilities been evaluated for possible damage due to tsunami forces, such as tsunami scour and tsunami debris impact? Please provide analyses, results and, if needed, proposed mitigation that addresses both post-earthquake and post-tsunami safety for proposed berms, roadways and elevated ground. Related documents should be complete, clearly organized and presented to allow for peer review by qualified specialists.

<u>Resource Report 6 – Pacific Connector Gas Pipeline Project</u>

16. The Resource Report 6 – Pacific Connector Gas Pipeline Project is incomplete. For example, some of the Appendices for have not been provided, including:
    - APPENDIX C – Site-Specific Landslide Evaluation
    - APPENDIX H – Geotechnical Boring Logs
    - APPENDIX I – Laboratory Testing
    - APPENDIX J – Seismic Reflection Survey – Stukel Mt. Fault

17. The Applicant states (on page 7): "With the exception of those in the Klamath Falls area, these mapped surface faults are not considered active and are not believed to be capable of renewed movement or earthquake generation (USGS, 2002 interactive fault website)". DOGAMI considers Quaternary active faults as capable of generating potentially damaging earthquakes. DOGAMI has mapped late Quaternary faults in Coos Bay, which could impact the proposed project. Please refer to this publication: www.oregongeology.org/pubs/gms/GMS-094.pdf. DOGAMI recommends that a thorough literature review be conducted for known Quaternary active faults, as well as a site specific investigation that covers the proposed project area to evaluate if unknown Quaternary faults exist that may negatively impact the proposed facilities. Analysis of recently acquired lidar data throughout Oregon has identified numerous previously unidentified late Quaternary or Holocene fault scarps including in the Klamath Falls area. The entire pipeline right-of-way (ROW) should be evaluated thoroughly with lidar coverage of a broad area around the ROW to identify potentially hazardous faults.

18. The Applicant states (on page 8): "The PCGP Project is located in relatively sheltered areas of Coos Bay, where the effects of a tsunami on the pipeline are expected to be relatively minor". DOGAMI requests the tsunami analyses that supports this statement. What tsunami modeling was conducted for the proposed pipeline alignment? What are the tsunami flow depths used to estimate scour potential? Were tsunami scouring forces evaluated for both the incoming (inflow) and outgoing (outflow) tsunami waves?

19. The Applicant states (on page 9): "The recurrence interval between Cascadia events has been irregular and ranges from about 100 to 1,000 years (Atwater and Hemphill-Haley, 1997). Typical recurrence intervals are thought to be on the order of 400 to 600 years (Clague et al., 2000)." DOGAMI requests that the Applicant consider the most recent scientifically peer reviewed data on recurrence intervals for the Cascadia Subduction Zone (e.g., Goldfinger, et al, 2016). DOGAMI recommends that the Applicant consider the continually evolving scientific information on the Cascadia Subduction Zone and related seismic hazards.

20. The Applicant states (on page 10): " PGAs for the PCGP Project are listed in Table 2, based on USGS (2008) data compilation." DOGAMI requests that the Applicant consider the most recent USGS data, including the 2014 USGS seismic hazard maps.

21. The Applicant states (on page 10) "Higher PGAs are possible where soft soil overlies bedrock, such as in the vicinity of North Slough and Haynes Inlet MP 1.47H to 5.3H. We estimate Site Class D conditions are appropriate for the MP 1.47H to 5.3H areas." It is

common in estuaries to have soils that are softer than Site Class D conditions due to the presence of estuarine muds and river sediments, and these soils may amplify earthquake shaking. Rather than the Applicant estimating the Site Class type as D, DOGAMI recommends that both a literature review and site specific analyses are conducted to determine actual Site Class types and use those to determine PGAs and other relevant seismic ground motions and response. Downhole shear wave velocity measurements of Coos Bay estuarine sediments are available in the DOGAMI O-13-06 database.

22. The Applicant states (on page 11): " ...there is a low risk of pipeline damage from ground shaking in the absence of other deformation adversely affecting the pipeline. Based on these studies, the potential damage to buried pipelines from ground shaking intensity at the site is considered to be low." DOGAMI requests the Applicant to provide information on the vulnerability of buried pipelines in sloped areas without ground deformation during seismic shaking, such as along portions of the proposed corridor that crosses the Coast, Klamath and Cascade Ranges.

23. The Applicant states (on page 11): "ancient, inactive faults have no potential for rupture." DOGAMI finds this statement to be misleading. Weak planes or zones, such as ancient faults and bedding planes, can be displaced from earthquake shaking. DOGAMI recommends that the Applicant evaluate weak planes and zones for potential displacement that could impact the proposed pipeline.

24. The Applicant reviews faults that cross the proposed pipeline on pages 11 - 13 and includes "TABLE 3. MAPPED QUATERNARY AND HOLOCENE FAULTS CROSSING THE PCGP PROJECT". DOGAMI recommends that Applicant evaluate all faults that can impact the pipeline, including nearby active faults in Coos Bay. As stated in an earlier comment, DOGAMI has mapped late Quaternary faults in Coos Bay, which could impact the proposed project. Please refer to this publication: www.oregongeology.org/pubs/gms/GMS-094.pdf. DOGAMI recommends that a thorough literature review be conducted for known Quaternary active faults, as well as a site specific investigation that covers the proposed project area to evaluate if unknown Quaternary faults exist that may negatively impact the proposed facilities.

25. The Applicant states (on page 13): "As mentioned in the previous section, published maps are adequate for identifying the presence or absence of active faults, but are generally not detailed enough for pipeline design." DOGAMI disagrees with this statement—many areas have not been carefully mapped by geologists and it is highly likely that many active faults have not yet been identified. Furthermore, newer technologies that allow for identification

of active faults are now readily available whereas in the past they were not. As stated in an earlier comment, DOGAMI recommends that a thorough literature review be conducted for known Quaternary active faults, as well as a site specific investigation that covers the proposed project area to evaluate if unknown Quaternary faults exist that may negatively impact the proposed facilities.

26. The Applicant discusses a three phase liquefaction analysis approach and states (on page 15): "This second phase liquefaction analysis was completed using simplified methods (Seed et al., 2003; Idriss and Boulanger, 2008; and Boulanger and Idriss 2014)". DOGAMI recommends that the Applicant conduct analyses consistent with the National Academies Liquefaction Study Report (2016), available at https://www.nap.edu/catalog/23474/state-of-the-art-and-practice-in-the-assessment-of-earthquake-induced-soil-liquefaction-and-its-consequences. For the Applicant's second phase, conducting analyses using additional methods to estimate liquefaction triggering would be considered as standard-of-practice. As DOGAMI stated in earlier comments, for all of the liquefaction analyses, the assumptions, methods used, and uncertainties associated with them need to be explicitly stated and presented for each step in the analysis. This includes the uncertainties associated with field investigations, lab testing, triggering analyses, settlement analyses, lateral spreading analyses, and proposed mitigation. This should also be a part of any future analyses including soil-structure interaction and other modeling of the structural responses to the hazards and for proposed mitigation. Results should be summarized so that it is clear which results are being used for design purposes.

27. The Applicant states (on page 15): "If liquefaction will be triggered at previously identified susceptible pipeline segments under the maximum considered earthquake (MCE) per ASCE 7-10 code". As DOGAMI stated in an earlier comment, the Applicant has developed seismic ground motions that have not used newer building code reference documents, namely ASCE 7-16, which was published in 2016 as opposed to 2010. Ground motion values using ASCE 7-16 should be presented and used in the liquefaction analyses.

28. The Applicant states (on page 16): "the liquefaction and lateral spreading potential at Indian Creek (MP 128.58 – 128.62) remains unknown and access to the site remains restricted". DOGAMI requests that the Applicant keep DOGAMI informed on the status of this situation and data gap, and explain their next steps. For example, will the Applicant select another proposed route?

29. The Applicant states (on page 16): "The third phase analysis for the rerouted pipeline segment extending from MP 1.5H to 5.5H is in process and the results will be available for

the final submittal of this report." DOGAMI requests that the Applicant keep DOGAMI informed on the status of these analyses.

30. The Applicant states (on page 17): "Higher PGAs are possible where soft soil overlies bedrock, such as in the vicinity of North Slough at MP 1.47 to 3.2H and Haynes Inlet MP 4.7H to 5.5. We estimate Site Class D conditions are appropriate for the North Slough and Haynes Inlet areas." As DOGAMI stated earlier, it is common in estuaries to have soils that are softer than Site Class D conditions due to the presence of estuarine muds and river sediments, and these soils may amplify earthquake shaking. Rather than the Applicant estimating the Site Class type as D, DOGAMI recommends that site specific analyses are conducted to determine actual Site Class types and use those to determine PGAs and other relevant seismic ground motions and response.

31. The Applicant states (on page 20): "At the Coos River site, stresses exceed 100 percent SMYS but are estimated to be below the combined stress limit as shown in Figure 4.3.1 above. However, the analyses were based on elastic modulus and when the yield stress is exceeded, as in the case of the Coos River site, a fully plastic analysis is required to accurately assess the pipe stresses and strains. A fully plastic analysis requires modeling the stress-strain behavior of the pipeline under cyclic conditions in such a way as to capture strain-hardening effects, which requires a full-scale cyclic pipe load test to develop accurate model parameters. It also requires that the operational hoop, thermal, and internal pressures are accounted for during cyclic conditions. This type of analysis is beyond the scope and expertise of GeoEngineers." DOGAMI recommends that appropriate pipeline analyses are conducted by qualified specialists for the Coos Bay site, and potential impacts associated with liquefaction, lateral spreading, cyclic strain, and buoyancy forces be addressed to ensure public safety.

32. The Applicant states (on page 20): "with the potential for very large, long recurrence interval, Cascadia events". DOGAMI finds this statement as misleading. Seismologists and earthquake geoscientists, as professionals, would not generally consider earthquake recurrence intervals on the order of a few hundred years to be "very large, long". DOGAMI requests the Applicant to clarify, substantiate or change their statement.

