Public Comments on the Oregon LNG Bidirectional Project, Section 404/10/103 Permit Application NWP-2005-748

Submitted to the U.S. Army Corps of Engineers on Behalf of:

Columbia Riverkeeper
Sierra Club
Columbia Pacific Common Sense
Pacific Coast Federation of Fishermen's Associations
Institute for Fisheries Resources
Northwest Steelheaders Association
Save Our Wild Salmon
Center for Biological Diversity
Landowners and Citizens for a Safe Community
Oregon Shores Conservation Coalition
Food and Water Watch
Native Fish Society
Northwest Environmental Advocates
Northwest Property Rights Coalition
Northwest Environmental Defense Center
Northwest Guides and Anglers Association
Oregon Physicians for Social Responsibility
Forest Grove Oregon Citizens Against the Pipeline
Willapa Hills Audubon Society
Wahkiakum Friends of the River
Oregon Coast Alliance
350PDX
Tessa Scheller
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January 15, 2015

TABLE OF CONTENTS

January 15, 2015

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Via U.S. Mail and Email

RE: Oregon LNG Bidirectional Project, Section 404/10/103 Permit Application; U.S. Army Corps NWP-2005-748; FERC Dockets CP09-6-001 and CP09-7-001

Dear U.S. Army Corps of Engineers,

Please accept these comments on the Joint Permit Application, NWP-2005-748, for LNG Development Company, LLC, dba Oregon LNG (Oregon LNG). These comments are submitted on behalf of Columbia Riverkeeper, the Pacific Coast Federation of Fishermen's Associations, the Institute for Fisheries Resources, Northwest Steelheaders Association, Northwest Environmental Advocates, Sierra Club, Northwest Property Rights Coalition, Oregon Shores Conservation Coalition, Northwest Guides and Anglers Association, Oregon Physicians for Social Responsibility, Save Our Wild Salmon, the Center for Biological Diversity, Columbia Pacific Commonsense, Landowners and Citizens for a Safe Community, Food and Water Watch, the Northwest Environmental Defense Center, the Native Fish Society, Forest Grove Oregon Citizens Against the Pipeline, Willapa Hills Audubon Society, Wahkiakum Friends of the River, Oregon Coast Alliance, 350PDX, Tessa Scheller, Roble and Catherine Anderson, and Cheryl Johnson (collectively Commenters). Commenters are a diverse coalition of national, regional, and local groups, as well as several individuals who reside in Clatsop County, committed to protecting public health, quality of life, and natural resources in the Pacific Northwest and beyond. Collectively, our organizations represent hundreds of thousands of members, many of which are threatened directly by Oregon LNG's proposed liquefied natural gas (LNG) Terminal, LNG tankers, Pipeline, and supporting infrastructure. Many of our members are also threatened

by natural gas extraction and associated impacts on domestic gas prices, public health, climate change, and coastal resources.

Commenters request that the Corps deny Oregon LNG's Joint Permit Application (Application) because the project violates the Clean Water Act, Rivers and Harbors Act, and is inconsistent with the Marine Protection, Research and Sanctuaries Act of 1972. Oregon LNG's proposal to build an LNG terminal, a high-pressure natural gas pipeline, and export North American natural gas overseas poses grave threats to the Pacific Northwest and the nation's investment in salmon recovery. Oregon LNG proposes building an LNG Terminal and industrial dock on undeveloped land, including high quality wetlands, located on the Skipanon Peninsula. Oregon LNG's plans also call for deepening the Columbia River—removing 1.2 million cubic yards of river bottom—to dock LNG tankers, and dredging 300,000 cubic yards of river bottom every three years to maintain the turning basin. Along the Pipeline route, the project will impact huge swaths of land within the coastal zone and will result in the use of eminent domain to take private land for LNG export. The Pipeline will also cross critical habitat and threaten wetlands. Although not part of the Application, Oregon LNG's project requires a new natural gas pipeline from the U.S.-Canada border to Woodland, Washington, known as the Washington Expansion Project pipeline (WEP Pipeline). While not part of the Application, the environmental and public health impacts of the WEP Pipeline are relevant to the Corps' analysis.

Outside of the Pacific Northwest, the project will induce additional natural gas production in the United States, primarily involving hydraulic fracturing (*i.e.*, fracking) of unconventional gas sources, causing attendant environmental harm; this inducement will occur notwithstanding Oregon LNG's plan to export gas produced in Canada. The project will also increase domestic gas prices, likely causing an increase in coal fired electricity generation, increasing emissions of greenhouse gas, conventional, and toxic air pollutants.

Overall, Oregon LNG's proposal will impose significant environmental and economic harm in the Columbia River estuary and beyond. For the reasons detailed below and described in exhibits attached hereto, the Corps should deny Oregon LNG's Application.

1. THE COLUMBIA RIVER ESTUARY.

Oregon LNG proposes building the West Coast's first LNG export terminal in the Columbia River estuary, an area at the center of a regional and national effort to restore endangered and threatened salmonids. This includes the Corps' obligations under the Federal Columbia River Power System Biological Opinion (FCRPS BiOp). The Columbia River estuary is a federally-designated Estuary of National Significance under the Clean Water Act's National

Estuary Program.[1] In 2006, the U.S. Environmental Protection Agency (EPA) designated the Columbia River as one of seven Priority Large Aquatic Ecosystems.[2] The Columbia River estuary is an "ecologically critical area," 40 C.F.R. § 1508.27(b)(3), that is essential to the survival juvenile salmon and steelhead, waterfowl, and many other species.[3]

Public and private entities have invested billions of dollars in efforts to restore endangered and threatened salmonids in the Columbia River Basin.[4] This includes significant investment in riparian and wetland restoration projects in the estuary. The National Marine Fisheries Service (NMFS) 2012 National Environmental Policy Act (NEPA) scoping comments on the Oregon LNG project describe the value of the Columbia River estuary, stating:

> The lower Columbia River estuary provides vital habitat for anadromous salmonids throughout the Columbia River basin, and is of particular importance from a threatened and endangered species recovery perspective. The estuary is designated as critical habitat for 17 species of ESA-listed fish and EFH [Essential Fish Habitat] for Pacific salmon.[5]

The federal government has funded—and will continue to fund for the foreseeable future—a significant portion of the salmon restoration efforts in the Columbia River estuary.

Multiple studies have identified the Columbia River estuary as vitally important for juvenile salmonid rearing and endangered species recovery.[6] The estuary is one of three major habitats that all Columbia River salmonids transit in their life history pathway moving between

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[1] U.S. Environmental Protection Agency (EPA), National Estuary Program in Region 10, http://yosemite.epa.gov/R10/ECOCOMM.NSF/6da048b9966d22518825662d00729a35/c7a2ab5e252f309688256fb600779ea6!OpenDocument

[2] EPA, *Columbia River Basin: State of the River Report for Toxics* (Jan. 2009), http://www2.epa.gov/sites/production/files/documents/columbia_state_of_the_river_report_jan2009.pdf

[3] NMFS, *Columbia River Estuary ESA Recovery Plan Module for Salmon and Steelhead* (2011); Fresh *et al*., *NOAA Technical Memorandum NMFS-NWFSC-69: Role of the Estuary in the Recovery of Columbia River Basin Salmon and Steelhead* (2005); 78 Fed. Reg. 2,726 (Jan. 14, 2013) (*Proposed Critical Habitat Designation for Lower Columbia Coho Salmon*).

[4] *See* Exhibit 56 (Thom, R. *et al.*, Columbia River Estuary Ecosystem Restoration Program, 2012 Synthesis Memorandum, PNNL-21477 FINAL (Jan. 2013)).

[5] Exhibit 5 (Letter from NMFS to FERC, Oregon LNG NEPA Scoping (Dec. 20, 2012)).

[6] NMFS, *Columbia River Estuary ESA Recovery Plan Module for Salmon and Steelhead* (2011); Fresh *et al*., *NOAA Technical Memorandum NMFS-NWFSC-69: Role of the Estuary in the Recovery of Columbia River Basin Salmon and Steelhead* (2005); 78 Fed. Reg. 2,726 (Jan. 14, 2013) (*Proposed Critical Habitat Designation for Lower Columbia Coho Salmon*).

freshwater and marine environments. An expert report prepared by Dr. Richard Williams (Williams Expert Report) summarizes the estuary's significance, stating:

> All salmonids migrating out of and back into the Columbia River Basin pass through the estuary twice. A growing body of evidence, much of it quite recent (Bottom *et al.* 2005; Roegner *et al*. 2012; Weitkamp *et al*. 2012), provides increasing insight into the important role that shallow water estuarine habitats in the LCRE [lower Columbia River estuary] play in stabilizing production of Columbia River salmon and steelhead.[7]

Estuarine habitats provide high growth opportunities for outmigrating juvenile salmonids and also provide protection from predators. Research in the Columbia River estuary demonstrates that the estuary is an important staging area where juvenile and adult salmon, steelhead, and trout undergo significant physiological changes that allow transitions to and from saltwater.

The Columbia River estuary supports tribal fisheries throughout the Columbia River Basin. Since time immemorial, Columbia River Basin tribes have relied on salmon that depend on the estuary for survival. As the Columbia River Inter-Tribal Fish Commission (CRITFC) explains,

> To call salmon a staple of the tribal diet would be an understatement. Historically, the typical tribal member ate almost a pound of salmon every day, but salmon represented much more than a source of nutrition—they shaped our societies and our religions.[8]

Indian people have lived in the Columbia River Basin for thousands of years. Salmon was their staple of life and the foundation of their culture and economy. According to conservative estimates, prior to European settlement, the Columbia River's annual salmon returns ranged from 11-16 million fish.[9] In 1855, the U.S. government signed treaties with some Columbia River tribes. In these treaties, tribes ceded most of their lands, but reserved the right to fish at "all usual and accustomed fishing places…in common with citizens." CRITFC sums up the tribes focus on salmon restoration in the Columbia River Basin:

> Today the tribes are doing everything in their power to make sure that salmon return to as many of their traditional waters as they can. Enormous amounts of resources are being poured into this effort, and tribal youth are joining the fight to save salmon. Every year, more and more tribal members are becoming fish biologists, environmental engineers,

[7] Exhibit 1 at 5 (Williams, Richard N., *Review of the draft Biological Assessment and Essential Fish Habitat for Proposed Oregon LNG Terminal Project* (Jan. 8, 2015) (hereafter Williams Expert Report)).
[8] CRITFC website, http://www.critfc.org/salmon-culture/we-are-all-salmon-people/
[9] CRITFC website, http://www.critfc.org/about-us/fisheries-timeline/

> and other scientists who are offering their minds as well as their hearts for the protection of the salmon, the water, and ultimately, their traditional way of life.[10]

Protecting and restoring the Columbia River estuary is a high priority for Columbia River tribes.

Salmon and other fisheries in the Columbia River estuary also support vibrant traditions of non-tribal subsistence, commercial, and sport fishing.[11] The Buoy 10 fishery, spanning the mouth of the Columbia River, is one of the Pacific Northwest's most renowned fisheries. Oregon LNG's Waterway Suitability Analysis states:

> The most notable sport fishing season is the "Buoy 10" season, which is the primary salmon season. This fishery, which runs from approximately August 1 through early September, extends from Buoy #10, near the entrances to the Columbia River, upriver past the Astoria-Megler Bridge to Tongue Point. A pamphlet published by the Oregon State Marine Board states that an estimated 5,000 boats are on hand on the weekends in August. The Salmon University Web page states that it is not uncommon to see 300+ boats trolling in an area of ½ mile near the buoy.[12]

Despite significant declines in the salmon fishery, commercial fishing in the Columbia River estuary persists. The primary commercial fisheries operating in the Columbia River estuary are gill-netters and crabbers. Gill nets are used on the Columbia River for salmon, sturgeon, shad, and smelt, with salmon as the primary target. In addition to commercial and sport fishing on the Columbia River, a number of fishing vessels operate out of the Columbia River in ocean fisheries.[13]

Oregon LNG proposes building the Terminal at the mouth of Youngs Bay, located within the Columbia River estuary. Youngs Bay is one of four Select Area Fisheries Enhancement (SAFE) sites, also known as "terminal fisheries" sites, in the Columbia River estuary. "Funded since 1993 by the Bonneville Power Administration, the SAFE project uses existing hatchery facilities to spawn, hatch and conduct initial rearing of juvenile salmon for subsequent out-

[10] CRITFC website, http://www.critfc.org/salmon-culture/we-are-all-salmon-people/
[11] Exhibit 58 (Oregon Department of Fish and Wildlife and Washington Department of Fish and Wildlife, 2014 Joint Staff Report: Stock Status and Fisheries for Spring Chinook, Summer Chinook, Sockeye, Steelhead, and Other Species, and Miscellaneous Regulations (Jan. 22, 2014)).
[12] Exhibit 6 (Oregon LNG Waterway Suitability Analysis (March 2008) (citations omitted) (hereafter OLNG WSA)).
[13] OLNG WSA at 2-18.

planting to net pen facilities in or around bays in the lower Columbia River."[14] The purpose of the SAFE program is to provide sport and commercial fisheries on the lower Columbia River with minimal impacts to non-local salmon stocks, including those protected under the Endangered Species Act (ESA).[15] The Youngs Bay SAFE site is funded by the Bonneville Power Administration as part of the FCRPS BiOp.[16] The FCRPS BiOp identifies funding for the Youngs Bay Select Areas Fisheries as a "Reasonable and Prudent Alternative," explaining that the program was established "to mitigate fisheries by providing the opportunity to harvest locally-produce salmon stocks in off-channel areas of the Columbia River."[17] According to a Washington Department of Fish and Wildlife Columbia River Fishing Group report, "[t]he Youngs Bay site has been the most successful to date, due in large part to the fact that it is the largest body of water included in the program."[18]

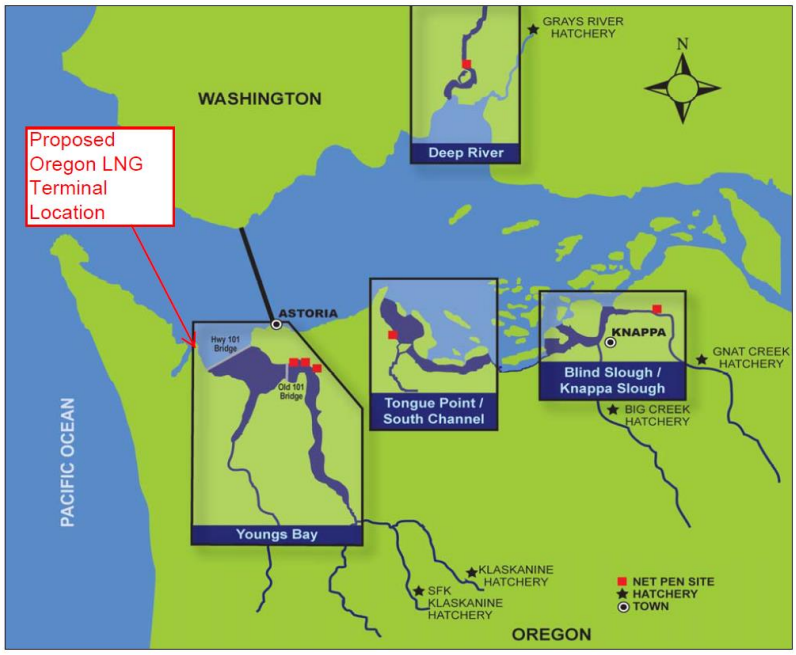

Figure 1. Map of Select Area Fisheries Enhancement sites. Credit: ODFW, WDFW, Clatsop County (Oregon LNG project location added to graphic).

[14] WDFW, Columbia River Fish Working Group at 3 (Oct. 2008) http://www.co.clatsop.or.us/Assets/Dept_10014/PDF/selective_fishingOct08.pdf.
[15] Columbia Basin Bulletin, *ODFW Seeking Lower Columbia Commercial Fisherman for Testing of Expanded Fisheries in 'Select Areas'* (Jan. 10, 2014), http://www.cbbulletin.com/429474.aspx.
[16] Columbia Basin Fish & Wildlife Program, Project No. 1993-060-00, Select Area Fisheries Enhancement, http://www.cbfish.org/Project.mvc/Display/1993-060-00.
[17] *Id.*
[18] WDFW, Columbia River Fish Working Group (Oct. 2008), http://www.co.clatsop.or.us/Assets/Dept_10014/PDF/selective_fishingOct08.pdf.

Overall, the Columbia River estuary is a local and regional treasure, and a national priority for watershed health and salmon recovery. For the reasons explained below, Oregon LNG's project will contribute to the degradation of an ecosystem that is the center of a national and regional effort to restore endangered salmon and other fish runs.

2. OREGON LNG'S PROJECT.

Oregon LNG's Application proposes dredge and fill activities to facilitate building and operating a bidirectional LNG terminal in Warrenton, Oregon, and 86.8 miles of pipeline from the proposed Terminal to the Northwest Pipeline Interconnection near Woodland, Washington. Throughout this comment, Commenters use the term "project" to refer to Oregon LNG's proposed LNG Terminal and 86.8 miles of proposed Pipeline; however, Oregon LNG's proposal also includes a connected action, the Northwest Pipeline, LLC, dba Williams Pipeline, WEP Pipeline.[19] The following comments focus on Oregon LNG's Terminal and 86.8 miles of Pipeline because the Corps' November 18, 2014, public notice requests comments on these aspects of Oregon LNG's larger proposal.

Oregon LNG and Williams Pipeline's project is summarized briefly below. Specific details on the dredge and fill actions proposed under Oregon LNG's pending application, NWP-2005-748, are described in greater detail throughout this comment.

- **Natural Gas Extraction.** Oregon LNG will use natural gas feedstock primarily from Western Canada, but also leaves the door open for obtaining natural gas from the western U.S.[20] Oregon LNG's primary source of gas appears to be shale gas. Shale gas production requires the controversial practice of hydraulic fracturing, or fracking, the impacts of which are discussed in greater detail below.

- **LNG Terminal – Upland.**[21] The Terminal would occupy 88.7-acres of a 96-acre parcel of state-owned land located on the northern portion of the East Bank of the Skipanon Peninsula (East Skipanon Peninsula) near the confluence of the Skipanon and Columbia rivers. Oregon LNG subleases the subject property from the Port of Astoria, which leases

[19] The Corps acknowledges that the Williams Pipeline is a connected action. Exhibit 7 (Letter from the Corps to FERC (Dec. 14, 2014)). FERC is preparing a Draft Environment Impact Statement on both Oregon LNG and Williams Pipeline proposals.
[20] Oregon LNG Prefiling Review Draft Resource Report 1 at 1-4.
[21] Oregon LNG's Joint Permit Application (JPA), NWP-2005-748, describes the dredge and fill activities at the Warrenton, Oregon terminal site and the section of pipeline extending from the terminal to Woodland, Washington.

the property from the Oregon Department of State Lands. The Corps holds an easement to dispose of dredge spoils on the East Skipanon Peninsula, including the portion of the Peninsula where Oregon LNG proposes building the Terminal. The Corps' easement, and Oregon LNG's pending lawsuit against the Corps, are discussed in greater detail below.

To build the Terminal and access road, Oregon LNG proposes filling 33.78 acres of palustrine and estuarine wetlands.[22]

The Terminal includes two 160,000-cubic meter LNG storage tanks, each approximately 17-stories tall, and a gas flare system. No impervious surfaces currently exist at the Terminal site.[23] The Terminal will result in approximately 28 acres of impervious surfaces.[24] The Terminal access road will create 2.5 acres of impervious surface.[25]

To operate the Terminal, Oregon LNG proposes withdrawing 10,100-acre feet of water per year from the Columbia River estuary.[26] According to Oregon LNG's water pollution discharge permit application, the Terminal would discharge between 1,000 and 2,600 gallons per minute of process wastewater and up to 1,500 gallons per minute of stormwater to the Columbia River.[27]

- **LNG Terminal – Below the High Water Line.** The marine facilities associated with the Terminal cover approximately 148 acres of aquatic area at the mouth of Youngs Bay.[28] Oregon LNG proposes building a 2,128-foot pier with a ship berth for one LNG vessel.[29] The 12-foot-wide pier provides access for two-way vehicle traffic and an 11-foot-wide pipeway.[30] Oregon LNG also proposes dredging 135.2-acres to create a turning basin and 17.1 acres to create an LNG vessel berthing area.[31] This requires

[22] JPA Public Notice at 2.
[23] JPA at 6-3.
[24] *Id.*
[25] *Id.*
[26] Oregon LNG Water Right Application S-87920. Oregon LNG also proposes withdrawing water for pipeline testing, Terminal construction, and fire suppression testing. *See* Oregon LNG Water Right Applications S-87921, LL-1486, LL-1487.
[27] Oregon LNG NPDES Permit Application (July 3, 2013).
[28] Oregon LNG Applicant Prepared Biological Assessment (hereafter OLNG BA) at 2-12.
[29] *Id.*
[30] *Id.*
[31] JPA Public Notice at 3.

dredging 1.2 million cubic yards in Youngs Bay.[32] To maintain the turning basin, Oregon LNG would dredge 300,000 cubic yards every three years.[33]

- **Dredge Spoil Disposal.** Oregon LNG proposes transporting dredged material from the marine berth and turning basin to an open-water disposal site in the Pacific Ocean.

- **LNG Tanker Traffic.** One LNG tanker alone is longer than three football fields and towers 20-stories high. Each departing tanker would carry the amount of gas equal to 8 percent of what the U.S. uses every day.[34] The Terminal would require 127 new inbound vessels crossing the Columbia River Bar every year, for a total of 254 new vessel trips (inbound and outbound). Each ship requires a moving security zone of a minimum of 500 yards.[35] The U.S. Coast Guard would also impose a security zone around the waterside area of the Terminal.[36] LNG vessel impacts include engine cooling water and ballast water intakes and discharges, with amounts varying depending on vessel design and whether the vessel is importing or exporting LNG.[37]

- **Oregon LNG's Pipeline in Oregon & Washington.** Oregon LNG proposes building 86 miles of 36-inch diameter, high-pressure pipeline through the City of Warrenton and Clatsop, Tillamook, and Columbia counties. Oregon LNG would drill under the Columbia River to build a pipeline through Cowlitz County. The pipeline would connect to the Williams Pipeline in Woodland, Washington. These comments refer to the 86 miles of pipeline proposed by Oregon LNG as "the Pipeline." The Pipeline route crosses agricultural and forest lands, residential properties, rivers, streams, and wetlands. Specifically, construction of the Pipeline would include 185 stream crossings, one of which includes an approximate 5030 linear foot horizontal directional drill (HDD) crossing underneath the Columbia River.[38] Oregon LNG would employ HDD to cross 21 rivers and larger streams and dry open trench methods to cross the 164 streams, including wetlands. Total Pipeline construction-related ground disturbance equals approximately 1195.2 acres.

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[32] OLNG BA at 2-25.
[33] *Id.* at 2-27.
[34] Calculation based on U.S. Energy Information Agency report, http://205.254.135.24/dnav/ng/ng_prod_sum_dcu_NUS_a.htm, and capacity of Q-Max LNG vessels, http://www.chemlink.com.au/conversions.htm.
[35] Waterway Suitability Assessment (WSA) for the Proposed Oregon LNG Receiving Terminal in Warrenton, Oregon at v.
[36] *Id.*
[37] OLNG BA at 2-4.
[38] JPA Public Notice at 2.

- **WEP Pipeline in Washington State.** Williams Pipeline (Williams) proposes building 136-miles of new, high-pressure pipeline in ten different segments in or near the existing Northwest Pipeline right-of-way. This project is referred to as the Washington Expansion Project Pipeline, or WEP Pipeline. Segments of the WEP Pipeline would run from Washington's northern border south to Woodland, Washington. Williams would also increase existing compression horsepower at five existing compressor stations.

- **Oregon LNG Mitigation.** To mitigate impacts caused by the Terminal, Oregon LNG proposes wetland restoration at 120 acres located at the mouth of the Youngs River on the west bank. Oregon LNG proposes breaching a levee to create estuarine wetland habitat. To mitigate impacts caused by the Pipeline, Oregon LNG proposes: (1) to mitigate temporary impacts to wetlands through onsite wetland rehabilitation, and (2) to use offsite, in-kind mitigation through an approved in-lieu fee program.

3. COMMENTERS' EXPERT REPORTS.

Leading experts in the fields of fisheries, hydrology, and wetland ecology prepared three export reports analyzing the impacts of Oregon LNG's project. Attached to these comments, Commenters submit the expert reports (hereafter Expert Reports), Exhibits 1–3, to assist the Corps in evaluating the environmental impacts of Oregon LNG's project. Commenters hereby incorporate by this reference Exhibits 1–3 in their entirety. Commenters also submit PDF copies of the references cited in each Expert Report.

The Expert Reports demonstrate that Oregon LNG's project poses significant harm to endangered species and other aquatic and terrestrial life. The Expert Reports conclude that Oregon LNG's proposed mitigation fails to compensate for these significant harms. Below, Commenters briefly summarize the credentials of the scientists who prepared the reports. CVs are also attached to each report.

Dr. Richard N. Williams, Ph.D., prepared a report titled *Review of the draft Biological Assessment and Essential Fish Habitat for Proposed Oregon LNG Terminal Project* (hereafter Williams Expert Report), which analyzes the impacts of Oregon LNG's project at the Terminal site below the high-water mark. Dr. Williams is a fisheries ecologist and Research Associate in the Department of Biology at the College of Idaho. Dr. Williams served as the Chair of the Independent Scientific Review Panel for the Northwest Power and Conservation Council from 1996 to 2005. He currently serves as a member of the Peer Review Group for the Council. Dr. Williams has been active in Columbia River salmon recovery issues since 1987. In 2006 Dr. Williams and colleagues published a book on Pacific salmon recovery, *Return to the River,*

which describes the century-long decline of Columbia River salmon and steelhead and proposes a new approach to restoration. Dr. Williams holds a B.S. in Zoology and English Literature from the College of Idaho and an M.S. and Ph.D. in Zoology from Brigham Young University.

Mr. Kenneth F. Bierly prepared an expert report analyzing the habitat value of wetlands at the proposed Terminal site, impacts from wetland fill, and the adequacy of Oregon LNG's proposed mitigation. Mr. Bierly's report, *Oregon LNG Terminal Wetland Impacts and Proposed Mitigation Review: Analysis of Available Information*, is attached hereto as Exhibit 2. Mr. Bierly is a wetland ecologist with three decades of experience in state environmental regulation. Mr. Berly served as the Wetland Program Director for the Oregon Department of State Lands from 1988 to 1996. From 1996 to 1999, Mr. Bierly served as the Program Manager for the State of Oregon Governor's Watershed Enhancement Board (OWEB). Mr. Bierly went on to lead the Oregon Watershed Enhancement Board as Deputy Director from 1999 to 2013. At OWEB, Mr. Bierly oversaw the production of the Oregon Watershed Assessment Manual and worked with local watershed councils throughout the state to complete watershed assessments for all lands using a common format. Mr. Bierly received a Hammer Award from the Clinton administration for his role in developing the Oregon Conservation Reserve Enhancement Program. The program remains a model for linking incentives to ecological needs in a creative manner. Mr. Bierly holds a B.S. degree from Oregon State University and a M.S. degree from Colorado State University.

Mr. Jonathan Rhodes prepared an expert report reviewing the impacts of Oregon LNG's proposed Pipeline on aquatic ecosystems. Mr. Rhodes is a hydrologist with more than 28 years of professional experience. Mr. Rhodes's professional experience includes work with tribal, federal, state, county, and city governments, as well as universities and non-profit groups. Mr. Rhodes served as Senior Scientist-Hydrologist for over 12 twelve years for the Columbia River Inter-Tribal Fish Commission, where his primary focus was the protection of salmon and steelhead habitats in the Columbia River Basin. Mr. Rhodes has published extensively on a variety of topics, including hydrologic nitrogen transport in forested watersheds, the genesis of topographic structures in melting snow, post-fire watershed management, fuel treatments, stream sedimentation, and comprehensive measures to protect and restore imperiled salmonids in the Columbia Basin. He holds a B.S. in hydrology from the University of Arizona, an M.S. in hydrology and hydrogeology from the University of Nevada-Reno, and has finished all required academic work toward a Ph.D. in forest hydrology at the University of Washington.
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4. NATIONAL ENVIRONMENTAL POLICY ACT.

The National Environmental Policy Act (NEPA), 42 U.S.C. § 4332 *et seq*., establishes an "action-forcing" mechanism to ensure "that environmental concerns will be integrated into the very process of agency decisionmaking." *Andrus v. Sierra Club*, 442 U.S. 347, 350 (1979). Pursuant to Section 102(2)(C), "all agencies of the Federal Government shall . . . include in every recommendation or report on . . . major Federal actions significantly affecting the quality of the human environment, a detailed statement" known as an environmental impact statement (EIS) addressing "the environmental impacts of the proposed action, any adverse environmental impacts which cannot be avoided . . ., alternatives to the proposed action," and other environmental issues. 42 U.S.C. § 4332. An EIS is fundamental for the public, tribes and state and federal agencies to understand a proposed project's impact on the environment and public health. Despite this clear mandate, the Corps has provided no indication of how it intends to comply with NEPA with regard to this permit.

In late 2012, the Federal Energy Regulatory Commission (FERC) held a public comment period seeking input on the scope of Oregon LNG's EIS.[39] Multiple federal and state agencies, local governments, non-governmental organizations, and members of the public filed NEPA scoping comments.[40] FERC is preparing a draft EIS (DEIS) and the Corps is a cooperating agency.[41]

The Corps issued the Section 404/10/103 Public Notice for Oregon LNG before the Corps, or any other federal agency, produced a DEIS on Oregon LNG's project. For the Bradwood and Jordan Cove LNG projects, both proposed in the State of Oregon, the Corps issued the Section 404/10/103 public notice *at the same time or after* FERC and the Corps issued

[39] Exhibit 8 (Columbia Riverkeeper *et al.* Comments on NEPA Scoping for Oregon LNG Bidirectional Project (Dec. 21, 2012)).
[40] Exhibit 5 (Letter from NMFS to FERC, Oregon LNG NEPA Scoping Comments (Dec. 20, 2012)); Exhibit 9 (Letter from U.S. Environmental Protection Agency to FERC, Oregon LNG NEPA Scoping Comments (Dec. 2012)); Exhibit 10 (Letter from National Park Service to FERC, Oregon LNG NEPA Scoping Comments); Exhibit 11 (Letter from U.S. Fish and Wildlife Service to FERC, Oregon LNG NEPA Scoping Comments); Exhibit 12 (Letter from State of Oregon to FERC, NEPA Scoping Comments); Exhibit 13 (Letter from Washington Department of Ecology to FERC, Oregon NEPA Scoping Comments); Exhibit 14 (Letter from City of Warrenton to FERC, Oregon LNG NEPA Scoping Comments); Exhibit 15 (Letter from Washington Department of Natural Resources to FERC, Oregon LNG NEPA Scoping Comments); Exhibit 16 (Letter from Oregon Department of Forestry to FERC, Oregon LNG NEPA Scoping Comments); Exhibit 17 (Letter from Columbia River Estuary Study Task Force to FERC, Oregon LNG NEPA Scoping Comments)).
[41] Exhibit 7 (Letter from the Corps to FERC (Dec. 14, 2014)).

a DEIS. The Corps provides no explanation for its decision to treat the Oregon LNG project differently than similar LNG projects proposed in the State of Oregon.

The Corps' decision to issue the Section 404/10/103 Public Notice before releasing a DEIS undercuts and harms the public's ability to comment on the impacts of Oregon LNG's project, including commenting on the CWA §404(b)(1) Guidelines. The DEIS should disclose a broad spectrum of the project's impacts that are highly relevant to the Corps' Section 404/10/103 permit decisions. Oregon LNG's project proposes unprecedented impacts to the lower Columbia River estuary and public safety. Since its inception, the project has drawn harsh criticism and opposition from business-owners, residents, and commercial and sport fishermen whose livelihoods are threatened by Oregon LNG's proposal. In turn, the public should have the ability to address information provided in the DEIS, as well as correct errors in the DEIS, in the Section 404/10/103 comments. Public and agency comments on the Bradwood LNG and Jordan Cove LNG Section 404/10/103 Public Notice demonstrate the critical role the DEIS plays in facilitating robust comments on the Corps' Section 404/10/103 decisions.

For these reasons, Commenters request that the Corps reopen the public comment period on Oregon LNG's Section 404/10/103 permits after the Corps and FERC produce a DEIS. At a minimum, the Corps must incorporate all comments received on the Oregon LNG DEIS in the administrative record for Oregon LNG's pending Application.

5. THE CLEAN WATER ACT & THE RIVERS & HARBORS ACT.

The purpose of the Clean Water Act (CWA), 33 U.S.C. § 1251 *et seq.*, is to restore and maintain the chemical, physical, and biological integrity of waters of the United States. Section 404 of the CWA prohibits the discharge of fill material without a permit. 33 U.S.C § 1344. There are two sets of implementing regulations that are binding on the Corps' 404 permit program, 33 CFR § 320.4(b)(4)—those promulgated by the Corps itself, 33 C.F.R. Parts 320-330, and those promulgated by the Environmental Protection Agency, called the "404 Guidelines." 40 CFR §§ 230.1-230.80.

Pursuant to the Corps regulations, a permit "is issued following a case-by-case evaluation of a specific project involving the proposed discharge(s) ... and a determination that the proposed discharge is in the public interest pursuant to 33 CFR part 320." 33 CFR § 323.2(g). In performing its review of an application, the Corps is required to undergo a "public interest review," which requires a determination of the "extent of public and private need for the proposed work," "the practicability of using reasonable alternative locations and methods to accomplish the objective of the proposed ... work," and "the permanence of detrimental effects." 33 C.F.R. §§ 320.1(a)(1), 320.4(a)(2)(i)-(iii). In making these determinations, the Corps must

consider "[a]ll factors which may be relevant to the proposal," including "the cumulative effects" of the project. 33 CFR § 320.4(a)(1).

