UNITED STATES OF AMERICA
DEPARTMENT OF ENERGY
FEDERAL ENERGY REGULATORY COMMISSION

IN THE MATTERS OF	**)**	
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Jordan Cove Energy Project, L.P.	**)**	**Docket CP17-495-0000**
	)	
Pacific Connector Gas Pipeline, L.P.	**)**	**Docket CP17-494-0000**
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The Western Environmental Law Center, Sierra Club, Greater Good Oregon, Pipeline Awareness Southern Oregon, Oregon Shores Conservation Coalition, Trout Unlimited, Center for Biological Diversity, Oregon Wild, Oregon Coast Alliance, Oregon Physicians for Social Responsibility, Umpqua Watersheds, Inc., OPAL Environmental Justice Oregon, Honor the Earth, 350 Corvallis, Columbia Riverkeeper, Friends of Living Oregon Waters (FLOW), Oregon Women's Land Trust, Earthworks, Hair on Fire Oregon, Rogue Climate, Oregon Women's Land Trust, Cascadia Wildlands, Snattlerake Hills, LLC, Waterkeeper Alliance, Great Old Broads for Wilderness, Cascade Volcanoes Chapter, Pacific Coast Federation of Fishermen's Associations, Institute for Fisheries Resources, Rogue Riverkeeper, Beyond Toxics, and affected landowners Deb Evans and Ron Schaaf submit these comments on the Draft Environmental Impact Statement (DEIS) for the Jordan Cove Energy and Pacific Connector Gas Pipeline Projects, dated March 2019.

We incorporate by reference comments on this DEIS submitted by the Institute for Policy Integrity.

These comments refer to the DEIS and other supporting documentation available in Dockets CP17-495-0000 and CP17-494-0000. Other references are made to publicly available documents, were possible. Where references may not be available on FERC's e-Dockets or otherwise publicly available, we have included these documents in Appendix A, Exhibits.

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I. INTRODUCTION

This draft environmental impact statement concerns a liquefied natural gas project that will require construction of massive infrastructure, directly impacting people and the environment throughout Oregon, and indirectly impacting the environment throughout the regions where exported gas is produced and, by significantly contributing to climate change, the environment worldwide.

Jordan Cove Energy Project, L.P. (Jordan Cove) seek to build liquefaction and terminal facilities capable of exporting up to 1.04 billion cubic feet per day (bcf/d) of natural gas as liquefied natural gas (LNG) from a proposed LNG export terminal in Coos Bay, Oregon. The proposed project will also have import capability. The proposed design also includes a 229-mile, 36-inch high-pressured gas pipeline capable of transporting 1.2 billion cubic feet per day of gas. This pipeline would be placed through Coos Bay and cross and permanently impair streams, wetlands, and sloughs, along with causing associated deleterious impacts to upland habitat, forest, farm, recreational, and residential uses. The pipeline would cross hundreds of waterbodies, cross more than a dozen miles of wetlands, require clear cutting of more than a thousand acres of the remaining old growth forests in Oregon, cross steep and remote terrain prone to landslides where emergency response is limited to local volunteers, and impact and permanently impair approximately 6,000 acres of state, federal and privately owned lands.

The current proposal is a modification of a prior, import-only and a second export proposal. In the course of review of these prior proposals, including FERC's NEPA review, environmental and community organizations (including many of the undersigned), state and local government officials, and other federal agencies expressed numerous criticisms regarding the project itself and the adequacy of environmental review. Many, if not most, of these criticisms continue to apply to the current proposal. The current export proposal will have even greater environmental impacts than the previous proposals (including but not limited to impacts relating to construction of liquefaction equipment and inducement of additional gas production to provide a supply for export). Many of the deficiencies in the prior environmental review have not been corrected in the current draft EIS. Accordingly, below, we frequently cite the draft and final environmental impact statements, and comments thereon, filed in FERC dockets CP04-441, CP07-444, CP13-483-000, and CP13-492-000. These documents are, obviously, already available to FERC, and must be considered part of the record here.

The current draft EIS is deficient because it glosses over the many of the Project's significant impacts and completely ignores many others. We discuss these deficiencies below. Following the structure of the DEIS, where appropriate, we roughly divide discussion of impacts of activities at the terminal site from discussion of impacts relating to the pipeline project. However, as we explain, these impacts must be considered cumulatively, and some types of impacts are common to both portions of the project. As such, some issues primarily addressed in one section also apply to the other, and each section must be understood as incorporating the others.

II. JORDAN COVE LIQUEFIED NATURAL GAS TERMINAL

A. General Safety Comments

Taken specifically and cumulatively, based even on only the risks disclosed here but even more so when an accurate picture is taken, the safety consequences of the proposed action pose an unreasonable burden on the public.

Safety is well-recognized as one of the major effects to the human environment flowing from an LNG terminal, and it ought to weigh heavily in consideration of public interest analysis and site suitability determinations. *Se e.g.* RLMS (2011), *Final Report: Suitability Assessment for LNG at Abbot Point*, (at p.i, "safety is a key driver in site selection…")

Draft EIS Conclusions regarding Safety are Unsupported and Wrong (§5.1.13) In the concluding section, the Draft EIS describes FERC's duty and conclusion as to:

> assess whether the proposed facilities would be able to operate safely and securely. As a result of our technical review…and our recommended mitigation, we believe that the facility proposed by Jordan Cove includes acceptable layers of protection or safeguards that would reduce the risk of a potentially hazardous scenario from developing into an event that could impact the off-site public.

DEIS, 5-10, 4-780. That conclusion makes no sense. It is not reasonably supported by the evidence before the agency, which shows substantial risks of horrific, high-consequence disasters being imposed on a host of unwilling parties. Moreover the conclusion is so vague and conclusory as to be practically worthless to inform either (1) the public and other experts, who ought to be engaged in the issue through the NEPA process, or (2) the decision-makers at FERC.

The conclusion regarding pipeline safety is even worse, stating bluntly that the "pipeline would be built and inspected according to USDOT standards. These standards ensure pipeline safety." DEIS, 5-11, 4-781. That is wrong, and dangerously misleading. Those standards kill three people each year, on average, from just this sort of pipeline.

The conclusions section also has paragraphs regarding the USDOT and USCG reviews, regarding the LNG facility siting and waterway suitability. DEIS, 5-10 – 5-11; 4-780 – 4-781. These paragraphs are concerning as they seem to punt consideration of core safety issues to future project stages, leaving loose ends that are likely to change important conclusions. Based on information available, both USDOT and USCG are going to find future deficiencies, which

the public has a right to discover in the NEPA context. It is unreasonable for FERC to conclude that safety risks are acceptable prior to even seeing those reviews. That those reviews are referred in the concluding section in this way underlines the problem that the existence of regulations and processes having to do with safety risks is taken as *assurance of safety.* As explained further in this next section, we strongly object to that complacent approach.

In many specific ways (detailed throughout these comments) and taken as a whole, the Draft EIS fails to meet the basic obligation to inform the public and decision-makers of the foreseeable significant impacts regarding reliability and safety. The safety section of the EIS reads like a corporate compliance document, not an environmental impact statement.

The 9th Circuit summarized some of these core principles:

> Our role in reviewing an EIS is to ensure that the agency has taken a 'hard look' at the potential environmental consequences of the proposed action." *League of Wilderness Defenders Blue Mountains Biodiversity Project v. Allen*, 615 F.3d 1122, 1135 (9th Cir. 2010) (internal quotation marks omitted). Taking a "hard look" includes "considering all foreseeable direct and indirect impacts. Furthermore, a 'hard look' should involve a discussion of adverse impacts that does not improperly minimize negative side effects." *N. Alaska Envtl. Ctr. v. Kempthorne*, 457 F.3d 969, 975 (9th Cir. 2006) (internal quotation marks and citation omitted). "[G]eneral statements about possible effects and some risk do not constitute a hard look absent a justification regarding why more definitive information could not be provided." *Or. Natural Res. Council Fund v. Brong*, 492 F.3d 1120, 1134 (9th Cir. 2007) (internal quotation marks omitted).

League of Wilderness Defenders-Blue Mts. Biodiversity Project v. United States Forest Serv., 689 F.3d 1060, 1075 (9th Cir. Or. 2012).

Section 4.13.1.1 from the start sets up the false premise: "LNG facilities… can pose a risk to the public if not properly managed." DEIS, 4-698. That logic, repeated throughout the section, is both false and misleading, and betrays a sense of complacency that itself increases the risk to safety. See e.g. DEIS, 5-11 (citing future DOT and USCG reviews as supporting a current conclusion that safety is assured); DEIS, 4-725 (describing FERC staff evaluating the "adequacy" of hazard detection). The fact is that these facilities do pose a risk to the public whether or not they are "properly" managed; "proper" management is very much an imperfect science with well-known weaknesses and areas of uncertainty. The best risk management recognizes those things, the failure to do so can be catastrophic. Baker et al. 2007. The Report of the BP US Refineries Independent Safety Review Panel (The Baker Panel Report), January 2007; Rufe et al. 2011. BP Deepwater Horizon Incident Specific Preparedness Review (ISPR) Final Report. January, 2011; National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling, 2011. Deepwater: The Gulf Oil Disaster and the Future of Offshore Drilling. Report to the President; Committee on Risk Assessment and Management of Marine Systems, Marine Board, National Research Council, 1998. Review of the Prince William Sound, Alaska, Risk Assessment Study. NATIONAL ACADEMY PRESS. Washington, D.C. 1998; Deepwater

Horizon Study Group, 2011. Final Report of the Investigation of the Macondo Well Blowout. March 1, 2011. Available online at: http://ccrm.berkeley.edu/pdfs_papers/bea_pdfs/dhsgfinalreport-march2011-tag.pdf; Bob Bea, January 22, 2006. Learning from Failures: Lessons from the Recent History of Failures of Engineered Systems. Available online at: http://ccrm.berkeley.edu/pdfs_papers/bea_pdfs/learning_from_failures2.pdf.

In addition, the DEIS doesn't really disclose *what* would happen if the risks occurred, beyond the vaguest descriptions. Hazards such as pool fires, jet fires, cryogenic spills, and cascading events are mentioned only in passing, without ever being described in either qualitative or quantitative terms. The Draft EIS never describes any safety hazard; only ways that safety hazards are mitigated.

The Draft EIS fails to provide objective metrics for the public or decision-makers to analyze the overall safety risk posed by the project. It never does discloses a body count. We are given no idea how frequently accidents are expected to occur. Risks assessments must have been done by the applicant that could be revealed here, or if they are not then FERC should gather this information. Where objective metrics can't be used and the agency needs to rely on qualitative statements like these, there arises a NEPA duty to explain why objective metrics can't be provided. *See League of Wilderness Defenders-Blue Mts. Biodiversity Project v. United States Forest Serv.,* 689 F.3d 1060, 1076 (9th Cir. Or. 2012) (citing *Klamath-Siskiyou Wildlands Ctr. v. Bureau of Land Mgmt.*, 387 F.3d 989, 994 & n.1 (9th Cir. 2004). The Draft EIS doesn't provide any explanation here. Nor could it, at least in many instances, where objective metrics are available and could be provided.

Fundamentally, the FERC needs to re-do this EIS, with a focus on actually describing the environmental consequences. 40 CFR 1502.16; 1508.8.

The approach taken in this EIS of using regulations as the organizing principle for analysis of safety effects compounds the misleading nature of the DEIS because it fails to confront the gaps in those regulations. It is indisputable that existing regulations do not (should not, could not) cover the whole field of environmental effects that might have significance. The siting regulations regarding burn zones for example address consequences of certain fire-related scenarios, but that is an entirely different issue from siting issues related to social and geophysical risk factors or emergency response capability. It also cannot be disputed that even where regulations directly apply, they have not (could not, should not) completely eliminated risk. Whatever the policy choices made by regulators and legislators, they have left a situation where the proposed action is going to result in significant environmental effects. The duty under NEPA is not to second-guess those policy choices, but to disclose and analyze the effects in light of them. This Draft EIS fails entirely to meet that core duty, instead presenting the issue as a mere matter of regulatory compliance. This is not a Draft EIS of a public agency, but the compliance document of a private company.

There are so many pieces of the safety puzzle outstanding here, and so many of the decisive consultations and studies have yet to occur, that the Draft EIS lacks information that is essential

to the decision, yet does not properly disclose and address that fact. *See* 40 CFR 1502.22. Under that regulation:

> When an agency is evaluating reasonably foreseeable significant adverse effects on the human environment in an environmental impact statement and there is incomplete or unavailable information, the agency shall always make clear that such information is lacking.
> (a) If the incomplete information relevant to reasonably foreseeable significant adverse impacts is essential to a reasoned choice among alternatives and the overall costs of obtaining it are not exorbitant, the agency shall include the information in the environmental impact statement.
> (b) If the information relevant to reasonably foreseeable significant adverse impacts cannot be obtained because the overall costs of obtaining it are exorbitant or the means to obtain it are not known, the agency shall include within the environmental impact statement:
> (1) A statement that such information is incomplete or unavailable; (2) a statement of the relevance of the incomplete or unavailable information to evaluating reasonably foreseeable significant adverse impacts on the human environment;
> (3) a summary of existing credible scientific evidence which is relevant to evaluating the reasonably foreseeable significant adverse impacts on the human environment, and
> (4) the agency's evaluation of such impacts based upon theoretical approaches or research methods generally accepted in the scientific community. For the purposes of this section, "reasonably foreseeable" includes impacts which have catastrophic consequences, even if their probability of occurrence is low, provided that the analysis of the impacts is supported by credible scientific evidence, is not based on pure conjecture, and is within the rule of reason.

40 C.F.R. 1502.22. The standard for whether a given scientific analysis must occur in an EIS is whether that analysis is "reasonably possible" to perform. *Pacific Rivers Council v. US Forest Service*, 668 F. 3d 609, 624 (9th Cir. 2012).

It is critically important that the safety and reliability section of the EIS be re-worked while applying that regulations. The Draft EIS here is incomplete in many important ways, with information outstanding. Rather than address safety issues, issue after issue is punted to future consideration and future project phases. The key safety consultations with cooperating agencies, like USDOT and USCG, are not complete. The FERC is restricted by regulation and policy in many ways to use and rely on results of those consultations, so that they are missing here is a major problem.

Incomplete and missing information is also a major problem related to DEIS section 4.13.1.6, which consists of a long list of "mitigation" measures, many of which consist of information to be provided or information to be reviewed at various points in the future. Those measures are sweeping in their scope, and a primary mechanism that FERC is using to evaluate safety implications of the project. This information is mostly essential to make informed public

comment and for the commission to consider, although the DEIS doesn't provide any analysis of the importance of that information. Where information is available or possible to obtain regarding impacts, it should be included in the Draft EIS.

A related failure throughout this section of the Draft EIS is the lack of discussion or recognition of quality scientific data. The Draft EIS exclusively relies on applicant-provided studies and data. Failure to disclose shortcomings in models is an independent NEPA violation. 40 C.F.R. § 1502.22; *See Lands Council v. USFS*, 395 F.3d 1019, 1032; (9th Cir. 2004). *See also* 40 CFR 1502.24 ("agencies shall insure the… integrity of the discussion and analyses" and identify sources and methods).

1. LNG Facility Historical Review

The discussion of historic incidents at LNG facilities is problematic in several ways.
First, the triumphalist presentation shows bias and complacency. It is a strange way to characterize the history as "free of safety-related incidents," when the same sentence has to acknowledge the Cleveland incident that killed 128, and when even the very recent history shows that LNG facilities hazards. DEIS, 4-712. For example, the recent accidents at Plymouth, Washington (March 31, 2014) and Sabine Pass, off Louisiana (January 22, 2018) were both major incidents that revealed a host of flaws in regulation and engineering.

Second, this discussion focuses unduly on specific engineering causes of incidents. Such a focus can come at the expense of diligence especially to process safety hazards.

Third, even this optimistic presentation of the LNG industry safety history gives us reason for concern. There is clearly a pattern of unforeseen causes resulting in violent incidents. Cascading events appear to be a major risk. As we urged during scoping, process safety needs to be a major focus of the FERC analysis here. *See e.g.* Baker et al. 2007. The Report of the BP US Refineries Independent Safety Review Panel (The Baker Panel Report), January 2007; Rufe et al. 2011. BP Deepwater Horizon Incident Specific Preparedness Review (ISPR) Final Report. January, 2011; National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling, 2011. Deepwater: The Gulf Oil Disaster and the Future of Offshore Drilling. Report to the President; Committee on Risk Assessment and Management of Marine Systems, Marine Board, National Research Council, 1998. Review of the Prince William Sound, Alaska, Risk Assessment Study. NATIONAL ACADEMY PRESS. Washington, D.C. 1998; Deepwater Horizon Study Group, 2011. Final Report of the Investigation of the Macondo Well Blowout. March 1, 2011. Available online at: http://ccrm.berkeley.edu/pdfs_papers/bea_pdfs/dhsgfinalreport-march2011-tag.pdf; Bob Bea, January 22, 2006. Learning from Failures: Lessons from the Recent History of Failures of Engineered Systems. Available online at:
http://ccrm.berkeley.edu/pdfs_papers/bea_pdfs/learning_from_failures2.pdf.

2. FERC preliminary engineering review

The DEIS description of FERC's preliminary engineering review (DEIS, 4-713 – 4-714) is of an incredibly vague, apparently free-floating review of critical elements of the project. Applicants must provide "information," which the staff "evaluates." *Id.* An "acceptable" design has "various

layers" of safeguards to "reduce" risk. *Id.* Even the hazards designed against are kept safely in the zone of the theoretical, being only "potentially hazardous" events that "could impact" the public and environment. *Id.*

Talking in general terms about things in the abstract does not fulfill NEPA's duty to disclose and analyze site-specific effects of the particular proposed action. This sort of drifting speculation and philosophical supposition fails that core duty. Rather than giving the public and decision-maker generalities, the EIS should provide useable, specific information predicting the likely effects, and reasonable available alternatives.

3. Process Design — process safety risks are substantial

The Draft EIS next describes the "process design" of the facility, in a section describing some of the extremely complex engineering and related regulatory structures addressing process systems. DEIS, 4-715.

This section fails to really describe what is at stake. We are told that the result of failure "could pose potential harm if not properly safeguarded…" DEIS, 4-716. What does that mean? While the DEIS does not reveal the scope of the problem, we fear based on other information that failure of any one of these *hundreds* of different systems and components could quickly result in a massive disaster.

This incredibly complex project poses huge risks in terms of process safety. In spite of our specifically requesting the issue be confronted in scoping comments, the Draft EIS largely fails to address safety in a useful or systematic way. We do thank you for at least referencing some of the benchmarks for process safety and management of change, but insist that the EIS must be revised so that the risks here are clearly and usefully described.

The available literature clearly establishes the importance of taking adequate stock of process safety hazards early in the process. *See e.g.* Baker et al. 2007. The Report of the BP US Refineries Independent Safety Review Panel (The Baker Panel Report), January 2007; Rufe et al. 2011. BP Deepwater Horizon Incident Specific Preparedness Review (ISPR) Final Report. January, 2011; National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling, 2011. Deepwater: The Gulf Oil Disaster and the Future of Offshore Drilling. Report to the President; Committee on Risk Assessment and Management of Marine Systems, Marine Board, National Research Council, 1998. Review of the Prince William Sound, Alaska, Risk Assessment Study. NATIONAL ACADEMY PRESS. Washington, D.C. 1998; Deepwater Horizon Study Group, 2011. Final Report of the Investigation of the Macondo Well Blowout. March 1, 2011. Available online at: http://ccrm.berkeley.edu/pdfs_papers/bea_pdfs/dhsgfinalreport-march2011-tag.pdf; Bob Bea, January 22, 2006. Learning from Failures: Lessons from the Recent History of Failures of Engineered Systems. Available online at: http://ccrm.berkeley.edu/pdfs_papers/bea_pdfs/learning_from_failures2.pdf.

There is concern that the relevant analyses are being put off until too late in the process, hiding significant impacts from the public and decision-maker, and preventing consideration of safer

alternatives. The HAZOP analysis for example, which appears to be the critical analysis revealing process safety issues, is put off until after final design. DEIS, 4-717. Worse, massive faith is being put into that analysis in the DEIS. In typically conclusory language, the DEIS says FERC's review of the HAZOP will "ensure" that "all systems" are addressed "appropriately." DEIS 4-718. What is appropriate is based on the vague FERC determination of what are "commensurate" layers of protection based on "generally accepted good engineering practices." *Id.*

The DEIS offers several recommendations to reduce process safety risks, mainly consisting of regular inspections. DEIS, 4-718; *see* DEIS §4.13.1.6. We support those measures, but urge that they are inadequate. Inspections and reports are fine, but without funding or enforcement they are weak sauce. Better would be recommendations to require regular inspections and funding, that could be done by an independent public body such as a Regional Citizen Advisory Council (RCAC).

We are concerned that the risks still present are higher than we are prepared to take, and certainly much higher than any public benefit to this project.

4. Mechanical Design

The DEIS section on mechanical design (DEIS, 4-718 – 4-719) shows the pattern of listing the applicable regulations, and identifying a number of FERC recommendations to cure apparent deficiencies. It is well and good to say there are various codes applicable to various and things, and they aim to follow all of them. But the duty under NEPA is a public discussion as to what the *effects* of the proposed action would be, and whether there are additional alternatives or mitigation measures. Please disclose and discuss any safety implications of the mechanical design of the LNG facility in a revised draft, including a discussion of the (1) predicted reliability of this sort of mechanical design, and (2) availability of any environmentally less-impactful alternatives.

5. Hazard Mitigation Design

The EIS reluctantly discloses that LNG could spill in the introduction to section on hazard mitigation design. DEIS, 4-719. Yet no discussion or analysis is provided regarding the likelihood, or range of potential releases. Information regarding the hazard is essential to any reasoned consideration of hazrd mitigation design, and should be provided for public comment in a revised or supplemental draft EIS. Please disclose and discuss a representative range of potential spills, including information regarding frequency and consequences.

The reader of the Draft EIS has to read between the lines to discern the threat. There is a lot of reference to fire codes and fire hazard equipment, DEIS 4-7-20, so evidently LNG releases pose a fire hazard. How frequently do fires result from releases of LNG? What range of fires occur at what sorts of frequencies?

Moreover, especially with regard to fire, the DEIS says that the regulations in this case do <u>not</u> include detailed fire protection provisions, leaving it to "subjective performance-based

language." DEIS, 4-720. The regulations are minimal and limited, boiling down to requiring *review* of things. *Id.* The NEPA process needs to include at least a reasonable discussion of that review. The Draft EIS says the "FERC staff evaluated" a list of things to "ensure" they provide "adequate protection," and there do follow several pages of discussion reflecting a review. *See* DEIS pp.4-720 – 4-729. But that discussion doesn't support the conclusory and vague assurances of adequacy, pointing to a large number of missing and outstanding items and suggesting the presence of numerous specific hazards. Please disclose and discuss in a revised draft

- what the subjective performance standards are (e.g. how safe is considered safe enough?);
- what alternatives might exist that could keep us safer (jurisdiction is complex, but there are myriad cooperating agencies in this EIS and NEPA analysis is not restricted by lead agency jurisdiction in terms of considering alternatives)
- The range of potential fires, and objective estimates of their frequency.

Please consider and discuss reliability, and implications of failure of, the spill containment systems. The Draft EIS discussion of spill containment, pp. 4-720 – 4-722, is helpful as far as it goes, but does not describe the hazard.

The Draft EIS repeatedly refers to "hazardous liquids" in terms of containment and response. *E.g.* DEIS 4-721 ("we evaluate whether all hazardous liquids are provided with spill containment…"). Please clarify whether this phrase is intended to refer to LNG (which is not categorized as a hazardous liquid) or not.

Please also clarify how this term, and the spill containment approach, addresses the obvious fact that in spill scenarios the *liquid* turns into a gas. It is unclear if containment of *liquid* hazards would prevent spread of the *gas* that would escape in a spill.

Given that spill containment is so critical at the facility, it is odd that there is no discussion of spill containment in relation to loading and unloading of LNG tankers. There have been releases of LNG during this process, and there are many potential scenarios where that could possibly happen. Containment of a release during loading would appear to be difficult, especially near and over the water. Releases of LNG to water could set off rapid phase transition, or freeze the outer hull of the ship, pier or other facilities. Please disclose and discuss the issue of spill containment as it is loaded, and from the vessel, in an EIS for public comment.

It is not possible to maintain spill containment without also containing rainwater, which seems to be a potential issue in this rainy environment, and immediately adjacent to critical estuary and wetland environments. The DEIS suggests that stormwater is an issue, with some back and forth regarding stormwater removal pumps and normally closed valves, but it doesn't describe the implications of the issue for effects. There seems to be an inherent tradeoff between environmental and safety values involved, and the public (and commission) need information to make informed comment and decision.

Many alarming risks emerge between the lines of the section regarding spacing and plant layout. DEIS, 4-722 – 4-723. Rather than describe risks and their frequency, the DEIS off-handedly

refers to hazards in the context of describing risks that will be minimized. DEIS, 4-722 – 4-723. We are essentially told not to worry about, consecutively, "cryogenic spills causing causing structural supports and equipment from cooling below their minimum design metal temperature" (yikes, what happens then?), "flammable or toxic vapor ingress into buildings" and "cascading damage from explosions;" "overpressures from vapor cloud explosions," "pool fires…causing cascading damage," "jet fires … causing cascading damage." DEIS, 4-722 – 4-723. Each of these hazards has additional FERC recommendations, which all sound like excellent ideas, but which beg the question of what other or different options there might be.

Please disclose and discuss in your revised draft EIS the frequency and consequences of a reasonable range of plant releases, including, at a minimum, each of the hazards identified as risks of cascading damage on pp. DEIS, 4-722 – 4-723.

We are concerned that the focus on preventing and assuring against offsite and "public" effects seems to mask the very real safety consequences for workers. Spills and fires within the plant, or during the loading/unloading process, are extremely hazardous. Even presuming best-possible safety practices, hazard to workers seems extremely high-consequence. We are not willing to see workers killed in this project any more than we are willing to suffer injury or death as members of the public. Please disclose and consider the onsite effects of these hazards, as well as (rightly) guarding against offsite impacts.

The DEIS section on ignition controls, DEIS pp. 4-724 – 4-725, is another vaguely reassuring ("minimal risk") exposition of regulations and recommendations that never describes the nature of the hazard being guarded against, or objective evaluation of the hazards for this project. We appreciate all regulators' and engineers' work to ensure safety, but that does not replace consideration of risk. This section fits the pattern of relying on vague reference to mitigation as absolute assurance against risk.

Critical missing information here is an objective evaluation of the ability to control ignition sources in a variety of release situations. We are particularly concerned with the ability to control releases from "outside" the containment, for example during loading. With the adjacent navigation channel, controlling possible ignition sources will be especially difficult. Please disclose and discuss ignition controls in relation to the marine project areas.

The DEIS discusses hazard detection for cryogenic spills, flammable and toxic vapors, and fires briefly. DEIS, 4-725 – 4-726. Information about the nature and frequency of these hazards is first necessary to evaluate their detection, so, again, information regarding the range and frequency fo various spills and hazards is essential to meaningful comment.

The description of hazard detection is vague and conclusory. As with so much else, we are told that FERC staff "evaluated the adequacy" of the systems to "ensure adequate" coverage. DEIS, 4-725. Even then it appears that information is missing. No decisions should be made until that information is provided and incorporated into the NEPA document.

In spite of the title of the section at DEIS, 4-725 – 4-726. the DEIS never does describe or evaluate the emergency shutdown procedures or capability. We are concerned that, especially

with high profit during operations, Jordan Cove will have incentive to manage the facility without shutdowns, at the expense of safety. In addition, we are concerned that, as with other highly complex facilities that are based on a flow of product, shutdown and startup could pose safety risks, or if the facility is designed to be capable of a sustained emergency shutdown. Please disclose and discuss the facility ability to shut down in emergency, and any relevant safety implications.

The DEIS sections on hazard control, passive cryogenic and fire protection, and firewater systems, DEIS pp.4-726 – 4-729, similarly point to, but never directly address, alarming hazards. Please provide evaluation of direct, indirect, and cumulative impacts of these hazards for public comment in a NEPA document.

B. Security Concerns.

The Draft EIS gives a general exposition of some of the many security-related requirements and regulatory structures that apply to the project. DEIS, 4-710 – 4-712. Things such as the TWIC Reader requirement, lighting and fencing, and exclusion zones will be a major endeavor. We are not privy to security-relate details so will have to leave it to officials to ensure that Jordan Cove is living up to all of these obligations.

This facility is a heightened security risk because it is located in an area not accustomed to facing risks and duties of this sort. There is no sizeable local Coast Guard presence, for example. Mariners and ATV users aren't accustomed to avoiding exclusion zones located atop historic recreation areas. There will be a need for training and particular diligence if the security requirements are going to be implemented.

The Draft EIS leaves detailed security planning to later stages, but there seems to be a fundamental problem with the facility location being located so close to the federal navigation channel. The required security exclusion zones appear not to be possible to establish, and still allow other vessels free use of the channel. Please consider and disclose this issue to the public. The Draft EIS does provide a map showing exposure zones for an intentional attack on an LNG tanker, but not for the Jordan Cove LNG facility. It is our understanding that the facility itself will be storing gas with energy far exceeding that of a nuclear bomb, so we are very concerned for the potential risks. Please disclose and consider the risk associated with the facility itself. The indirect consequences of many of the many strict security measures are not addressed in the Draft EIS, but they will impose high burdens on the public and the environment. Exclusion zones will cut off valued recreational and navigation areas in the estuary. Tanker security will close the whole river, essentially, and occupy the safest bar crossings. In general emergencies (such as an earthquake or tsunami!) the security priority will occupy limited response attention and resources, such as police and ambulance.

C. Siting Concerns.

Pursuant to the August 31, 2018 MOU between USDOT and FERC, the DOT is supposed to issue a letter of determination (LOD) regarding whether a facility is capable of complying with location criteria and design standards in 49 CFR 193 subpart B; and FERC is committed to

relying on it in considering the public interest. DEIS at 4-698. The Draft EIS does not contain any of that analysis, even though it appears to be (by its terms) essential information. Apparently, this analysis and review has not yet been done. DEIS @ 4-702.

The siting requirements in 49 CFR 193 subpart B are incredibly limited and narrow in scope.

Facilities are only required to meet NFPA 59A and some limited requirements. 49 CFR 193.2051. A thermal radiation protection zone and a dispersion exclusion zone are required around containers and transfer systems, and those zones must be based on specified formulas. 49 CFR 193.2057 – 59. Facilities also must be designed to withstand wind of certain speeds. 49 CFR 193.2067.

NFPA 59A requires consideration of protection against forces of nature (§2.1.1(c)), other factors bearing on site-specific safety (§2.1.1(d)), and provisions to prevent damaging effects or flammable mixtures of vapors from crossing property lines.

The Draft EIS is misleading in writing that these rules "ensur[e]" the location "would not pose an unacceptable level or risk to public safety." DEIS at 4-699. Those rules are actually quite a lot more limited. By their own terms they do not "ensure" anything, nor should they be read as definitive as to "acceptable" levels of risk to public safety. (moreover NEPA here requires FERC to disclose that level of risk, acceptable or not, in an objective manner).

Under FERC filing regulations, the applicant must identify how its proposed design would comply with 49 CFR 193 subpart B. 18 CFR 380.12(m) and (o).

The requirements for design spills from process or transfer areas are more stringent. For LNG spills, the 1,600 Btu/ft2-hr flux level cannot extend beyond the plant property line onto a property that can be built upon. In addition, section 2.1.1 of NFPA 59A (2001) requires that factors applicable to the specific site with a bearing on the safety of plant personnel and the surrounding public must be considered, including an evaluation of potential incidents and safety measures incorporated into the design or operation of the facility. USDOT has indicated that potential incidents, such as vapor cloud explosions and toxic releases should be considered to comply with Part 193 Subpart B.

Please analyze how the requirements under 49 CFR subpart B, that the operator exercise legal control over activities within the exclusion zone, could be met. DEIS, 4-700. Specifically, it appears to be impossible to meet this standard for the marine areas near the facility. Those are navigable maritime waters, subject to free navigation. Jordan Cove has zero authority over those waters, and even the federal government (through the U.S. Coast Guard) have only limited ability to restrict or prohibit movement there.

Similarly, we do not see how the design spills from the transfer areas would not extend beyond the plant property line. DEIS, 4-701. Navigating vessels would seem to be directly exposed to the extreme heat flux.

Scoping comments raised concerns regarding modeling for vapor cloud dispersion and associated hazards, but these are not squarely addressed in the Draft EIS. *See e.g.* Jerry Havens, April 26, 2016, "Assessing Explosion Hazards of Large Hydrocarbon Clouds Formed in Calm Conditions: Are We Doing It Wrong?" 55th UKELG Meeting on Dispersion and Consequences of LNG Releases. If LNG spills, it vaporizes. Because these vapors are heavier than air, they form a cloud close to the ground that will eventually dissipate. However, if an ignition source is present before the vapor cloud dissipates to less than 5% to 15% concentration, the vapor cloud can ignite and burn. The concerns expressed by many commenters about the risks of the pipeline extend beyond the possibility of catastrophic seismic events, to question the modeling and methods employed to understand the risks posed by vapor at the site. For example, on February 4, 2015, Senator Ron Wyden requested that FERC and PHMSA provide information to the public regarding the hazard modeling used to measure vapor cloud dispersion. This modeling is relevant to general spills but also to the possibility of a rupture or other spill resulting from tsunami or earthquake.

On January 14, 2015 and February 6, 2015, Jerry Havens , Distinguished Professor of Chemical Engineering at University of Arkansas, and James Venart, Professor Emeritus of Mechanical Engineering at University of New Brunswick, published two papers regarding the Jordan Cove LNG Export Terminal Draft Environmental Impact Statement under FERC Docket No. CP13-483. Professor Havens and Professor Venart found significant discrepancies and problems with Jordan Cove's hazard analysis for their LNG Export facility and determined the hazards had been significantly underestimated. Safety measures incorporated into the proposed Jordan Cove LNG Export terminal actually increased the chance of a catastrophic failure and presented a far more serious public safety hazard than regulators had analyzed and deemed acceptable.

According to comments and analysis provided during a previous iteration of this project, "the hazards attending the proposed operations at the Jordan Cove export facility could have the potential to rise, as a result of cascading events, to catastrophic levels that could cause the near total loss of the facility, including any LNG ship berthed there. Such an event could present serious hazards to the public well beyond the facility boundaries."

Those safety and security issues were never resolved and the new LNG terminal design may present additional problems. The concerns raised by Professor Havens and Venart need to be fully addressed and analyzed with respect to the new proposed LNG terminal design.

The Draft EIS also fails to disclose or account for the substantial uncertainty associated with such models. *See* Hideyuki Oka (2010). Consequence Analysis of Large-Scale Liquefied Natural Gas Spills on Water, NaturalGas, ISBN: 978-953-307-112-1, InTech, Available from:http://www.intechopen.com/books/natural-gas/consequence-analysis-of-large-scale-liquefied-natural-gas-spills-on-water.

While the Draft EIS addresses only UDOT siting requirements, it neglects other pertinent and relevant standards. It is important for the EIS to look at international standards. The LNG shipping industry, after all, is inherently an international endeavor, and it is managed for the most part not by nation States but by industry groups and corporations. Such standards are relevant under NEPA, regardless whether FERC has jurisdictional authority to enforce them.

For LNG facilities, the de-facto global authority is SIGTTO, the Society of International Gas Tanker and Terminal Operators. http://www.sigtto.org. The proposal here runs afoul of SIGTTO siting standards for LNG facilities by being located in a busy port, adjacent to a populated urban area, and on the outside curve of a shipping channel. According to available summaries of the **SIGTTO siting criteria:**

- There is no acceptable probability for a catastrophic LNG release;
- LNG ports must be located where LNG vapors from a spill or release cannot affect civilians
- LNG ship berths must be far from the ship transit fairway;
- To prevent collision or allision from other vessels;
- To prevent surging and ranging along the LNG pier and jetty that may cause the berthed ship to break its moorings and/or LNG connection;
- Since all other vessels must be considered an ignition source; LNG ports must be located where they do not conflict with other waterway uses [— now and into the future. [This requires long-range planning for the entire port area prior to committing to a terminal location];
- Long, narrow inland waterways are to be avoided, due to greater navigation risk;
- Waterways containing navigation hazards are to be avoided as LNG ports;
- LNG ports must not be located on the outside curve in the waterway, since other transiting vessels would at some time during their transits be headed directly at the berthed LNG ship;
- Human error potential always exists, so it must be taken into consideration when selecting and designing an LNG port

See SIGTTO. 1997. Site Selection and Design for LNG Ports and Jetties.

That basic logic is applied with regard to siting decisions globally. *See e.g.* RLMS (2011) *Suitability Assessment for LNG Industry at Abbot Point*, p.16 "jetties should be located to remove as many risks as possible by placing terminals in sheltered locations remote from other port users, in particular where other ships do not pose a collision risk and where gas leaks can not affect local populations.")

Also relevant here are the World Bank Group Environmental, Health, and Safety Guidelines for Liquefied Natural Gas Facilities, April 11, 2017. Available online at www.ifc.org/ihsguidelines). Numerous of these standards have not been met, including conduct a spill risk assessment for the facilities and related transport/shipping, supported by internationally recognized models, or to develop a spill prevention and control plan…supported by the necessary resources and training.

D. Vessel Safety Concerns.

The Draft EIS starts this section with an optimistic exposition of the generally non-disastrous historic LNG vessel record. DEIS, 4-702 – 703 ("Since 1959, marine vessels have transported LNG without a major release of cargo or a major accident involving an LNG marine vessel.").

First, the complacent conclusion is the wrong lesson to draw. This is a history of the world's roughly 370 LNG vessels and 100 terminals, a small sample size, and over only several decades. As the number of vessels and potential consequences of accidents increases through time, the recorded history of stochastic events like marine casualties is expected to increase. The applicant's sense of confident assurance rings as hollow here, as very similar assurances that were made prior to the *Exxon Valdez* and BP *Deepwater Horizon* oil spills, and Texas City BP refinery explosion. After those and other disasters, that prior complacency has been specifically indicted warned against in strong terms. This section of the EIS is therefore not only misleading, but betrays an affirmatively dangerous attitude that actually makes people even less safe.

Second, while the DEIS does not draw this conclusion, the listed casualties (among others) do show that LNG transport is and will continue to be a hazardous occupation. Vessel casualties associated with this project should be expected.

That casualties should be expected is also reflected in the known history of vessel casualties more generally (not just LNG vessels). It is true that LNG is a peculiar cargo with peculiar risks, but a vessel is a vessel and many of the risks here are inherent risks of shipping on a large scale.

The EIS entirely fails to consider new build of LNG vessels. This is important is a couple of ways. First, the global fleet of LNG vessels is expanding, so future years are mathematically more likely to see LNG vessel casualties. And second, it is significant in terms of indirect and cumulative effects, because **the proposed action will have unexplored effects to the LNG shipping and ship-building industry**. That has been the case on other LNG terminal projects and is likely to be the case here. *See* Schuler 2019. "Qatar Launches Massive LNG Shipbuilding Program That Could Exceed 100 Ships" *gcaptain.com* https://gcaptain.com/qatar-launches-lng-shipbuilding-program/ (relating tender of 100 new LNG tankers, including requirements directly linked to Golden Pass LNG, currently under construction).

The Draft EIS entirely fails to disclose or address safety considerations related to repair and/or maintenance work on LNG tankers (or tanks). Especially because the facility calls for a second slip for an LNG tanker, and the lack of other nearby ports, it is possible that repair work would be done here. And work on LNG tankers is a notably dangerous activity! Over the years, "a high number of serious casualties have occurred involving fires in the cargo containment system of liquefied gas carriers, whilst the vessels have been in shipyards. Many of these have resulted in multiple fatalities, environmental damage and serious financial loss…" SIGTTO 2001, iii. *Fire Prevention in the Cargo Containment Systems of Liquefied Gas Carriers in Shipyards*.

1. LNG marine vessel safety regulatory oversight

The Coast Guard authority is even more limited, an important factor that the Draft EIS fails to accurately disclose or analyze. 33 CFR 105 and 127. The Draft EIS goes on at length about Coast Guard responsibility and authority as though these things were firmly established and boundless. *See e.g.* DEIS at 4-704 ("The Coast Guard is responsible for matters related to navigation safety, LNG marine vessel engineering and safety standards, and all matters pertaining to the safety of facilities or equipment located in or adjacent to navigable waters up to the last valve immediately before the receiving tanks.") In actual fact, the scope of Coast Guard

authority over foreign-flagged vessels (there are no U.S.-flagged LNG carriers, and it is not reasonable to foresee there will be any) remains narrow. Please disclose and discuss the actual extant USCG authority, in light of actual USCG policies and resources in the area, as that relates to safety risks. We are concerned that, especially with so few USCG resources in the area, and so little authority to begin with, the anticipates mitigation measures and safety layers will not meet the DEIS optimistic expectations.