33. The Applicant states (on page 20): "a fully plastic analysis of pipe strain will be completed to verify that the liquefaction and lateral spreading induced plastic deformation of the pipe at the Coos River crossing is tolerable." As stated earlier, DOGAMI recommends that appropriate pipeline analyses are conducted by qualified specialists for the Coos Bay site,

and potential impacts associated with liquefaction, lateral spreading, cyclic strain, and buoyancy forces are addressed to ensure public safety.

34. The Applicant states in their Conclusion sector (on page 21): "One Holocene (active) fault crossing and three Quaternary fault crossings were identified along the proposed pipeline alignment as listed in Table 3." As DOGAMI stated earlier, DOGAMI recommends that a thorough literature review be conducted for known Quaternary active faults, as well as a site specific investigation that covers the proposed project area to evaluate if unknown Quaternary faults exist that may negatively impact the proposed facilities. The faults should not be limited to locations of the proposed pipeline crossings.

35. The Applicant states (on page 25): "some of the later reroute alignments are currently outside the area of LiDAR and aerial photograph coverage". DOGAMI recommends the Applicant obtain high resolution lidar for all areas that may impact the proposed facilities along the proposed route. Lidar coverage should be collected with enough buffer distance to characterize potential seismic and landslide hazards. For example, for landslide hazards, the lidar should include from the valley bottom to the top of the ridge. Also, there is publicly available statewide aerial photography. Please evaluate the potential large landslides keeping in mind that landslides may extend from the tops of ridges and may move downslope to block rivers. In addition, lidar should be used to evaluate seismic sources.

36. The Applicant states (on page 27): "The DOGAMI study provides a broad-scale assessment and mapping of slopes potentially susceptible to RMLs along the portion of the pipeline within Coos, Douglas and Jackson counties (MPs 1.5H - 166). The potential for RMLs to occur east of MP 166 generally is considered to be relatively low based on geologic conditions, relatively little rainfall and statistically fewer past historical RML occurrences. However, the slopes east of MP 166 were reviewed for this hazards report to identify high-risk sites based on general guidelines provided in Forest Practices (FP) Technical Note 2 of the Oregon Department of Forestry (ODF, 2000). The ODF guidelines recommend screening for high-risk sites by identifying slopes that exceed 65 percent gradient on existing topographic maps, then performing surface reconnaissance to identify high risk site features." Both the DOGAMI RML and ODF RML methods are outdated. DOGAMI recommends that the Applicant use current state of practice methods that include lidar as a base map.

37. The Applicant states (on page 27): "Based on available topographic mapping, no slopes along the pipeline alignment east of MP 166 exceed 65 percent or appear to be at high

potential for RML occurrence." DOGAMI does not agree with the conclusion based on the fact that state-of-practice methods were not used to develop this conclusion. DOGAMI recommends that the Applicant use current state of practice methods that include lidar as a base map.

38. The Applicant states (on page 46): "As currently planned the portions of the pipeline that are crossing waterbodies that have the potential to be impacted by tsunami scour, will be installed using trenchless methods at depths well below the potential scour depths. Therefore, tsunami scour is not considered a hazard to the pipeline project." The Applicant further states "The modeling analysis showed that some temporary scour may occur in Coos Bay along the pipeline during inundation of the tsunami (approximately 1 to 2 hours)." The Applicant indicates that scour from tidal currents and river flows are approximately 3 feet at the pipeline crossing, and "it is recommended to use a 3-foot depth of scour resulting from tsunami impact". DOGAMI requests the Applicant provide information on maximum potential scour depth from a Cascadia tsunami. Also, DOGAMI requests information on the minimum factor of safety the Applicant applied to address the maximum potential scour depth from Cascadia tsunamis along the proposed alignment in greater Coos Bay area.

Draft Resource Report 13 Engineering and Design Material, Chapter 13.3 Natural Hazards and Conditions, Jordan Cove Energy Project, dated May 2017, which includes:

- Appendix I.13 Natural Hazard Design Investigations and Forces, and
- Appendix J.13 Site Investigation and Conditions, and Foundation Design

Based on the review of tsunami-related documents in Resource Report 13, DOGAMI requests additional supporting information that discusses and clarifies the following:

39. The Applicant, in general, found that their MIKE21 modeling matched the DOGAMI L1 first wave arrival (which reflects the largest wave), although wave amplitudes and phase differences were observed for later wave arrivals. No explanation is provided to account for the latter differences. DOGAMI requests further discussion of differences in the modeling results after the initial wave arrival to account for phase and amplitude differences observed in the modeling results.

40. DOGAMI requests that the Applicant provide peer reviewed documentation that describes the MIKE21 FM model and its ability to model tsunami inundation. Many issues are unclear, for example, does MIKE21 adequately account for the (vertical) wave runup on the wall and/or composite structure?

41. DOGAMI requests that the Applicant provide further explanation of the approach used to define the digital elevation model (DEM) that is recommended. In particular, how does the developed grid differ from the tsunami grids generated by NOAA's National Center for Environmental Information (NCEI). These data may be obtained here: https://www.ngdc.noaa.gov/mgg/inundation/tsunami/.

42. DOGAMI requests that the Applicant explain to what extent has the model been tuned to match the DOGAMI L1 scenario and inundation results.

43. DOGAMI requests that the Applicant provide a better depiction of the three cases used to define the design crests. It is unclear whether the design reflects a berm, wall, or a composite structure around the perimeter of the entire complex, or portions of the complex. Please provide figures that characterize the proposed design.

44. DOGAMI requests that the Applicant explain why mean high water (MHW) was used as opposed to MHHW (as used by DOGAMI).

45. Values of future sea level rise (SLR) presented by the Applicant are based on existing (historical) trends derived for the Charleston tide gauge. Based on its current rate, estimates were made out into the future (i.e. 30 years). This is an overly simplistic approach that assumes the past is the key to the future and hence discounts possible acceleration of SLR in the future. A more effective approach would be to base future estimates on the National Research Council (2012) SLR study that was completed for the US West Coast. National Research Council estimates account for expected local tectonic changes as well eustatic and steric responses and are a more reasonable (and current) estimates for the future. Please address SLR using current scientific data and methods.

46. Provide analysis of the potential role of sediment erosion of the North Spit dunes caused by the design tsunami. Research on the US East Coast suggests that sediment erosion during a tsunami may be significant and could impact inundation extents and runup (Tehranirad et al., 2015, 2016; Tehranirad, 2016). This notion is also supported by field studies following the March 11, 2011 Tohoku, Japan tsunami (Goto et al., 2012; Tanaka et al., 2012).

47. Provide analyses of the potential role of tsunami wave reflection/focusing/defocusing as the tsunami impacts the proposed LNG facilities and its possible public safety implications for the surrounding Coos Bay environment. Tsunami waves that impact against proposed protective structures (e.g., berm, wall or composite structure) and the subsequent transfer of that energy to other areas within the bay is a public safety concern. DOGAMI requests

additional modeling for the purposes of addressing public safety. All documents should be complete, clearly organized and presented to allow for peer review by qualified specialists.

48. DOGAMI requests that the Applicant provide analysis of maritime vessels and their potential to become ballistics within the bay. Maritime evacuation planning in response to the tsunami should be conducted and provided.

49. DOGAMI requests that the Applicant provide analysis on the potential for off-site debris impacting the facilities and the potential ramifications with respect to public safety.

50. DOGAMI requests that the Applicant provide information on each of the DEMs used for the tsunami model. For example, were three different DEMs used that reflect the three different case studies: berm, wall and composite structure? Please provide the DEMs.

51. Elevated structures, including elevated berms, used for assembly areas in the tsunami inundation zone are subject to ASCE 7-16 chapter 6 requirements. To ensure public safety, DOGAMI strongly recommends that the Applicant design all elevated structures to be used as assembly areas in the ASCE tsunami design zone in accordance with ASCE 7-16 chapter 6. Design documents should be complete, clearly organized and presented to allow for peer review by qualified specialists.

Document Content(s)

Exhibit 66

PUBLIC COMMENT

Provided by Barbara Gimlin, P.O. Box 1527, North Bend, OR 97459

Intertidal Flats Mitigation Proposed for Kentuck Slough

Jordan Cove Energy Project Joint Permit Applications

U.S. Army Corps of Engineers/Oregon Department of State Lands

January 11, 2015

INTRODUCTION

This public comment document presents concerns and credibility issues regarding the Compensatory Wetland Mitigation (CWM) plans submitted or referred to in current U.S. Army Corps of Engineers (Corps) and Oregon Department of State Lands (DSL) Joint Permit Applications (JPAs) for the Jordan Cove Energy Project (JCEP) in North Bend, Oregon. Of the CWM versions presented for the overall JCEP project, this document focuses on only one portion of each— the estuarine mitigation proposed for the Intertidal Flats Mitigation Site at Kentuck Slough.

The estuarine mitigation proposed for Kentuck by the JCEP has not undergone the serious environmental and hydrologic evaluation needed to ensure the mitigation will not result in contamination of the Coos Bay estuary, flooding of adjacent and upstream property owners, and a potential mosquito infestation that would affect area residents. Much more input is needed from hydrologists, engineers, natural resources scientists, and planners to fully understand and design a plan for the site that will address current and future site-specific conditions on the ground, including upstream of the site. The inconsistencies in the plans brought forward, together with the lack of appropriate studies and documentation, is alarming. As it stands, there is a significant potential for substantial adverse effects from the mitigation proposed at Kentuck.

Coos Bay is my playground and I enjoy boating, fishing, clamming, and crabbing in the bay. Kentuck is part of the neighborhood I live in. If toxins are released into the bay from the existing plans for the project, be it from the extensive soil contamination at the main facility site or former golf course toxins released by opening up Kentuck, it will likely have a devastating effect to marine life and the humans who consume shellfish if the issues presented are not fully addressed. In addition, my neighbors who live up Kentuck Way Lane already have increased annual flooding problems, and that will likely increase even more by the current plans for Kentuck.