EPA, in turn, has issued "guidelines" that also govern the issuance of dredge and fill permits, *see* 40 CFR Part 230, and that are binding on the Corps. 33 CFR § 320.4(a)(1). These regulations provide that "dredged or fill material should not be discharged into the aquatic ecosystem, unless it can be demonstrated that such a discharge will not have an unacceptable adverse impact either individually or in combination with known and/or probable impacts of other activities affecting the ecosystems of concern." 40 CFR § 230.1(c). Moreover, "[f]rom a national perspective, the degradation or destruction of special aquatic sites, such as filling operations in wetlands, is considered to be among the most severe environmental impacts covered by these Guidelines." *Id.* at 230.1(d). The Guidelines state that "[t]he guiding principle should be that degradation or destruction of special sites may represent an irreversible loss of valuable aquatic resources. *Id.* Therefore, these regulations prohibit the Corps from issuing any permit "if there is a practicable alternative . . . which would have less adverse impact on the aquatic ecosystem." *Id.* at § 230.10(a). An alternative is "practicable" if it is "available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes." *Id.* at § 230.10 (a)(2).

In addition, the Guidelines prohibit permitting a discharge that will violate state water quality standards, violate of toxic effluent standards, jeopardize a species currently protected under the ESA, or violate of any requirement designed to protect a marine sanctuary under the Marine Protection, Research, and Sanctuaries Act. *Id.* at § 230.10(b). The 404 guidelines further provide that the Corps may not issue a dredge and fill permit "which will cause or contribute to significant degradation of the waters of the United States." *Id.* § 230.10(c). Such effects include adverse impacts to human health and welfare, the life stages of aquatic life or other wildlife dependent on a site, the overall integrity of an aquatic ecosystem, and human use such as recreation or economic values. *Id.* at §§ 230.10(c)(1)-(4).

Where impacts are unavoidable, the Guidelines require that there be appropriate and practicable steps taken to minimize harm to aquatic ecosystems by the discharge activity. *Id.* § 230.10(d). EPA separates into seven broad categories the factors the Corps must assess in regards to impact minimization: location of discharge, the material to be discharged, controlling the material after discharge, methods and technology used to disperse material, impacts to plant and animal populations, and impacts to current and potential human use. *Id.* at §§ 230.70-76.

Any permit that does not conform to the Guidelines is invalid. The degree of analysis required under the Guidelines is commensurate with the impacts to the aquatic environment.

The Guidelines further explain:

> *Special aquatic sites* means those sites identified in subpart E. They are geographic areas, large or small, possessing special ecological characteristics of productivity, habitat, wildlife protection, or other important and easily disrupted ecological values. These areas are generally recognized as significantly influencing or positively contributing to the general overall environmental health or vitality of the entire ecosystem of a region. (See section 230.10(a)(3)).

Id. at 230.3(q-1) (emphasis in original). Oregon LNG proposes dredging and filling waterbodies and wetlands designated as "special aquatic sites" under the CWA § 404(b)(1) Guidelines.

The Oregon LNG project would destroy and modify high-quality habitat in the Columbia River estuary, which has already been adversely impacted by historic dredge and fill activities. Accordingly, the Corps must engage in a thorough examination of the factors laid out in the Guidelines. For the reasons stated below, Oregon LNG's project fails to comply with the CWA, Rivers and Harbors Act, and their implementing regulations. 33 CFR § 320.4(b)(4); 40 CFR §§ 230.1-230.80.

6. PUBLIC INTEREST ANALYSIS UNDER THE CORPS' IMPLEMENTING REGULATIONS.

This project is not in the public interest. Pursuant to the Corps' CWA and Rivers and Harbors Act Section 10 implementing regulations, the "decision whether to issue a permit will be based upon an evaluation of the probable impacts, including cumulative impacts, of the proposed activity and its intended use on the public interest." 33 CFR § 320.4(a)(1). This "public interest" review lies at the heart of the Corps' analysis and must guide the agency's review of Oregon LNG's project. The public interest review is intended to be broad, capturing all relevant issues that could impact the environment, human health and natural resources. The Guidelines state:

> Evaluation of the probable impact which the proposed activity may have on the public interest requires a careful weighing of all those factors which become relevant in each particular case. The benefits which reasonable may be expected to accrue from the proposal must be balanced against its reasonable foreseeable detriments. The decision whether to authorize a proposal, and if so, the conditions under which it will be allowed to occur, are therefore determined by the outcome of this general balancing process. That decision should reflect the national concern for both protection and utilization of important resources.

33 CFR § 320.4(a)(1). The Corps' regulations include a non-exhaustive list of factors that may be relevant for each individual project. 33 CFR § 320.4(a)(1) states in part:

> All factors which may be relevant to the proposal must be considered including the cumulative effects thereof: among those are conservation, economics, aesthetics, general environmental concerns, wetlands, historic properties, fish and wildlife values, flood hazards, floodplain values, land use, navigation, shore erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, food and fiber production, mineral needs, considerations of property ownership and, in general, the needs and welfare of the people.

Id. Consistent with the mandate that the Corps consider "all those factors that become relevant," this non-exhaustive list of factors includes issues beyond those directly related to the impacts of in-water work. *Id.* By requiring an analysis of "cumulative impacts" and by including a non-exhaustive, but far reaching, list of factors, the Corps' regulations clearly require a broad analysis of the public interest that captures all impacts associated with the project and not just those that result directly from the permitted activities.

The Corps must apply the following criteria when determining whether the LNG terminal and pipeline are in the public interest:

(i) The relative extent of the public and private need for the proposed structure or work
(ii) Where there are unresolved conflicts as to resource use, the practicability of using reasonable alternative location and methods to accomplish the objective of the proposed structure or work; and
(iii) The extent and permanence of the beneficial and/or detrimental effects which the proposed structure or work is likely to have on the public and private uses to which the area is suited.

33 CFR § 320.4(a)(2). The regulations recognize the strong public interest in protecting wetlands, stating:

> (2) Wetlands considered to perform functions important to the public interest include:
>
> (i) Wetlands which serve significant natural biological functions, including food chain production, general habitat and nesting, spawning, rearing and resting sites for aquatic or land species;

(ii) Wetlands set aside for study of the aquatic environment or as sanctuaries or refuges;
(iii) Wetlands the destruction or alteration of which would affect detrimentally natural drainage characteristics, sedimentation patterns, salinity distribution, flushing characteristics, current patterns, or other environmental characteristics;
(iv) Wetlands which are significant in shielding other areas from wave action, erosion, or storm damage. Such wetlands are often associated with barrier beaches, islands, reefs and bars;
(v) Wetlands which serve as valuable storage areas for storm and flood waters;
(vi) Wetlands which are ground water discharge areas that maintain minimum baseflows important to aquatic resources and those which are prime natural recharge areas;
(vii) Wetlands which serve significant water purification functions; and
(viii) Wetlands which are unique in nature or scarce in quantity to the region or local area.

...

(4) No permit will be granted which involves the alteration of wetlands identified as important by paragraph (b)(2) of this section or because of provisions of paragraph (b)(3), of this section unless the district engineer concludes, on the basis of the analysis required in paragraph (a) of this section, that the benefits of the proposed alteration outweigh the damage to the wetlands resource.

33 CFR § 320.4(b).

Oregon LNG asks the Corps to allow the largest and most environmentally harmful private project in the recent history of the Columbia River estuary. Indeed, it is difficult to conceive of a project with greater unacceptable impacts to the Columbia River estuary and one that tips further from being in the public interest. For the reasons explained in the following sections, the Corps must deny Oregon LNG's permits.

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7. THE PROJECT FAILS TO COMPLY WITH THE 404(b)(1) GUIDELINES.

7.1. Purpose & Need.

There is no need for the Oregon LNG project. The stated purpose of the project is "to export North American natural gas to foreign markets."[42] According to Oregon LNG's Application, "[a] secondary purpose of the Project is to facilitate the availability of Canadian gas supplies for delivery to Pacific Northwest markets, including the Portland metropolitan area."[43] Yet, as discussed below, there is no "need" that this project will satisfy, thus this project should not be authorized. Even if there is a market for the gas, Oregon LNG has failed to demonstrate why this project, in this location, is necessary to fulfill that need, and therefore, given the significant, certain impacts to this invaluable area, the Corps should deny permits for the project.

As an initial matter, Oregon LNG fails to demonstrate the "need" for siting the LNG tanks and liquefaction facility adjacent to the Columbia River. The LNG tanks and liquefaction facility are not "water-dependent" and, therefore, Oregon LNG fails to demonstrate a need for siting the Terminal in wetlands adjacent to the Columbia River. For example, Oregon LNG could build the Terminal at an upland location and build a pipeline to the dock to load LNG onto ocean-going vessels (hereafter LNG tankers).

Furthermore, Oregon LNG fails to demonstrate the need for its proposed facility. Oregon LNG is one of multiple proposals to export LNG from the United States. Pending and authorized LNG export projects amount to 40.96 billion cubic feet per day (bcf/d) of gas.[44]

Oregon LNG fails to demonstrate a need for an LNG export terminal on the East Skipanon Peninsula when the project proposes exporting natural gas feedstock from Canada. This issue is discussed at length in the alternatives analysis section below. Oregon LNG's Application describes the project's purpose and need, stating in part:

> The primary purpose of the Project is to export North American natural gas to foreign markets. The Project will interconnect with the Northwest interstate transmission system, which connects Pacific Northwest demand centers gas supplies in British Columbia and the Rocky Mountain area of the United States. With the establishment of this

[42] JPA at 2
[43] *Id.*
[44] U.S. DOE, *Applications Received by DOE/FE to Export Domestically Produced LNG from the Lower-48 States* (as of Sept. 10, 2014), http://energy.gov/sites/prod/files/2014/09/f18/Summary%20of%20LNG%20Export%20Applications.pdf

> interconnection, the Project will be able to export Canadian natural gas and, to a lesser extent, U.S. natural gas. A secondary purpose of the Project is to facilitate the availability of Canadian gas supplies for delivery to Pacific Northwest markets, including the Portland metropolitan area. The Project will also enable delivery of gas to isolated U.S. markets in need of supply, including Hawaii and coastal Alaskan communities.[45]

Oregon LNG fails to demonstrate the need for an LNG export terminal in Warrenton, Oregon, when the primary purpose of the project is to export natural gas extracted in Canada.

To the extent Oregon LNG's proposes importing LNG, Oregon LNG fails to demonstrate the need for an LNG import terminal in light of the outlook for North American natural gas production. Oregon LNG's purpose and need statement appears to acknowledge this reality, stating:

> The outlook for North American natural gas production has improved, owing to drilling productivity gains that have enabled rapid growth in supplies from unconventional gas-bearing formations in the United States and Canada. Improvements in drilling and extraction technologies have coincided with rapid diffusion in the natural gas industry's understanding of the unconventional resource base and best practices in drilling and resource development. These changes have rendered obsolete once prominent fears of declining future domestic natural gas production.[46]

Oregon LNG's own evidence on the demand for LNG export wholly undercuts the company's arguments for siting a bidirectional terminal capable of importing natural gas.

Sierra Club and Columbia Riverkeeper address the purpose of and need for Oregon LNG's project at length in detailed comments and accompanying exhibits submitted to the U.S. Department of Energy (DOE), attached hereto as Exhibit 18.[47] Commenters hereby incorporate by this reference Exhibit 18 and submit attachments thereto. For the reasons stated in Exhibit 18 and described below, Commenters object to Oregon LNG's mischaracterization of the purpose and need for the project.

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[45] JPA at 2.

[46] Supplement to the Joint Permit Application for the Oregon LNG Bidirectional Project (Oct. 2014) at 3-1 (hereafter "Supp. JPA").

[47] Exhibit 18 (Sierra Club and Columbia Riverkeeper USDOE Protest on Oregon LNG).

7.1.1. The Proposal Will Increase Natural Gas Prices.

The potential risk of increased domestic natural gas prices weighs strongly against the need for the project as higher gas prices will hurt public and private need for the project. First, larger export levels lead to larger domestic price increases, while rapid increases in export levels lead to large initial price increases that moderate somewhat in time. Even slower increases in export levels lead to price increases, just at a slower scale of price hikes. Second, natural gas markets in the U.S. will increase production to satisfy an estimated 60–70% of the increase in natural gas exports, with three-quarters of this increased production expected from shale resources. Third, the remaining deficit in energy supply correlated to price increases will likely be met by the electric sector, which the U.S. Energy Information Administration (EIA) anticipates coal-fired generation to primarily produce. Fourth and last, consumers will consume less but still see an increase in their natural gas and electricity costs if export is allowed under any scenario. Increases in domestic natural gas prices, in shale gas production, and in coal-fired electricity production possess serious economic and environmental consequences for the greater public and as well as the West Coast's environmental economies that cast significant doubt on the benefits or need for Oregon LNG's export proposal.

Because price is a key component of the rationale behind LNG export, the following section explains EIA's conclusion that LNG export will cause gas price hikes and why those price increases weigh against the purpose and need for the Oregon LNG export proposal.

EIA projects that U.S. natural gas prices will rise over the long run, even before considering the possibility of additional exports, with projected pricing varying considerably depending on assumptions concerning supplies and economic growth. However, increases in natural gas prices at the wellhead translate to similar absolute increases in delivered prices to customers under all scenarios and baseline cases. If exports proceed under the assumptions of Scenario 1, phasing in 6 Bcf/d of exports over six years, price impacts peak at about 14% in 2022. In contrast, rapid increases in export levels in Scenario 4, phasing in 12 Bcf/d of exports over 4 years, equates to a 36% price hike at the wellhead. Particularly troubling is the Low Shale EUR case, where the rapid introduction of 12 Bcf/d of exports results in a 54% increase in wellhead price by 2018. Although notably termed "pessimistic" by the EIA, this estimate is closely corroborated by current data showing how many LNG export authorizations are currently before DOE and FERC, and by the volumes requested in those applications. If all domestic LNG export applications are approved as written, Scenario 4 and the Low-Shale EUR case-study may very closely reflect reality where the public experiences a drastic hike in natural gas prices, an outcome that weighs strongly against the alleged benefits of Oregon LNG's application or the public's "need" for the project.

Further, the Export Report clearly corroborates higher gas prices with increased production, particularly in shale reserves. The baseline case anticipates total domestic natural gas production to grow from 22.4 Tcf in 2015 to 26.3 Tcf in 2035, averaging 24.2 Tcf for the 2015-2035 period, where increased export incites higher domestic pricing, reduced domestic consumption, and increased domestic production. However, the Export Report does not provide a substantive analysis of new estimates of recoverable natural gas reserves, data that is crucial to an accurate assessment of whether Oregon LNG's export proposal is competitive or secure.

7.1.2. Domestic Gas & Electricity Price Increases Are Not in the Public Interest.

In addition to price and production impacts, a public interest analysis should examine the nexus between increased natural gas export, decrease in consumption in electric power sector, and an increase in other power generation for electricity needs. In scenarios 1–4, where there is natural gas export, most of the decrease in consumption occurs in the electrical power sector, where the tradeoff in sources is between natural gas and coal, especially in the short-term relative to the 25-year reference period. The EIA estimates that increased coal-fired generation will account for approximately 65% of the decrease in natural gas-fired generation under reference case conditions, and likely an even higher percentage in a Low Shale EUR case. The increased use of coal for power generation results in an average increase in coal production from 2015-2035 over reference case levels of between 2 and 4 percent across all export scenarios. In the words of the EIA: "[As natural gas exports increase, along with prices for electricity generation], [a]ccordingly, coal prices also increase slightly which, along with higher gas prices, drive up electricity prices."

In other words, exporting LNG would not only increase domestic gas prices on the order of as much as 50 percent, but also increase our nation's reliance on coal-fired energy combustion – a dubious endeavor for many health and environmental concerns in and of itself not specifically discussed here – as well as increase general electricity costs for the public.

Assessment of economic impacts in light of whether Oregon LNG's proposal satisfies the public interest should also consider productivity and its relation to an assessment of competitiveness in light of likely firm strategies responsive to profit opportunities. Given a limited number of drilling rigs, firms will certainly deploy them in those places where profits are most likely, where the question for an energy company is not whether a well is viable in terms of potentially recoverable gas, but whether it is *commercially* viable.[48] Production in shale plays is

[48] Christopherson, S. and Rightor, N., *How Should We Think About the Economic Consequences of Shale Gas Drilling?* Cornell University at 9 (May 2011),

unpredictable and only a small number of wells may be able to produce commercial volumes of gas over time without costly re-fracking. Evidence from the Barnett and Haynesville shale plays indicates that high initial production rates may drop off rapidly, making it difficult for operators to cover costs. "Shale production is characterized by a steep decline curve early in its productive life. The more oil and/or gas that you can make up front the better the economics."[49]

Similarly, geologist and investment advisor Arthur Berman[50] states the following in regard to production trends across U.S. shale plays:

> ... most wells do not maintain the hyperbolic decline projection indicated from their first months or years of production. Production rates commonly exhibit abrupt, catastrophic departures from hyperbolic decline as early as 12-18 months into the production cycle but, more commonly, in the fourth or fifth years for the control group. Pressure is drawn down and hydraulically produced fractures close...Workovers and additional fracture stimulations may boost rates back to previous levels, but rarely restore a well to its initial decline trajectory. More often, a steep hyperbolic or exponential terminal decline follows attempts to remedy a well's deteriorating performance.

Christopherson notes the distinct possibility that "few wells will exhibit the hyperbolic production curves that are used to describe trends *across* wells in a shale play,"[51] such unpredictability demonstrated by the 2009 collapse in levels of production of drilling in the Jonah Field in Colorado, indicating the volatility and difficulty in accurate projects for long-term periods. Because shale plays may not produce the long-term results indicated by the hyperbolic curves used by industry, the HVHF boom in the U.S. shows evidence of a speculative "bubble" undermining Oregon LNG's reliance on this information in support of its LNG export application.

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http://www.greenchoices.cornell.edu/downloads/development/shale/Thinking_about_Economic_Consequences.pdf.

[49] McFarland, Greg. "Shale Economics: Watch the Curve". *Oil & Gas Evaluation Report*. Website published by Obsidian Energy Company, LLC. (Mar. 17, 2010), http://www.oilandgasevaluationreport.com/tags/shale-play/.

[50] Berman, A. "Lessons from the Barnett Shale suggest caution in other shale plays." (2009), http://www.aspousa.org/index.php/2009/08/lessons-from-the-barnett-shale-suggest-caution- in-other-shale-plays/.

[51] Christopherson, S. and Rightor, N., at 10.

7.2. Alternatives Analysis.

7.2.1. Overview of Alternatives Analysis.

A critical component of the Corps' review under CWA § 404(b)(1) is the alternatives analysis. The Guidelines require a finding of noncompliance when there is a practicable alternative to the proposed discharge that would have a less adverse effect on the aquatic ecosystem. 40 CFR § 230.12(a)(3)(i). "An alternative is practicable if it is available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes." 40 CFR § 320.10(a)(2). The applicant has the burden of clearly demonstrating there are no practicable alternatives. *Northwest Environmental Defense Center v. Wood*, 947 F. Supp. 1371, 1374 (D. Or. 1996). The Guidelines state that "practicable alternatives that do not involve special aquatic sites are presumed to be available, unless clearly demonstrated otherwise." 40 CFR § 230.10(a)(3). The following comments demonstrate that there are multiple practicable alternatives, and Oregon LNG fails to "clearly demonstrate[]" that practicable alternatives to destroying special aquatic site are not available.

Commenters do not support LNG export at any location due to the harmful impacts. However, the Corps' alternatives analysis must account for a range of reasonable alternatives and take a hard look at whether, if exports occur at all, one of these alternatives would have lower environmental impacts than Oregon LNG's proposal. In turn, Commenters urge to Corps to engage in a rigorous review of alternatives to the Oregon LNG project and provide the following comments on Oregon LNG's applicant-prepared alternatives analysis. The following comments are in no way intended to endorse any LNG export or import project.

Oregon LNG's bad gamble on gas markets, and subsequent decision to re-file its FERC application, is not grounds to restrict the alternatives analysis to terminal sites that serve the Portland metro natural gas market. As Oregon LNG's application makes crystal clear, the overriding purpose of the project is to export natural gas from Canada.[52] The Corps must therefore reject Oregon LNG's decision to eliminate the majority of the alterative LNG terminal locations based on their failure to serve the Portland metro area natural gas market. Oregon LNG fails to demonstrate that one of the stated project purposes, to import LNG to the Portland metro area, is a viable or significant purpose which warrants restricting the terminal's geographic location to the Columbia River estuary. Multiple practicable alternatives exist, including siting an LNG terminal in Canada, closer to the natural gas feedstock. In addition, energy conservation

[52] JPA at 2 ("The primary purpose of the Project is to export North American natural gas to foreign markets."); *id.* ("[T]he project will be able to export Canadian natural gas and, to a lesser extent, U.S. natural gas.").

and efficiency is a preferable practicable alternative that Oregon LNG dismisses without adequate justification. Offshore LNG terminals are also practicable alternatives that Oregon LNG fails to evaluate adequately. Furthermore, multiple design changes at the Terminal site itself offer less harmful practicable alternatives. For the reasons explained below, Oregon LNG fails to overcome the presumption that "practicable alternatives that do not involve special aquatic sites" are available. 40 CFR § 230.10(a)(3).

Alternatives to Oregon LNG's project should include, at a minimum, consideration of the following:

(1) Whether, consistent with the *EIA Export Study*, exports, if allowed, should move forward in smaller quantities or a slower time table to mitigate the domestic economic and environmental impacts associated with large export volumes or rapid export schedules;

(2) Whether export from other locations would better serve the public interest by mitigating economic or environmental impacts or by limiting the cumulative impacts of multiple terminals located in one region (*i.e.*, the Gulf Coast);

(3) Whether limitations on the sources of exported gas – *e.g.*, limiting export from particular formations or regions – would help to mitigate environmental and economic impacts;

(4) Whether to condition export on the presence of an adequate regulatory framework, including the fulfillment of the recommendations for safe production made by DOE's Shale Gas Subcommittee, would better serve the public interest by ensuring that the production increases associated with export will not increase poorly-regulated unconventional gas production;

(5) Whether to delay, deny, or condition exports based upon their effect on the U.S. utility market (including changes in air pollution emissions associated with the impacts of increased export demand on fuel choice);

(6) Whether to require exporters to certify that any unconventional gas produced as a result of their proposal (or shipped through their facilities) has been produced in accordance with all relevant environmental laws and according to a set of best production practices, such as that discussed by DOE's Shale Gas Subcommittee;

(7) Whether alternative terminal sites exist on the West Coast, including sites in Canada;

(8) Whether practicable alternatives exist in conservation, efficiency, and renewable energy;

(9) Whether alternative terminal site configurations on the East Skipanon Peninsula exist to reduce impacts to wetlands;

(10) Whether alternative terminal sites exist that are brownfields or redevelopment sites;

(11) Whether alternative terminal sites exist that are not in close proximity to communities, hospitals, first responders and schools;

(12) Whether alternative terminal sites exist that are not located within ESA-designated critical habitat;

(13) Whether alternative terminal sites exist that would not disrupt the Buoy 10 fishery;

(14) Whether alternative terminal sites exist that would not disrupt to Columbia River's most productive Select Area Fisheries Enhancement site, the Youngs Bay terminal fisheries site;

(15) Whether alternatives terminal sites exist that would not impact tribal treaty rights;

(16) Whether alternative terminal sites exist that are not within a tsunami inundation zone;

(17) Whether alternative terminal sites exist that are not susceptible to liquefaction in the event of an earthquake;

(18) Whether alternative terminal sites exist that would not result in the loss of a U.S. government dredge spoil disposal site;

(19) Whether alternatives terminal sites exist that would not result in the loss of a potential high-quality wetland restoration site to support ESA-listed salmonid recovery;

(20) Whether alternatives terminal sites exist that would not require routing a gas pipeline through over a hundred waterbody crossings;

(21) Whether alternative terminal sites exist that would not require such large-scale dredging and maintenance dredging;

(22) Whether alternative LNG tankers sizes could support a reduction in dredging for the turning basin and berthing area.

As the following section demonstrates, Oregon LNG's alternatives analysis falls woefully short of analyzing adequately alternatives to the proposed project.

7.2.2 Alternatives to LNG Export.

Energy conservation and efficiency are preferable, practicable alternatives that Oregon LNG dismisses without justification. Oregon LNG apparently copied and pasted its energy conservation analysis from the LNG import terminal application and, in turn, the analysis lacks any consideration of energy conservation as an alternative an LNG *export* terminal. To the extent Oregon LNG analyzes energy conservation as an alternative to LNG import, the company relies on outdated information on the Portland metro area and fails to analyze the broader Pacific Northwest market, which Oregon LNG claims the Terminal would serve.[53] Oregon LNG's analysis falls far short of overcoming the presumption against destroying special aquatic areas.

7.2.3 Alternatives to LNG Import.

To the extent Oregon LNG's project proposes LNG import, Oregon LNG's application fails to assess accurately non-LNG alternatives, such as conservation, efficiency, and renewable energy. In fact, Oregon LNG's application fails to acknowledge renewable energy and greenhouse gas emission laws passed in Oregon, Washington, and California. These laws require a greater percentage of electricity generation to come from renewable sources. Because LNG is at least 25 percent more polluting than domestic natural gas in its lifecycle greenhouse gas emissions, Oregon LNG cannot assume that LNG has a place in an increasingly carbon-limited energy market.[54]

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[53] *See* Supp. JPA, Appendix K at 10-7 (stating "Energy conservation programs are already in place in Oregon, and have led to significant energy savings. However, the Portland metro area continues to experience natural gas supply vulnerability during peak demand periods despite energy conservation measures.").

[54] Jaramillo *et al.* Comparative Life-Cycle Air Emissions of Coal, Domestic Natural Gas, LNG, and SNG for Electricity Generation. *Environ. Sci. Technol.,* at 6290 -6296 (2007); *see also* Heede, Richard. May 2006. LNG Supply Chain Greenhouse Gas Emissions for Cabrillo Deepwater Port: Natural Gas From Australia to California, http://www.edcnet.org/ProgramsPages/LNGrptplusMay06.pdf

Because avoiding building the Terminal and Pipeline would prevent severe damage to the aquatic ecosystem of the Columbia River estuary, Oregon LNG must give more serious consideration to the impact of increasing reliance on renewable energy on the future of natural gas-fired electricity. In comments on the proposed Bradwood LNG import terminal, the Oregon Department of Environmental Quality (DEQ) questioned whether Bradwood LNG's impacts were necessary and without alternatives in renewable energy and conservation: "Decades of maintaining LNG facilities in Oregon to supply natural gas to California might not be justified, especially given Oregon's policy to reduce reliance on non-renewable energy sources and the West Coast Governors' goal to explore new renewable energy options on the coasts." [55] The Oregon Department of Land, Conservation and Development (DLCD) agreed, stating: "There should be a rigorous analysis of alternatives and more consideration of conservation and renewable energy."[56] The Oregon Department of Energy expressed skepticism about the real need for the Bradwood LNG import terminal, citing new renewable portfolio standards in the State of Oregon as a factor that could reduce demand for fossil fuel-powered electricity. Like Bradwood LNG, Oregon LNG dismisses energy conservation without citing credible sources, let alone engaging in a rigorous analysis.

7.2.4 Alternative Terminal Locations.

Oregon LNG's alternatives analysis fails to demonstrate that there is not a practicable alternative to the proposed discharge that would have a less adverse effect on the aquatic ecosystem. An applicant may not define a project in order to preclude the existence of any alternative sites. *Sylvester v. U.S. Army Corps of Engineers*, 882 F.2d 407, 409 (9th Cir. 1989). Oregon LNG's does just that; by defining the project need and purpose narrowly, Oregon LNG precludes the existence of any alternative sites.

Notably, Oregon LNG's decision to propose an LNG terminal on the East Skipanon Peninsula ignores every siting criteria NOAA recommended in its NEPA scoping comments on the project. In the following section, Commenters discuss NOAA's criteria, Oregon LNG's failure to account for the criteria in selecting the proposed Terminal location, as well as additional alternatives Oregon LNG failed to address adequately or at all.

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[55] Exhibit 19 at 9 (Preliminary Comments of DEQ, Oregon State Agencies on Bradwood LNG DEIS at 9 (Nov. 2007)).

[56] *Id.* at 21.

7.2.4.1 Oregon LNG Ignores NOAA's Recommended Siting Criteria.

In December 20, 2012, NOAA filed with FERC NEPA scoping comments on the Oregon LNG project.[57] NOAA's scoping comments include a subsection, titled "Siting of LNG Terminals," which describes NOAA's recommendations on siting LNG terminals.[58] NOAA's letter states:

> The location of LNG terminals, and associated infrastructure, will influence the type and magnitude of impacts on aquatic resources. The Commission should follow these recommendations with regard to import terminal siting to mitigate for project effects on marine and anadromous resources.

As the following section demonstrates, Oregon LNG's proposed Terminal location ignores and/or rejects every NOAA terminal siting recommendation.

> *NOAA Recommendation No. 1: "Site LNG new terminals as far offshore as feasible, in locations of lower biological productivity, and away from sensitive habitats and migration routes of marine mammals or protected migratory species."*[59]

Oregon LNG's Terminal location ignores NOAA's recommendation. Oregon LNG proposes locating the Terminal onshore, within the Columbia River estuary in Youngs Bay. The East Skipanon Peninsula and the mouth of Youngs Bay are an area of high biological productivity that federal expert agencies designated as critical habitat for multiple ESA-listed species.[60] The Terminal's dock and turning basin are located within the migration routes for marine mammals and protected migratory species, including listed salmonids.

> *NOAA Recommendation No. 2: "Site LNG terminals and associated pipeline networks to avoid or minimize construction and operation impacts on marine mammals, marine and anadromous fish, ESA-listed species, ESA-designated critical habitats, EFH [Essential Fish Habitat], estuaries, wetlands and shallow water habitats, and fishing areas."*[61]

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[57] Exhibit 5 (Letter from NMFS to FERC, Oregon LNG NEPA Scoping Comments (Dec. 20, 2012)).
[58] *Id.* at 4.
[59] *Id.*
[60] Exhibit 1 (Williams Expert Report).
[61] Exhibit 5 at 4 – 5 (Letter from NMFS to FERC, Oregon LNG NEPA Scoping Comments (Dec. 20, 2012)).

The Terminal location conflicts with NOAA's recommendation. First, the proposed Terminal is located within the Columbia River estuary. Second, Oregon LNG proposes filling 33.78 acres of palustrine and estuarine wetlands and building an industrial dock within shallow water habitat.[62] Third, Oregon LNG proposes building and operating the Terminal within the most popular non-tribal sport and commercial fishing area in the Columbia River estuary. Fourth, siting the Terminal at the mouth of Youngs Bay fails to avoid or minimize construction and operation impacts on marine mammals, marine and anadromous fish, ESA-listed species, ESA-designated critical habitats, and Essential Fish Habitat (EFH). For example, Oregon LNG's proposed Terminal location covers critical habitat for ESA-listed species, including Lower Columbia River Chinook Salmon, Snake River Fall-Run Chinook Salmon, Upper Willamette River Chinook Salmon, Upper Columbia River Spring-run Chinook Salmon, Snake River Sockeye Salmon, Lower Columbia River Steelhead, Middle Columbia River Steelhead, Upper Columbia River Steelhead, Upper Willamette River Steelhead, Snake River Basin Steelhead, Columbia River Chum Salmon, Lower Columbia River Coho Salmon, North American Green Sturgeon (Southern DPS), and Eulachon. Oregon LNG's disregard for NOAA's second recommendation on terminal siting is discussed in detail in below.

> *NOAA Recommendation No. 3: "Site LNG terminals to maximize the use of existing viable infrastructure such as existing pipeline networks, and deep draft berthing areas."*[63]

Oregon LNG's Terminal location conflicts with NOAA's recommendation. Oregon LNG proposes developing over 88.7 acres of an undeveloped site on the East Skipanon Peninsula. There is no existing infrastructure on the site, including gas or water pipeline networks. The East Skipanon Peninsula lacks deep draft berthing areas. Oregon LNG proposes dredging 135.2-acres to create a turning basin and 17.1 acres to create an LNG vessel berthing area.[64] This requires dredging 1.2 million cubic yards in Youngs Bay.[65] To maintain the turning basin, Oregon LNG would dredge 300,000 cubic yards every three years.[66] Oregon LNG's selected Terminal location ignores, in its entirety, NOAA's third siting recommendation.
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[62] JPA Public Notice at 2.
[63] Exhibit 5 at 5 (Letter from NMFS to FERC, Oregon LNG NEPA Scoping Comments (Dec. 20, 2012)).
[64] JPA Public Notice at 3.
[65] OLNG BA at 2-25.
[66] *Id.* at 2-27.

NOAA Recommendation No. 4: "Site LNG terminals to minimize conflicts with current activities such as recognized spawning or nursery areas, areas where fishing gear is deployed, navigation channels, and research use areas."[67]

Oregon LNG's proposed Terminal location conflicts with NOAA's recommendation. The Terminal site is adjacent to the most productive SAFE program site within the entire Columbia River estuary. In January 2014, the Oregon Department of Fish and Wildlife (ODFW) adopted fishing regulations that endeavor to concentrate commercial fishing within Youngs Bay.[68] Fishing gear is deployed routinely by commercial fishing vessels within Youngs Bay. Even with the ODFW "control zone" in place, sport fishing continues in Youngs Bay. For these reasons, Oregon LNG's proposed Terminal location disregards NOAA's fourth siting recommendation.

NOAA Recommendation No. 5: "Minimize vessel use of confined waterways. Vessel passage in confined waterways can cause erosion of shoal water areas, resuspend sediment from the channel bottom, strand juvenile salmonids, and contribute to shoreline erosion."[69]

Oregon LNG's proposed Terminal location conflicts with NOAA's recommendation. Oregon LNG proposes building the Terminal within Youngs Bay, a "confined waterway." Oregon LNG predicts that approximately 127 LNG tankers will frequent the Terminal on an annual basis. Oregon LNG therefore fails to "[m]inimize vessel use of confined waterways."