As the Draft EIS says, LNG marine vessels are also regulated under USCG regulations at 46 CFR 154, and the IMO Codes. DEIS @ 4-703. But the DEIS says nothing about these regulations and codes, or what impact they do or do not have in regards to predicted impacts, possible alternatives, or mitigation measures. The discussion of regulations is entirely general, only on occasion even referring to the Jordan Cove project at all. As discussed, this exposition of regulations in the abstract does not fulfill NEPA's mandate to consider effects to the human environment, and only reinforces the tendency towards complacency.

In regards to the NVIC 01-11 zones of concern, for example, the DEIS describes them in passing, without any discussion of their significance for this analysis. Does this mean that a pool fire is considered to be a likely consequence of a major vessel casualty? Of the project? Is that our operating scenario, and if so how and why was that picked? Is radiant heat a significant hazard factor from vessel casualties?

Please discuss regulatory oversight regarding vessels (1) offshore (e.g. waiting to load); (2) using the extra slip for repairs; and (3) grounded or otherwise disabled, for example in the estuary. Those are all reasonably foreseeable scenarios, and we feel that risks are heightened due to complex and limited regulatory oversight of foreign-flagged vessels in those positions.

2. Jordan Cove WSA

The DEIS, scandalously, fails to disclose or discuss any of the many pressing issues discussed and identified in the WSA/LOR process. What is discussed is only a brief history of documents being filed. It lists the Jan 9, 2017 LOI and prelim WSA submitted; the April 10, 2006 applicant-prepared WSA that was used for 2017 app; and a December 29, 2012 WSA update); the Jan 23, 2017 USCG-accepted WSA; and the May 10, 2018, USCG issued LOR and LOR analysis.

There are more recent updates regarding waterway suitability that are not included, and the absence of which is not revealed or discussed. *See* 40 CFR 1502.22. For example, in the context of the DSL removal-fill process it came out that there have been more recent simulations that have resulted in adjustments to the maximum size vessels downward. The ongoing local land use processes for the four NRI dredge areas also is producing a large flurry of information and potential project changes. Please reveal the latest information in a revised draft for public comment, ensure essential information is gathered where possible and discuss any information limitations. 40 CFR 1502.22.

Also, the *substantive* information in the waterway suitability studies and recommendations need to be revealed to the public and decision-makers in terms of predicting environmental consequences, and comment opportunity provided. The DEIS doesn't meet even the obligation to

disclose issues (let alone discuss them adequately, consider alternatives, etc.). The watershed suitability assessment and letter of recommendation analysis are not even included, although they easily could be. The Draft EIS Appendix B contains only the LOR itself, which is an entirely conclusory cover letter, and not even the supporting analysis. The 4 enclosures identified on that document are not included in the Draft EIS, and are not available (at least not readily so) online. Please include that information, including updates to the WSA, in a revised Draft EIS as an appendix. That information also needs to be revealed and discussed in the body of the EIS. The site-specific and project-specific direct and indirect consequences are incredibly and directly relevant to the public, and to other expert agencies, who are likely to provide useful information. That information is essential to solicit informed public comment, and to a reasoned decision.

3. LNG Marine Vessel Routes and Hazard Analysis

This section of the Draft EIS, which addresses one of the most important issues, never really gets off the ground and fails NEPA's minimum bar for a "hard look." Had the requisite hard look been taken, it would be obvious that significant and unavoidable negative impacts can be expected. *See e.g.* West Cost Offshore Vessel Traffic Risk Management Project, Final Report, July 2002.

Marine hazards are not disclosed or discussed specifically <u>at all</u>. The first sentence of this section, for example, brushes by the first and one of the major hazards along the route, the Coos Bay bar, without any notice whatever. DEIS, 4-707. The rest is no better, lacking disclose or consideration of a range of significant issues and impacts to the public. The four navigation reliability improvement areas, which are even now being touted as necessary to alleviate specific hazards at critical turns, are not disclosed or discussed. Two hazard zone maps are displayed, but other than being obviously alarming (showing a large part of North Bend/Coos Bay being burned alive) no explanation or analysis is given.

It is not correct that the vessel's transit "would begin when it reaches the entrance" of Coos Bay. DEIS, 4-707. Obviously, inherent in this project by its very nature, vessel transits will have to *begin* across the sea somewhere, presumably somewhere in Asia. They also will *end* their journeys there as well. The zone for NEPA effects consideration then necessarily must encompass crossing the Pacific Ocean. We note that a similar error is being made in the applicant-prepared BA, which restricted its consideration to the territorial sea (also begging the question of why FERC restricts its consideration even more). Many of the applicable authorities here apply out to sea. The ESA applies within the territorial sea and high seas. *See e.g. Turtle Island Restoration Network v. NMFS*, 340 F.3d 969 (9th Cir. 2003). Jurisdiction under the MSA is explicit and vast, including territorial waters and the EEZ, and for anadromous species the high seas. 16 U.S.C. §1801 *et seq.*, §1811 (anadromous fish). NOAA generally sets the scope of Essential Fish Habitat consultation to the EEZ, 200 nautical miles from the baseline. *See* 50 CFR §600.805(b)(2). Jurisdiction under the MMPA includes both the EEZ and the high seas. 16 U.S.C. §1372(a)(1). Jurisdiction under the Clean Water Act extends here through the contiguous zone and to the end of the EEZ— 200 nautical miles out to sea. Jurisdiction under NEPA extends uncontroversially to the EEZ, and we believe in this case should correctly also be applied to high seas beyond the EEZ. *See e.g. NRDC v. Dep't of Navy*, No. CV-01-07781 at 21 (C.D. Cal. Sept. 19, 2002). *See also Env. Defense Fund v. Massey*, 986 F.2d 528 (D.C.C. 1993).

The ESA and MSA evaluations therefore must extend to include *at least* the EEZ. These are the areas our nation is privileged and responsible, under customary international law including as expressed through the MSA, to protect and manage for maximum sustained yield. In terms of anadromous fish and marine mammals, to high seas beyond the EEZ that are not within another nation's territory. Important issues related to vessel strikes, marine pollution, air pollution, and safety need to be dealt with, but would be missed under Jordan Cove's incorrect map of the world. The fact that vessels who ply these routes will be flagged in Liberia, Panama or some other flag-of-convenience country, while relevant in some ways, is not a reason to restrict careful evaluation under the ESA and MSA, as well as the MMPA, NEPA, CWA, and other authorities. The lack of U.S. "territory" beyond twelve miles, is not a reason to exclude consideration of the vast, productive and important Exclusive Economic Zone, and high seas, or to ignore the substantial authority we have through exercise of port state jurisdiction over foreign-flagged vessels.

4. USCG LOR and Analysis

The DEIS does correctly note that the Coast Guard conclusion that this waterway is suitable for LNG traffic is based on "full implementation of the strategies and risk mitigation measures identified by the Coast Guard to Jordan Cove in its WSA." DEIS, 4-709. Whatever measures these are, except for being told that they are critical, the reader (and decision-maker) must only guess at what those measures might be, and what other issues they might raise. An agency cannot avoid NEPA analysis by relying on aspirational, unstated mitigation measures. In addition to considering mitigation implementation and effectiveness, the measures themselves can have important indirect and cumulative implications.[1]

Relying on perfectly implemented effective mitigation is particularly arbitrary where there is no authority to require it. *See* DEIS, 4-709.

The statement that "Neither the Coast Guard nor the FERC has authority to require waterway resources of anyone other than the applicant under any statutory authority or under the Emergency Response Plan (ERP) or the Cost Sharing Plan" makes no sense. DEIS, 4-709. What cost sharing plan and what ERP is being referred to? Why say the Coast Guard has no authority to require waterway resources of anyone other than the applicant? Coast Guard authority in the area is not restricted to this applicant at all, and they would have authority to require things of other waterway users.

The DEIS statement that each vessel transit is evaluated case-by-case "what, if any" safety and security measures need to be taken is confusing and alarming. DEIS, 4-710. The LOR establishes many measures that are known and mandatory, so it is not the case that we need to wait for a vessel to show up at the bar before knowing whether there are safety issues or not. Those issues can (and should be) considered now, notwithstanding the obvious fact that the Coast Guard can make judgement calls in any given case. It is alarming though to see that the purported mitigation here relies so completely on future judgements. Those judgments will all be made

[1] *E.g.* security zones around LNG vessels resulting in extended closures of the river channel.

with limited information and under time pressure by a COTP who is located several hundred miles away from Coos Bay.

The concluding sentence of this section is representative of the circular non-analysis logic of this section. "If" the project is approved, and "appropriate resources" are not in place, "then the COTP would consider at that time what, if any, vessel traffic and/or facility control measures would be appropriate to adequately address navigational safety and maritime security considerations." DEIS, 4-710. What does that even mean? What is the decision-maker supposed to do with information like this?

5. Missing Marine Safety Issues

LNG vessel traffic interferes with other marine traffic, increasing safety risks to other mariners. The Draft EIS appears to entirely fail to consider the direct, indirect and cumulative effects of the proposed action on the safety of other mariners and waterway users (like surfers, clammers).

The maritime law governing vessel navigation and liability in Coos Bay is favorable to large commercial carriers of LNG, *at the expense of* other mariners, including commercial and recreational fishers. [2] In essence, larger and more dangerous vessels (like LNG tankers) take priority, so when navigation is at a bottleneck (as it is in the FNC) it is the smaller vessels whose use of the waterway is impaired. The points-of-no-return here are buoy 1 clear out beyond the bar, and the vessel slip at the facility, and the voyage optimistically takes about 90 minutes. So for every LNG vessel that enters or exits, 240 times a year and always at daylight, all of the other mariners in the area will have to make way.

In various filings Jordan Cove has admitted only small impact to recreational use by boaters. The Department of State Lands has requested additional information, and has not made its determination regarding effects to navigation. According to analysis in **RR5,** LNG carriers in Coos Bay would potentially impact on other boating about 7 hours per week, or about 8% of all daylight hours. This calculation is incorrect and misleading. First, daylight hours is a misleading metric because it fails to recognize that only some times are suitable for boating and recreation, and that both LNG and other users will have to compete for the best of those hours. Assuming all daylight hours are available fails to account for inclement weather, which is a common limiting factor for recreation and navigation in the estuary. Second, while couched as a worst-case calculation of maximum impact, it actually fails to admit of the sporadic interruptions caused by the new risks this project brings, in the form of vessel casualties, or unusual national security risks. Third, it ignores the significant impact of the actual dredging and construction work. The NRI dredging in Coos Bay overlaps with the salmon fishing season in October, for example. Thus the impact is experienced not only in small percentages out of a universal average, but as complete interference with uses that are seasonal for a matter of years.

6. Hazard & Interference to Recreational Vessels

[2] *See* COLREGS, 1972 Convention on the International Regulations for Preventing Collisions at Sea;" 33 USC 1601 – 1608; 33 CFR 89 etc. (Navigation Rules and implementing regulations) (navigation rules available online at https://www.navcen.uscg.gov/pdf/navRules/CG_NRHB_20181106.pdf);

The interplay with recreational users is especially important.[3] For example, on August 30, 2016, three kayakers were injured when a ferry collided with their group in the Hudson River, highlighting the dangers of recreational and commercial vessels operating on the same waterways. This led to a major effort by NTSB, which found that the most critical safety factor was cooperation between recreational and commercial users at established ports.[4] We are concerned that for Jordan Cove in particular, such cooperation has not been taking place, making the risk here especially large.

The Coos Bay estuary generally, and areas at and in the immediate vicinity of the NRI dredging and dredge lines, is used extensively by "recreational" boaters, including for fishing.[5] In 2005, recreational boaters took 30,996 boat trips in Coos Bay and engaged in 36,547 use-days of boating activity. Approximately 88% of these use days were related to fishing.

According to State data, nearly 90 percent of the boat use-days [in Coos Bay] involved fishing (including angling, crabbing, and clamming). Coos County local recreation expenditures, including hunting, fishing, wildlife, viewing, and shellfishing totaled $6.2 million dollars in 2008. Travel-generated expenditures for these activities in Coos County generated $33.5 million dollars in 2008.[6]

Also falling under the "recreational" vessel umbrella are subsistence fishers, for whom the activity is a cherished cultural tradition, and a matter of direct economic livelihood. Subsistence use is almost universally recognized as a highest and best use of waterways, and it warrants more careful attention here. Tribal consultation is an important part of that consideration, but that does not capture all subsistence users or interests so the broader public issue should be considered as well.

The estuary is popular for clamming and crabbing, two fisheries that are particularly disturbed by dredging, and that are particularly vulnerable to chemical changes in the water.

All four of the dredge areas are located at or adjacent to areas specifically used for fishing and/or crabbing, ensuring navigation conflicts. These and other areas also are used for fishing other species, notably salmon. The practice of "mooching the Bar" is widespread in the fall season and is centered almost exclusively around the hour before and the hour following slack high water.

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[3] *See e.g.* NTSB Safety Recommendation Board, Safety Recommendation Report
Shared Waterways: Safety of Recreational and Commercial Vessels in the Marine Transportation System. MSR-17/01. Available online at: https://www.ntsb.gov/investigations/AccidentReports/Reports/MSR1701.pdf.

[4] NTSB 2017 @ p.81. ("Cooperation is needed because shared waterway safety issues are a function of geography, vessel types, predominant weather, and other local factors. Local stakeholders working cooperatively are in the best position to address local issues through mutual respect and a shared commitment to safety.")

[5] Image Source: http://www.dfw.state.or.us/mrp/shellfish/maps/images/coos_shellfish_areas2.jpg. *See also e.g.* http://oregonfishinginfo.com/Coos%20Bay.html ("Good fishing for salmon extends over a wide area outside of Coos Bay" "Fishing for rockfish is excellent…" "Feeder salmon enter lower Coos Bay during the summer usually in July feeding from Charleston to Fossil Point north to Jordan Cove");
http://www.dfw.state.or.us/mrp/shellfish/maps/images/coos_shellfish_areas2.jpg;

[6] "Fishing, Hunting, Wildlife Viewing, and Shellfishing in Oregon - 2008 State and County Expenditure Estimates"; Prepared for the Oregon Department of Fish and Wildlife - Travel Oregon; Dean Runyan Associates; May 2009, available at http://www.dfw.state.or.us/agency/docs/Report 5 6 09--Final%20%282%29.pdf

The DEIS fails to identify the lower bay on the inside of the North Jetty as a popular recreational surfing spot, particularly during high and near slack outgoing tides, commonly in the winter months or periods of high ocean surf conditions. Surfers access this location by off highway vehicles via the North Spit or by paddling across the estuary from shore points in Charleston. Surfing in the lower bay is typically associated with winter periods of large ocean swells and strong fresh water runoff. Transiting LNG tank vessels would negatively impact surfing at this location and they could pose a safety hazard to one another. Please consider and discuss this issue in a revised Draft EIS.

7. Vessel Casualties are reasonably foreseeable

As with any major marine endeavor, this proposal in the Coos Bay estuary poses a significant risk of vessel casualties. Shipping casualties involving LNG vessels should be considered foreseeable during the life of this facility. The DEIS makes a major error by putting such faith in the Coast Guard to save them from all disaster.

Vessel casualties occur for a large variety of reasons.[7] These reasons are not entirely alleviated by routine, even tyrannically stringent mitigation. Even with pilots (which are a great help!), for example, small errors can and do occur with major consequences. The March 30, 2016 grounding of the bulk carrier *Sparna*, in the Columbia River northwest of Portland for example shows that pilotage is no guarantee of safety, especially in narrow confined channels. In that casualty the pilot's rudder order to starboard was misapplied by the helmsman to port. *Id.* While only for a moment, the result was the ship grounding on a rock, flooding the forward tanks and causing a half-million in damages. *Id.* The NTSB investigation there is informative because it found the probable cause of the casualty was the failure of the pilot and bridge team to monitor the helmsman's actions. *Id.* So it is all well and good that there will be local pilots guiding each ship in and out, but it would be reckless to pretend that that assured safe operations. Shipping is inherently dangerous and the stakes of even minor, momentary errors can be immense.

The applicant's assessment of effects to navigation entirely ignore the unique problems of earthquake and tsunami hazard at this estuary. **What happens to an LNG vessel in the facility or estuary in an earthquake/tsunami scenario?**[8] The Draft EIS failure to discuss that major problem is a fatal error. Nothing in the Coast Guard or DOT reviews excuses the lack of consideration. We are concerned with this issue for several reasons. The consequence of LNG vessel casualties is enormous, potentially killing thousands. The presence of an LNG vessel in the channel, or disabled at the slip, even with perfect survival of the facility itself would be a huge hindrance to response and safety of responders. Jordan Cove has suggested that they could unmoor the vessel and put it head-in to the wave exiting the estuary in a tsunami scenario, which (1) doesn't sound possible in light of short tsunami warning times and difficulty unmooring (needing tugs etc.); (2) would expose those crew to needless additional hazard; and (3) is most likely to be even more dangerous to the public and to response. A reasonable alternative would appear to be designing the marine slip so that *an LNG tanker* is expected to safely survive a

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[7] *See e.g.* NTSB Safer Seas Digest 2017, Lessons Learned from Marine Accident Investigations. Available online at: https://www.ntsb.gov/investigations/AccidentReports/Reports/SPC1802.pdf

[8] *See What Happens to an LNG Tanker in a Tsunami?* B. Higginbotham, 2019. Dr Higginbotham is a published and recognized expert in tsunami effects who has specifically reviewed the current project proposal.

tsunami. Jordan Cove has conducted some hydrodynamic analysis, but predicting currents in a tsunami is notorious unpredictable, and we do not see assurance that the marine slip can safely hold tankers through an earthquake and tsunami. Please disclose and consider this essential information in a revised draft EIS.

Coos bay even currently, while a small port, is a hazardous place that is difficult to manage. The bay is subject to currents, tides and winds under normal conditions. Water depth is low through most of the estuary, and for large tankers particularly the navigation channel is very narrow. According to JCEP's narrative to Coos County, the environmental conditions coupled with increasing ship size, "have caused the Coos Bay Pilots to impose ever more limiting restrictions on when vessels may safely transit the Channel," and that these "cause significant delays and increased pressure on the Pilots." JCEP Narrative to Coos County @ p.3. It is further indicated that delays decrease efficiency and competitiveness of maritime commerce, "jeopardizing continued success for maritime commerce in Coos Bay." *Id.* This is called a "pressing need." *Id.*
Timing Restriction. The bar channel is another obvious hazard, so significant that tankers only propose to cross it and the LOR only applies when it is crossed only at slack high tides during daylight. This limitation, combined with security measures (like the 500-yard exclusion zone, *see* USCG July 1, 2008 WSR) particular to tankers along with ordinary navigation rules, raises a particular harm to navigation, because with 120 vessel calls per year, that means they are relying on using 240 out of the 365 available daylight high tides in the year. Having claimed the safest crossing times for themselves, all remaining vessels will have to make due with the remaining 115 available daylight slack high tides. If there are fifty other vessels, such as tank barges or export ships, using the port in a year, then for all practical purposes mariners will no longer be able to use the safest bar crossing time at all. Outgoing vessels would have to hold up just inside the bar while the LNG ship passes, or leave earlier under time pressure, both of which are situations that increase safety risks to vessels and directly impair navigation.

Relying on the high slack tides raises another navigation-related concern by creating bottlenecks on both sides of the bar. Ships will have to time their entrance and exit precisely on a chance that only comes once a day. This situation greatly increases the chances of LNG ships having to hold up offshore for longer (and inconvenient) periods of time, or making mistakes trying to time loading and exit times exactly. According to current guidance, which recognizes the hazard posed by waiting tank vessels along this navigation route and unprotected coastline, vessels holding up are directed to stay fifty nm from shore. There is no suitable anchorage for large vessels near shore, and certainly none well off the continental shelf. That means that if a bar crossing is missed for any reason it adds a roughly 100 nm to the journey, and this at one of the more hazardous locations, where vessels will burn additional fuel and increase chances for accidents to happen.

It is not realistic that Jordan Cove will actually be able to meet its logistic needs to move enough gas in light of the bar timing restriction. Needing to use 240 daylight high tides, best case, that leaves only 125 days to lose when ships are loading at the dock (or any other delay). If it takes even one day to load a ship, that would use up 120 of those days. Put differently, each vessel requires at least three days to enter, load, the exit— best case scenario. If it takes two days to load, then there aren't close to enough high tides in the year, so that would result in either a

significant reduction in the number of vessels (and therefore amount of gas) the facility can move, or a relaxing of safety measures.

Vessel Routing **between the estuary and open ocean, around the bend and through the channel over the bar**, is an especially hazardous maneuver in both directions. At the **first NRI** the ships, after making a 95-degree turn, have to center themselves in the channel to make a 21-degree starboard turn into the Coos Bay Range, and do that within a distance of about two ship lengths, "which is much less than the minimum of 5.0 ship lengths recommended by normal industry guidance (citing USACE EM 1110-2-1613, chapter 8-2). JCEP Narrative to Coos County, 2019 @ 4. The dredging proposed for the NRI would widen the inside range channel from 300 to 450 feet, lengthening the corner cutoff from 850 feet to 1,400 feet from the turn's apex. That still leaves vessels needing to make their turns in less than normal industry guidance, and with almost no room for error. **NRI #2** addresses the turn from the Coos Bay Range to the Empire Range channels. The current cutoff distance there is only 500 feet, much less than a single ship length, which "is inadequate to allow deep draft vessels to start their turn early enough to safely make the turn and be positioned in the center of the next channel." JCEP Narrative to Coos County, 2019, @ 4. There are numerous hazards, exposed and submerged, on both sides of the channel throughout the route, but especially at the entrance and first big turn. We feel that this hazard is unacceptable, in light of the high consequence to LNG vessel casualties.

Please disclose and discuss the likelihood and consequences of LNG vessel casualties in and around the estuary. This can and should be done qualitatively and quantitatively, consider the local conditions and foreseeable consequences to vessel traffic. We consider this information essential to making meaningful comment on the proposal.

8. Coast Guard Review Raises numerous issues demanding NEPA analysis

First, it must be remembered that a LOR is not a decision or regulatory document, but rather serves as comments of the Coast Guard in a NEPA process. FERC's perspective here is different from the Coast Guard, and while the views in the LOR are certainly persuasive and important, they are only the beginning of the analysis. The actual navigation of the channel by LNG tankers would be a very hazardous affair.

The LOR very weakly asserts the *applicant* is "expected to examine the feasibility of implementing such mitigation measures" in consultation with others. USCG LOR, 2018, p.2. It is hard to know what to make of a Coast Guard *expectation* that the applicant will only *examine* feasibility of measures. It is not much, and reliance on such measures to actually mitigate impacts would be purely speculative and not reasonably foreseeable. Please be sure not to rely on speculative mitigation measures in your analysis, and ensure that the removal-fill mandates regarding protection of navigation, protection of health and safety, and implementation of full mitigation are fulfilled.

As indicated in paragraph 2 of the LOR itself, the Coast Guard simply *assumed* that the applicant is *fully* capable of doing everything it hopes to do, that actual conditions at the port are perfectly described, and even that the applicant will fully meet all regulatory requirements, even the

emergency and operations manual. The Coast Guard recommendation is "contingent" on the perfect application of everything in the WSA. USCG 2018 at 6, ¶11. Those are wild assumptions, making it incumbent on the Corps to conduct its own analysis, and to do its own consultation with the Coast Guard.

Coos Bay is subject to a pilotage requirement, illustrating the tricky nature of the port, and raising a host of new complications. There are only two pilots in Coos Bay. They have never piloted LNG tankers before, and currently only handle a light load of fifty vessels per year.

The applicant claims to have established what it calls an "emergency response planning group," which it says is tasked with education and preparedness for the facility. *See* USCG 2018 LOR p.2 ¶10. It is dangerous that this critical issue is farmed out to an *ad-hoc* "planning group." Despite efforts to do so, our coalition has been unable to take part in this group. Pursuing official channels with the Coast Guard and State, it seems this entity is a creature of Jordan Cove's own invention, and not a part of any official prevention, preparedness and response under the National Response Framework or National Contingency Plan. What this *ad hoc* group illustrates is that, in fact, emergency responders are <u>not</u> in place, trained or capable of handling this facility. The LOR also reveals that the Coast Guard itself will be playing a very minimal role, reflecting its limited capacity here. The Captain of the Port is far distant in Portland. The LOR states the Coast Guard will not require any safety inspections for visiting vessels beyond the minimum required. USCG 2018 LOR p.2.

The Limited access areas for this project have yet to be established. *Id.* p.2 ¶3. This has caused confusion in the community, and hindered meaningful public engagement regarding impacts to navigation. It does seem safe to assume exclusion zones around the tanker and facility, and these would be a major hindrance to free navigation in Coos Bay. Yet, the perpetual confusion and lack of any policy are indicative of problems to come, as mariners will be frustrated by the inability to plan ahead.

While the Coast Guard says they made a "systematic" review under NVIC 01-2011, what it describes actually occurring is an *ad hoc* process weak on expertise or stakeholder representation. No tribes, resource agencies, or public-interest representatives were present. The primary analysis occurred over a single day, during which it could not have been possible to conduct more than a cursory review of conditions and factors. For example it is said that this group considered "each" scenario and causes of events, and the contributing factors for each and their likelihood of occurrence. USCG 2018 LORA at 5 ¶8. That amounts to thousands of evaluations of probability done *ad hoc*, rather than by any objective standard.

Recent changes to vessel size as part of this Coast Guard review aren't addressed in the Draft EIS. It is interesting that the removal fill application mentions that, after recent simulations, the Coast Guard has deemed that the channel is suitable for LNG carriers up to 299.9 length, 49 meters breadth, and 11.9 draft— a reduction in all three parameters.

9. Rollover

The Draft EIS does not address the problem of "roll-over," which occurs in large LNG storage tanks when different densities of LNG mix inappropriately within a tank. *See* "Rollover in LNG Storage Tanks 2nd Edition: 2015: Summary Report by the GIIGNL Technical Study Group on the Behaviour of LNG in Storage", http://www.giignl.org/sites/default/files/PUBLIC_AREA/Publications/rollover_in_lng_storage_tanks_public_document_low-res.pdf; World Bank EHS, 13, at Sec. 1.2.2.

10. Indirect effects of vessel casualties are not disclosed or addressed

The Draft EIS fails to address the indirect and cumulative impacts of the maritime safety risks associated with tanker and tug traffic. Should an LNG vessel go ashore or become stranded in the channel, for instance, what would be the indirect consequences of that? It would appear that for about a 9-mile stretch, from buoy 1 outside the channel to the slip at the facility, any serious casualty would leave any vessel sitting in an extremely inconvenient location.

E. Geological Hazards.

The Cascadia Subduction Zone (CSZ) is located off the Oregon coast and extends from Northern California to Vancouver, B.C, where the oceanic Juan de Fuca and Gorda Plates meet the North American Plate. The zone widens from 60 km off southern Oregon to 150 km off the northern Olympic Peninsula in Washington. According to US Geological Survey's 2009 Earthquake Probability Mapping there is a 10% chance of a greater than 5.0 magnitude earthquake in the CSZ in the next 30 years. This probability increases as the years go on with a 20-25% chance in the next 50 years and a 30-40% chance in 100 years. A recent study based on 13 years of research finds that the Coos Bay area is more vulnerable than northern stretches of the CSZ, and concludes that there is a 40 percent chance of a major earthquake in the Coos Bay region during the next 50 years.[9] The study author, Chris Goldfinger, a professor at Oregon State University, states that "major earthquakes tend to strike more frequently along the southern end – every 240 years or so – and it has been longer than that since it last happened."[10] Forecasts predict that the CSZ is due for an earthquake similar in strength to the 9.0 magnitude earthquake felt off the coast of Japan in March 2011. A high magnitude earthquake in this zone would create several different conditions that may severely impact the stability of the terminal and pipeline.

The Jordan Cove LNG Terminal will be constructed on dredged spoils. This poses a threat from earthquake liquefaction hazards which occur when water-saturated sediment is exposed to strong seismic shaking. The shaking causes the grains to lose grain-to-grain contact and the sediment acts as a fluid. Liquefaction is more likely in loose sandy soil with a shallow water table. Liquefied sediment layers may vibrate with displacements large enough to rupture pipelines, move bridge abutments, or rupture building foundations.

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[9] Goldfinger, *et al*., *Turbidite Event History – Methods and Implications for Holocene Paleoseismicity of the Cascadia Subduction Zone*, in EARTHQUAKE HAZARDS OF THE PACIFIC NORTHWEST COASTAL AND MARINE REGIONS, USGS PROFESSIONAL PAPER 1661 (Robert Kayen, ed.) July 17, 2012.

[10] Oregon State University Press Release, *13-Year Cascadia Study Complete – And Earthquake Risk Looms Large* (Aug. 1, 2012). *Available at* http://oregonstate.edu/ua/ncs/archives/2012/jul/13-year-cascadia-study-complete-%E2%80%93-and-earthquake-risk-looms-large

The Coos Bay area has a population of about 31,750 according to the 2010 Census. There are residential areas, businesses, and an airport all located within half a mile of the Jordan Cove site. A hazardous event at the site could seriously impact the safety and infrastructure of the surrounding area. The Jordan Cove site will include two large LNG storage tanks, the liquefaction terminal, pipeline connections, marine facilities, and a natural gas fueled power plant. Disruption of the site from earthquake or tsunami could compromise the integrity of any of these components and possibly lead to leaking of gas or LNG, disruption in power service to the local grid, gas explosion or other catastrophic event.

A recent study of large historic landslides along the Oregon coast indicates that they were most likely caused by a high magnitude earthquake occurring in the CSZ. A future earthquake could result in further movement of existing rockslides as well as formation of new rockslides along the coast. Landslides along the pipeline route could result in breakage or movement of the pipeline.

The DEIS recommends that further geotechnical studies (which have not yet been performed) and detailed designs of ground improvements be submitted to FERC for review and approval prior to construction. It is unclear why FERC believes that the initial information presented by the applicant is sufficient to make the determination that the site is suitable for this project, given the proximity of the Coos Bay communities and infrastructure as well as the risks and probabilities of a major megathrust earthquake at this location.

While existing mapping and planning programs will provide communities with a better sense of what to expect in the event of an earthquake or tsunami, the 2011 Japanese tsunami is a prime example of the fact that even where planning programs and mitigation measures are in place for such a disaster, there are significant challenges to predicting the full extent of damage that may be caused by natural hazards. The DEIS does not adequately address the level of destruction possible at this location.

F. Safety Issues.

1. Spills

If LNG spills, it vaporizes. Because these vapors are heavier than air, they form a cloud close to the ground that will eventually dissipate. However, if an ignition source is present before the vapor cloud dissipates to less than 5% to 15% concentration, the vapor cloud can ignite and burn. The concerns expressed by many commenters about the risks of the pipeline extend beyond the possibility of catastrophic seismic events, to question the modeling and methods employed to understand the risks posed by vapor at the site. For example, on February 4, 2015, Senator Ron Wyden requested that FERC and PHMSA provide information to the public regarding the hazard modeling used to measure vapor cloud dispersion. This modeling is relevant to general spills but also to the possibility of a rupture or other spill resulting from tsunami or earthquake.

According to comments and analysis provided by professors of chemical and mechanical engineering Jerry Havens and James Venart, “the hazards attending the proposed operations at the Jordan Cove export facility could have the potential to rise, as a result of cascading events, to

catastrophic levels that could cause the near total loss of the facility, including any LNG ship berthed there. Such an event could present serious hazards to the public well beyond the facility boundaries." *See* Havens & Venart Comment, Jan 14, 2015.

2. Aviation Hazards.

The proposed terminal would be less 0.6 miles from the Southwest Oregon Regional Airport (SORA). DEIS 4-750. LNG carriers would pass within 0.75 mile of the end of SORA's runway number 4/22[11]. Construction and operation of the proposed project may have significant impacts on aviation, presenting both physical obstacles (including permanent structures and LNG carriers) and a hazardous thermal plume. The DEIS fails to take the required hard look at either impact.[12]

a. Obstruction Hazards

Under the Federal Aviation Act of 1958, the Federal Aviation Administration ("FAA") determines whether proposed construction will present a hazard to air navigation. *BFI Waste Sys. of N. Am., Inc. v. F.A.A.*, 293 F.3d 527, 528 (D.C. Cir. 2002) ("*BFI Waste*").

Here, the two LNG tanks, the amine regenerator, the oxidizer, and LNG carrier vessels will, by virtue of their height and location relative to the airport, constitute "obstruction[s] to air navigation." *See* 14 C.F.R. §§ 77.17(a), 77.19(b). It is likely that cranes and other construction equipment will also constitute such obstructions, but Jordan Cove has not yet submitted information on this equipment to the FAA, DEIS 4-750, and the DEIS provides no discussion of the extent to which this equipment will impact aviation.

On May 7, 2018, the FAA issued "notices of presumed hazard" for the tanks, amine regenerator, and oxidizer, and for seven LNG carrier vessel transit points. DEIS, 4-750.[13] For the amine regenerator, oxidizer, and westernmost vessel transit point, the FAA informed Jordan Cove that it could request additional study of whether the obstruction would pose an adverse impact to aviation. The other ten notices, however, explained that unless the height of the obstruction at issue was reduced, the obstruction would be deemed to have an adverse impact *per se*, because of, *e.g.*, intrusions into "traffic pattern airspace." *See* FAA, "Procedures for Handling Airspace Matters," JO 7400.2M at 6-3-8 d.1.b (Feb. 28, 2019).[14]

b. The DEIS Understates the Impact of LNG Carrier Vessels on Aviation

The DEIS provides only one short paragraph discussing the impact of LNG carriers on aviation:

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[11] FAA, Aeronautical Study No. 2018-ANM-7-OE (May 7, 2018) (providing coordinates of 43-24-55.79N, 124-16-29.14W for LNG Carrier Stack Transit Point 4); http://www.airnav.com/airport/KOTH (providing coordinates of 43-24.883747N, 124-15.635873W for end of Runway 4/22)

[12] This section addresses potential impacts of the project on aviation. The DEIS also fails to adequately address the potential impacts of aviation on the project, e.g., of an aircraft crashing into an LNG storage tank.

[13] Copies of these notices are included in the docket at Accession No. 20180510-5165, Part 8.

[14] Available at http://www.faa.gov/documentLibrary/media/Order/7400.2M_Bsc_dtd_2-28-19.pdf. Courts have described this handbook as "binding" and "controlling." *BFI Waste*, 293 F.3d at 529.

> During operation of the Jordan Cove LNG Project, LNG carriers in the Federal Navigation Channel would cross [t]he airport approach pathway. Jordan Cove has indicated that aircraft would be delayed by about 13 minutes for each passing vessel, consisting of a 10-minute advance notice period, and 3 minutes of actual time during which airspace would be potentially obstructed. LNG carrier transit times could also be adjusted to avoid conflict with air traffic, if the need arises.

DEIS, 4-625.

The DEIS does not explain how the 13 minute estimate was calculated or provide any citation in support. There is no indication that the FAA, the agency with expertise in this matter, agrees that the period of potential obstruction will only be three minutes long. Transit point 1 is more than two miles from the slip.[15] Carriers will travel between 4 and 6 knots, DEIS, 2-14, requiring roughly 20 to 30 minutes to cross this distance. Turning and mooring the carrier will require another 90 minutes, *id.*, after which time the carrier will be loaded, and the process reversed. All in all, each carrier will ordinarily be in locations where it will have a *per se* adverse impact for roughly 20 hours. *Id.* (explaining that total time spent east of Buoy K will be "about 22 hours"), *see also id.* 4-255 ("Jordan Cove estimates that about 110 to 120 LNG carriers would visit its terminal each year," and remain "at the terminal dock for a period of about 17.5 to 24.5 hours.").

Even if conflicts between aviation and carriers could be resolved by delaying flights by 13 minutes, the DEIS fails to present any discussion of the impact of such delays. The DEIS does not address how often such delays will occur, an analysis that requires, at a minimum, consideration of the amount of carrier traffic, the amount of present and foreseeable future aviation traffic,[16] and the expected timing of each. The DEIS does not address whether, how often, or how severely delaying one aircraft operation will delay other operations at the airport. Nor does the DEIS provide any explanation as to how adjusting LNG carrier transit times would reduce impacts to aviation, or the feasibility of such adjustments: with an average of more than 50 aircraft operations per day,[17] the slow speed of carriers, and the scope of the area that obstructs the airport, there may never be a good time.

We note that Jordan Cove currently expects to utilize significantly taller carriers than were previously proposed, and as such, prior analyses of the impacts of carriers on aviation (and other resources) do not address the impacts of the current proposal. According to Jordan Cove's most recent submissions to the FAA, the proposed carriers stack height will be 211' Above Mean Sea Level (AMSL),[18] 45' taller than was indicated by Jordan Cove's prior FAA submissions.[19]

c. Structures

[15] FAA, Aeronautical Study No. 2018-ANM-4-OE (May 7, 2018) (providing coordinates of 43-23-49.37N, 124-16-56.55W).
[16] The North Bend Airport had 18,549 aircraft operations (takeoffs and landings) in 2018. https://www.gcr1.com/5010web/airport.cfm?Site=OTH&AptSecNum=2 (last visited June 12, 2019).
[17] *Id.*
[18] FAA, Aeronautical Study No. 2018-ANM-4-OE (May 7, 2018)
[19] *See also* Memo from J.C Smith, Commander, Sector Columbia River/Captain of the Port/Captain, U. S. Coast Guard to Jordan Cove Energy Project, L. P. dated 7 November 2018

According to the FAA, as currently proposed, the two LNG storage tanks will cause *per se* adverse impacts to aviation, and the amine regenerator and thermal oxidizer are obstacles that may cause adverse impacts. [20] Jordan Cove has not provided FERC or the FAA with any information about the height of cranes or other construction equipment; it is likely that this equipment would cause additional adverse impacts while onsite.

The DEIS suggests that permanent structures would not in fact impact aviation, because other existing obstacles already require aircraft to operate at altitudes and locations that provide an adequate buffer around the proposed terminal structure. DEIS 4-751 (summarizing comments of Southwest Oregon Regional Airport regarding prior proposed terminal design).[21] The DEIS does not provide detail or information sufficient to demonstrate that the structures will not in fact impact aviation. And, as the DEIS notes, the FAA has not agreed with the Airport's position, in reviewing either the prior or the current design. Finally, nothing in the DEIS or the Airport's 2015 letter addresses the impact of construction equipment on aviation.

Nonetheless, we agree with the Airport on one issue: the "option" of flipping flight patterns for Runway 04 should be avoided, because such a flip would cause adverse impacts as described in the Airport's 2015 letter. If the project cannot be reconciled with the current flight patterns, the project should be modified or rejected.

d. FERC Must Not Issue Certificates Until the FAA Has Completed Its Evaluation

The DEIS recommends that Jordan Cove "file the final determinations from the FAA prior to initial site preparation." DEIS 4-751. This is too late. FERC cannot determine whether the terminal is consistent with the public interest, and thus whether a certificate should issue, until FERC knows whether the project will present an aviation hazard and the nature and extent of the impact of the project on aviation, and FERC needs to consider the FAA's input in making this determination. If "a determination of no hazard cannot be reached," the FERC's response may need to be much more than issuance of "a modification, variance, or amendment." *Id.* Nor can FERC issue a certificate for the pipeline, and allow, *inter alia*, condemnation for the right of way to commence, prior to resolving these issues for the terminal. If the terminal cannot be reconciled with continued operation of the airport, the terminal should be denied, and the pipeline with it. This issue cannot wait to be resolved after issuance of a conditional certificate.

3. Thermal Plume

Separate from physical obstructions, the project risks impacting aviation by creation of a thermal plume. Unlike physical obstructions, the FAA does not at present regulate impacts of thermal plumes on aviation. However, "the FAA has determined that thermal exhaust plumes in the vicinity of airports may pose a unique hazard to aircraft in critical phases of flight (particularly

[20] *See supra* note 2 and accompanying text.
[21] Although not specifically cited by the DEIS, the letter discussed at DEIS 4-750 to 4-751 can be found at Accession No. 20150803-5249.

takeoff, landing and within the pattern) and therefore are incompatible with airport operations."[22] Similarly, the National Academy of Sciences has recognized the impacts thermal plumes can have on aircraft. [23] NEPA and the Natural Gas Act require FERC to consider these impacts here.

The DEIS's dismissal of the risk of thermal plumes is nonsensical and arbitrary. DEIS 4-625 to 4-626. Thermal plumes are principally created by combustion. In the prior design, the largest source of combustion and heat was the proposed South Dunes Power Plant, where gas would be burned to generate electricity, which would then power the liquefaction equipment. As the DEIS notes, the current design does away with the South Dunes Power Plant. DEIS 4-626. However, it does not follow that "the LNG terminal would not general thermal plumes." *Id.* The current design still combusts gas; it just moved the location of that combustion from an electricity-generating powerplant to, principally, five gas combustion turbines integrated into liquefaction trains at the terminal site.[24] Combustion in these turbines will still generate significant heat, and FERC must take a hard look at the impact of the resulting thermal plume. Indeed, it may be that the thermal plume is now closer to the airport and runway ends, closer to actual flight paths, and/or at a location will prevailing wind will cause thermal plumes to be more, rather than less, of a problem.