There are various CWM plans floating around in the regulatory system for the mitigation proposed for the overall project, and all include various versions of the mitigation proposed for Kentuck. The lack of consistency is an indicator that the project warrants close and interactive scrutiny by the local, state and federal agencies that are authorized to review and approve the project.

BACKGROUND

The comments included in this document are based on my personal observations living one mile from Kentuck since 2008, along with firsthand knowledge of the JCEP while working on the project as

environmental consultant while employed by SHN Consulting Engineers & Geologists, Inc. (SHN) in Coos Bay from March 2013 to April 2014.

The existing bridge over the Kentuck Slough channel is located on East Bay Road and includes four large tidegates that regulate the flow between the channel and the Coos Bay estuary. The structure was rebuilt in 2007 and Coos County received $2,321,000 through Oregon Transportation Investment Act funds in 2003 to construct the project. Now the JCEP wants to remove the bridge and tidegates and open up the estuary along East Bay Road by building a bridge and allowing tide waters into both the former Kentuck golf course and the historical inlet that at one time extended approximately five miles inland prior to being filled over 60 years ago.

Figure 1. Existing tidegates (4) at the East Bay Road bridge over the Kentuck Slough channel. The tidegates and bridge were rebuilt in 2007 at the cost of over $2 million. (1-8-15).

The most recent JCEP JPA on record for the DSL was submitted in March 2014. The most recent version of the JPA submitted to the Corps was in October 2014. There are four CWM plans included and referred to in project documentation. They were all prepared by David Evans and Associates, Inc. (DEA) and look very similar. Of note, two different (but similar) CWM plans are included in the full JPA document submitted to the Corps for the current JCEP permit application, and both are dated October 2014. It is unclear which CWM plan is the final product, even from the narrative, but it appears the CWM plan attached first in the document is the one that is moving forward. In addition, two other

CWM plans were submitted to the DSL and are associated with their project documentation (December 2011, March 2014).

My concerns about the lack of proper study and analysis for the Kentuck mitigation portion of the project repeatedly fell on deaf ears while I worked on the project under SHN. I sat in on weekly conference calls with DEA, the consulting company hired by the project to (among many things) write the CWP plan. It was like they didn't want to hear anything that would interfere with what they had in place. This was despite the fact that the plan(s) in place did not take into account the issues brought forth in this public comment. I went as far as to send site photos during flooding stages and documentation of ongoing fill being conducted upstream that could affect the site hydrology. To my knowledge, it was ignored. The issues certainly were not included or addressed in the resultant CWM plans proposed by DEA, or in any other part of the JPAs prepared by DEA that were submitted to the Corps and DSL.

The CWM plans used in the current JPA for the Corps frequently refer to the DSL Removal-Fill (RF) Permit No. 37712-RF (issued by the DSL in December 2011 and expiring December 21, 2016) as providing approval for the mitigation proposed for estuarine resources at Kentuck for the current JCEP project. DSL Permit 37712-RF is based on a JPA submitted to the DSL in 2011 by the International Port of Coos Bay (Port) for the Port's previously proposed Oregon Gateway Marine Terminal project.

The current JCEP DSL permit recorded online at the DSL's website (as of January 8, 2015), Permit 54908-RF, is dated March 20, 2014, and includes a CWM plan dated March 2014. The March 2014 CWM plan has significant changes from the CWM plan approved by the DSL in December 2011, and is different from the two October 2014 CWM plans included in the Corps JPA. There is no documentation provided in any of the JCEP documents to demonstrate the previous CWM plan approved for the Port DSL permit issued in 2011 has been subsequently approved (as revised) for the current DSL permit for the JCEP. The 2011 approval was based on a different applicant and a different overall project. If the Corps and/or DSL have approved the subsequent changes, that process of approval should be documented as part of the administrative record included in the most current JPAs.

There is a lack of consistency in the information presented for review in the JPAs and associated CWM plans. It can be difficult at times to tell what is actually planned for the site. Even the most current CWM plan presented has not been updated and lists the construction of the project and associated mitigation as anticipated to begin in the 3rd and 4th quarters of 2014.

Despite the above inconsistencies, the comments and questions presented in this document are valid for all CWM plans associated with the JCEP.

EXISTING EAST BAY ROAD BRIDGE AND ASSOCIATED TIDEGATES

The narratives for the various CWM plans for Kentuck do not clearly present information on the existing tidegate structure installed under the current East Bay Road bridge that connects Kentuck Slough to Coos Bay. It is a substantial structure with four large tidegates and was rebuilt in 2007.

Prior to the recent replacement, the previous bridge did not meet current design standards and needed to be replaced. Attached to the downstream side of the existing bridge was a set of three 7.5-ft wide by 10-ft high top-hinged tide gates. One of the tide gates was wedged in the gate slot and completely

inoperable. The other two gates functioned, but leaked significantly during flood tides. Additionally, the gates were frequently overtopped during high tides.

The leaky gates allowed for saltwater intrusion into the slough and also resulted in an increase in the amount of saltwater that intruded into adjacent land via groundwater flow. This negatively affected the quality of the soil during the summer months when there is little freshwater inflow to the slough to help dilute the salt concentrations from the bay water. The local landowners indicated at the time that the volume of saltwater influx to the slough was tolerable, but any increase would not be acceptable.

WEST Consultants, Inc., was hired to conduct an HEC-RAS unsteady flow hydraulic model of the tidegate designs for the new bridge to accommodate and improve upon conditions that encourage the estuarine habitat, while at the same time would not increase the volume of saltwater influx to the slough over the existing conditions. Kentuck Slough is considered an important salmonid habitat. Therefore, the hydraulic parameters for the replacement tidegates installed in 2007 were developed in close consultation with the National Marine Fisheries Service (NMFS), U.S. Fish and Wildlife Service (USFWS), and the Oregon Department of Fish and Wildlife.

After over $2 million being spent to create an efficient bridge with tidegates at Kentuck in 2007, the JCEP now wants to undo it. For the complicated mitigation proposed at Kentuck for the JCEP, more complex hydraulic analysis to identify the impacts is needed to support the determination of appropriate mitigation. Removal of the existing bridge and tidegates needs full evaluation of existing hydrology, hydraulics, sediment transport, fluvial geomorphology and water quality, and the supporting documentation needs to be presented for evaluation.

INTERTIDAL FLATS MITIGATION PROPOSED — KENTUCK SITE

The Kentuck Slough site is referred to as "primarily unvegtated mudflat and tide channels, and some salt marsh." The following appears to be the scope of work for the JCEP CWM plan related to the site, from the JPA submitted to the Corps:

> *Jordan Cove Energy Project Compensatory Wetland Mitigation Plan – Part B*
>
> **1.2.2 Intertidal Flats Mitigation Site (Kentuck Slough Site)**
>
> **Mitigation Goal 2:** Reestablish tidal flow to approximately 45.01 acres of historical intertidal habitats adjacent to Kentuck Slough. (Actual area as currently designed will be 46.59 acres, which results in additional contingency credits. Mitigation Goal 2 and associated Objectives are based on the minimum acreage needed to meet standard DSL mitigation ratios). To achieve this goal, the following objectives will be carried out:
> • **Objective 2.1:** Construct a new bridge in East Bay Drive to allow tidal exchange between Kentuck Inlet and the "back nine" of Kentuck Golf Course.
> • **Objective 2.2:** Construct a new cross dike between the front and back nine of Kentuck Golf Course, with a standard tidegate to drain the front nine to the back nine, and construct a fish friendly tidegate array through the Kentuck Slough dike, allowing the majority of flow from Kentuck Slough to enter the back nine.
> • **Objective 2.3:** Remove the culvert and tidegate located adjacent to the east side of East Bay Road near the southeast corner of the golf course site.

• **Objective 2.4:** Restore tidal connection to the irrigation pond creek system through installation of a fish passable culvert that meets ODFW fish passage criteria.
• **Objective 2.5:** Construct and/or enhance approximately 6,000 linear feet of tide channels.
• **Objective 2.6**: Establish an approximately 1.73 acre wetland bench along Kentuck Slough by relocating the existing levee southward.
• **Objective 2.7:** Establish an emergent to scrub-shrub, brackish to freshwater transitional plant community along the Kentuck Slough bench described in Objective 2.6.
• **Objective 2.8:** Establish a minimum of 0.18 acres of salt marsh habitat within the internal portion of the Kentuck Slough site, with the remainder of the internal portion (43.10 acres) being mudflat and/or tide channel. A greater amount of salt marsh, with subsequent reduction in mudflat is acceptable.

Below is the general study area used by DEA for Kentuck.