NOAA Recommendation No. 6: "Minimize the area of dredging and amount of resulting depth change. Dredging and the disposal of dredged material can cause substantial impacts on many aquatic organisms and their habitats. The permanent removal of material from the aquatic environment may interfere with sediment routing and habitat forming processes, and contribute to shoreline erosion."[70]

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[67] Exhibit 5 at 5 (Letter from NMFS to FERC, Oregon LNG NEPA Scoping Comments (Dec. 20, 2012)).

[68] ODFW Press Release, Commission Adopts Youngs Bay Closure (Feb. 7, 2014, http://www.dfw.state.or.us/news/2014/february/020714.asp.

[69] Exhibit 5 at 5 (Letter from NMFS to FERC, Oregon LNG NEPA Scoping Comments (Dec. 20, 2012)).

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[70] Exhibit 5 at 5 (Letter from NMFS to FERC, Oregon LNG NEPA Scoping Comments (Dec. 20, 2012)).

Oregon LNG's proposed Terminal location conflicts with NOAA's recommendation. As noted above, Oregon LNG proposes unprecedented dredging in Youngs Bay. This includes dredging 135.2-acres of river bottom to create a turning basin and 17.1 acres to create an LNG vessel berthing area.[71] Together, Oregon LNG's proposal calls for dredging 1.2 million cubic yards in Youngs Bay.[72] To maintain the turning basin, Oregon LNG would dredge 300,000 cubic yards every three years.[73] The Columbia River estuary is well-documented as being "sediment-starved." Yet Oregon LNG proposes removing over 1.2 million cubic yards of sediment from the estuary. The size and scale of Oregon LNG's proposed dredging in Youngs Bay disregards NOAA's sixth siting recommendation.

> *NOAA Recommendation No. 7: "Resource evaluation surveys of the proposed site should include information comparing and contrasting the relative aquatic resource impacts of alternate LNG sites and associated infrastructure. The effort should consider and include information and analysis regarding: Marine mammals, marine, estuarine, and anadromous fish, endangered/threatened species, ESA critical habitat, EFH and HAPCs, impacts to the function and value of these habitats; local fishing activity; the type of federally-managed fish species that may be impacted; potential cumulative impacts; a consideration of how climate change may affect those impacts; and the possibilities of interconnecting with existing facilities (e.g., location of existing pipelines, heat sources, and other viable infrastructure) that the applicant could potentially utilize. The analysis should also consider the duration of identified species and habitat impacts."*[74]

Oregon LNG's alternative analysis disregards NOAA's recommendation. The alternatives analysis includes a section evaluating alternative terminal locations. The section is notably devoid of the analysis NOAA's recommends. Specifically, Oregon LNG's alternatives analysis does not include any specific information comparing and contrasting the relative aquatic resource impacts of alternate LNG sites and associated infrastructure. Instead, Oregon LNG's analysis includes cursory statements on relative habitat impacts, to the extent the issue is addressed at all. Oregon LNG's analysis of the Jordan Cove Energy Project, proposed in Coos Bay, Oregon, illustrates how Oregon LNG's disregard for NOAA's seventh recommendation. As stated above, Commenters oppose all proposals for LNG export, including the proposed Jordan Cove project.

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[71] JPA Public Notice at 3.
[72] OLNG BA at 2-25.
[73] *Id.* at 2-27.
[74] Exhibit 5 at 5((Letter from NMFS to FERC, Oregon LNG NEPA Scoping Comments (Dec. 20, 2012)).

In describing Jordan Cove's environmental impacts and comparing them to the Oregon LNG project, Oregon LNG's states summarily:

> The Jordan Cove Energy Project does not have any apparent environmental advantages over the [Oregon LNG] Project and would seem to have greater environmental impacts when considering the associated pipeline, which is approximately 144 miles longer than the Oregon Pipeline.[75]

As the Jordan Cove analysis demonstrates, Oregon LNG wholly disregards NOAA's seventh recommendation.

> *NOAA Recommendation No. 8: "Provide a reasonable range of alternative locations for the siting of the LNG terminal as part of the alternatives analyzed pursuant to NEPA. The analyses of these alternative sites should be comprehensive to allow for meaningful comparison among the sites. The alternatives analysis should consider all potential sites within the expected service area (e.g., west coast of North America) regardless of whether a project proponent has filed with FERC for authorization to construct a facility on that site."*[76]

Oregon LNG's alternatives analysis falls far short of providing the information recommended by NOAA. As subsection 7.1.3.2 explains, Oregon LNG restricts its analysis of terminal locations in Canada to pending or proposed LNG terminal locations. Oregon LNG also provides limited and unsubstantiated information on potential terminal locations, *see* subsection 7.1.3.3. Oregon LNG's analysis lacks information that would facilitation a "meaningful comparison," and "comprehensive" review as NOAA recommends.

7.2.4.2 Alternative Terminal Locations in Canada.

Oregon LNG's alternatives analysis fails to analyze adequately alternative terminal locations in Canada. The most glaring error in Oregon LNG's alternatives analysis is the company's claim that it must restrict the Terminal's geographic location based on the project's partial purpose of importing natural gas to the Portland metro area.[77] The Corps must reject this argument. As noted above, Oregon LNG's application is crystal clear: the fundamental purpose of Oregon LNG's project is to export Canadian-sourced gas. At most the project will only utilize

[75] Supp. JPA, Appendix K at 10-14.
[76] Exhibit 5 at 5 (Letter from NMFS to FERC, Oregon LNG NEPA Scoping Comments (Dec. 20, 2012)).
[77] Supp. JPA at 5-1.

two LNG import vessels per year, as opposed to 125 export vessels.[78] Yet, Oregon LNG's alternatives analysis vetoes any terminal location that does not serve the questionable, market contingent project purpose of importing LNG to serve the Portland metro market. The Corps should reject Oregon LNG's decision to reject every prospective terminal location in Canada based on the "LNG import to the Portland metro market" project purpose.

The Corps should evaluate alternative terminal locations based on the project's fundamental, overriding purpose: The of export Canadian-sourced natural gas. Statements in Oregon LNG's "Project-specific Criteria and Alternatives Analysis" section, Supp. JPA at 5-1, are grossly inconsistent with Oregon LNG's statements in the "Purpose and Need" section, Supp. JPA at 3-1. For example, Oregon LNG's alternatives analysis states: "The primary objective of for the Terminal location is to import and supply up to 1.5Bscf/d of natural gas to the Pacific Northwest region and the Portland metro area, and to export up to 1.25 Bscf/d to the global market, assuming a heating factor of 1,000Btu." However, Oregon LNG's "Purpose and Need" section states that "[t]he primary purpose of the project is to export North American natural gas to foreign markets." Oregon LNG's claim that "[t]he primary objective of for the Terminal location is to import and supply up to 1.5Bscf/d of natural gas to the Pacific Northwest region and the Portland metro area, and to export up to 1.25 Bscf/d to the global market, assuming a heating factor of 1,000Btu[]" does not square with the number of LNG import and export vessels. The Corps must reconcile the project's true purpose and, in turn, use this purpose to guide the alternatives analysis.

The history of Oregon LNG's project provides context for the skewed alternatives analysis. Oregon LNG invested millions of dollars in siting an LNG *import* terminal on the East Skipanon Peninsula before market conditions changed and the project's primary purpose flipped to an LNG export terminal. This fact, not Oregon LNG's claims that the project must be sited near the Portland metro market, underlies the applicant's decision to propose an LNG export terminal on the East Skipanon Peninsula. The Corps, however, cannot restrict its alternatives analysis to suit Oregon LNG's bad gamble on LNG markets.

As Section 7.1 explains, there is no proven "need" for the project in the Pacific Northwest. Oregon LNG's alternatives analysis rests, in part, on the assumption that LNG export is a vital resource for the future of the Pacific Northwest. Yet, the analysis provides no impartial information showing need in the Pacific Northwest that matches the enormous scale of the Oregon LNG proposal. This overarching problem renders the alternatives analysis submitted by Oregon LNG highly suspect, and any range of alternatives must be evaluated in a West Coast-wide context, including Canada.

[78] OLNG Draft BA at 2-2–2-3.

With this context in mind, the Corps must require a rigorous analysis of potential LNG terminal locations in Canada. While the Corps must conduct this analysis, Commenters again reiterate opposition to all LNG export projects. Oregon LNG's alternatives analysis includes a description of proposed LNG terminals on the West Coast of Canada, including: (1) Kitmat LNG, (2) Douglas Channel LNG, (3) LNG Canada Export Project, (4) Pacific Northwest LNG Project, (5) Prince Rupert LNG Project, (6) Alta Gas Offshore LNG Project, and (7) Shell Canada LNG Project. The analysis of these pending proposals is a far cry from "rigorous." As noted above, Oregon LNG rejected every proposal based on the "LNG import to Portland metro area" criterion.

In addition, Oregon LNG restricts its analysis of potential LNG terminals in Canada to pending proposals. The alternatives analysis must consider potential *alternative terminal locations*, not simply where other companies are proposing LNG export terminals.

7.2.4.3 Alternative Terminal Locations in the U.S.

Oregon LNG provides a cursory and inaccurate analysis of the impacts of its dredge and fill activities, and the Corps must find that practicable alternatives exist to undermining the health of the estuary, both in the Columbia River and in wetlands and rivers impacted by the Terminal and Pipeline. "An alternative is practicable if it is available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes." 40 C.F.R. § 320.10(a)(2). Oregon LNG's alternatives analysis fails to address many alternatives, and some alternatives are given such cursory consideration that it is impossible to realistically conclude that they are not practicable. This includes changes to Terminal design, turning basin size and design, alternative Terminal sites, and both major and minor route variations on the Pipeline route. Overall, the analysis lacks fundamental information about why Oregon LNG adopted certain restrictive siting criteria. In addition, the alternatives analysis contains a number of claims about why certain sites were eliminated from consideration, yet fails to substantiate the claims with any citations to any sources.

In the following section, Commenters highlight examples of Oregon LNG's inadequate analysis of alternative terminal locations in the U.S. Commenters again reiterate opposition to all LNG export projects.

Jordan Cove Energy Project (Coos Bay, Oregon). Oregon LNG's analysis of the Jordan Cove Energy Project is a prime example of Oregon LNG's failure to provide meaningful and substantiated reasons for rejecting potential alternative terminal locations. Like Oregon LNG,

Jordan Cove proposes exporting North American natural gas. Both projects are proposed in the State of Oregon and both projects are at approximately the same regulatory review stage. Yet Oregon LNG's alternatives analysis examines and rejects the Jordan Cove project in a mere three paragraphs. For example, Oregon LNG states: "the existing channel depth in Coos Bay is maintained at 37 feet at mean lower low water (MLLW), less than what is provided by the lower Columbia River deep draft shipping channel (Port of Coos Bay, 2013)."[79] Oregon LNG fails to explain why the channel depth is adequate for a comparable LNG export project, but acts as an end-game criterion for Oregon LNG.

Oregon LNG's claim that its project will serve the Portland metro market, which results in eliminating the Coos Bay location. Oregon LNG fails to describe how the minimal, and highly questionable, import of LNG can justify eliminating the Coos Bay location. This is particularly true given Oregon LNG's admission that Jordan Cove would serve the "Pacific Northwest," which includes the Portland metro area.

Puget Sound. Oregon LNG dismisses every port in Puget Sound with a summary statement followed by its signature "Portland metro area" criterion veto. Oregon LNG's Puget Sound ports analysis states in full:

> Locations in the Puget Sound were eliminated as a result of the legal challenges associated with attempting to add new supertanker traffic to the sound per the 1977 Magnuson Amendment to the Marine Mammal Protection Act (MMPA), which effectively bans additional supertankers from those waters. In addition, construction of a Terminal in Puget Sound would not be in proximity to the key target market of the Portland metro area.[80]

Oregon LNG fails to cite any language from the MMPA or case law to substantiate its summary claim.

Grays Harbor. Oregon LNG eliminated all potential site locations in Grays Harbor without adequate justification.[81] Three oil companies deemed Grays Harbor an ideal location for deep draft shipping terminals.[82] Oregon LNG's alternatives analysis fails to discuss this fact, let alone endeavor to distinguish its proposal from similar energy projects. Oregon LNG's alternatives analysis states:

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[79] Supp. JPA, Appendix K at 10-23.
[80] *Id.* at 10-19.
[81] *See* Supp. JPA, Appendix K at 10-23–10-24.
[82] Exhibit 20 (Grays Harbor Crude-by-Rail Fact Sheet (Aug. 2013), http://www.portofgraysharbor.com/about/CBR-Project.php).

> The main reason for dismissing Grays Harbor is due to concerns with the existing depth and width of the north shipping channel within Grays Harbor. The existing channel within Grays Harbor is 300 feet wide dredged to a depth of 36 feet at MLLW (Grays Harbor Economic Development Council, 2007). Access and reasonable turning basin for LNG ships would be difficult with these existing channel dimensions.[83]

Oregon LNG fails to provide any technical analysis, let alone supporting facts regarding shipping requirements, to justify its sweeping dismissal of Grays Harbor. Oregon LNG's cursory conclusion is questionable in light of three major proposals to significantly increase Panamax vessel traffic to facilitate oil-by-rail terminals at the Port of Grays Harbor. For example, Oregon LNG fails to explain: (1) why smaller LNG vessels are not feasible, (2) if there are any proposals to expand the depth or width of the Grays Harbor channel, and (3) why access and reasonable turning basin for LNG ships would be difficult. Oregon LNG's conclusions on the suitability of Grays Harbor lacks critical information to evaluate whether the company's claims for eliminating potential sites are justified.

Likewise, Oregon LNG presents a conclusion on the suitability of Grays Harbor based on a nearby airport without providing supporting documentation or facts. Oregon LNG states:

> The location of the Bowerman Field airport in proximity to the best potential sites for an LNG Terminal within Grays Harbor also creates an obstacle. Development of LNG storage tanks cannot occur within a horizontal distance of 1 mile from the ends of an airport runway, or 0.25 mile from the nearest point of a runway per 49 *Code of Federal Regulations* (CFR) 193.2155(b). Thus, Bowerman Field hinders development of LNG tanks in areas of Grays Harbor, especially the vicinity of Port of Grays Harbor Terminal 3.[84]

Oregon LNG fails to state: (1) why the Port of Grays Harbor Terminal 3 is an ideal location for an LNG terminal, (2) why other potential sites within Grays Harbor were eliminated from consideration, (3) if and why Bowerman Field is within a horizontal distance of 1 mile, 0.25 mile from the nearest point of runway, from alternatives sites Oregon LNG considered within Grays Harbor. Without this fundamental information, the Corp has no way of verifying the veracity of Oregon LNG's claims.

[83] Supp. JPA, Appendix K at 10-23.
[84] *Id.* at 10-23–10-24.

Terminal Locations in the State of California. Oregon LNG's alternatives analysis does not contain any analysis of alternative site locations in California. This decision contradicts NMFS's recommendation to consider alternative terminal locations on the West Coast.

Columbia River Terminal Locations. Oregon LNG's alternatives analysis considers eight sites on the lower Columbia River.[85] The potential properties include: (1) Tansey Point (RM 10); (2) East Bank Skipanon Peninsula (RM 11.5); (3) Tongue Point (RM 18); (4) Bradwood Landing (RM 38); (5) Wauna (RM 41); (6) Port Westward (RM 53); (7) Barlow Point (RM 63); and (8) Kalama (RM 68). Oregon LNG eliminates every site for similar reasons, namely safety due to longer vessel transits and increased air pollution emissions. Oregon LNG's analysis also lacks any analysis of potential industrial sites at the ports of Longview, Vancouver, and Woodland, and private port properties such as the former Reynolds Metals private port property in Cowlitz County, Washington.

The Columbia River sites analyses contain common flaws. First, Oregon LNG fails to address the relative differences in tsunami and earthquake risks at the alternative locations in comparison to the East Skipanon Peninsula. Second, Oregon LNG fails to acknowledge the fact that the East Skipanon Peninsula is a Corps dredge spoil disposal site, whereas the other industrial properties are not. Third, Oregon LNG fails to discuss the relative benefits of a shorter pipeline route serving an upriver terminal site. Fourth, Oregon LNG fails to address and comment on other industrial terminals that are proposed at the same sites, and distinguish its project from those projects. Commenters identify specific flaws in Oregon LNG's Columbia River terminals sites alternatives analyses below.

Barlow Point. Oregon LNG relies on weak and speculative criteria to eliminate the Barlow Point site, located in Cowlitz County, Washington. Oregon LNG states that the highly desirable industrial site "includes an area that in many respects is a suitable terminal location." However, Oregon LNG eliminates the site from consideration because of an "anticipated loss of the necessary zoning" and a vague description of "river and onshore" conflicts.[86] Oregon LNG does not cite any evidence to substantiate its rationale for eliminating Barlow Point.

Tansy Point. Oregon LNG concludes that Tansy Point has a higher environmental score than the proposed project location. However, Oregon LNG rejects this site on the grounds that "[t]he safety and constructability evaluation show that it provides limited separation of the berth from the deep draft shipping channel and would place the berth and onshore Terminal facilities

[85] *Id.* at 10-24.
[86] *Id.* at 10-24.

in proximity to existing residences and a public park."[87] Oregon LNG fails to include a comparison of distance between the berth and the deep draft shipping channel between the East Skipanon Peninsula and Tansy Point. Oregon LNG also fails to describe the number of residences and the size of the park, and then compare the safety factor to the relative Sandia Zones of Concern impacts from the East Skipanon Peninsula location.

Tongue Point. Aside from vessel safety, Oregon LNG fails to discuss public safety implications for siting an LNG terminal at Tongue Point. Oregon LNG also fails to address the relative impact to commercial and sport fishing between the East Skipanon Peninsula location and Tongue Point.

Wauna. The Wauna site is located in a significantly more remote location than the East Skipanon Peninsula. Despite this fact, Oregon LNG fails to address the relative public safety differences between the proposed project location and Wauna. Oregon LNG also fails to address the relative differences in tsunami and earthquake risks at the Wauna site, an upriver location, in comparison to the East Skipanon Peninsula. Oregon LNG's analysis also lacks any discussion of the relative benefits of a shorter pipeline route serving an upriver terminal site.

Port Westward. Oregon LNG fails to address any potential properties at the existing Port Westward industrial site. Instead, Oregon LNG's analysis considers property zoned PA-38, Primary Agriculture. Since Oregon LNG filed its FERC application, a crude oil-by-rail terminal began operating at Port Westward, the Global Partners terminal. In 2014, a Chinese company announced plans to site a large methanol terminal at Port Westward.[88] The crude oil and methanol terminals demonstrate a significant weakness in Oregon LNG's terminal alternatives analysis: If similar companies deem Port Westward a viable terminal location, why is Oregon LNG's alternatives analysis limited to sites that are zoned for agriculture? Oregon LNG also fails to address the relative amount of dredging that would be required at Port Westward, located in a relatively deep area of the Columbia River.

Kalama. Oregon LNG rejects potential terminal locations in Kalama, Washington. In 2014, Northwest Innovation Works announced plans to site a large methanol terminal at the Port of Kalama.[89] This proposal alone captures the inadequacy of Oregon LNG's alternatives

[87] Supp. JPA, Appendix K at 10-35.
[88] Exhibit 21 (Associated Press, *China, BP plan two Columbia River chemical plants* (Jan. 1, 2014), http://www.columbian.com/news/2014/jan/22/china-bp-plan-two-columbia-river-chemical-plants/).
[89] *Id.*

analysis: If a methanol company is proposing a terminal and pipeline in Kalama, why is Oregon LNG's consideration of Kalama a mere three sentences?[90]

East Skipanon Peninsula. Oregon LNG's analysis of the East Skipanon Peninsula—the proposed project site—is remarkable for its complete disregard for the ecological and biological value of the site, as well as the substantial amount of dredging required to accommodate LNG tankers in Youngs Bay. Expert reports submitted by Commenters demonstrate the fundamental errors in Oregon LNG's opinion on the quality of wetlands on the East Skipanon Peninsula and ESA-species presence in the project action area.[91] Oregon LNG's analysis is also remarkable for its failure to disclose and discuss: (1) tsunami and earthquake risk at the site; (2) the Corps' easement for dredge spoil disposal; (3) the Youngs Bay SAFE program site; and (4) the substantial use of Youngs Bay for commercial and sport fishing.

Oregon LNG has not met its burden of overcoming the presumption that practicable alternatives exist.

7.2.5 Terminal Design Alternatives.

Oregon LNG does not provide sufficient reasoning or detail to justify its dismissal of many design and project alternatives that could have a less adverse impact on the aquatic ecosystem. In particular, Oregon LNG provides little consideration of the relative costs, technologies, and logistics in rejected alternatives. Many alternatives exist in the West Coast energy market that could provide cleaner, safer, more affordable energy without the enormous negative impact to the Columbia River estuary. Oregon LNG also ignores NOAA's input on project design. For the reasons explained below, Oregon LNG has not met its burden of overcoming the presumption that practicable alternatives exist.

Oregon LNG must evaluate designing the terminal for a smaller footprint and smaller LNG vessels. Oregon LNG fails to demonstrate that there are no practicable alternatives to its terminal site design. Reducing the size of the terminal footprint as well as the area that requires dredging are methods of diminishing the impact on the aquatic ecosystem. Oregon LNG fails to address the possibility of building a smaller terminal; in turn, the analysis does not provide

[90] Supp. JPA, Appendix K at 10-24 (stating "Oregon LNG looked as far east along the Columbia River as Kalama and found a site ideally located with respect to the main natural gas pipeline. However, this site is located at river mile 68, requiring a long trip upriver and under two existing bridges. In addition, existing residences in Prescott, Washington, would be within 2,000 feet of the docked LNG ships.").
[91] *See generally* Exhibits 1–3 (Williams, Bierly, and Rhodes Expert Reports).

adequate data to justify why a smaller site design is not practicable. Likewise, Oregon LNG does not thoroughly evaluate the potential for using smaller vessels to access the East Skipanon Peninsula, potentially reducing the size of the terminal overall, and limiting the depth and area of the turning basin. There are a range of sizes of LNG vessels (from under 100,000 cubic meters to greater than 200,000 cubic meters). Oregon LNG fails to discuss adequately these practicable alternatives.

Oregon LNG's alternatives analysis also contains unsubstantiated statements on the impacts of dredging 1.2 million cubic yards of river bottom. Oregon LNG states: "[B]oth the 2007 and 2008 characterization activities indicated the dredge material is mostly sand and as such is expected to generate minimal turbidity."[92] This statement runs counter to DEQ's 401 certification analysis for the Bradwood LNG project.[93] The impacts of Oregon LNG's proposed dredging are discussed in greater detail below. In general, Oregon LNG grossly underestimates the impacts of this unprecedented amount of dredging at the mouth of Youngs Bay.

Finally, Oregon LNG ignores NOAA's input on terminal design. NOAA's 2012 NEPA scoping comments state:

> Reduce environmental effects by preferentially placing infrastructure in previously disturbed upland areas with low restoration value, minimizing the facility footprint, and siting and designing the vessel wharf and turning basin to minimize the need for dredging, including maintenance dredging.[94]

NOAA's input on terminal design also includes "[a]void[ing] illuminating aquatic areas that may cause changes in behavior or increase risk to living resources, or modify value or function of their habitat."[95] Oregon LNG's proposal for lighting the LNG terminal fails to account sufficiently for NOAA's input.

7.2.6 Alternative Dredge Spoil Disposal Sites.

Oregon LNG's discussion of alternatives for disposing 1.2 million cubic yards of dredge spoils is incomplete and contradictory. First, Oregon LNG acknowledges and describes the well-documented benefits of in-river dredge spoil disposal. Then, Oregon LNG's Alternatives

[92] Supplemental JPA, Appendix K at 10-46.
[93] Exhibit 22 (Oregon DEQ 401 Certification Denial for Bradwood LNG (Mar. 10, 2011)).
[94] Exhibit 5 at 6 (Letter from NMFS to FERC, Oregon LNG NEPA Scoping Comments (Dec. 20, 2012)).
[95] *Id.*

Analysis concludes by stating that a decision of the proposed dredge spoil disposal site remains in flux. Oregon LNG's Dredge Material Management Plan, however, states Oregon LNG will dispose of dredge spoils at an EPA-approved ocean disposal site. Oregon LNG's analysis falls far short of explaining why the applicant is foregoing in-river disposal given the applicant's admission that in-river disposal is highly preferred by resources agencies.

Specifically, both Oregon LNG's Alternatives Analysis, Appendix K, and Dredge Material Management Plan, Appendix N, acknowledge and describe the benefits of in-river dredge spoil disposal. Oregon LNG states:

> In general, the LCR [Lower Columbia River] is regarded as sediment-deficient because extensive upstream portions of the river have been dammed, which may severely limit downstream migration of sediment. It is therefore generally preferred to retain the dredged material within the riverine system, which confers a number of benefits to the watershed including creation of habitat and reducing erosion, especially if the material to be dredged is clean and would not degrade the new receiving environment. However, a number of dredge placement options are still being analyzed at this time.[96]

Oregon LNG also acknowledges the benefits of in-river dredge spoil disposal in the Dredge Management Plan, stating:

> The LCR has been subjected to extensive damming practices during past decades and, consequently, has become sediment-deprived and subject to extensive ocean scouring at its mouth. Much of the sediment scoured from the river mouth is transported upriver during powerful incoming tides, which has resulted in shoaling of LCR channels and embayments, including Youngs Bay, Baker Bay, Steamboat Bay, and other side channels of the LCR. Therefore, when clean material is dredged from LCR embayments, it is highly desirable to keep the material within the riverine system rather than removing it to deeper ocean waters to upland disposal sites.[97]

Oregon LNG reviewed current dredge material placement practices for portions of the lower Columbia River, in particular the Corps' Channel Improvement Program and the Port of Astoria's ongoing maintenance dredging. Oregon LNG states, "In general, both programs place high priority on in-water placement, where possible, to maintain the sediments in the system unless contamination becomes a factor, when near-shore or upland placement practices may become preferable."[98]

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[96] Supp. JPA, Appendix K at 10-49.
[97] Supp. JPA, Appendix N at ES-2.
[98] *Id.* at ES-3.

After describing the benefits of in-river disposal, the Oregon LNG's Alternatives Analysis states:

> Oregon LNG priority sites have shifted to the USEPA Deepwater Site, USEPA Shallow Water Site, USACE North Jetty S, and the USACE South Jetty Nearshore Site. Further discussion of the shift in site priorities will be provided in the Bidirectional Project Resource Report 10.[99]

Oregon LNG now proposes dredge spoil disposal at an EPA Deepwater Site.[100] Oregon LNG's alternatives analysis, however, lacks any meaningful, let alone probative, discussion of alternatives to deepwater disposal. This is particularly alarming in light of the applicant's own statements praising the benefits of in-river disposal.

7.2.7 Alternative Pipeline Routes.

Oregon artificially narrows the project purpose to serving the Portland metro area and, in turn, eliminates from consideration practicable alternatives. For the reasons stated above, the Corps must reject Oregon LNG's decision to restrict consideration of alternatives based on the alleged project purpose of serving the Portland metro area. Assuming *arguendo* that there is a need for LNG import to the Portland metro area, Oregon LNG fails to demonstrate why the relative proportion of the project need for LNG import warrants the Pipeline's impacts to hundreds of waterbodies and the Columbia River estuary.

Like the alternative Terminal site locations, Oregon LNG's alternative Pipeline route locations ignores expert agency input on the pipeline route. NOAA's 2012 NEPA scoping comments recommend "design[ing] pipeline alignments to use previously disturbed upland areas, avoid or minimize disturbance in riparian areas, and co-locate or combine with other existing or proposed pipelines where possible."[101] Oregon LNG's proposed Pipeline route ignores NOAA's input. Similarly, the Oregon Department of Forestry's 2012 NEPA scoping comments express concern regarding the proposed Pipeline route, stating

> Realizing the project must be in compliance with the Clean Water Act and Endangered Species Act among others, the ODF has concerns regarding the pipeline route across perennial and fish-bearing streams on State Forest lands. Where possible it would be beneficial to minimize the removal of forest cover when constructing segments of the

[99] Supp. JPA, Appendix K at 10-49.
[100] JPA Public Notice (Nov. 18, 2014) ("The applicant is proposing to transport dredged material for the purpose of disposal in the Pacific Ocean.").
[101] Exhibit 5 at 6 (Letter from NMFS to FERC, Oregon LNG NEPA Scoping (Dec. 20, 2012)).

> pipeline beneath and in close proximity to a water course. In the EIS, a plan for revegetation and rehabilitation of the construction corridor should include reforestation with native tree species.[102]

Oregon LNG's alternatives analysis fails to incorporate input from NOAA and the Oregon Department of Forestry. An expert report prepared by Jonathan Rhodes (hereafter the Rhodes Expert Report) analyzes the pipeline's impacts on waterbodies.[103] The Rhodes Expert Report further demonstrates Oregon LNG's failure to incorporate input from expert agencies. Commenters hereby incorporate the Rhodes Expert Report by this reference.

7.2.8 Conclusion for Alternatives Analysis.

The Corps must deny Oregon LNG's proposed discharge of dredged and fill material because Oregon LNG fails to demonstrate that there are not practicable alternatives. 40 CFR § 230.10 (requiring an examination of practicable alternatives). The practicable alternative requirement of the 404(b)(1) Guidelines is intended to discourage unnecessary filling or degradation of the aquatic environment. The regulations state that "no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem." 40 CFR § 230.10(a). As explained in the preamble to the Guidelines, this provision means that "the guidelines…prohibit discharges where there is a practicable, less damaging alternative….Thus, if destruction of an area of waters of the United States may reasonably be avoided, it should be avoided."[104] Oregon LNG fails to consider key practicable alternatives to its project, to the design of the Terminal and the turning basin, and to the Pipeline.

To the extent Oregon LNG attempts to address alternatives to LNG export, the applicant's analysis is wholly inadequate. Oregon LNG likewise fails to address alternatives to LNG import. Oregon LNG dismisses non-LNG alternatives, while assuming that electricity generation from LNG-sourced gas will be a major driver for the project. There are many alternative methods of generating electricity that do not involve LNG importation. Energy conservation, renewable energy, and energy efficiency all present practicable alternatives to LNG throughout the West Coast. There are also practicable alternatives available for maintaining gas supplies to the Pacific Northwest and the West Coast, including increasing access to domestic supplies of natural gas. Alternative LNG sites – particularly sites closer to

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[102] Exhibit 16 at 3 (Letter from Oregon Department of Forestry to FERC, NEPA Scoping Comments for the Oregon LNG Project (Dec. 13, 2012)).
[103] Exhibit 3 (Rhodes Expert Report)
[104] 45 Fed. Reg. 85,340 (Dec. 24, 1980).

the likely target market in Northern California – must also be considered and are almost entirely omitted in the alternatives analysis. Finally, Oregon LNG fails to assess practicable alternatives in the Pacific Northwest and to the design of its project that would significantly reduce the negative impacts of its project on the aquatic environment.

7.3 Loss of Corps' Dredge Spoil Disposal Site.

The public interest in retaining a federal government dredge spoil disposal site on the East Skipanon Peninsula weighs in favor of denying Oregon LNG' permits. While in-river dredge spoil disposal is preferred, contaminated dredge spoils require upland disposal sites. The Corps holds an easement for dredge spoil disposal on the East Skipanon Peninsula.[105] The Corps' easement covers nearly the entire footprint of Oregon LNG's sublease with the Port of Astoria.[106]

Oregon LNG cannot build the proposed Terminal unless a federal court invalidates the Corps' right to dispose dredge spoils on the East Skipanon Peninsula and the court chooses not to purchase the easement, or the Corps forfeits the easement.[107] Oregon LNG subleases the East Skipanon Peninsula from the Port of Astoria, which leases the land from the State of Oregon. The East Skipanon Peninsula was created in the late 1920s and 1930s when the Corps dredged the Skipanon Channel and deposited fill in what is now called the "East Skipanon Peninsula." The area that is presently the East Skipanon Peninsula was previously tidal marshes and mudflats.[108] In 1957, Clatsop County granted a perpetual Soil Disposal Easement to the Corps. Oregon LNG disputes the Corps' right to this easement.

On August 1, 2014, Oregon LNG filed a lawsuit against the Corps. Oregon LNG seeks a court order stating that the Corps does not have any right, title, or interest in the East Skipanon

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[105] Exhibit 23 (Corps' Motion to Dismiss, *Oregon Development Company, LLC v. U.S. Army Corps of Eng'rs*, Case No. 3:14-cv-01239-AC (Nov. 14, 2014))

[106] Exhibit 24 (Oregon Development Company, LLC, Complaint, Exh. B, *Oregon Development Company, LLC v. U.S. Army Corps of Eng'rs*, Case No. 3:14-cv-01239-AC (Aug. 1, 2014) (map produced by Oregon DSL on March 14, 2014, showing Port of Astoria lease area and 1957 Corps easement)).

[107] Under 28 U.S.C. § 2409a(b), "if the final determination shall be adverse to the United States, the United States nevertheless may retain such possession or control of the real property or of any part thereof as it may elect, upon payment to the person determined to be entitled thereto . . . ." 28 U.S.C. § 2409a(b); *see also Patchak v. Salazar*, 632 F.3d 702, 709–10 (D.C. Cir. 2011) ("This provision gives the United States the option of retaining possession of the property if it loses the quiet title action, so long as the government pays just compensation . . . .").

[108] CREST DMD Handbook (1989), http://www.gpo.gov/fdsys/pkg/CZIC-tc187-b37-1989/html/CZIC-tc187-b37-1989.htm.

Peninsula. In a December 14, 2014, letter to FERC, the Corps stated it plans to "vigorously defend this action."[109] Commenters commend the Corps for protecting a federal property right.

Oregon LNG fails to identify the existence of the easement or the lawsuit in its application or any other federal agency filing. This raises the questions of whether Oregon LNG has failed to disclose other material information in this or other agency filings. This question is relevant to the Corps' public interest analysis.