Although the impacts of thermal plumes depends on many factors, we note that at least one facility, the Eastshore Energy project, has been rejected on the basis of the impact its thermal plume would have on aviation, even though that facility would have had a lower heat input and would have been farther from the affected airport than Jordan Cove's current proposal. *Compare* DEIS 4-656 (Jordan Cove will have five 524.1 mmbtu/hr combustion turbines, in addition to other heat sources) with Eastshore Energy Center CEC Air Quality Permit Application, Table 8.1-2[25] (proposed heat input of 1000 mmbtu/hr), National Academy of Sciences 2011 at 29 (Eastshore Energy "would consist of fourteen 70-ft-tall exhaust stacks located approximately 1 mile from the airport.").

Thus, FERC must model the size and severity of the thermal plume(s) that would be generated by the proposed terminal, and the impact on aviation. The FAA has developed, and recommends, a tool for performing this modeling: the "Exhaust-Plume-Analyzer" developed by the MITRE corporation. The prior, 2013 analysis of Jordan Cove's impacts preceded development of this tool, and was conducted using a different methodology.[26] In analyzing the effects of the current design's thermal plume, FERC must explain its choice of methodology.

4. Geotechnical and Structural Design

[22] Federal Aviation Administration, Technical Guidance and Assessment Tool for Evaluation of Thermal Exhaust Plume Impact on Airport Operations, at 2 (Jan. 21, 2015), https://www.faa.gov/airports/environmental/land_use/media/Technical-Guidance-Assessment-Tool-Thermal-Exhaust-Plume-Impact.pdf

[23] "Investigating Safety Impacts of Energy Technologies on Airports and Aviation", Transportation Research Board of the National Academies, 2011, p. 29

[24] Jordan Cove, Resource Report 9, at 5 (September 2017).

[25] Attached.

[26] Thermal Plume Study at 1-5 (July 2013).

As elsewhere in this document, a primary comment is that the DEIS approach is vague and conclusory, relies too heavily on mitigation and future evaluations, dismisses incomplete and unavailable information without comment, and gives the misleading impression that there are no serious geotechnical issues or alternatives on this project. Overall this approach encourages complacency of the sort that, time and again, leads to large industrial disasters. The section opens by explaining that Jordan Cove provided geotechnical and structural design information to demonstrate they "would be appropriate" and "ensure" accordance with all regulations, standards, and "generally accepted good engineering practices." DEIS 4-729.

The DEIS gives an extended description of a geotechnical investigation done by KBJ and contracted by Jordan Cove. DEIS, 4-730 – 4-732. We strongly request use of images, which are certainly available, to illustrate this information.

We are concerned with bias where the applicant's study lacks peer review, even with FERC staff evaluation (which, naturally, "ensure[s] the adequacy." DEIS, 4-732. Outright scientific fraud is very rare in our experience; science is more frequently manipulated by strategically manipulating the questions. Here, KBJ will have been focused, quite ethically, on regulatory compliance for its high-paying client. That is a different mission from what FERC's duty is here, which is to present high-quality scientific information to the public and commission. Please further discuss the reliability of this and other applicant-provided studies where they are being relied on. Please also draw on independent information, or gather new information where that is necessary, to ensure a best available information is used.

Please also critically evaluate effectiveness of the proposed liquefaction mitigation. We are concerned that Jordan Cove has underestimated how shifty the sand is here. Whatever mitigation is necessary for the foundation needs to be done at the start.

Our concern ultimately is that the facility sits on a shaky foundation. That is the message we read between the lines of the DEIS analysis. *See e.g.* DEIS, 4-733. This is sand, with high groundwater, basically surrounded by salt water. It would be hard to imagine a shiftier foundation to build on. Moreover the very ground on which the facility sits is envisioned to be dredged spoils from the marine estuary, also sand and silt, and a poor foundation material. Expected settlement of up to nearly a foot sounds alarming, given the high stakes. DEIS, 4-733. The upper limit for settlement is essential information that needs to be in the public NEPA document. We are concerned they are playing too close to the edge of safety, and that the potential consequence of error is immense.

The DEIS concludes, after describing settlement and slumping and poor soils, that Jordan Cove's results indicate that conditions "are suitable" for the facilities, "if" the proposal and recommendations are implemented. That conclusory statement fails the NEPA standard for a hard look.. Without any idea what your standard for "suitable" is, and not even being told what the risks are[27], there is little to meaningfully comment about. DEIS, 4-733.

a. Structural and Natural Hazard Evaluation

[27] What are the potential safety and reliability-related consequences of settlement or slumping? Foundation issues tend to have cascading consequences to structures.

The Draft EIS offers a few of the relevant hazard-related regulations (18 CFR 380.12(m), 18 CFR 380.12(o)(14), 49 CFR 193, NFPA 59A. First, the results of some of these regulations should be described and analyzed. What were the potential hazards to the public from facility failure? What is the likelihood of natural disaster impacting on the facility? Given that these standards are largely subjective, it is especially important that they be exposed to public view and commission judgement.

Second, even in the EIS gaps in the regulation emerge, to where the conclusion becomes arbitrary. The Coast Guard has no regulation criteria regarding earthquake or tsunami, for example, so the basis (or fact) of their "approval" in that regard is a mystery. DEIS, 4-734. None of the regulations appears to encompass an all-hazard review. *Id.* The FERC conclusion is vague and conclusory, rather than providing the public and commission with useful information regarding the natural hazards. What does it mean that FERC staff "evaluated potential… design to withstand impacts from natural hazards?" DEIS, 4-734.

b. Earthquakes, Tsunamis, and Seiche

The Draft EIS is extremely understated about the truly alarming risk of Cascadia Subduction Zone earthquake and associated tsunami. *See* DEIS 4-734 et seq. At the outset of this issue we note that the hazard is framed in a narrow and overly restricted way. Rather than evaluate consequences of a range of foreseeable scenarios, and plan for the hazard in the context of wider emergency response planning for a major CSZ event, Jordan Cove has contracted for its own narrow analysis of this location.

In any case relying on the applicant alone is misguided here, where scientific knowledge is advancing, uncertainty is high, and there is wide expertise among the commenting public. Please do not rely on Jordan Cove's assessment alone. *See* DEIS, 4-735 (relating We are concerned that Jordan Cove is relying on much smaller design earthquakes than could likely occur. Please evaluate earthquake hazard under the very-large earthquake possibilities, using best-available science.

For example, all of the later modeling and hazard planning is on the assumption that there are no faults and nor risk of faulting below the facility. DEIS, 4-735. However, because of the deep sand, investigations actually were not able to determine whether or not there was historic faulting. DEIS 4-736. That uncertainty needs to be closed as much as possible with the best available science, and the reliability of the resulting information disclosed in a NEPA document for public review.

The Draft EIS does at least recognize that a CSZ earthquake is likely during the lifetime of the project, although the assumptions are not clearly presented. DEIS, 4-736. The best available science, which is subject to change and uncertainty, indicates a range of likely earthquake intensities. According to US Geological Survey's 2009 Earthquake Probability Mapping there is a 10% chance of a greater than 5.0 magnitude earthquake in the CSZ in the next 30 years. This probability increases as the years go on with a 20-25% chance in the next 50 years and a 30-40% chance in 100 years. A recent study based on 13 years of research finds that the Coos Bay area is

more vulnerable than northern stretches of the CSZ, and concludes that there is a 40 percent chance of a major earthquake in the Coos Bay region during the next 50 years.[28] The study author, Chris Goldfinger, a professor at Oregon State University, states that "major earthquakes tend to strike more frequently along the southern end – every 240 years or so – and it has been longer than that since it last happened."[29] Forecasts predict that the CSZ is due for an earthquake similar in strength to the 9.0 magnitude earthquake felt off the coast of Japan in March 2011. A high magnitude earthquake would create several different conditions that may severely impact the stability of the terminal and pipeline.

It isn't quite clear what earthquake intensities Jordan Cove planned for or modeled, or how their assumptions compare with other available planning assumptions. Following regulatory guidance from DOT, the operating basis earthquake is quake of a 10% probability in 50 years (475-year return interval) and the SSE (safe shutdown earthquake) is of a 2% probability n 50 years (2,475-year return interval quake. DEIS, 4-736. Elsewhere it is explained that both quakes correspond to a magnitude 6 or greater quake. DEIS, 4-738. Please disclose and consider the likelihood of earthquakes (and tsunami) on using the conservative end of the best-available science.

Rather than plan for a single design earthquake of only a moderate size, please analyze and disclose earthquake likelihood on a sliding range. We are concerned that, for whatever reason, the DEIS only considers two design earthquake intensities, neither of them reflecting the unhappy end of the predicted range of likely CSZ events. For example, on page 4-737 the DEIS says (in passing) that the OBE and SSE provided by Jordan Cove are only 80% of the values from ATC/USGS websites. DEIS, 478. Please clearly disclose and discuss the operating basis earthquake and tsunami events. Please ensure Jordan Cove plans and builds for a conservative assumption, and explain in a NEPA document what the resulting effects might be under different size earthquakes.

Stability of facilities against earthquakes is presented in a vague and conclusory manner, and the likely effects never are disclosed or evaluated. The obvious conclusion is stated in a vague way at the end of a paragraph, buried among technical jargon and citations, where it is recognized that, in light of CSZ risk and local soils, "the seismic risk to the site is considered high." DEIS, 4-737. The risk of what!? What is the range of outcomes of earthquakes that the applicant is planning for? That risks ought the public to know about and the commission to consider?
It is unclear why FERC believes that the initial information presented by the applicant is sufficient to make the determination that the site is suitable for this project, given the proximity of the Coos Bay communities and infrastructure, risks and probabilities of a major megathrust earthquake at this location, and hazardous soils. The DEIS does discuss for several pages FERC staff reviews of various seismic hazard studies, in its characteristic conclusory fashion, but even this does not seem to support a conclusion that the location is suitable. *See e.g.* DEIS, 4-738

[28] Goldfinger, et al., Turbidite Event History – Methods and Implications for Holocene Paleoseismicity of the Cascadia Subduction Zone, in EARTHQUAKE HAZARDS OF THE PACIFIC NORTHWEST COASTAL AND MARINE REGIONS, USGS PROFESSIONAL PAPER 1661 (Robert Kayen, ed.) July 17, 2012.
[29] Oregon State University Press Release, 13-Year Cascadia Study Complete – And Earthquake Risk Looms Large (Aug. 1, 2012). Available at http://oregonstate.edu/ua/ncs/archives/2012/jul/13-year-cascadia-study-complete-%E2%80%93-and-earthquake-risk-looms-large

("site would experience…violent shaking and a potential for heavy damage to structures.") (identifying site as design category D and risk category of II, III or IV).

We are very concerned with liquefaction risks on the site, especially in combination with tsunami risk and other hazards. The Jordan Cove LNG Terminal will be constructed on dredged spoils. This poses a threat from earthquake liquefaction hazards which occur when water-saturated sediment is exposed to strong seismic shaking. The shaking causes the grains to lose grain-to-grain contact and the sediment acts as a fluid. Liquefaction is more likely in loose sandy soil with a shallow water table. Liquefied sediment layers may vibrate with displacements large enough to rupture pipelines, move bridge abutments, or rupture building foundations. The liquefaction concern is especially dire when seen in context and the indirect and cumulative effects emerge. How do we empty damaged tanks if the marine slip is closed up? If an earthquake hits in combination with a tsunami, how might liquefaction change exposure to inundation in the tsunami? The discussion in the Draft EIS is inadequate. Even though a high hazard seems to exist, no risk or possible ill consequences are presented. *See e.g.* 4-739 (explaining the presence of liquefiable soils, then pivoting on supposed mitigation with "deep soil mixing or… deep foundations" and a "permanent sheet pile wall" at the marine berth. *Id.* Such blind reliance on mitigation, without even disclosure of possible impacts, does not comply with NEPA.

We are concerned with the risk of cascading fires or large leaks from the facility in the event of an earthquake, which could very quickly and easily impact the public offsite. The Coos Bay area has a population of about 31,750 according to the 2010 Census. There are residential areas, businesses, and an airport all located within half a mile of the Jordan Cove site. The Jordan Cove site will include two large LNG storage tanks, the liquefaction terminal, pipeline connections, marine facilities, and a natural gas fueled power plant. Disruption of the site from earthquake or tsunami could compromise the integrity of any of these components and possibly lead to leaking of gas or LNG, disruption in power service to the local grid, gas explosion or other catastrophic event. A hazardous event at the site could seriously impact the safety and infrastructure of the surrounding area.

The DEIS entirely fails to address effects of LNG tankers as related to an earthquake. What risks attend loading an LNG tanker in the event of an earthquake? How do response times compare with warnings for earthquakes? Is the loading process, which is not under the same DOT jurisdiction, designed to meet the same operating and safe shutdown standards for earthquake? The important cumulative effects regarding earthquake planning are entirely missed by the Draft EIS. Indirect and cumulative effects are missed in several important ways, including:

- Effect of the proposed action (LNG tankers, facility, and pipeline) on earthquake/emergency preparedness (e.g. redirecting response resources; introducing new and difficult-to-handle hazards);
- The combined effects of earthquake, tsunami, and liquefaction, under actual operating conditions (i.e. tanker tied up and loading);
- Redirection of response personnel and resources to the project site, where they are at increased exposure to earthquake and tsunami risk;

- Ability to adequately evacuate, in light of need for response resources in the area (emergency center, navigation channel, airport).

Please consider the earthquake hazard including in the context of larger regional exposure to the CSZ, including attendant **tsunami risk**. Numerous factors inherent in the location at Jordan Cove and Coos Bay estuary make it extremely vulnerable to earthquake and tsunami hazard.

First, a large earthquake and tsunami must be viewed as reasonably foreseeable. The level of risk, while inherently uncertain, can be objectively quantified. The Cascadia Subduction Zone (CSZ) off the Oregon Coast makes large earthquakes inevitable.[30] Modeling shows a significant probability— on the order of 40% in 50 years — of large earthquakes hitting the Coos Bay area during the life of this project.[31] When (not if) an earthquake hits, the chances of a tsunami hitting Coos Bay are high. The State of Oregon has invested significant effort to quantifying tsunami risk.

Distant tsunamis caused by earthquakes on the Pacific Rim strike the Oregon coast frequently but only a few of them have caused significant damage or loss of life. Local tsunamis caused by earthquakes on the CSZ happen much less frequently but will cause catastrophic damage and, without effective mitigation actions, great loss of life.

With respect to distant sources, Oregon has experienced 25 tsunamis in the last 145 years with only 3 causing measurable damage. Thus, the average recurrence interval for tsunamis on the Oregon coast from distant sources would be about 6 years. However, the time interval between events has been as little as one year and as much as 73 years. The two most destructive tsunamis occurred only 4 years apart (1960 and 1964) and originated from two different source areas (south central Chile and the Gulf of Alaska). Because only a few tsunamis caused measurable damage, a recurrence interval for distant tsunamis does not have much meaning for this region with respect to losses. However, every time NOAA issues a distant tsunami warning for the coast, evacuation plans are triggered at significant cost to local government and business.

Geologists predict a 10% chance that a CSZ tsunami will be triggered by a shallow, undersea earthquake offshore Oregon in the next 30 years, causing a tsunami that will strike all parts of the Oregon coast about 15–20 minutes after the earthquake. This forecast comes from the 10,000-year geologic record of 19 CSZ fault ruptures extending the entire length of the Oregon coast (i.e., recurrence of approximately 500 years)

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[30] Cascadia Subduction Zone. Pacific Northwest Seismic Network. https://pnsn.org/outreach/earthquakesources/csz.
[31] *See* Goldfinger, *et al*., *Turbidite Event History – Methods and Implications for Holocene Paleoseismicity of the Cascadia Subduction Zone*, in EARTHQUAKE HAZARDS OF THE PACIFIC NORTHWEST COASTAL AND MARINE REGIONS, USGS PROFESSIONAL PAPER 1661 (Robert Kayen, ed.) July 17, 2012.; Chris Goldfinger, 13-Year Cascadia Study Complete – And Earthquake Risk Looms Large, OREGON STATE UNIVERSITY NEWSROOM (Aug. 1, 2012), http://oregonstate.edu/ua/ncs/archives/2012/jul/13-year-cascadia-study-complete-%E2%80%93-and-earthquake- risk-looms-large; Goldfinger, C., et al. (2017) The importance of site selection, sediment supply, and hydrodynamics: A case study of submarine paleoseismology on the northern Cascadia Margin, Washington USA. Marine Geology: http://dx.doi.org/10.1016/j.margeo.2016.06.008; Schmalzle, G.M., et al. (2014) Central Cascadia subduction zone creep. *G3 | Geochemistry, Geophysics, Geosystems*. DOI: 10.1002/2013GC005172.

(DOGAMI, 2009). As previously mentioned, the southern Oregon coast has a higher chance of experiencing a local tsunami and earthquake, the probability increasing progressively southward. The last CSZ event occurred approximately 300 years ago (Satake et al., 1996).

Owing to much faster arrival and generally larger size, tsunamis originating from the CSZ will cause much larger life and property losses than most distant tsunamis and are at least as frequent as the largest distant tsunamis. Inundation from the largest distant tsunamis approximates inundation from the "Small" Cascadia tsunami on Oregon Tsunami Inundation Maps (TIMs). Oregon Natural Hazards Mitigation Plan 2015, pp.373 – 74.

The DEIS inadequately presents the risk of tsunami here. One problem relates to optimistic assumptions regarding maximum wave height. The Draft EIS recognizes the tsunami risk generally, referring to Jordan Cove modeling showing that a tsunami could not reach run-up elevation of more than 34.5 ft. DEIS, 4-739. First, such hydrodynamic models are subject to a high degree of uncertainty, and the result depends largely on the size of design earthquake that was used. That uncertainty is not acknowledged. Second, other sources appear to show much higher potential wave heights, giving rise to the question of Jordan Cove's operating assumptions. *See e.g.* Tsunami Inundation Map, State of Oregon DOGAMI, 2012. The DEIS discusses a few of the parameters and says that FERC staff found the tsunami elevation "suitable" for the project site. DEIS, 4-740.

Please evaluate the quality of that information, and gaps and uncertainties associated with information, under NEPA. This information is essential to meaningful public comment.
As a general rule increasing the width and depth of the channel will tend to increase the amplitude of the tsunami as it strikes upstream facilities. This project presents potentially extreme hazards to the local community. The project site on the North Spit is located at a bend in Coos Bay, where tidal energy is deflected. The elevation of the land at this location could significantly alter the direction and velocity of an incoming tsunami. For example, instead of running up onto the North Spit and inundating the land there, the proposed sand wall, if it survives the liquefaction and lateral spreading effect of the earthquake, would deflect and redirect the force of a tsunami. The deeper channel could increase the amplitude of that deflected energy. The proposed significant alteration of the shoreline at this location could have important effects on the inundation of other areas within the Bay Area communities. In other words, the risks of these types of hazards extend beyond just the inundation, liquefaction, and ground shaking at the project site. The project's proposed alterations of the shoreline at the project location could have significant impacts to the communities of the Coos Bay area. The application does not provide information to tell, and does not suggest this factor has been considered. Jordan Cove's hydrodynamic analysis does show that proposed dredging and fill associated with the project will change currents at various points in the estuary, generally increasing them. Even that does not include the large dredging project, ostensibly proposed by the Port. It says nothing explicitly about behavior in tsunami. The access channel changes combined with a relatively large amount of erosion and deposit of sediment, the new slip and LNG facility, introduces new hydrologic features that could behave in unpredictable and potentially deadly ways in a tsunami. The general trend, showing changes to sediment erosion & deposition and increased currents, is

enough to say now that unconsidered channel dredging impacts to tsunami behavior represent a significant public health and safety impairment.

> Deepening of channels by dredging to improve navigability also enables greater penetration of tsunami energy into the harbor. Similar problems occurred along major rivers, e.g., the Mississippi River, when construction of levees restricted the channel width, negating the purpose of natural flood plains to distribute and absorb the excess water volume during major floods (e.g., severe flooding in the Midwest and South in 1973 [2]).

Barberopoulou, A., Legg, M., & Gica, E. (2015). Time evolution of man-made harbor modifications in San Diego: Effects on tsunamis. *Journal of marine science and engineering*, 3(4), 1382-1403. Don: 10.3390/jmse3041382.

Second, a tsunami hitting Coos Bay is predicted to be enormously destructive. Cumulative Effects are not addressed - CSZ Event would be Broadly Destructive – overwhelming response resources. *See e.g.* Oregon Natural Hazards Mitigation Plan, pp.373 – 74, 2015, According to the State of Oregon, "The entire coastal zone is highly vulnerable to tsunami impact." Oregon Natural Hazards Mitigation Plan 374, 2015. A tsunami would be a regional disaster event. An earthquake and/or tsunami that impacted this facility is also expected to have wide-ranging impacts, especially on the coast. According to the Oregon Natural Hazards Mitigation Plan (2015), p.290:

Tsunamis may take the form of distant or local events. The CSZ earthquake and local tsunami event have the potential to affect the entire coastline through severe ground shaking, liquefaction of fine- grained soils, landslides, and flooding. In addition to causing significant loss of lives and development, a CSZ earthquake and local tsunami would dramatically affect the region's critical infrastructure, including principal roads and highways, bridges, tunnels, dams, and coastal ports. The region has the most seismically vulnerable highway system in the state. Seismic lifelines will be fragmented along US-101 and along east-west routes that connect the region to the rest of the state.

There are 1,300 state facilities in Region 1. Of these, the following are in earthquake or tsunami zones:

- All 1,300 state-owned/leased facilities, valued at over $336 million, are in the earthquake zone. Of these, 186 are critical/essential facilities.
- 676 state-owned/leased facilities, valued at approximately $134 million, are in the tsunami hazard zone. Of these, 98 are critical/essential facilities.
- In addition, there are 913 non-state-owned critical/essential facilities in the earthquake hazard zone. Of these, 243 are in the tsunami zone.

The destruction caused by a Tsunami is likely to be much worse as a result of the hazard introduced LNG terminal and pipeline operations. Even in the best case the likely emergency response measure is going to be evacuation from the area around the LNG terminal, but that

shuts down the estuary and perhaps even the airport. This hazard is entirely ignored by the Draft EIS.

The Draft EIS entirely fails to discuss or consider the indirect effects of tsunami and earthquake on the surrounding area. Inundation of a large part of the sand spit that the facility is built on, and the road in and out, and the area airport, with all the debris and assorted flotsam and jetsum associated with a tsunami, is going to significant impact on terminal operations. Even the capability to shut down safely after an earthquake and tsunami is not addressed.

Third, this LNG facility is directly exposed to tsunami risks in many ways. During-construction risks are uniquely large, as well as operations near the marine areas during loading. Effectively all of the terminal work occurs in mapped tsunami inundation zone, and the on-water work will obviously be directly subject to tsunami risk as well. The APCO site, the trans-pacific parkway/Highway 101 interchange, and on the North Fill area are all in tsunami exposure zones. Earthquake and/or Tsunami response during dredging is not addressed in their applications, imposing yet another public safety and navigation cost of the project. Anchored dredges and long slurry lines through the bay would obviously be both themselves at risk during an event, and potentially pose additional hazard to others.

The proposed mitigation of a protective berm seems a bit absurd. Please analyze and discuss the likely reliability of that envisioned mitigation. The bottom of the LNG storage tanks are only 20 ft above sea level, and failure of that mitigation could be catastrophic.

The Draft EIS entirely fails to address what might happen to an LNG tanker in a tsunami. This is a major omission that needs to be corrected. Nothing in the Coast Guard planning provides adequate assurance. As explained in the summary, “What happens to an LNG tanker in a tsunami?” by expert Brentwood Higginbotham, PhD, tankers would be exposed to risky tsunamis, especially if they are in the channel but also in dock. Even without a tank rupture, the presence of a tanker in the estuary would be a major added hazard.

c. Hurricanes, Tornadoes, and other Meteorological Events

The Draft EIS discussion of storms, DEIS, 4-740 – 4-744, while relatively lengthy, never does present the relative risk of storms, or explain the objective basis for assumptions about likely wind speeds. The DEIS tells us the details of the wind speeds assumptions in various contexts, but without saying in plain English what the relative risks, or the available mitigation or alternatives, are. While not subject to hurricanes like the Gulf Coast, the coast can see very strong gusts and occasional sustained strong winds, so the facility should be built to withstand it. It appears that Jordan Cove is hoping to rely on only regulatory compliance, and even that to weaker standards, which increases our concern.

The wind hazard in relation to the LNG vessels is one of the major everyday safety hazards associated with the proposed operation, and it is a major omission from the Draft EIS. Please disclose and discuss the planning assumptions that were made with regard to wind impacts on LNG tankers, and explain the risks of high wind gusts causing tanker casualties.

The DEIS discloses that the project is not planned to survive a tsunami that occurred during a storm surge. Storm surge can be as high as 24 ft. at the project site, so a tsunami on top of it could easily swamp the protective berm. In light of the decision not to plan for that event, please disclose the consequence of tsunami (or storm surge) that inundated the facility.

d. External Impact Review

The Draft EIS includes a strange section assessing potential impact from external events (DEIS 4-745 – 4-749). For some reason, , here we see detailed mathematical descriptions of projectile ranges as related to fireball diameters. That detail is perplexing, especially because the fire effects of releases from the facility itself were so meticulously avoided.

The mathematical details here are interesting, however, and suggest to us that the range of possible consequences of releases includes truly massive fireballs and hurling objects.
In regards to pipelines it is a perplexing omission and serious error that the proposed Pacific Connector pipeline is not considered in terms of external impact review. The end of the line is a location that is especially prone to explosions and other disasters, and at this complex and unique facility and risks are even higher. The connection of the pipeline, LNG facility, and LNG tankers are three locations where a proper focus on process safety would have revealed a need for special focused attention

e. On-site and Offsite Emergency Response Plans

The Draft EIS describes emergency response planning regulations as though the field is covered, when anyone in that field can tell you that it isn't. DEIS, 4-753 – 4-755. During the recent revision to the Northwest Area C-plan under OPA-90, for example, the Coast Guard didn't even know whether that plan addressed LNG or not. LNG-specific regulations remain a blank spot in Oregon law. LNG response isn't addressed in interagency response plans in Oregon.

Even where other plans do exist, other responders generally aren't prepared to address unique LNG risks. Normal fire-fighting is largely inapplicable to LNG fires. Beyond vague and conclusory assurances that the necessary training and equipment will be provided, we have seen no indication that area emergency responders will be equipped to respond to emergencies. Many of the basic needed facilities just don't exist, which presents uniquely higher risks. At the most basic level, the Coos Bay area doesn't even have a burn ward, should there be any injury in any sort of fire. Transportation options are limited and the location is remote from industrial centers. Local communities struggle just to keep the lights on, let alone to keep tabs on a hazardous industrial facility.

The Coos Bay Geographic Response Plan, part of the Northwest Area C-plan by the Northwest Area Committee, for example, which is touted by the applicant as representing preparedness, is specific to liquid spills, and so is largely inapplicable to LNG spills or gas leaks.

The existing response planning too shows the generally overloaded nature of emergency response capability. As discussed above in the context of tsunami and earthquake response, response resources in this area are susceptible to being rapidly overwhelmed.

Evacuation-related problems are a particularly significant emergency response deficiency, that is not addressed in the Draft EIS. There are many situations in emergency response to LNG or gas leaks and fires that call for evacuation from the area.

The DEIS says that Jordan Cove submitted a draft ERP that would address emergencies and potential releases, and FERC appears poised to consider that adequate pending a few recommendations for filing updates. Information regarding this planning is essential to meaningful comment, and it needs to be included in a NEPA document for public review. We challenge any idea that there is a robust collaboration of Jordan Cove and emergency responders, and emphasize for the commission that this project is going to have to plan to bring all of its own emergency response with it.

f. FERC recommendations

The DEIS section 4.13.1.6 (pp. 4-755 - 768) contains a long list of recommendations for various measures at various times. A mere listing of mitigation measures, without consideration or discussion of their role and effectiveness, fails to meet the hard look duty under NEPA.

Many of the provisions relate to studies and information regarding hazards that Jordan Cove needs to provide. *See e.g.* DEIS, 4-755 (vapor dispersion modeling, etc.) This information needs also to be provided to the public. Also, relevant portions of that information needs to be included in the NEPA document itself to enable public comment and commission understanding of the issues.

We are concerned that the project leaves so much back-loaded work to be done, and the management-of-change procedure is so vague, that later information and changes to the project will result in unforeseen changes and unevaluated risks. As explained above, the analysis under 40 CFR 1502.22 of missing information needs to be done specifically for the many recommendations for later information. Where important steps are necessarily forced into the future, please meet the duty now to disclose the likely impacts.

5. Social Welfare & Public Safety.

Construction of oil and gas infrastructure, including processing plants, export terminals, extraction sites and pipelines, requires a large influx of labor with frequently unforeseen impacts on local communities. Temporary labor camps associated with fracked gas facilities impose outsized impacts on local infrastructure, public services, and public health through increases in crime, drug use, assaults, kidnapping, sex trafficking, and sexually transmitted infections. Native American communities, especially women and girls, have suffered disproportionately from these impacts.

The influx of labor necessitates temporary housing and makes demands on local communities to provide for and adjust to the sudden increase in population and need for services. Frequent reports in the past ten years have documented burdens on local infrastructure, public services and

public health and increasingly on nearby tribal communities through increases in crime, drug use, assaults, kidnapping, sex trafficking, and sexually transmitted infections (STI).

- In Williams County, North Dakota, in the Bakken Shale, increases in crime have corresponded with the flow of oil. The infusion of cash has reportedly attracted career criminals who deal in drugs, violence, and human sex trafficking. In 2014 the *Williston Herald* portrayed the rapid rise of "violent crimes that result in the immediate loss of an individual's property, health or safety, such as murder, larceny and rape." With fewer than 100 law enforcement personnel, crime in Williams County "has risen in kind with the county's population, but funding, staffing and support training for law enforcement has not."[32]

- According to the North Dakota Health Department, the number of HIV and AIDS cases in North Dakota more than doubled between 2012 and 2014, and cases were shifting to the state's western oil fields, where 35-40 percent of all new cases occurred. Previously, only 10 percent of cases were in that region.[33] This trend followed on the heels of an upsurge in sexually transmitted chlamydia cases in the same region. The North Dakota state director of disease control, Kirby Kruger, attributed the uptick in HIV cases to the drilling and fracking industry and attempted to spread HIV prevention messages at the "man camps" that house young male workers in the oil industry.[34] Human sex trafficking accompanied the fracking boom, but a shortage of medical professionals hampered response to the public health crisis, according to Kruger, who noted that it was difficult to hire nurses and medical staff who could live in the area on a public health wage.

- In 2017 the Southwest Pennsylvania Environmental Health Project established a voluntary public health registry to track and analyze impacts of shale gas development on people living near gas production facilities. According to a spokesperson, "The vast majority of independent science is looking at [shale gas development] and saying something's not good there. We need to know more … The findings of this registry will allow the health care community to be more informed about what problems people are experiencing when they walk into their offices."[35]

- Sexually transmitted infections (STI) can increase through sexual mixing patterns associated with labor migration. A longitudinal, ecologic study was conducted from 2000–2016 in a prolific shale gas region situated in Ohio. Reported cases of chlamydia, gonorrhea and syphilis by county and year were obtained from the Ohio Department of Health. All 88 counties were classified as none, low, and high shale gas activity in each year, using data from the Ohio Department of Natural Resources.

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[32] (Bell, 2014) Retrieved from http://www.willistonherald.com/news/modernized-slavery/article_84e257d8-3615-11e4-a4f8-001a4bcf887a.html
[33] (Associated Press, 2014) Retrieved from http://billingsgazette.com/news/state-and-regional/montana/north-dakota-hiv-aids-rate-rises-with-population- growth/article_a939fed6-f737-5cfb-957f-ab800673f4d7.html
[34] (Heitz D. , 2014)
[35] (Hopey, 2017)

Compared to counties with no shale gas activity, counties with high activity had 21% increased rates of chlamydia and 19% increased rates of gonorrhea.[36]

One of the underreported effects of the fracking boom is the strain on the area's healthcare system. Motor vehicle accidents and deaths, for example, are many times higher for oil and gas workers than workers in other industries, leading to over-burdened hospitals and emergency response services. One study found oil and gas workers died from work-related motor vehicle accidents 8.5 times more frequently than other wage and salary workers.[37]

The Methodist Healthcare Ministries executive report of the South Texas Community Needs Assessment describes the consequences of the fracking boom on healthcare in rural Texas counties near the Eagle field shale (EFS) area. Results include:

- Increased STIs (rates of chlamydia in part of the EFS area is 365 per 100,000 people—compared to a national average of 84 per 100,000).

- Increases in the number of uninsured patients, as much work in the oilfield is done by subcontractors who do not have health insurance. Additionally, workers in the industries that have grown to provide services to oil field workers are generally uninsured. At a single site in the study, the percentage of uninsured patients grew from 60 percent in 2011 to 74 percent in 2013. Across the study, self- pay, and charity cases increased 11%.

- Increases in heat exhaustion, dehydration, sleep deprivation, exposure to oil and gas spills, and accidents.

- Increase in traffic accidents. In one county, accidents increased 412% between 2009-2011.

The impact on hospitals has also been described in the Bakken oil field region of North Dakota:

- Trauma services have increased in some rural areas by over 1000%. Half these trauma visits are attributed to oil field injuries, though many are drug overdose related.

- In North Dakota between 2012-2014 HIV/AIDS cases doubled. 35% occurred in the western oil fields, the site of large "man camps" which had already seen a significant increase in chlamydia cases.

Reports are emerging of disproportionately severe trauma to tribal communities near temporary labor camps. In January 2014, James Anaya, the United Nations special rapporteur, opened the meeting of the UN's Permanent Forum stating: "It has become evident … that extractive industries many times have different and often disproportionately adverse effects on indigenous

[36] (Deziel N.C., 2018) https://doi.org/10.1371/journal.pone.0194203
[37] (Retzer, 2013)

peoples, and particularly on the health conditions of women." He detailed the effects on Native American women and girls, including increased rates of STIs and HIV/AIDS, physical assault, and sexual harassment and violence. He additionally noted that "contamination of indigenous lands and natural resources resulting from extractive activities has significant implications for reproductive health, having contributed in many cases to birth defects, delayed child development and disease among community members." In addition, he noted, the full range of health effects are yet to be determined, igniting fears among Native Americans about the unknown intergenerational effects that the contamination will have on their communities.[38]

A 2016 opinion piece in the *Boston Globe* exposed the risks Native American women faced due to the Dakota Access Pipeline: "It also endangers women and girls. That's because, in this country as around the world, extractive industries create so-called 'man camps,' places where male workers often work twelve-hour days, are socially isolated for weeks or months at a time, and live in trailers in parks that extend for miles. Many men retain their humanity, but as advocacy organizations like First Nations Women's Alliance have noted, these man camps become centers for drugs, violence, and the sex trafficking of women and girls. They also become launching pads for serial sexual predators who endanger females for miles around."[39]

In 2014 the U.S. Justice Department Office on Violence Against Women awarded three million dollars to five rural and tribal communities to prosecute crimes of violence against women and provide services to victims of sexual assault, domestic violence, and stalking in the Bakken Region of North Dakota and Montana.[40] Rationale documented by tribal leaders, law enforcement, and the FBI included, "rapid development of trailer parks and modular housing developments often referred to as 'man camps'; abrupt increase in cost of living, especially housing; rapid influx of people, including transients, in a previously rural and stable community; constant fear and perception of danger; and a lost way of life. Local and tribal officials and service providers reported that these changes have been accompanied by a rise in crime, including domestic and sexual violence."[41]

To address the community health and safety harms linked to temporary labor camps of extractive industries, the British Columbia Ministry of Aboriginal Relations and Reconciliation funded a research project in 2017, carried out in consultation with First Nations. The project noted that "increased domestic violence, sexual assault, substance abuse, and an increased incidence of sexually transmitted infections (STIs) and HIV/AIDS due to rape, prostitution, and sex trafficking are some of the recorded negative impacts of resource extraction projects, specifically as a result of the presence of industrial camps and transient work forces." The objectives of the project were to stimulate dialogue and to develop detailed protective steps for Nations, government, and industry in advance of the initiation of planned extraction projects in the region,

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[38] (Rickert, 2014). http://nativenewsonline.net/currents/un-special-rapporteur-oil-gas-mining-operations-brings-increased-sexual-violence/

[39] (Nagle, 2016)

40 (U.S. Department of Justice, 2014) Retrieved from http://www.justice.gov/opa/pr/associate-attorney-general-west- announces-3-million-grants-address-violence- against-women

[41] (U.S. Department of Justice, 2014) Retrieved from http://www.justice.gov/sites/defaultfiles/ovw/legacy/2014/04/25/fy2014-initative-for-the-bakken-region-enhanced-services-for-victims.pdf

in order to prevent violence against women and other life changing negative effects linked to the industrial camps.[42]

Jordan Cove LNG has applied for a permit for a 2100-person temporary labor camp to be built on the north sand spit in Coos Bay during construction of the fracked gas processing plant. Access would be limited to one way in and out. Access for emergency responders and escape for visitors and personnel in case of emergencies would be inadequate and present a serious danger.

Proposed temporary housing would be serviced by new utilities including water supply and waste disposal. Will proposed utilities be adequate to handle a large influx of workers? If not, there is potential for negative impacts on the waters of Coos Bay, the estuary, and the ocean shore with the potential for contamination of soils and water as well as significant stress on the public water system by significantly increased usage. The large influx of labor will likely also place increased stress on the police, fire, and health resources of Coos Bay, North Bend, and surrounding communities.

Many temporary labor camps may be needed to build the proposed Pacific Connector Pipeline, especially in rural areas in and near tribal lands, raising concerns of increased risks to rural communities of communicable diseases, crime, drug use, assaults, and homicides. Local communities do not have the resources or the ability to protect their community members, and public health resources are insufficient to respond to the projected adverse health impacts.

6. Occupational Health and Safety.

When fossil fuel export projects are proposed, supporters emphasize economic opportunities, particularly job creation. What is left out of the discussion is how dangerous and unhealthy these jobs can be. Workers in the fossil fuel industry are exposed to myriad health risks and are killed on the job at rates four to seven times higher than other industries.[43]

The many detrimental health impacts of oil and gas field work are well studied and documented, including benzene exposure;[44] [45] silicosis;[46] endocrine disruption;[47] radiation and noise exposure;[48] exposure to hydrogen sulfide;[49] and increased overall mortality rates, especially due to work-related motor vehicle accidents. [50] [51]

With remarkable disregard for public health, the oil and gas industry, specifically, is exempt from disclosing the chemicals they use and from most federal statutes protecting worker, resident

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[42] (Gibson, 2017) Retrieved from http://www.thefirelightgroup.com/thoushallnotpass/wp-content/uploads/2016/03/Firelight-work- camps-Feb-8-2017_FINAL.pdf
[43] (AFL-CIO, 2018)
[44] (Lombardi, 2014)
[45] (Esswein E. e., 2014)
[46] (Bang, 2015)
[47] (O'Neill, 2014)
[48] (Witter, 2014)
[49] (Cribb, 2017)
[50] (AFL-CIO, 2018)
[51] (Olsen, 2014)

and environmental health, including, but not limited to, the Clean Water Act, Clean Air Act, Compensation and Liability act and the Toxic Release Inventory.[52] Despite high mortality rates from fire and explosion, the oil and gas industry is also exempt from OSHA regulations called process safety management (PSM), which regulate industries to prevent workplace explosions.[53]

Diesel emissions expose large numbers of fossil fuel workers to known respiratory hazards. The US Department of Transportation (DOT), responsible for the health and safety of interstate truck and bus drivers, has neither a standard for diesel emissions nor other health standards with explicit exposure limits.[54] Nor does OSHA have any standard specifically for exposure to diesel exhaust.[55] Only a small proportion of the thousands of chemicals present in the gas and particulate matter of diesel emissions is covered by OSHA standards, and most of these standards require only that specified limits not be exceeded over an 8-hour work shift. Components in the gas phase rarely exceed their limits. Their greatest potential threat comes from their adsorption onto diesel engine particulates, bringing them deep into the lungs. This exposure is unlimited and unregulated. Similarly, for environmental contaminants, components taken separately rarely exceed their limits, but their threat is increased when combined with simultaneous exposure to other contaminants.