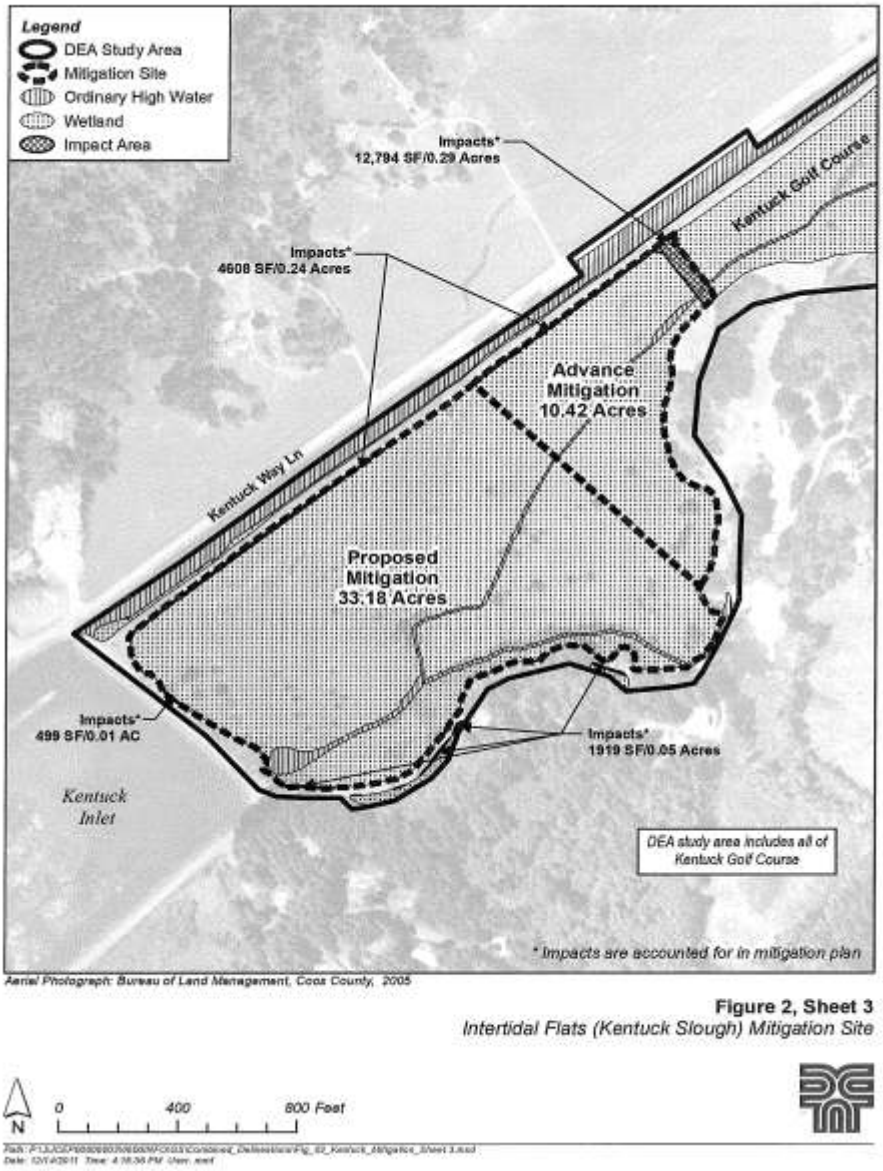

Figure 2. Study area used by DEA to development mitigation at the Kentuck Slough site.

Changes to the JCEP CWM Plan in the October 2014 Corps Permit Application

One of the CWM plans for Kentuck submitted in the October 2014 JPA to the Corps states mitigation for the site has been refined based on agency comments since the issuance of DSL Permit 37712-RF in 2011. What agency comments were considered and why aren't they referenced and documented? For the current CWM plan, the following are fairly significant changes to the mitigation proposed from what was previously approved in DSL Permit 37712-RF in 2011:

- The October 2014 CWM plan includes the establishment of 12.49 additional acres of tidally influenced habitats at the site and adjacent areas that were not included in 2011.
- Mitigation improvements such as levee relocation, cross-dike placement, roadway upgrades, etc., wil now result in 3.11 acres of permanent incidental wetland impacts, of which 0.59 acres was previously included.
- An additional 0.59 acres of incidental emergent wetlands impacts wil result from improvements needed at the site, in addition to the 10.47 acres of mudflat impacts presented in 2011.
- Current designs include raising elevations within the site to better support establishment of salt marsh, provided there is suitable material to import to raise grades. (*This seems a bit vague.*)
- The current design proposes rebuilding the existing Kentuck Slough levee roughly adjacent to the south side of the existing levee and restoring the area under the old levee back to wetland, creating a wetland bench along the slough channel.

Inconsistencies in Elevation Data

The October 2014 CWM plan states the following:

- *The primary salt marsh surface at the reference site (immediately downstream of East Bay Road) occurs between approximately elevations 5.5 and 8.5 feet NAVD88 (North American Vertical Datum of 1988). However, typical elevations within the former golf course range between 2.0 and 4.0 feet NAVD88. These lower elevations in the former golf course preclude vegetation establishment, and therefore mudflat would be the predominant habitat type without intervention. … Current design includes raising elevations within the site to better support establishment of salt marsh; however this is reliant on having suitable material to import to raise grades.*

However, in a November 4, 2010, letter to Chuck Wheeler at the National Marine Fisheries Service, DEA states the following:

- *The proposed mitigation would reestablish tidal flow to approximately 33 acres of historic intertidal mudflat/low marsh habitat adjacent to Kentuck Slough. Survey information confirms that elevations within the golf course are appropriate for establishing mudflat habitat. The primary salt marsh surface at the reference site (immediately downstream of East Bay Drive) occurs between elevations 7.0 and 9.0 feet mean low low water (MLLW). However, typical elevations within the golf course range between 4.0 and 6.0 feet MLLW. These lower elevations in the golf course preclude vegetation establishment and therefore mudflat will be the predominant habitat type (DEA 2010).*

Why would the elevation at MLLW immediately downstream of East Bay Road (7.0-9.0 feet) be higher than the NAVD88 elevation data at the same site presented by DEA in 2014 (5.5-8.5 feet)? In turn, the MLLW listed for the golf course in 2010 (4.0-6.0 feet) is higher than the NAVD88 elevation data in 2014 (2.0-4.0 feet). No supporting documents from site visits, field studies, and surveys conducted are provided for any of the assertions. And it sure seems like much more elevation data is needed overall.

PRIMARY CONCERNS ABOUT THE PROPOSED MITIGATION AT KENTUCK

Potential Site Contaminants

The former golf course at Kentuck operated over four decades before closing in 2009. The CWM plans do not demonstrate that any studies on contaminants have been conducted at the site, particularly for contaminants that may be harmful to marine life. While fertilizers, pesticides and herbicides have improved in recent years, who knows what was previously used at the site and the residual contamination risk the previous use as a golf course may pose.

Attachment A for the October 2014 Corps JPA lists the following regarding potential hazardous materials that may be encountered by the overall project:

13. **Hazardous, Toxic, and Waste Material Handling:** Petroleum products, chemicals, fresh cement, sandblasted material and chipped paint, wood treated with leachable preservatives or other deleterious waste materials shall not be allowed to enter waters of this state. Machinery refueling is to occur at least 150 feet from waters of this state and confined in a designated area to prevent spillage into waters of this state. Barges shall have containment system to effectively prevent petroleum products or other deleterious material from entering waters of this state. Project-related spills into waters of this state or onto land with a potential to enter waters of this state shall be reported to the Oregon Emergency Response System (OERS) at 1-800-452-0311.

This short section does not begin to address the issue of potential contaminants at the Kentuck mitigation site, which is part of the overall JCEP. In addition to concerns over the prior use as a golf course, other concerns were brought up during a Coos County Commissioners meeting on September 22, 2009. The commissioners approved a zone change for the Kentuck Golf Course to exclusive farm use to allow the Port to use the land. Commissioner Bob Main voted no, in light of concerns he said he had about pollutants washing into Coos Bay. Commissioners Nikki Whitty and Kevin Stufflebean voted yes.

A story carried in *The* World newspaper on September 23, 2009, said developers had devised a plan that would flood the back nine holes of the course to satisfy government wetland replacement requirements for the JCEP, and that they would remove part of the dike west of the course and build a bridge for East Bay Road. It also included the following:

> *Main said he was concerned that a former methamphetamine lab in a house in the area had contaminated the course and would leach into the bay if the mitigation plans proceeded. Oregon's Department of Health Services has a house on Golf Course Lane listed as unfit for use.*

Main's fellow commissioners and the Port's lawyer tried to reassure Main, noting that state and federal agencies would check into those issues through a biological assessment and U.S. Army Corps of Engineers review. Main remained opposed.

"I'm not comfortable that they will check that potential problem," he said.

Mark Whitlow, a Portland attorney representing the Port, said it was premature to discuss the runoff issue, because the primary purpose of the meeting was the zone change.

"Until the Port's project goes forward, there is no project proposal for the site," he said.

There is no mention in any of the CMP plans that the potential contamination from the former meth house has been investigated. This is not for lack of knowledge. I brought up the article during the summer of 2013 twice during weekly conference calls with DEA and also provided DEA staff with a copy of the article. And it's clear the JCEP's attorney, Mark Whitlow, was aware of the potential issue. At a minimum, it should be brought up and addressed in all project documents related to the proposed mitigation.

Site Hydrology

There is a serious lack of documentation of existing hydrological studies that have been conducted for the proposed Kentuck mitigation, including upstream of the site. The area floods frequently and even when the golf course was open, the locals referred to it as the "yacht club" during the rainy season. Farms and homes to the north of the Kentuck Slough channel, along with to the west (upstream) for approximately three miles, are frequently flooded during heavy rains.

Figure 3. Former Kentuck Golf Course taken from East Bay Road (looking west) following heavy rain. The channel is on the other side of the levy shown on the left. (12-24-14)

The October 2014 CMP plan states that groundwater at the site was typically observed in soil pits from 10 inches depth to within an inch or two of the surface. It further states that saturation typically occurred 2 inches above this depth and that these conditions are "typical of wintertime conditions." The plan, however, does not present any data, dates, or locations to substantiate this claim. From driving past the site on an almost daily basis for the past 6-1/2 years, I can tell you the ground saturation is frequent and much deeper during rainy periods. Heavy rains can occur in the fall, winter, and spring, and further monitoring and analysis is needed to accurately depict the current hydrology.