The East Skipanon Peninsula dredge spoil disposal site's value—and the significant cost of losing a site that can accommodate contaminated dredge spoils—is highly relevant to the Corps' public interest analysis. The cost of losing the East Skipanon Peninsula dredge spoil disposal site includes the cost of locating and paying for a new site, the monetary cost of longer shipping time to dispose of spoils at a new site, and any relative increased environmental costs of associated with transporting and disposing of dredge spoils at the new site. The public interest in retaining an upland dredge disposal site on the East Skipanon Peninsula weighs in favor of denying Oregon LNG's permits.

7.4 Terminal Dredging.

Oregon LNG proposes dredging the mouth of Youngs Bay to create an LNG tanker turning basin and build an industrial dock. The aquatic area covered by Oregon LNG's proposal includes habitat designated as "critical habitat" for the recovery of endangered and threatened salmon and steelhead stocks. This includes: Lower Columbia River Chinook Salmon, Snake River Fall-run Chinook Salmon, Upper Columbia River Spring-run Chinook Salmon, Upper Columbia River Spring-run Chinook Salmon, Lower Columbia River Steelhead, Middle Columbia River Steelhead, Upper Columbia River Steelhead, Upper Willamette River Steelhead, Snake River Basin Steelhead, and Columbia River Chum Salmon. Lower Columbia River Coho Salmon critical habitat is proposed in the terminal area.

Oregon LNG's dock and turning basin require an unprecedented level of habitat modification in Youngs Bay. Oregon LNG proposes dredging 1.2 million cubic yards of river bottom to create a turning basin that can accommodate LNG tankers ranging in size from 70,000 to 266,000 cubic meters. The turning basin would extend from the edge of the Columbia River Federal Navigation Channel to the berthing line to facilitate LNG tanker turning, docking, and undocking. The bottom elevation is currently 20 to 30 feet below mean lower low water

[109] Exhibit 7 (Letter from Corps to FERC (Dec. 14, 2014)).

(MLLW). Oregon LNG proposes dredging to –43 feet Columbia River Datum (CRD), with two additional feet allowed for overdredging to –45 feet CRD.[110]

According to Oregon LNG's Dredge Material Management Plan, "[t]he change in elevation will result in conversion of subtidal habitat to slightly deeper subtidal habitat, and there will be no direct loss of habitat."[111] Oregon LNG's claims are not supported by the best available science or the record. For the reasons explained below, the Corps should deny Oregon LNG's permits based on the significant, detrimental impacts of Oregon LNG's dredging.

7.4.1 Physical & Chemical Impacts.

Oregon LNG undercuts significantly government agencies' and the public's ability to comment on dredging impacts because Oregon LNG has not yet determined what method(s) of dredging it would employ. Specifically, Oregon LNG's Dredge Material Management Plan describes various dredging methods. However, Oregon LNG fails to disclose which method its contractors would use. Oregon LNG states:

> The method of dredging has not yet been determined, and some methods may result in direct mortality to sturgeon. Oregon LNG will prevent dredge-related mortality by selecting a dredging method that does not result in direct mortality and/or by coordinating with resource agencies on the timing of dredging.

Oregon LNG's decision to postpone specifying a dredging method undermines public comments on the project's impacts. As the public comments on the Bradwood LNG terminal demonstrate, the dredging method is highly relevant to the physical, chemical, and biological impacts of dredging.[112]

Notwithstanding Oregon LNG's failure to disclose the method for dredging, Commenters endeavor to address physical and chemical impacts of dredging 1.2 million cubic yards at the mouth of Youngs Bay. The geomorphic modifications due to dredging affect the normal water fluctuations, as discussed in 40 CFR § 230.24. The impacts include changes in salinity gradient, nutrient balance, and dissolved oxygen balances. Oregon LNG's dredging would adversely affect communities of aquatic life, induce populations of nuisance organisms, modify habitat, reduce food supply, restrict movement of aquatic fauna, and change the adjacent upstream and downstream areas.

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[110] Supp. JPA, Appendix N at ES-2.
[111] *Id.* at 4-1.
[112] Exhibit 25 (Columbia Riverkeeper *et al.* Clean Water Act Section 404 Comments for the Bradwood LNG Project (Dec. 18, 2007)).

The proposed turning basin would essentially double the width and cross-section of the channel at a key location where the navigation channel changes from a west-southwest direction to a northwest direction. Under historic conditions both the north and south channels split the flow; now the south channel directs the bulk of the flow. The Terminal is in a location where strong tidal and river currents are mixing throughout the year. This raises the potential for Oregon LNG's turning basin to create a large scale eddy on incoming or outgoing tides. Sedimentation or erosion may be exacerbated in the area.

The Corps must assess independently the veracity of the models used by Oregon LNG to predict the impacts of the dredging on hydrology. A study that measures impacts on a dynamic system like the Columbia River estuary must include an analysis of impact over a long enough period to be representative of the impact in a highly variable system; Oregon LNG's hydrodynamic modeling lacks this in-depth analysis. Oregon LNG also opts for 2-dimensional modeling in a number of scenarios, foregoing the more probative 3-dimensional modeling. This was a critical flaw in the Bradwood LNG hydrodynamic modeling.[113] Oregon LNG repeats this significant flaw to the determinant of government agencies reviewing the project, as well as the public.

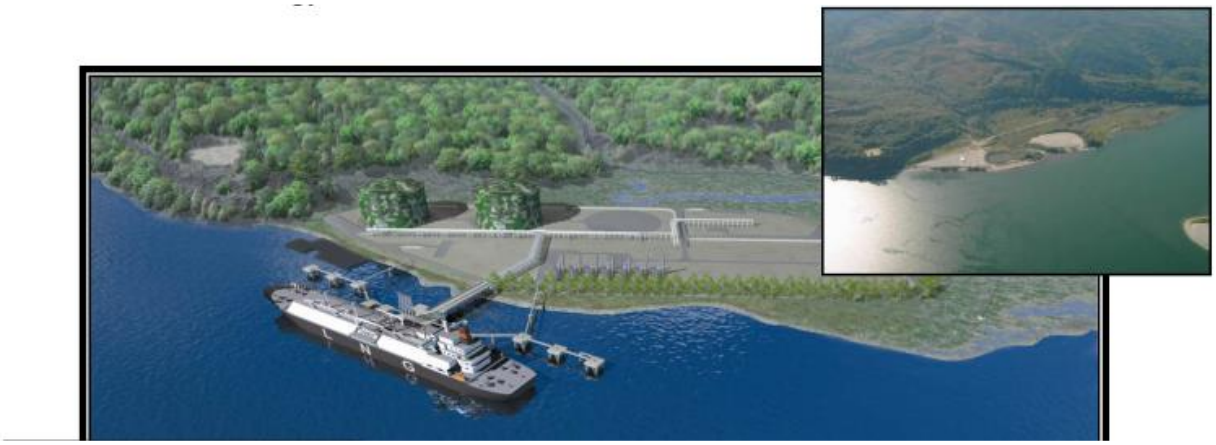

Figure 2. Bradwood LNG schematic and aerial photograph of proposed terminal site. Credit: Bradwood LNG Biological Assessment.

DEQ's decision denying a 401 Certification for the Bradwood LNG terminal and pipeline is highly relevant to the Corps' analysis of Oregon LNG's project. NorthernStar Natural Gas proposed building an LNG import terminal 22 miles upriver from Astoria at Bradwood, Oregon.

[113] Exhibit 22 (DEQ, *Evaluation Report and Findings on Clean Water Act 401 Water Quality Certification Application for Bradwood Landing* (March 10, 2011)).

On May 5, 2010, NorthernStar filed for bankruptcy.[114] After NorthernStar filed for bankruptcy, the DEQ released a detailed report denying Bradwood's Clean Water Act 401 water quality certification. DEQ stated:

> Based on evaluation of the best available information, adverse impacts to multiple water quality parameters may be significant and this will adversely impact existing and potential designated beneficial uses. Because the subject waterways are already Water Quality Limited, reversal of the impacts of the geomorphic alternations would not be possible, and mitigation has not been demonstrated to be adequate or achievable, DEQ concludes that application for 401 WQC for this proposed project should be denied.[115]

Prior to the project's demise, NorthernStar submitted a Biological Assessment to FERC. Although the Services never released a Biological Opinion disclosing the project's impacts on ESA-listed species, the Bradwood Biological Assessment provides useful information to compare the Bradwood and Oregon LNG terminal proposals. This information is summarized in the Table 1 below.

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[114] *Id.*

[115] *Id.* at 25.

Table 1. Comparison of Bradwood LNG and Oregon LNG Proposals.

	Bradwood LNG	Oregon LNG
Terminal Location	Lower Columbia River, Clifton Channel, River Mile (RM) 38-39	Lower Columbia River, Youngs Bay, RM 11.5
Size of Dredge Area	46 acres within a 58 acre area[116]	109 acres in 135 acre area[117]
Amount of Dredging	700,000 cubic yards[118]	1.2 million cubic yards[119]
Natural Water Depth	-20 feet Columbia River Datum (CRD)	20 to 30 feet Mean Lower Low Water (MLLW)[120]
Depth of Dredging	-42 feet CRD	-50 feet MLLW at berthing area; -45 MLLW at turning basin[121]
Maintenance Dredging	80,000 every two – four years	300,000 cubic yards every three years[122]
Dredge Spoil Disposal Location	Portion for dredge spoils as fill for construction of the terminal, with the balance moved to the Wahkiakum County Sand Pit[123]	Proposes in-water dredge spoil disposal at designated Pacific Ocean site outside of the mouth of the Columbia River[124]
Vessel Traffic	· 125 vessels would arrive at the terminal each year[125] · 250 inbound and outbound vessel trips · ~ 2.4 LNG vessel trips per week	· 127 vessels would arrive at the terminal each year[126] · 254 inbound and outbound vessel trips

[116] Bradwood BA at ES-1.
[117] OLNG BA at 2-25; 3-33.
[118] Bradwood BA at 2-5.
[119] OLNG BA at 3-33.
[120] *Id.* at 2-25.
[121] *Id.* at 3-33.
[122] *Id.* at 2-25.
[123] Bradwood BA at 2-16 – 2-17.
[124] OLNG BA at 2-21.
[125] Bradwood BA at 2-129.
[126] OLNG BA at 3-70.

		· average of 2.4 LNG vessel trips per week[127]
ESA-Listed Species Impacted by Project According to Applicant-drafted BA	· 38 listed endangered or threatened species or proposed · applicant concluded project may affect, and is likely to adversely affect 16 ESA-listed species[128]	· 52 listed endangered or threatened species or proposed for listing · applicant concluded project may affect, and is likely to adversely affect, 22 ESA-listed species
Ballast Water Intake Impacts	· 125 LNG import vessels per year would take on ballast water	· 2 LNG import vessels per year would intake ballast water[129]; LNG export vessels do not require ballast water intake[130]
Cooling Water Impacts	· 125 LNG import vessels per year would discharge cooling water[131]	· 125 LNG export vessels per year would withdraw cooling water [132] · All LNG vessels would discharge cooling water[133]

For the Bradwood LNG project, NMFS, DEQ, and the Columbia River Inter-Tribal Fish Commission contracted with an independent third party for review of the hydrodynamic modeling and analysis submitted by the applicant. For a project that proposes a significantly more dredging, a similar independent review is warranted for the Oregon LNG project. In the interim, Commenters urge the Corps to analyze hydrodynamic modeling information on Oregon LNG's project prepared by researchers at Oregon State University.

The chemical and physical impacts of Oregon LNG's dredging are discussed in detail in the Williams Expert Report. Commenters incorporate by this reference the Williams Expert Report.

7.4.1.1 Turbidity, Temperature, & Dissolved Oxygen.

Without justification or citation to sources, Oregon LNG's application concludes that dredging 1.2 million cubic yards will not exacerbate temperature conditions in the Columbia

[127] *Id.* at 3-2.
[128] Bradwood BA at ES-3.
[129] OLNG BA at 2-35.
[130] *Id.* at 2-35.
[131] Bradwood LNG BA at 2-100.
[132] OLNG BA at 2-4.
[133] *Id.* at 2-100.

River estuary or contribute to elevated turbidity. The Corps must reject the applicant's unsupported conclusions. The best available science demonstrates that Oregon LNG's dredging will contribute to elevated temperature and turbidity, which harms water quality.

The Columbia River is classified as water quality limited under the CWA, Section 303(d) for temperature. EPA has not on yet completed a TMDL for temperature. Elevated temperature has a number of well-documented, negative impacts on species including ESA-listed salmonids. Similarly, turbidity has a number of adverse effects on water quality, including reducing light for photosynthesis by algae and plants, increasing temperature, and decreasing dissolved oxygen levels. Increases in temperature as a result of turbidity are caused by the suspended particles absorbing more heat from sunlight and, therefore, increasing the temperature of the water around the particles.

Oregon LNG fails to analyze how dredging will alter water temperature due to increases in turbidity, and how any changes in water temperature resulting from increased turbidity due to will exacerbate the DEQ 303(d) water quality-limited status of these waters. Also, as a result of turbidity and increased water temperatures, dissolved oxygen levels and light will decrease, harming aquatic biota including federally protected fish species.

Oregon LNG's application ignores the best available science on the impacts of dredging on turbidity and sediment. The Williams Expert Report describes the literature on the impacts of dredging on turbidity and sediment, stating:

> Dredging will also increase turbidity and suspended sediment for at least as long as dredging occurs – the OLNG project construction phase and subsequent periodic maintenance dredgings of turning basin. These impacts degrade water quality and have negative effects on salmonids. Elevated turbidity can violate water quality standards and increase treatment costs for downstream water uses (Reid, 1999). Elevated turbidity and suspended sediment levels can also impair the ability of salmonids to feed and cause gill damage (Rhodes et al., 1994). Elevated turbidity and sediment delivery can also adversely affect benthic macroinvertebrates that are an essential part of aquatic foodweb for salmonids and other aquatic fauna.[134]

Oregon LNG fails to analyze and account for the best available science on turbidity and suspended sediment.

Oregon LNG's maintenance dredging will also increase water temperature in the Columbia River near the dredging site. Dredging increase temperature because the suspended

[134] Exhibit 1 at 22 (Williams Expert Report).

particles absorb more heat from sunlight. In response to channel deepening dredging on the Columbia River, DEQ stated, "this project is expected to result in an increase in surface water temperatures during the low flow time of year both during dredging and flowlane disposal as a result of increased turbidity. . . . Temperature contributions are particularly problematic given the water quality limited listing for temperature in the lower Columbia River."[135] Oregon LNG's conclusion that dredging will not cause elevated temperatures is not supported by the best available science.

The potential turbidity increases and the impact to aquatic life are great due of the large size and long duration of the dredging. DEQ described the significant impacts from dredging in the Columbia River estuary in its decision denying the Bradwood LNG 401 certification, stating, "Physical observations of USACE dredging in the Columbia River, reveals that some erosion occurs even when modeling doesn't predict it (Castro 2010)."[136] DEQ's 401 Certification also describes the adverse impacts of turbidity on ESA-listed species, stating:

> Direct and indirect impacts of excessive turbidity to salmonids and other fish species is well documented in the literature (Rosetta, 2005). Impacts to endangered salmonids, other migratory species and resident fish may reach lethality at time or cause behavioral impacts (Rosetta, 2005), such as avoidance of Clifton Channel [the section of the Columbia River where Bradwood proposed dredging].

DEQ's 401 certification for the Bradwood LNG project, which proposed *less* dredging that Oregon LNG's proposal, is highly relevant to the Corps' analysis of Oregon LNG's impact on the Columbia River estuary.

The Corps must also consider findings from the Williams Expert Report, which concludes that dredging will increase turbidity, which will have negative effects on salmonids by impairing their ability to feed and by causing gill damage.[137] Elevated turbidity can also adversely affect benthic macroinvertebrates, upon which salmon and other organisms rely for food. The long-term and constant nature of this dredging are particularly troubling and distinguish this project from smaller dredging operations that the Corps routinely approves. This controversial project requires close scrutiny. The Corps must analyze and make findings on the size, scope, duration, and intensity of the dredging, and how each affects aquatic life.

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[135] Letter from DEQ to Colonel Butler, Corps at 2 (Sept. 29, 2000).
[136] Exhibit 22 at 62 (DEQ 401 Certification Denial for Bradwood LNG).
[137] Exhibit 1 at 24 (Williams Expert Report).

In addition, the Corps must thoroughly analyze maintenance dredging. Maintenance dredging will result in further degradation of water quality through repeated resuspension of sediments. Oregon LNG proposes maintenance dredging of 300,000 cubic yards every three years. A great number of complex factors are associated with how often dredging will be needed, including whether over-dredging will be allowed initially and sediment transport processes of the dynamic Columbia River. The Corps must analyze maintenance dredging and provide a more thorough analysis on how often dredging activities will be conducted and how much dredging material will be removed. Without this information the public and the Corps cannot possibly evaluate the impact maintenance dredging will have on water quality and the effects on organisms in the river.

Dredging will also decrease dissolved oxygen near the site because dredging increases the oxygen demand by disturbing sediments. In response to the proposed channel deepening dredging on the Columbia River, DEQ stated, "this project is expected to exert an oxygen demand both during dredging and flowlane disposal."[138] The Corps should reject the dredging due to the decreased dissolved oxygen caused by the dredging.

All of the physical and chemical changes discussed above are exacerbated by the large-scale channel deepening in the lower Columbia River. The channel deepening alone has detrimental impacts on the physical and chemical characteristics of the lower Columbia River. The Corps must analyze the cumulative effects of the Oregon LNG's proposed dredging, taking into account the channel deepening, increased ship traffic from both the channel deepening and LNG tankers, the increase erosion from both projects, increased wave action, and geomorphic and hydraulic changes.

7.4.1.2 Introduction of Toxic Pollutants from Bed & Shoreline Sediments.

Oregon LNG's dredging may harm aquatic life in the estuary will be harmed by the resuspension of contaminated sediments into the water column. Sediments in rivers are often implicated for their tendency to store large amount of contaminants, which may turn into a significant source of contamination to aquatic and terrestrial organisms if disturbed (Landrum and Robbins 1990). This is a particularly serious problem in the Columbia River estuary. The Corps must examine the all available data, including data generated from the channel deepening, to determine potential contaminants. The Corps must also conduct a site-specific analysis at Youngs Bay, as well as all of the upstream and downstream areas where hydraulic and geomorphic modifications may mobilize sediments. Oregon LNG provides outdated sampling

[138] Letter from DEQ to Colonel Butler, Corps at 2 (Sept. 29, 2000).

data from 2007 and 2008. The Corps cannot rely on seven-year old data to authorize Oregon LNG's unprecedented level of dredging in Youngs Bay.

7.4.1.3 Impact to Columbia River Navigation Channel.

Oregon LNG proposes dredging adjacent to the Federal Columbia River Navigation Channel. The applicant-generated Turning Basin Hydrodynamic Modeling Report concludes that the project will not result in increased sedimentation in the navigation channel. The Corps must verify independently the applicant's conclusion. Notably, Oregon LNG relies on a two-dimensional model. As noted above, DEQ raised significant concerns about the use of a two-dimensional model for predicting sedimentation in the dynamic estuary system. Oregon LNG proposed dredging in an area that is relatively more dynamic than the upstream Clifton Channel, the proposed location of the Bradwood LNG terminal. The Corps cannot rely on Oregon LNG's conclusions about the project's impact on the Federal Navigation Channel without more in-depth analysis.

7.4.2 Biological Impacts.

The proposed dredging is the antithesis of salmon recovery and restoring estuarine habitats, as described in every local, state, and federal salmon recovery management plan. Oregon LNG's dredging will result in the permanent destruction of at least 152 acres of prime salmon habitat.[139] A portion of the project area is critical shallow water habitat. The area adjacent to Oregon LNG is widely recognized as vital fish habitat. Oregon LNG is a prime example of an unacceptable project due to its size, scope, and location in critical salmon habitat.

The Williams Expert Report describes in detail recent studies on the lower Columbia River estuary, including sampling results collected at locations at and near the project area. Oregon LNG's Biological Assessment (BA) and other application materials fail to acknowledge, let alone analyze, these studies. The Williams Expert Report states:

> In spite of presenting a large amount of information on ESA-listed salmon and steelhead populations (Section 3 of the OLNG draft Biological Assessment; CH2MHill 2013), significant recent and highly relevant research on juvenile salmonids in the lower Columbia River estuary (LCRE) and its implications were not included in the OLNG BA. That information is reviewed in this report (pp. 10-18) and includes specific studies on juvenile salmon use of estuarine habitats in the LCRE by researchers from NOAA-NMFS and ODFW (Bottom et al. 2005a, 2005b, 2008, 2011; Roegner et al. 2008, 2012;

[139] JPA Public Notice at 3.

> Weitkamp et al. 2012), and OSU's Oregon Cooperative Fisheries and Wildlife Research Unit (Anderson et al 2005; Schreck et al. 2005; Roby et al. 2005; Evans et al. 2012).
>
> *This body of research is a surprising and significant omission from the OLNG BA* as it sheds substantial light on how juvenile salmonids utilize the shallow water habitats and deeper water migratory pathways in the immediate proximity of the Oregon LNG site.
>
> The studies by Bottom, Schreck, Roegner, Weitkamp, and Thompson revealed important habitat associations, juvenile salmonid migratory patterns, and life history diversity patterns that were not previously well understood. Many of them have direct implications on the likely impacts to shall water habitats and deeper water pathways in the immediate proximity of the Oregon LNG site. *The Oregon LNG draft Biological Assessment is deficient in not considering the work these researchers and their studies more thoroughly with respect to the potential impacts of construction and operation on the proposed Oregon LNG project.*[140]

The Williams Expert Report concludes:

> Based on these results, it is clear that construction and operation of the proposed Oregon LNG project would negatively impact ESA-listed salmonids of a variety of species and life stages throughout the entire year. The habitats surrounding the proposed Oregon LNG site, both shallow water and deeper water, are used extensively by salmonids including fry for rearing, by juvenile salmonids for rearing and outmigration, and by returning adult salmon. Impacts would likely be greatest for fry-stage juvenile subyearling Chinook and chum salmon, which use the shallow water habitats of the Lower Columbia River estuary extensively for rearing and growth prior to outmigration.[141]

For the reasons explained below, the Corps should deny Oregon LNG's project because the harm to important fisheries is not in the public interest.

7.4.2.1 Loss of Habitat.

Oregon LNG's project will destroy habitat for 13 ESUs of Columbia River and Snake River salmon that are listed are threatened under the ESA, in addition to multiple other non-listed salmon and other listed species that rely on the estuary for rearing and migration. Each fish species likely passes directly through the proposed site. The Corps cannot rely on Oregon LNG's faulty analysis of aquatic life because the applicant fails to adequately consider studies on ESA-listed species presence at and near the project area. In addition, Oregon LNG fails to discuss and

[140] Exhibit 1 at 25 (emphasis added) (Williams Expert Report).
[141] *Id.*

analyze the project's potential impact on an RPA in the FCRPS BiOp: the Youngs Bay SAFE Enhancement project.

The south channel of the Columbia River is a primary migration corridor for downstream migrating juvenile salmon (listed species). The estuary is already identified in the FCRPS BiOp as a large survival bottleneck for upriver stocks of salmon, and is key rearing and migration habitat for lower river (below Bonneville) fish. Any change in currents, habitat, or food resources could adversely affect survival during passage as the fish transition from brackish to marine waters. For example, should residence time of fish increase in the area, which is likely if currents change, the juveniles will become more vulnerable to avian predation. Avian predation already accounts for a large proportion of the mortality of juvenile salmon, particularly in the lower estuary.[142]

Oregon LNG underestimates ESA-listed species presence within the project area, and undervalues the project area's importance for ESA species recovery. The Williams Expert Report explains this oversight, stating:

> Studies by Bottom, Schreck, Roegner, Weitkamp, and Thompson document widespread use of nearshore habitats by juvenile salmonids, particularly subyearling Chinook and chum salmon, in Youngs Bay and Point Adams Beach, areas that abut the OLNG site upstream and lie just downstream, respectively. These results highlight the potential impacts that construction and operation of the proposed Oregon LNG Project would have on ESA-listed juvenile salmonids[.][143]

In addition, many of the outmigrating juvenile ocean-type (subyearling) salmonids move along the southern shore (Roegner et al. 2012). The Williams Expert Report explains the significance of this fact, stating: "Because there is not alternative migration pathway for them [the subyearling salmonids], they are forced into deeper water if the area is dredged and pilings and overhead structures are built."[144] The Williams Expert Report concludes that "[t]his will likely result in more predation on this specific suite of juveniles by fish and birds."[145]

Sampling by ODFW in 2013-14 in the Youngs Bay Test Fishery showed the project area is used by adult Chinook salmon (both spring and fall runs), coho salmon, sockeye salmon, and steelhead trout. Adult salmon were captured in the two outer test zones, both of which abut the proposed Oregon LNG site at their northwest edges. Based on the ODFW sampling results, the

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[142] *Id.* at 24.
[143] *Id.* at 26.
[144] *Id.*
[145] *Id.*

Williams Export Report concludes that "it is likely that construction and operation of the proposed Oregon LNG project would negatively impact in-river migrating adult ESA-listed salmonids that transit the Oregon shoreline migration route that includes the project site and the outer portions of Youngs Bay."[146]

Finally, the Corps must analyze carefully input on dredging raised by resource agencies. For example, ODFW raised concerns about the biological impact of Oregon LNG's dredging in 2012 NEPA scoping comments. ODFW states:

> The ODFW is concerned about the size of the proposed dredge area for docking ships, the anticipated impacts to juvenile salmonids and eulachon, and the magnitude of the dredging which will likely have to continue outside the shipping channel throughout the life of the facility.[147]

The Corps must account for ODFW's input in weighing the public interest in authorizing 1.2 million cubic yards of dredging at the mouth of Youngs Bay.

7.4.2.2 Suspending Pollutants.

As discussed above, the dredging will harm aquatic life by introducing multiple pollutants contained in the dredge sediments and on the shorelines. The Corps must evaluate the effect of each pollutant, alone and synergistically, on salmonid health. The adverse effects of excess temperature, turbidity, oxygen demand, and some toxic pollutants is well known. The dredging will increase each of these pollutants, which will harm aquatic life. In addition, the Corps must understand the effect of multiple each toxic, organic and traditional pollutant associated with dredging and erosion near the East Skipanon Peninsula. The Corps cannot rely on Oregon LNG's application in this respect because Oregon LNG failed to collect adequate date.

Surprisingly, Oregon LNG did not analyze the tissue sample studies in this region that show high concentrations of toxic pollutants in fish tissue. The bi-state commission concluded that tissue samples were a more reliable measure of the pollution problem, and study of these tissues indicated significant chemical contamination problems in the Oregon LNG area. Disturbance of the area is likely to exacerbate the problem. The Corps must assess these impacts.

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[146] *Id.* at 26.
[147] Exhibit 12 (Letter from State of Oregon to FERC, State of Oregon NEPA Scoping Comments, Oregon LNG (Dec. 19, 2012)).

7.4.2.3 Light, Noise, & Vibration.

The intensity of Oregon LNG's dredging is unprecedented in the Columbia River estuary. Dredging is proposed to occur *non-stop* (24 hours per day, 7 days per week) for 2 – 3 months. No other proposal for dredging in the Columbia has operated 24-hours per day, 7 days per week for multiple months. Potentially debilitating impacts to aquatic species include noise, continuous light, suspension of sediment, turbidity, loss of salmonid habitat and ability to rest or avoid predation, and potential attractant for sturgeon to a dangerous construction zone.

The Corps must analyze the effect of this barrage of noise, light, and vibration on salmonids and other resident species. The impacts from noise and light produced during dredging activities are not sufficiently analyzed in Oregon LNG's BA or Dredge Material Management Plan.

The Corps must also analyze the effect of light pollution during dredging activities. Numerous studies show light can affect a variety of aquatic organisms and may attract or repel such organisms. Oregon LNG does not indicate whether lighting will be used on the dredging ships during times of darkness. If so, lighting impacts to aquatic species during dredging activities should be analyzed by the Corps. Possible adverse impacts caused by lights during dredging activity could be attraction of fish or aquatic organisms to the dredging area, causing harm either by increased sound levels, turbidity levels, or the possibility of harm from contact with the cutter head dredging equipment. The Corps should analyze the effects any lighting during dredging activities will have on aquatic organisms so that the Corps and the public may fully evaluate the impacts of dredging activities.

7.4.2.4 Fish Entrainment.

Dredging has the potential to capture small fish and aquatic invertebrates in the flow of water and entrain them along with dredge materials being suctioned. Oregon LNG fails to disclose the method it will deploy to dredge the mouth of Youngs Bay. In turn, the public and government agencies cannot provide comments on the extent to which Oregon LNG's dredging will entrain salmonids and other ESA-listed species. The Corps, however, must analyze the impacts of fish entrainment due to dredging. The Corps must consider the fact that the fish killed will include salmonids listed as threatened under the federal ESA and the Oregon ESA. The Corps must consider that cumulative impacts on aquatic life, including the impacts from dredging, terminal construction and operation, pipeline construction and operation, as well as the impact of the channel deepening dredging.

7.4.2.5 Dredge Spoil Disposal.

Oregon LNG fails to account for the harm to aquatic life caused by dredge spoil disposal. The fact that EPA has designated a Pacific Ocean dredge spoil disposal site does not render the impacts of disposal *de minimis*. The Corps must account for impacts to aquatic life in the Pacific Ocean from depositing 1.2 million cubic yards of dredge spoils, and an additional 300,000 cubic yards every three years.

7.4.3 Economic & Human Use Impacts.

Dredging will adversely affect the commercial and recreational fishing industries. In Oregon, Washington, and Idaho, thousands earn their livelihood from salmon and steelhead fishing.[148] The recreational fishing industry is worth millions more. The continued success of these industries depends on the recovery of healthy populations of fish and continued access to the traditional fishing areas. Oregon LNG's dredging will adversely affect both of these requirements.

First, the dredging will degrade vital fish habitat, which will reduce health of the fisheries. The commercial salmon fishery is already severely limited due to dwindling populations. Oregon LNG's permanent destruction of key salmon habitat will further degrade the fishery, and, in turn, degrade the opportunities for commercial and recreational fishing, as well as tribal fishing rights throughout the Columbia River Basin.

In addition, the 24-hour per day dredging will completely block access to the traditional fishing grounds at the mouth of Youngs Bay. This will seriously degrade sport and commercial fishing and violate the public trust. The Corps must analyze this impact in the public interest analysis.

7.5 Terminal Construction.

7.5.1 Wetland Fill.

Oregon LNG proposes to permanently fill 33.78 acres of palustrine and estuarine wetlands.[149] The fill will modify the physical characteristics by replacing wetlands with sand and then concrete. The fill will destroy the filtering capacity of the wetlands, which will lead to

[148] Exhibit 26 at 4 (Ecotrust, *Economic Risk of the Morrow Pacific Project: Livelihood, Habitat, and Recreation* (Mar. 20, 2014)).
[149] JPA Public Notice at 2.

increased run-off, turbidity, and water temperature. The biological impacts of the proposed fill are severe.

The loss of additional estuarine wetlands only compounds the significant loss of wetlands in the lower Columbia River. According to a recent study by the Lower Columbia River Estuary Partnership, 68 to 70 percent of vegetated tidal wetlands, which are critical habitats for juvenile salmonids, were lost since 1870.[150] An expert report on the impacts of Oregon LNG's fill at the Terminal site further describes the historic loss of wetlands in lower Columbia River estuary. Wetland ecologist Kenneth F. Bierly, former Wetlands Program Manager for the Oregon Department of State Lands and former Deputy Director for the Oregon Watershed Enhancement Board, prepared a report, *Oregon LNG Terminal Wetland Impact and Proposed Mitigation Review: Analysis of Available Information* (hereafter Bierly Expert Report).[151] The report describes the historic loss of wetland habitat near the proposed Terminal site, stating:

> There have been significant losses of emergent wetlands from the Youngs Bay reach of the lower Columbia River.
>
> * * *
>
> The most recent analysis of habitat change in the Lower Columbia River for the lower river hydrogeomorphic unit that includes the Skipanon and Youngs Bay shows a historic loss of more than 6,000 acres of emergent marsh. The report (Marco and Pilson, 2012) describes the area as 'Reach A was historically dominated by herbaceous tidal wetlands, and thus this class exhibited the sharpest overall areal decline, while the wooded wetlands classes showed significant declines as well relative to their initial extents.' While the proponent of the project emphasize the loss of forested wetlands, the area of the terminal was historically emergent wetlands of the preponderance of losses of the lower river reach has been emergent wetlands. The loss of an additional 35 acres of marsh compounds the historic loss of more than 6,000 acres of tidal wetlands.[152]

The Bierly Export Report also notes that "[t]he Youngs Bay area has had significant losses of emergent tidal wetlands near the river[]" and "the tidal regime change has reduced salinity intrusion and affected the estuarine habitats."[153] Wetland losses around the Skipanon River eliminated nearly all the fringing marsh area of the south bank of the lower reach of the

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[150] Exhibit 27 (Lower Columbia River Estuary Partnership, *Habitat change in the Lower Columbia River and Estuary, 1870-2011* (2013)).
[151] Exhibit 2, the Bierly Expert Report, is incorporated by reference into these comments.
[152] Exhibit 2 at 2–5 (Bierly Expert Report).
[153] *Id.* at 5.

Columbia River adjacent to the main channel. In this degraded state, every remaining acre of wetland is important.