The oil and gas industry is currently exempt from much of OSHA's noise standards as well, despite numerous health risks to workers from noise levels resulting from drilling, heavy equipment, diesel engines, and pipe-fitting operations.[56]
The majority of jobs offered by the Jordan Cove project will come during the short-term construction of the facility (which is true of each of the proposed fracked gas projects). In its Resource Report 1, the parent company Pembina estimates an average of 1,023 construction employees per month over a five-year construction period. Work would include pile driving and dredging of the bay, road and infrastructure construction, and building the processing facility itself.[57]

While not a definitive accounting of all occupational risks, Jordan Cove exemplifies the specific risks to workers' health posed by projects of this scale:

- Acute and continuous exposure to diesel fumes, VOCs, and other toxic emissions from heavy construction machinery, high levels of bus and truck traffic, and the presence of two large diesel-fired generators as well as two black diesel backup generators.

- Nighttime use of vehicles and heavy equipment: dredging and pile driving of the bay is expected to occur 24 hours per day over two years. Many of the workers would be

[52] (Colborn, 2011)
[53] (Soraghan M. , 2015)
[54] (American Public Health Association, 2014)
[55] (U.S. Department of Labor: Occupational Safety and Health Administration, n.d.)
[56] (Witter, 2014)
[57] (Jordan Cove Energy Project L.P., 2017)

temporary and come from out of county, likely commuting long distances and leading to higher risk of over-exhaustion and vehicular death.

- High noise exposure would occur from ongoing and wide use of heavy machinery.

- Silica exposure from high levels of dust produced in concrete work, dredging, and masonry.

When completed, the facility would require 180 permanent positions.[58] Employees at the terminal will similarly experience constant high noise level exposure and possible over-exhaustion from nighttime operations. They are also at risk of acute and deadly exposure to VOCs, benzene, and methane during routine testing and maintenance of the gas storage tanks. The greatest risk for workers at Jordan Cove comes from potential fires and explosion from unknown or unrepaired leakages, exemplified by the explosion at the William's Company LNG storage facility in Plymouth, Washington. These risks are augmented by the possibility of earthquake and tsunami.

Pembina has promised to build what they call the Southwest Oregon Regional Safety Center (SORSC) near the terminal, including a "security center" and an "emergency operations center". They have also promised to build a fire station nearby in a separate facility, staffed with industrial firefighters.

However, as the explosion in Plymouth demonstrated, significant safety issues were not necessarily mitigated by the presence of firefighters; in fact, the firefighters and trained LNG employees who responded to the situation in Plymouth could not immediately act due to continued leakage of explosive fumes. The root problem of the above case was not a lack of firefighters or emergency crews, but the degradation of storage equipment, employee error, proximity of flammables, and scale of the facility.

Pipeline construction workers will experience many of the same risks as those at Jordan Cove: high diesel fume exposure, long and irregular hours including nighttime work and commuting, continual noise pollution, and high risk of silica dust exposure from digging equipment.

Pipeline monitors, likewise, face what can be lethal exposure to methane, VOCs, and other noxious gasses potentially released during maintenance at compressor stations, as well as during any leak repair.

Because the PCGP will transport fracked gas in unprocessed, pressurized form there would be continuous risk of leaks and explosions. If a pipeline failure occurs, Pacific Connector employees and local emergency responders would be responsible for resolving the problem at their own risk. Pacific Connector Gas Pipeline LP writes in their "Resource Report No. 11, Reliability and Safety" that they would plan for this by sharing information with existing safety organizations. They do not, however, plan to provide emergency training in the case of gas leakage, or pay for more emergency equipment, suggesting the burden of risk will fall on local emergency responders and local jurisdictions.

[58] (Draft Environmental Impact Statement for the Jordan Cove Energy Project, 2019)

In addition, in many places along the pipeline, the company has only promised to patrol and check for leaks once per year.[59]

Climate change has already dramatically increased the number and severity of wildfires in Oregon. According to Firefighters United for Safety, Ethics and Ecology (FUSEE), over half the 229-mile long pipeline would cross through lands already designated by the U.S. Forest Service as having moderated to very high wildfire risk.[60] The result will be a pipeline that functions like a quick-burning fuse, causing, in case of a spill and ignition, major wildfires in the surrounding area. Firefighters responding to the disaster would face a dangerous double-risk: the need to suppress the pipeline explosion as well as suppressing the fires that would threaten surrounding communities and themselves.

a. Fire and Explosions.

According to numbers compiled by *Energywire*, the oil and gas industry employs less than 1% of the U.S. workforce but is responsible for nearly 10% of occupational deaths from fire.[61] Between 2009 and 2013, the sector had the highest rate of mortality from fire and explosions of any private industry, and the second highest of all occupations, behind only firefighting.[62]

- In Seattle in 2016, a gas line exploded injuring nine firefighters and destroying multiple businesses. The line was supposed to have been shut off in 2004, but the contractors hired by Puget Sound Energy failed to properly cut and cap the line and gas had been flowing through it for 12 years.[63]

- On August 1, 2018 outside Midland, Texas, two pipelines began leaking at their intersection. Five workers from the pipeline companies, Kinder Morgan and Navitas Midstream, and two local firefighters responded to the leak by attempting to shut off the flow. A fire ignited and a series of explosions followed. All seven workers were hospitalized and one later died of his injuries. No report has yet determined the cause of the explosion.[64] One week later a different pipeline exploded, killing a three-year old child in her home.

- The Williams Company's LNG storage facility in Plymouth, Washington is the largest in the Pacific Northwest, with two fourteen-million-gallon storage tanks. (See section "Natural and Human Caused Disasters" above for more) At eight a.m. on March 31, 2014, fracked gas inside the LNG processing station ignited, creating a series of rolling explosions, that fragmented equipment, sent 250 pounds of metal flying up to 900 feet away, and lit the facility on fire. Four employees were injured from the shrapnel, and one was burned. Before the explosion, plant operators had

[59] (Jordan Cove LNG, 2017)
[60] (Firefighters United for Safety, Ethics and Ecology, 2019)
[61] (Soraghan M. , 2015)
[62] (Soraghan M. , 2015)
[63] (Lacitis, 2017)
[64] (San Angelo Standard-Times, 2018)

temporarily dismantled the site's safety monitors, so the plant continued to operate and leak fracked gas through the emergency. Company officials requested that employees repeatedly reenter the facility to manually shutdown dangerous equipment. Though more than a hundred emergency responders arrived on-site, they were unable to enter the facility for eight hours until the wind changed enough to drive out the flammable fracked gas. The extreme cold of LNG also made plugging the leaks time intensive: holes would freeze over until ambient temperature melted enough to begin leaking again. Despite the five injured employees, the company recorded only one injury in the official report months later because federal regulations only mandate that oil and gas producers report injuries leading to death or overnight hospital stays.[65]

b. Deadly gases and airborne hazards.

The production, transport and storage of fracked gas exposes workers and adjacent communities to numerous toxic air pollutants during each stage of its life cycle: drilling, well completion and fracking; transport by rail, pipeline or ship; liquefaction, refining, processing, and storage. Airborne toxins pose more serious risks for workers, as likelihood and severity of exposure increases significantly with proximity to operations, as well as during particular stages of production.[66]

Common hazardous air pollutants emitted during fracked gas production, processing, and transport include, among others: volatile organic compounds (VOC) like benzene, toluene, ethylbenzene, and xylene; formaldehyde; hydrogen sulfide; carbon monoxide; sulfur oxide; diesel particulates; ozone; and radon gas.[67] [68]

Researchers in Colorado found, during the extraction process alone (fracking), companies used 944 different products, which together contained 632 different chemicals. Of these chemicals:[69]

- More than 75% affect skin, eyes, and other sensory organs, as well as respiratory and gastrointestinal systems;
- 40-50% affect the brain and nervous systems;
- 37% affect the endocrine system; and
- 25% cause cancer and mutations

Still largely unstudied on their own, these chemicals can also combine and potentially form new reactants when exposed to air, high temperatures, and other variables of the extraction process.[70]

c. Hydrogen Sulfide

[65] (Powell T. , 2016)
[66] (McKenzie, Human health risk assessment of air emissions from development of unconventional natural gas resources, 2012)
[67] (Shonkoff S. e., 2014)
[68] (McKenzie, Human health risk assessment of air emissions from development of unconventional natural gas resources, 2012)
[69] (Colborn, 2011)
[70] (Kaden, 2015)

Hydrogen sulfide, or "sour gas," is one of the most common and dangerous byproducts of oil and gas production, causing acute and chronic breathing issues, neurological defects, and death. It can also corrode metal, making storage dangerous. In high concentrations the gas deadens a person's sense of smell, making it undetectable.[71, 72] A study in the Alberta tar sands found that of workers interviewed, 35% experienced high exposure levels, and 10% had at some point been "knocked down" (lost consciousness) by the gas.[73] Hydrogen sulfide is regulated in many states producing oil and gas, but according to Energy Wire's reporting, in the years 2013 and 2014 alone, five workers died from exposure in the fracking fields. In 1975, the gas was responsible for the deaths of nine in Denver City, Texas.[74]

d. Volatile Organic Compounds.

Between 2010 and 2015 at least nine workers died from close proximity to hydrocarbon vapors, also known as volatile organic compounds (VOC), trapped in fracked gas storage containers.[75] All petroleum contains potentially lethal levels of VOCs. But according to a study by the National Institute for Occupational Safety and Health (NIOSH), VOC exposure in fracked gas is more unpredictable and often more dangerously concentrated than in conventional oil and gas production.[76] Exposure to these trapped gases can lead to sudden loss of consciousness and death.[77] An investigation by Energywire found that one of the ways workers are taught to avoid these sudden exposures is by "testing the wind" before they open the hatch.[78] Workers face these risks during all routine container tests—at the fracking site, during transport, and at processing facilities.[79]

e. Silicosis.

Exposure to silica dust is a well-known hazard in mining, construction, sandblasting, and other industries. It is a known lung carcinogen. In hydraulic fracturing, intensive blasting of sand and the general lack of regulation creates conditions where silica exposure can become extremely hazardous. A study by NIOSH of eleven fracking sites in five states found that full-shift silica exposure exceeded the criteria for safe levels, sometimes by ten times or more. Even wearing a respirator was ineffective.[80]

The huge amount of sand required by hydraulic fracking has led to a surge of intensive sand mining in parts of Minnesota and Wisconsin. This has in turn led to higher health risk for miners, and likely their communities as well due to the ambient silica dust released during the extraction

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[71] (Kaden, 2015)
[72] (Lee, 2014)
[73] (Hessel, 1997)
[74] (Lee, 2014)
[75] (Harrison, 2016) https://www.cdc.gov/mmwr/volumes/65/wr/mm6501a2.htm
[76] (Esswein E. e., 2014)
[77] (NIOSH-OSHA, 2018)
[78] (Soraghan M. , SAFETY: Poisoned by the Shale? Investigations Leave Questions in Oil Tank Deaths, 2014)
[79] (Harrison, 2016)
[80] (Esswein, Occupational Exposures to Respirable Crystalline Silica During Hydraulic Fracturing, 2013)

process.[81] Recently, the American Thoracic Society called for greater recognition of the harm of silicosis, citing its prevalence, seriousness and yet underrepresentation in occupational health cases.[82] Silicosis risks will occur during construction of fracked gas pipelines, processing, and storage facilities.

A report by researchers in Quebec found that, while all major construction projects expose workers to silica, pipeline laborers had some of the highest risks of silicosis exposure due to their frequent use of jackhammers, masonry saws, and other dust producing heavy machinery.[83]

f. Diesel Engine Exhaust (DEE).

Workers encounter diesel engine exhaust (DEE) from heavy machinery throughout gas production and transport. Diesel exhaust components include carbon monoxide, nitric oxide, nitrogen dioxide, sulfur oxides, and polycyclic aromatic hydrocarbons, as well as fine particulate matter. When NIOSH conducted a full shift study of diesel exhaust exposure at multiple fracking sites, they found the mean exposure over time (17 µg/m3, ranging from 0.1–68 µg/m3) near to the state of California's maximum safe exposure level (20 µg/m3). 10% of their measurements exceeded this limit.[84]

DEE is a recognized carcinogen and cause of lung cancer.[85] U.K. researchers have estimated DEE to be the third largest contributor to occupationally induced lung cancer (after asbestos and silica) and estimate DEE is responsible for up to 6% of all lung cancer deaths.[86] Diesel fumes not only impact workers at close proximity, but create regionally hazardous air quality.

g. Radiation.

Radon is a component of fracked gas, but its concentration levels can far exceed safe levels as a result of the extraction process. These concentrations can then travel with the gas and dissolve into the mixed fluids, or "slurry", produced during the disposal of fracking wastes.[87] Radon will remain in the gas and disposal slurry until the radioactive isotopes fully decay, creating a long-term exposure risk for both workers and downstream consumers.[88] Radon is second only to tobacco as a cause of lung cancer. [89]

h. Noise Impacts.

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[81] (Korfmacher, 2013) https://doi.org/10.2190/NS.23.1.c
[82] (Deslauriers, 2016)
[83] (Beaudry, 2013)
[84] (Esswein E. e., Measurement of Area and Personal Breathing Zone Concentrations of Diesel Particulate Matter (DPM) during Oli and Gas Extraction Operations, Including Hydraulic Fracturing, 2018)
[85] (Benbrahim-Tallaa, 2012)
[86] (Vermeulen, 2013)
[87] (Steinhäusler, 2004)
[88] (Kaden, 2015)
[89] (Al-Zoughool, 2008)

Risks from noise generation are higher with fracking than conventional gas production due to the greater scale and length of time when workers are exposed to noise during horizontal drilling and other unconventional extraction methods.[90]

While this draft Environmental Impact Statement (DEIS) alleges to be an "analysis of potential noise impacts on human receptors," there is actually no discussion of the impact on humans, only estimates of predicted noise levels without any mention of what these noise levels might do to humans. The only concern in this DEIS seems to be the extent to which the project complies with existing regulations and FERC guidelines.

Today's literature on the health effects of noise is replete with research studies on the adverse effects of noise on health. These effects include sleep disruption, communication interference, cardiovascular and endocrine effects, job performance decrements, and adverse educational effects. Extensive studies of the health impact of excessive noise reveal that these effects are often caused or exacerbated by stress. The adverse effects of community noise exposure are often stated in terms of the degree of annoyance or aversion experienced by a population, up to a point where communities will take action against the source of this disruption. Adverse effects are also described in terms of their effects on physical health, particularly the cardiovascular and endocrine effects. Future iterations of the EIS must include a discussion these effects along with an attempt at quantification in order to properly describe the impact of the proposed LNG terminal. Several references are provided at the end of these comments to facilitate this process.

It is unfortunate that the State of Oregon exempts construction projects from its noise regulations, along with other major noise sources: vehicles, rail traffic, and airport operations.[91] In addition to construction noise, noise levels from all of these sources may be increased by this proposed project and exacerbate the impact on individuals and communities, although the DEIS has not addressed these additional sources. The DEIS points out that the Oregon regulations have established noise limits for "designated quiet ares" but that the State has designated no such areas. The DEIS does address construction noise with respect to the FERC guidelines, as well as the Oregon regulations covering noise from industrial and commercial activities. However, the DEIS reveals many instances in which the proposed project will not comply. In these cases, FERC recommends mitigation measures, which, as I will point out, are unlikely to be used.

The DEIS states clearly that the Coos Bay community would be subjected to prolonged, high levels of noise from the construction of this project and possibly during its operation as well. According to the DEIS noise contours (Fig. M-3), a substantial part of the town would exceed the EPA maximum recommended day-night noise level (L_{dn}) of 55 dBA[92] and portions would exceed an L_{dn} of 60 dBA during the four years of construction. Average noise levels in the recreational area are projected to be as high as 65 dBA and above. Maximum noise levels (L_{max}) would range from 65 dBA in the town to 69 dBA in the recreational area. Once construction is completed, the DEIS predicts an increased noise level over the existing ambient that is not

[90] (Kaden, 2015)
[91] OAR 340-035-0035.
[92] Information on levels of environmental noise requisite to protect public health and welfare with an adequate margin of safety (EPA/ONAC Report 550/9-74-004). U.S. Environmental Protection Agency. Washington, DC, 1974. Available at: http://www.nonoise.org/library/levels.htm.

"significant," but will likely be audible. The DEIS recommends a full power load noise survey and mitigation measures should noise levels exceed an L_{dn} of 55 dBA.

The most disruptive and annoying source of noise would be pile driving in the Coos Bay area and rock blasting along the Pacific Connector Pipeline. Construction of the terminal is projected to occur 20 hours per day, six days per week with little relief for the community. Predicted maximum levels show an 8-dBA increase over the existing ambient L_{dn}, which will be very disturbing to the residents, a large number of whom live on the south and east end of the town. The incessant pounding will persist well into the evening and nighttime hours when people need to rely on rest and sleep.

Along the proposed pipeline, construction is planned to occur between 7 am and 7 pm for a period of 12 to 18 months, with any specific area impacted for several weeks to a few months. There are more than 100 structures within 150 feet of the right-of-way, and several within 50 feet. The DEIS estimates noise levels of rock blasting as an energy average (L_{eq}) of 95 dBA at 50 feet, 87 dBA at 100 feet, and 74 dBA at 300 feet. These levels will guarantee that nearby residents will be subjected to noise levels exceeding the interiors of some of the noisiest manufacturing facilities in the U.S. In addition, low-flying helicopters involved in clearing the landscape will produce ear-splitting sound levels estimated at 115 dBA at a distance of 50 feet.

The DEIS fails to mention the effects of these noise levels on the hearing of workers, whose exposures are substantially greater because of proximity to the source. These exposures undoubtedly exceed the 85-dBA time-weighted average limit required by OSHA for the initiation of hearing conservation programs.[93] Surveys of noise exposed construction workers show average exposures of 91-99 dBA for workers using loaders and dozers and an average of about 96 dBA for workers in industrial, commercial, and institutional construction.[94]

Because these activities will be pursued for 12 hours every day, they give community members little time for respite during the day, and they give workers insufficient opportunity to recover from temporary threshold shifts in hearing. As hearing loss criteria and standards are based on an 8-hour exposure day, five days per week, these long exposures greatly increase the likelihood of hearing damage and necessitate a more conservative approach.[95]

Throughout the DEIS there is far too much reliance on recommended mitigation. Some of the analyses even *presume* mitigation in the estimated noise levels, for example the 98-dBA estimated level at 50 feet for rock blasting. This kind of presumption should not be allowed in an EIS. The DEIS assumes that the company will continuously monitor noise levels at all places. Whenever these levels are out of compliance, the company should stop the activity and implement mitigation measurs, such as erecting a wall or ceasing nighttime activities, and then it should file a report to the Secretary. The DEIS assumes that when designing the compressor station, the company will incorporate "best practices applicable to noise reduction." The DEIS

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[93] https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_id=9735&p_table=STANDARDS

[94] Suter, A.H. (2002). Construction noise: Exposure, effects, and the potential for remediation, a review and analysis. Am. Ind. Hyg. Assoc. J., 63, 768-787.

[95] Suter, A.H. (2000). Standards and Regulations. In E.H. Berger, L.H. Royster, J.D. Royster, D.P. Driscoll, and M. Layne (Eds.) The Noise Manual, (5th ed.) American Industrial Hygiene Assoc., Fairfax, VA., 639-668.

also assumes that mitigation measures would be implemented "to the extent feasible" during construction, but the company can easily claim that such measures would be either technically or economically infeasible. Without rigorous enforcement and substantial penalties, any profit driven company is unlikely for environmental reasons to cease operations or perform any mitigations with the associated costs and delays. Instead, the company will most likely plough ahead regardless of citizen impact or FERC guidelines.

In the real world mitigation almost never takes place unless it is mandatory, and even then usually not until it is enforced. Most of the mitigation efforts described in the DEIS are only recommendations, using the words "should" or "may," with absolutely no teeth behind them. There is no mention of mandatory requirements or of enforcement, and therefore any assumption of mitigation is misguided.

The impact of noise exposure is based on several factors, the most obvious of which is noise level (perceived as loudness), but other variables, such as frequency (or pitch), complexity, temporal pattern, and meaning also affect the response of individuals and communities. In most instances the DEIS has used cumulative descriptors to measure the noise impact. These descriptors average the noise energy over a period of time, usually the energy average throughout the day, as in $L_{eq,}$ or the average sound level over the day and night, as in L_{dn}, which assigns a 10-dB penalty to nighttime noise levels. Cumulative measures are useful and widely employed in the U.S. to assess community impact for sources such as road traffic noise. For sources like construction noise, however, which is highly intermittent and often impulsive, these metrics should be supplemented by single event measures, such as the L_{max} or maximum level.[96]

While the DEIS has estimated the impact with L_{max} in some instances, it relies too heavily on cumulative measures of noise exposure and too little on single event measures. This is especially true for construction noise involving sources like pile driving, pneumatic drilling and pounding, and impulsive sources like rock blasting. These types of noise are more disturbing than continuous noise, and they are much more likely to produce sleep disruption, stress, and aversive reactions. Moreover, the noise levels for both cumulative and single event estimates for pile driving exceed the FERC criteria at noise sensitive areas.

The intermittent booms occurring during rock blasting provide a good example of the failure of cumulative measures to describe the impact. Averaging the energy of these sources over a 12-hour period does not adequately describe their effects, nor even does the use of a single event measure like $L_{max.}$ since their effects are dependent upon additional factors. The jarring quality of intermittent blasts coupled with the warlike associations of intense helicopter noise are likely to produce stress and behavioral responses[97] in the exposed community. The presence of negative overlay would be a factor in both cases. In addition, helicopter noise, which is predominantly low frequency, would be substantially underestimated using the A-weighted filter incorporated in the descriptors used here. The DEIS does give an estimated maximum level of blasting noise as 98 dBA at 50 feet (buried in Table M-16 but not discussed), but only *after* mitigation has been applied, and, consequently, its actual level will be much higher to an unknown extent.

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[96] https://www.nae.edu/35649/Technology-for-a-Quieter-America

[97] Suter, A.H. (1992). Communication and Job Performance in Noise: A Review, ASHA Monographs No. 28. American Speech-Language-Hearing Assoc., Rockville, MD.

The most salient example of the misuse of cumulative measures is the ridiculous Table 4.12.1.4.5, which uses a cumulative descriptor (L_{eq}) for blowdown events, flattening out a single noise event into a number representing the "average" sound level over an 8-hour period. It would be like describing the daily average level of a bomb blast as the sound of a sewing machine. The ear does not operate that way, and neither does the human brain's response to sound. Again, the use of mitigation, in the form of a silencer, is already assumed, leaving the citizens to trust that the company will bother to use it.

This DEIS would allow the construction and operation of a facility that would expose the surrounding community to high levels and prolonged durations of noise. The citizens of Coos Bay would be subjected to an ear-splitting din for the better part of four years and those living along the pipeline would experience noise as if they were working in factories. The workers themselves would be at serious risk of develop hearing loss. Whenever projected noise levels appear to reach or exceed the FERC guidelines, the Agency has allowed the company to fall back on non-mandatory mitigation procedures, for which there is little probability of compliance. Although the DEIS purports to be an "analysis of potential noise impacts on human receptors," there is actually no such analysis, only the degree to which certain standards are met, or in many cases, not met. If the company would prepare a report that did indeed analyze the effect on humans, it would show how disastrously noisy this project would be and it would be roundly rejected.

G. Water Quality and Compliance with the Clean Water Act

As discussed more fully below, the FERC may not grant a permit to the applicants because the State of Oregon has determined that this project will violate the state's water quality standards. Indeed, the proposed project would do immense damage to water quality in Oregon by causing significant temperature increases in numerous stream segments, by causing significant decreases in dissolved oxygen levels in Coos Bay, and further degrading stream segments that are already water quality impaired for temperature, dissolved oxygen, pH, turbidity, and sedimentation.

The proposed project would violate Oregon's statewide narrative criteria by creating conditions deleterious to aquatic species, including Coho salmon (Oncorhynchus kisutch), green sturgeon (Acipenser medirostris) and eulachon (Thaleichthys pacificus); by permanently converting acres of highly productive intertidal habitat to low productive deep-water habitat; by entraining and killing fish as LNG vessels uptake millions of gallons of engine cooling water; by discharging heated cooling water above ambient temperatures into Coos Bay; by killing and injuring aquatic life through ship-animal collisions (vessel strikes) and beaching (stranding) of animals in the vessels' wakes; and by permanently removing coastal riparian vegetation along Coos Bay that is an essential component of the food chain for fish and aquatic life.

The proposed project would also violate Oregon's water quality standard for temperature by removing riparian vegetation that shades streams, causing stream heating. The proposed project would violate Oregon's water quality standard for turbidity by causing a more than 10% increase in natural turbidity levels in Coos Bay and stream segments impacted by pipeline installations. The proposed action would also impair beneficial uses to be protected in the

Rogue, Umpqua and South Coast Basins by engaging in blasting activities that will adversely impact surface water and groundwater used for drinking, and by impairing commercial and recreational fishing in estuaries and adjacent marine waters in the South Coast Basin.

Below, we summarize deficiencies in the discussion of the terminal's impacts on water quality. We separately discuss the pipeline's impacts on water quality in the following sections.

1. The DEIS understates the impacts to Coos Bay

According to the DEIS, the potential impacts associated with the construction of the Jordan Cove LNG Project and the resulting LNG carrier traffic are "related primarily to Project-related dredging, stormwater management, carrier travel, and carrier water use." DEIS at 4-83. Specifically, the project will result in "increases in turbidity, suspended and deposited sediment, bottom and shoreline erosion, toxic substance releases, and water temperature changes." DEIS at 4-83. FERC's analysis and summary of the impacts this project will have on Coos Bay, its water quality, and the plants, fish, and wildlife that rely on the Bay, however, fails to address the scope and significance of the harm this project will cause.

Coos Bay is the extensive estuary of the Coos River. Occupying approximately 20 square miles, the bay is the second largest drowned river valley on the Oregon Coast. Tidelands cover approximately 4,569 acres including 2,738 acres of tidal marsh and 1,400 acres of eelgrass beds. Its primary features include the main, expansive bay, an extensive arch of water around a peninsula, and major arms—South Slough, near the entrance of the bay, Jordan Cove, at the heart of the bay, and Haynes Inlet, which extends northeasterly from the main body of the bay.

The natural environment of the Coos estuary supports a diversity of plants and animals. The extensive shallow tidal flats provide habitat for shellfish as well as feeding and spawning habitat for many native fish. The Coos Bay supports a variety of beneficial uses as designated in the South Coast Basin as a whole.[98] These include fish and aquatic life, wildlife & hunting, fishing, boating, water contact recreation, aesthetic quality, and commercial navigation & transportation.

Coos Bay is central to Oregon's commercial fishing industry, whose economic contribution is equivalent to about 10,000 jobs. Economic contributions from commercial fishing go beyond harvesting and seafood-processing, and include visitors and tourism, boat building and gear manufacturing, safety, research, and education.[99] Recreational fisheries, including shellfish harvest and crabbing, are also important resources in Coos Bay. Several of the most important shellfish beds are located near the LNG transit route along the edge of the North Spit (western side of lower Coos Bay).

Both Coos Bay and the Coos River are water quality impaired for different pollutants, including but not limited to temperature, sedimentation, and toxics such as lead.

[98] *See* Table 300A (OAR 340-041-0300).
[99] *See* Oregon Commercial Fishing Industry Year 2016 Economic Activity Summary at 5 (April 2017).

Table 3. 303(d) Listings for Streams Crossed by Pacific Connector Pipeline in the South Coast Basin – Coos Subbasin[100]

Waterbody Crossed by Pipeline	Dissolved Oxygen	Habitat Modification	Temperature	Biological Criteria	Sedimentation	Toxics
Coos Bay					X	X
Coos River			X		X	

Coos Bay and the Coos River support salmonid species, including Oregon Coast coho (*Oncorhynchus kisutch*), winter steelhead (*Oncorhynchus mykiss irideus*), fall Chinook salmon (*Oncorhynchus tshawytscha*), and coastal cutthroat trout (*Oncorhynchus clarki clarki*).[101] Coos Bay and the Coos River support ESA-listed species, including but not limited to Oregon Coast coho and green sturgeon.

Construction of the marine slip would require excavating 38-acres from uplands. The slip and access channel combined would equal 60-acres and result in the permanent loss of 14.5-acres of shallow subtidal and intertidal habitat, 0.6-acres of estuarine saltmarsh habitat, and 1.9 acres of submerged aquatic vegetation habitat. Additionally, the applicants propose to dredge 5.7 million cubic yards of material to create the slip basin and access channel. Dredged material would be disposed of at the LNG terminal, Roseburg Forest Products Site, South Dunes Site, or Kentuck Site. Dredging for the temporary berth would require dredging approximately 45,000 cubic yards of material. Dredging of the existing navigation channel would remove 700,000 cubic yards of material and would construct a temporary pipeline on the bottom of the channel over 8.3 miles to remove the dredged material. Widening of the Transpacific Parkway/Highway 101 intersection would require permanently filling in 0.51 acres of intertidal habitat. Future maintenance dredging at the slip, access channel, and navigation channel (NRI areas) would require dredging of between 34,600 – 37,700 cubic yards of material annually and additional dredging of the navigation channel of between 27,900 – 49,800 cubic yards of material every three years.[102]

By constructing the Kentuck mitigation site, applicants propose to reconstruct and enhance 100-acres of tide channels, mudflats, saltmarsh, and freshwater wetlands. At the eelgrass mitigation site, the applicants propose establishing approximately 9-acres of eelgrass beds at different densities.

Maintenance dredging of the access channel, marine slip, and NRI area will involve dredging between 34,600 cubic yards and 37,700 cubic yards of material from the access channel and slip every year and dredging between 27,900 cubic yards and 49,800 cubic yards of material from the NRI area every three years.

[100] Oregon's 2012 Integrated Report Assessment Database and 303(d) list. Oregon DEQ. https://www.deq.state.or.us/wq/assessment/rpt2012/search.asp.
[101] Salmonids in the Lower Coos Watershed. Partnership for Coastal Watersheds. http://www.partnershipforcoastalwatersheds.org/salmonids-in-the-lower-coos-watershed/.
[102] U.S. Army Corps of Engineers. Public Notice Application for Permit and to Alter Federally Authorized Projects. 60-day notice. NWP-2017-41. 22 May 2018. P. 3-6.

a. Turbidity and Sedimentation

The DEIS acknowledges that "[d]redging and construction activities at the Jordan Cove LNG Project would result in temporary increases in turbidity and sedimentation in Coos Bay." DEIS, 4-83. FERC states that "[d]redging activity, primarily associated with slip, access channel, temporary material barge berth, MOF, and marine waterway modifications would be the major sources of turbidity and suspended sediment in Coos Bay." DEIS, 4-83. Development of the proposed Slip and Access Channel would require the excavation and dredging of approximately 5.70 million cubic yards (mcy) of material. Jordan Cove's Dredge Material Management Plan ("DMMP") describes three potential dredging methodologies, clamshell, hydraulic cutter-head, hydraulic hopper dredging, but acknowledges that the final dredging methods would depend on the equipment availability and the contractors' individual experience. *See* DEIS, 4-84.

According to FERC, Jordan Cove's models to estimate the range of turbidity and suspended sediment that would result from Project-related dredging showed "that constructing the access channel via mechanical dredging would result in a maximum concentration of turbidity of 600 to 6,000 mg/l depending on tidal velocity. " DEIS, 8-84. A second model, addressing suspended sediment concentrations from the proposed dredging operations concludes that "[c]onstructing the slip and access channel would result in suspended sediment that would exceed about 20 mg/l over background levels within about 0.2 to 0.3 mile of the dredging site and exceed about 500 mg/l within about 0.1 mile with either dredging method (clamshell or cutter suction dredge)."

In addition, turbidity models for both construction and maintenance of the four Marine Waterway Modifications areas showed "suspended sediment levels would be similar to those modeled for the access channel, but distribution of sediment plumes would be more extensive." DEIS, 8-84. There, FERC notes that "the overall maximum distribution of areas over background suspended sediment (about 20 mg/l) would . . . average[e] about 1.2 miles from the specific active dredging site of the four channel expansion areas with any dredging methods." DEIS, 8-84 (internal citation omitted). "Turbidity levels and distribution would be similar for both construction or maintenance dredging." DEIS 8-84.

Based on this information, Oregon DEQ concluded that "[t]he modeling confirmed turbidity exceeding 10 NTU above background levels extending a total of more than one mile above and below the Navigational Reliability Improvement dredge locations" and "confirmed elevated but comparatively localized turbidity plumes at the Slip, Access Channel, and eelgrass mitigation dredge locations." As a result, DEQ determined that these activities will violate Oregon's water quality standards.

However, a review of the hydrodynamic and sediment modeling studies reveals that:

> All but one of the studies conducted by Moffat & Nichol rely on the results of two-dimensional model simulations that are inherently incapable of representing the dynamics required to assess impacts on water quality in Coos Bay… All studies were critically

> limited in temporal scope representing a small subset of the conditions exhibited in the system.[103]

Specifically regarding the potential for increased turbidity and sediment impacts from proposed activities related to construction and operation of the terminal (JCEP), the Turbidity Analysis Memo (M&N 2017c) uses a two-dimensional model with significant limitations. For example, the study conditions were not described, the applicants did not provide the number of sediment size classes, and initial or boundary conditions for the system were not reported. Additionally, model calibration and validation were also not included. FERC cannot rely upon inaccurate and narrow two-dimensional modeling provided by the applicant to assess the impacts to water quality.

The applicants propose to install pipeline through Coos Bay over a 7-mile section, sidecasting material in the water without proposed turbidity control measures. After the pipeline is placed in the trench, the sidecast material will be used to backfill the trench. This activity in the waters of Coos Bay and the resulting suspension of large volumes of silty material over a long duration, will potentially result in exceedances of Oregon's turbidity standard. The DEIS fails to address these impacts or

The DEIS does not include any discussion of alternative methods for dredging and containment of suspended sediments to meet the turbidity standard and prevent distribution of fine and/or contaminated material. The applicant's response discusses alternatives to the pipeline route, but did not provide a discussion of alternative methods for the pipeline trench dredging and containment of suspended settlement that would meet the turbidity standard or the allowable exceedance.

In addition, FERC fails to adequately address the cumulative impacts of the many other elements of the project that will increase sediment in the Bay. Instead, the DEIS briefly examines each potential source of additional sediment in the Bay from the project and generally concludes that each will not be significant in and of itself. For example, the DEIS notes that "[p]ropeller wash from LNG carriers and tug boats associated with the Project, as well as ship wakes (waves) breaking on shore, could increase erosion along the shoreline and resuspend loose sediment along the shallow shoreline area, resulting in temporary increases of turbidity and sedimentation in the bay, both of which would affect water quality." DEIS, 4-86. The DEIS, however, concludes these impacts would be limited in time or location. DEIS, 4-86. At no point does FERC attempt to quantify the overall effect or otherwise examine the total impact on the Bay from these cumulative increases in sediment and disturbances. As a result, the DEIS effectively dismisses these activities as inconsequential without explaining the overall impact.

[103] Lopez, Jesse. Assessment of hydrodynamic studies by Moffat & Nichol for the Jordan Cove Liquefied Natural Gas Terminal Project. 1 July 2018.

b. Stormwater Management

Although FERC recognizes that "[p]roject-related fluids that enter Coos Bay could affect state water quality standards" and that stormwater runoff is part of this problem, the DEIS largely fails to address this issue. FERC seems to rely exclusively on the potential state-issued Clean Water Permits that would regulate the discharge of stormwater to avoid addressing the potential impacts of the increased stormwater discharges from the facility. Yet, as FERC notes "stormwater runoff could transport sediment and hazardous materials into Coos Bay" and "[t]he introduction of sediment into Coos Bay would increase turbidity and sedimentation as discussed above and the introduction of hazardous materials would affect local water quality." FERC must address these impacts in the EIS.

Stormwater runoff is one of the largest, if not *the* largest, threats to water quality in Oregon. In addition to carrying "conventional" pollutants (*e.g.*, increased temperature, pH, low dissolved oxygen, and turbidity), stormwater runoff also contains large loads of toxic pollutants such as heavy metals, oil and grease, pesticides, and organic compounds. Stormwater runoff from residential, commercial, and industrial areas is responsible for 21 percent of impaired lakes and 45 percent of impaired estuaries in the United States. These impacts are caused by both the types of materials carried in runoff and the quantity of runoff, as a high volume of flow contributes to erosion and sedimentation, and affects aquatic habitats.

First, FERC must address the potential impact stormwater runoff will have during the construction of the terminal and related facilities. Despite the potential, significant impacts FERC appears to dismiss any possible effects from stormwater discharges because such discharges must be covered by a state-issued Clean Water Act permit. This assumption is faulty for three reasons.

To begin with, there is no assurance that the applicants will apply for or be granted such a permit. Indeed, the history of this project shows that the applicant has not demonstrated that it will submit a proper application for the required NPDES 1200-C application. In 2010, the applicant applied for the permit, and DEQ notified the applicants that critical details of long-term stormwater management are required. Specifically, DEQ requested information related to runoff from all impervious areas at terminal and pipeline facilities, docks, structures, pavements, roadways, and access and storage areas. The applicants did not provide an adequately detailed stormwater management plan including specifications for proposed treatment facilities sized to handle runoff from all contributing impervious surfaces. To date, the applicant has not reapplied for a permit.

In addition, given the known and potential soil contamination at various locations that would be disturbed for site construction, a stormwater management plan must be individually developed for each construction location, accounting for contaminants at each site, and adopting measures to ensure that contaminants are not transported to the shoreline or released into the waters of Coos Bay and nearby wetlands. Indeed, there are several highly contaminated areas within the project that warrant specific attention and analysis.

Both the Ingram Yard property and the location of the proposed South Dunes site on the former Weyerhaeuser North Bend Containerboard Mill are listed in the DEQ's Environmental Cleanup Site Information (ECSI). The Ingram Yard property (ECSI 4704) was used for spreading of contaminated materials from the late 1970s to 1994 and contains "low levels of potentially bioaccumulating chemicals and must not be placed in waters of the state."[104] More recently, during the construction of the Industrial Wastewater Pipeline by Jordan Cove, the contractor discovered black soils in March 2015 on the site. The results of the sampling confirmed that the black soil contained contaminants, including but not limited to, mercury, arsenic, dioxins, and petroleum products.[105]

Photo 1. Black soils discovered during construction of the JCEP IWP Phase 1 Project.

IWP Phase 1A & 1B Construction, Black Soil Summary Report, Jordan Cove Energy Project. 15 April 2015. P. 1.

Additionally, the South Dunes site is also listed on the ECSI database (ECSI 1083). This site is also part of the former Weyerhaeuser North Bend Containerboard Mill. A 2007 Environmental Site Assessment commissioned by Jordan Cove found:

"Contaminants were detected at several locations across the site. Samples collected within the black ashy mill waste typically had higher concentrations of contaminants than those taken in sand. VOCs and tributyltin were not detected. Detected levels of PAHs and TPH were below state and federal guidelines. Chromium was detected in one sample in test pit TP-7 above the SSL. Arsenic was detected in all samples analyzed. The level of arsenic is below the background levels with the exception of test pit TP-7. Dioxins and furans were detected throughout the site at levels below the PRG for individual congeners. The TEQ value for test pit TP-10 at a depth of 2 ft is above the equivalent PRG. PES also reported TEQ values above the equivalent PRG. Although the value is above federal guidelines for individual samples, the statistical level for the site is within state requirements."[106]

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[104] Oregon Department of Environmental Quality. Weyerhaeuser – Ingram Yard. Environmental Cleanup Site Information Database. Available online at http://www.deq.state.or.us/Webdocs/Forms/Output/FPController.ashx?SourceId=4704&SourceIdType=11.

[105] IWP Phase 1A & 1B Construction, Black Soil Summary Report, Jordan Cove Energy Project. 15 April 2015. Available online at http://www.deq.state.or.us/Webdocs/Controls/Output/PdfHandler.ashx?p=0522588a-0b10-4e07-9705-599d39399d8dpdf&s=Black%20Soil%20Summary%20Report.pdf . P. 2.

[106] Jordan Cove Task Order No. 8 Phase II Environmental Site Assessment Proposed Liquefied Natural Gas Terminal North Bend, Oregon. 16 January 2007. Available online at http://www.deq.state.or.us/Webdocs/Controls/Output/PdfHandler.ashx?p=001761ee-a0de-4084-a735-1098e00fc023.pdf&s=JCEPTaskOrder8GRIPhase2ESA(1-2007).pdf . P. 6.

According to a 2004 Phase I Environmental Assessment of the site prepared for Weyerhaeuser, the report states that chemicals were used at the mill, including but not limited to biocides, resins, alum, mineral spirits, petroleum distillates, and other cleaning agents. Boiler blowdown containing chemicals may have been discharged into a septic drain field. Compressor condensate may also have been released at the site.[107]

The map below is based on aerial imagery from September 2006 and indicates the area of the site that was not included in DEQ's "no further action" determination.

Weyerhaeuser North Bend Containerboard Mill. ECSI 1083. Oregon Department of Environmental Quality.