Figure 4. Kentuck Slough channel west of East Bay Road bridge and tidegates (north of the former Kentuck golf course) following heavy rain. (12-24-14)

Section 4.3.2.1 of the October 2014 CWM plan for existing hydrology states the following:

> *Shallow ponding was observed in many locations throughout the former golf course, but was most pronounced in the western half. Ground topography throughout the former golf course varies slightly, with roughly 2 to 3 feet of difference in relief from location to location. Drift lines were observed along the edges of the higher areas, which suggest that ponding was substantially greater before the site visit occurred. This ponding is likely the result of direct precipitation, which had not occurred for more than a week before the site visit.*

My first question would be, "What site visit?" And just one site visit was conducted to determine the existing hydrology? It's far from adequate. Where's the documentation? When was it conducted? One site visit vaguely referred to in the plan is listed as having occurred in January 2009. Is that the one they're referring to? The short Existing Hydrology section refers to shallow inundation occurring during "high tide," but what high tide? Tides vary many feet with the lunar cycle. Where is the data, are there photos, and how can they possibly claim the four paragraphs in Existing Hydrology represent the existing hydrology? The science is missing.

There is limited space for water to go at Kentuck and opening up the estuary will likely increase the flooding potential far upstream and to the north if this factor is not carefully studied and analyzed in the development of a project design. In addition, the annual rise of the world's oceans, thought to be approximately 1 cm a year, also needs to be calculated in.

Figure 5. Farm north of Kentuck Way Lane at Mile Post 1 following heavy rain. (12-24-14)

The above photo of a farm north of Kentuck Way Lane shows typical flooding during heavy rains. The site is west (upstream) of the new tidegate and dike proposed in the mitigation, despite the substantial reinforcement at the existing bridge and tidegates one mile downstream. The flooding extends to the south and west of Kentuck Way Lane, as shown in the next photo.

Figure 6. Farm south of Kentuck Way Lane at Milepost 1.5. Photo taken from Kentuck Lane at Milepost 1 and is looking west beyond the proposed tidegate and berm for the JCEP Kentuck mitigation. (12-24-14)

The October 2014 CWM plan refers to potential site constraints identified in the CWM plan authorized under DSL Permit 37712-RF, including the following:

> *Opening the site to tidal influence creates the risk of increased flooding potential and saltwater intrusion to adjacent and upstream landowners. New cross dike construction and repair and/or enhancement of the existing dike are therefore required to ameliorate this risk.*

That all sounds well and good, but where are the studies and data to address how the new tidegate and dike will address the increased tidal flow and the substantial flooding that occurs well upstream of the site they propose to block off?

Flood impacts (stage, velocity, duration) need to be addressed regarding current alterations that have been taking place upstream. In particular, Main Rock Products, Inc. (Main Rock) between Mile Post (MP) 3 and 4 has been progressively filling a 47.41 acre parcel located at 95688 Kentuck Way Lane (Parcel No. 1100, Coos County Tax ID: 25400, Map No. 25S12W04). The area is listed by the USFWS Wetlands Mapper as being Palustrine, emergent and temporarily flooded (PEMA) wetlands. As the fill amount has increased, portions of the wetlands have been excavated out to define the next boundary for the fill extension.

Figure 7. Coos County tax map showing the location of the Main Rock Products, Inc. parcel being filled.

Currently the western 1/3 of the parcel is being filled. However, further east along Kentuck Way Lane, the remaining 2/3 of the tax lot has also been progressively filled since 2003.

On January 8, 2014, I submitted an alleged violation report regarding the fill to Anita Andazola, Corps Compliance & Enforcement specialist, at the Corps North Bend Field Office. The alleged violation was provided to DEA at the time and followed up with discussion during a conference call with DEA on January 13, 2014, while I still worked for SHN. During the conference call, after expressing my extensive concerns about the Kentuck mitigation proposed, Sean Sullivan, DEA JCEP project lead, said unless there was a malfunction of the tidegate proposed for mitigation, problems were not anticipated. I reiterated that I felt it was quite likely the extensive amount of fill that has been occurring upstream of the mitigation site will affect the overall hydrology of the area and we left it at that.

On July 9, 2014, I followed up with Anita Andazola at the Corps on the alleged violation report submitted in January. Her response was that the information had previously been provided by the Corps to the EPA and she recommended I contact Yvonne Vallette of the EPA's Portland office. I spoke with Yvonne the same day and found out that another alleged violation report had been turned in by one of the adjacent property owners in October of 2013. Yvonne had visited the Corps' office in North Bend and met with Anita about various projects. She said she had expected to do a site visit and conduct further review of the Kentuck situation at that time, but they were not able to get to it. The Oregon Department of Environmental Quality National Pollution Discharge Elimination Systems (NPDES) permit was reissued for Main Rock on November 18, 2013 (Facility No. 52575), without modifications. Main Rock continues to operate under a permit under the Oregon Department of Geology and Mineral Industries (DOGAMI), which allegedly has approved the fill. A copy of the correspondence with the Corps and EPA is attached.

Figure 8. Ongoing fill activities along Kentuck Way Lane. View is at MP 3.2 looking east. (1-11-15)

A site visit on January 11, 2015, confirmed that extensive fill of the western portion of the Main Rock parcel has been continuing and now extends much further towards Kentuck Creek to the south since January 2014, filling a very wet area. The fill that is being placed appears to be spoils extracted from marketable rock/gravel and appears to be have a high silt/clay component. There are no sediment and erosion control measures in place for the extensive fill piles placed at the site. Instead, there are visible bulldozer tracks where the fill is systematically being pushed into the wetlands. Over the years, there has likely been a significant rise in elevation at the site(s) for the fill that has placed. It has created a platform-like over-sized berm for the surrounding wetlands and creek.

Figure 9. Ongoing fill activities along Kentuck Way Lane. View is at MP 3.2 looking west. (1-11-15)

Historical photos help to show the amount of fill that has been progressively been placed by Main Rock in recent years south of MP 3 and 4 of Kentuck Way Lane. For the parcel being filled, Kentuck Creek weaves back and forth along the long lot, occurring south of the site for the western 1/3 and eastern 1/3 but crossing over to the northern side adjacent to the road (Kentuck Way Lane) for the middle portion.

In Google Earth imagery from August 27, 2007, you can see where fill has been placed to the east at approximately MP 3.4. The images from November 16, 2011, show that Main Rock also began to fill the wetlands to the west from approximately MP 3.1-3.3, with the fill measuring approximately 445' long by 60' wide. By July 22, 2012, it was approximately 665' long and 120' wide. Although the length didn't change much by the next Google Earth photo taken on May 3, 2013 (approximately 690' long), the width of the fill from Kentuck Way Lane toward Kentuck Creek increased to approximately 190 feet. Since the last imagery, the length and particularly the width has increased much more. Not easily seen from Kentuck Way Lane is the extensive excavating and bulldozing of fill that is occurring at the current site along the southern boundary of the fill.

Figure 10. Fill placed south of Kentuck Way Lane between MP 3 and 4 (top right) as of August 27, 2007.

Figure 11. Fill placed south of Kentuck Way Lane between MP 3.1 and 3.3 as of July 22, 2012.

Figure 12. Fill placed between MP 3 and 4 as of May 3, 2013.

When the Kentuck mitigation site is newly re-opened to Coos Bay to increase the size of the estuary, complex and dynamic flow patterns are likely to occur. It is essential that the plan design takes into account the increased flows, tidal channels, and how flooding of adjacent properties to the north and west will be prevented. A hydrodynamic model that clearly researches and addresses the capacity and flow dynamics likely to occur needs to be developed and submitted for approval prior to issuance of Corps and DSL permits associated with the project. This should include monitoring that extends upstream of the proposed mitigation site and be based, at a minimum, on tides, storm surge, stream velocity, flow capacity, projected long-term sea level rise and, most importantly, current conditions. In addition, the current monitoring proposed in the CWM plans is far from adequate (once a year) and needs to be revised to ensure all seasons and scenarios are monitored and addressed.

Nautical charts displayed at the Coos Bay Boat Building Center show that from 1865 to 1937 Kentuck Slough extended approximately 5 miles inland from its current site and was an inlet. By 1947 approximately ½ of the inlet was filled in to the east, and by 1953 the inlet was primarily filled in west of East Bay Road. Today, the Kentuck Slough channel that remains is regulated by four large tidegates under East Bay Road, with a levy separating the channel east of the bridge/tidegates from the former Kentuck Golf Course site (closed in September 2009). The proposed JCEP Kentuck mitigation site extends from river mile 0.0 to 0.9 of the Kentuck Slough channel. In addition, there is a 5' diameter culvert and tidegate near the southeast corner of the former golf course along East Bay Road (approximately 1/10 mile from the four existing tidegates and associated bridge) that will be revised.

Figure 13. Nautical chart from 1937 shows Kentuck Inlet extending approximately 5 miles inland.

Figure 14. Nautical chart from 1947 shows Kentuck Inlet as filled to the west, reducing its size approximately in half.

Figure 15. By 1953, the nautical chart shows Kentuck Inlet filled to its approximate location today, with a channel now in its place.

The CWM plan (page 10) states the Kentuck mitigation site is a "100-acre historic flood terrace" that historically "would have been classified as an estuarine wetland." **Historically it was an inlet.**

AND WHAT ABOUT THE MOSQUITOES?

In the summer of 2012, an expansion project undertaken by the USFWS was completed for the Bandon Marsh south of Coos Bay. The purpose of the project was to allow tidal flats to resume their natural state after being diked and used for grazing land by farmers for decades. The expansion resulted in a huge mosquito infestation the following summer that was referred to as a biological disaster. It wreaked havoc on all surrounding property owners and made ventures outside a chore to escape the mosquitoes. The increase of mosquitoes was determined to be caused by removing tidegates, digging ditches, and increasing hydrology for the expansion. The original price tag for the 1000-acre restoration project was $4 million dollars. It inflated to $10 million plus and could have grown upwards of $100 million dollars if it were not for the temporary suspension of the marsh expansion in September 2013, until the situation could be contained.

While the Kentuck Slough mitigation proposed is smaller in size, it is very similar in terms of expansion of tidal flats. The potential for a similar mosquito infestation at Kentuck needs to be thoroughly evaluated and brought forward in discussions.