The Corps should deny Oregon LNG's permits because the East Skipanon Peninsula contains an impressive array of healthy wetlands that benefit juvenile salmonids. The Bierly Expert Report describes the habitat value of the East Skipanon Peninsula wetlands, and why the applicant's conclusions about the wetland quality are not based on the best available science. The Bierly Expert Report states:

> Previous studies for facility development at the east bank Skipanon site have characterized the wetlands and flats along the site as 'productive tidelands' based on benthic invertebrate sampling and tidal marsh detritus production availability to the estuary (Montagne & Associates, Inc., 1976).[154]

In addition, the Bierly Expert Report notes that "[t]he most recent evaluation of 'priority habitats' for the Columbia River Estuary (LCREP, 2013, Figure 32) clearly shows the wetlands fringing the Skipanon peninsula as 'existing priority habitat.' "[155]

Oregon LNG's opinion on the quality and value of the East Skipanon Peninsula wetlands is not supported by the best available science. According to Oregon LNG, the tidal wetlands are considered "Priority 5" habitats using ODFW's ranking scheme.[156] Oregon LNG's categorization makes the judgment that the marshes are "not essential habitat for fish and wildlife" and that the marshes are "not readily accessible because of lack of developed channels."[157] After reviewing Oregon LNG's filings, the Bierly Expert Report concludes that "this is a judgment based on limited or no information." In contrast, the Bierly Expert Report concludes that, based on the best available science, the low and high marsh on the East Skipanon Peninsula are at least Priority 2 using ODFW's rankings scheme. The Bierly Expert Report describes the evidence for drawing this conclusion, stating:

> Studies of the use of tidal marshes in the Salmon River Estuary has documented juvenile salmon use of the marsh plain outside tidal channels and limitations of access by limited access to a breached dike site (Gray et al., 2002; Gray, 2005). In a recent review of juvenile salmon use in Columbia River Estuary Bottom et al. (2011) concluded: 'Extensive wetland diking and filling in the lower estuary has eliminated habitat for fry and fingerling migrants and has likely reduced the expression of some estuary-resident

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[154] *Id.* at 6.
[155] *Id.*
[156] Oregon LNG Resource Report, Appendix 3B at 9 – 12.
[157] Exhibit 2 at 6 (Bierly Expert Report).

> life histories. Substantial losses of historical wetlands in the lower estuary have reduced rearing opportunities for fry and fingerling migrants that tend to remain in the estuary for the longest periods.'[158]

The Bierly Expert Report demonstrates that Oregon LNG failed to rely on the best available science in reaching its conclusion that the East Skipanon Peninsula wetlands are low quality habitat.

Research in the Columbia River estuary demonstrates that the Skipanon Peninsula wetlands are priority habitat. Recent studies of juvenile salmonid use of the Columbia River estuary (Roegner *et al.* 2004) shows the Skipanon shoreland as having high habitat utilization potential for juvenile salmonids.[159] For example, recent research on juvenile salmonid use of the Columbia River estuary (Johnson et al. 2013) show use of marshes established on the periphery of disposal sites similar in origin and structure to the East Skipanon Peninsula wetlands.[160] Simenstad *et al.* (2000) describe marsh habitats immediately adjacent to low tide reaches as particularly important for juvenile salmon production and survival. As the Bierly Expert Report explains, "With the limited knowledge of the behavior of juvenile salmon in the Columbia River estuary, yet a growing awareness of the estuary in salmon survival, eliminating more fringing tidal marsh in the lowest portion of the estuary has significant long-term risk."[161] The public interest in protecting special aquatic sites and habitat that supports ESA-listed species weighs in favor of denying Oregon LNG's permits.

Finally, the Corps must also consider input from state and federal natural resource agencies. For example, in 2012 NEPA scoping comments on the Oregon LNG project, ODFW stated:

> The ODFW is concerned about impacts to the high quality wetland surrounding the terminal resulting from improvements or alteration of the existing access road to the facility. An alternatives analysis in the EIS that contains other options than improvement or alternation of that existing road will help the ODFW understand the measures taken by the Applicant to avoid and minimize impact to habitat and species. The ODFW recommends the EIS contain analysis and discussion pertaining to the road location, design, and alternatives considered as well as analysis of those options eliminated from further consideration. Ideally, the existing access road to the proposed export terminal

[158] *Id.* at 6-7.

[160] *Id.* at 7.
[161] *Id.* at 8.

facility would be abandoned habitat restored, and a new access road would be proposed at a location that does not fragment habitat patch size and reduce quality habitat.[162]

The Corps must account for issues raised by natural resource agencies during both the NEPA process as well as the comment period on the 404/10/103 permits.

7.5.2 Stormwater.

Stormwater pollution is a leading cause of water quality degradation in the United States. According to the National Research Council, "[s]tormwater runoff from the built environment remains one of the great challenges of water pollution control, as this source of contamination is a *principal contributor* to water quality impairment of waterbodies nationwide."[163] Stormwater from construction sites can lead to discharges of sediment, turbidity, nitrogen, phosphorus, metals, trash and debris, nutrients, organic matter, pesticides, petroleum hydrocarbons, polycyclic aromatic hydrocarbons (PAHs), other toxic organics, substances that can modify pH, and pathogens.[164] EPA acknowledges that the cumulative effects of these pollutants are significant.[165]

The Corps' public interest analysis must consider the detrimental impacts of polluted stormwater from Terminal construction. No impervious surfaces currently exist at the Terminal site.[166] The Terminal will result in approximately 28 acres of impervious surfaces.[167] The Terminal access road will create 2.5 acres of impervious surface.[168] Stormwater pollution caused by construction of the Terminal will contribute to degraded water quality in the Columbia River estuary, generally, and Youngs Bay, specifically. The Corps must afford careful consideration to the degraded state of the Columbia River estuary, 303(d) listings, and ESA listings. Based on these factors, the Corps should deny Oregon LNG's proposal to increase significantly pollution in this degraded system.

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[162] Exhibit 62 at 25 (State of Oregon, ODFW, NEPA Scoping Comments).
[163] *Urban Stormwater Management in the United States*, National Research Council (Oct. 15, 2008), http://www.epa.gov/npdes/pubs/nrc_stormwaterreport.pdf (emphasis added).
[164] *See* EPA's *Environmental Impact and Benefits Assessment for Proposed Effluent Guidelines and Standards for the Construction and Development Category*, 3–6 (Nov. 2009), http://www.epa.gov/ guide/construction/; *see also* 74 Fed. Reg. 62996, 63010 – 011 (December 1, 2009).
[165] *Id.*
[166] JPA at 6-3.
[167] *Id.*
[168] *Id.*

7.5.3 Water Consumption.

The Corps' public interest analysis must account for the significant amount of water used by Oregon LNG during construction. According to Oregon LNG's FERC filings, constructing and testing the Pipeline and Terminal will initially consume 182,900,000 gallons of water.[169] Oregon LNG intends to purchase the water to hydrostatically test the Pipeline from the City of Woodland, Washington.[170] Water to hydrostatically test the infrastructure at the Terminal would likely come directly from the Columbia near Warrenton.[171] Oregon LNG's use of millions of gallons of water to build the Terminal and Pipeline must be accounted for in the public interest analysis.

7.5.4 Air Pollution.

Oregon LNG fails to consider the temporary increases in air pollution resulting from construction activities. Numerous activities conducted during construction of the proposed Terminal will cause increases in air pollutant levels in the region. These activities include anything from the operation of construction equipment to increases in vehicle traffic to and from the site. Construction equipment, including dredge ships, and vehicles transporting construction supplies will add to the emissions. Oregon LNG's analysis fails to demonstrate whether project construction will exceed National Ambient Air Quality Standards (NAAQS). Certain emission (NO_x and VOCs) will raise regional emissions during construction. If regional emissions are raised by more than 10 percent in some instances, the local effect may be sufficient to cause some respiratory distress in humans or animals.

7.5.5 Noise & Light Pollution.

Noise and light levels during construction of the proposed Terminal will reach levels that could be a nuisance to humans and cause harm to animals. Noise will originate from a variety of sources during construction, including increased vehicle traffic, engine driven construction equipment, pile driving, and blasting activities. The impacts from these sources of noise are either inadequately addressed by Oregon LNG or the mitigation measures proposed are not sufficiently clear or effective to prevent nuisance or harm to humans and animals in the affected region.

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[169] Oregon LNG, Prefiling Review Draft Resource Report 1—General Project Description, 1-21, 1-22.
[170] *Id*. at 2-15.
[171] *Id*.

In addition, light from construction activities and the overall Terminal lighting plan can adversely affect fish and wildlife behavior. Oregon LNG does not adequately assess the possible impacts of Terminal construction and lighting. Oregon LNG recognizes that artificial lighting can have adverse effects on wildlife in the areas surrounding the Terminal. However, Oregon LNG has not submitted a detailed final lighting plan for either construction or terminal operations. The Corps must analyze the impact of light on aquatic and terrestrial species.

In, pile driving will have a substantial adverse impact on underwater organisms. Oregon LNG proposes driving either four or eight piles per day.[172] With a total of 150 piles in the current design, that totals 19 to 38 days of pile driving over a four month period.[173] Oregon LNG suggests a number of proposed mitigation measures to alleviate some of the harm of pile driving. Yet Oregon LNG fails to show that harm will not occur to organisms in the vicinity, especially pinnipeds and salmonids. First, even if all the mitigation measures proposed by Oregon LNG work, the threshold level for physiological harm for salmonids of 180 dB re: 1 µPa will not be met within close proximity to pile driving. Furthermore, even with the mitigation measures the noise levels will still exceed the behavioral impact levels of 150 dB re: 1 µPa more than a mile away. Given that the pile driving is estimated to last for approximately four months, many endangered fish and other animals could be killed, or at the very least harmed, by this activity.

Oregon LNG's proposed mitigation may not even work to reduce underwater noise. The Bradwood LNG DEIS noted that there is the possibility bubble curtains may not have their full intended mitigating effect, and NFMS has echoed concerns about the efficacy of bubble curtains in its May 11, 2007, letter to FERC. The Bradwood LNG DEIS recommended that Bradwood file a contingency plan if the bubble curtains do not work as intended before pile driving commences.[174] A similar contingency plan is warranted for the Oregon LNG project.

In addition to underwater noise impacts, Oregon LNG's construction activities may disturb various birds, including migratory birds. Oregon LNG fails to address the impacts of construction noise to bird species in its Application. Oregon LNG also fails to address this issue in the Biological Assessment.

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[172] Oregon LNG BA at 3-52.
[173] *Id.*
[174] Bradwood DEIS at 4-139.

7.6 Terminal Operation.

Oregon LNG's operations will contribute to the degraded water and air quality in the Columbia River estuary. The Corps must consider the direct, indirect, and cumulative effects of Oregon LNG's Terminal in considering Oregon LNG's compliance with 404(b)(1) Guidelines. For the reasons stated below, the Corps should deny Oregon LNG's permits.

7.6.1 Stormwater.

Oregon LNG's Terminal will increase impervious surfaces, reduce natural infiltration and associated water quality benefits, and increase polluted stormwater runoff to the Skipanon and Columbia rivers. As Commenters explain above, stormwater pollution would contribute to the degraded state of water quality in the Columbia River estuary. The Corps must consider the public interest in additional polluted stormwater when weighing the benefits and harms caused by Oregon LNG's Terminal.

7.6.2 Wastewater.

The Columbia River, and the communities that depend on it, face serious threats from toxic pollution and elevated temperature. Every day thousands of pipes buried under and along the Columbia River discharge toxic and other pollution from cities, industry, stormwater, and other sources. Pesticides and heavy metals also enter the river from non-point source pollution, such as runoff from agricultural lands and air deposition. In its Application, Oregon LNG proposes increasing toxic and temperature pollution to an already overburdened river system. The public interest in fishable, swimmable rivers weighs in favor of denying Oregon LNG's permits.

During operation, the Terminal would discharge polluted process wastewater via the City of Warrenton Publicly Owned Treat Works (POTW). The City of Warrenton POTW has a history of violating National Pollutant Discharge Elimination System (NPDES) permit limits.[175] Oregon LNG's Prefiling Draft Resource Reports grossly underestimate the water quality impacts to the estuary by concluding, in summary fashion, that the POTW will comply with applicable federal and state standards. The Corps must analyze the direct, indirect, and cumulative impacts of discharging more pollution to the heavily degraded Columbia River, including the City of

[175] Oregon Department of Environmental Quality Fact Sheet, City of Warrenton POTW at 2, http://www.deq.state.or.us/wqpr/372_2009120800021CS01.PDF.

Warrenton's capacity to treat Oregon LNG's wastewater and the City's ability to comply with Oregon's human health criteria for toxics and other water quality standards

Commenters hereby incorporate by this reference Exhibit 28, Columbia Riverkeeper's comments on Oregon LNG's draft NPDES permit (hereafter Riverkeeper NPDES Permit Comments). As the Riverkeeper NPDES Permit Comments demonstrate, Oregon LNG's polluted wastewater discharges fail to comply with the CWA and state water quality standards. For example, Oregon LNG's application states that it would use the City of Warrenton's regulatory mixing zone. Oregon LNG's NPDES permit application ignores a practical reality. Oregon LNG is not "using" the City's mixing zone; it is creating a second, overlapping mixing zone on top of the City's existing mixing zone. Oregon LNG cannot demonstrate compliance with OAR 340-041-0053(2)(c)(A)–(B), which require that mixing zones be as small as possible and not overlap.

Oregon LNG also fails to demonstrate compliance with water quality standards for temperature. The Columbia River is water quality limited for temperature (*i.e.*, on Oregon's EPA-approved 303(d) list) at the City of Warrenton outfall. Oregon LNG proposes to use a regulatory mixing zone for temperature. Absent a mixing zone, Oregon LNG proposes to discharge wastewater in exceedance of Oregon's numeric temperature criteria. To date, neither EPA nor the states of Oregon and Washington have issued a temperature Total Maximum Daily Load (TMDL) for the Columbia River. Oregon LNG's NPDES permit application assumes incorrectly that there is assimilative capacity for temperature in the Columbia River. Oregon LNG's proposal to apply a mixing zone for temperature fails to comply with the CWA given the Ninth Circuit's ruling in *Friends of Pinto Creek v. EPA,* 504 F.3d 1007 (9th Cir. 2007).

Furthermore, Oregon LNG's grand plans to mix wastewater with other permitted facilities is highly questionable. Oregon LNG's NPDES permit application states that it will use effluent from the City of Warrenton POTW and discharge wastewater via the existing City of Warrenton outfall. In NEPA scoping comments to FERC, the City of Warrenton states:

> While domestic water use at the [Oregon LNG] facility is likely to be nominal, processing water demands and subsequent discharges will likely strain the city's systems. The EIS should analyze the projected demand of both domestic and process water and the city's capacity to provide such volumes to the plant and any improvements necessary to the city's system to meet the demand. Similar analyses should address the disposal of process water from the plant.[176]

[176] Exhibit 14 (Letter from City of Warrenton to FERC, Oregon LNG NEPA Scoping Comment (Dec. 21, 2012)).

There is no evidence that Oregon LNG has reached an agreement with the City of Warrenton to use its effluent and outfall.

In addition, Oregon LNG proposes using a large proportion of the City of Warrenton POTW's wastewater as process water. The balance of wastewater effluent and intake from the Terminal is confusing, and the information in Oregon LNG's NPDES permit application contradicts the assertion that Oregon LNG will use more POTW water than it discharges into the system. For instance, Oregon LNG's application demonstrates in a block flow diagram that the Terminal will discharge more water to Warrenton's POTW than it receives.[177] According to the figure, as well as the discussion on Oregon LNG NPDES permit application page 2-2, Oregon LNG will generally discharge more wastewater than it receives from the POTW system. In addition, Oregon LNG's application fails to address how the devastating fire at Pacific Seafood in June 2013 will impact its plans and associated reasonable potential analyses.[178] For the reasons stated above and described in the Riverkeeper NPDES Permit Comment, Oregon LNG's wastewater disposal plans remain dubious.

The Corps must analyze carefully Oregon LNG's application, and the representations therein, to ensure pollution from Oregon LNG does not compromise public health or salmon recovery efforts in the Columbia River Basin.

7.6.3 Water Consumption.

Oregon LNG's Terminal alone will use over four billion gallons of water per year. The Corps must evaluate the public interest in using the State of Oregon's limited water resources for LNG export. The Terminal requires water on a continuous basis for cooling, ballast water, irrigation, fire suppression, and domestic purposes.[179] Oregon LNG proposes withdrawing water from the Columbia and the Skipanon rivers and/or buying water from the City of Warrenton to meet these water needs.[180] During operation, the Terminal will use over 11 million gallons of

[177] *See* Oregon LNG NPDES Permit Application, Figure 2-1, "Cooling Water Makeup Supply and Treatment – Block Flow Diagram."
[178] OPB, *Pacific Seafood finds temporary facilities after processing plant fire* (June 14, 2013), http://www.opb.org/news/article/pacific-seafood-finds-temporary-facilities-after-processing-plant-fire/.
[179] Oregon LNG, Prefilling Review Draft Resource Report 2 — Water Use and Quality, 1-21.
[180] *Id.*

water per day.[181] By comparison, water users in the entire city of Astoria use an average of 2.5 million gallons of water per day.[182]

Given the well-documented scarcity of water in the Columbia River Basin, the Corps must undertake a robust analysis of the direct, indirect, and cumulative impacts of taking more water out of the Columbia River and its tributaries to support LNG export. This includes evaluating how Oregon LNG's water withdrawals impact water availability, particularly in light of climate change modeling, impacts to Columbia River water quality, impacts to ESA-listed species and other aquatic life and wildlife, and the cumulative impacts of water withdrawals in the estuary, specifically, and Columbia River Basin, in general.

7.6.4 Air Pollution.

The Corps must weigh the direct, indirect, and cumulative impacts of Oregon LNG's air pollution emissions in evaluating the public interest in authorizing Oregon LNG's project. Oregon LNG acknowledges the proposed Terminal is a "major source" and must obtain a preconstruction major source permit, an Air Contaminant Discharge Permit, and an operating permit, a Title V major source permit. This is a significant change from the LNG import proposal. According to Oregon LNG's FERC filing, the facility exceeds the greenhouse gas PSD threshold. The facility's emissions will also exceed the Significant Emissions Ration (SER) thresholds for NOx, CO, SO2, and PM2.5. Operation of the proposed Terminal, Pipeline, and other facilities will emit harmful carbon monoxide (CO), nitrogen oxides (NO_x), volatile organic chemicals (VOC), greenhouse gases (GHGs), sulfur dioxides (SO_x), particulate matter (PM_{10} and $PM_{2.5}$), and hydrogen sulfide (H_2S) pollution.

The following section discusses solely the emissions associated with operation of the Terminal and Pipeline, but as Oregon LNG application acknowledges, construction of the project will result in significant emissions in addition to the quantities discussed below.

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[181] Oregon LNG's filings state that it will discharge, at most, 3.5 million gallons of water per day to the City of Warrenton POTW. Oregon LNG Export Project Prefiling Resource Report 1 at 1-25. Consequently, Oregon LNG's consumptive use of water exceeds 7.5 million gallons of water per day.

[182] Daily Astorian, *Where does Astoria's water come from?,* http://www.dailyastorian.com/free/where-does-astoria-s-water-come-from/article_8ccacabe-dfcb-11e0-a440-001cc4c03286.html

VOC and NO_x

The proposed Oregon LNG project will cause significant emissions of VOCs and NO_x, emitted directly from project facilities and indirectly from tanker and other ship traffic and operations. In total, Oregon LNG estimates emissions of 736.1 tons per year (tpy) of NO_x emissions and 60.47 tpy of VOC.[183] Oregon LNG's figures provide an incomplete picture, because they do not include emissions from the WEP Pipeline. The WEP Pipeline includes installing an additional 90,000 horsepower of compression.[184] The documents submitted in connection with that project do not specify whether these compressors will be powered by electricity from the grid, natural gas, or some other power source. Because natural gas fired compressors have significant NOx and VOC emissions, total emissions resulting from the project could much higher than the above.[185] Where electrical compressors are used, the Corps must consider the power source and power line route that will service the compressors.

These emissions will harm the environment by increasing the formation of ground level ozone. VOCs and NO_x contribute to the formation of ground-level ozone, also referred to as smog. Smog pollution harms the respiratory system and has been linked to premature death, heart failure, chronic respiratory damage, and premature aging of the lungs.[186] Smog may also exacerbate existing respiratory illnesses, such as asthma and emphysema, or cause chest pain, coughing, throat irritation and congestion. Children, the elderly, and people with existing respiratory conditions are the most at risk from ozone pollution.[187]

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[183] The 736.1 tpy of NO_x includes 76.1 tpy from terminal operations, 53.9 tpy from ship and dredging activity near the terminal site, 304 tpy from induced tanker transits Oregon exclusive economic zone (EEZ), and 306.1 tpy in the Alaska EEZ. *See* FERC Dkt. PF12-18, Resource Report (RR) 9-16 to 9-19. For VOC, 35.8 tpy are emitted from terminal facilities.

[184] FERC Dkt. PF12-20 RR 1-1, 1-42 (Aug. 16, 2012).

[185] The proposal for the Oregon Pipeline proposes electrically driven compression, the environmentally preferable option with few direct NOx or VOC emissions. RR 1-18, 9-13.

[186] EPA, *Proposed New Source Performance Standards and Amendments to the National Emissions Standards for Hazardous Air Pollutants for the Oil and Natural Gas Industry: Regulatory Impact Analysis*, 4-25 (July 2011), http://www.epa.gov/ttnecas1/regdata/RIAs/oilnaturalgasfinalria.pdf. (hereinafter O&G NSPS RIA) Jerrett *et al.*, *Long-Term Ozone Exposure and Mortality*, New England Journal of Medicine (Mar. 12, 2009), http://www.nejm.org/doi/full/10.1056/NEJMoa0803894#t=articleTop.

[187] *See* EPA, *Ground-Level Ozone, Health Effects*, http://www.epa.gov/glo/health.html. EPA, Nitrogen Dioxide, Health, available at http://www.epa.gov/air/nitrogenoxides/health.html.

Significant ozone pollution also damages plants and ecosystems.[188] Ozone also contributes substantially to global climate change over the short term. According to a recent study by the United Nations Environment Programme, behind carbon dioxide and methane, ozone is now the third most significant contributor to human-caused climate change.[189]

CO

Operation of the proposed terminal will directly emit 150.5 tpy of CO, with an additional 197.18 tpy of marine vessel emissions.[190] As with NOx and VOC, additional compressors installed as part of the Washington Expansion Project may raise this total. CO can cause harmful health effects by reducing oxygen delivery to the body's organs and tissues.[191] CO can be particularly harmful to persons with various types of heart disease, who already have a reduced capacity for pumping oxygenated blood to the heart. "For these people, short-term CO exposure further affects their body's already compromised ability to respond to the increased oxygen demands of exercise or exertion."[192]

GHGs

Oregon LNG estimates that the Terminal, Pipeline, and associated facilities will directly emit over 2.6 million tpy of carbon dioxide equivalent in greenhouse gases (CO2e), with an additional 118,544.6 tpy emitted by marine vessel traffic.[193] These greenhouse gas emissions will contribute to climate change, harming both the local and global environments.

The impacts of climate change caused by greenhouse gases include "increased air and ocean temperatures, changes in precipitation patterns, melting and thawing of global glaciers and ice, increasingly severe weather events, such as hurricanes of greater intensity and sea level rise."[194] A warming climate will also lead to loss of coastal land in densely populated areas,

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[188] O&G NSPS RIA at 4-26.
[189] *Id. See also* United Nations Environment Programme and World Meteorological Organization, (2011): *Integrated Assessment of Black Carbon and Tropospheric Ozone: Summary for Decision Makers* (hereinafter "UNEP Report," http:// www.unep.org/dewa/Portals/67/pdf/Black_Carbon.pdf), at 7.
[190] Oregon LNG Resource Report 9, Air and Noise Quality at 9-16 to 9-18.
[191] EPA, *Carbon Monoxide*, http://www.epa.gov/air/carbonmonoxide/health.html.
[192] *Id.*
[193] Oregon LNG Resource Report 9, Air and Noise Quality at 9-16 to 9-19.
[194] 76 Fed. Reg. at 52,791-22 (citing U.S. EPA, 2011 U.S. GREENHOUSE GAS INVENTORY REPORT EXECUTIVE SUMMARY (2011).

shrinking snowpack in Western states, increased wildfires, and reduced crop yields.[195] More frequent heat waves as a result of global warming have already affected public health, leading to premature deaths. And threats to public health are only expected to increase as global warming intensifies. For example, a warming climate will lead to increased incidence of respiratory and infectious disease, greater air and water pollution, increased malnutrition, and greater casualties from fire, storms, and floods.[196] Vulnerable populations—such as children, the elderly, and those with existing health problems—are the most at risk from these threats.

The Oregon LNG's project and climate change are discussed in greater detail below in Section 7.18.

Sulfur Dioxide

The Terminal and compressor stations will directly emit an estimated 72 tpy of SO_2, with an additional 80.88 tpy emitted by marine vessel traffic.[197] Sulfur dioxide causes respiratory problems, including increased asthma symptoms. Short-term exposure to sulfur dioxide has been linked to increased emergency room visits and hospital admissions. Sulfur dioxide reacts in the atmosphere to form particulate matter (PM), an air pollutant which causes a great deal of harm to human health.[198] PM is discussed separately below.

Particulate Matter

The proposed Terminal and Pipeline compressor stations will directly emit an estimated 14.9 tpy of particulate matter, with an additional 51.2 tpy emitted by marine vessel traffic.[199] PM consists of tiny particles of a range of sizes suspended in air. Small particles pose the greatest health risk. These small particles include "inhalable coarse particles," which are smaller than 10 micrometers in diameter (PM_{10}), and "fine particles" which are less than 2.5 micrometers in diameter ($PM_{2.5}$). PM_{10} is primarily formed from crushing, grinding or abrasion of surfaces. $PM_{2.5}$ is primarily formed by incomplete combustion of fuels or through secondary formation in the atmosphere.[200]

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[195] *Id.* at 66, 532–33.
[196] EPA, *Climate Change, Health and Environmental Effects*, http://epa.gov/climatechange/effects/health.html.
[197] Oregon LNG Resource Report 9, Air and Noise Quality at 9-16 to 9-19.
[198] EPA, Sulfur Dioxide, Health, http://www.epa.gov/air/sulfurdioxide/health.html.
[199] Oregon LNG Resource Report 9, Air and Noise Quality at 9-16 to 9-19.
[200] *See* EPA, Particulate Matter, Health, http://www.epa.gov/pm/health.html; BLM, *West Tavaputs Plateau Natural Gas Full Field Development Plan Final Environmental Impact*

PM causes a wide variety of health and environmental impacts. PM has been linked to respiratory and cardiovascular problems, including coughing, painful breathing, aggravated asthma attacks, chronic bronchitis, decreased lung function, heart attacks, and premature death. Sensitive populations, include the elderly, children, and people with existing heart or lung problems, are most at risk from PM pollution. PM also reduces visibility,[201] and may damage important cultural resources.[202] Black carbon, a component of PM emitted by combustion sources such as flares and older diesel engines, also warms the climate and thus contributes to climate change.[203]

7.6.5 Noise & Light Pollution.

Oregon LNG's Terminal will operate around the clock, lighting the night sky as part of their 24-hour surveillance requirements and creating loud noises as they convert natural gas into LNG. According to Oregon LNG's latest filings, the Terminal will require the ability to flare gas —a visual blight in the scenic Columbia River estuary.

The Corps must examine how noise and light pollution will harm the communities in the estuary, as well as fish and wildlife. This includes examining the impact of noise and light pollution from Pipeline compressor stations. The Corps must account for direct, indirect, and cumulative impacts of noise and light pollution, including impacts:

- during the LNG Terminal construction phase (discussed above);
- in the course of the LNG Terminal's operational life;
- from LNG tankers;
- during Pipeline and compressor station construction;
- during Pipeline maintenance
- from Pipeline compressor stations.

The Corps' analysis must include impacts of light and noise pollution on nearby residents, including impacts on residents' sleep and attendant health consequences.

Statement (West Tavaputs FEIS), at 3-19 (July 2010), http://www.blm.gov/ut/st/en/fo/price/energy/Oil_Gas/wtp_final_eis.html.

[201] EPA, *Visibility – Basic Information*, http://www.epa.gov/visibility/what.html.

[202] *See* EPA, Particulate Matter, Health West Tavaputs EIS, at 3-19; O&G NSPS RIA at 4-24.

[203] UNEP Report at 6; IPCC (2007) at Section 2.4.4.3.

Specific impacts include generating fog and gas flaring. The Terminal will generate fog during operation of large ambient air vaporizers. The Terminal also requires gas flaring. In weighing the public interest, the Corps must evaluate how the Oregon LNG project—including both import and export functions—could impact visibility in Warrenton and surrounding communities.

7.6.6 Energy Consumption & Associated New Energy Infrastructure.

Oregon LNG's project requires huge amounts of energy to transport and liquefy natural gas. Notably, the proposed Jordan Cove LNG terminal would require a 420 MW gas-fired power plant, which the Oregonian concluded would be one of the biggest sources of greenhouse gases in Oregon.[204] The source of Oregon LNG's power is unclear, but the company's current plans call for purchasing power from the power grid. Regardless of Oregon LNG's power source, the Corps must evaluate the environmental impacts of generating the power that would fuel the LNG Terminal and Pipeline compressor stations. In addition, the Corps' public interest analysis must evaluate the impact of Oregon LNG's electric transmission line upgrades and associated impacts to terrestrial and aquatic ecosystems, as well as National Parks. Oregon LNG's Application fails to address this issue in its entirety.

The power source for Oregon LNG's Terminal has been in flux throughout the pendency of the company's FERC applications. According to a July 1, 2014, FERC filing, Oregon LNG now intends to upgrade Pacific Power's 115-kV line through Clatsop County, Oregon. In its LNG import terminal FERC application, Oregon LNG had indicated that it would use the Bonneville Power Administration's 230-kV system for the bulk of its electricity transmission.[205] Oregon LNG did not contemplate, in Resource Report 10 of its FERC application, an alternative that incorporated the use of Pacific Power's lower-voltage 115-kV line. The change is notable because Pacific Power gets roughly two-thirds of its electricity from coal-fired power plants.[206] It also requires Oregon LNG to expand its right-of-way rather than re-conducting the existing 230-kV Bonneville line.

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[204] Exhibit 51 (Oregonian, *Jordan Cove LNG in Coos Bay could quickly become one of the largest greenhouse gas emitters in Oregon* (Nov. 18, 2014)).
[205] Oregon LNG Resource Report 1, Figure 1.11-1; Resource Report 10 at 10-57.
[206] Oregon Department of Energy Website, http://www.oregon.gov/energy/Pages/Oregons_Electric_Power_Mix.aspx (Jan. 12, 2015) (interactive map tool shows 67.4% of Pacific Power's energy portfolio comes from coal).

Oregon LNG's FERC filings and Application lack necessary information on the transmission line route. The latest filings by Oregon LNG provide land disturbance estimates, but lack actual maps of the new proposed Pacific Power transmission route. Oregon LNG submitted revised land disturbance information on July 1, 2014, about the impacts of what Oregon LNG termed the "Driscoll-Clatsop-Warrenton 230-kV line." Driscoll, Clatsop and Warrenton are the names of substations that would have to be upgraded to facilitate the new 230-KV line. Oregon LNG's July 1st filing also indicates that it will upgrade facilities in Warrenton, such as the Warrenton substation and transmission lines to the Terminal.

Oregon LNG's consolidated land use application to Clatsop County omitted discussion of new transmission lines or significant upgrades to Pacific Power's 115-kV line. In a July 9, 2014, letter from Clatsop County's attorney to Oregon LNG's attorney, the County wrote:

> It is important for Clatsop County to understand the proposed changes to electric transmission lines within its jurisdiction, however this new FERC filing does not specify where the identified land impacts will occur. We therefore request that you review this issue with your client, and either inform us where the land impacts and upgraded electric transmission lines are shown in the existing application and record, *or explain how you intend to obtain county land use approval for these transmission lines and their associated land impacts.*[207]

The County appears likely to require land use approval for the new proposed electrical facilities.

The Corps' public interest analysis must evaluate the impacts of Oregon LNG's power source and transmission line upgrades. This includes air pollution, climate change, and other impacts caused by the generation of power for Oregon LNG's Terminal. At a minimum, Oregon LNG will likely require 350 MW of energy every day, which is more energy than the average U.S. power plant generates in a day. Jordan Cove LNG plans to build its own gas-fired power plant, the South Dunes Power Project, to provide a stable power source for its proposed LNG export terminal in Coos Bay, Oregon. If Oregon LNG also requires uninterruptible power to operate, the Corps must fully evaluate the impact of operating the facility with diesel or future gas-fired generation in the local area. The Corps' public interest analysis must also assess the direct, indirect, and cumulative impacts of energy sources that currently generate power for the grid, including hydroelectric, coal, and wind power. Overall, the Corps should deny Oregon LNG's permits based on the significant harm caused by operating and building the Terminal.
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[207] Letter from Clatsop County to Oregon LNG (July 9, 2014).

7.7 Oregon LNG's Impacts on Migratory Bird Impacts.

In considering the public interest in Oregon LNG's project, the Corps must evaluate the project's impacts on migratory and other birds. The purpose of Oregon LNG's project is to distribute natural gas feedstock from Canada. Consequently, construction and operation of this project will facilitate ongoing and additional natural gas production in Canada.[208] The Corps must therefore consider the transboundary impacts on migratory birds, including the impacts of gas drilling in Canada.

Migratory birds are fully protected under the Migratory Bird Protection Act (MBTA), which prohibits the "take" of migratory birds and their nests or eggs, except as permitted by regulation.[209] "Take" is defined by the MBTA as "pursue, hunt, shoot, capture, collect, [or] kill."[210] The prohibition applies broadly to all taking done "at any time, by any means or in any manner."[211] The Corps must ensure that the Oregon LNG's construction, operation, and the drilling that supports the natural gas feedstock for the project does not cause the unlawful take of migratory birds.

The Terminal poses significant threats to migratory birds. In September 2013, an LNG terminal in Saint John, New Brunswick, Canada, killed approximately 7,500 songbirds, including some endangered species.[212] The migrating birds flew into the gas flare at Canaport LNG. At the time, weather conditions were foggy and overcast, which may have contributed to the incident. According to the head of zoology for the New Brunswick Museum, not much is known about how such birds navigate at night, but officials believe they are attracted to light, particularly red or flashing lights. In October 2014, government regulators filed charges against Canaport LNG stemming from the massive bird kill.[213] In light of the known risks that LNG terminals pose to migratory birds, the Corps' public interest analysis must account for the threats posed by Oregon LNG's proposed Terminal.