Both the Ingram Yard and South Dunes sites (ECSI 4704 and 1083) are listed as "Partial No Further Action" as of 2006. The DEQ reports acknowledge that the recommendation for no further action is contingent upon there being no "new or previously undisclosed information" becoming available. Further, as demonstrated by the map above, there are also locations within the site that are not included within the "Partial No Further Action" finding that could be impacted by the applicant's proposed activities.

Additionally, on December 16, 2014, Barbara Gimlin, former Environmental Inspector at the Jordan Cove LNG terminal site and employee of SHN Consulting, submitted testimony to FERC regarding the discovery of contaminants at the site during a March 2014 exploratory test program. Ms. Gimlin describes her knowledge of discovery of contaminated soils along the Jordan Cove shoreline during a September 2013 cultural resources survey by Southern Oregon

[107] LEVEL I ENVIRONMENTAL SITE ASSESSMENT WEYERHAEUSER COMPANY HORSEFALL BEACH ROAD NORTH BEND, OREGON DELTA PROJECT NO. E003-627-2. June 2004. Available online at http://www.deq.state.or.us/Webdocs/Controls/Output/PdfHandler.ashx?p=02f102a1-f089-494a-9ca9-dea5d52fdb7dpdf&s=DeltaLevel1ESA(6-2004).pdf . P. 8.

University Laboratory of Anthropology. Ms. Gimlin then describes her personal observations of excavations at the site exposing potential contaminants including "black soils (north to south in Ingram Yard, including near the shoreline), bright yellow granulated/powder found in clumps of varying sizes, gray gummy material found in clumps (likely related to hydraulic drilling conducted by GRI), and the exposure of an underground concrete storage tank punched through by heavy equipment with unknown liquid inside." These exposures occurred during the March 2014 Kiewit test program.[108]

The information provided by Gimlin, in combination with the documented discovery of "black soils" by Jordan Cove in 2015, should be considered "new or previously undisclosed information" "which warrants further investigation." Given that the project calls for excavating and moving large amounts of soils from one area to another, to be used as fill for the South Dunes site and other construction areas, the extent and condition of the contamination at these sites must be fully investigated, disclosed, and addressed to ensure contaminants do not reach waterways.

Finally, the DEIS fails to address the pollutants that may be discharged even if the applicant applies for, is granted, and operates in compliance with a 1200-C NPDES permit. In general, the 1200-C permit requires permittees to comply with a set of best management practices that will reduce or eliminate the discharge of pollutants during construction. As a result, it is possible that there will be discharges of pollutants that will occur during construction, even if the applicant complies with the permit. The DEIS must address the potential impact of these discharges.

Second, the DEIS fails to address the potential impacts of stormwater discharges from the facility if it is built and operated. Instead, the DEIS devotes two sentences to discussing the possible use of an oil-water separator to minimize the potential discharge of oil from the facility. DEIS, 4-87. The DEIS fails to address the potential pollutants that may be discharged from the facility once in operation. In particular, stormwater runoff from roads, and similar industrial facilities, contains "a complex mixture" of chemical pollutants from motor vehicles "in the form of exhaust, leaking crankcase oil and wearing of [brake pads and tires]." Julann A. Spromberg et al., *Coho salmon spawner mortality in western US urban watersheds: biolinfiltration prevents lethal storm water impacts*, 53 J. Applied Ecology 398, 405 (2016). Pollution from stormwater runoff degrades water quality, impairs beneficial uses, and damages aquatic ecosystems. Of particular concern in Oregon, stormwater runoff from developed areas has been directly linked to recurring, acute mortality events in salmonid populations, the recurrence of which is known as "mortality syndrome" or "urban stream syndrome." Spromberg, *supra*, at 405. A study on the effects of salmonid exposure to highway stormwater runoff revealed that, regardless of variations rainfall conditions and water chemistry, urban highway runoff was "100% lethal to otherwise healthy adult [salmonids]." *Id*. at 402. Adult salmonids exposed to untreated runoff became symptomatic or died within hours of exposure to unfiltered runoff, and those that survived the initial exposure died within 24 hours. *Id.* at 402-404.

Here, During operation, the LNG terminal would cover about 100 acres with impervious surface

[108] Gimlin, Barbara. Public Comment on Jordan Cove Energy Project Draft EIS by Barbara Gimlin. 12 February 2015. FERC Docket No. CP13-483-000.

materials, such as asphalt, concrete, and compacted gravel. FERC must catalog the potential pollutants that may be found at the facility, determine the potential those pollutants will be discharged, and then address the impact of these discharges on the Bay.
Stormwater from the Jordan Cove site will be discharged into Coos Bay. The FEIS says the water will be tested before being discharged, but does not say what contaminants will be tested for and what levels will be allowed to be discharged. There is no indication in the FEIS that FERC recognizes that stormwater carries heavy metals, petroleum products and brake chemicals and compounds that are deleterious to fish and fish habitat.

NMFS FEIS Comments at 2 (June 8, 2009). The current DEIS, like the previous documents, makes no mention of the potential for heavy metals. The DEIS states that stormwater in areas "potentially contaminated with oil and grease" will be collected, tested, and treated, but nothing indicates that what contaminants will be tested for, whether this testing will include heavy metals, or whether the treatment will be effective for the full range of possible contaminants. *See, e.g.*, 4-87. Nor is there any discussion of whether stormwater that is not potentially contaminated with oil and grease has the potential to be contaminated with other pollutants.Without this analysis the DEIS will not present an accurate picture of the potential impact of the project on Coos Bay.

c. Spills or Leaks of Hazardous Materials

Similarly, the DEIS notes that "an inadvertent release of construction equipment–related fluids (fuel storage, equipment refueling, and equipment maintenance) could adversely affect water quality in Coos Bay." However, the DEIS concludes that "adherence to the SPCC Plan would greatly reduce the likelihood of such impacts, as well as minimize the resulting impacts should a spill occur" and "[a]s such, significant adverse impacts on surface water due to contamination from hazardous material spills or releases are not expected to occur." DEIS, 4-88. This analysis is inadequate for four reasons. First, the DEIS fails to explain what hazardous material will be present, in what amounts, where and how they will be stored, and how and when they will be used during the construction of the terminal that may be spilled. This information is essential to understanding the risk presented by the construction phase of this project. Second, the DEIS fails to provide any explanation of the potential consequences of a spill of these materials. Third, the DEIS fails to offer any explanation of why the proposed SPCC is adequate to mitigate against the risk presented from a potential spill. For example, the DEIS fails to explain why there is any certainty the applicant will, in fact, implement and comply with the proposed plan. Finally, except for a short discussion of risks associated with the spill of LNG, the DEIS is silent concerning the potential for the spill of hazardous materials from the facility if it is constructed and operated. The DEIS must provide a complete analysis of these risks.

d. Invasive Species

The DEIS acknowledges that "[w]hile berthed, LNG carriers would release ballast water and engine cooling water into the marine slip." DEIS 4-88. Without saying so, the DEIS appears to acknowledge that this ballast water could potentially introduce nonnative and invasive species into Coos Bay. Despite this, the DEIS contains no discussion of this potential risk from this project. Instead, the DEIS explains, at length, the standards that may, or may not, apply with

vessels that will use the terminal. *See* DEIS, 4-88 - 89. What is absent from this discussion is any analysis of whether these measures will prevent the introduction of nonnative or invasive species to the Bay. Also missing from the discussion is any analysis of what species may be introduced, the environmental impact of such release, and the additional steps the applicant could and should take to avoid such a result. Again because the DEIS does not, and likely cannot, conclude that the measures outlined in the discussion will prevent the introduction of nonnative or invasive species, FERC must address the potential consequences of such a release.

e. Temperature

Jordan Cove states that water will be discharged from engine cooling at 3 degrees C (5.4 degrees F) above ambient water temperatures. Modeling of mixing zones and dissipation of water temperature increases were likewise based on this assumed 3 degrees of increase. DEIS, 4-91. However, Jordan Cove did not provide any information regarding the source of this assumed temperature of cooling water. Nothing in the JPA or FERC filings appears to support the assertion that engine cooling water will be only 3 degrees Celsius higher than the average ambient Coos Bay water temperatures of 10 degrees Celsius. In fact, FERC's FEIS for the Bradwood LNG Project states that:

Cooling water discharged from a 150,000 m3 steam powered LNG carrier could initially be 19.4ºF higher than ambient water temperatures" as compared to seasonally ranging ambient temperatures in the Columbia River of 42 to 68ºF.[109]

Oregon LNG, also proposed for the Columbia River, estimated that "according to industry sources, the water taken for cooling the vessel's machinery is warmed by 6 to 9 degrees Celsius at the point of discharge" and that the average for diesel-powered LNG vessels would be 8.9ºC above ambient water temperatures.[110]And according to EPA, cooling water can reach high temperatures with the "thermal difference between seawater intake and discharge typically ranging from 5ºC to 25ºC, with maximum temperatures reaching 140ºC."[111] Given these widely varying ranges of cooling water discharge temperatures, FERC must address the potential worst-case scenario and analyze the maximum potential temperature increases from diesel and steam powered vessels. FERC must further require that the applicants provide an accurate number of shipments that would occur using 148,000 cubic meter ships (the maximum size that would be allowed to transit Coos Bay) to export the full proposed natural gas export amounts (0.9 Bcf/d according to FERC, 1.2 Bcf/d according to DOE, 1.55 Bcf/d according to NEB and DOE).

f. Dissolved Oxygen

Depletion of DO in waterways is a significant pollution problem, affecting fish and aquatic species in a variety of ways at different life stages and life processes. DO levels can be influenced by several factors, including pH changes, temperature increases, decaying material or algae blooms, and sedimentation.

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[109] Bradwood LNG Project FEIS at 4-85 (2008).
[110] Oregon LNG, CH2MHill Technical Memorandum, Appendix F Cooling Water Discharge Analysis, at 2 (Sept. 10, 2008).
[111] EPA, Final 2013 Vessel General Permit Fact Sheet at 133.

The proposed action involves dredging that will decrease dissolved oxygen in Coos Bay because dredging increases the oxygen demand by disturbing sediments and releasing oxygen-demanding materials (decomposing organic materials contained within the sediments). Oregon DEQ previously expressed strong concerns about lowered dissolved oxygen levels that the proposed action would cause. In its 2008 DEIS comments, DEQ stated:

Total organic carbon, acid volatile sulfides, and nutrient sampling should be conducted to quantify the potential for adverse impact to oxygen levels caused by resuspension of sediments during dredging activities. Impacts should then be evaluated utilizing hydrodynamic modeling which can capture real time tidal conditions and simulate real time tidal exchanges during the period of the project.[112]

The DEIS fails to address the potential impacts to dissolved oxygen levels in the bay from the proposed activities, particularly the dredging and other sediment-disturbing activities. The applicant's hydrodynamic modeling memo concludes that the project will cause changes in currents, but does not evaluate the impacts to oxygen levels caused by dredging or real time tidal exchanges during the project period.[113] As noted in its comments on the 2014 DEIS, "these data should be utilized to quantify the potential for adverse impact to oxygen levels caused by resuspension of sediments during dredging activities."[114]

FERC must perform an independent sediment transport analysis consistent with actual conditions in the Coos Bay estuary. In particular, FERC must consider that construction dredging lowers dissolved oxygen levels in estuarine waters not only by re-suspending sediment, but by deepening an estuarine channel where hypoxic conditions can occur due to reduced circulation in deeper waters. Once the dredging is completed, there also is the potential for reduced circulation in the deeper portions of the approach channel. In combination with other factors, reduced circulation has the potential to result in lower dissolved oxygen levels in the deeper waters. The applicants must prove that actual hydrodynamic conditions in Coos Bay would not result in a 0.1 mg/L decrease in dissolved oxygen levels caused by reduced circulation in the deeper channel.[115]

2. The Application Fails to Incorporate Practicable Steps that will Minimize Potential Adverse Impacts of the Discharge on the Aquatic Ecosystem.

Under 40 C.F.R. § 230.10(d):

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[112] State of Oregon 2008 DEIS comments at 63.
[113] Hydrodynamic Modeling Memorandum at 29.
[114] State of Oregon 2015 DEIS comments at 42.
[115] Further, as discussed in more detail in the Assessment of hydrodynamic studies by Moffat & Nichol for the Jordan Cove Liquefied Natural Gas Terminal Project, the applicants rely on two-dimensional models that "are inherently incapable of representing the dynamics required to assess impacts on water quality in Coos Bay." The applicants utilized a salinity study as a proxy for water quality variables including dissolved oxygen, pH, temperature, and turbidity. However, as described in Appendix 1, salinity is inherently different from these other variables.Lopez, Jesse. Assessment of hydrodynamic studies by Moffat & Nichol for the Jordan Cove Liquefied Natural Gas Terminal Project. 1 July 2018. P. 1.

Except as provided under section 404(b)(2), no discharge of dredged or fill material shall be permitted unless appropriate and practicable steps have been taken which will minimize potential adverse impacts of the discharge on the aquatic ecosystem.

a. Failure to Avoid Impacts

First and foremost, the application fails to demonstrate what efforts have been made to avoid impacts to wetlands. Instead, the DEIS focuses on explaining mitigation efforts to address impacts to wetlands and waters of the U.S.

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.

EPA, *Wetlands Compensatory Mitigation*, available at http://www.epa.gov/owow/wetlands/pdf/CMitigation.pdf.

The 1990 Memorandum of Agreement Between the Department of the Army and the Environmental Protection Agency describes the legal requirements:

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).

MOA, 1990 (emphasis added).

Jordan Cove flips this sequence on its head by siting the terminal and pipeline where it will have tremendous adverse impacts, but then attempting to mitigate those impacts. As the MOA states, compensatory mitigation may not be used as a method to reduce environmental impacts.

b. Failure to Adequately Identify and Explain Mitigation Plans

Second, the DEIS does not describe or explain proposed minimization and mitigation measures. FERC and the public must be able to identify the final plan for mitigation in order to evaluate its components. The public cannot possibly evaluate the effectiveness of any mitigation plans proposed by Jordan Cove without the specifics of the plans. Simply stating that Best Management Practices ("BMPs") will be used is insufficient for evaluation of mitigation measures specific to each site. This listing of BMPs to be used is inadequate for a proper analysis of the effectiveness of the proposed sediment control measures.

The mitigation plans lack, among other things:

- Specific information regarding the water quality and habitat impacts of the improvements to roads;
- Design specifics used to justify the incomplete ESC;
- An assessment of increase in impervious surfaces resulting from road improvements, and how surface flow runoff will be affected by said road improvements. The FERC should evaluate the effects of greater impervious areas and changes in storm water drainage dynamics resulting from road widening and construction, and also evaluate the potential from increased pollutants entering Henderson Marsh and Coos Bay from resulting increased storm water runoff;
- Analysis of the potential for releasing contaminants from the soil during road construction. The FERC should require Jordan Cove to provide a plan on dealing with any soil contaminants encountered during road construction activities and analyze the possible environmental effects from the release of any such contaminants.

The description of a general BMP without site-specific considerations is worthless to the public, and the FERC, for proper evaluation of the measures to be used for mitigation of environmental impacts caused by construction activities.

c. Failure to Compensate for Impacts to Wetlands

Third, even if Jordan Cove were properly avoiding adverse impacts, the mitigation does not adequately compensate for the damage. The prime estuarine salmon habitat that would be destroyed are irreplaceable. In addition, adequate mitigation must replace habitat values with "in-kind" and "in-place" habitat. The MOA 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.

MOA, 1990.

H. Impacts to the Oregon Dunes ecosystem.

1. Groundwater impacts

The Jordan Cove proposed LNG Terminal and Power Plant will require a tremendous amount of water for construction and operation, with 75,000 gallons per day for dust control and 595.5 million gallons of water for various other construction activities, including hydrostatic testing, as well as 71.5 million gallons of water annually for terminal operations. DEIS at 2-8. The DEIS confirms that Jordan Cove would need "a total of about 667 million gallons of water for construction and operation of the Jordan Cove LNG Project." *Id*. at 4-75. This water would be drawn from the aquifer that underlies the Oregon dunes ecosystem, which could adversely affect groundwater resources for the region:

Constructing and operating the Jordan Cove LNG Project could affect groundwater, because of the shallow depth to groundwater and the permeability of the overlying sands and gravels across the site. Site stabilization, excavation, pile driving, and the installation of permanent aboveground facilities could all affect groundwater. In addition to the permanent modification of site topography which could affect underlying groundwater characteristics (quantity, flow, and quality); an inadvertent release of equipment-related fluids, such as lubricating oil, gasoline, and diesel fuel, could affect groundwater. Installing piles to support the Jordan Cove LNG Project could create vertical conduits further affecting underlying groundwater characteristics. Additionally, these conduits could also transmit contaminants.

DEIS at 4-76. Furthermore, runoff from the construction and impervious surfaces of the site could introduce contaminants into the groundwater, causing further harm to this important public trust resource:

During operation, the LNG terminal would cover about 100 acres with impervious surface materials, such as asphalt, concrete, and compacted gravel. The conversion of pervious surface to impervious surface can typically cause a decrease in the local recharge of shallow groundwater (by converting infiltration to runoff); however, Jordan Cove would capture most runoff for infiltration into the ground on-site with only high flows expected to run off directly to the bay. Additionally, in comparison to the total 12,480-acre area of the Dune-Sand Aquifer, this 0.8 percent area reduction would not likely result in an adverse effect on the level of groundwater in the area. Through use of the measures discussed above, we conclude that impacts on groundwater resources at the Jordan Cove LNG Project would be minimized to the extent practicable and would not be significant.

DEIS at 4-77. However, while the DEIS acknowledges the potential for groundwater reduction and contamination, it does not provide an analysis of the environmental harm that is likely to occur from these impacts. There is, for example, no analysis of the harm to species from the loss of wetland and lake habitat from groundwater withdrawals, and no discussion of the long-term impacts that contamination of the groundwater would have on sensitive coastal species, or to the Coos Bay community (including fisheries). The DEIS therefore does not provide the hard look

that NEPA requires, nor does it appear to provide an analysis of alternatives, including ways to reduce water use and avoid groundwater contamination.

Importantly, while the 2015 DEIS for the project stated that "Water levels at the [Coos Bay North Bend Water Board] well that is closest to the LNG terminal (well #46 located 3,500 feet north) may drop as much as 0.5 feet," 2015 DEIS 4-347, the current DEIS continues to state that the closest well would be 3,500 feet away, but fails to acknowledge the potential for a reduction in the water level of that well, and fails to consider what that drop would do to local lakes and wetlands, including the wetlands in the proposed mitigation site close to the well. In scoping, FERC was asked to consider the impact of using these wells on the Oregon Dunes ecosystem, but the DEIS failed to address this issue, in clear violation of NEPA.

2. Impacts to species from water withdrawals

Water withdrawal from the coastal Dunes-Sands aquifer for the project will likely cause harm to species in the area, which the DEIS failed to adequately address. Importantly, this project is immediately adjacent to the Oregon Dunes National Recreation Area, which is a sensitive ecosystem that contains Globally Significant Plant Communities, including rare vegetation dependent on wetlands, pools and lakes. The water withdrawals for the adjacent Jordan Cove project will adversely impact the Dune's plant, fish and wildlife ecosystems.

Studies of the Oregon Dunes have found that groundwater wells near the southern edge of the Dunes could be drying up the natural lakes and wetlands in the Dunes. FERC failed to consider the findings of this study, even though it was submitted during scoping:

The well field in the Horsefall area, at the south end of the Recreation Area, is being studied to monitor changes in groundwater levels, and its potential effects on wetlands. Sustained pumping of groundwater may alter extent and composition of seasonal or perennially-flooded wetlands. If dewatering is sustained over a period of years, shallow lakes may be replaced by dry or seasonally-wet associations typical of deflation plains. Because sand is highly permeable, excessive pumping may also cause pollution of groundwater by infiltration of salt water, sewage, fertilizers and pulp mill wastes.[116]

The "south end of the Recreation Area" is adjacent to the proposed Jordan Cove terminal. Horsfall area is less than one-mile north of Jordan Cove. Horsfall and Beale Lake are protected specifically for wildlife within the Dunes, yet groundwater used to supply the water needs of this project could degrade these important habitat areas.

The Dune Plant Study details some valuable plants that could be lost:

These lakes are unique because of their large size and extensive aquatic bed and emergent plant associations, dominated by pond lily, floating-leaved pondweed, water-shield and hardstem bulrush. Several lakes contain water clubrush, an uncommon plant species, and extensive

[116] USDA Forest Service, Plant Associations of the Oregon Dunes National Recreation Area at 13 (1998) (available at https://ecoshare.info/uploads/publications/PlantAssociationsOfTheOregonDunes.pdf) (the "Dune Plant Study").

populations of the insectivorous bladderwort. The lakes host large concentrations of waterfowl during the migration season.[117]

The Dune Plant Study warns: "Groundwater pumping in the wellfield in the Horsfall area may be lowering the water table, threatening the long-term viability of these lakes." This area would be used for to supply the Jordan Cove Project. The study further notes:

The groundwater drains into lakes, streams, North Slough and the ocean. Winter precipitation elevates the watertable… The seasonal rise in water table also causes vernal pools to form… These pools are teeming with invertebrates and are temporary sources of food and breeding grounds for amphibians and migrating waterfowl.… Groundwater pumping on the North Spit of Coos Bay has raised concerns about year-round depression of the water table, dewatering valuable wildlife habitat and possibly altering plant succession at these sites.

The DEIS, however, fails to address the impacts to invertebrates, amphibians and migrating waterfowl from the groundwater pumping attributable to Jordan Cove. While the study recommends that "Groundwater pumping in the vicinity of Horsfall Lake and Beale Lake needs to be monitored to determine if it is detrimental to the plant associations there," no monitoring was offered in the DEIS. As such, FERC has clearly failed to provide the hard look that NEPA requires.

The Dune Plant Study further emphasizes that "Pumping of groundwater for municipal use may be causing the water table to drop in some areas of the Recreation Area, and may hasten invasion of upland species." Therefore, the millions of gallons needed for the Jordan Cove project will further exacerbate the invasion of upland species, yet the DEIS makes no mention of this adverse environmental impact.

Moreover, the proposed mitigation for impacts to the dune ecosystem is inadequate. While the prior 2015 DEIS included a Wildlife Habitat Mitigation Plan, no such plan appears to have been included with the current DEIS. It therefore remains unclear whether Jordan Cove will still purchase 105 acres of Dunes to provide mitigation for the project, as was previously proposed. Further, even if Jordan Cove does purchase lands for mitigation, it previously failed to ensure that it would restrict motorized recreation on the site. This is incredibly important, since most wildlife at the terminal site is threatened by motorized recreation. It also remains unclear whether Jordan Cove would allow for herbicides to be applied on mitigation parcels to control European beachgrass and Scotch boom and return areas to an unvegetated state. This method has the potential to pollute wetland sites, and to impact wildlife if not applied with the correct method and time of year. The DEIS failed to provide these details.
In sum, the Oregon Dunes is a critically important and unique habitat for plants and wildlife. The Dunes support rare and important plant communities, including some of the rarest and most endangered plant communities in Oregon. Large and intact examples of these plant communities are quite rare, with some ranked as threatened throughout their range. The Dune Plant Study study described several lakes, vernal pools, and native plant associations that are in danger due to groundwater pumping. Since the LNG Terminal and Power plant will use the groundwater from

[117] *Id*. at 8.

this area, the DEIS should have considered the impacts to these very sensitive, rare, and unique ecosystems adjacent to the Jordon Cove site. The failure to do so is a clear violation of NEPA.

3. Impacts to species from construction activities in the Dunes

Construction activities in the Oregon dune ecosystem will also harm species that rely on habitat in the area around Jordan Cove, including existing snowy plover habitat, a bird species protected under the Endangered Species Act.[118] The DEIS failed to address this harm.

According to the County land use applications for Jordan Cove, the proposed construction activities include stripping vegetation and placement of open sand along a portion of the backside of the ocean foredune in the northwest corner of Parcel W, as well as removal of invasive species (primarily Scotch broom) by hand or machinery along the access roads at the north end of the parcel. Land Use Application at 15-16.[119] These activities, along with the use of vehicles to access Parcel W, have the potential to harm snowy plovers and result in the loss of habitat if efforts are not undertaken to avoid disturbance of this sensitive species. Therefore, a snowy plover habitat mitigation plan must be submitted, which explains precisely how such activities will be undertaken, and what efforts will be made to minimize and mitigate any impacts to plover habitat. In fact, the Coos County Land Use Code makes it clear that "[a]ll permitted uses and activities must be consistent with a Snowy Plover habitat mitigation plan." *See* GC #5. While the Applicant has proposed activities that may affect snowy plover habitat, no such mitigation plan has been provided, and this issue was not addressed in the DEIS.

Of the Oregon sites surveyed in 2010, the Coos Bay North spit critical habitat unit had the highest number of documented adult plovers and the second highest number of breeding birds.[120] Clearly, this area is key to snowy plover conservation. Elements of habitat essential to the conservation of the snowy plover include sparsely vegetated interdune flats, sandy beach areas above and below the high-tide line with occasional surf-cast wrack supporting small invertebrates for plover foraging, and close proximity to tidally influenced estuarine areas.[121]

Threats to snowy plover habitat include disturbance by humans, vehicles and pets in important nesting and foraging areas, and encroachment of non-native invasive European beach grass on available nesting and foraging habitat.[122] In addition, the species is threatened by climate change induced sea-level rise and significant industrial development in Coos Bay generally, and specifically on the north spit. This habitat is incredibly important as a heavily used both historic and currently occupied habitat area. However, the habitat faces significant threats requiring special management. As the Fish and Wildlife Service has noted "small changes in the adult survival rate can have relatively large effects on population stability so the maintenance of quality overwintering habitat is important to conservation."[123]

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[118] Listed as threatened on March 5, 1993. 58 Fed. Reg. 12,864.
[119] *See* County File Nos. HBCU-15-05/FP-15-09/CD-15-152
[120] Lauten, D.J., K.A. Castelein, J.D. Farrar, A.A. Kotaich, and E.P. Gaines. *The Distribution and Reproductive Success of the Western Snowy Plover along the Oregon Coast – 2012* at 27, Table 3. Oregon Biodiversity Information Center (Dec. 21, 2012).
[121] 76 Fed. Reg. at 16,066.
[122] *Id.*
[123] 76 Fed. Reg. 16,048 (citing Nur et al. 1999 p.14).

The proposed activities on Parcel W (which is not discussed in the DEIS) have the potential to cause disturbance to plover habitat. The use of vehicles and machinery for vegetation management can result in loss of habitat through disturbance, and may introduce non-native beach grasses depending on the protocols employed to ensure that the equipment does not contain seeds. A snowy plover habitat mitigation plan is required to ensure that these impacts do not result in take of the species or the loss of plover habitat, and these impacts must be fully analyzed by FERC in order to provide the "hard look" that NEPA requires.

I. Impacts to Fish, Wildlife, and Sensitive Species

1. Harm from Tanker Traffic

At least 110-120 LNG carriers would visit the terminal each year, resulting in up to 240 tanker trip per year for the project. DEIS, 1-4. This is an increase over the prior proposal for Jordan Cove, and therefore the impacts of LNG tanker traffic will be even greater. Movement of these massive vessels will injure fish and aquatic life by ship-animal collisions (vessel strikes), beaching (stranding) of animals in the vessels' wakes, increased noise pollution, fish entrainment and cooling water discharge. The increase in tanker traffic, and the impacts it will have on species, including species listed under the ESA, are a direct and/or indirect consequence of the project, which must be fully considered by FERC in the EIS. *See Sierra Club v. Mainella*, 459 F.Supp.2d 76, 105 (D.D.C.2006) (holding that agencies must examine the indirect impacts of their actions where the impacts are "functionally inseparable" from activities for which the agency is granting the permit because they "may not take place" without the agency's approval of the permit). As set forth below, the DEIS fails to provide the "hard look" that NEPA requires on these impacts. *See Balt. Gas & Elec. Co. v. Nat. Res. Def. Council, Inc.*, 462 U.S. 87, 97 (1983) (NEPA obligates federal agencies to take a "hard look" at the environmental consequences of its actions).[124]

2. Strikes and Strandings by LNG Vessels

Ship strikes are a major cause of death for numerous marine species, including ESA-listed whales and turtles that would be affected by tanker traffic for Jordan Cove. While the DEIS acknowledges the risk of ship strikes, it fails to provide the rigorous analysis of the impacts to marine species that NEPA requires.

A 2003 report identified 292 confirmed or possible ship-whale strikes between 1975 and 2002, finding fin and humpback whales are the species most commonly found struck.[125] Sea turtles,

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[124] As part of this review, the agency must examine the indirect effects of a proposed project. 40 C.F.R. § 1508.8. "Indirect effects" are those that are "later in time or farther removed in distance," yet "reasonably foreseeable," *Dep't of Transp. v. Pub. Citizen*, 541 U.S. 752, 764 (2004), and include those "effects related to induced changes in … water and other natural systems, including ecosystems." 40 C.F.R. § 1508.8(b).

[125] Jensen, A.S. and G.K. Silber. 2003. Large Whale Ship Strike Database. U.S. Department of Commerce, NOAA Technical Memorandum. NMFS-OPR-25, 37 pp. Available at: https://www.greateratlantic.fisheries.noaa.gov/shipstrike/news/shipstrike03.pdf.

including protected Leatherback (Dermochelys coriacea),[126] Pacific green *sea turtles* (Chelonia mydas) and olive ridley *sea turtles* (Lepidochelys olivacea), are also struck by ships, though due to their small size there are few estimates of mortality. In its most recent Stock Assessment Report, National Marine Fisheries Service 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.[127] However, the number of documented ship strikes grossly underestimates actual incident and mortality numbers, as many of these animals sink, are scavenged, or are otherwise never seen.[128] 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.[129] Based on annual census records of Southern Resident killer whales, carcasses from confirmed deaths of known individuals are recovered only 6% of the time.[130]

Ship strikes involving large vessels are the "principal source of severe injuries to whales."[131] Most ship strikes to large whales result in death.[132] Ship strike-related mortality is a documented threat to endangered Pacific coast populations of endangered fin, humpback, blue, sperm, and killer whales, all of which may be harmed by LNG tanker traffic serving Jordan Cove.

In recent years, ship strikes have become an increasing problem for these critically endangered species along the Pacific Coast. For example, between 2001 and 2010, 12 blue whales were reported stranded due to vessel collisions.[133] And, in 1998, NMFS identified ship strikes as one of the primary threats to the endangered blue whale in the Pacific.[134]

Fin whales, which are routinely sighted in waters off the U.S. Pacific coast, were the most frequently struck species in the analysis conducted by Jensen and Silber (75 confirmed strikes,

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[126] In 2012, NMFS designated critical habitat for the leatherback, including nearshore areas around Coos Bay and areas that are part of the proposed LNG tanker routes. 77 Fed Reg 4170 (Jan. 2012).
[127] Caretta, J.V. et al. 2017. U.S. Pacific Marine Mammal Stock Assessments: 2016. Available at: https://repository.library.noaa.gov/view/noaa/14915.
[128] *Id*.
[129] 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. Available at https://onlinelibrary.wiley.com/doi/epdf/10.1111/j.1755-263X.2011.00168.x
[130] Fisheries and Oceans Canada. 2008. Recovery strategy for the northern and southern resident killer whales (Orcinus orca) in Canada. Fisheries and Oceans Canada, Ottawa, Canada. Available at: www.cbc.ca/bc/news/bc-081009-killer-whale-recovery-strategy.pdf; *see also* Kraus, S.D. et al. 2005. North Atlantic right whales in crisis. *Science* 309:561-562. Available at: http://www.sciencemag.org/content/309/5734/561 (estimating that only approximately 17 percent of ship struck North Atlantic right whale are actually detected).
[131] Laist, D.W., Knowlton, A.R., Mead, J.G., Collet, A.S. and Podesta, M., 2001, Collisions between ships and whales, *Marine Mammal Science*, 17(1): 35-75. Available at file:///C:/Users/JMargolis/Desktop/ORLNG/Attachments%20for%20DSL/shipstrike.pdf
[132] Jensen, A.S. and Silber, G.K., 2004, Large Whale Ship Strike Database. U.S. Department of Commerce, *NOAA Technical Memorandum*. NMFS-OPR-25. Available at https://www.greateratlantic.fisheries.noaa.gov/shipstrike/news/shipstrike03.pdf
[133] National Marine Fisheries Service. 2010. Southwest Regional Office, California Marine Mammal Stranding Network Database.
[134] National Marine Fisheries Service. 1998. Recovery plan for the blue whale (*Balaenoptera musculus*). Prepared by Reeves R.R., P.J. Clapham, R.L. Brownell, Jr., and G.K. Silber for the National Marine Fisheries Service, Silver Spring, MD.

26 percent of total strikes).[135] At least 18 fin whale mortalities and injuries due to ship strikes were conclusively documented off the coasts of California, Oregon, and Washington between 1993 and 2008.[136] In their examination of 130 whale strandings in Washington State from 1980-2006, Douglas *et al*. (2008) similarly found fin whales to be very susceptible to ship strikes.[137] The final NMFS recovery plan for fin whales ranks the threat posed by ship strikes as "potentially high."[138]

A spatial risk assessment was conducted in 2004 to identify areas where fin, humpback, and killer whales encounter areas of high shipping intensity.[139] The study found that relative risk was highest in confined areas (geographic bottlenecks), such as the mouth of the Coos Bay estuary where vessels would have to enter to reach the proposed facility. The study further found that the few known cases of collisions involving fin whales suggest that mortality due to ship strike for this species may already be approaching or even exceeding mortality limits under the most risk-averse management objectives.[140]

Other species, however, are also facing increased risk of harm from ship strikes. For example, the NMFS draft recovery plan for southern resident killer whales documents rare but increasing cases of collisions between ships and individuals of that distinct population segment,[141] which was listed as endangered in 2005.[142]

The DEIS, however, fails to provide a sufficient analysis of the potential harm from ship strikes. While it acknowledges the potential for harm, stating that "Potential direct effects of the Project could include injury and/or mortality due to ship-strikes," it provides no actual analysis of the potential harm, but rather states that "additional details on whale densities and potential for ship strikes will be provided in the pending BA." This is insufficient. Pursuant to 40 C.F.R. §1502.25(a), "[t]o the fullest extent possible, agencies shall prepare draft environmental impact statements concurrently with and integrated with environmental impact analysis and related surveys and studies required by the Fish and Wildlife Coordination Act (16 U.S.C. 661 et seq.), the National Historic Preservation Act of 1966 (16 U.S.C. 470 et seq.), the Endangered Species Act of 1973 (16 U.S.C. 1531 et seq.), and other environmental review laws and executive orders." The concurrency requirement for the NEPA and ESA process is essential for public involvement. There is no opportunity for public comment on the development of a Biological Assessment or Biological Opinion; therefore, it is only through the NEPA process that the public

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[135] Jensen, A.S. and G.K. Silber, *supra* note 37.
[136] National Marine Fisheries Service. 2010. Recovery plan for the fin whale (*Balaenoptera physalus*). National Marine Fisheries Service, Silver Spring, MD.
[137] Douglas, Annie B., *et al*., 2008, Incidence of ship strikes of large whales in Washington State, *Journal of the Marine Biological Association of the United Kingdom.* doi:10.1017/S0025315408000295 (available at https://www.cascadiaresearch.org/files/publications/Douglas_et_al_2008-Incidence_of_ship_strikes_of_large_whales.pdf).
[138] National Marine Fisheries Service. 2010. Recovery plan for the fin whale (*Balaenoptera physalus*). National Marine Fisheries Service, Silver Spring, MD. at I-26.
[139] Williams, R, O'Hara, P.J., 2010, Modelling ship strike risk to fin, humpback and killer whales in British Columbia, Canada, *Journal of Cetacean Research and Management,* 11:1-8.
[140] *Id*.
[141] National Marine Fisheries Service (NMFS). 2008. Recovery Plan for Southern Resident Killer Whales (*Orcinus orca*). National Marine Fisheries Service, Northwest Region, Protected Resources Division, Seattle, Washington.
[142] 70 Fed. Reg. 69903 (Nov. 18, 2005).

may comment on the impacts to listed species. Furthermore, in order to fully assess the cumulative impacts of the proposal as NEPA requires, all impacts must be fully vetted in the NEPA documents. *See Sierra Club v. FERC*, 867 F.3d 1357, 1374 (D.C. Cir. 2017) ("[T]he existence of permit requirements overseen by another federal agency or state permitting authority cannot substitute for a proper NEPA analysis."). FERC has therefore violated NEPA by failing to fully analyze these issues in the DEIS.

While the BA may eventually provide further information, that does not change the fact that the DEIS disregards and/or underestimates this increased risk to marine mammals, including protected species. The analysis in the DEIS fails to provide an accurate estimate of the risk by species per year and cumulatively over the life of the project. Rather, the DEIS merely claims that the project is not likely to adversely affect federally-listed whale species because ship strikes are "thought to be infrequent" and "though to be discountable" based on a 2018 study by Rockwood et al.[143]; however, that study found that "Mortality from collisions with vessels is one of the main human causes of death for large whales," and that "ship strikes are rarely witnessed and the distribution of strike risk and estimates of mortality remain uncertain at best." This is the *only* reference provided in the DEIS' to support these specious claims, and it clearly does not support FERC's conclusion. The DEIS has therefore failed to provide sufficient information on this important adverse impact of the proposed project, rendering it woefully inadequate.

The only mitigation mentioned in the DEIS is that "Jordan Cove would provide a ship strike avoidance measures package to LNG carrier operators transporting cargo from the LNG terminal that would consist of multiple measures to avoid striking marine mammals"; however that "avoidance measure package" has not been provided for public review and comment, so it remains entirely unclear what Jordan Cove is actually proposing. In order to meet the requirements of NEPA, all such materials must be provided, and the DEIS is therefore inadequate.

Regardless, it is clear from other Jordan Cove materials that the Applicant is not undertaking sufficient efforts to prevent ship strikes, and the "avoidance measure package" is inadequate. Jordan Cove previously explained, in Resource Report 3 attached to the FERC application materials, that recent research into whale/ship strike interactions has identified a "sound shadow" that is created by the vessel's hull blocking engine noise, so that whales are unaware of the vessel's presence until it is often too late to avoid strikes. It notes that technology has been developed "in the form of a submerged directional array that can be deployed at the vessel's bow to fill the acoustical shadow with sounds detectible by marine mammals and thus avoid a ship strike." It goes on, however, to state that "the use of sound projection within the bow shadow is currently not required," and the use of a directional array to prevent strikes is not included in the list of measures being undertaken to avoid harming marine mammals. Jordan Cove clearly has no intention of taking the measures necessary to protect these species from harm. None of that information was included in the DEIS.

[143] The DEIS fails to provide the full citation for this article, but is appears to reference Rockwood RC, Calambokidis J, Jahncke J (2018) Correction: High mortality of blue, humpback and fin whales from modeling of vessel collisions on the U.S. West Coast suggests population impacts and insufficient protection. PLOS ONE 13(7): e0201080. https://doi.org/10.1371/journal.pone.0201080

Moreover, the DEIS provides insufficient analysis of LNG tanker speeds, and the effects on ship strikes. While the DEIS claims that LNG carriers would travel at speeds of about 12 knots in the open ocean prior to entering Coos Bay, it provides no evidence to support this statement. DEIS, 4-233. Rather, according to the International Group of Liquefied Natural Gas Importer, LNG carriers typically travel at almost 20 knots at ocean speeds.[144] And, an analysis by LNG World Shipping "shows that while LNGCs engaged on long- or medium-term charters sail at an average speed of 19.5 knots, those same vessels re-let into the spot market or on short-term contracts are only sailing at an average speed of 14.5 knots."[145] This is well more than the 12 knots that is claimed in the DEIS, and the difference is important: Research has shown 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."[146] For example, studies have found that the vast majority of lethal and serious whale ship strikes involved vessels exceeding 14 knots. Specifically, Pace and Silber (2005) found that probability of serious injury or mortality increased from 45 percent at 10 knots to 75 percent at 14 knots, exceeding 90 percent at 17 knots. Therefore, the potential for strikes to occur from LNG tankers serving the Jordan Cove project is higher than the DEIS would suggest.

Furthermore, as stated above these tanker ships pose a risk of strikes to not only whales, but to other marine creatures, including sea turtles, yet the DEIS fails entirely to address this potential harm. Multiple ESA-listed turtles are present in the area, including the green turtle, leatherback, olive ridley, and loggerhead. In 2012, NMFS designated critical habitat for the leatherback, which includes nearshore areas around Coos Bay and areas part of the LNG tanker routes. 77 Fed Reg 4170 (Jan. 2012). The failure to address this harm renders the DEIS entirely inadequate.