CONCLUSION

The estuarine mitigation proposed for Kentuck by the JCEP has a significant potential to result in contamination of the Coos Bay estuary, flooding of adjacent and upstream property owners, and a potential mosquito infestation that would affect area residents. During my time working on the JCEP under SHN, I encountered serious transparency and integrity issues with the management of both SHN and DEA. From inaccurate site plans submitted with permits to failing to address issues as they arose, the standard operating procedures of "let's wait and see if it comes out in public comment" is not the proper response to issues. Hence my public comment.

Before the project starts moving dirt around (or mud and sand), it needs to conduct a full analysis on every aspect of the mitigation proposed at Kentuck and demonstrate it understands the implications to the environment it will be affecting. The issues ranges far beyond the CWM comments presented in this document for the Kentuck. There is a pattern being set for the JCEP, and another major issue is the ongoing neglect by the project to properly address soil contamination issues at the facility site on the North Spit of Coos Bay. As with the soil contamination issues, additional studies are needed to ensure the designs and plans in place prior to ground disturbing activities fully address the potential adverse effects of the project.

It is my assertion that inadequate environmental and hydrologic studies have been conducted to warrant the Kentuck Slough mitigation to proceed as planned. It is imperative the Corps and DSL make sure the proper process is followed to ensure the natural and human environment will be protected to the maximum extent possible. That is not being done by the current CWM proposed and the residents who call Coos Bay and North Bend home deserve better. Both agencies need to ask tough questions, to coordinate with other respective agencies to ensure they are approving the same actions, and to expect complete investigation and analysis before approving any action.

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Chuck Wheeler, Fisheries Biologist, NMFS Oregon Coast Habitat Branch
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Thomas Leahy, Councilor, Coos Bay City Council
Rick Wetherell, Mayor, City of North Bend
David Koch, Chief Executive Officer, International Port of Coos Bay
John Souder, Executive Director, Coos Watershed Association
Warren Brainard, Chief, Confederated Tribes of Coos Lower Umpqua and Siuslaw Indians (CTCLUSI)
Howard Crombie, Director, Department of Natural Resources, CTCLUSI
Bob Garcia, Chairman, CTCLUSI
Don Ivy, Chief, Coquille Indian Tribe
Brenda Meade, Chairperson, Coquille Indian Tribe

ATTACHMENT
July 2014 Correspondence with the Corps and EPA

From: "Vallette, Yvonne" <Vallette.Yvonne@epa.gov>
To: "Andazola, Anita M NWP" <Anita.M.Andazola@usace.army.mil>, bgimlin@charter.net
Date: 07/09/2014 08:05:51 EDT
Subject: RE: [EXTERNAL] Checking in and update on alleged violation submitted for Kentuck on 1-8-14 (UNCLASSIFIED)

Anita: I chatted w/ Barb this afternoon to assure her that we have taken a look at this situation. I think next steps is to talk w/ DOGAMI and get a better sense of what their permit allows (or not). Looking at the aerial photos, there definitely seems to be some fill creep happening. That overburden pile is just getting wider and wider (and probably taller), so a line needs to be drawn somewhere to stop it from spreading. Let's talk tomorrow if you have time.

Yvonne Vallette, PWS
Aquatic Ecologist
U.S. Environmental Protection Agency
Region 10, Oregon Ops Office
805 SW Broadway, Ste. 500
Portland, OR 97205
Phone: (503) 326-2716
Cell: (503) 545-4962

-----Original Message-----

Sent: Wednesday, July 09, 2014 4:18 PM
From: Andazola, Anita M NWP To: bgimlin@charter.net
Cc: Vallette, Yvonne
Subject: RE: [EXTERNAL] Checking in and update on alleged violation submitted for Kentuck on 1-8-14 (UNCLASSIFIED)
Classification: UNCLASSIFIED
Caveats: NONE

Barb - This information has been previously provided by the Corps to EPA. You may be interested in contacting EPA directly. Yvonne Vallette is likely your best option at 503-326-2716.

Sincerely,
Anita Andazola, Biologist
Corps of Engineers Regulatory
Eugene Section
Compliance & Enforcement
2201 Broadway, Ste. C
North Bend, Oregon 97459
541-756-5316 office
541-751-1624 Fax
http://www.nwp.usace.army.mil/Missions/Regulatory.aspx

-----Original Message-----

Sent: Wednesday, July 09, 2014 3:51 PM
From: bgimlin@charter.net
To: Andazola, Anita M NWP
Subject: [EXTERNAL] Checking in and update on alleged violation submitted for Kentuck on 1-8-14

Hi Anita,

I wanted to touch base with you about the report of an alleged violation I submitted to you on January 8 for the fill of wetlands at 95688 Kentuck Way Lane in North Bend (attached). The fill continues and last week they were going gangbusters with trucks back and forth to the site, repeatedly dumping fill. I went for a bicycle ride past the site and was very disheartened to see what was occurring. They have completely filled in the two large rectangular ponded areas along the road (shown in the previous photos) and they continue to fill the site to the south with all the ponded areas from those photos also filled in now.

The continued and large expanse of fill in USFWS-designated wetlands is bound to increase the flooding downstream of their neighbors. Should I contact the USFWS and/or the EPA about this? I would like to know something is being done and that corrective actions will be required.

I'd be happy to take some additional photos if that would help. I am cc'ing my friend Carri Baker who lives approximately 1 mile west of the site and who will undoubtedly continue to be affected more and more by the fill that is occurring. As previously mentioned, I would like to keep this report confidential.

Thank you for your assistance in this matter and I'll look forward to hearing from you. Something needs to be done, and sooner rather than later.

Barb

Barbara J. Gimlin
P.O. Box 1527
North Bend, OR 97459

Exhibit 67

DICKSTEINSHAPIRO LLP

1825 Eye Street NW | Washington, DC 20006-5403
TEL (202) 420-2200 | FAX (202) 420-2201 | dicksteinshapiro.com

February 6, 2014

Via Electronic Filing

Ms. Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E., Room 1A
Washington, DC 20426

Re: Supplemental Information
Supplement to Technical Memorandum – Tsunami Hydrodynamic Modeling
Jordan Cove Energy Project, L.P., Docket No. CP13-483-000

Dear Ms. Bose:

Jordan Cove Energy Project, L.P. (JCEP) hereby submits for filing in the above referenced docket supplemental information described below that is related to JCEP's application, filed May 21, 2013, for authorization to site, construct and operate a natural gas liquefaction and liquefied natural gas export facility on the North Spit of Coos Bay in unincorporated Coos County, Oregon. Specifically, Coast & Harbor Engineering, Inc. (CHE) has prepared a Supplement to CHE's Technical Memorandum on Tsunami Hydrodynamic Modeling dated September 26, 2013 (CHE 2013b) and filed in this docket on October 1, 2013 as Attachment 6.16-1 to the Second Supplemental Response to Environmental Information Request. The Supplement to Technical Memorandum addresses the differences between the most recent report (CHE 2013b) and the previously submitted report (Zhang 2012).

All information included in this filing is Public. This filing is being made electronically. All persons on the Official Service List will be served by email with a copy of this filing. Three courtesy paper copies and three CDs of this filing are being provided for the Office of Energy Projects (OEP), to the attention of Paul Friedman, Steven Busch and James Glaze, respectively, and one courtesy paper copy and one CD are being provided to each of John Scott at Tetra Tech, the third party environmental contractor for JCEP's project, and Bob Bachman, also a FERC contractor. Finally, all other persons listed below will be served by email with a copy of this filing.

If you have any questions about this filing, please contact me at webbb@dicksteinshapiro.com or 202-420-4782 or my colleague Joan Darby at darbyj@dicksteinshapiro.com or 202-420-2745.

Respectfully submitted,

/s/ *Beth L. Webb*

Attorney for
Jordan Cove Energy Project, L.P.

cc: Service List
Paul Friedman, OEP, FERC
Steven Busch, OEP, FERC
James Glaze, OEP FERC
John Scott, Tetra Tech
Joe Iozzi, Tetra Tech
Bob Bachman
Paul Uncapher, North State Resources
Lorraine Salas, BLM
Leslie Frewing, BLM
Wes Yamamoto, FS
Kristen Hiatt, BOR
Heidi Firstencel, COE
Russ Berg, USCG
Marc Talbert, DOE
Teresa Kubo, EPA
Doug Young, FWS
Thomas Finch, DOT

Enclosure

COAST & HARBOR ENGINEERING

Supplement to Technical Memorandum
Jordan Cove LNG Facility Tsunami Hydrodynamic Modeling

This document supplements the Technical Memorandum on Tsunami Hydrodynamic Modeling prepared by Coast & Harbor Engineering, Inc. (CHE) dated September 26, 2013, CHE (2013b). The supplement addresses the differences between the most recent report (CHE 2013b) and previously submitted report (Zhang 2012).

The most recent tsunami hydrodynamic modeling study conducted by CHE (2013b) was initiated to update the previous work performed by Zhang (2012) to implement the most recent guidelines and requirements of the Federal Energy Regulatory Commission (FERC). The following updates were implemented in the 2013 study:

- Model bathymetry and topography at the project site were updated from the previous study of Zhang (2012) to reflect the most recent design elevations in the tsunami hydrodynamic modeling. The previous study of Zhang (2012) did not include some recent modifications of design bathymetry and topography elevations of the project.
- Tsunami hydrodynamic modeling was conducted using the Mean High Water (MHW) tidal elevation, in coordination with the Oregon Department of Geology and Mineral Industries (DOGAMI) and FERC. The previous study of Zhang (2012) had used Mean Higher High Water (MHHW).
- To account for uncertainties in prediction of tsunami wave runup on the protection berm around the LNG facility, a safety factor of 1.3 was applied to the results of tsunami hydrodynamic modeling, as required by FERC and in anticipation of an update to the American Society of Civil Engineers Minimum Design Loads for Buildings and Other Structures (ASCE/SEI 7-10) to be released in 2016. The detailed methodology for implementation of this safety factor is explained in CHE (2013a). The previous study of Zhang (2012) had not used this safety factor.
- The most recent tsunami hydrodynamic modeling study by CHE (2013b) uses the L1 rupture scenario ("Large" splay fault Cascadia source), which represents 3 of 19 full-margin Cascadia events over the last 10,000 years, following Priest *et al.* (2009, 2010) and Witter *et al.* (2011). DOGAMI estimated that this scenario is probably the closest scenario to the FERC required 2,475-year return period design earthquake event. The previous study of Zhang (2012) had used XL and XXL rupture scenarios in addition to the L1 event. Upon further discussion and coordination with DOGAMI and FERC, it was agreed that the L1 rupture scenario is the appropriate design scenario to meet FERC requirements.