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[208] Oregon LNG Terminal and Oregon Pipeline Project Draft Resource Report 1 at 1-3 (2008).
[209] 16 U.S.C. § 703(a).
[210] *Id.* § 715(n).
[211] *Id.* § 703(a).
[212] Exhibit 29 (The Globe and Mail, *7,500 songbirds killed at Canaport gas plant in Saint John* (Sept. 18, 2013)).

[213] Exhibit 30 (CBC News, *Canaport LNG faces charges for bird kill* (Oct. 20, 2014), http://www.cbc.ca/news/canada/new-brunswick/canaport-lng-faces-charges-for-bird-kill-1.2805161).

The Corps must also evaluate the impacts of natural gas production on migratory birds. For example, the U.S. Fish and Wildlife Service has documented that oil and gas waste pits present significant risks to wildlife. Pits can "entrap and kill migratory birds and other wildlife" as birds mistake waste pits for bodies of water and become covered with substances that may cause exposure and exhaustion.[214] In addition, the New Mexico Department of Game and Fish has expressed concern about the hazards of hydrocarbon toxicity to wildlife including "acute and chronic ingestion or absorption toxicity, loss of thermal stability from oiling of fur or feathers, and reproductive failure due to absorption of chemicals from the maternal bird body through the shell of eggs."[215] The Corps must account for migratory bird impacts in both Canada, as well as the Rocky Mountains, since Oregon LNG acknowledges that some feedstock may come from that region.

7.8 LNG Vessel Impacts.

LNG export poses significant threats to marine life. Oregon LNG's project will increase current ship traffic on the North Pacific Great Circle Route, including passing through sensitive marine life habitat such as feeding and breeding grounds and migratory routes. For example, Oregon LNG's tankers will pass through the Aleutian Islands Alaska Maritime Wildlife Refuge. The Corps must analyze the impacts of additional maritime traffic, including the increased risk of vessel spills, accidents, and harm to sensitive marine life. Oregon LNG's impacts to marine resources are addressed in comments submitted by the Center for Biological Diversity, Exhibit 4, which Commenters incorporate by reference.

Oregon LNG's Application estimates that 127 vessels will arrive annually at the Terminal and will travel primarily to and from Asia along the North Pacific Great Circle Route, past the Aleutian Islands. According to Oregon LNG, these additional 250 trips will increase travel along this route by around 6 percent. Oregon LNG's 2008 Import Terminal documents estimated that the additional trips, calculated even before the project included an export component, could increase traffic along coastal California, Oregon, and Washington by over 4 percent.[216]

For the reasons explained by the Center for Biological Diversity, the Corps must account for the impact of LNG tanker traffic on marine resources in evaluating the public interest in the

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[214] U.S. Fish & Wildlife Service, Region 6 Envtl. Contaminants Program, Reserve Pit Mgmt.: Risks to Migratory Birds (2009).
[215] Letter from Lisa Kirkpatrick, Conservation Services Division Dept. of Fish and Game, to New Mexico Oil and Conservation Division, Environmental Bureau re OCD Rule "Pits and Below-Grade Tanks" NMAC 19.15.2.40; NMGF Project No. 11251 (Feb. 2, 2007).
[216] Oregon LNG Terminal and Oregon Pipeline Project Draft Resource Report 1 at 1-26 (2008).

project. This includes the cumulative impacts of Oregon LNG tanker traffic and past, present, and reasonably foreseeable future ship traffic. For example, the Corps must analyze the combined impact of Oregon LNG's tanker traffic and the reasonably foreseeable future impacts other projects in the Pacific Northwest.

7.8.1 Ship Strikes.

Ship strikes are a major cause of death for numerous marine species, including ESA-listed whales and turtles. A 2003 report identified 292 confirmed or possible ship strikes between 1975 and 2002, finding fin and humpback whales are the species most commonly found struck.[217] Sea turtles are also struck by ships. Most ship strikes to large whales result in death.[218] In its most recent Stock Assessment Report, NMFS has also documented numerous vessel-related mortalities and serious injuries for humpback whales, fin whales, killer whales, and other species on the West Coast, including some off of Oregon and Washington.[219] However, the number of documented ship strikes grossly underestimates actual incident and mortality numbers, as many of animals sink, are scavenged, or are otherwise never seen.[220] Recent studies have estimated that only 2 percent of cetaceans killed are ever recovered, and thus mortality estimates based on stranded animals may vastly underestimate actual mortality.[221] Based on annual census records of Southern Resident killer whales, carcasses from confirmed deaths of known individuals are recovered only 6 percent of the time.[222]

In a Technical Memo, revised in June 2012, the Oregon LNG attempts to estimate the likelihood of ship strike from the project, and conclude, based on the number of documented ship

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[217] Jensen, A.S. and G.K. Silber. Large Whale Ship Strike Database. U.S. Department of Commerce, NOAA Technical Memorandum. NMFS-OPR-25, 37 (2003), www.nmfs.noaa.gov/pr/pdfs/shipstrike/lwssdata.pdf.
[218] *Id.*
[219] Caretta, J.V. et al. 2001. U.S. Pacific Marine Mammal Stock Assessments: 2011. NOAA-TM-NMFS-SWFSC-488, http://www.nmfs.noaa.gov/pr/pdfs/sars/po2011.pdf.
[220] *Id.*
[221] Williams, R. et al. 2011. Underestimating the damage: interpreting cetacean carcass recoveries in the context of the *Deepwater Horizon*/BP incident, Conservation Letters, Vol. 4, Issue 3, pp. 288-233 (June/July 2011) DOI: 10.1111/j.1755-263X.2011.00168.x.
[222] Fisheries and Oceans Canada, *Recovery strategy for the northern and southern resident killer whales (Orcinus orca) in Canada*. Fisheries and Oceans Canada, Ottawa, Canada (2008), www.cbc.ca/bc/news/bc-081009-killer-whale-recovery-strategy.pdf; *see also* Kraus, S.D. *et al.* North Atlantic right whales in crisis. *Science* 309:561-562 (2005), http://www.sciencemag.org/content/309/5734/561 (estimating that only approximately 17 percent of ship struck North Atlantic right whale are actually detected).

strikes in the area, that the likelihood is relatively low, around 0.05 per year per species.[223] Because the number of documented ship strikes does not reflect the actual number of ship strikes, this estimate is unrealistically low and ultimately unhelpful.

Oregon LNG notes that LNG carriers typically travel at almost 20 knots at ocean speeds, and 10 to 12 knots once in the Columbia River.[224] Research demonstrates a direct correlation between vessel speed and ship strikes resulting in whale mortality, including "clear evidence of a sharp rise in mortality and serious injury rate with increasing vessel speed."[225] For example, studies have found that the vast majority of lethal and serious whale ship strikes involved vessels exceeding 14 knots.

Commenters encourage the Corps to fully consider the increased risk of marine mammal vessel strikes as a result of shipping associated with this project. Commenters also encourage the Corps to consider this project's shipping impacts cumulatively with other upcoming shipping-related projects, including the Jordan Cove LNG export facility and proposed coal export, methanol, oil, and propane terminals.

Further, shipping through the Aleutian Islands is expected to increase as the Arctic sea ice recedes from global warming. This adds to the risk of ship strikes, underwater noise, and greenhouse gas and other emissions from the ships. Commenters encourage the Corps to consider both the proposed impacts of this project in addition to the anticipated impacts of increased shipping through the North Pacific Great Circle Route.

7.8.2 Underwater Noise.

Over the past 50 years, there has been a dramatic increase in ocean noise pollution from human sources including Navy active sonar, seismic surveys used for research and oil and gas exploration, and commercial shipping. Vessel traffic is the largest source of noise pollution in the marine environment, and the intense, low frequency noise pollution generated by ships can

[223] *See Oregon LNG: Estimate of Potential Whale Strikes*, at 3 (June 2012).
[224] *Id.*
[225] Pace, R.M. and Silber, G.K. Abstract: Simple Analyses of ship and large whale collisions: Does speed kill? Sixteenth Biennial Conference on the Biology of Marine Mammals. San Diego, (Dec. 2005); Laist, D.W., Knowlton, A.R., Mead, J.G., Collet, A.S. and Podesta, M. Collisions between ships and whales. Marine Mammal Science 17(1): 35-75 (2001); Vanderlaan, A.S.M. and Taggart, C.T. Vessel Collisions with Whales: The probability of lethal injury based on vessel speed. Marine Mammal Science 23(1): 144-156 (2007).

travel great distances through the water.[226] This low frequency propeller noise is also in the same lower-frequency range used for communication by whales, dolphins, and other marine animals.[227]

Numerous studies have documented the potential impacts of increasing ocean noise, which can mask communication and impede reproduction, feeding, navigation, and ultimately survival of marine animals.[228] Further, a recent study documented that chronic stress in North Atlantic right whales is associated with exposure to low frequency noise from ship traffic, which can cause long-term reductions in fertility and decreased reproductive behavior, increased vulnerability to diseases, and permanent cognitive impairment.[229] Reducing ship speed can reduce noise levels.[230]

7.8.3 Air Pollution.

LNG tankers and the security vessels that accompany them are required to run their engines during the entire cargo loading cycle, spewing exhaust and air pollutants that would impact surrounding communities. LNG tankers emit substantial amounts of air pollutants, including sulfur dioxide (SOx), nitrogen dioxide (NOx), and particulate matter that can cause serious human health impacts like respiratory inflammation, worsening of existing respiratory

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[226] Hildebrand, J. Impacts of anthropogenic sound *In*: *Marine Mammal Research Conservation Beyond Crisis.* Edited by*:* J.E. Reynolds III, W.F. Perrin, R.R. Reeves, S. Montgomery and T.J. Ragen. Johns Hopkins University Press, Baltimore, Maryland, pp. 101-124 (2005).
[227] *Id.*
[228] *See* Final Report of the NOAA International Symposium: Shipping Noise and Marine Mammals: A Forum for Science, Management, and Technology. Arlington, VA. (May 2004) (summarizing studies), www.nmfs.noaa.gov/pr/pdfs/acoustics/shipping_noise.pdf; Wright, A.J. 2008. International Workshop on Shipping Noise and Marine Mammals, Hamburg, Germany, 21st-24th April 2008. Okeanos - Foundation for the Sea, Auf der Marienhohe 15, D-64297 Darmstadt. 33+v p.
[229] Rolland, R.M. *et al.* Evidence that ship noise increases stress in right whales. Proceedings of the Royal Society B. (Feb. 8, 2012); Rolland, R.M. *et al.* The inner whale: hormones, biotoxins and parasites. In: Kraus S.D. and R.M. Rolland, (eds.). The Urban Whale: North Atlantic Right Whales at the Crossroads. Harvard University Press, Cambridge, MA (2007).
[230] Wright 2008; *see also* Southall, B. L. and A. Scholik-Schlomer. 2008. Final report of the NOAA International Conference: "Potential Application of Vessel-Quieting Technology on Large Commercial Vessels," 1-2 May, 2007, Silver Spring, MD, U.S.A. (noting the correlation between vessel speed and noise).

diseases, and even premature death.[231] Environmental impacts of these pollutants are also serious and include nitrogen nutrient loading, acidification, smog caused by NOx and other precursor gases, and changes in visibility.[232]

Ships also emit substantial amounts of greenhouse gases. Marine shipping was responsible for 3.6 percent of the United States' black carbon emissions in 2002,[233] and shipping is responsible for all black carbon released over the oceans.[234] All of these pollutants contribute to the ongoing and increasing impacts of global climate change. Further, the absorption of carbon dioxide into the ocean causes ocean acidification, altering seawater chemistry and impacting species.

The Corps must calculate and consider all air emissions of the shipping associated with this project and evaluate the impacts this air pollution will have on human health and the environment, in addition to all other direct and indirect air emissions associated with this project.

7.8.4 Spills.

The Corps must fully evaluate the potential for and full effects of both minor and major spills from an LNG carrier or the facility itself. Commonly, LNG carriers can transport 125,000 m^3 to 145,000 m^3 of LNG, and newly designed carriers may carry up to 265,000 m^3 of LNG.[235] If spilled, the LNG may volatilize and transport as a vapor cloud or spread as a liquid on the water's surface.[236] Further, the LNG may ignite, causing an additional safety concern. The Corps must fully evaluate the consequences of an LNG carrier spill over water, including impacts to marine mammals and shorebirds.

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[231] *See* Proposal to Designate an Emission Control Area of Nitrogen Oxides, Sulphur Oxides and Particulate Matter, International Maritime Organization, Marine Environment Protection Committee, Submitted by the United States and Canada (Apr. 2009).
[232] *Id.*
[233] Battye, W. and K. Boyer. Methods for Improving Global Inventories of Black Carbon and Organic Carbon Particulates, Report No. 68-D-98-046. Prepared for U.S. EPA by EC/R Inc. (2002), http://www.epa.gov/ttn/chief/conference/ei11/ghg/battye.pdf.
[234] Reddy, M. Shekar and O. Boucher. Climate impact of black carbon emitted from energy consumption in the world's regions. *Geophysical Research Letters* 34: L11802 (2006).
[235] Luketa, A., et al. Breach and Safety Analysis of Spills Over Water from Large Liquefied Natural Gas Carriers. Sandia National Laboratories (2008), http://www.energy.ca.gov/lng/documents/2008-09-11_SANDIA_2008_Report.PDF.
[236] Hightower, M. et al. Guidance on Risk Analysis and Safety Implications of a Large Liquefied Natural Gas (LNG) Spill Over Water. Sandia National Laboratories (2004), http://www.energy.ca.gov/lng/documents/2004-12_SANDIA-DOE_RISK_ANALYSIS.PDF.

7.8.5 Engine Cooling & Ballast Water.

The Corps must examine the impacts of LNG tanker engine cooling and ballast water on aquatic life. This analysis must include both LNG import and LNG export scenarios since Oregon LNG proposes a bidirectional facility. The Corps' analysis must also account for the financial and ecological costs of invasive species. The Corps must go beyond Oregon LNG's boilerplate 'we will comply with state and federal law' and address the serious economic and ecological threats posed by invasive species. As part of this analysis, Oregon LNG must examine the introduction of invasive species from tankers.

LNG tankers may harm or take ESA-listed species through entrainment. Entrainment occurs when fish are sucked into mechanical equipment, such as dredges, turbines, or an ocean-going ship's ballast or cooling water systems. The Oregon LNG BA notes that ballast water intake velocities at the sea chests exceed the ODFW and NMFS recommended maximum screen intake velocities of 0.4 foot per second (fps) for fry and 0.8 fps for fingerlings during at least part of the offloading period. When both ballast and cooling water are being withdrawn, maximum velocity at the sea chest face would be 2.2 fps, and the area that exceeds 0.4 fps extends out approximately 5 feet from the hull. Because the intake grill openings and the intake velocities exceed ODFW and NMFS screening criteria (NMFS, 2008d *cited in OLNG BA*), salmonid fry and fingerlings potentially could be entrained or impinged on the intake screen or filter if they were close enough to the sea chest intakes during the ballast- water intake period. The Terminal would require a total cooling/ballast water intake of 1,610 million gallons per year, versus 3,538 million gallons per year for the analyzed export-only facility.

Juvenile salmon, adult and juvenile smelt, and juvenile sturgeon are susceptible to entrainment in ballast water and during dredging operations.[237] Some fish species, such as sturgeon, can be attracted to dredging operations because of the stirred up organic matter and benthic invertebrates, which make up their food.[238] According the Williams Expert Report, "[f]or threatened and endangered fish species, the impact of reducing the populations of juveniles on the remaining populations of fish and other estuarine and riverine populations (*e.g.*, shrimp, razor clams, and Pacific sandlaces, etc.) can negatively affect the estuarine foodweb and have serious repercussions on the survival of both endangered and other area species."

The Corps must also evaluate the impact of Oregon LNG's project on eulachon. In March 2010, NMFS listed the southern eulachon Distinct Population Segment (DPS) as threatened under the ESA. Critical habitat was designated in October 2011. The southern

[237] Exhibit 1 at 23 (Williams Expert Report).
[238] *Id.*

eulachon DPS extends the U.S.-Canada border south to include populations in California, Oregon, and Washington, including the lower Columbia River estuary where the proposed Oregon LNG project site is located. The Williams Expert Report states: "it is clear from the analysis presented in the OLNG BA that the construction and operation of the Oregon LNG Terminal and project would negatively impact eulachon in the Lower Columbia River Estuary."

The greatest potential for entrainment/impingement for eulachon is at the larval stage.[239] Seasonal eulachon larval abundance was obtained from a recent study of planktonic fish larvae in the lower Columbia River estuary (Marko, 2008, *cited in OLNG BA*). Each import vessel requires 12.3 million gallons of cooling water and each export vessels requires 37 million gallons of cooling water. Using these data, the Oregon LNG BA estimates entrainment of 1,225,920 larval eulachon, which equates to removing the reproductive output of 1,837 female eulachon

Ballast water also has the potential to harbor non-native, nuisance organisms, which have the potential to cause economic and ecological degradation to affected nearshore areas. These organisms also could arrive on the hulls and exterior equipment (e.g., anchors and anchor chains) of LNG tankers. The Williams Expert Report describes Oregon LNG's inadequate consideration of impacts from ballast water, stating:

> OLNG fails to reasonably consider the project's cumulative effects on the spread and establishment of noxious weeds and its impacts on aquatic resources. It notes that such impacts are likely, but discounts their impact, noting that most potentially noxious or invasive species will have already been introduced to the system by other ships and shipping activities. While there is clearly some truth to such a perspective, it is not a reasonable viewpoint, and seriously underplays the responsibility of Oregon LNG to have protocols and practices in place that safeguard against unnecessary and unwanted introductions of non-native noxious plants of animals.[240]

The Corps' public interest analysis must account for the deleterious impacts of ballast water and engine cooling water on in the Columbia River estuary.

7.8.6 Wake Stranding.

The Corps' public interest analysis must consider the increased risks of juvenile salmonid wake stranding caused by Oregon LNG's massive tankers. A 2013 U.S. Geological Survey report on wake stranding in the lower Columbia River describes the negative impacts of large vessels, stating: "Long period wake waves from deep draft vessels have been shown to strand small fish, particularly juvenile Chinook salmon Oncorhynchus tschawytcha, in the lower

[239] OLNG BA at 3-73.
[240] Exhibit 1 at 24 (Williams Expert Report).

Columbia River."[241] Waves from ship wakes can also lift young fish above the water line, stranding them on shoreline banks and causing juvenile mortality. The Corps' public interest analysis must factor in the loss of ESA-listed salmonids and other aquatic life from wake stranding caused by LNG tankers.

7.8.7 Shoreline Erosion.

The Corps' public interest analysis must include consideration of the direct and cumulative impacts of LNG tanker vessels on shoreline erosion. Large vessels cause large wakes, which erodes fragile shoreline habitats.[242] When a shoreline erodes, sediment is detached from the bank and suspended in water.[243] Shoreline erosion has a negative impact on water quality. Specifically, shoreline erosion increases turbidity, decreasing water clarity.[244] Reduced water clarity can make it difficult for fish to find food, reduce the amount of light available for waterbed plants, and affect water temperature.[245]

Waves from ship wakes frequently travel parallel to the riverbank and estuary shoreline and can erode land from the edges of nearshore habitat. Shoreline erosion from waves can increase sediment and turbidity in nearshore shallow waters utilized by subyearling salmonids and other fishes. Continual shoreline erosion from waves can also reset shoreline vegetation and prevent plant growth that could help stabilize shoreline habitat, increase habitat diversity and foodweb productivity—all of which would benefit subyearling outmigrating juvenile salmonids.

The Corps' public interest analysis must account for the direct, indirect, and cumulative impacts of 127 LNG tankers on shoreline erosion.

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[241] Exhibit 62 (Kock, Tobias J., *Review of a model to assess stranding of juvenile salmon by ship wakes along the Lower Columbia River, Oregon and Washington*, USGSOpen-File Report 2013-1229, http://pubs.er.usgs.gov/publication/ofr20131229).

[242] Larissa Laderoute and Bernard Bauer, *River Bank Erosion and Boat Wakes Along the Lower Shuswap River, British Columbia for the Regional District of North Okanagan Fisheries and Oceans Canada*, 13 (2013), http://www.rdno.ca/docs/River_Bank_Erosion_Lower_Shu_River_Final_Project_Report.pdf.

[243] *Id.*

[244] *Id.*

[245] *Id.*

7.9 Geologic Hazards & Natural Disasters.

It is not in the public interest to site a high risk LNG terminal and pipeline in a high risk geologic area. Oregon LNG proposes building the Terminal within the tsunami inundation zone on land created in the early twentieth century using Columbia River dredge spoils. These sandy soils are extremely unstable when earthquakes occur because they amplify the effects of ground shaking (*i.e.*, liquefaction). Since Oregon LNG proposed a Terminal on the East Skipanon Peninsula, scientists have published significant new information about earthquake and tsunami risks on the Oregon Coast. For example, according to an Oregon State University study, geologic data from the past 10,000 years indicates that the Oregon Coast has a significant likelihood of experiencing a subduction zone earthquake in the next 50 years—roughly the lifespan of the Oregon LNG project.[246]

The Corps must evaluate the impacts of Oregon LNG's Terminal, tankers, and Pipeline in the event of an earthquake, tsunami, and other natural disasters. In addition, the Corps must evaluate proposed Pipeline's impacts in light of geologic hazards along the pipeline route. For both the Terminal and Pipeline, the Corps must consider the capacity of first-responders to deal with a catastrophic event caused by an earthquake, tsunami, or other natural disaster. For the reasons explained below, the Corps must verify independently the veracity of Oregon LNG's claims related to seismic and tsunami engineering and risk assessment.

7.9.1 Terminal & Seismic Risks.

The risk of a devastating 9.0 magnitude earthquake and subsequent tsunami on the lower Columbia River estuary and Oregon Coast is well-documented.[247] Despite this risk, Oregon LNG proposes building the Terminal on land created from sand deposits. Sandy soils are highly susceptible to liquefaction. Liquefaction is a soil behavior phenomenon in which saturated sand softens and loses strength during strong earthquake ground shaking.[248] As noted above, even

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[246] Exhibit 31 (Goldfinger, C. *et al.*, *Turbidite Event History—Methods and Implications for Holocene Paleoseismicity of the Cascadia Subduction Zone: U.S. Geological Survey Professional Paper 1661-F* (2012), http://pubs.usgs.gov/pp/pp1661f/); *see also* Exhibit 52 (Oregonian, *Major earthquake in Oregon could be in next 50 years, infrastructure not ready* (Aug. 1, 2012)).

[247] Exhibit 37 (Oregon Department of Land Conservation and Development, *Preparing for a Cascadia Subduction Zone Tsunami: A Land Use Guide for Oregon Coastal Communities* (Jan. 2014), http://www.oregon.gov/lcd/ocmp/docs/publications/tsunamiguide20140108.pdf).

[248] Exhibit 32 (*Earthquake Risk Study for Oregon's Critical Energy Infrastructure Hub*, Oregon Department of Geology and Mineral Industries, Open File Report 0-13-19 at 7 (2013), http://www.oregongeology.org/sub/earthquakes/CEI-Hub-report.pdf). In 2013, the DOGAMI

FERC, which has a history approving LNG proposals, has questioned Oregon LNG's "unprecedented" engineering plans and the company's attempt to mitigate for seismic and tsunami risks.[249] The uncertainty surrounding Oregon LNG's seismic engineering is highly relevant to the Corps' public interest analysis.

Oregon LNG concedes that liquefaction at the Terminal site is likely in the event of an earthquake. In addition, the Oregon Department of Energy and the Oregon Department of Geology and Mineral Industries (DOGAMI) recognize the risks of siting energy infrastructure soils susceptible to liquefaction.[250] In Oregon LNG's October 2008 Resource Report 6, the company acknowledged that it had drilled 350 feet deep at the proposed terminal site without reaching bedrock. Oregon LNG proposes "deep soil mixing" to improve the foundation of its project, but this strategy is unproven and may not provide a stable foundation given the very severe geologic risks that could impact the Oregon LNG site.

In evaluating seismic and tsunami risks, the Corps' should consider input from federal and state agencies. In comments on the scope of the Oregon LNG EIS, DOGAMI states:

> [T]he Applicant should provide a thorough geological characterization of the proposed project area and surrounding area as well as a comprehensive site-specific geologic hazard and geotechnical assessment (including seismic, tsunami, lateral spreading, subsistence, surface fault rupture, landslide, flood and channel migration hazards) at the proposed facility and along the pipeline.[251]

DOGAMI goes on to state:

> These assessments should include supporting evidence to explain how the facility can be appropriately constructed and operated. *This is particularly relevant due to the generally high seismic and seismically-induced hazards at the facility and the generally high landslide hazards along the pipeline route*.[252]

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released a study on earthquake risk and Oregon's critical energy infrastructure, which focused on the Portland metro area. In that report, DOGAMI states: "Liquefaction and lateral spreading hazards are the *primary concern* to the oil terminals that handle Oregon's fuel supply." *Id.* at 7 (emphasis added).

[249] Exhibit 33 (Letter from FERC to Oregon LNG (Environmental Data Request) (Aug. 1, 2013)).

[250] Exhibit 32.

[251] Letter from State of Oregon to FERC, Comments on NEPA Scoping for Oregon LNG Bidirectional Project at 17(Dec. 19, 2012)

[252] *Id.* (emphasis added).

Although Oregon LNG filed Resource Reports on seismic and tsunami risks, DOGAMI requested additional analysis of the most current science on these risks. DOGAMI's letter to FERC states:

> We also recommend that a comprehensive review of new science relevant to geology and geological hazards be incorporated into the proposed EIS. New science should include, but not limited to, recent publications about the seismic hazard in Oregon (e.g., Goldfinger and others, 2012; Witter and others, 2011) and new landslide hazard maps in Oregon (e.g., DOGAMI publications). The performance of natural gas and petroleum facilities during the March 11, 2011 Tohoku Japan earthquake and tsunami should be evaluated and considered in siting and design of the proposed export terminal and pipeline.[253]

The Corps must account for DOGAMI's input in evaluating the public interest of siting a high risk LNG terminal on the East Skipanon Peninsula.

FERC has also raised significant concerns about the efficacy of Oregon LNG's seismic engineering plans. In its August 1, 2013, letter to Oregon LNG, FERC raised significant questions about Oregon LNG's proposed system of berms. Oregon LNG's FERC filings fail to demonstrate that the berm system would protect LNG tanks, pipeline infrastructure, gas flare facilities, and other infrastructure at the Terminal. FERC's letter to Oregon LNG states:

> The project foundations are designed for liquefaction settlements of up to 28 inches extending to depths of 169 feet (elevation -148 feet) and downdrag from this settlement. *The design provides unprecedented pile lengths of up to 280 feet for the tanks and 200 to 220 feet for other equipment.* While the design is apparently conservative considering liquefaction to unprecedented depths of 169 feet, the berms protecting the tanks are sitting on the same materials and are subject to 1-foot lateral and up to 3-feet vertical displacement *and have a high likelihood of failure when subjected to the design Tsunami event . . . The designer need to clearly demonstrate that the LNG tanks and the process areas would not be flood due to the Design Tsunami. The present report falls significantly short of this important consideration.*[254]

Oregon LNG has not resolved FERC's significant critque of its terminal design. In addition, FERC is not satisfied by the quality of Oregon LNG's seismic slope stability and displacement analysis, stating: "[Oregon LNG must] [p]erform additional seismic slope and displacement cases for rapid drawdown after [a] tsunami."[255] The Corps must consider these concerns and rely

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[253] *Id.*

[254] Exhibit 33 at 17 (emphasis added) (Letter from FERC to Oregon LNG (Environmental Data Request) at 17 (Aug. 1, 2013)).

[255] *Id.* at 18.

on third-party analysis to verify whether Oregon LNG's claims on seismic and tsunami engineering are reliable.

7.9.2 Terminal & Tsunami Risks.

A large seismic event in the Pacific Rim has the potential of generating a tsunami on the Oregon Coast and lower Columbia River estuary. The entire Terminal site is within the tsunami inundation zone. The Terminal and its marine facilities will have infrastructure located at elevations near sea level, and subject to damage from large waves. The Corps must evaluate whether Oregon LNG's proposed system of berms would protect LNG tanks, pipeline infrastructure, gas flare facilities, and other infrastructure at the Terminal.

The Corps' analysis must consider the impact of LNG vessels in the event of as tsunami, as well as the impact of high-water and flooding at the Terminal and along access roads. This includes analyzing the studies and information from the March 11, 2011, earthquake and tsunami in Japan. The Corps' analysis must include consideration of the public safety and environmental impacts if an LNG tanker becoming disabled, damaged, or grounded during a tsunami event. In addition, the proposed Terminal location is prone to routine weather hazards, including high winds, high waves, and flooding.

7.9.3 Pipeline & Geologic Hazards.

In weighing the public interest in LNG export, the Corps must evaluate the public safety and environmental risks of the Pipeline in the context of geologic hazards. Oregon LNG's Application understates the risks of landslides along the pipeline route. For example, in a June 25, 2010, letter from the Oregon Department of Forestry (ODF) to Clatsop County, ODF states:

> ODF takes issue with the general notion that the pipeline locations, including the proposed reroute across ODF ownership is not crossing landslides and that identified features have been avoided. ODF agrees that the applicant avoids the most active portions of the landslides that we are aware of, but do not agree that they are absolutely avoiding landslides.
>
> These may be subtle distinctions, but are important. It is the difference between implying zero risk and low risk. The pipeline will clearly be crossing landslides . . . . Contrary to the applicant's assertion, the ODF letter [June 2, 2010 letter to Clatsop County] does

> indeed identify concerns and outstanding issues between the applicant and ODF and [ODF] would again ask that the June 2, 2010 letter be reviewed on its own merit.[256]

ODF concludes: "[T]here are outstanding issues and concerns that cannot be addressed until the pipeline location has been staked on the ground, further review is conducted, and easements are negotiated."[257]

The Corps must account for landslide risks along the Pipeline route in analyzing the public interest in LNG export. Along the proposed pipeline route, high winds, heavy rains, and flooding have generated landslides in recent years that have damaged key infrastructure such as roads, pipelines and power lines. For example, within the past 15 years, land movement has caused multiple pipeline failures in Cowlitz County, and at least one segment of gas pipeline in Cowlitz County near Kelso has been relocated above ground due to an unstable slope. In addition, routing the Pipeline through the Coast Range poses a long-term threat to slope stability.

7.10 Pipeline Construction & Operation.

The Corps' public interest analysis must consider the harm to public safety, ESA-listed species, and fish and wildlife habitat caused by Oregon LNG's Pipeline. The Rhodes Expert Report, Exhibit 3, addresses in detail the impacts of the Pipeline on aquatic ecosystems and ESA-listed salmonids. Commenters incorporate by reference Exhibit 3 and submit references cited in Exhibit 3 for the Corps' consideration. In addition, the Center for Biological Diversity submitted in-depth comments, attached hereto as Exhibit 4, on the Pipeline's impacts to ESA-listed birds, including the Northern Spotted Owl and Marbled Murrelet. Commenters hereby incorporate by reference Exhibit 4 and attachments thereto. For the reasons described below and in Exhibits 3 and 4, Commenters urge the Corps to deny Oregon LNG's permits.

7.10.1 Habitat Fragmentation.

The Corps must assess the cumulative impacts of Oregon LNG's proposed Pipeline route and existing and reasonably foreseeable future transmission, road, and pipeline right-of-ways that threaten habitat quality and wildlife. The Pipeline would impact aquatic and terrestrial wildlife habitat in numerous ways. Clearing forestland along the Pipeline right-of-way directly removes habitat, provides a conduit for the spread of wildfires, and provides increased access to

[256] Exhibit 34 (Letter from the Oregon Department of Forestry to Clatsop County (June 25, 2010)).
[257] *Id.*

off-road vehicle users (ORVs). The Corps must weigh the public interest in protecting fish and wildlife habitat in considering whether to issue permits for Pipeline construction.

Habitat fragmentation is one of the most pervasive and difficult-to-control threats to native ecosystems in the United States. It occurs when land uses break up contiguous blocks of habitat into smaller patches or when roads, transmission lines, pipelines, or other corridors penetrate blocks of habitat. The Pipeline will contribute to and create new habitat fragmentation, compromising the integrity of habitat interior in wetlands, forests, and other ecosystems. For example, habitat fragmentation can have negative effects on wildlife and ecosystems through direct habitat loss or indirectly through changes that occur as a result of the adjacent habitat type and the particular land use associated with it.

In addition, the Corps must consider the effects of Pipeline construction and right-of-ways on habitat disturbance, including increased exotic and invasive species. Impacts include, but are not limited to: providing access for plants and animals that thrive in disturbed environments and the associated detriment to species that require contiguous habitat; opening access to previously remote areas via the new roads and pipelines and the impact of increased human access on fish and wildlife; the spread of invasive plant species; disturbance of sensitive habitats and species of conservation concern, including threatened and endangered species; the increase in car, truck, and heavy machinery traffic; and the impact of pipelines and roads as acting as barriers to movement for many amphibian species and some small mammals.

7.10.2 Road Construction & Long-Term Impacts.

Oregon LNG fails to address adequately the aquatic impacts from road use, road modifications, temporary extra work area (TEWA) construction and temporary and permanent access roads. Roads contribute to the disruption of hydrologic function and increase sediment delivery to streams. Roads also provide access to otherwise isolated habitat, and the activities that accompany access magnify their negative effects on aquatic habitats. The Application fails to provide complete and accurate maps of roads (existing, proposed, and expanded), specific characterizations of impacts to waterways that the Pipeline would impact, details regarding types of roads, or specific details on long-term maintenance proposed for roads in steep terrain areas.

Road construction has the potential to produce a myriad impacts to waters of the U.S., including:

- Soil erosion, compaction, loss of forest productivity;
- Pollution: sedimentation, thermal loading;

- Rapid water runoff: peak flows;
- Impaired floodplain function;
- Barrier to movement of wood and spawning gravel;
- Fragmentation: wildlife dispersal barrier;
- Human disturbance: weed vector, hunting pressure, loss of snags, litter, marbled murrelet nest predation, human fire ignition, etc.