In sum, many ESA-listed species, as well as non-ESA-listed species, in the project area will be adversely affected by LNG tanker traffic associated with the proposed project. By omitting any discussion of the anticipated indirect adverse effects associated with tanker traffic, the indirect effects analysis both excludes key features that must be considered under NEPA, *see* 40 C.F.R. § 1508.8(b), and deprives the public of the opportunity to assess the complete environmental picture, in contravention of NEPA's "twin aims" of ensuring that agencies "consider every significant aspect of the environmental impact of a proposed action" and "inform the public that it has indeed considered environmental concerns in its decisionmaking process." *Balt. Gas & Elec. Co. v. Nat. Res. Def. Council, Inc.*, 462 U.S. 87, 97 (1983) (internal quotation omitted).

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[144] *See* IGLNGI, LNG Information Paper No. 3 (available at https://giignl.org/sites/default/files/PUBLIC_AREA/About_LNG/4_LNG_Basics/lng_3_-_lng_ships_7.3.09-aacomments-aug09.pdf)

[145] LNG World Shipping, LNG Top-Table Session in the Sun (Aug. 14, 2018), available at https://www.lngworldshipping.com/news/view,lng-toptable-session-in-the-sun_53892.htm

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

3. Injury Caused by Noise from LNG Vessels and Marine Slip Construction

The proposed Project would substantially increase the amount of ship-related noise in the waters around Coos Bay and off the coast of Oregon, posing a risk of harm to fish and marine mammals. The DEIS has failed to provide the "hard look" that NEPA requires on the impacts of this noise on species, including species listed under the ESA.

Increased noise from LNG ship traffic creates conditions that are deleterious to fish or other aquatic life. The noise emitted from LNG ships is above the NMFS's noise threshold for physical harm to fish. LNG ships are considered cargo vessels and cargo vessels are known to emit high levels of low frequency sound (6.8 to 7.7 hertz (Hz) at 181 to 190 dB, re: 1 μPa) capable of traveling long distances (Richardson et al., 1995). *See* Bradwood Landing LNG Terminal DEIS at 4-224. The NMFS' current noise thresholds for fish are a peak pressure of 180 dB re: 1 μPa for physical harm and an impulse pressure, or root mean square (rms), of 150 dBrms re: 1 μPa for behavioral disruption. Therefore, noise from LNG vessels can adversely affect whales and other marine mammals, yet the DEIS fails to adequately address this important adverse environmental impact in violation of NEPA. *Balt. Gas & Elec. Co. v. Nat. Res. Def. Council, Inc.*, 462 U.S. 87, 97 (1983) (NEPA obligates federal agencies to take a "hard look" at the environmental consequences of its actions).

Sound is the key sense for dolphins and whales to find their way around, detect predators, find food and communicate. The sound frequency range within which whales communicate and echolocate corresponds to the frequency range of ship noise. Ships hundreds and even thousands of miles away interfere with the acoustic space of these animals. With more ship traffic, the ability for whales and dolphins to communicate, search for prey, and avoid predators will be compromised.

Ocean noise pollution, predominantly from large shipping vessels, has created an "omnipresent hum" in our ocean. [147] Large commercial shipping vessels are the primary source of anthropogenic low-frequency sound contributing to ambient (background) noise in the ocean. Because very loud low-frequency sound can travel great distances in the deep ocean, increasing noise impacts areas far beyond the source of the noise.[148] The DEIS, however, has failed to adequately account for the adverse impacts that ship noise associated with the project would have on marine species.

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[147] For example, tests conducted near San Nicolas Island, one of the Channel Islands just south of the Channel Islands NMS, indicate that ambient noise pollution in that area has increased by 10-12 decibels over the past 40 years. McDonald *et al*. suggest that this increase, potentially reflected throughout the Northeast Pacific, is most likely due to changes in commercial shipping. McDonald, M.A., Hildebrand, J. and Wiggins, S.M., 2006, Increases in deep ocean ambient noise in the Northeast Pacific west of San Nicolas Island, California, *Journal of the Acoustical Society America*, 120(2): 711-718. Available at http://cetus.ucsd.edu/Publications/Publications/PAPERS/McDonaldJASA2006.pdf

[148] Hildebrand, J. 2005. 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. Available at http://www.cetus.ucsd.edu/sio133/PDF/HildebrandJHU-MMR2005.pdf

NOAA has recently begun mapping marine noise levels using its SoundMap and CetMap mapping tools.[149] These maps show that human-caused cumulative and ambient ocean noise pollution has increased ambient sound levels to over 100 decibels (dB) over the majority of the Pacific and Atlantic oceans.[150] This sound level is equivalent to attending a live rock concert or standing next to a running chainsaw.[151]

Evidence exists that ship noise is associated with chronic stress in whales.[152] Past studies have identified the effect of vessels and associated noise on Southern Resident Killer whales specifically, particularly as it negatively affects foraging efficiency.[153] Houghton et al. (2015) measured the noise levels that whales received while collecting location data for all vessels within 1,000m of the whale. This allowed a comparison of vessel traffic to the ambient noise received by the Southern Residents.[154] Vessel speed was found to be the only significant predictor of noise levels; thus, the scientists concluded that vessel speed was most important in predicting noise levels received by Southern Residents.[155] As discussed above, the DEIS erroneously claims that LNG tankers would be travelling at only 12 knots in the open ocean, when it is readily apparent that such ships routinely travel above 14 knots, and even to 20 knots. FERC must therefore assess the potential for impacts to marine species from noise at these speeds.

Anthropogenic noise pollution can mask marine mammal communications at almost all frequencies these mammals use.[156] "Masking" is a "reduction in an animal's ability to detect relevant sounds in the presence of other sounds."[157] Marine mammals use different song, chirp, and whistle frequencies for a variety of purposes, including echolocation for feeding, long-

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[149] *See* http://cetsound.noaa.gov/

[150] *Summed Outputs—Sound Field Data Availability*, NOAA, http://cetsound.noaa.gov/SoundMaps/NorthAtlantic/Basin/Chronic/NA_OceanBasin_Chronic_Sum/NorthAtlantic_Sum_ThirdOctave/Atl_Sum_0050Hz_0005m_ThrdOct.png (last accessed Oct. 29, 2014) (Atlantic Ocean noise pollution levels); *Summed Outputs—Sound Field Data Availability*, NOAA, http://cetsound.noaa.gov/SoundMaps/NorthPacific/Basin/Chronic/NP_OceanBasin_Chronic_Sum/NorthPacific_Sum_ThirdOctave/Pac_Sum_0050Hz_0005m_ThrdOct.png (last accessed Oct. 29, 2014) (Pacific Ocean noise pollution levels).

[151] *See Comparative Examples of Noise Levels*, INDUSTRIAL NOISE CONTROL, INC. (Feb. 2000), http://www.industrialnoisecontrol.com/comparative-noise-examples.htm.

[152] Rosalind M. Rolland et al., Evidence that ship noise increases stress in right whales. 279 *Proceedings of the Royal Society B: Biological Sciences* (2012) (available at http://doi.org/10.1098/rspb.2011.2429).

[153] Lusseau et al. 2009, Vessel traffic disrupts the foraging behavior of southern resident killer whales Orcinus orca. Endangered Species Research, Vol. 6: 211–221, 2009 (*available at* https://www.int-res.com/articles/esr2008/6/n006p211.pdf); Noren, D. P. and D. D. W. Hauser. 2016. Surface-Based Observation Can Be Used to Assess Behavior and Fine-Scale Habitat Use by an Endangered Killer Whale (Orcinus orca) Population. Aquatic Mammals. Volume 42 (Issue 2), pages 168 to 183.

[154] Houghton J, Holt MM, Giles DA, Hanson MB, Emmons CK, Hogan JT, et al. (2015). The Relationship between Vessel Traffic and Noise Levels Received by Killer Whales (*Orcinus orca*). PLoS ONE 10(12): e0140119. Available at https://doi.org/10.1371/journal.pone.0140119.

[155] *Id*.

[156] *See, e.g.*, Hildebrand, J.A., *Impacts of Anthropogenic Sound*, *supra* note 50; Weilgart, L., 2007, The Impacts of Anthropogenic Ocean Noise on Cetaceans and Implications for Management, 85 CANADIAN J. ZOOLOGY 1091-1116 (2007).

[157] OCEAN NOISE AND MARINE MAMMALS, *supra* note 59, at 96.

distance communication, environmental imaging, individual identification, and breeding.[158] Odontocetes, or toothed mammals such as dolphins and killer whales, produce broad-spectrum clicks and whistles that can range between 1 and 200 kilohertz (kHz).[159] Mysticites, or baleen whales such as blue and right whales, have much lower-frequency calls, ranging between 0.2 and 10 kHz.[160]

Ambient ship noise can cover important frequencies these animals use for more complex communications.[161] Some species, such as the highly endangered right whale, are especially vulnerable to masking.[162] Ship noise can completely and continuously mask right whale sounds at all frequencies.[163] NOAA has recognized that this masking may affect marine mammal survival and reproduction by decreasing these animals' ability to "[a]ttract mates, [d]efend territories or resources, [e]stablish social relationships, [c]oordinate feeding, [i]nteract with parents, or offspring, [and] [a]void predators or threats."[164] Studies have also found that chronic exposure to boat traffic and noise can cause whales to reduce their time spent feeding.[165]

In addition to masking effects, marine mammals have displayed a suite of stress-related responses from increased ambient and local noise levels. These include "rapid swimming away from [] ship[s] for distances up to 80 km; changes in surfacing, breathing, and diving patterns; changes in group composition; and changes in vocalizations."[166] Some avoidance responses to localized marine sounds may even lead to individual or mass strandings.[167] Louder anthropogenic sounds may also lead to permanent hearing loss in marine mammals.[168]

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[158] *Id*. at 42-44; Jason Gedamke, *Ocean Sound & Ocean Noise: Increasing Knowledge Through Research Partnerships*, NOAA 2 (2014), *available at* http://cetsound.noaa.gov/Assets/cetsound/documents/MMC%20Annual%20Meeting%20Intro.pdf; Clark, C.W. et al., *Acoustic Masking in Marine Ecosystems as a Function of Anthropogenic Sound Sources*, *available at* https://www.academia.edu/5100506/Acoustic_Masking_in_Marine_Ecosystems_as_a_Function_of_Anthropogenic_Sound_Sources.

[159] OCEAN NOISE AND MARINE MAMMALS, NAT'L RES. COUNCIL 41-42 (2003), *available at* http://www.nap.edu/openbook.php?record_id=10564&page=R1.

[160] *Id*. at 42.

[161] *Id*. at 42, 100 ("An even higher level, an understanding threshold" may be necessary for an animal to glean all information from complex signals").

[162] Clark, C.W. at al., *Acoustic Masking in Marine Ecosystems: Intuitions, Analysis, and Implication*, 395 MARINE ECOLOGY PROGRESS SERIES 201, 218-19 (2009), available at http://www.int-res.com/articles/theme/m395p201.pdf.

[163] *Id.* (showing anthropogenic noise masking 100 percent of the frequencies right whales used over the majority of a six-hour study).

[164] Jason Gedamke, *supra* note 58, at 2; Clark, C.W. *et al*., *supra* note 64, at *3.

[165] *See i.e.* Williams, R. D., et al., 2006, Estimating relative energetic costs of human disturbance to killer whales (*Orcinus orca*), *Biological Conservation*, 133: 301-311. Available at http://www.oceansinitiative.org/wp-content/uploads/2010/11/williamsetal2006_energeticcostdisturbance.pdf

[166] OCEAN NOISE AND MARINE MAMMALS, *supra* note 59, at 94.

[167] *Id*. at 132; BRANDON L. SOUTHALL ET AL., FINAL REPORT OF THE INDEPENDENT SCIENTIFIC REVIEW PANEL INVESTIGATING POTENTIAL CONTRIBUTING FACTORS TO A 2008 MASS STRANDING OF MELON-HEADED WHALES 3 (*PEPONOCEPHALA ELECTRA*) IN ANTSOHIHY, MADAGASCAR, INT'L WHALING COMM'N 4 (2013), *available at* http://www.cascadiaresearch.org/oldsite/Hawaii/Madagascar_ISRP_Final_report.pdf.

[168] Kastak, D. et al., 2008, *Noise-Induced Permanent Threshold Shift in a Harbor Seal*, 123 J. ACOUSTICAL SOC'Y OF AM. 2986; Kujawa, S.G. & Liberman, M.C., 2009, *Adding Insult to Injury: Cochlear Nerve Degeneration After "Temporary" Noise-Induced Hearing Loss*, 29 J. NEUROSCIENCE 14,077, available at https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2812055/pdf/nihms163964.pdf.

NOAA and legislative leaders have recognized the threat to ocean species posed by increased anthropogenic ocean noise levels.[169] On the issue of ocean noise, NOAA has stated:

Rising noise levels can negatively impact ocean animals and ecosystems in complex ways. Higher noise levels can reduce the ability of animals to communicate with potential mates, other group members, their offspring, or feeding partners. Noise can reduce an ocean animal's ability to hear environmental cues that are vital for survival, including those key to avoiding predators, finding food, and navigation among preferred habitats.

NOAA's approach to managing ocean noise aims to reduce negative physical and behavioral impacts to trust species, as well as conserve the quality of acoustic habitats.[170]

Though difficult to detect, noise-induced stress is a serious threat for cetaceans.[171] In a noise exposure study using a captive beluga whale, increased levels of stress hormones were documented.[172] Stress due to noise can lead to long-term health problems, and may pose increased health risks for populations by weakening the immune system and potentially affecting fertility, growth rates and mortality.[173]

Many species are already threatened by increasing ocean noise. The NMFS recovery plan for Southern resident killer whales (*Orcinus orca*) describes the disturbance from vessel traffic and the associated noise pollution as a potential threat to the species, since population numbers have fallen to below 100 individuals despite its protection under the ESA since 2005.[174] The population has, in fact, been in an alarming decline in recent years. As of December 31, 2016, there were only 78 Southern Resident killer whales remaining.[175] A recent study by Vélez-Espino et al. (2014), analyzing 25 years of monitoring data from 1987 to 2011, showed that the population has declined at a rate of 0.91% per year.[176] Under current conditions and at a 0.91% annual decline in growth rate, the Southern Resident killer whale population is expected to reach 75 individuals in a generation, with an extinction risk of 49% and a minimum abundance of 15

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[169] *See Phase 2-NOAA's Ocean Noise Strategy* (http://cetsound.noaa.gov/cetsound); *Congressional Briefing on Marine Mammal Health and Stranding* (Sept. 24, 2014), http://www.mmc.gov/special_events/capitalhill_briefing/capitalhill_briefing_summary.shtml; *see generally* Jason Gedamke, *supra* Note 58.

[170] *Underwater Noise and Marine Life*, NOAA, http://cetsound.noaa.gov/index.

[171] Weilgart, L., 2007, The Impacts of Anthropogenic Ocean Noise on Cetaceans and Implications for Management, 85 CANADIAN J. ZOOLOGY 1091-1116 (2007).

[172] Romano, T.A. *et al.*, 2004, Anthropogenic sound and marine mammal health: measures of the nervous and immune systems before and after intense sound exposure, *Canadian Journal of Aquatic Science*, 61: 1124-1134. Available at https://www.researchgate.net/publication/255588954_Anthropogenic_sound_and_marine_mammal_health_Measures_of_the_nervous_and_immune_systems_before_and_after_intense_sound_exposure/download

[173] *Id.*

[174] National Marine Fisheries Service (NMFS). 2008. Recovery Plan for Southern Resident Killer Whales (*Orcinus orca*). National Marine Fisheries Service, Northwest Region, Protected Resources Division, Seattle, Washington.

[175] As of December 2016, the southern resident killer whale population totals 78 individuals (J Pod=24, K Pod=19, L Pod=35) CENTER FOR WHALE RESEARCH, http://www.whaleresearch.com/orca-population.

[176] Vélez-Espino et al. 2014. Relative importance of chinook salmon abundance on resident killer whale population growth and viability. Aquatic Conserv: Mar. Freshw. Ecosyst. (2014). Available at https://cdn.shopify.com/s/files/1/0249/1083/files/Velez-Espino_etal_2014_AQC_doi.pdf?12878

individuals expected during a 100-year period.[177] NMFS likewise projects a downward trend in population growth over the next 50 years, and has found that the loss of even one Southern Resident killer whale every seven years would keep it from reaching optimum sustainable population.[178] The recovery plan identifies "sound and disturbance from vessel traffic" as factors that currently pose a risk for this population of Southern resident killer whales.[179]

Vessel presence modifies Southern Resident killer whale foraging behavior by hunting substantially less and increasing traveling activities.[180] In addition to causing physical disturbance, anthropogenic noise from the vessels can impair the Southern Resident killer whale's highly developed acoustic sensory system used to navigate, and communicate with kin, mates and other conspecifics.[181] Noise can mask communications, disrupt vocal learning, mask echolocation signals, and permanently damage hearing sensitivity.[182] Noise can also impair the Southern Resident killer whale's ability to locate food. Recent studies demonstrate that food unavailability and poor nutrition can lead to increased physiological stress and reproductive loss.[183]

Killer whales rely on their highly developed acoustic sensory system for navigating, locating prey, and communicating with other individuals. Increased levels of anthropogenic sound have the potential to mask echolocation and other signals used by the species, as well as to temporarily or permanently damage hearing sensitivity. Exposure to sound may therefore be detrimental to survival by impairing foraging and other behavior.[184] The DEIS has failed to discuss any of this, and has ignored the potentially devastating harm that increased tanker traffic could have on this highly imperiled species, in violation of NEPA.

Other species that communicate over vast distances in the ocean, such as blue and fin whales, will increasingly have trouble hearing one another as the ambient noise level continues to rise. The masking of reproductive calls may prevent widely distributed mates from finding each other and reproduction rates may fall as a consequence.[185] This could have a significant impact on the survival of these imperiled species, which the DEIS failed to adequately address.

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[177] Vélez-Espino, L.A., Ford, J.K.B., Araujo, H.A., Ellis, G., Parken, C.K., and Balcomb, K.C. 2014. Comparative demography and viability of northeastern Pacific resident killer whale populations at risk. Can. Tech. Rep. Fish. Aquat. Sci. 3084: v + 58 p. Available at https://cdn.shopify.com/s/files/1/0249/1083/files/TR3084_Velez-Espino_Resident_Killer_Whale_Populations_at_Risk.pdf?12882

[178] Carretta, J.V. et al., U.S. Pacific Marine Mammal Stock Assessments 2016: Killer Whale (*Orcinus orca*): Eastern North Pacific Southern Resident Stock (Mar. 13, 2017), NOAA-TM-NMFS-SWFSC-577.

[179] *Id.*

[180] NOAA Fisheries, SOUTHERN RESIDENT KILLER WHALES: TEN YEARS OF RESEARCH AND CONSERVATION (2014). Available at https://www.nwfsc.noaa.gov/research/divisions/cb/ecosystem/marinemammal/documents/bigreport10814.pdf

[181] Nat'l Marine Fisheries Serv., *Recovery Plan for Southern Resident Killer Whales (Orcinus orca)* II-104 (2008).

[182] *Id.*

[183] Wasser et al., POPULATION GROWTH IS LIMITED BY NUTRITIONAL IMPACTS ON PREGNANCY SUCCESS IN ENDANGERED SOUTHERN RESIDENT KILLER WHALES (ORCINUS ORCA), 16 (2017).

[184] *Id.*

[185] Weilgart, L., 2007, The impacts of anthropogenic ocean noise on cetaceans and implication for management. *Canadian Journal of Zoology*, 85 CANADIAN J. ZOOLOGY 1091-1116. Available at http://whitelab.biology.dal.ca/lw/publications/Weilgart%202007%20CJZ%20noise%20review.pdf

Hearing loss, classified as either "temporary threshold shift" or "permanent threshold shift," is also a concern for animals exposed to the intense noise pollution produced by human activities. Hearing loss reduces the range in which communication can occur, interferes with foraging efforts and increases vulnerability to predators. Hearing loss may also change behaviors with respect to migration and mating and it may cause animals to strand, which is often fatal. For marine mammals such as whales and dolphins that rely heavily on their acoustic senses, both permanent and temporary hearing loss should be regarded as a serious threat.[186]

Furthermore, noise impacts to marine mammals are predicted to increase with global climate change, wherein the absorption of carbon dioxide by the ocean could create noisier oceans.[187] When greenhouse gas reacts in the ocean, it lowers pH, creating more acidic waters. The more acidic the water, the less that sound waves are absorbed. Keith Hester, a researcher with the Monterey Bay Aquarium Research Institute, predicts sounds will travel 70% further by 2050 because of increased carbon dioxide acidifying our oceans.[188] A louder ocean will negatively affect cetaceans that rely on sound to navigate, communicate, find food, and avoid predators. The DEIS fails entirely to discuss or account for the increased harm from noise associated with the project in light of climate change.

The greatest source of human-caused marine noise by far is ship propeller cavitation—the sound poorly designed propellers make as they spin through the water.[189] Cavitation accounts for as much as 85 percent of human caused noise in the world's oceans.[190] Cavitation may also increase due to hull designs that create non-homogenous wake fields behind ships.[191] And even well-designed propellers and hulls may begin to cavitate if they are not regularly cleaned and smoothed.[192] The DEIS does not discuss this issue, and fails to address whether propellers for the LNG tankers associated with the project would be routinely cleaned and smoothed.

Another significant source of anthropogenic marine noise is on-board machinery, especially diesel engines.[193] Other onboard machines may also cause vibrations that migrate underwater.[194] Finally, ship noise increases at higher speeds, as this increases the degree and volume of cavitation and onboard machine sounds.[195] The DEIS has failed to discuss any of these sources of marine noise, and is therefore entirely inadequate.

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[186] Hildebrand, J., 2005, Impacts of anthropogenic sound, *supra* note 50.
[187] Hester, K. C., *et al.*, 2008, Unanticipated consequences of ocean acidification: A noisier ocean at lower pH. *Geophysical Research Letters*, 35:31. Available at https://agupubs.onlinelibrary.wiley.com/doi/epdf/10.1029/2008GL034913
[188] *Id*.
[189] Joseph J. Cox, *Evolving Noise Reduction Requirements in the Marine Environment*, MARINE MAMMAL COMM'N: CONGRESSIONAL BRIEFING ON OCEAN NOISE, at 12 (2014), *available at* https://www.mmc.gov/wp-content/uploads/cox_capitalhill_briefing_0914.pdf; GUIDELINES FOR THE REDUCTION OF UNDERWATER NOISE FROM COMMERCIAL SHIPPING TO ADDRESS ADVERSE IMPACTS ON MARINE LIFE, INT'L MARITIME ORGANIZATION 1-2 (2014) (definition of cavitation) [hereinafter GUIDELINES] (available at https://www.ascobans.org/sites/default/files/document/AC21_Inf_3.2.1_IMO_NoiseGuidelines.pdf).
[190] Joseph J. Cox, *supra* note 91, at 12.
[191] *Id* at 4.
[192] *Id* at 5.
[193] *Id* at 4.
[194] *Id*.
[195] *Id* at 5.

In addition, noise from construction of the marine slip (including pile driving) may adversely impact marine species, including pinnipeds. Jordan Cove would install hundreds of steel piles for the LNG vessel berth (marine facility). This pile driving could exceed NMFS noise criteria and cause adverse impacts to marine mammals. According to the applicant's modeling, sound levels greater than 180 dB will extend several hundred feet from pile driving operations. DEIS, 4-253. Jordan Cove has not yet developed a plan to protect marine mammals from noise impacts associated with the construction of the marine slip and berth, and admits that "methods for wood pile installation are unknown." *Id.* The DEIS acknowledges, however, that "There is some risk of cumulative noise levels associated with wood pile-driving." FERC must consider whether these potential impacts can be adequately addressed, and the DEIS fails to provide the "hard look" that NEPA requires on this issue.

Regardless, it is clear that the increased noise impacts associated with the proposed Project would result in "take" of federally-protected species. Congress intended the term "take" to be defined in the "broadest possible manner to include every conceivable way" in which a person could harm or kill wildlife.[196] The term "take" is defined in the statute to include "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct."[197] The implementing regulations for the Act define "harm" to include "significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering."[198] The term "harass" is defined to mean "an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering."[199]

The DEIS, however, states that these issues will be addressed in the forthcoming BA. That is not sufficient. As discussed above, pursuant to 40 C.F.R. §1502.25(a), "[t]o the fullest extent possible, agencies shall prepare draft environmental impact statements concurrently with and integrated with environmental impact analysis and related surveys and studies required by the Fish and Wildlife Coordination Act (16 U.S.C. 661 et seq.), the National Historic Preservation Act of 1966 (16 U.S.C. 470 et seq.), the Endangered Species Act of 1973 (16 U.S.C. 1531 et seq.), and other environmental review laws and executive orders." The concurrency requirement for the NEPA and ESA process is essential for public involvement, and FERC cannot ignore these important adverse impacts in its NEPA analysis.

4. Stranding and Entrainment of Fish by LNG Vessels

Vessel traffic will also cause wake stranding of juvenile salmon and other fish. Wake stranding will increase greatly due to the additional deep draft ships. Further, turning of the LNG tankers with high thrust tugs will increase wake stranding and disorientation of salmon. These impacts were not addressed in the DEIS.

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[196] S. Rep. No. 93-307, 93d Cong., 1st Sess. 1, reprinted in 1973 USCAAN 2989, 2995.
[197] 16 U.S.C. § 1532(18).
[198] 50 C.F.R. § 17.3.
[199] *Id.* § 17.3.

The LNG vessels that would dock in the new marine slip under the proposed action would also take in large amounts of bay water from the slip to cool vessel engines. The DEIS acknowledges that this will harm fish, (*See e.g.* DEIS, 4-332 "Entrainment and impingement of coho salmon could occur in LNG carriers' cooling water intake port during LNG carrier loading and possibly dredging") but fails to take the required hard look at the effects this impact will have on endangered, threatened, and sensitive species.

In fact, the DEIS summarily concludes that "entrainment and impingement from LNG carrier water intakes at the terminal would not have substantial adverse effects on any marine phase of aquatic resources (e.g., the juvenile stage of salmonids) or their food sources," without reference to any specific study, analysis or facts to substantiate that claim. DEIS, 5-5. The DEIS therefore does not meet the basic requirements of NEPA.

Moreover, the measures that Jordan Cove has proposed to deal with these problems are unproven and inadequate, as NMFS itself has noted in its comments for the prior DEIS and FEIS. In fact, many of the criticisms NMFS previously levied against the project apply to the current proposal as well. For example, for the prior DEIS for Jordan Cove, NMFS specifically noted problems with the lack of fish screens to prevent entrainment of threatened and endangered species:

> Jordan Cove no longer proposes to include fish exclusion screens with a fixed water delivery system to the hulls of the ships. NMFS maintains that screening ballast and engine cooling water is the most effective method to minimize adverse effects to the aquatic resources. While the U.S. Coast Guard has identified some regulatory difficulties with the original screening design proposed in the DEIS, those difficulties do not preclude its implementation.

NMFS FEIS Comments at 2 (June 8, 2009). The DEIS for the current export project indicates that this problem has not been remedied: the DEIS notes that the current proposal is to use ship-mounted screens that do meet NMFS criteria. DEIS, 4-256. The DEIS acknowledges that "The result is likely to be that fish at fry and larger juvenile size salmonids near the intakes may be entrained or impinged during cooling water intake," and that "smaller marine and estuarine fish, juvenile stages of crab and shrimp, as well as other zooplankton and eggs and larvae fish could also be entrained." *Id.* The DEIS further admits that "Some estuarine organisms potentially including juvenile salmonids would be removed from Coos Bay with this process during every loading cycle. It is expected that a high portion of juvenile larval stages of fish and invertebrates entrained or impinged would result in mortality." *Id*.

Nevertheless, as with the prior DEIS that NMFS found was insufficient as to fish entrainment, the current DEIS concludes that entrainment impacts are minimal because "natural mortality of these early life stages is extremely high." *Id*. In other words, because many juvenile and larval aquatic organisms die, the additional mortality caused by entrainment is not significant. This defies logic. Simply because juvenile fish already suffer high mortality is no reason to discount the additional mortality caused by entrainment in LNG vessels via cooling water uptake. This ignores the cumulative impacts of increased mortality, and does not provide the "hard look" that NEPA requires.

Moreover, the analysis that is provided in the DEIS completely misses the mark. The DEIS provides a comparison of fish entrainment in LNG vessels with the loss of marine organisms from the Coos Bay estuary due to tidal influence, but the two are not comparable. While this analysis may suggest that the LNG tankers would only be removing a small percentage of the food sources in Coos Bay, it says nothing about the cumulative impacts of increased mortality on fish species, particularly those that are listed under the ESA, such as Coho salmon. These fish would not merely be removed from the bay, as with tides, but would be killed by the LNG vessels, thereby reducing the population in violation of the ESA.

The DEIS attempts to downplay this fish mortality through LNG entrainment by claiming that the overall increase in loss from the early life stages to adult survival is relatively small. However, it acknowledges that "Loss of juvenile salmonids from entrainment or impingements could also reduce adult returns," DEIS at 4-259, yet does not provide any analysis as to how this loss might affect the species. Rather than analyze the actual impacts, the DEIS asserts that "due to the extremely small portion of total water intake relative to the volume of Coos Bay, likely intake locations (30 feet deep, in the back of the isolated slip) likely away from concentrations of juvenile salmonids, the relative portion of juvenile salmonids that would be entrained and suffer direct mortality would be small." *Id.* This reliance on the volume of water, rather than the likely number of fish that would be taken through entrainment, is inconsistent with the requirements of the ESA (*see* 50 C.F.R. § 402.14(i)(1)(i) (requiring FWS to specify the amount or extent of incidental take), and does not provide the "hard look" that NEPA requires.

Furthermore, the DEIS fails to explain how the data regarding overall juvenile fish mortality is relevant to the specific conditions of Coos Bay and its ESA and EFH species and benthic communities. As NMFS previously explained:

In fact, it is more likely that the abundance of organisms, including OC Coho salmon juveniles and southern DPS green sturgeon, especially smaller life stages, may be greater in the slip area as they use it for refuge from the higher velocities of the main channel. Secondly, the FERC analysis minimizes the potential for effects to resources based on the percentage of Coos Bay water that will be taken aboard ships. The analysis incorrectly assumes that resources are evenly distributed throughout the bay. Provide an effects analysis that incorporates the likely heterogeneity of resources in the estuarine environment.

NMFS 2008 DEIS comments at 2. Clearly FERC has continued to ignore NMFS on this important issue, and the DEIS remains inadequate. Additional analysis is necessary to provide the public with adequate information about the fish exclusion technology to be used, complete with an analysis of the effectiveness of the plan.

5. Temperature Impacts from Discharge of Cooling Water

The DEIS states that water will be discharged from LNG tankers for engine cooling at 2 to 3 degrees C (3.6 to 5.4 degrees F) above ambient water temperatures. DEIS at 4-91. Modeling of mixing zones and dissipation of water temperature increases were likewise based on this

assumed 3 degrees increase. However, Jordan Cove did not provide any information regarding the source of this assumed temperature of cooling water. The only reference provided is to a 2017 hydrodynamic model conducted by Moffat and Nichol; however, this study has not been included with the DEIS materials, and further appears to have been conducted on behalf of the applicant, and therefore lacks credibility. Nothing in the DEIS or FERC filings appears to support the assertion that engine cooling water will be only 3 degrees C higher than the average ambient Coos Bay water temperatures.

On the other hand, the assertion is belied by FERC's FEIS for the Bradwood LNG Project, which states that "cooling water discharged from a 150,000 m^3 steam powered LNG carrier could initially be 19.4ºF higher than ambient water temperatures" as compared to seasonally ranging ambient temperatures in the Columbia River of 42 to 68ºF. Bradwood LNG Project FEIS at 4-85 (2008). Oregon LNG, also proposed for the Columbia River, estimated that "according to industry sources, the water taken for cooling the vessel's machinery is warmed by 6 to 9 degrees Celsius at the point of discharge" and that the average for diesel-powered LNG vessels would be 8.9ºC above ambient water temperatures. Oregon LNG, CH2MHill Technical Memorandum, Appendix F Cooling Water Discharge Analysis, at 2 (Sept. 10, 2008). And according to EPA, cooling water can reach high temperatures with the "thermal difference between seawater intake and discharge typically ranging from 5ºC to 25ºC, with maximum temperatures reaching 140ºC." EPA, *Final 2013 Vessel General Permit Fact Sheet* at 133.

Therefore, it appears that the information provided in the DEIS is not accurate, and in fact discharges could be as much as 19ºF higher than ambient temperatures, presenting a significant temperature stress risk to salmonids. Since the ambient temperature in Coos Bay ranges from 51-58ºF with a mean temp of 55º (not "nominally 50º" as the DEIS claims at 4-92),[200] a temperature increase of 10 degrees—which appears possible and even likely based on FERC's EIS for Bradwood LNG—would put the temperature above the optimum temperature for growth of spring Chinook salmon, which is 60.1°F (15.6°C). The DEIS in fact notes that temperatures above 60 during summer could reduce growth and lead to increased mortality rates, and that water temperatures ranging from 71.6 to 75.2°F (22 to 24°C) would limit distribution of many salmonid species. DEIS at 4-291. A 19º increase over ambient temperatures, as FERC acknowledged for the Bradwood LNG project, would therefore pose a significant risk to these species, yet the DEIS fails to assess or account for these impacts. The analysis in the DEIS is therefore premised on inaccurate information, and does not provide the hard look that NEPA requires.

The DEIS appears to state that the temperature increase will be dispersed—apparently discussing a 5.4° F increase 40-80 feet from the discharge point and the average increase in the slip area as a whole—but the DEIS does not specifically discuss potential impacts from higher temperatures prior to dispersion closer to the discharge point. DEIS 4-91. Thus, the DEIS does not offer an adequate analysis of impacts to ESA-listed species from cooling water discharge. Consultation for the project is clearly warranted, and until official consultation is initiated, it is impossible for the public to know what mitigation measures will be proposed and whether they will be effective. Regardless, it is readily apparent that the DEIS is misleading and inadequate, and the actual levels of thermal discharge must be revisited.

[200] See https://www.currentresults.com/Oceans/Temperature/oregon-average-water-temperature.php

6. Other harms associated with LNG Tankers

In addition to the foregoing, FERC must also consider that ocean-going ships emit substantial amounts of air pollutants, including sulphur dioxide (SOx), nitrogen dioxide (NOx), and particulate matter that can cause serious human health impacts like respiratory inflammation, worsening of existing respiratory diseases, and even premature death.[201] 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.[202]

Further, ships also emit substantial amounts of greenhouse gases. For example, in 2007 alone, shipping resulted in carbon dioxide emissions of 1,046 million metric tons, almost three percent of global greenhouse gas emissions.[203] A single container ship can emit more pollution than 2,000 diesel trucks. Ships also contribute as much as 30 percent of the world's nitrogen oxide emissions, an estimated 27.8 million tons per year.[204] Ships also emit black carbon, or soot, as they burn fossil fuels. Marine shipping was responsible for 3.6 percent of the United States' black carbon emissions in 2002,[205] and shipping is responsible for all black carbon released over the oceans.[206] 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 DEIS, however, fails to 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. The DEIS therefore fails to take the "hard look" that NEPA requires.

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[201] *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).

[202] *Id*.

[203] Marine Environment Protection Committee, International Maritime Organization (IMO), Prevention of Air Pollution from Ships: Second IMO GHG Study 2009 (Apr. 9, 2009). Prepared by Øyvind Buhaug et al. Available at: http://www.imo.org/en/OurWork/Environment/PollutionPrevention/AirPollution/Documents/SecondIMOGHGStudy2009.pdf

[204] Friends of the Earth International (FOEI). 2007. Prevention of Air Pollution from Ships: Recent Findings on Global Warming Justifying the Need for Speedy Reductions of Greenhouse Gas Emissions from Shipping. Submitted to the Marine Environment Protection Committee, IMO (May 4, 2007).

[205] Battye, W. and K. Boyer. 2002. 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. Available at http://www.epa.gov/ttn/chief/conference/ei11/ghg/battye.pdf.

[206] Reddy, M. Shekar and O. Boucher. 2006. Climate impact of black carbon emitted from energy consumption in the world's regions. *Geophysical Research Letters* 34: L11802. Available at https://agupubs.onlinelibrary.wiley.com/doi/epdf/10.1029/2006GL028904

J. Loss of High-Quality Benthic Communities

The project would result in significant harm to the benthic communities within Coos Bay. The proposed activities would mobilize fine sediments harmful to many stages of aquatic life, clear streamside habitats, and alter the basic structure of the bottoms of our streams, rivers and bays, negatively impacting essential benthic habitat.[207] These impacts were discussed in the DEIS; however, as set forth below, FERC failed to provide the "hard look" that NEPA requires.

The applicant proposes to dredge nearly 6 million cubic yards of material from Coos Bay and dig trenches through roughly 400 waterways, laying a 36" pipeline across hundreds of acres of sensitive estuary and wetland habitats, which will cause increased sediment loading in Coos Bay. The construction of the Project would result in the permanent loss of 14.5-acres of shallow subtidal and intertidal habitat, 0.6-acres of estuarine saltmarsh habitat, and 1.9 acres of submerged aquatic vegetation habitat. Approximately 9,519 cubic yards of material would be excavated and discharged into waterways. The proposed dredging would impair water quality by decreasing dissolved oxygen, changing salinity levels, increasing temperature, and increasing sedimentation.

Dredging will undoubtedly destroy habitat in Coos Bay, with damaging impacts on fish habitat and benthic communities that species rely on, including species protected under the ESA such as Coho salmon. Suspended particulates released from dredging harm various life stages of aquatic organisms by smothering eggs, altering substrates, and interfering with reproduction, among other things. The project would result in a loss of the substrate that local fish depend upon for feeding and breeding. It would introduce contaminants into the water column, such as heavy metals, that would cause direct harm and adversely impact the habitats and resources they depend on.

Many studies have found that sediment loading can adversely impact fish, such as salmon. In fact, studies have found that sediment loading "can be considered one of the greatest causes of impaired water quality."[208] The 2014 Southern Oregon/Northern California Coast (SONCC) Coho Recovery Plan identifies impaired water quality as one of the key limiting stressors for the Upper Rogue River population.[209] Studies have further found that the effects of turbidity on water quality may result in biological effects on aquatic organisms such as disruptions in

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[207] *See i.e.* Kjelland et. al. (2015) A review of the potential effects of suspended sediment on fishes: potential dredging-related physiological, behavioral, and transgenerational implications, Environ Syst Decis 35:334–350 (available at https://link.springer.com/article/10.1007/s10669-015-9557-2) (citing U.S. EPA (2003) National water quality report to congress (305(b) report); Dara H. Wilber & Douglas G. Clarke (2001) Biological Effects of Suspended Sediments: A Review of Suspended Sediment Impacts on Fish and Shellfish with Relation to Dredging Activities in Estuaries, North American Journal of Fisheries Management, 21:4, 855-875; Berg, L., and T.G. Northcote (1985) Changes in territorial, gill-flaring, and feeding behavior in juvenile coho salmon (*Oncorhynchus kisutch*) following short-term pulses of suspended sediment. Can. J. Fish. Aquat. Sci. 42: 1410-1417.

[208] Kjelland et. al. (2015) A review of the potential effects of suspended sediment on fishes: potential dredging-related physiological, behavioral, and transgenerational implications, Environ Syst Decis 35:334–350 (available at https://link.springer.com/article/10.1007/s10669-015-9557-2) (citing U.S. EPA (2003) National water quality report to congress (305(b) report) at 335.

[209] Available at https://www.westcoast.fisheries.noaa.gov/protected_species/salmon_steelhead/recovery_planning_and_implementation/southern_oregon_northern_california_coast/SONCC_recovery_plan.html

migrations and spawning, movement patterns, sublethal effects (e.g., disease susceptibility, growth, and development), reduced hatching success, and direct mortality.[210]

Dredging will also result in a loss of benthic habitat and important food sources for fish. The DEIS notes that submerged aquatic vegetation (including eelgrass, macrophytic algae) as well as other food web components such as phytoplankton, zooplankton, detritus, and epiphyton, are all important in supplying habitat and food base for EFH species within Coos Bay:

Submerged grasses are one of the important major habitat components in Coos Bay. Recreationally and commercially harvested species such as clams and shrimps, Dungeness crab, English sole, and salmonids use the eelgrass beds extensively. Previous studies (Akins and Jefferson 1973) have reported that Coos Bay has 1,400 acres of lower intertidal and shallow subtidal flats covered by eelgrass meadows. ODFW (1979) conducted habitat mapping in Coos Bay and documented intertidal and subtidal aquatic beds. Submerged grass meadows provide cover and food for many organisms including burrowing, bottom-dwelling invertebrates; diatoms and algae; herring that deposit eggs clusters on leaves; tiny crustaceans and fish that hide and feed among the blades; and, larger fish, crabs and wading birds that forage in the meadows at various tides. Eelgrass provides shelter for a variety of fish and may lower predation, allowing more opportunity for foraging. The protective structure attribute of eelgrass is primarily for smaller organisms and juvenile life history stages of fishes.

DEIS at 4-241. The DEIS fails, however, to put the loss of these important benthic resources into context, and never explains how the loss of this benthic habitat will ultimately affect the species that rely on it.