It was expected that implementation of the above items in the tsunami hydrodynamic modeling study of CHE (2013b) will lead to results different from that of Zhang (2012) in terms of water surface elevation and depth-averaged velocity. In order to ensure consistency between recent (CHE 2013b) and previous (Zhang 2012) tsunami modeling studies, first, a repeat of modeling

effort conducted by Zhang (2012) using exactly the same modeling grid, input files, and source code was conducted and results of Zhang (2012) were reproduced. Second, a comparison between modeling results of CHE (2013b) and Zhang (2012) for the modified landscape was conducted (for the L1 rupture scenario).

Figures 1 through 3 demonstrate and compare the extent of maximum inundation from the two studies of CHE (2013b) (shown in red), and Zhang (2012) (shown in yellow) for the L1 event for the modified landscape. Figure 1 compares the modeling results on the large scale, for the entire Coos Bay. The figure shows a reasonable overall agreement in terms of extent of tsunami inundation (and hence, water surface elevation) between results obtained in CHE (2013b) and Zhang (2012).

Figure 2 shows a zoomed-in view of the modeling at the project site. The shown differences between modeling results are expected and mainly due to implementation of the most recent design elevations in constructing the model bathymetry and topography by CHE (2013).

Figure 3 presents a zoomed-in view of the modeling results in Coos Bay further inland from the project site. The figure shows a larger extent of inundation, mostly at embayment areas, predicted by Zhang (2012) tsunami modeling compared to that of CHE (2013b). The difference in the inundation extents can be explained as follows:

- The landscape in the area between yellow and red lines is relatively flat, with typical elevations of 6 to 8 ft above NAVD88, and mainly at the end of embayment areas. This means that even small changes in water surface elevation correspond to rather large changes in extent of inundation (runup) on these flat landscapes.
- A safety factor of 1.3 is not applicable in the areas with elevations less than MHW (6.46 NAVD88). Therefore this factor cannot be used to increase the water surface elevation in this modeling domain.
- Therefore, it is expected that inundation extent due to tsunami that was modeled at MHHW elevation exceed inundation extent due to tsunami that was modeled at MHW elevation in these areas.

Figure 1. Extent of tsunami wave inundation for L1 Scenario for Coos Bay for modified landscape obtained from Zhang (2012) study, shown in yellow and CHE (2013b) study, shown in red

Figure 2. Extent of tsunami wave inundation for L1 Scenario at project site for modified landscape obtained from Zhang (2012) study, shown in yellow and CHE (2013b) study, shown in red

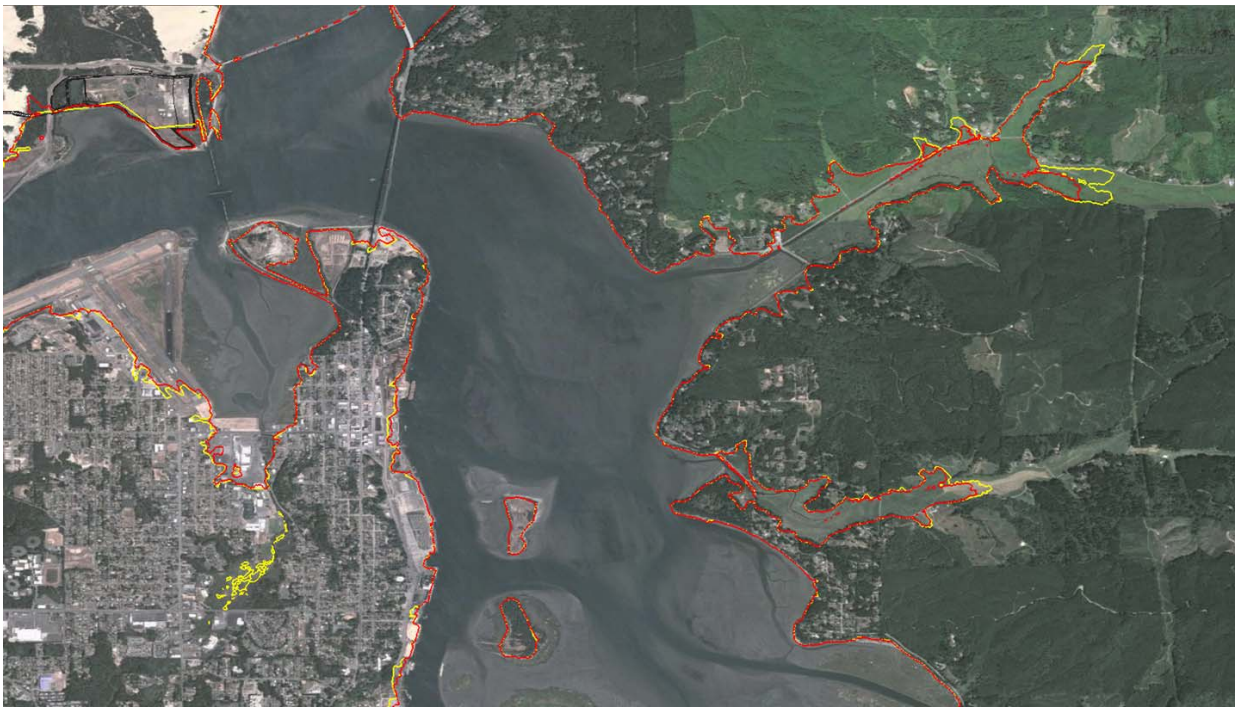

Figure 3. Extent of tsunami wave inundation for L1 Scenario further east of project site for modified landscape obtained from Zhang (2012) study, shown in yellow and CHE (2013b) study, shown in red

1. References

CHE. 2013a. Jordan Cove Energy Project, Tsunami Hydrodynamic Modeling Input and Methodology. Coast & Harbor Engineering. Edmonds, WA.

CHE. 2013b. Technical Memorandum: Jordan Cove LNG Facility Tsunami Hydrodynamic Modeling. Prepared for Jordan Cove Energy Project. Coast & Harbor Engineering. Edmonds, WA.

Priest, G.R., Goldfinger, C., Wang, K., Witter, R., Zhang, Y., Baptista, A.M. 2009. Tsunami hazard assessment of the Northern Oregon coast: a multi-deterministic approach tested at Cannon Beach, Clatsop County, Oregon: Oregon Department of Geology and Mineral Industries Special Paper 41.

Priest, G.R., Goldfinger, C., Wang, K., Witter, R., Zhang, Y., Baptista, A.M. 2010. Confidence levels for tsunami-inundation limits in northern Oregon inferred from a 10,000-year history of great earthquakes at the Cascadia subduction zone: Natural Hazards, doi10.1007/s11069-009-9453-5.

Witter, R. C., Y. Zhang, K. Wang, G. R. Priest, C. Goldfinger, L. L. Stimely, J. T. English, and P. A. Ferro. Special Paper 43, Simulating tsunami inundation at Bandon, Coos County, Oregon, using hypothetical Cascadia and Alaska earthquake scenarios.

Zhang, Y.J. 2012. Final Report, Site-Specific Tsunami Modeling at the Jordan Cove LNG Facility Coos County, Using New Cascadia Sources. Center for Coastal Margin Observation & Prediction (CMOP), Oregon Health & Science University.

Exhibit 68

Oregon
John A. Kitzhaber, MD, Governor

DEQ of Environmental Quality
Western Region Eugene Office
165 East 7th Avenue, Suite 100
Eugene, OR 97401
(541) 686-7838
FAX (541) 686-7551
TTY 711

June 25, 2014

Mr. Robert L. Braddock
Vice President-Project Manager
Jordan Cove Energy Project L.P.
125 Central Ave., Suite 380
Coos Bay, OR 97420

Re: Warning Letter with Opportunity to Correct
Jordan Cove-Ingram Yard Contaminated Soils
WLOC-WRE-2014-0033
North Bend, Coos County proj 6765

Dear Mr. Braddock:

In late April 2014, the Oregon Department of Environmental Quality (DEQ) was informed that contaminated soils had been encountered, excavated and incorporated into onsite berms at the Jordan Cove Ingram Yard site. This activity was part of the site preparation associated with geotechnical tests to be conducted as part of the Jordan Cove Energy Project. On May 8, 2014, I conducted an inspection at the Jordan Cove Ingram Yard site in North Bend, OR.

Based upon the inspection of your facility, and our review of the May 7, 2014 letter report prepared by your consulting engineering firm, SHN documenting the aforementioned site preparation work, DEQ has concluded that Jordan Cove Energy Project L.P. (Jordan Cove) is responsible for the following violations of Oregon environmental law:

VIOLATION #1

OAR 340-093-0040(1) - Prohibited Disposal states the following:

(1) No person shall dispose of or authorize the disposal of solid waste except at a solid waste disposal site permitted by DEQ to receive that waste, or at a class of disposal site specifically exempted by OAR 340-093-0050(3) from the requirement to obtain a solid waste permit.