Roads have a particularly negative influence on aquatic and riparian ecosystems and organisms. Roads interfere with movement of materials and organisms in three dimensions: upstream/downstream, channel/upland, and surface/subsurface.[258] Roads are also a conveyor belt for delivering chronic sediment to streams.[259]

In recent decades, studies in a variety of terrestrial and aquatic ecosystems have demonstrated that roads aggravate many of the most pervasive threats to biological diversity, including habitat destruction and fragmentation, edge effects, exotic species invasions, pollution, and overhunting. Roads have been implicated as mortality sinks for animals ranging from snakes to wolves; as displacement factors affecting animal distribution and movement patterns; as population fragmenting factors; as sources of sediments that clog streams and destroy fisheries; as sources of deleterious edge effects; and as access corridors that encourage development, logging and poaching of rare plants and animals. EPA describes the impacts of roads as follows:

> Stormwater discharges from logging roads, especially improperly constructed or maintained roads, may introduce significant amounts of sediment and other pollutants into surface waters and, consequently, cause a variety of water quality impacts. … [S]ilviculture sources contributed to impairment of 19,444 miles of rivers and streams [nationwide]. … forest roads can degrade aquatic ecosystems by increasing levels of fine sediment input to streams and by altering natural streamflow patterns. Forest road runoff from improperly designed or maintained forest roads can detrimentally affect stream health and aquatic habitat by increasing sediment delivery and stream turbidity. This can adversely affect the survival of dozens of sensitive aquatic biota (salmon, trout, other native fishes, amphibians and macroinvertebrates) where these species are located. Increased fine sediment deposition in streams and altered streamflows and channel morphology can result in increased adult and juvenile salmonid mortality where present

[258] Doyle, Jim. *Where the Water Meets the Road*, http://web.archive.org/web/20070325061623/http://www.fsl.orst.edu/geowater/RRR/jim/aquahab/index.html.
[259] Derrig, Michael. *Road Improvements for Watershed Restoration*, http://www.fsl.orst.edu/geowater/PEP/calfed/derrig/index.html.

> (e.g., in the Northwest and parts of the East), a decrease in aquatic amphibian and invertebrate abundance or diversity, and decreased habitat complexity.
>
> The physical impacts of forest roads on streams, rivers, downstream water bodies and watershed integrity have been well documented but vary depending on site-specific factors. Improperly designed or maintained forest roads can affect watershed integrity through three primary mechanisms: they can intercept, concentrate, and divert water (Williams, 1999).[260]

Temporary roads present most of the same risks posed by permanent roads.[261]

Oregon LNG's Application fails to disclose the full extent of the road network for Pipeline construction or explain how these impacts are adequately mitigated. To use heavy equipment on many of the existing roads, significant road modifications are necessary, including blading/grading, widening, drainage improvements, and the construction of turnouts and roadside TEWAs. The Application does not include detailed descriptions of what activities will occur that could impact wetlands, streams, and other waters. Rather, the Application relies on blanket statements about the application of best management practices (BMPs) to avoid impacts to streams. By not specifying the location and nature of construction activities associated with all access roads, the Application provides an inadequate description of the project.

The Corps must evaluate the impacts of all construction activities, including culvert replacements, arising from construction of the Pipeline. The Application lacks site-specific information on impacts to resources for both existing and new roads, instead relying on broad statements regarding use of BMPs. It is impossible for the public to know the Pipeline's impact on special aquatic sites without a detailed and up-to-date description of road construction activities.

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[260] EPA 2012. Notice of Intent to Revise Stormwater Regulations Federal Register (May 23, 2012), http://www.gpo.gov/fdsys/pkg/FR-2012-05-23/pdf/2012-12524.pdf.

[261] Roadless Area Conservation FEIS — Specialist Report for Terrestrial and Aquatic Habitats and Species prepared by Seona Brown and Ron Archuleta, EIS Team Biologists, Available at http://web.archive.org/web/20040515020554/http://roadless.fs.fed.us/documents/feis/specrep/xbio_spec_rpt.pdf.

On steep slopes, particularly in rainy winter months, similar BMPs failed to prevent impacts to streams, creeks and ditches. Not only is road construction inadequately described in the Application, but the measures to prevent significant sedimentation and turbidity in streams are neither site-specific nor reliable.

During construction of the 12-inch Coos County pipeline in 2003, covering terrain similar to the proposed Pipeline, erosion and sedimentation control measures repeatedly failed. The Application provides little specific information to justify the assumption that, particularly in steep areas, BMPs will be adequate to prevent impacts to streams. Pictured above, a silt fence during construction of the Coos County pipeline in 2003 is overtopped by eroding soil, which is

then deposited directly into a small tributary stream of the Coquille River. The second photo shows a bale of hay, an erosion control device, which became lodged in a culvert, resulting in stream cutting through the road itself. For the reasons stated above and described in Exhibits 3 and 4, the Corps must assess the impacts of road construction in evaluating the public interest in authorizing Oregon LNG's project.

7.10.3 Pipeline Waterbody Crossings.

7.10.3.1 Physical &Chemical.

Pipeline construction will require numerous stream, wetland, and river crossings. The Corps' public interest analysis must account for the direct, indirect, and cumulative impacts of Pipeline construction on water quality. This includes the potential for hydraulic fracturing, or a "frac-out." A frac-out occurs when an HDD fails, fractures a streambed or riverbed, and releases drilling lubricants into the stream. Because the Oregon LNG project propose using HDDs to cross multiple salmon-bearing streams and rivers, including the Columbia River itself, the Corps must fully assess the potential and impacts of HDD failures.

HDD crossings, when successful, have impacts in areas adjacent to rivers where staging and construction areas occur. HDDs also require the disposal of materials extracted from the drill hole. HDD attempts frequently fail, causing drastic impacts to water quality and fish habitat. For example, many HDD attempts along the 12-inch Coos County pipeline failed, resulting in "frac-outs," situations in which large amounts of sediment and bentonite clay (used as a drilling lubricant) were released into streams. Bentonite clay and sediment released through frac-outs can disrupt fish spawning habitat, increase turbidity, and potentially introduce other contaminants to impacted waterways. Oregon LNG fails to adequate address the risk and potential impacts of frac-outs.

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The photographs above document a frac-out that led to sedimentation and a huge release of bentonite clay into the Coquille River during construction of the 12-inch Coos County pipeline. A similar HDD failure on Nehalem River, Lewis and Clark River, or other waterbody crossings would severely impact water quality and salmon habitat.

Nonetheless, even where HDD succeeds without a frack out, this method of pipeline installation can lead to large, unanticipated sediment discharge. Moreover, there is a substantial risk that horizontal directional drilling will fail at some crossings, with adverse environmental consequences.

Construction in riparian areas and along steep slopes also increases the risk of erosion and sedimentation in important Columbia River tributaries, some of which are listed as water quality limited (*i.e.,* already in violation of state water quality standards). These issues are addressed at length in the Rhodes Expert Report, which is incorporated in its entirety by reference and attached hereto as Exhibit 3.

7.10.3.2 Biological.

The Corps must analyze the Pipeline's impacts on ongoing and reasonably foreseeable restoration work along the Pipeline route. Taxpayer dollars have funded—and continue to fund—extensive restoration work throughout the Estuary. Many restoration projects are currently underway or planned for the near future. For example, ODFW identified the Lewis and Clark River and its tributaries as important habitat for Coho salmon, Fall Chinook, and Winters Steelhead. ODFW recommended that third-parties target the Lewis and Clark River for easement acquisition to protect functioning riparian areas, as well as restoration of degraded riparian areas, in order to ensure the survival and recovery of these species.[262] The Oregon LNG pipeline directly threatens efforts to stabilize and restore fish and fish habitat. The possibility of HDD frac-out and failure, which Oregon LNG has largely dismissed in its application, conflicts with ODFW's identified goal of reducing the sediment load into the Lewis and Clark River and its tributaries.

The Corps must also evaluate the biological impacts of a frac-out. Oregon LNG characterizes drilling lubricants, particularly bentonite clay, as "non-toxic." Even is this claim is true, which is dubious, it does mean these substances are not harmful. For example, as NMFS cautioned in a comment on the prior import proposal, "a frac-out from horizontal directional drilling will cause bentonite, a very fine clay, to be released into the water column that has the potential, if fish are present, to clog their gills, causing them to suffocate. Whether it is a toxic compound or not, the particle size of the clay is of concern for fish."[263] Bentonite clogs fish gills and fish habitat, leading to fish mortality and loss of spawning habitat.

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[262] Lower Columbia River Conservation and Recovery Plan For Oregon Populations of Salmon and Steelhead, (Aug. 6, 2010), http://www.dfw.state.or.us/fish/CRP/docs/lower-columbia/OR_LCR_Plan%20-%20Aug_6_2010_Final.pdf .
[263] FERC Dkt. PF07-10, NMFS Comment at 11 (July 18, 2008).

7.10.4 Air Pollution.

The Corps' public interest analysis must evaluate how large compressor stations would impact air quality in nearby communities. In particular, the Corps must consider the power source and power line route for providing electricity to the large new proposed compressor station in Columbia County. Additionally, the Corps must consider whether this station will operate at 48,000 Hp or larger (Oregon LNG's Resource Report 9 suggests 80,000Hp).

7.11 National Park Systems Impacts.

The Corps' public interest analysis must consider the Oregon LNG project's detrimental impacts to the National Park System. On November 7, 2012, the National Park Service (Park Service) submitted detailed comments describing impacts that FERC should evaluate in its EIS.[264] The Park Service manages the Lewis and Clark National Historical Park (Park) and the Lewis and Clark National Historical Trail (Trail). Commenters agree with many of the comments raised by the Park Service and recommend that the Corps evaluate Oregon LNG's project in light of the Park Service's substantial concerns. These include, but are not limited, the following issues:

- safety hazards to National Park visitors;
- impacts to threatened and endangered species within the Park and along the Trail;
- impacts to bald eagles within the Park;
- the Pipeline's impact to contiguous wetlands located within the Park;
- the Pipeline's impact on suspending contaminated sediments from the Astoria Marine Construction Company;
- impacts to cultural landscapes and viewsheds;
- visual and audible impacts to historic sites along the Trail and at the Park; and
- other recreational impacts, particularly along the Lower Columbia River Water Trail.

Input from the Park Service is highly relevant to the Corps' public interest analysis.
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[264] Exhibit 10 (Letter from National Park Service to FERC, Oregon LNG NEPA Scoping Comments (Nov. 7, 2012)).

7.12 Economic Impacts.

7.12.1 Terminal.

As part of its public interest analysis, the Corps must consider the economic impacts of the Terminal. Oregon LNG claims that the Terminal will support 147 full-time jobs.[265] The Corps should reject the applicant's position that 147 jobs automatically renders this facility economically advantageous. The Corps must balance the advantage of any full-time jobs and the short-term construction jobs with the detriment to existing businesses and industries in Clatsop County, the State of Oregon, and the Pacific Northwest. Overall, Oregon LNG presents a tremendous risk and negative impacts to multiple local businesses, industries, and municipalities.

7.12.1.1 Fishing & Shipping Industry.

The Terminal would result in significant, adverse economic impacts on commerce, including impacts to the fishing and shipping industries. Oregon LNG proposes dredging a massive hole that spans 135 acres of the Columbia River in Youngs Bay—roughly the size of 102 football fields. This is the heart of what historically has been the most popular non-tribal sport and commercial salmon fishing area on the Columbia River.[266] Furthermore, Youngs Bay is the most productive Chinook salmon mitigation site (*i.e.,* to mitigate for lethal impacts of the Columbia River hydroelectric dams) in the entire Columbia River estuary. The Corps must analyze the economic impacts of siting an LNG terminal in the heart of this productive fishery.

As discussed above, Youngs Bay is one of four sites in the lower Columbia River that comprise the ODFW's Select Area Fisheries Enhancement (SAFE) project. The SAFE project is a two-decade long salmon stocking program funded primarily by the Bonneville Power Administration to off-set harm to endangered salmon from Columbia and Snake River hydroelectric dams. The primary purpose is to reduce fishing impacts on wild and weak upriver salmon stocks by increasing the availability of hatchery fish in off-channel areas of the lower Columbia. The FCRPS BiOp identifies funding for the Youngs Bay Select Areas Fisheries as a "Reasonable and Prudent Alternative" (*i.e.,* a mitigation measure to off-set endangered salmon and steelhead harm from the dams). The BiOp states that fisheries agencies established the

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[265] Oregon LNG claims that, once operational, the Terminal will support 147 full-time jobs. Supplemental JPA at 3-4. Notably, Oregon LNG estimates that none of those jobs would go to local residents. *Id.* at 3-5 (stating "ECONorthwest conservatively estimates that the 147 workers directly employed at the Terminal would relocate from outside the Project area.").

[266] Exhibit 39 (Martin, Irene, *A Social Snapshot of the Columbia River Gillnet Fishery* (Sept. 2005); *see also* U.S. Coast Guard, Buoy 10 Taskforce, http://www.uscg.mil/d13/sectcolrvr/ops/buoy10.asp.

program "to mitigate fisheries by providing the opportunity to harvest locally-produce salmon stocks in off-channel areas of the Columbia River."

Of the four terminal fisheries sites in the Columbia River Estuary, the Youngs Bay site has the highest five-year average for Chinook salmon harvest. Biologists believe that stocking salmon at Youngs Bay may result in a *10-fold increase* in survival and catch rates because the fish are released closer to the ocean at a size and time of year that is more conducive to spring Chinook out-migration.[267]

In February 2014, the Oregon Fish and Wildlife Commission adopted a sport fishing closure in the section of Youngs Bay near the proposed Terminal site.[268] The closure restricts sport fishing from August 1st to September 15th. The purpose of the closure is to reduce the impact of sport fishing on hatchery fish returning to Youngs Bay so that these fish will be available for commercial fishing in Youngs Bay. "The closure, along with several other changes to fisheries management, emerged during the 2012 process to restructure sport and commercial fisheries on the Columbia River. Senate Bill 830, passed by 2013 Oregon Legislature, directed the [Oregon Fish and Wildlife] Commission to create a closure area."[269] The Northwest Sportfishing Industry Association is fighting to reverse the season sport fishing closure.[270] This demonstrates the importance of Youngs Bay to the efforts to restore and maintain a healthy fishery in the Columbia River. The Terminal's impacts would undermine these efforts, and harm the sport and commercial fishing in the region.

Dredging activities also have the potential to disrupt recreational and commercial fishing, as well as shipping on the Columbia River. Dredging activities have the potential to disrupt recreational and commercial access near the Skipanon Peninsula, where Oregon LNG proposes dredging. Even after dredging is complete, routine operation of the Terminal requires maintenance dredging and, in turn, harms river commerce.

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[267] ODFW News Release, http://www.dfw.state.or.us/news/2009/november/110609b.asp (Nov. 6, 2009).
[268] ODFW News Release, http://www.dfw.state.or.us/news/2014/february/020714.asp (Feb. 7, 2014).
[269] *Id.*
[270] Exhibit 38 (Northwest Sportfishing Industry Association, *NSIA committed to fighting today's ODFW Commission Youngs Bay ruling* (Feb. 7, 2014), http://www.nsiafishing.org/general/nsia-committed-to-fighting-todays-odfw-commission-youngs-bay-ruling/); Exhibit 59 (The Columbia Basin Bulletin, *Sportfishing interests seek reversal on 'Control Zone' closure at Youngs Bay* (Feb. 21, 2014)).

The heavily used salmon fishery at Buoy 10, near the mouth of the Columbia River, is located directly adjacent to the shipping channel that LNG tankers traveling to the Skipanon Peninsula terminal would use.[271] In turn, LNG tankers and the salmon fishing boats will necessarily be attempting to use the same space.

Due to the safety and security risk associated with LNG, LNG tankers require exclusion zones while in transport and while docked at the Terminal. The U.S. Coast Guard imposes LNG tanker exclusion zones, which place restrictions on commercial and recreational fishing and barge traffic associated with LNG tankers.[272] Over 46,000 commercial and recreational fishing boats use the Columbia River estuary each year for fishing and transit to the ocean. These boats will have to avoid the 500 yard safety zone around LNG tankers. This will cause delay in the extremely short and regulated commercial fishing season. Due to heavily regulated fishing seasons, missing just one drift could cost thousands of dollars. Further, LNG tankers and fishing boats will both want to cross the notoriously dangerous Columbia River bar at favorable tides. Because the LNG tankers would have priority, fishing boats are left with more risky crossings.

Significantly, LNG tankers are unannounced for security reasons. As a result, private and commercial boats will not have the opportunity adjust river use habits prior to using Buoy 10. As multiple state and federal agencies noted in the context of Bradwood LNG's impact on Buoy 10 area, the Buoy 10 fishery and other recreational and commercial river use are an integral part of the lower Columbia River economy.

In the context of the Bradwood LNG terminal, ODFW stated that "[t]he moving 500-yard safety and security zone around 125 LNG ships per year (2-3 per week) as they move up the Columbia River will be very disruptive to commercial and recreational fishing boats."[273] Similarly, in comments to the Bradwood LNG DEIS, the Ports of Vancouver and Portland also raised concerns about the lack of information regarding potential negative impacts to shipping from disruptions in traffic. Both characterized the potential for delay and one-way vessel traffic as potentially damaging to upriver ports as well as to the operation of cruise ships in Astoria.[274]

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[271] Exhibit 40 (Washington Department of Fish and Wildlife, 2014 Creel Data for Buoy 10 Fishery (accessed Jan. 13, 2015), http://wdfw.wa.gov/fishing/creel/buoy10/); Exhibit 39 (Martin, Irene, *A Social Snapshot of the Columbia River Gillnet Fishery* (Sept. 2005)).
[272] *See* Exhibit 41 (U.S. Coast Guard Letter of Recommendation for Oregon LNG Project at 1 (April 24, 2009)).
[273] *See* Exhibit 19 at 33 (Letter from State of Oregon to FERC, Preliminary Comments of DEQ on Bradwood LNG DEIS (Nov. 2007)).
[274] Port of Portland Comments on Bradwood LNG DEIS (Dec. 2007)); Port of Vancouver Comments on the Bradwood LNG DEIS (Dec. 2007).

The Corps must also consider the Terminal's impact on local marine traffic. The Oregon LNG project has the potential to disrupt local marine traffic, particularly a nearby public marina on the Skipanon River. Exclusion zones restrict access to the Skipanon River while LNG tankers are approaching and docking at the facility.

7.12.1.2 Tourism, Real Estate, & Local Communities.

The Terminal and accompanying LNG tankers would cause economic harm inhibiting the flow of boat traffic, diminishing the tourism appeal of the area, and negatively impacting the housing market. In addition to these delays faced by tourist vessels, LNG would diminish tourism in the area in general, a $352 million industry for Clatsop County. LNG tankers are perceived as being unsafe. In an industry where perception is reality, tourism as an economic generator depends on a positive perception of the area." In turn, militarizing the mouth of the Columbia to protect LNG shipping from terrorists would change tourists' perception of the area for the worse, thereby leading to decreased tourism, decreased jobs, and a decreased taxable base for the County. Additionally, property values of areas near Terminal site would experience a considerable decrease, due to factors such as the diminished aesthetic appeal of the area as well as the ongoing subjection to the blast zone of the LNG tankers. Also associated with the risks inherent in LNG are increased insurance costs.

In addition, the Terminal will require significant investments by local communities, including costs related to emergency response costs and the increasing the capabilities of emergency responders. Oregon LNG would place additional burdens on coastal communities related to emergency response costs and measures, declining fishing and recreation industries, and unknown safety concerns due to geologic instability and proximity to rising river waters due to global warming.

Finally, Oregon LNG has not provided protection against abandoning the site, the consequences of which would fall on the taxpayers. For example, Oregon LNG has yet to demonstrate how the company will protect taxpayers in the event the company declares bankruptcy or abandons the site. The Corps must consider the public interest in Oregon LNG's Terminal in light of the company's failure to provide financial assurances to local communities.
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7.12.1.3 Economic Impacts to Tribes & Other Environmental Justice Communities.

From air pollution to impacts on subsistence fishing, Oregon LNG's project raises significant environmental justice issues. The Corps must address these significant impacts in the public interest analysis.

First and foremost, the Corps has treaty and constitutional duties to consider the project's impacts on Columbia River treaty tribes. Commenters will leave comments on these duties and obligations to the sovereign tribal nations.

On February 11, 1994, President Clinton issued Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations." The Executive Order makes it the responsibility of each Federal agency to "make achieving environmental justice part of its mission in identify and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations." Accompanying this order was a Presidential Memorandum stating that "each Federal agency shall analyze the environmental effects, including human health, economic and social effects, of Federal actions, including effects on minority communities and low-income communities, when such analysis is required by the [National Environmental Policy Act]."

The Corps' public interest analysis must evaluate how the construction of the Terminal and Pipeline will impact cultural resources. This includes impacts to Native American cultural resources, impacts to cultural resources at the Lewis and Clark National Historical Park and along the Lewis and Clark National Historical Trail, and other cultural sites near the terminal, along the LNG tanker route and pipeline route. The Corps public interest review will benefit from government-to-government consultation with Columbia River tribes and other tribes impacted by the Oregon LNG project.

The Corps' actions to date, including starting the public comment period before copies of the application were available, and then refusing to extend the comment period in light of this deficiency, undercut efforts to inform and engage environmental justice communities. Moving forward, Commenters urge the Corps engage tribes and environmental justice communities in a meaningful way.

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7.12.1.4 Induced Gas Production & Gas Exports.

There is strong evidence that gas exports impair the public interest. These impairments include: (1) regional and national economic dislocations and disruptions caused by natural gas extraction, including by the industry's boom-and-bust cycle, (2) national increases in gas and electricity prices and resulting shifts to more polluting fuels, (3) and environmental impacts of many sorts. Any one of these categories of interests could be impaired by gas export.

The Corps' public interest analysis must account for the significant environmental impacts from increased gas production. The U.S. Energy Information Administration (EIA), essentially every other LNG export applicant, and other informed commenters all agree that LNG exports will induce additional production in the U.S. The Oregon LNG project is no exception. Notwithstanding its stated plan to source gas for export from Canada, Oregon LNG concedes that the proposed project will induce additional production in the U.S.[275]

Specifically, the Corps must account for the public health and environmental impacts of induced natural gas production in the U.S. As Oregon LNG explains, if gas produced in Canada is not exported, that gas will enter the U.S. market.[276] This increase of supply in the U.S. market would, in turn, lower gas prices and cause U.S. gas producers to produce less gas than they would otherwise.[277] Conversely, to the extent that Canadian gas is exported, U.S. gas prices will be higher, incentivizing domestic gas producers to increase production.[278]

Sierra Club and Columbia Riverkeeper submitted extensive comments to the U.S. Department of Energy (DOE) on induced natural gas production and Oregon LNG, Exhibit 18, which are incorporated herein by reference. Commenters are also providing the Corps with copies of the exhibits Sierra Club and Columbia Riverkeeper submitted to DOE. The Corps must examine the direct, indirect, and cumulative impacts of induced gas production resulting from Oregon LNG project as part of the public interest analysis.

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[275] *See* Oregon LNG U.S. Department of Energy Application at 24 ("the demand induced by . . . exports will spur production" in the U.S.) (OLNG DOE Application).
[276] *Id.* at 15.
[277] *Id.*
[278] The project may also export gas produced in the U.S., likely produced in the Rocky Mountain states, directly inducing further U.S. production. Although Oregon LNG states that they expect that market conditions will favor sourcing gas from Canada, the application explicitly notes that the pipeline infrastructure will provide the ability to export gas produced in the U.S., and the application offers no legal restriction on Oregon LNG's ability to do so. As the EIA Export Study demonstrates, exports of gas produced in the U.S. will increase U.S. production.

Although Oregon LNG does not estimate the amount by which its proposal would increase U.S. production, other studies suggest that production increases closely correspond with the volume of exported gas. For example, the EIA, in a study of effects of U.S. exports commissioned by the DOE, estimated that the majority of exported gas would come from increased production, primarily from shale gas.[279] Specifically, the EIA predicts that "about 60 to 70 percent" of the volume of LNG exported would be supplied by increases in domestic production, with the remainder supplied reductions in domestic consumption of current production, and that "about three quarters of this increased production is from shale sources."[280] Simple application of these predictions to Oregon LNG's request to export 1.3 bcf/d indicates that the proposal would result in at least application estimates that the application would result in at least 0.78 bcf/day of increased production in North America, including 0.59 of shale gas production.

Furthermore, EIA and DOE have more precise tools to estimate how U.S. production will change in response to Oregon LNG's proposed exports, including the ability to predict how and when production will increase in individual gas plays. EIA's core analysis tool is the National Energy Modeling System (NEMS). NEMS was used to produce the EIA exports study. NEMS models the economy's energy use through a series of interlocking modules that represent different energy sectors on geographic levels.[281] Notably, the "Natural Gas Transmission and Distribution" module already models the relationship between U.S. and Canadian gas production, consumption, and trade, specifically projecting U.S. production, Canadian production, and imports from Canada.[282] For each region, the module links supply and demand annually, taking transmission costs into account, in order to project how demand will be met by the transmission system.[283] Importantly, the Transmission Module is *already* designed to model LNG imports and exports, and contains an extensive modeling apparatus to do so on the basis of production in the U.S., Canada, and Mexico.[284] Right now, the Module focuses largely on LNG imports, which have been the status quo up to this point, but it also already links the Supply Module to the existing Alaskan *export* terminal to project exports from that site and their impacts

[279] *EIA Export Study*, 6, 11.
[280] *Id.* at 6.
[281] Energy Information Administration ("EIA"), *The National Energy Modeling System: An Overview*, 1-2 (2009), http://www.eia.gov/oiaf/aeo/overview/pdf/0581(2009).pdf
[282] *Id.* at 59.
[283] EIA, *Model Documentation: Natural Gas Transmission and Distribution Module of the National Energy Modeling System*, 15-16 (2012), http://www.eia.gov/FTPROOT/modeldoc/m062(2011).pdf
[284] *See id.* at 22-32.

on production.[285] Thus, there is no technical barrier to such modeling going forward. Indeed, EIA used this model for its export study, which forecast production and price impacts.

Similarly, the "Oil and Gas Supply" module models individual regions and describes how production responds to demand across the country. Specifically, the Supply Module is built on detailed state-by-state reports of gas production curves across the country.[286] As EIA explains, "production type curves have been used to estimate the technical production from known fields" as the basis for a sophisticated "play-level model that projects the crude oil and natural gas supply from the lower 48."[287] The module distinguishes coalbed methane, shale gas, and tight gas from other resources, allowing for specific predictions distinguishing unconventional gas supplies from conventional supplies.[288] The module further projects the number of wells drilled each year, and their likely production – which are important figures for estimating environmental impacts.[289] In short, the supply module "includes a comprehensive assessment method for determining the relative economics of various prospects based on future financial considerations, the nature of the undiscovered and discovered resources, prevailing risk factors, and the available technologies. The model evaluates the economics of future exploration and development from the perspective of an operator making an investment decision."[290] Thus, for each play in the lower 48 states, the EIA is able to predict future production based on existing data. Importantly, the EIA makes clear that "the model design provides the flexibility to evaluate alternative or new taxes, environmental, or other policy changes in a consistent and comprehensive manner."[291]

EIA is not alone in its ability to predict localized effects of LNG exports. A study and model developed by Deloitte Marketpoint claims the ability to make the sort of localized predictions that FERC claims are necessary to assessment of environmental impacts, and numerous other LNG export terminal proponents have relied on this study in applications to FERC and DOE.[292] According to Deloitte, its "North American Gas Model" and "World Gas Model" allow it to predict how gas production, infrastructure construction, and storage will

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[285] *See id.* at 30-31.
[286] EIA, *Documentation of the Oil and Gas Supply Module,* 2-2(2011), http://www.eia.gov/FTPROOT/modeldoc/m063(2011).pdf
[287] *Id.* at 2-3.
[288] *Id.* at 2-7.
[289] *See id.* at 2-25– 2-26.
[290] *Id.*
[291] *Id.*
[292] Deloitte Marketpoint, *Made in America: The Economic Impact of LNG Exports from the United States* (2011) (hereinafter "*Deloitte Report*"), http://www.deloitte.com/assets/Dcom-UnitedStates/Local%20Assets/Documents/Energy_us_er/us_er_MadeinAmerica_LNGPaper_122011.pdf.

respond to changing demand conditions, including those resulting from LNG export: "The end result is that valuing storage investments, identifying maximally effectual storage field operation, positioning, optimizing cycle times, demand following modeling, pipeline sizing and location, and analyzing the impacts of LNG has become easier and generally more accurate."[293]

Even if (contrary to all available evidence and Oregon LNG's own admission) the proposed exports would not induce additional gas production in the U.S., the proposed exports would undoubtedly induce additional production in Canada, and DOE/FE would be required to consider the effect, if any, of that induced production on the environment in the U.S.

Finally, the project will also increase domestic gas prices, likely causing an increase in coal fired electricity generation, increasing emissions of greenhouse gas, conventional, and toxic air pollutants. This issue is discussed at length in Sierra Club and Columbia Riverkeeper's comments on Oregon LNG's application, Exhibit 18, which is incorporated by reference.

7.12.2 Pipeline.

Pipeline construction and operation will have a negative impact on economic development and property values. The Pipeline will degrade property values, including farms and forestlands, by preventing customary uses of land, causing erosion and environmental damage, harming drainage systems, and creating a safety risk. The Corps must account for the direct and indirect impacts of the Pipeline on economic development and decreased property values. This analysis should include an assessment of the attendant impact on state and federal sales and property taxes.

7.12.2.1 Flood Control Structure Impacts.

The Corps' public interest analysis must consider the impacts of Pipeline construction, operation, and maintenance on these flood control structures and the lives and property they protect. The Pipeline would intersect dikes and other flood control structures. The Corps constructed most or all of these dikes.[294] For example, the proposed Pipeline segment beginning in Woodland, Washington, would cross under a dike along the Washington shore of the Columbia River which protects lowland farms around Woodland. The Pipeline would also run for several hundred feet along a dike protecting Deer Island, Oregon. As the Pipeline approaches

[293] Deloitte, *Natural Gas Models*, http://www.deloitte.com/view/en_US/us/Industries/power-utilities/deloitte-center-for-energy-solutions-power-utilities/marketpoint-home/marketpoint-data-models/b2964d1814549210VgnVCM200000bb42f00aRCRD.htm.
[294] *See* National Levee Database, http://nld.usace.army.mil/egis/f?p=471:1.

the Terminal site, it would intersect various dikes and flood control structures along the lower Lewis and Clark River and around the City of Warrenton, Oregon.

As the Public Notice acknowledges, the Pipeline would require authorization from the Corps. Under the Rivers and Harbors Act, private parties such as Oregon LNG cannot alter federal flood control structures without permission from the Corps. 33 U.S.C. § 408 (Section 408). Most of the dikes and flood control structures along the Pipeline route were built, or are owned by, the Corps. Accordingly, Oregon LNG must secure permission under Section 408 from the Corps in order to construct the proposed pipeline segments. Section 408 permits and can require significant data collection and risk analysis by the Corps and the applicant. The Corps must incorporate information from the 408 process into the public interest analysis.

7.13 Public Safety.

The Corps must account for the significant public safety risks posed by Oregon LNG's project. The project would put a significant number of people at risk of catastrophic accidents resulting from an LNG or natural gas accident. The route for LNG tankers and the Terminal site itself are extremely close to the communities of Warrenton, Hammond, and Astoria.[295] The Pipeline will cross near residences, through communities, under an interstate highway, and near other areas where accidents or terrorist-induced crimes could leave a devastating toll on human life.

Oregon LNG has not produced Emergency Response Plans. Additionally, Oregon LNG has not identified resources, including funding, to respond to emergencies. Oregon LNG's decision to withhold this information, and delay funding agreements, until late in the permitting process is highly relevant to the Corps' public interest analysis.

In the following section, Commenters explain why the public interest in safe communities weighs in favor of denying Oregon LNG's permits.

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[295] In a 2008 presentation to the California Energy Commission, Oregon LNG acknowledged that LNG terminals should not be sited near population centers. Exhibit 57 at 13 (Oregon LNG Project, Presentation to California Energy Commission (Dec. 4, 2008)). Yet Oregon LNG proposes building the Terminal within and near the cities of Warrenton, Hammond, and Astoria.

7.13.1 LNG Tankers.

Tankers carrying 30 million gallons or more of LNG present a significant safety threat to those who live, work and recreate along the lower Columbia River. To put it mildly, LNG tankers contain an extremely large amount of energy. An LNG release due to either accidental or intentional (*i.e.,* terrorist) acts could cause a fire of unbelievable proportions. Sandia National Labs has projected that an intentional breach of an LNG tanker that spilled just 10% of an LNG tankers load could produce a vapor cloud that could affect a 1.5 mile radius from a given tanker. The Government Accountability Office (GAO), however, concludes that the risk projections in the Sandia Report likely underestimates the impact the Sandia report ignores the potential for the type of cascading fire on an LNG tanker that would likely occur if one LNG tank ignited and therefore spurred additional ignitions of adjacent tanks. The GAO called for additional study of this threat.

The Corps must consider the risk of a cascading LNG tanker fire as part of the public interest review. In addition, the Corps' safety evaluation must account for the fact that LNG tankers use flammable insulation to protect the LNG tanks. This insulation could catch fire and lead to a cascading failure.

7.13.2 Terminal.

The Corps must consider threats to public safety posed by Oregon LNG's Terminal. The Corps' analysis should include, a minimum, a siting and carrier analysis,[296] risk and consequence assessment of potential LNG spills over water,[297] and National Protection Association standards applying to LNG.[298] Local and international regulatory requirements from such organizations as the International Maritime Organization, U.S. Coast Guard should all be assessed for their roles in mitigating risks of LNG. The Corps' analysis should account for international and domestic LNG accidents, including the following examples.