A large and diverse population of benthic and epibenthic invertebrates is present in and around Coos Bay. Clams, crabs, oysters, and shrimp make up important components of these invertebrates in the bay. Some of the most abundant and commercially important of these species include bentnose clams (*Macoma nasuta*), Pacific oyster (*Crassostrea gigas*), Dungeness crab (*Metacarcinus magister*), and ghost shrimp (*Neotrypaea californiensis*). DEIS at 4-232. These species are susceptible to direct and cumulative harm from dredging and the loss of benthic communities, particularly due to sedimentation.

The creation of the access channel and marine slip would modify approximately 37 acres of present-day subtidal and intertidal habitat to deep water habitat within Coos Bay. DEIS at 4-243. This would adversely affect marine species, including juvenile salmonid listed under the ESA:

> The creation of the access channel would result in the modification of about 37 acres of present-day subtidal and intertidal habitat to deeper water habitat in the bay. The dredging operation to create the access channel would change physical conditions of the bay bottom in this area, locally altering the bathymetry and potentially altering the morphology and water currents. About 19 acres of intertidal to shallow subtidal

[210] Coen L.D. 1995. A review of the potential impacts of mechanical harvesting on subtidal and intertidal shellfish resources. South Carolina Division of Natural Resources, Marine Resources Research Institute, James Island, South Carolina, pp 46. Available at file:///C:/Users/JMargolis/Desktop/ORLNG/Attachments%20for%20DSL/harvester.pdf

> habitat, including approximately 2 acres of eelgrass habitat and less than 1 acre of salt marsh, would be modified to primarily deep subtidal habitat during the dredging process of the deepened channel. Increasing depth and removal of vegetation would reduce the quality of habitat for juvenile salmonids and other juvenile marine species.

DEIS at 4-243.

The DEIS further acknowledges direct impacts to benthic organisms from dredging activities:

> To improve navigation reliability for LNG carriers, Jordan Cove proposes to excavate four submerged areas in Coos Bay along the vessel access route. This would include the dredging of some 27 acres of deep subtidal habitat at bend areas along the route and the dredge lines for this activity would include another 13 acres of mostly deep subtidal habitat modification. These dredging activities and follow-up maintenance dredging would disturb this habitat and, in the short term, reduce function of these areas primarily from disturbance to benthic and epibenthic organisms living in these areas and organism that feed in these areas.
>
> The installation of the pile dike rock apron would change habitat from soft bottom to rock habitat over an area of about 2 acres. The construction would include short-term increase of local turbidity from bottom disturbance and initial loss of benthic organisms by burial.
>
> ***
>
> A large quantity of suspended sediment can reduce light penetration, which in turn reduces primary production of both pelagic and benthic algae and grasses. Increased suspended sediment can affect feeding of benthic and pelagic filter feeding organisms (Brehmer 1965; Parr et al. 1998), and the settling of the suspended particles can cause local burial, affect egg attachment, and modify benthic substrate. High enough levels can have direct adverse effects on fish ranging from avoidance to direct mortality.
>
> ***
>
> Jordan Cove's dredging would also directly remove benthic organisms (e.g., worms, clams, benthic shrimp, starfish, and vegetation) from the bay bottom within the access channel and navigation channel modifications.

DEIS at 4-244, 245, 247.

While the DEIS has therefore acknowledged that the project will result in substantial harm to benthic communities, it does not fully analyze the harm this would have on the marine environment, particularly on imperiled species, such as Coho salmon. Rather, it discounts the harm, averring that the disturbed areas would recover in several months to one year. *Id.* at 4-248. This, however, does not provide a full analysis of the potential harm, including the short-term harm associated with the loss of habitat and food resources, as well as long-term harm associated with a project of this scale. The DEIS in fact notes that this project would result in larger quantities being dredged and in different substrates than the reference sites it uses for its analysis (i.e. Lowe Columbia and Yaquina Bay), and therefore there is scant support for the assertions in the DEIS. The lack of project- and species-specific analysis of the harm from loss

and damage to benthic communities in the DEIS renders it inadequate under the law. *See Balt. Gas & Elec. Co. v. Nat. Res. Def. Council, Inc.*, 462 U.S. 87, 97 (1983) (NEPA obligates federal agencies to take a "hard look" at the environmental consequences of its actions).[211]

Moreover, there is no discussion of the potential for release of heavy metals or other contaminants through the dredging of Coos Bay, which requires a site-specific analysis that has not been provided. Dredging is likely to lead to the introduction of contaminants, such as heavy metals and pesticides, into the water column. These contaminants are released when settled soils are disturbed, leading to exposure and uptake by fish. There is, in fact, known contamination at the terminal site that, if disturbed as a result of project activities, could impact species – both the Ingram Yard property and the location of the proposed South Dunes site on the former Weyerhaeuser North Bend Containerboard Mill are listed in the DEQ's Environmental Cleanup Site Information ("ECSI") database. The release of heavy metals or other contaminants from these areas could devastate the local fisheries and adversely affect the habitat for much longer than one year, yet the DEIS fails to even mention this potential for harm.

Dredging the bay will degrade the habitat for several species of shrimp, including the native mud shrimp. The DEIS failed to address this species, other than acknowledging that they are harvested in the region. DEIS at 4-232. The shrimp are especially sensitive to the kind of disturbance caused by installing the pipeline through the bay. Mud shrimps are also dealing with the cumulative impacts of an introduced parasite infestation, a parasitic isopod called *Orthione griffenis*.[212] The invasive parasite arrived in the ballast water, probably on container ships sailing from Japan.[213] If the dredging and the pipeline installation in the bay cause the shrimp to decline even further, it can trigger lower water quality in the bay since the shrimp are filter feeders. Scientists have determined that "In Oregon estuaries, mud shrimp filter as much as 80 percent of the bay water per day."[214] They are also an important food source for birds, fish, and other animals. The DEIS failed to consider the impacts to the bay ecosystems if the Jordan Cove Project reduces Mud Shrimp populations even further. The DEIS fails to address any of these concerns, and is therefore inadequate.

Dredging may also set back efforts to restore habitat for oysters. As the DEIS acknowledges:

Coos Bay contains one of only three known native Oregon coastal populations of the Olympia oyster (*Ostrea lurida*). Within its native range, this species has significantly diminished from historical levels (National Fish and Wildlife Federation et al. 2010). Efforts have been taken in the bay to restore this species and improvements in bay water quality and sediment have resulted in self-sustaining populations over the last two decades (Groth and Rumrill 2009; Rumrill 2007).

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[211] As part of this review, the agency must examine the indirect effects of a proposed project, 40 C.F.R. § 1508.8, and include those "effects related to induced changes in … water and other natural systems, including ecosystems." 40 C.F.R. § 1508.8(b).

[212] Jolene Guzman, *Invader kills off mud shrimp* (February, 2009), available at http://theworldlink.com/news/local/invader-kills-off-mud-shrimp/article_fa08c2d9-47e9-5cb6-83d3-6bad07ec3bdf.html. (Guzman, 2009)

[213] *Id.*

[214] Eric Wagner, *Mud Shrimp Meets Invasive Parasite, High Drama for Northwest Estuaries* (2006), *available at* http://depts.washington.edu/nwst/issues/index.php?issueID=winter_2006&storyID=782. (Wagner, 2006)

DEIS at 4-232. The DEIS fails to address how the dredging would affect these oysters, and the loss of resources that have been put into the recovery efforts.
In sum, the DEIS has failed to provide the "hard look" that NEPA requires on the permanent loss of several acres of highly productive intertidal and benthic habitat that would be converted to low productive deep-water habitat, and the impacts this would have on the species of Coos Bay.

K. Permanent Loss of Coastal Riparian Vegetation

Removal of vegetation near the shorelines will adversely affect aquatic species by removing a source of food. Numerous studies have established that riparian vegetation provides a valuable food source for fish, especially juveniles. Wipfli, 1997. The food is the result of invertebrates in the detritus, understory, and canopy of riparian vegetation. Many of these invertebrates find their way into the water and are subsequently eaten by fish.

Clearing vegetation along the edge of Henderson Marsh and Coos Bay will destroy this habitat for invertebrates, thus destroying a valuable food source for fish along the stretches of these waterbodies. The analysis of food source impacts due to removal of vegetation conducted in the DEIS is limited to possible increases in food in the form of microorganisms and aquatic invertebrates in the water due to increased temperatures. Any increases in food by increased production of microorganisms and aquatic invertebrates will further be offset by losses of invertebrates along the shoreline due to the removal of vegetation. The impacts to fish and other aquatic organisms resulting from the removal of a valuable food source, in the form of invertebrates, through the destruction of terrestrial vegetation along the shores of Coos Bay and Henderson Marsh, would be detrimental to resident biological communities.

The DEIS fails to address salinity changes and resulting impacts to fish resources in Coos Bay. The DEIS likewise does not address the impacts of fertilization in riparian areas and nutrient loading impacts on water quality.

Jordan Cove will introduce or allow the proliferation of invasive species to Coos Bay, the terminal site, and along the pipeline route. First, ships from foreign ports will transport exotic species on multiple surfaces and in water releases from ballast or engine cooling water. These species may harm the aquatic ecosystem. Second, the removal of vegetation, and long-term disturbances at the site will allow the introduction and proliferation of exotic species, which will harm native ecosystems and may require herbicides and pesticides to manage.

L. Individual Species

1. Coho Salmon – Southern Oregon/Northern California Coast ESU

The project area includes two major river systems known to support SONCC Coho: the Rogue River and the Klamath River. The DEIS acknowledges that the project is likely to adversely affect SONCC Coho due to numerous impacts to feeding, juvenile exposure to elevated turbidity levels, potential swim bladder rupture due to blasting activities, injury and mortality during fish salvage, and long term habitat deterioration due to reductions in large woody debris. Stream

crossing construction and removal of riparian vegetation are the two primary contributors to these impacts.

In addition, the DEIS admits that the project is likely to adversely impact critical habitat for SONCC Coho. The acknowledged impacts include loss of hatching and rearing habitat from substrate removal and turbidity at stream crossings, degraded water quality as a result of turbidity caused by stream crossing construction, reduction in food sources, barriers to migration during stream crossing construction, and long term loss of native riparian vegetation.

The pipeline construction will disrupt fish passage by damming the streams during the trenching and pipeline placement. It is unclear how long fish passage would be interrupted. The mitigation of capturing and removing fish behind the dams is historically ineffective, and will result in the take of threatened salmonids. This is particularly troubling and unacceptable for large crossings proposed on the Coquille, Umpqua, and potential crossings of the Rogue and Coos if proposed HDDs fail. *See* discussion of HDD failure, *supra*. The DEIS fails to acknowledge the potentially severe impacts to SONCC Coho and its designated critical habitat as a result of HDD failure, and the FERC should not rely on this faulty analysis.

2. Coho Salmon – Oregon Coast ESU

The project area includes designated critical habitat for the Federally Threatened Oregon Coast Coho: the South Umpqua Subbasin, Coquille Subbasin, and the Coos Subbasin (which includes the Coos Bay estuary). The DEIS acknowledges that the project is likely to adversely affect Oregon Coast Coho and its critical habitat.

Activities related to the marine terminal and north spit facilities, including discharge of maintenance dredging spoils causing turbidity plumes, LNG vessel wake strandings, engine cooling water intake entrainment, dredging of the access channel and construction of the pipeline across Hayes Inlet could all jeopardize the survival of this species. Moreover, cooling water intake is likely to entrain and impinge many food sources for Coho, such as juvenile stages of crab and shrimp, other zooplankton and eggs and larvae fish. Pipeline-related activities including stream crossing construction or failures of those operations, blasting, mortality during fish salvage operations, and loss of large woody debris for habitat also have the potential to cause jeopardy to the Oregon Coast Coho and adversely affect its designated critical habitat.

The DEIS does not address direct mortality impacts to listed fish from dredging in Coos Bay. As discussed *supra*, the proposed hydraulic cutterhead dredge method will entrain juvenile fish, including threatened salmonids, as well as benthic organisms critical to salmon diets. Mechanical dredging would not have the same fish entrainment impacts, but is not seriously considered as an alternative dredge method.

The FERC must analyze the impacts of fish entrainment due to dredging. The FERC must also consider the fact that the fish killed will include salmonids listed as threatened under the federal ESA and the Oregon ESA. The FERC must also look to the effect cooling water entrainment would have on food sources for the threatened Coho salmon. The FERC must consider 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 and maintenance dredging.

The proposed dredging is the antithesis of salmon recovery and restoring estuarine habitats, as described in every local, state, and federal management plan. Quite simply, we cannot recover threatened salmon while simultaneously permitting this huge dredging project. Jordan Cove is a prime example of an unacceptable project due to its size, scope, and location in critical salmon habitat.

3. North American Green Sturgeon – Southern Distinct Population Segment

Both Northern and Southern population segments of the North American Green Sturgeon are known to occur within Coos Bay for feeding, growth, and thermal refuge. The DEIS admits that the project is likely to adversely affect Green Sturgeon as a result of bottom disturbance and reduction of benthic food supply from construction and maintenance dredging as well as dredged spoils disposal, and the potential for dredged spoils disposal to bury subadult Green Sturgeon. Likewise, the project is likely to adversely affect critical habitat for the species. The FERC must look at the effect dredging and dredged spoils disposal would have on food sources for the threatened green sturgeon.

4. Pacific Eulachon – Southern Distinct Population Segment

Pacific Eulachon (also known as candlefish) utilize Coos Bay for habitat, and may be present in the estuary during construction and operation of the project. Eulachon typically spend three to five years in saltwater before returning to freshwater to spawn in late winter through mid-spring. Eulachon are a small fish rich in calories and important to marine and freshwater food webs, as well as commercial and recreational fisheries and indigenous people from Northern California to Alaska. The DEIS does not adequately assess potential impacts to this species as a result of the dredge and fill operations proposed in ocean waters, Coos Bay, and coastal tributaries.

5. Lost River Sucker

The Lost River Sucker is a federally listed endangered species that spawns in freshwater streams. The Pacific Connector Pipeline will cross the Lost River upstream of known spawning areas. The pipeline will also cross the Klamath River, another basin where Lost River suckers occur. The DEIS acknowledges that the project is likely to aversely affect Lost River sucker and its designated critical habitat due to injury or death during fish salvage or release of drilling muds from frac-out during HDD of the Klamath River.

6. Shortnose Sucker

The Shortnose sucker is another endangered fish species whose populations have been severely impacted by dam construction, water diversions, overfishing, water quality problems, loss of riparian vegetation, and agricultural practices. Shortnose sucker critical habitat includes the Klamath River within the project area. The DEIS states that the project is likely to adversely

affect shortnose suckers for the same reasons that the Lost River sucker is likely to be adversely affected.

7. Snowy Plover.

The DEIS failed to consider all threats to the threatened western snowy plover from this project. For instance, dredging soils will attract snowy plovers to nest in inappropriate areas. Plovers often return to the same breeding sites year after year , while the dredged sand will be moved for various purposes.

The closest snowy plover nest is only 1.1 miles from the terminal site, in critical habitat, and in the best Snowy Plover nesting habitat in Oregon, at the tip of the north spit.

Additional impacts the DEIS failed to consider would be increased predation to plover nests because increased development brings increased corvids, a predator of plover nests. LNG ships could negatively impact the snowy plover at sea. Skunks and coyote's could be attracted to the dredged material or human presence, increasing the predation threat in plovers. Increased human activity also means more dogs disturbing their nests. The DEIS says that Jordan Cove would "minimize" impacts by humans and pets, but has no specific information on how that would be done.

These impacts to the Snowy Plover should have made the Plover a Likely to Aversely Affect endangered species. The mitigation offered in the DEIS is inadequate, simply a few thousand dollars.

Western snowy plover active nest sites are located within two miles of the proposed LNG terminal site, with critical habitat located approximately 2.6 miles from the site. Snowy plovers are heavily impacted in this area due to human disturbance and scavenger and predator effects. Jordan Cove proposes to implement BMPs to protect plovers from construction and operation impacts, however, those measures have not been clearly articulated or demonstrated that they will offset the potential impacts from increased human activities in the area where plover are known to nest and occupy critical habitat.

8. Native Oysters.

Coos Bay contains one of only three known native Oregon coastal populations of the Olympia oyster. Within its native range, this species is significantly diminished from historical levels. Thousands of Olympia Oysters could be within the pipeline right-of-way. Oysters will be affected by turbidity and sedimentation caused by the installation of the pipeline in the bay, using an open cut method in Haynes Inlet.

The DEIS refers us to the Olympia Oyster mitigation plan . That plan claims that "dispersal of fine sediments and elevated turbidity will be confined to a very small area and are thus unlikely to negatively impact Olympia oysters outside the pipeline right of way. Thus the only negative effects to Olympia oysters would be direct disturbance."

The PCGP failed to consider that fine sediments and turbidity spread downstream with the flow of water, or upstream if the tide is coming in. The PCGP has no basis to conclude the dispersal of fine sediments will not travel.

Dredging the bay, which would not occur as much without this project, will harm more oysters. These oysters, including at the mouth of Coos Bay, should have been considered in the DEIS.

PCGP proposes to relocate the oysters within the right-of-way to an area northwest of the right-of-way, where there are already Olympia oysters. However, the DEIS failed to consider how many oysters can occupy that site, and if it is currently at capacity.

M. Compliance with the Coastal Zone Management Act.

Pursuant to section 307(c) of the CZMA, the applicants must provide a consistency certification that the project is consistent with the Oregon Coastal Management Program. 16 U.S.C. § 1456(c)(3). The Oregon Department of Land Conservation and Development is responsible for ensuring, pursuant to the federal Coastal Zone Management Act (CZMA) of 1972, that the proposed project is consistent with the state's coastal management program. 15 C.F.R. Part 930, Subpart D, contains the applicable regulations for the federal consistency determination. Specifically, 15 C.F.R. § 930.11(h) defines "enforceable policy," stating,

The term 'enforceable policy' means State policies which are legally binding through constitutional provisions, laws, regulations, land use plans, ordinances, or judicial or administrative decision, by which a State exerts control over private and public land and water uses in the [']coastal zone,' 16 USC 1453(6a), and which are incorporated in a management program as approved by OCRM either as part of a program approval or as a program change under 15 CFR part 923, subpart H.

Oregon's coastal management program includes: 1) the statewide land use planning goals; 2) the applicable acknowledged city or county comprehensive plan and land use regulations; and 3) state statutes and regulations governing removal-fill, water quality, and fish & wildlife protections.

The DEIS does not demonstrate compliance with the Coastal Zone Management Act ("CZMA"). The application is both incomplete and inadequate. The application is premature, lacking complete applications to other key agencies and adequate analyses of impacts to sensitive resources. Additionally, the project has failed to obtain local approvals for the terminal and pipeline necessary for the project to demonstrate compliance with the CZMA.

1. Inadequate Information to Support Certification.

The application to the Corps, DEQ, and DLCD lacks key information. The lack of adequate information for all of these agencies, including DEQ, renders the CZMA application incomplete because the CZMA requires key state authorizations be received as part of the application. For all the reasons detailed above demonstrating incompleteness of the section 401 application to DEQ, the application to DLCD is also incomplete under the CZMA.

The application is also incomplete because it does not show that the project complies with local land use regulations, despite assertions to the contrary in the DEIS. Although some portions of the project have been reviewed and approved by Coos County, key elements of the project, including the South Dunes Power Plant and Utility Corridor, have not yet been subject to review for consistency with Statewide Planning Goals and/or local comprehensive plan and land use ordinance provisions. There are currently no pending applications before Coos County for these determinations. Instead, these components are being reviewed as part of the Oregon Department of Energy (Energy Facility Siting Council) certification process. The DEIS is therefore inaccurate and the public notice is misleading and premature.

The applicants have failed to provide adequate information related to Statewide Planning Goals and local land use requirements:

- Information demonstrating compliance with Statewide Planning Goals 16, 17, and 18 for impacts to coastal shorelands, estuaries, and dunes.
- Information demonstrating compliance with Statewide Planning Goal 7 related to natural hazards.
- Information demonstrating compliance with Statewide Planning Goals 5 and 6 for natural resources and air and water.
- Information demonstrating compliance with CBEMP Policies #17 and #18. The location of project components within the Coos County Shorelands Values Inventory Map has not been provided and/or explained with sufficient detail to allow a determination of compliance with those policies.

The applicants have failed to provide adequate information related to state removal-fill laws:

- Information regarding impacts to waters of the state including wetlands at the South Dunes site. The information provided as to impacts to Wetland M is inconsistent. In addition, the applicants have not provided any information explaining the nature of fill material to be deposited in the waters of the state.
- Descriptions of the nature and duration of each activity associated with the construction of the barge berth, including dredging, filling or pile driving, and impacts due to sedimentation and noise.

The applicants have failed to provide adequate information related to state water quality laws:

- Information related to wastewater discharge from the South Dunes site.
- Information related to the source of water for the South Dunes facility, maximum water use, and annual average and worst-case conditions for water loss.
- Information explaining measures to be included in the NPDES permit for stormwater discharges that will minimize impacts of erosion and sedimentation on surface water.

The applicants have failed to provide adequate information related to state wildlife protection laws:

- Information related to sensitive species on ODFW Wildlife Division Sensitive Species List.
- Information related to the nature, extent and duration of impacts on the habitat that could result from construction, operation and retirement of the South Dunes facility.
- Information related to the potential for indirect impacts on eelgrass habitat from sedimentation and the quantity of habitat that could be impacted.
- Information sufficient to demonstrate how the Upland Erosion Control, Revegetation, and Maintenance Plan will offset fragmentation impacts to wetlands and estuarine habitat for the South Dunes site.
- Information related to mitigation of indirect impacts to amphibians at the South Dunes site.
- Information related to impacts to raptors, other birds, and nesting habitat at the South Dunes site.
- Information to substantiate claims of no direct impact to stellar sea lions from the South Dunes project component.
- Information related to mitigation measures for wildlife habitat disturbed as a result of activities related to the South Dunes site.
- Information related to impacts to marine mammals and birds resulting from the South Dunes project component.
- Inconsistent information related to impacts to green sturgeon.

This lack of information puts DLCD in the impossible position of reviewing a consistency certification without fundamental information about how the project would impact the coastal zone. Without this information, DLCD and the public are crippled in their ability to comment on the project's consistency with the enforceable policies of the OCMP. At a minimum, the Coalition requests that DLCD object to the Applicants' CZMA certification on the basis that they have failed to submit adequate information demonstrating that the project complies with the enforceable policies of the Oregon Coastal Management Program.

2. The Project is Inconsistent with Statewide Planning Goals.

DLCD should object to the CZMA certification because the project is inconsistent with several of Oregon's Statewide Planning Goals. The Statewide Planning Goals are implemented through local comprehensive plans. For this project, Coos County and Douglas County, as well as the City of Coos Bay are the local governments with regulatory authority for land use approval of the project. However, as discussed above, many components of the project have not been reviewed or approved for local land use approvals. DLCD must independently consider whether the project will comply with the Statewide Planning Goals applicable to this project within the Coastal Zone.

a. Goal 6: Air, Water, and Land Resource Quality

Jordan Cove LNG fails to demonstrates its project is consistent with Statewide Planning Goal 6, "[t]o maintain and improve the quality of the air, water and land resources of the state." The Coalition's scoping comments to FERC, as well as prior comments from the State of Oregon,

National Marine Fisheries Service, and others, describe a multitude of environmental impacts from Jordan Cove LNG's terminal. DLCD should object to the CZMA certification because the project is not consistent with Statewide Planning Goal 6.

b. Goal 7: Natural Hazards

Statewide Planning Goal 7 requires land use planning to reduce risk to people and property from natural hazards. Regulated natural hazards include floods, landslides, earthquakes and related hazards, tsunamis, coastal erosion and wildfire. The proposed LNG terminal would be located in an area subject to extreme risk from earthquake and tsunami inundation. In addition, the pipeline would cross several areas of steep terrain and heavily forested areas within the Coastal Zone, subject to landslide and wildfire risk.

Scientists predict that there is a 40 percent chance of a major earthquake (magnitude 8.7 to 9.2) and tsunami on the Cascadia Subduction Zone off Coos Bay in the next 50 years. The severity of the earthquake would be similar to that experienced in Japan in March of 2011. If by 2060 there has not yet been a major earthquake, 85 percent of known intervals of earthquake recurrence in 10,000 years will have been exceeded. This type of event would cause violent ground motion, soil liquefaction, lateral spreading and subsidence. In turn, these land changes could cause pipe breaks and damage the LNG storage tanks proposed for the facility. In order to protect the site from tsunami inundation, Jordan Cove proposes to use sand to fill and elevate the property site above the projected inundation level, 40 feet or more about current land elevations.

The project site on the North Spit is located at a bend in Coos Bay, where tidal energy is deflected. The elevation of the land at this location could significantly alter the direction and velocity of an incoming tsunami. For example, instead of running up onto the North Spit and inundating the land there, the proposed sand wall, if it survives the liquefaction and lateral spreading effect of the earthquake, would deflect and re-direct the force of a tsunami. DOGAMI has prepared inundation zone maps to help the communities of Coos Bay and North Bend prepare for evacuation and planning in case of tsunami. The proposed significant alteration of the shoreline at this location could have important effects on the inundation of other areas within the Bay Area communities. In other words, the risks of these types of hazards extend beyond just the inundation, liquefaction, and ground shaking at the project site. The project's proposed alterations of the shoreline at the project location could have significant impacts to the communities of the Coos Bay area. These types of risks to people and property must be accounted for in order to comply with Goal 7.

c. Goal 9: Economic Development

Statewide Planning Goal 9, OAR 660-015-0000(9) provides for "adequate opportunities throughout the state for a variety of economic activities vital to the healthy welfare, and prosperity of Oregon's citizens." Jordan Cove LNG's proposed terminal and its adverse effects on shipping, fishing, and tourism would undermine the fundamental mandate of Goal 9. The Jordan Cove LNG site falls along the necessary ingress and egress of practically any vessel bound for or leaving from Coos Bay. These unavoidable interferences with these industries

indicate the failure of Jordan Cove LNG's proposal to comply with Goal 9's intent for Comprehensive Plans to account for the economies of all regions of the state.

Additionally, construction of the terminal would disregard at least two Planning Guidelines enumerated in Goal 9. Planning Guideline 2 of Goal 9 offers among the most relevant considerations to the proposals at issue when it states in part that "[t]he [comprehensive] plan should also take into account the social, environmental, energy, and economic impacts upon the resident population." While guidelines are "suggested approaches . . . designed to aid . . . in compliance with goals," ORS § 197.015, the failure to follow guidelines suggests the potential for noncompliance with goals. Here, the Applicants' proposals would negatively impact each of the considerations enumerated in the portion of Planning Guideline 2 stated above.

Social: Construction of the Jordan Cove LNG terminal would diminish recreational and commercial fishing due to both the fishing vessels' compliance with the mandatory safety zone accompanying every LNG carrier en route to Jordan Cove LNG as well as the decreased salmon spawning habitat as a result of the vast amount of proposed dredging and filling of critical salmon habitat. Additionally, the danger of an LNG breach will surely instill a degree of apprehension among a number of those within an LNG carrier's mobile blast zone and, in some cases, fear. Particularly given the modern potential for terrorist activity, both apprehension and fear would have a reasonable basis in reality.

Environmental: The proposed terminal site is home diverse flora and fauna, both marine and land, including salmon rearing habitat. In supplanting this ecosystem with industry, Jordan Cove LNG will harm these and other environmental treasures. As discussed throughout these comments, the environmental effects of the proposed project are significant and far-reaching.

Economic: The terminal and accompanying carriers will cause economic harm inhibiting the flow of boat traffic, diminishing the tourism appeal of the area, and negatively impacting the housing market. Coos County is home to many commercial and recreational fishermen. The LNG-related delays caused to commercial fishing vessels would thus be felt heavily in Coos County. Delayed shipping and tourist vessels bound for Coos County would experience similar costly delays. In addition to these delays faced by tourist vessels, LNG would diminish tourism in the area in general. Additionally, property values of areas near Jordan Cove or anywhere along the LNG tanker pathway 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 carriers. Also associated with the risks inherent in LNG are increased insurance costs. Id.

Energy: The costs of LNG export likewise will harm the community. LNG export activities, rather than providing public benefits, will significantly increase gas costs to U.S. consumers and businesses as they are forced to compete with high-priced overseas markets. These impacts are discussed in detail in Section 1.1 of these comments, *infra*.

Jordan Cove LNG's project also disregards Goal 9's Planning Guideline 4, which states "[p]lans should strongly emphasize the expansion of increased productivity from existing industries and firms as a means to strengthen local and regional economic development." This guideline

indicates the Goal 9's preference toward improvements or modifications of existing entities, with an emphasis on "local and regional economic development."

d. Goal 11: Public Facilities and Services

Statewide Planning Goal 11 is to "plan and develop a timely, orderly and efficient arrangement of public facilities and services to serve as a framework for urban and rural development." OAR 660-015-0000(11). The project, with its influx of 2,100 workers (at peak), is likely to place stress on existing public services including police and fire protection, as well as water and sewer treatment providers. Several components of the project, including the addition of the Southwest Oregon Regional Safety Center and the North Bend worker's camp, threaten to violate the policies of Goal 11. For example, the Applicants have not demonstrated that the proposed North Bend workers' camp can be adequately served by existing water and sewer systems. If existing water and/or wastewater treatment facilities are not adequate to serve the additional 2,000 users at the workers' camp, the expansion of these public services must comply with Goal 11 policies.

DLCD has an independent obligation under the CZMA to review Douglas and Coos County's actions related to land use approvals for the project and ensure that the counties' actions comply with the Statewide Planning Goals. In addition, several components of the project have not yet been reviewed for land use compliance. DLCD must ensure that all aspects of the project comply with the Statewide Planning Goals as part of the enforceable policies of the Coastal Management Program. The Coalition urges DLCD to protect Oregon's interests by objecting to the Applicants' consistency determination on the basis that the project is inconsistent with the Statewide Planning Goals.

3. The Project's Proposed Water Use is Inconsistent with Coastal Management Plan Policies.

The Applicants will be required to seek approval for water rights to construct and operate the LNG terminal and pipeline. The Oregon Water Resources Department's (OWRD) mission is to "restore and protect streamflows and watersheds in order to ensure the long-term sustainability of Oregon's ecosystems, economy, and quality of life."[215] Further, water resources are held by the state in trust for its citizens. "The state, as trustee for the people, bears the responsibility of preserving and protecting the right of the public to the use of the waters [for navigation, fishing and recreation]." *Oregon Shores Conservation Coalition v. Oregon Fish and Wildlife Comm'n,* 62 Or App 481, 493, 662 P2d 356 (1983).

As part of its mission and public trust duty, OWRD must act to protect water resources for future generations of Oregonians. In light of the threats to water resources posed by population growth, increased usage and demand, upstream pollution, urbanization, drought and climate effects, and over-utilization of groundwater and surface waters, OWRD should be vigilant in acting to protect continued access to potable water. OWRD has acknowledged that management of water resources in Oregon is facing a number of significant challenges. *See* WRD, *Integrated Water Resources Strategy Discussion Draft* 8 (Dec 2011). Surface water is nearly fully allocated during

[215] Oregon Water Resources Department, *About Us*, http://www.oregon.gov/OWRD/about_us.shtml (May, 2007) (last visited Jan. 11, 2015).

summer months and groundwater is showing decline in many areas. *Id*. at 19. Almost 15,000 stream miles in Oregon do not meet the state's water quality standards for one or more pollutants. *Id.* at 22. These include several streams and waterways that will be impacted by the project, including Coos Bay and the Coos River.

Using Oregon's public water resources to construct and operate LNG export facilities is not in the best interest of the public of this state. The proposed LNG terminal and pipeline would consume millions of gallons of water each year, cause water pollution, and harm Oregon's recovering salmon runs. Pipeline construction would damage forestlands and watersheds, and disrupt property rights. Forcing Oregonians to live and work near massive LNG export facilities will subject citizens to unacceptable and unnecessary risks. Because using Oregon's water for LNG export would be detrimental to Oregon's interests, OWRD has the authority, and the obligation, to deny applications for water rights for this project.

N. Air Impacts

FERC must revise the DEIS to explain how operational air emissions were estimated, and to ensure a hard look at these emissions. Because the DEIS provides no explanation as to how the values presented in table 4.12.1.3-2 were calculated, commenters cannot meaningfully comment on the appropriateness of these estimates. However, several discrepancies between these estimates and those presented in the prior EIS call the current estimates into question.
For example, the current DEIS estimates combined vessel and tug emissions that, on a per-vessel-call basis, are significantly lower than the estimate provided in table 4.12.1.1-5 in the prior FEIS. This discrepancy is entirely unexplained. It is also contrary to what would be expected, given that the current DEIS appears to assume both larger tankers and a longer transit time, factors that we assume would *increase* per-vessel-call emissions.
As another example, the current DEIS estimates vastly lower operational volatile organic chemical emissions, principally because of a reduction in fugitive emissions (131.05 tons reduced to 7.98). The DEIS offers no explanation for this reduction; we question whether this reduction is even plausible.

III. PACIFIC CONNECTOR NATURAL GAS PIPELINE.

The applicants also propose to construct a 229-mile, 36-inch high-pressured gas pipeline, which will be placed through Coos Bay and cross and permanently impair streams, wetlands, and sloughs, along with causing associated deleterious impacts to upland habitat, forest, farm, recreational, and residential uses. The pipeline would cross approximately 400 waterbodies, require clear cutting of thousands of acres of the remaining old growth forests in Oregon, cross steep and remote terrain prone to landslides where emergency response is limited to local volunteers, and impact and permanently impair approximately 5,938 acres of state, federal and privately owned lands. The DEIS states that the Pacific Connector Gas Pipeline (PCGP) would cross approximately 11.6 miles of wetlands. The Joint Permit Application ("JPA") associated with Clean Water Act compliance for this project states that the PCGP would cross approximately 11.64 miles of wetlands, impacting approximately 239 acres of wetlands. The JPA also states that 87,454.19 cubic yards of material will be excavated from wetlands, and 39,117.61 cubic yards of material from waters, for a total of 126,571.80 cubic yards to be

excavated along the pipeline route. According to the JPA, 660 features of potentially jurisdictional wetlands and other waters were identified within the project corridor. The DEIS states that approximately 239 acres of wetlands will be disturbed during construction of the project. DEIS Appendix N, Table N-1b at N-67.

As a largely undeveloped upstream region, the portion of the Project area sited for the proposed upstream pipeline and related infrastructure will be dramatically affected. The Pacific Connector pipeline would traverse approximately 40 miles of BLM lands and 31 miles of NFS lands on its 232-mile route from Malin to Coos Bay, Oregon. The pipeline project would cross portions of 19 fifth-field watersheds, 16 of which include BLM or NFS lands where the ACS applies. In 12 of the 16 watersheds traversed by the pipeline on federal lands, the pipeline project would cross perennial or intermittent streams or clip areas designated as Riparian Reserves; in 4 of the watersheds crossed, the pipeline project would not intersect with Riparian Reserves or stream crossings.

A. Pipeline and the Pipeline Right-of-Way

Construction of the pipeline, including clearing the pipeline right of way, will have tremendous impacts. In this section, we discuss the impacts related to terrestrial pipeline activities. Impacts related to pipeline stream crossings are discussed in the following subsection.

B. Municipal Watersheds Effects.

The Pacific Connector Gas Pipeline would require blasting and clearcutting a 75 to 95-foot right-of-way across steep terrain and through soils with high potential for erosion and landslides. It would remove trees and streamside vegetation along more than 485 Oregon streams and rivers. It would warm waters and introduce nutrients, increasing the risk of Harmful Algae Blooms (HAB). It would also increase the risks of human-caused fire and wildfire.

As noted by the Oregon Department of Environmental Quality, "Many studies have shown that it is more cost-effective to prevent pollution in the environment than to remove it through treatment or to implement restoration.[216] Reducing or eliminating pollutants through protection and prevention can:

- lower treatment and maintenance costs for public water providers
- improve long-term viability of groundwater drinking water sources
- reduce the need for equipment replacement or upgrades
- reduce risks associated with many contaminants (including ones known to be toxic, persistent, and/or bio-accumulative)
- promote long-term assurances of a safe and adequate drinking water supply
- help protect property values and preserve the local and regional economic growth potential
- enhance public confidence in their drinking water
- reduce the need for expensive treatment in both surface water and groundwater

[216] Oregon Department of Environmental Quality Environmental Solutions: Watershed Management Section, 2018) https://www.oregon.gov/deq/FilterDocs/SurfaceWaterResourceGuide.pdf

Alternatively, pollution of drinking water associated with fracked gas infrastructure may saddle water providers and ratepayers with costly new monitoring and treatment systems.

The proposed Pacific Connector Pipeline (PCP) has vast potential to degrade water quality and quantity on public, private, and tribal land for drinking water and other beneficial uses. The project would directly harm approximately 480 Oregon rivers and streams by clearcutting through riparian areas, building new roads to access these rivers, damming and diverting water, cutting trenches and laying a 36-inch pipeline directly through riverbanks and riverbeds. Horizontal drilling beneath the wild and scenic Rogue, Umpqua, Coquille, Coos, and Klamath Rivers could result in pollution of waters with toxic drilling fluids. At least twelve public drinking water sources are located in watersheds to be transected by the proposed pipeline.

The pipeline would slash a 95-foot wide swath through forest, ranch, and farm land and would also cross the popular recreational hiking trail, the Pacific Crest Trail. Clear cuts along the trail and elsewhere would be permanently maintained by cutting and spraying fertilizers, herbicides and pesticides.

During construction, testing of the pipeline to determine if it will hold gas would utilize enormous quantities of fresh water in areas that are designated as drought affected. For example, the Klamath Basin and those who rely on Klamath water (irrigators, tribal communities, endangered species, wildlife refuges, and associated wildlife) already experience extreme strain on water resources. Testing could require over 60 million gallons of fresh water. If the project re-uses water to test multiple segments of pipe, it would still consume at least 16 million gallons of water.[217] Discharged test water would be contaminated with materials used to construct the pipeline.

According to the Oregon DEQ and the Oregon Health Authority, water contamination "depends on three major factors: 1) the occurrence of a land use/activity that releases contamination, 2) the location of the release, and 3) the hydrologic, ecological, and/or soil characteristics in the source area that allow the transport of the contaminants to the waterbody and thereby the intake."[218] Human factors affecting water quality include:

- All activities and facilities within riparian areas
- Road locations and conditions, especially stream crossings, and roads near streams, on steep slopes, and with drainage systems connected to the stream network
- Stormwater runoff from contaminated lands, for example, with high phosphorus or nitrogen content
- Recently managed forestland which has been harvested, replanted, and treated with herbicides.
- Quarries, construction, and other industrial sites
- Hazardous material sites
- Solid waste landfill sites

[217] Draft Environmental Impact Statement for the Jordan Cove Energy Project, 2019
[218] Oregon Department of Environmental Quality Environmental Solutions: Watershed Management Section, 2018

Each of these factors is associated with the proposed pipeline.

Some landscapes are more sensitive to disturbances and contamination has greater potential to impact the water supply.[219] Sensitive areas include:

- Riparian areas
- Springs, seeps, and wetlands
- Steep slopes (>70-85%)
- Floodplains
- Areas with high soil erosion or runoff potential, for example, disturbed or bare soil
- High water table areas
- Areas of high soil permeability
- Areas within 1000 feet of rivers and streams.

The proposed pipeline would pollute streams, wetlands and riverbeds; blast rock and hillsides; clear-cut and destroy vegetation in each of these sensitive areas within municipal watersheds. Potential adverse impacts include:

- increased water temperature from loss of forest cover and riparian area buffers
- increased erosion from loss of forest cover and riparian areas leading to increased sediment and turbidity
- increased use of chlorine due to higher turbidity levels, leading to increased chemical by-products that carry their own health risks
- contamination of water and soil by oil, lubricants, and chemicals
- movement of non-native species into watersheds on tires of vehicles, on boats, and equipment
- fires due to construction and blasting accidents and rupture or failure of the pipeline
- wildfire leading to pipeline explosion leading to larger wildfire
- water contamination through accidental application of fire suppressants/retardants
- post-fire slope failures, debris flows, landslides, increased turbidity, loss of drinking water, increased cost for replacement of drinking water, increased costs for water treatment
- disruption of surface water connection with groundwater (from blasting and water diversions)
- disruption of groundwater connection with wells and surface water (from blasting and water diversions)
- contamination of water by herbicides like picloram (to maintain right-of-way free of vegetation on and near the pipeline route) which could persist in the groundwater for years
- contamination of water by intensive use of fertilizers to re-plant cleared area around pipeline
- increased incidence of harmful algal blooms

[219] Oregon Department of Environmental Quality Environmental Solutions: Watershed Management Section, 2018

Construction and operation of the pipeline would also degrade habitat for aquatic life, especially the endangered Coho salmon, with negative impacts on fishing and traditional activities of tribal communities. Habitat degradation would occur through loss of forest canopy, removal of riparian vegetation, decreased summer flows, warming of water, and addition of fertilizers/nutrients to encourage re-growth of vegetation on certain properties following installation of the pipeline.