As described in the SHN letter report, contaminated soils were encountered, excavated, and graded with much of the materials used to construct onsite berms. Investigations conducted at the site in the mid-2000's had identified the presence of these contaminated soils, which are native soils mixed with residual sludge waste. Weyerhaeuser had disposed of sludge waste in the Ingram Yard area when their mill was in operation. Based on results of the earlier site investigations, the contaminated soils contain low levels of potentially bioaccumulating chemicals that must not be placed in the waters of the state.

While it was recognized that contamination level in the soil material are low such that the soils can be left onsite, DEQ stated in a September 15, 2006 No Further Action (NFA) letter that "any residually contaminated soil or sediment excavated during future site activities or development must be properly managed and disposed in accordance with DEQ regulations and policies."

Therefore, the disposal of solid waste (i.e., contaminated soils) that occurred during the site preparation work required a solid waste permit. As the site preparation activities were a short-term operation, DEQ can issue a specific solid waste permit called a "letter authorization."

Disposing of or authorizing the disposal of a solid waste at a location not permitted by DEQ to receive that solid waste is a Class I violation of OAR 340-012-0065(1)(c).

Corrective Action(s) Requested

In order to correct the violation cited above, minimize the impacts of the violation on the environment and employee safety, and to avoid further enforcement action by the DEQ, we request that Jordan Cove take the following action by the date indicated:

Corrective Action – Violation #1:

a) Submit a completed application for a new solid waste disposal site permit. Specifically, the type of permit requested should be a Solid Waste Letter Authorization (SWLA) as this type of permit is applicable for short-term projects. Please submit your application to DEQ **by no later than July 31, 2014**.

Should this violation remain uncorrected or should Jordan Cove repeat this violation, this matter may be referred to the DEQ's Office of Compliance and Enforcement for formal enforcement action, including assessment of civil penalties and/or a DEQ order. Civil penalties can be assessed for each day of violation.

If it is anticipated that future activities at this site will result in the additional excavation and disposal of contaminated soils/materials at the Jordan Cove Energy Project site, these contaminated soils/materials must be managed and/or disposed of in accordance with DEQ rules. If the contaminated soils/materials will be disposed of onsite, Jordan Cove will need to apply for a new solid waste disposal site permit.

If you believe any of the facts in this Warning Letter are in error, you may provide information to me at the office at the address shown at the top of this letter. The DEQ will consider new information you submit and take appropriate action.

The DEQ endeavors to assist you in your compliance efforts. Should you have any questions about the content of this letter or desire additional technical assistance, please feel free to contact me by e-mail at wong.gene@deq.state.or.us or by phone at 541-687-7438.

Sincerely,

Gene Wong, P.E., Environmental Engineer
Solid Waste Permitting and Compliance
Western Region – Eugene Office

Cc: File

Ec: Fran Holman; DEQ – Salem
Mary Camarata, DEQ - Eugene
Office of Compliance and Enforcement - DEQ Headquarters
J. Mark Denning, SHN Consulting Engineers, 275 Market Avenue, Coos Bay, OR 97420-2228
Kelly McNutt, Kiewit Infrastructure West Co., 2215 E. 1st St., Vancouver, WA 98661

X:\Solid Waste\SWLA\SWLA2014\JordanCove\WLOC(6-14)

Oregon
John A. Kitzhaber, MD, Governor

Department of Environmental Quality
Western Region Salem Office
750 Front Street NE, Suite 120
Salem, OR 97301-1039
(503) 378-8240
FAX (503) 373-7944
TTY 711

July 31, 2014

Mr. Robert L. Braddock
Vice-President-Project Manager
Jordan Cove Energy Project L.P.
125 Central Ave., Suite 380
Coos Bay, OR 97420

RE: JCEP LNG Terminal Project L.P. – Ingram Yard
SW Permit No. 1545, SW Project No. 6809
Solid Waste Letter Authorization Permit
Coos County

Dear Mr. Braddock:

The enclosed Solid Waste Letter of Authorization (SWLA) Permit No. 1545 is issued in response to your application received July 21, 2014. This SWLA has been issued to allow the excavation and temporary storage of low-level impacted ash/soil in berms as part of the Test Pile and Ground Improvement Program performed at the Ingram Yard area of the JCEP LNG Terminal Project, as described in your SWLA application. This SWLA also sets forth specific requirements for the maintenance of the berms.

You are urged to carefully read the permit and comply with its conditions.

SWLA Permit No. 1545 is valid until January 31, 2015. For more information on DEQ's Solid Waste Program including rules, statutes and technical assistance visit http://www.deq.state.or.us/lq/sw/index.htm.

Sincerely,

Brian Fuller, Manager
Western Region Hazardous and Solid Waste
Permitting and Compliance

Encl: SWLA Permit

Cc: File

ec: Gene Wong, DEQ Eugene
Fran Holman, DEQ-Salem
Office of Compliance and Enforcement – DEQ Headquarters
J. Mark Denning, mdenning@shn-engr.com

X:\Solid Waste\SWLA\SWLA2014\1545JordanCove\PermitCvrLtrJul2014

State of Oregon
Department of
Environmental
Quality

SOLID WASTE DISPOSAL SITE PERMIT: LETTER AUTHORIZATION

Oregon Department of Environmental Quality
165 East 7th Avenue, Suite 100
Eugene, Oregon 97401

Telephone: (541) 686-7838

Issued in accordance with the provisions of ORS Chapter 459 and subject to the land use compatibility statement referenced below.

ISSUED TO:

Jordan Cove Energy Project, L.P.
125 Central Avenue, Suite 380
Coos Bay, OR 97420

(541) 266-7510

FACILITY NAME AND LOCATION:

JCEP LNG Terminal Project, L.P.
Jordan Cove Road
Coos County

PROPERTY OWNER:

Jordan Cove Energy Project, L.P.
125 Central Avenue, Suite 380
Coos Bay, OR 97420

Attn: Robert Braddock

OPERATOR:

Jordan Cove Energy Project, L.P.
125 Central Avenue, Suite 380
Coos Bay, OR 97420

(541) 266-7510

ISSUED IN RESPONSE TO:

- an application for Solid Waste Letter of Authorization (SWLA) received July 21, 2014; and
- a Land Use Compatibility Statement signed by the Coos County Planning Dept. Director, July 11, 2014.

Pursuant to OAR 340-093-0050(5) the determination to issue this permit is based on findings and technical information included in the permit record.

ISSUED BY THE OREGON DEPARTMENT OF ENVIRONMENTAL QUALITY

July 31, 2014

Brian Fuller, Manager
Hazardous and Solid Waste Program
Western Region

Date

PERMITTED ACTIVITIES

In accordance to SWLA No. 1545, which **will expire on January 31, 2015**, the permittee is hereby authorized in conformance with the requirements, limitations and conditions set forth in this document including all attachments.

PERMITTED ACTIVITIES

Description
In response to a Warning Letter issued by DEQ on June 25, 2014 (WLOC-WRE-2014-0033), Jordan Cove Energy Project, L.P. (Jordan Cove) applied for a Solid Waste Letter Authorization Permit (SWLA) to address the short term project that has already been conducted at their site. This project, which was associated with the Test Pile and Ground Improvement Program being performed at the site, involved the grading and temporary stockpiling of low-level impacted ash/soil at the Ingram Yard area of the Jordan Cove Liquefied Natural Gas (LNG) project. The disposal of solid waste (i.e., low-level impacted ash/soil) onsite requires a solid waste permit.

The purpose of the Test Pile and Ground Improvement Program was to investigate various methods for pile driving and ground improvement techniques to determine design parameters and efficient construction techniques for the Jordan Cove Energy Project. In order to perform these geotechnical tests, it was necessary to excavate and temporarily store both clean and low-level impacted ash/soil. Approximately 1,700 cubic yards of soil (both clean and low-level impacted soil) was excavated during the grading activities in the Ingram Yard.

Work on the project began in February 2014 and grading activities in this area for the geotechnical tests were substantially completed in April 2014. Grading operations at the testing site removed the top 12- to 60-inches of sand and top soil. All exposed soil at the finished grade of the test site was clean sand. The low-level impacted ash/soil that had been removed was integrated into larger stockpiles that were subsequently placed into the perimeter berms around the test area. Gravel was used to cover the flat test area surfaces, while the surface of the berms were seeded and mulched.

Activities of the project must be conducted in compliance with following requirement: the structural integrity of the perimeter berms must be maintained to reduce the potential for any materials from the low-level impacted ash/soil to leach out of the berms.

A permanent disposal plan for the ash/soil material temporarily stored as part of the Test Project, as well as ash/soil material not disturbed by the Test Project in the Ingram Yard area, is being developed by Jordan Cove. This plan will need to be submitted to and approved by DEQ prior to any future grading activities where the ash/soil material will be disturbed. This plan should be submitted as part of an application for a new Solid Waste Disposal Permit for this material. It is anticipated that the ash/soil material will be utilized as fill material during planned construction of the LNG terminal and permanently buried.

Disclaimers
The issuance of this permit does not convey property rights in either real or personal property, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights.

DEQ, its officers, agents, or employees do not sustain any liability on account of the issuance of this permit or on account of the construction, maintenance, or operation of facilities pursuant to this permit.

Authority
Conditions of this permit are binding upon the permittee. The permittee is liable for all acts and omissions of the permittee's contractors and agents [ORS 459.376].

The permittee shall allow representatives of DEQ access to the project areas at all reasonable times for the purpose of making inspections, surveys, collecting samples, obtaining data and carrying out other necessary functions related to this permit.

Issuance of this permit does not relieve the permittee from the responsibility to comply with all other applicable federal, state or local laws or regulations. This includes the following solid waste requirements, as well as all updates or additions to these requirements:

1. Solid Waste Letter Authorization Permit Application received July 21, 2014,
2. Oregon Revised Statutes, Chapters 459 and 459A,
3. Oregon Administrative Rules, Chapter 340, and
4. Any other documents submitted by the permittee and approved by DEQ.

Solid Waste Letter of Authorization No.1545 expires on January 31, 2015.