• *Staten Island Tank Fire, USA, 1973.* A fire erupted at an out-of-service LNG tank that was being repaired. Forty workers then inside the tank were killed. LNG, which had

[296] Consequence Assessment methods for Incidents Involving Releases from Liquefied Natural Gas Carriers. (May 13, 2004) ABSG Consulting Inc. for the Federal Energy Regulatory Commission. http://www.ferc.gov/industries/lng/safety/reports/cons-model.pdf.
[297] Guidance on Risk Analysis and Safety Implications of a Large Liquefied Natural Gas (LNG) Spill Over Water, Sandia National Laboratories (Dec. 2004), http://fossil.energy.gov/programs/oilgas/storage/lng/sandia_lng_1204.pdf.
[298] NFPA 59A: Standard for the Production, Storage, and Handling of Liquefied Natural Gas (LNG), 2009 Edition. National Fire Protection Association. (Next edition 2012).

leaked through the liner during previous fillings, had accumulated in the soil below and around the concrete tank wall berm. It has been assumed that an electrical spark in one of the irons or vacuum cleaners ignited the flammable gas reentering the tank.

• *Massachusetts Barge Spill, July 1974.* After a power failure and the automatic closure of the main liquid line valves, a small amount of LNG leaked from a 1-inch nitrogen-purge globe valve on the vessel's liquid header-pressure surge caused by the valve closure induced the leakage of LNG.

• *Cove Point, Maryland, 1979.* LNG leak from a high-pressure pump found its way into an electrical conduit.

• *Nevada Test Site, Mercury, Nevada, 1987.* An accidental ignition of an LNG vapor cloud occurred at the U.S. Department of Energy Nevada Test Site in August 1987.

• *Savannah, Georgia, March 14, 2006.* A potentially disastrous spill was averted when the liquefied natural gas tanker Golar Freeze discharging its load at the Southern LNG terminal on Elba Island broke from its moorings and pulled away from the pier. The dock was shut down for about 36 hours while representatives from the Coast Guard and an LNG engineer from the Federal Energy Regulatory Commission investigated the incident.

• *LNG Tanker Adrift, Cape Cod, Massachusetts, February 11, 2008.* Coast Guard and tugboat crews rescued a liquefied natural gas tanker crippled off Cape Cod after many hours of drifting at sea at the mercy of powerful winds and high waves. Just 5-years-old, the fully laden LNG carrier was corralled by four tugboats about 25 miles east of Provincetown.

7.13.3 Pipeline.

The Corps must account for the risk of a natural gas pipeline explosion in the public interest analysis. As recent natural gas pipeline explosions demonstrate, even with modern safety standards and inspections, deadly pipeline explosions continue to occur. The proposed pipeline will use odor-less gas and have a high-impact blast zone of over 800 feet. The Corps must account for the risks of loss of life, property destruction and damage, and wildfires from a pipeline explosion. In addition, the Corps must also account for the psychological impacts on local landowners and nearby residents. Commenters incorporate by reference Exhibits 43–47, which address safety risks posed by the Pipeline.

7.14 Climate Change.

The Corps' public interest analysis must consider the lifecycle greenhouse gas emissions of Oregon LNG's project and attendant impacts on climate change. This includes greenhouse gas emissions from producing natural gas and the resulting methane leakage in gas fields; fugitive emissions from piping and compressing natural gas; emissions from electricity generation necessary to operate the terminal; pollution from shipping gas overseas in tankers powered by bunker fuel; and emissions from re-gasifying LNG once it reaches its target market.

Natural gas extraction is leaky, and natural gas is mostly methane, a highly potent greenhouse gas with one hundred times the climate change potential of carbon dioxide over a 20-year period). Cooling natural gas to about −162°C (−260°F) and shipping it overseas for use in distant countries is costly and energy-intensive. Natural gas is mostly methane, a super-potent greenhouse gas, which traps 86 times as much heat as carbon dioxide over a 20-year period. In turn, even small leaks in the natural gas production and delivery system can have a large climate impact — enough to gut the entire benefit of switching from coal-fired power to gas.

According to a 2014 DOE report, the climate change impacts of LNG export to Asia are comparable to coal. On May 29, 2014, the DOE released a preliminary environmental report for public comment analyzing the lifecycle greenhouse gas emissions resulting from LNG exports.[299] The results show that U.S. LNG would likely be nearly as bad as coal when exported to Europe and comparable to coal when exported to Asia when the climate impacts of methane leakage are measured over a 20-year timeframe.

LNG derived from conventional gas wells has a 30 percent larger carbon footprint than domestic natural gas. On a global scale, LNG will have a greater impact to climate change than current natural gas sources used in the Pacific Northwest.

The Corps must also examine climate change impacts of energy produced to power the Terminal. Oregon LNG's application fails to specify a source of electricity generation for the Terminal. Instead, Oregon LNG claims that it will buy its power from the grid. However, Oregon LNG will be adding to the overall load on the grid, and the source of its electricity must be considered in the overall climate change impact assessment. Indeed, if Oregon LNG is

[299] Exhibit 48 (U.S. Department of Energy: National Energy Technology Laboratory. *Life Cycle Greenhouse Gas Perspective on Exporting Liquefied Natural Gas from the United States*, DOE/NETL-2014/1649, Office of Fossil Energy (May 29, 2014), http://energy.gov/sites/prod/files/2014/05/f16/Life%20Cycle%20GHG%20Perspective%20Report.pdf).

planning to purchase power from Pacific Power, the electricity generated to liquefy LNG may come partially from coal-fired generation, thus increasing the overall carbon footprint of Oregon LNG's proposal.

7.15 Cumulative Impacts.

The Corps must consider the cumulative impacts of Oregon LNG's project, including the cumulative effects of "conservation, economics, aesthetics, general environmental concerns, wetlands, historic properties, fish and wildlife values, flood hazards, floodplain values, land use, navigation, shore erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, . . . considerations of property ownership and, in general, the needs and welfare of the people." 33 CFR § 320.4(a). The Corps' analysis, therefore, is not limited to the region directly adjacent to Terminal. Nor is the review limited to short-term impacts, but it must consider the long term impacts on the estuary and the entire length of the pipeline. Further, the cumulative impacts analysis must include the proposed WEP Pipeline, which, as explained above, is delivers gas to the Oregon LNG project. The Oregon LNG project would have a tremendous adverse impact on each of the factors listed above.

The Corps must consider the project's cumulative impacts, which include the degraded state of the Columbia River estuary. The Northwest Power and Conservation Council Columbia River Basin Fish and Wildlife 2014 Program Report, summarizes the degraded condition of the Columbia River, stating:

> Salmon and steelhead runs, along with other native fish and wildlife in the basin, have declined significantly in the last 150 years. Recent years have seen some improvements in the number of adult salmon and steelhead passing Bonneville Dam; however, many of these are hatchery fish. Many human activities contributed to this decline, including land and water developments across the region that blocked traditional habitats and dramatically changed natural conditions in rivers where fish evolved.
>
> These developments included the construction of dams throughout the basin for such purposes as hydroelectric power, flood control, commercial navigation, irrigation, and recreation. Fourteen of the largest multi-purpose dams are on the mainstem Columbia; the mainstem Snake River adds another dozen major projects. Water storage in the Columbia River totals approximately 30 percent of the average annual runoff, which fluctuates from year-to-year depending on the snowpack. With its many major federal and non-federal hydropower dams, the Columbia and its tributaries comprise one of the most intensively developed river basins for hydroelectric power in the world.

> Hydroelectric dams in the basin produce, under normal precipitation, about 41 percent (14,000 average megawatts) of all the electricity generated in the Pacific Northwest.[300]

As part of the cumulative effects analysis, the Corps must consider Oregon LNG's impact on fish habitat in light of the already tenuous state of salmonids, green sturgeon, eulachon, and other species impacted by the project. The wetland and shallow water habitat in the Columbia River is significantly degraded. The remaining habitat on the East Skipanon Peninsula, therefore, takes on added importance. The Corps must also consider the cumulative economic effect of Oregon LNG's project on the fishing industry and communities dependent upon the fishing economy. The direct harm to fish will harm the fishing industry, as will the lack of access to traditional fishing areas.

The Corps' cumulative impacts must also account for the reasonably foreseeable industrial development in the estuary. The Columbia River estuary is at the epicenter of a series of high-profile proposals to develop fossil fuel transport projects. These proposals involve transporting coal, crude oil, methanol, and propane through some of the most important salmon habitat in the continental United States. Examples of development proposals that the Corps must account for in the cumulative impacts analysis are described briefly below.

- *Millennium Bulk Coal Export Terminal.* Longview, Washington. Ambre Energy proposes building and operating a 44 million ton per year coal export terminal on the Columbia River. The project requires dredging to accommodate deep draft vessels and new industrial docks, among other things. At two loaded vessels per day, the Millennium project would add 730 outgoing Panamax vessels per year. [301]

- *Morrow Pacific Coal Export Project.* Boardman, Oregon. The Morrow Pacific Project would export 8 million tons of coal per year using two Columbia River ports—the Port of Morrow and Port Westward. The project requires building a new dock at the Port of Morrow, barging coal to Port Westward, and transferring coal from barges to Panamax vessels. The project would add 133 outgoing Panamax vessels per year.

- *Tesoro/Savage Oil-by-Rail Terminal.* Vancouver, Washington. Tesoro/Savage proposes the nation's largest crude oil-by-rail terminal project at the Port of Vancouver.

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[300] Exhibit 49 (Northwest Power Planning Council, Fish and Wildlife Program Fifth Power Plan (2014), https://www.nwcouncil.org/fw/program/2014-12/program/)
[301] Millennium Bulk Terminals, Joint Aquatic Resources Permit Application, 10 (2010) ("At maximum throughput, approximately two vessels per day would be loaded.")

Tesoro/Savage's application to Washington EFSEC states that the project could require as many as 365 vessels per year to transport 360,000 barrels of crude oil each day. [302]

- *Global Partners Oil-by-Rail Terminal.* Port Westward, Oregon. Global started operating a crude oil-by-rail terminal in late 2012. Global intends to sharply increase its shipments of crude oil through Port Westward. According to Oregon DEQ, Global could ship as much as 120,000 barrels/day, increasing vessel traffic by 115 vessels per year. [303]

- *Northwest Innovation Works Methanol Export Terminals.* Kalama, Washington, and Port Westward, Oregon. Two methanol export proposals would use large volumes of natural gas to produce and export methanol to China from the Port of Kalama and Port Westward. Each facility would require two ships per week,[304] totaling 208 ships per year.

The Corps' public interest analysis must account for the cumulative impacts of existing industrial development and associated vessel traffic, as well as reasonably foreseeable future projects.

Increased vessel traffic poses unique risks to ESA-listed species in the Columbia River estuary. These proposed energy-related projects alone would add over *1,500 outgoing deep draft vessels*, increasing vessel traffic by 117%. This estimate does not include increased Panamax vessel traffic from a recently proposed propane terminal at the Port of Portland. To understand these projections in historical context, the Columbia has not seen this many ships in over 20 years.

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[302] Tesoro/Savage, Biological Resources Report, Appendix H.1 to application to the Energy Facility Site Evaluation Council (EFSEC) at 75 (2013) ("It is estimated that the proposed Facility will result in approximately 140 ship transits per year in 2016 (first full year of operations) up to 365 ship transits per year at full buildout.").

[303] Oregon Department of Environmental Quality Public Notice (Feb. 28, 2014) (Global "significantly increased crude oil storage and loading and now intends to receive and transload as much as 1,839,600,000 gallons per year." One barrel of oil is 42 gallons. According to DEQ's notice, and converting gallons per year to barrels per day, Global intends to ship 120,000 barrels/day – an increase of 115,000 barrels over currently permitted levels. Assuming the same ratio of ships to barrels as the Vancouver Tesoro/Savage project (both hope to use Panamax vessels), the Global oil terminal will require roughly 115 additional ships outgoing per year.).

[304] St. Helens Chronicle, *Methanol plant could be in the works for Port Westward* (Jan. 21, 2014), http://www.thechronicleonline.com/news/article_b96d4192-82f7-11e3-a2be-001a4bcf887a.html.

Quantifying incremental change is feasible. Oregon LNG's application does not even attempt to acknowledge important past, ongoing, and future actions that will continue to hamper recovery of sensitive wildlife, fish, and their habitats. Oregon LNG's cumulative impacts analysis also omits the obvious impact that industrialization and hydropower development have had on the Columbia River—developments which harm the Columbia's critical salmon nursery. The Columbia River Channel Deepening Project, which has occurred and will continue to occur in the immediate project area, will impact fisheries and should be incorporated into a consideration of how Youngs Bay will function as even more important migration and refuge habitat during and in the wake of the Oregon LNG project.

For the reasons discussed above and throughout these comments, the cumulative impacts of Oregon LNG's project require that the Corps deny Oregon LNG's permits.

7.16 Mitigation is Inadequate.

Oregon LNG's proposed mitigation does not offset the tremendous damage that the Terminal and Pipeline would cause. Oregon LNG proposes breaching dikes along the Youngs River, at approximately River Mile 5–6, in two or three locations. The dike breaching would allow flooding of 120 acres of pasture that was historically tidal marsh.

First, the mitigation violates the fundamental tenant of the Corps' mitigation sequencing by failing to avoid adverse impacts. As described in these above, there are practicable alternatives to the LNG export and the Terminal location with less adverse impact. EPA describes the mitigation sequencing as follows:

> In 1990, the Environmental Protection Agency (EPA) and the Department of Army entered into a Memorandum of Agreement (MOA) to clarify the type and level of mitigation required under Section 404 regulations. The agencies established a three-part process, known as mitigation sequencing to help guide mitigation decisions:
> 1. Avoid - Adverse impacts are to be avoided and no discharge shall be permitted if there is a practicable alternative with less adverse impact.
> 2. Minimize - If impacts cannot be avoided, appropriate and practicable steps to minimize adverse impacts must be taken.
> 3. Compensate - Appropriate and practicable compensatory mitigation is required for unavoidable adverse impacts which remain.[305]

[305] EPA, *Wetland Compensatory Mitigation*, http://www.epa.gov/owow/wetlands/pdf/CMitigation.pdf.

The MOA describes the requirement of the law:

> *Avoidance.* Section 230.10(a) allows permit issuance for only the least environmentally damaging practicable alternative. The thrust of this section on alternatives is avoidance of impacts. Section 230.10(a) requires that *no discharge shall be permitted if there is a practicable alternative* to the proposed discharge which would have less adverse impact to the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences. In addition, Section 230.10(a)(3) sets forth rebuttable presumptions that 1) alternatives for non-water dependent activities that do not involve special aquatic sites are available and 2) alternatives that do not involve special aquatic sites have less adverse impact on the aquatic environment. *Compensatory mitigation may not be used as a method to reduce environmental impacts* in the evaluation of the least environmentally damaging practicable alternatives for the purposes of requirements under Section 230.10(a).[306]

Oregon LNG flips this sequence on its head by siting the Terminal where it will have tremendous adverse impacts, but then attempting to mitigate those impacts. As the MAO states, compensatory mitigation may not be used as a method to reduce environmental impacts. The Corps must deny the permit because it violates the mitigation sequencing requirements.

Second, even if Oregon LNG had properly avoided adverse impacts, the mitigation does not adequately compensate for the damage. The destruction of nearly 35 acres of wetland and over 100 acres of prime estuarine salmon habitat is irreplaceable. In addition, adequate mitigation must replace habitat values with "in-kind" and "in-place" habitat. The MAO states:

> Generally, in-kind compensatory mitigation is preferable to out-of-kind. There is continued uncertainty regarding the success of wetland creation or other habitat development. Therefore, in determining the nature and extent of habitat development of this type, careful consideration should be given to its likelihood of success.[307]

Here, much of the proposed mitigation is not "in-kind" or "in-place." The construction and operation of the Terminal will cause immediate, severe, deleterious impacts to salmon, critical habitat, and Essential Fish Habitat.

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[306] Memorandum of Agreement between the U.S. Department of the Army and EPA (1990) (emphasis added).
[307] *Id.*

Oregon LNG asserts that salmon habitat will receive a net benefit from the project, but provides no scientific basis for this questionable statement. As the Williams, Rhodes, and Bierly Expert Reports demonstrate, Oregon LNG understates significantly the extent and severity of impacts that will need to be mitigated, and so the analysis of how mitigation will offset these problems is thus inherently flawed. Most importantly, Oregon LNG's proposed mitigation measures do not necessarily offset the types of habitat the project would destroy.

The Bierly Expert Report analyzes Oregon LNG's proposed compensatory mitigation and concludes that the mitigation is inadequate. The Bierly Reports states:

> The proposed development will impact more than 35 acres of fringing marsh along the Skipanon delta. This loss compounds the near complete loss of intertidal wetlands at the Skipanon- Alder Creek delta. Historic diking and unconfined dredge disposal have created the small acreage of fringing marsh, estimated as 400 acres in the Youngs Bay area, (Thomas, 1981) or some 40 percent of the remaining marshes in the Youngs Bay area have become established on disturbed sites. [308]

The Bierly Report describes the inadequacy of Oregon LNG's analysis on the compensability of the proposed mitigation, stating:

> The mitigation site is up Youngs Bay more than 5 miles and could be significantly influenced by the net pen rearing facility in Youngs Bay. The mitigation site has not been evaluated for ecological benefits nor have the restoration actions been evaluated for potential ecological effects. The evaluation of the proposed mitigation site has been by hydraulic modeling to demonstrate that the modeled tidal flooding will likely inundate the entire site. The eventual marsh configuration on the proposed mitigation site will depend on the elevation of the site in comparison to the tidal regime and condition of remnant tidal channels and any proposed reconfiguration of channels (none is proposed at this time).[309]

The Bierly Expert Report concludes that Oregon LNG's proposed mitigation is not adequate, stating:

> The proposed mitigation site lies nearly 5 to 6 miles up Youngs River, a significantly different relationship to the Columbia River than the impact site. The proposed restoration action also raises questions about the functional benefits to juvenile salmon if the diked area is to be breached in only two or three locations. There is no biological basis for the proposal other than the results of the hydrological modeling that shows

[308] Exhibit 2 at 9 (Bierly Expert Report).
[309] *Id.*

flooding of the entire site but has no evaluation of the biological outcomes from restoration.

Oregon LNG fails to demonstrate that the significant environmental harm caused by the Terminal and Pipeline is offset by the proposed mitigation.

7.17 Conclusion for Public Interest Analysis.

The Oregon LNG project will have numerous harmful environmental effects and is contrary to the public interest. Oregon LNG's project will harm the local environment surrounding the proposed Terminal and Pipeline, it will induce environmentally harmful gas production, it will increase prices domestic consumers and industry pay for natural gas, and it will increase domestic coal consumption causing attendant harm to public health and the environment. Oregon LNG's application does not address any of these economic and environmental costs. These environmental harms translate into economic damage. If pollution sickens people, or restricts their travel, economic productivity will suffer – as it will, more directly, if clean air and water and adequate waste disposal capacity are not available. Similarly, as landscapes are industrialized, tourism, agricultural, forestry, hunting and angling, and other place-dependent industries will suffer. The Corps must both consider these environmental impacts in and of themselves and monetize them to weigh them against other economic harms in the public interest analysis.

On the other hand, Oregon LNG's application overstates the economic benefit of its proposal by relying on a faulty economic model that has been extensively criticized by economists. The flaws in Oregon LNG's analysis are described in detail in Sierra Club and Columbia Riverkeeper's comments to DOE, Exhibit 18, which are incorporated by reference.

8. VIOLATIONS OF OREGON & WASHINGTON WATER QUALITY STANDARDS.

Oregon LNG's project will cause or contribute to violations of Oregon and Washington's water quality standards. This includes the protection of aquatic life and fishing, both designated uses, narrative criteria, biocriteria, dissolved oxygen, temperature, toxic substances, turbidity and the states' Antidegradation Policies. DEQ extended the 401 certification comment period by 30 days. The Washington Department of Ecology (Ecology) has not opened a 401 certification public comment period. Commenters request that the Corps consider comments on DEQ and the Washington Department of Ecology's 401 certifications in reaching a decision on the Oregon LNG project.

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9. THE PROJECT WITH CAUSE OR CONTRIBUTE TO SIGNIFICANT DEGREDATION OF WATERS OF THE UNITED STATES.

The proposed action would cause or contribute to significant degradation of the waters of the United States by causing significantly adverse effects on fish, wildlife, and special aquatic sites. Under 40 CFR § 230.10(c):

> Except as provided under section 404(b)(2), no discharge of dredged or fill material shall be permitted which will cause or contribute to significant degradation of the waters of the United States. Under these Guidelines, effects contributing to significant degradation considered individually or collectively, include:
>
> …
>
> (2) Significantly adverse effects of the discharge of pollutants on life stages of aquatic life and other wildlife dependent on aquatic ecosystems, including the transfer, concentration, and spread of pollutants or their byproducts outside of the disposal site through biological, physical, and chemical processes;
>
> (3) Significantly adverse effects of the discharge of pollutants on aquatic ecosystem diversity, productivity, and stability. Such effects may include, but are not limited to, loss of fish and wildlife habitat or loss of the capacity of a wetland to assimilate nutrients, purify water, or reduce wave energy.

For the reasons stated above, the Corps should deny Oregon LNG's permits because the project fails to comply with 40 CFR § 230.10(c).

10. THE PROJECT WILL HARM ESA-LISTED SPECIES AND CRITICAL HABITAT.

The Corps may not approve the permit if it "jeopardizes the continued existence of species listed as endangered or threatened under the Endangered Species Act of 1973, as amended, or results in likelihood of the destruction or adverse modification of . . . critical habitat" 33 C.F.R § 230.10(b)(3). As discussed in detail above, the destruction of nearly 35 acres of wetlands and over 135 acres of prime estuarine habitat will jeopardize the struggling populations of 13 ESUs of salmonids and other ESA-listed species. In addition, the proposal will increase in deep draft ship traffic, which will increase wake stranding of juvenile fish and increase vessel strikes and other harassment of endangered and threatened marine mammals, including several whale species and steller sea lion. For the reasons provided in this comment letter and stated in the Williams, Rhodes, and Bierly Expert Reports, the Corps should deny Oregon LNG's project based on impacts to ESA-listed species and critical habitat.

11. THE CORPS LACKS SUFFICIENT INFORMATION TO MAKE A REASONABLE JUDGMENT.

40 CFR § 230.12(a)(3)(iv) requires a finding of noncompliance with restrictions on discharge when the application does not contain sufficient information. The Corps does not have sufficient information on the practicable alternatives and the impacts on the proposed development. Moreover, as discussed throughout this comment and in the Williams, Rhodes, and Bierly Expert Reports, the application contains blatant factual errors and significant omissions of important information to assess the project's impacts and compensability of the proposed mitigation.

Notably, Oregon LNG omits highly relevant information about Oregon LNG's control of the East Skipanon Peninsula. Since at least 2009, Oregon LNG has known that the Corps holds a dredge spoil disposal easement for the East Skipanon Peninsula. Oregon LNG did not disclose any information about the easement, including Oregon LNG's federal district court lawsuit against the Corps. Oregon LNG's omission of the significant information is remarkable on a number of levels. Oregon LNG's failure to disclose information that is highly relevant to the Corps' public interest analysis casts significant doubt on the veracity of the application as a whole.

In addition, the Corps must find noncompliance because the applicant failed to provide accurate information in the Application. Mr. Peter Hansen, Oregon LNG's CEO, signed his name under the following certification: "I certify that, to the best of my knowledge and belief, the proposed activity described in this application complies with the Oregon Coastal Zone Management Program (OCMP) and will be completed in a manner consistent with the program." The LNG terminal, however, does not comply with the OCMP because the proposed industrial use is inconsistent with the Clatsop County Land Water Development and Use Ordinance, Standards Document, and Comprehensive Plan and the City of Warrenton Zoning Code and Comprehensive Plan.

Clatsop County denied land use authorizations for Oregon LNG's proposed Pipeline. Specifically, Clatsop County denied Oregon LNG's application to build and operate a 41-mile long segment of the Pipeline through the County. Compliance with Clatsop County's land use laws is a requirement of the NOAA-approved OCMP.[310] Mr. Hansen certainly understood that

[310] Exhibit 35 (Letter from Columbia Riverkeeper *et al.* to the Oregon Department of Land Conservation and Development, Oregon LNG Coastal Zone Management Act Public Comments (Nov. 7, 2013)).

non-compliance with Clatsop County land use means that the project did not comply with the OCMP. The Corps cannot simply accept the applicant's false certification on its applications.

If the application is incomplete or inaccurate, the Corps does not have sufficient information to issue a permit. The Corps' choices are to deny the permit or request a new and accurate permit application.

12. REQUEST FOR PUBLIC HEARING.

In a letter dated December 8, 2014, Columbia Riverkeeper requested that the Corps hold public hearings on the Oregon LNG project. *See* Exhibit 50. For the reasons stated in the December 8th letter, Commenters request that the Corps hold public hearings on this high controversy, high impact project.

13. CONCLUSION.

Commenters urge the Corps to deny permits for Oregon LNG's project. Oregon LNG fails to demonstrate compliance with the Clean Water Act and Rivers and Harbors Act. Oregon LNG's project presents unprecedented threats to the Columbia River estuary and undermines significantly efforts to restore endangered salmonids, including the Corps' obligations under the FCRPS BiOp. The Corps must rely on the best available science in evaluating the project's impacts on the environment and public health. For the reasons stated above and in exhibits incorporated hereto by reference, the best available science supports one outcome: denying Oregon LNG's permits.

Commenters appreciate the Corps' consideration of public input on Oregon LNG's project. Please direct any questions or correspondence to the undersigned at (541) 965 – 0985 or lauren@columbiariverkeeper.org.

Sincerely,

Lauren Goldberg
Staff Attorney, Columbia Riverkeeper
Submitted on behalf of Columbia Riverkeeper, the Pacific Coast Federation of Fishermen's Associations, the Institute for Fisheries

Resources, Northwest Steelheaders Association, Northwest Environmental Advocates, Sierra Club, Northwest Property Rights Coalition, Oregon Shores Conservation Coalition, Northwest Guides and Anglers Association, Oregon Physicians for Social Responsibility, Save Our Wild Salmon, the Center for Biological Diversity, Columbia Pacific Commonsense, Landowners and Citizens for a Safe Community, Food and Water Watch, the Northwest Environmental Defense Center, the Native Fish Society, Forest Grove Oregon Citizens Against the Pipeline, Willapa Hills Audubon Society, Wahkiakum Friends of the River, Oregon Coast Alliance, 350PDX, Tessa Scheller, Roble and Catherine Anderson, and Cheryl Johnson

cc via email w/o encl.:

Christine Reichgott, U.S. Environmental Protection Agency
Teresa Kubo, U.S. Environmental Protection Agency
Dick Pedersen, Oregon Department of Environmental Quality
Jennifer Purcell, Oregon Department of Environmental Quality
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Nina DeConcini, Oregon Department of Environmental Quality
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Margi Hoffman, State of Oregon Governor's Office
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Carl Merkle, Confederated Tribes of the Umatilla Indian Reservation
Elmer Ward, Confederated Tribes of Warm Springs
Brady Kent, Confederated Tribes and Bands of the Yakama Nation
Elizabeth Sanchey, Confederated Tribes and Bands of the Yakama Nation

TABLE OF EXHIBITS

Exhibit No.	Description
1	Williams, Richard N., *Review of the draft Biological Assessment and Essential Fish Habitat for Proposed Oregon LNG Terminal Project* (Jan. 8, 2015)
2	Bierly, Kenneth, *Oregon LNG Terminal Wetland Impacts and Proposed Mitigation Review: Analysis of Available Information* (Jan. 8, 2015)
3	Rhodes, Jonathan, J. *Summary of likely impacts of construction and maintenance of pipeline for the proposed Oregon LNG Terminal and Oregon Pipeline Project (Project) on watersheds and aquatic resources and adequacy and veracity of the discussion and assessment of these impacts in the Project's Biological Assessment (BA), Joint Permit Application (JPA), and supplements thereto* (Jan. 12, 2015)
4	Letter from Center for Biological Diversity to U.S. Army Corps of Engineers, Comments on Oregon LNG Bidirectional Project Joint Permit Application, NWP-2005-748 (Jan. 2015)
5	Letter from National Marine Fisheries Service to FERC, Oregon LNG NEPA Scoping (Dec. 20, 2012)
6	Oregon LNG Waterway Suitability Analysis (Mar. 2008)
7	Letter from the Corps to FERC (Dec. 14, 2014)
8	Letter from Columbia Riverkeeper *et al.* to FERC, Comments on NEPA Scoping for Oregon LNG Bidirectional Project (Dec. 21, 2012)
9	Letter from U.S. Environmental Protection Agency to FERC, Comments on NEPA Scoping for Oregon LNG Bidirectional Project (Dec. 26, 2012)
10	Letter from National Park Service to FERC, Comments on NEPA Scoping for Oregon LNG Bidirectional Project (Nov. 7, 2012)
11	Letter from U.S. Fish and Wildlife Service to FERC, Comments on NEPA Scoping for Oregon LNG Bidirectional Project (Jan. 11, 2013)
12	Letter from State of Oregon to FERC, Comments on NEPA Scoping for Oregon LNG Bidirectional Project (Dec. 19, 2012)
13	Letter from Washington Department of Ecology to FERC, Comments on NEPA Scoping for Oregon LNG Bidirectional Project (Dec. 18, 2012)

14	Letter from City of Warrenton to FERC, Comments on NEPA Scoping for Oregon LNG Bidirectional Project (Dec. 21, 2012)
15	Letter from Washington Department of Natural Resources to FERC, Comments on NEPA Scoping for Oregon LNG Bidirectional Project (Dec. 21, 2012)
16	Letter from Oregon Department of Forestry to FERC, Comments on NEPA Scoping for Oregon LNG Bidirectional Project (Dec. 13, 2012)
17	Letter from Columbia River Estuary Study Taskforce to FERC, Comments on NEPA Scoping for Oregon LNG Bidirectional Project (Dec. 19, 2012)
18	Sierra Club and Columbia Riverkeeper, Motion to Intervene, Protest and Comments to the U.S. Department of Energy (Nov. 2013)
19	Letter from State of Oregon to FERC, Preliminary Comments of DEQ on Bradwood LNG DEIS (Nov. 2007)
20	Grays Harbor Crude-by-Rail Fact Sheet (Aug. 2013), http://www.portofgraysharbor.com/about/CBR-Project.php
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22	DEQ, *Evaluation Report and Findings on Clean Water Act 401 Water Quality Certification Application for Bradwood Landing* (March 10, 2011)
23	U.S. Army Corps of Engineers, Defendant's Motion to Dismiss, *Oregon Development Company, LLC v. U.S. Army Corps of Eng'rs*, Case No. 3:14-cv-01239-AC (Nov. 14, 2014)
24	Oregon Development Company, LLC, Complaint, Exh. B, *Oregon Development Company, LLC v. U.S. Army Corps of Eng'rs*, Case No. 3:14-cv-01239-AC (Aug. 1, 2014)
25	Columbia Riverkeeper *et al.* Clean Water Act Section 404 Comments for the Bradwood LNG Project (Dec. 18, 2007)
26	Ecotrust, *Economic Risk of the Morrow Pacific Project: Livelihood, Habitat, and Recreation* (Mar. 20, 2014)

27	Lower Columbia River Estuary Partnership, *Habitat change in the Lower Columbia River and Estuary, 1870-2011* (2013)
28	Letter from Columbia Riverkeeper to Oregon Department of Environmental Quality, Comments on Oregon LNG Bidirectional Project NPDES Permit Application (Nov. 21, 2013)
29	CBC News, *7,500 songbirds killed at Canaport gas plant in Saint John* (Sept. 18, 2013), http://www.cbc.ca/news/canada/new-brunswick/7-500-songbirds-killed-at-canaport-gas-plant-in-saint-john-1.1857615
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34	Letter from the Oregon Department of Forestry to Clatsop County (June 25, 2010)
35	Letter from Columbia Riverkeeper et al. to the Oregon Department of Land Conservation and Development, Oregon LNG Coastal Zone Management Act Public Comments (Nov. 2013)
36	Yeh, Harry et al., *Tsunami Hydrodynamics in the Columbia River*, Civil Environmental and Engineering Faculty Publication and Presentations. Paper 106 (2012), http://pdxscholar.library.pdx.edu/cengin_fac/106
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40	Washington Department of Fish and Wildlife, 2014 Creel Data for Buoy 10 Fishery (accessed Jan. 13, 2015), http://wdfw.wa.gov/fishing/creel/buoy10/
41	U.S. Coast Guard Letter of Recommendation for Oregon LNG Project (April 24, 2009)
42	U.S. Coast Guard Letter of Recommendation Analysis for Oregon LNG Project (April 24, 2009)
43	Letter from Columbia Riverkeeper to Clatsop County, Testimony on Oregon Pipeline, LLC Consolidated Land Use Application (June 9, 2010)
44	Letter from Columbia Riverkeeper to Clatsop County, Testimony on Oregon Pipeline, LLC Consolidated Land Use Application (June 24, 2010)
45	Letter from Columbia Riverkeeper to Clatsop County, Testimony on Oregon Pipeline, LLC Consolidated Land Use Application (July 16, 2010)
46	Letter from Columbia Riverkeeper to Clatsop County, Testimony on Oregon Pipeline, LLC Consolidated Land Use Application (Oct. 22, 2010)
47	Letter from Columbia Riverkeeper to Clatsop County, Testimony on Oregon Pipeline, LLC Consolidated Land Use Application (Feb. 23, 2010)
48	U.S. Department of Energy: National Energy Technology Laboratory. *Life Cycle Greenhouse Gas Perspective on Exporting Liquefied Natural Gas from the United States*, DOE/NETL-2014/1649, Office of Fossil Energy (May 29, 2014), http://energy.gov/sites/prod/files/2014/05/f16/Life%20Cycle%20GHG%20Perspective%20Report.pdf.
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60	Roegner, C. *The contribution of tidal fluvial habitats in the Columbia River Estuary to the recovery of diverse salmon ESUs*, Prepared for the U.S. Army Corps of Engineers (May 2013)
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62	Kock, Tobias J., *Review of a model to assess stranding of juvenile salmon by ship wakes along the Lower Columbia River, Oregon and Washington*, USGS Open-File Report 2013-1229, http://pubs.er.usgs.gov/publication/ofr20131229