These same effects would increase risk of harmful algal blooms (HAB). According to the Centers for Disease Control and Prevention, HAB can produce toxins that cause illness in people, companion animals, livestock and wildlife.[220] Exposures to the toxins can occur when people or animals have direct contact with contaminated water by:

- Swimming
- Breathing in aerosols (tiny airborne droplets or mist that contain toxins) from recreational activities or wind-blown sea spray
- Swallowing toxins by drinking contaminated water or eating contaminated fish or shellfish

Human and animal illnesses and symptoms vary depending on the nature and length of exposure and the particular HAB toxin involved. Common toxins include cyanotoxins which can be toxic to the nervous system, liver, skin, or the gastrointestinal tract. No human deaths in the United States have been caused by cyanotoxins; however, companion animal, livestock, and wildlife deaths caused by cyanotoxins have been reported throughout the United States and the world.[221]

During the summer of 2018, a state of emergency was declared by Governor Brown when the drinking water supply for the City of Salem was tainted by HABs. Eight drinking watersheds in SW Oregon that would be transected by the PCGP are today at risk for HAB.[222] The construction and maintenance of the proposed Pacific Gas Connector Pipeline would greatly exacerbate that risk.

According to the Jordan Cove DEIS, "If a groundwater supply is affected by the Project, Pacific Connector would work with the landowner to provide a temporary supply of water; if determined necessary, Pacific Connector would provide a permanent water supply to replace affected groundwater supplies."[223]The same claim is made for mitigation for a temporary or permanent loss of surface water supplies. Replacement of a permanently contaminated aquifer or surface water drinking source would, however, require trucking in bottled water or piping it in from an alternative source. This would be costly, difficult, and in some cases impossible. It would represent a permanent erosion of quality of life as well as significant reduction in land value. Lack of an affordable and reliable source of clean water renders a landscape uninhabitable over the long term.

Watersheds that could be degraded by this project include, but are not limited, to those that provide water to the City of Coquille, Myrtle Point, Myrtle Creek, Medford, Eagle Point, Central

[220] Centers for Disease Control and Prevention, n.d.
[221] Centers for Disease Control and Prevention, n.d.
[222] Oregon Health Authority, 2018
[223] Draft Environmental Impact Statement for the Jordan Cove Energy Project, 2019

Point, Jacksonville, Phoenix, Talent, Shady Cove, Anglers Cove, Tri-City JW and SA, Clarks Branch Water Association, Country View MH Estates, Lawson Acres Water Association, Glendale, Roseburg Forest Products – Dillard, Winston Dillard Water District, Tiller Elementary School, Latgawa Methodist Church Camp, Milo Academy, and Lake Creek Learning Center. Over 156,750 Oregonians rely on safe drinking water from these systems.

Many of these systems are already sensitive to contaminants of concern, including risk of erosion, turbidity, microbiological contamination, and harmful algal blooms. Many have already invested in expensive technology to clean and disinfect water.

The map below demonstrates the drinking watershed for Myrtle Point, one of the many areas in SW Oregon that are susceptible to elevated erosion potential from ground disturbance and vegetation removal and would face increased risk with construction and operation of the Pacific Connector Gas Pipeline. Steep slopes are identified for 117 miles of the proposed pipeline. 94 miles of the pipeline would be located in soils with high or severe erosion potential. Maps at this fine scale for specific watersheds are available from Oregon DEQ. Erosion leads to increased turbidity levels which can present costly challenges for human health, water treatment and water delivery.

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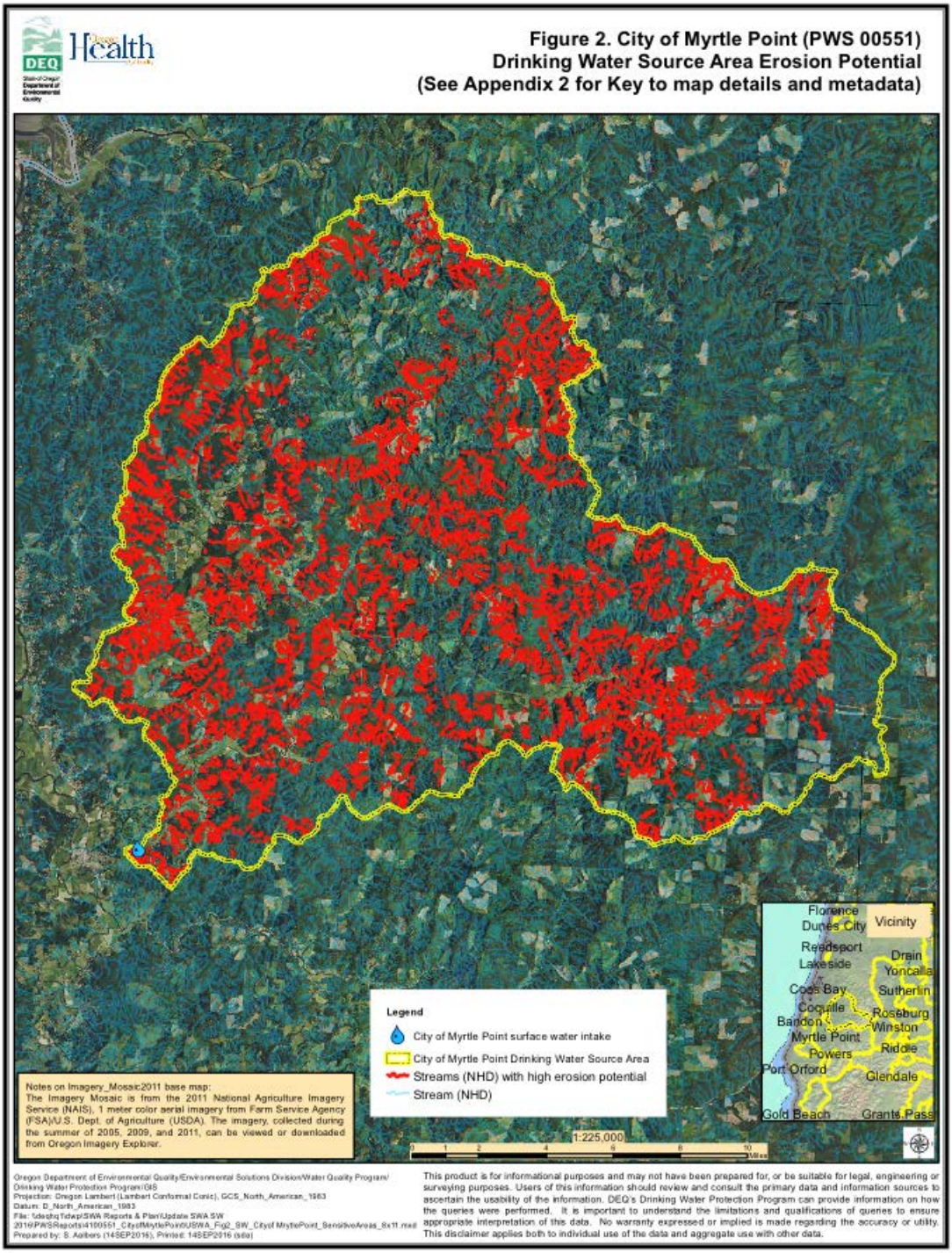
Figure 17
City of Myrtle Point, Oregon
Drinking Water Source Area Erosion Potential



Below are excerpts from Oregon DEQ/Oregon Health Authority Source Water Assessments and/or information published by municipal water providers. Description of watersheds include

sensitive areas and potential sources of contamination. In many cases they include potential pollutants from erosion and landslides, high soil permeability, stream miles in erodible soils, high soil erosion potential present, shallow landslide potential and landslide deposits. It is staggering to contemplate the damage that could be done by this massive project.

Medford Water Commission (PWS 4100513) provides water to Medford and provides wholesale water to cities of Eagle Point, Central Point, Jacksonville, Phoenix, Talent and the Lake Creek Learning Center

Source: Rogue River and Big Butte Springs
Jackson County
Serves 131,867 (includes those served by wholesale customers)

Oregon DEQ/Oregon Health Authority (OHA) Updated Water Source Assessment demonstrates:

A. Potential Pollutants: 8 hr time of travel in Drinking Water Source Area with 203 stream miles

- Stream miles in erodible soils: *156*
- High Soil Erosion Potential: *77%*
- Shallow Landslide Potential: S*ee DEQ*
- Landslide Deposits: *limited areas throughout watershed* include earth and debris slides, flows, slumps, falls and complex landslide types. (Does not include rock material landslide deposits.)

B. Potential Pollutants: Full Surface Drinking Water Source Area with 6,909 stream miles

- Stream miles in erodible soils: *5,244*
- High Soil Erosion Potential: *76%*
- Shallow Landslide Potential: *See DEQ*
- Landslide Deposits: *areas throughout watershed* include earth and debris slides, flows, slumps, falls and complex landslide types. (Does not include rock material landslide deposits.)

Potential Harmful Algae Bloom (HAB) **risk criteria/factors identified in Medford's Drinking Water Source Area** by DEQ in June 2018:

Previous HAB Advisory

DEQ Water Quality Limited Listing indicating the waterbody needs TMDL for Algae and aquatic weeds, pH, dissolved oxygen

OHA DWS sampling location for cyanobacteria toxin (2011-2017)

Waters of potential concern for HAB

C. Groundwater wells: Drinking water source area 88.68 acres

City of Coquille (PWS 4100213)

Source: Coquille River
Serves 3,866 people

D. Potential pollutants from erosion and landslides (See Table 1: Drinking Water Source Area Land Use and Susceptibility Analysis Summary from DEQ 2016 Source Water Assessment):

- Stream miles in erodible soils: *1,488.69* (Coquille River) *4.74* (Rink Creek)
- High Soil Erosion Potential: *41.4%* (Coquille River) *99.6* (Rink Creek) (% stream miles with high erosion located within 300' of stream)
- Shallow Landslide Potential: S*ee DEQ*
- Landslide Deposits: *Multiple landslide deposits are present* and points are mapped throughout the Coquille watershed; Limited landslide/deposit near Rink Creek intake

Potential Harmful Algae Blooms (HAB) **risk criteria/factors identified in City of Coquille's Drinking Water Source Area** by DEQ in June 2018:

DEQ Water Quality Limited Listing indicating the waterbody needs TMDL for Dissolved Oxygen, Chlorophyll-A

Multiple Water Quality Listings (Source: OR DEQ Water Quality Assessment (DEQ/WQ - 10/31/2014) and DEQ Source Water Assessment 2016)

Myrtle Point (PWS 4100551)
Source: North Fork Coquille River
Serves 2,600 people

DEQ/OHA Source Water Assessment 2016 (excerpts):

Potential Pollutants: 8 hr time of travel in Drinking Water Source Area with 203 stream miles

- Stream miles in erodible soils: *1,011.54*
- High Soil Erosion Potential: *47%* (% stream miles with high erosion located within 300' of stream)
- Shallow Landslide Potential: *See DEQ*
- Landslide Deposits: *Multiple landslide deposits are present* and points are mapped throughout the watershed

Potential Harmful Algae Bloom (HAB) **risk criteria/factors identified in Myrtle Point's Drinking Water Source Area** by DEQ in June 2018:

DEQ Water Quality Limited Listing indicating the waterbody needs TMDL for Dissolved Oxygen
Sampling point for cyanobacteria toxin (2011-2017) Multiple rivers and streams are already listed as Water Quality Limited (See Water Quality Analysis 10.31.2014)

Winston Dillard Water District (PWS 4100957)
Source: South Umpqua River
Douglas County
Serves 8,000 people

DEQ Source Water Assessment 2003 (excerpts):

There are eleven other public water systems located upstream of the Winston-Dillard intake that obtain their drinking water from the South Umpqua River or its tributaries. This source water assessment addresses the geographic area providing water to Winston-Dillard's intake (Winston Dillard's portion of the drinking water protection area) between Winston-Dillard's intake and the next upstream intake for Roseburg Forest Products.

Risks for the system, according to the Water Summary Brochure: A total of 36 potential contaminant sources were identified in Winston-Dillard's drinking water protection area. 0f these, 34 are located in the sensitive areas and 29 are high-to- moderate risk sources within "sensitive areas". *The sensitive areas within the Winston- Dillard drinking water protection area include areas with high soil permeability, high soil erosion potential, high runoff potential and areas within 1000' from the river/streams. The sensitive areas are those where the potential contamination sources, if present, have a greater potential to impact the water supply.*

Potential Harmful Algae Bloom (HAB) **risk criteria/factors identified in Winston- Dillard's Drinking Water Source Area by** DEQ in June 2018:

Previous HAB Advisory

DEQ Water Quality Limited Listing indicating the waterbody needs TMDL for Algae and aquatic weeds, Chlorophyll-A, pH, Dissolved Oxygen

OHA DWS sampling location for cyanobacteria toxin (2011-2017)

Roseburg Forest Products-Dillard (PWS 4194300)
Source: South Umpqua River
Douglas County

Serves 2,000 people

From 2003 Source Water Assessment Summary Brochure (excerpts):

RISKS FOR THE SYSTEM:

A total of 18 potential contaminant sources were identified in Roseburg Forest Products' drinking water protection area. Of these, 17 are located in the sensitive areas and 14 are high-to-moderate risk sources within "sensitive areas". *The sensitive areas within the Roseburg Forest Products drinking water protection area include, but are not limited to, areas with high soil permeability, high soil erosion potential, high runoff potential and areas within 1000' from the river/streams. The sensitive areas are those where the potential contamination sources, if present, have a greater potential to impact the water supply.*

Potential Harmful Algae Bloom (HAB) **risk criteria/factors identified in Roseburg Forest Products - Dillard Drinking Water Source Area** by DEQ in June 2018:

Previous HAB Advisory

DEQ Water Quality Limited Listing indicating the waterbody needs TMDL for Algae and aquatic weeds, Chlorophyll-A, pH, Dissolved Oxygen

Clarks Branch Water Association (PWS 4100548)
Source: South Umpqua River
Douglas County
Serves 140 people

DEQ Water Source Assessment Summary Brochure 2003 (excerpts):

RISKS FOR THE SYSTEM:

A total of 36 potential contaminant sources were identified in Clarks Branch's drinking water protection area. Of these, 35 are located in the sensitive areas and 32 are high-to- moderate risk sources within "sensitive areas." (Maps are available from the 2003 Source Water Assessment.) *The sensitive areas within the Clarks Branch drinking water protection area include, but are not limited to, areas with high soil permeability, high soil erosion potential, high runoff potential and areas within 1000' from the river/streams. The sensitive areas are those where the potential*

contamination sources, if present, have a greater potential to impact the water supply.

Potential Harmful Algae Bloom (HAB) risk criteria/factors identified in Clarks Branch Drinking Water Source Area by DEQ in June 2018:

Previous HAB Advisory

Water Quality Limited Listing indicating the waterbody needs TMDL for

Algae and aquatic weeds, Chlorophyll-A, pH, dissolved oxygen

Waters of potential concern for HAB

Tri-City JW and SA (PWS 4100549)
Source: South Umpqua River Douglas County
Serves 3,500
Number of connections: 1,500

DEQ Source Water Assessment 2003 (excerpts):

RISKS FOR SYSTEM:

A total of 40 potential contaminant sources were identified in Tri-City Water District's drinking water protection area. Of these, 37 are located in the sensitive areas and 32 are high- to moderate- risk sources within "sensitive areas". *The sensitive areas within the Tri-City Water District drinking water protection area include, but are not limited to, areas with high soil permeability, high soil erosion potential, high runoff potential and areas within 1000' from the river/streams. The sensitive areas are those where the potential contamination sources, if present, have a greater potential to impact the water supply.*

Potential Harmful Algae Bloom (HAB) **risk criteria/factors identified in Tri-City JW and SA Drinking Water Source Area** by DEQ in June 2018:

Previous HAB Advisory

DEQ Water Quality Limited Listing indicating the waterbody needs TMDL for Algae and aquatic weeds, Chlorophyll-A, pH, dissolved oxygen

OHA DWS sampling location for cyanobacteria toxin (2011-2017)

Hiland Water Co. Shady Cove (PWS 4101520)
Source: Rogue River
Serves 975 people

Due to the close proximity of intakes on the Rogue River, the following April 24, 2018 assessment of Anglers Cove/SCHWC addresses Hiland Water Co. Shady Cove.

Anglers Cove/SCHWC (PWS 01483)
Source: Rogue River
Jackson County
Serves 80 people

DEQ/OHA Source Water Assessment April 24, 2018 (excerpts):

Due to the close proximity of intakes on the Rogue River, this assessment addresses Anglers Cove/SCHWC and Hiland Water Co. Shady Cove.

Country View Mobile Home Estates also has an intake on the Rogue River upstream of these intakes and there are a number of public water systems downstream that also depend on Rogue River for their drinking water. For watersheds with more than one intake such as the Rogue Subbasin, all protection areas for intakes upstream of the water system's intake are included in their drinking water source area. Activities and impacts in upstream drinking water protection area also have the potential to impact downstream water users.

<u>A. Potential Pollutants: 8 hour Time of Travel for Drinking Water Source Sub-Basin of Rogue</u>

- Drinking Water Source Area: *219 sq. mi*
- Stream Miles in Drinking Water Source Area: *1,288*
- Stream Miles in Erodible Soils: *1,227*
- High Soil Erosion Potential Percent: *96%* (% stream mi with high erosion located w/in 300’ of stream)
- Shallow Landslide Potential: *See DEQ*
- Landslide Deposits: *Limited areas throughout watershed* includes earth and debris slides, flows, slumps, falls and complex landslide types. (Does not include rock material landslide deposits.)

<u>B. Full Source Water Source Area Rogue Basin upstream of intake</u>

- Drinking Water Source Area: *6,229 sq. mi*
- Stream Miles in Drinking Water Source Area: *4,717*
- Stream Miles in Erodible Soils: *3,558*
- High Soil Erosion Potential Percent: 75% (% stream mi with high erosion located w/in 300’ of stream):
- Shallow Landslide Potential: *See DEQ*
- Landslide Deposits: *Limited areas throughout watershed* includes earth and debris slides, flows, slumps, falls and complex landslide types. (Does not include rock

material landslide deposits.)

Potential Harmful Algae Bloom (HAB) **risk criteria/factors identified in Hiland Water Co. Shady Cove and Anglers Cove/SCHWC Drinking Water Source Area** by DEQ in June 2018:

Previous HAB Advisory

DEQ Water Quality Limited Listing indicating the waterbody needs TMDL for Algae and aquatic weeds, pH

Country View Mobile Home Estates (PWS #4100808)

Source: Rogue River plus a well
Jackson County
Serves 132 people
Oregon Source Water Assessment Report (excerpts):

In the Country View Mobile Home Estates watershed, the results of the susceptibility "analysis" include the distribution of 22 identified *high-to-moderate risk sources within the areas of highly permeable soils, high erosional soils, high runoff potential soils, and within the 1000' setback from the streams.*

<u>A. Potential Pollutants: 8 hr time of travel in Drinking Water Source Area</u>

- Stream miles in Drinking Water Source Area: 1,334
- Watershed Source Area: 227.86 sq mi
- High Soil Erosion Potential: *95%*
- Shallow Landslide Potential: *See DEQ*
- Landslide Deposits: *Limited areas throughout watershed* includes earth and debris slides, flows, slumps, falls and complex landslide types. (Does not include rock material landslide deposits).

<u>B. Potential Pollutants: Full Surface Drinking Water Source Area</u>

- Watershed Source Area: *1,146.6 sq mi*
- Stream miles in Drinking Water Source Area: *4,613*
- Stream miles in erodible soils: *3,156*
- High Soil Erosion Potential: *68%*
- Shallow Landslide Potential: *See DEQ*
- Landslide Deposits: *Limited areas throughout watershed* includes earth and debris slides, slumps, falls, and complex landslide types. (Does not include rock material landslide deposits).
- Well Protection Area: *0.51 sq mi*

Excellent maps are available in DEQ's Updated Water Source Assessment (April 2018).

Potential Harmful Algae Bloom (HAB) **risk criteria/factors identified in Country View MH Estates Drinking Water Source Area** by DEQ in June 2018:

Previous HAB Advisory

DEQ Water Quality Limited Listing indicating the waterbody needs TMDL for Algae and aquatic weeds, pH, dissolved oxygen

OHA DWS sampling location for cyanobacteria toxin (2011-2017)

Tiller Elementary, SD #15 (PWS 4192139)
Source: South Umpqua River
Serves: 60 people

DEQ Source Water Assessment Summary 2003 (excerpts):

RISKS FOR THE SYSTEM:

A total of eighteen potential contaminant sources were identified in Tiller Elementary's drinking water protection area. Sixteen of these are located in the sensitive areas and twelve are high-to-moderate risk sources within "sensitive areas". *The sensitive areas within the Tiller Elementary drinking water protection area include areas with high soil permeability, high soil erosion potential, high runoff potential and areas within 1000' from the river/streams. The sensitive areas are those where the potential contamination sources, if present, have a greater potential to impact the water supply.*

City of Glendale (PWS 4100323)
Source: South Umpqua Subbasin: Cow Creek (permanent), Mill Creek (emergency), Section Creek (emergency)
Douglas County
Serves 872 people

2003 Source Water Assessment (excerpts):

The drinking water for the City of Glendale is supplied by three intakes located on Cow Creek, Mill Creek and Section Creek.

RISKS FOR THE SYSTEM:

A total of 45 potential contaminant sources were identified in City of Glendale's drinking water protection area. All of these are located in the sensitive areas and 40 are high-to- moderate risk sources within "sensitive areas". *The sensitive areas within the City of Glendale drinking water protection area include areas with high soil permeability, high soil erosion potential, high runoff*

potential and areas within 1000' from the river/streams. The sensitive areas are those where the potential contamination sources, if present, have a greater potential to impact the water supply.

C. Additional Threats to Drinking Water

Applications of herbicides, including picloram, to clear and maintain a right-of-way free of vegetation on and near the pipeline route increase risks to safe drinking water. Picloram, in particular, is quite persistent in the environment. According to the EPA:[224]

- Picloram has a high potential to contaminate surface water by runoff from use areas.
- Picloram is highly soluble in water, resistant to biotic and abiotic degradation processes, and mobile under both laboratory and field conditions. It is stable to hydrolysis and anaerobic degradation, and degrades very slowly with half-lives ranging from 167 to 513 days.
- Eventual contamination of groundwater is virtually certain in areas where picloram residues persist in the overlying soil. Once in groundwater, picloram is unlikely to degrade, even over a period of several years.

Potential Harmful Algae Bloom (HAB) **risk criteria/factors identified in Glendale's Drinking Water Source Area** by DEQ in June 2018:

DEQ Water Quality Limited Listing indicating the waterbody needs TMDL for Dissolved Oxygen

D. Coos Bay Watershed Impacts.

Coos Bay is the extensive estuary of the Coos and Millicoma Rivers. Occupying approximately 20 square miles, the bay is the second largest drowned river valley estuary on the Oregon Coast. Tidelands cover approximately 4,569 acres including 2,738 acres of tidal marsh and 1,400 acres of eelgrass beds. The estuarine system's primary features include the main, expansive bay, an extensive arch of water around a peninsula, and major arms—South Slough, near the entrance of the bay, Jordan Cove, at the heart of the bay, and Haynes Inlet, which extends northeasterly from the main body of the bay. Jordan Cove, site of the proposed LNG export facility of the same name, is an embayment on the eastern shore of the North Spit, which encloses the outer portion of Coos Bay estuary.

The natural environment of the Coos estuary supports a diversity of plants and animals. The extensive shallow tidal flats provide habitat for shellfish as well as feeding and spawning habitat for many native fish. The Coos Bay supports a variety of beneficial uses as designated in the

[224] (U.S. Environmental Protection Agency, 1995) https://www3.epa.gov/pesticides/chem_search/reg_actions/reregistration/fs_PC-005101_1-Aug-95.pdf

South Coast Basin as a whole.[225] These include fish and aquatic life, wildlife & hunting, fishing, boating, water contact recreation, aesthetic quality, and commercial navigation & transportation.

Coos Bay is central to Oregon's commercial fishing industry, whose economic contribution is equivalent to about 10,000 jobs. Economic contributions from commercial fishing go beyond harvesting and seafood-processing, and include visitors and tourism, boat building and gear manufacturing, safety, research and education.[226] Recreational fisheries, including shellfish harvest and crabbing, are also important resources in Coos Bay. Several of the most important shellfish beds are located in close proximity to the LNG transit route along the edge of the North Spit (western side of lower Coos Bay).

Both Coos Bay and the Coos River are water quality impaired for different pollutants, including but not limited to temperature, sedimentation, and toxics such as lead.

Table 1. 303(d) Listings for Streams Crossed by Pacific Connector Pipeline in the South Coast Basin – Coos Subbasin[227]

Waterbody Crossed by Pipeline	Dissolved Oxygen	Habitat Modification	Temperature	Biological Criteria	Sedimentation	Toxics
Coos Bay					X	X
Coos River			X		X	

Coos Bay and the Coos River support salmonid species, including Oregon Coast coho (*Oncorhynchus kisutch*), winter steelhead (*Oncorhynchus mykiss irideus*), fall Chinook salmon (*Oncorhynchus tshawytscha*), and coastal cutthroat trout (*Oncorhynchus clarki clarki*).[228] Coos Bay and the Coos River support ESA-listed species, including but not limited to Oregon Coast coho and green sturgeon.

1. Stream Crossings

All of the stream crossings proposed for the Coos Subbasin would use a dry open-cut method, except for the two HDD crossings proposed for Coos Bay and the HDD crossing proposed for the Coos River. The DEIS should comprehensively review each stream crossing, particularly for those crossings identified as moderate or high risk. Further, the DEIS should require a topographic survey, longitudinal survey of the stream profile, top and bottom of banks, and the top and bottom floodplain slopes for each stream crossing.

[225] *See* Table 300A (OAR 340-041-0300).
[226] *See* Oregon Commercial Fishing Industry Year 2016 Economic Activity Summary at 5 (April 2017).
[227] Oregon's 2012 Integrated Report Assessment Database and 303(d) list. Oregon DEQ. https://www.deq.state.or.us/wq/assessment/rpt2012/search.asp.
[228] Salmonids in the Lower Coos Watershed. Partnership for Coastal Watersheds. http://www.partnershipforcoastalwatersheds.org/salmonids-in-the-lower-coos-watershed/.

In addition to the potential for increased erosion, channel migration, avulsion, and/or scour as a result of pipeline crossings, many of the proposed crossings cut through waterbodies that are already impaired for sedimentation. Channel modifications that increase sedimentation can decrease the depth and frequency of pools, which decreases the assimilative capacity for thermal loading of a stream.[229] Proposed activities to conduct dry open cut technology have the potential to increase sedimentation, modify habitat, decrease dissolved oxygen, and impair the aquatic habitat.

2. Coos Bay HDD Crossings

The applicant proposes to install the 36-inch pipeline across Coos Bay using two horizontal directional drills (HDD) of 5,200 and 9,000 feet each. This is a significant change from the prior route, which crossed Haynes Inlet at the north of Coos Bay and away from the navigation channel constructed using an open wet cut method after rejecting the use of HDD. In 2006, the applicant's engineer described challenges for the crossing:

The length, diameter, and geometry of the crossing approach the limits of successfully completed HDD crossings…In our opinion, the geometric and mechanical requirements for this crossing reduce the potential for successfully completing the crossing. [230]

The applicant's engineer concluded, "[a] crossing of this magnitude would not be considered routine and the potential for failure would be substantial."[231] The HDD crossing of Haynes Inlet was determined "non-feasible" due to cumulative effects of the geotechnical conditions, construction capabilities, and workspace constraints.[232]

HDD crossings, even when successful, have impacts in areas adjacent to waters 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. The DEIS fails to disclose and analyze the likelihood and frequency of frac-out events. Instead, the DEIS at 4-269 merely acknowledges the possibility, stating:
The current pipeline route in the bay would be two HDD spans of 0.7 and 1.6 miles with no planned subtidal or intertidal habitat disturbance. Generally, an HDD would avoid direct effects on the bay and associated estuarine resources. However, an HDD requires the use of drilling mud as a lubricant during the process. This fluid is under pressure and there is a possibility of an inadvertent release of drilling mud through a substrata fracture, allowing it to rise to the surface (also referred to as a frac-out).[233]
Additionally, DEQ in its denial of the 401 certification for the project identifies the lack of comprehensive feasibility analysis for the Coos Bay HDD. Specifically, DEQ states:

However, JCEP's consultant states that the "* * *feasibility evaluation of the proposed Coos Bay East HDD is based on limited subsurface data. Our conclusions should be considered preliminary

[229] "Chapter 2: Temperature." Rogue River Basin TMDL. Oregon DEQ. December 2008. P. 2-20.
[230] Geoengineers Memorandum to Lori Dalton, Williams Northwest Pipeline (Nov. 15, 2006).
[231] Geoengineers Memorandum to Lori Dalton, Williams Northwest Pipeline (Nov. 15, 2006).
[232] PCGP ltr (June 1, 2010).
[233] 2019 DEIS at 4-269.

pending completion of a subsurface exploration program. Resource Report 2, Appendix G.2. The feasibility analysis generally finds a low risk of drilling fluid releases. However, at the east end of the crossing approaching Kentuck Slough there is a high risk of hydraulic facture and drilling fluid surface release. Resource Report 2, Appendix G.2., at 9. The evaluation identifies potential mitigation for this risk, but it is unclear what specific mitigation measures JCEP is currently proposing.[234]

As part of the agency's rationale for denying the 401 certification for the project, DEQ specifically states that the lack of available information regarding the proposed Coos Bay HDD crossings did not provide reasonable assurance that those HDD crossings would comply with state water quality standards under OAR 340-041-007.[235] The DEIS should adequately characterize and review the proposed activities and mitigation measures for the proposed Coos Bay HDD crossings.

The DEIS should also comprehensively evaluate the geologic hazards associated with the proposed Coos Bay HDD crossings. In its 2017 scoping comments, DOGAMI noted that "geologic hazard evaluations and proper mitigation of hazards are needed."[236] The State requested "a thorough geologic characterization of the project area and surrounding area and a comprehensive site-specific geologic hazard and geotechnical assessment . . . at the proposed facility and along the pipeline with supporting evidence to explain that the facility can be appropriately constructed and operated throughout its existence."[237]

3. The 2019 DEIS does not take into consideration the Applicant's most current HDD Feasibility Evaluation for the Coos Bay Estuary.

During the pendency of the EIS process for the proposed Pipeline, the Applicant has been seeking multiple local and state permits required to authorize its proposed use of Horizontal Directional Drilling ("HDD") and Direct Pipe technology to site and locate its proposed Pipeline within Coos Bay. Subsequent to the publication of the 2019 DEIS, the Applicant submitted a "Revised HDD Feasibility Evaluation" to Coos County in conjunction with its permit request for the proposed segment of the Pipeline under Coos County's jurisdiction.[238] A copy of this Revised HDD Feasibility Evaluation is attached to this comment.[239] A full analysis addressing the inconsistencies between Appendix D.2 in Resource Report 2 (part of PCGP's application to the FERC) and the Applicant's 2019 Revised HDD Feasibility Evaluation for Coos County should be provided for public comment in a supplemental DEIS prior to any substantive decision to approve the requested Certificate. These inconsistencies are discussed in further detail below.

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[234] Evaluation and Findings Report: Section 401 Water Quality Certification for the Jordan Cove Energy Project. Oregon Department of Environmental Quality. May 2019. P. 29.
[235] Evaluation and Findings Report: Section 401 Water Quality. P. 30.
[236] State of Oregon 2017 Scoping comments at 8.
[237] Id.
[238] *See* Pacific Connector Gas Pipeline ("PCGP"), *Applicant's First Open Record Period Submittal*, Coos Cnty. File No(s) AM-18-010/HBCU-18-002, Ex. 11 (Dated Apr. 12, 2019) [hereinafter *Revised HDD Feasibility Evaluation*] http://www.co.coos.or.us/Portals/0/Planning/AM-18-010-HBCU-18-002/PCGP%20Early%20Works%20First%20Open%20Record%20Period%20Submittal.PDF.
[239] *See Attach*. 1.

4. The 2019 DEIS fails to adequately describe the scope of the proposed HDD crossing for Coos Bay East and Coos Bay West.

The Applicant's Revised HDD Feasibility Evaluation provides more comprehensive details regarding the conceptual design of the proposed Coos Bay East and Coos Bay West pipeline crossings than those contained in the DEIS.[240] Per the 2019 DEIS, PCGP proposed to use the HDD method to cross under the Coos Bay Estuary (MPs 0.3–1.0 and 1.5–3.0).[241] It also included a feasibility analysis, attached as Appendix G.2 of Resource Report 2 as part of Pacific Connector's 2017 application to the FERC.[242] The data contained within the 2019 DEIS' regarding the feasibility of the proposed use of HDD technology to cross Coos Bay is limited to the following:

That study showed that the HDD under the Coos Bay Estuary could be completed in two sections with a total length of about 8,970 feet and a maximum depth of about -190 feet…In case of an HDD failure, or the unanticipated release of drilling mud, Pacific Connector prepared a contingency plan.[243]

This description provided in the 2019 DEIS of the total length of the two sections (8,970 ft) differs from the combined length provided the 2019 Revised HDD Feasibility Evaluation (14,109 ft). Per the 2019 Revised HDD Feasibility Evaluation, the design horizontal length of the Coos Bay West crossing is approximately 5,137 feet.[244] Per the 2019 Revised HDD Feasibility Evaluation, the Coos Bay East crossing design horizontal length of the conceptual HDD is 8,972 feet.[245] The 2019 DEIS fails to adequately address pipe string laydown along Kentuck Slough Valley for the Coos Bay East crossing. In contrast, the Applicant states in its Revised HDD Feasibility evaluation that the bottom tangent was designed with a 25.62-degree horizontal curve, in order to accomplish the necessary alignment to facilitate the pipe string laydown area along Kentuck Slough Valley at the east end of the crossing.[246] These discrepancies regarding the scope of proposed HDD crossing of Coos Bay East and Coos Bay West should be addressed in a supplemental DEIS prior to the publication of a final EIS in this matter.

5. Both the 2019 DEIS and the Revised HDD Feasibility Analysis fail to establish that the Applicant's proposed use of HDD technology to place the Pipeline under the Coos Bay Estuary would be feasible.

As discussed below in this comment, the 2019 DEIS fails to fully evaluate the feasibility of the applicant's proposed use of HDD technology to cross Coos Bay. The Revised HDD Feasibility Evaluation suffers from a similar deficiency, which further undermines the

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[240] *See Revised HDD Feasibility Evaluation*, 1, 68.
[241] 2019 DEIS, 2-62.
[242] 2019 DEIS, 2-62.
[243] 2019 DEIS, 2-62 - 2-63 (citing Appendix H.2 to Resource Report 2 as part of Pacific Connector's 2017 application to the FERC).
[244] *Revised HDD Feasibility Evaluation*, 6.
[245] *Revised HDD Feasibility Evaluation*, 73.
[246] *Revised HDD Feasibility Evaluation*, 73.

Applicant's assertion that "the HDD under the Coos Bay Estuary could be completed in two sections with a total length of about 8,970 feet…"[247] Specifically:

a. The Revised HDD Feasibility Evaluation only suggests "technical" feasibility, and includes a number of limitations and guidelines for use that raise doubts about the practical feasibility of both the Coos Bay East and the Coos Bay West crossings.

The revised Coos Bay West and Coos Bay East HDD feasibility evaluations conclude that the use of HDD technology for the crossing is "technically" feasible.[248] However, both conclusions are solely based on physical characteristics. Neither of the Revised HDD Feasibility Evaluations comment on whether the crossings are practically or logistically feasible, and both are subject to many limitations, including recommendations for further study to determine feasibility. For instance, geotechnical engineering recommendations for both Revised HDD Feasibility Evaluations are preliminary.[249] Limitations provided for the Revised HDD Feasibility Evaluations also state that sampling cannot provide a complete and accurate view of subsurface conditions for the entire site.[250] Although the Revised HDD Feasibility Evaluations appear to address geotechnical feasibility to some extent, they do not address environmental impacts or anthropogenic impacts. A more comprehensive analysis is needed with evaluation of potential adverse impacts arising from HDD technology based on constructability, as well as potential impacts that will arise in the process of successfully completing the HDD crossings within acceptable risk tolerances. A supplemental DEIS addressing the lack of data regarding practicable feasibility of the proposed Coos Bay East and Coos Bay West crossings must be issued with adequate consideration for potential adverse environmental impacts.

b. It is unclear which HDD method will be used to accomplish the Coos Bay East crossing.

The 2019 DEIS fails to discuss which HDD method will be used to accomplish the Coos Bay East crossing. Pacific Connector has previously described two conceptual options (i.e., Single Horizontal Directional Drilling Option and a Dual Horizontal Directional Drilling Option) to accomplish the Coos Bay East HDD crossing.[251] In the Revised HDD Feasibility Evaluation, the Applicant simply states: "Due to the substantial length of the HDD, we anticipate that it will be completed using pilot hole intersect methods."[252] However, there is no discussion as to why the "pilot hole intersect" method is now preferable to a previously proposed "tie-in method."[253] The Applicant should provide discussion as to how this method differs from the previously mentioned Single and Dual Options.

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[247] *See* 2019 DEIS, 2-62.
[248] *See Revised HDD Feasibility Evaluation*, 6; *See Revised HDD Feasibility Evaluation*, 73.
[249] *See Revised HDD Feasibility Evaluation*, App. D, 64; *See Revised HDD Feasibility Evaluation*, App. D, 159.
[250] *See Revised HDD Feasibility Evaluation*, App. D, 64; *See Revised HDD Feasibility Evaluation*, App. D, 159.
[251] *DEQ Additional Information Request Letter*, 3 (March 11, 2019) https://www.oregon.gov/deq/Programs/Documents/jcepAddInfoRequest03112019.pdf.
[252] *See Revised HDD Feasibility Evaluation*, 73.
[253] *See Revised HDD Feasibility Evaluation*, 84.

If the Applicant is proposing to use the Single HDD Option, it must address what alternative measures might be used should PCGP discover that the underlying geology does not consist of competent bedrock at the bottom tangent elevation depth (-190 feet mean sea level).[254] Further, hydraulic fracture of bedrock increases the potential for fluid release. More data regarding site specific risks must be provided.

If the Applicant is proposing to use the Dual HDD Option, the Applicant has failed to provide sufficient discussion on the following issues:

- The dual option relies on a shared tie-in workspace located in a tidal flat area south of Glasgow Point. Describe how the workspace will be isolated from open water during Horizontal Directional Drilling installation.

- The likelihood of inadvertent surface returns of drilling fluid is highest near entry points where drilling pressures can exceed the shear strength and pressure from overburden soils. Describe what special contingency measures will be employed to contain drilling fluids in this inter-tidal environment.

- What is the proposed final depth below surface of the installation at the tie-in location? What measures, if any, are proposed to ensure the pipeline remains buried for the life of the project?

- Describe the scope of open-water activities such as intetidal dredging for barge access to the shared tie-in workspace.

- Describe what procedures Pacific Connector will employ to avoid, minimize, or mitigate the effects of this option on water quality.[255]

The Applicant must provide a clear description of proposed HDD construction methods, an explicit statement of which method it has selected for use, and a full analysis of potential adverse impacts prior to any substantive decision on the Certificate. A supplemental DEIS should be issued to fully address the aforementioned deficiencies.

c. Parcel ownership of the potential shared tie-in workspace located in a tidal flat area south of Glasgow Point associated with the proposed Dual HDD option is unclear.

As discussed above, neither the Revised HDD Feasibility Evaluation nor the 2019 DEIS addresses which method will be used to accomplish the Coos Bay East crossing. A 2017 analysis by GeoEngineers stated: "Due to the substantial length of the proposed HDD, GeoEngineers evaluated two potential alternatives for accomplishing the proposed Coos Bay East 36-inch HDD installation; a single 8,972-foot-long alternative and two shorter HDDs connected by an *open cut tie-in located within the tidal flats of Coos Bay*." Neither the 2019

[254] *DEQ Additional Information Request Letter*, 3.
[255] *DEQ Additional Information Request Letter*, 3-4.

DEIS nor the Revised HDD Feasibility Evaluation contain the relevant parcel ownership information for this proposed shared tie-in workspace in the middle of the Bay just south of Glasgow Point. If the Applicant is proposing to use the Dual Drilling Option, or should the pilot intersect method require the shared tie-in work area, it must provide ownership details for the subject parcel. Further, it must provide further detail addressing potential adverse environmental impacts of the proposed tie-in area. A map of the previously proposed propo

d. The length of the proposed Coos Bay East crossing is outside the recommended parameters for Direct Pipe technology installation.

The Revised HDD Feasibility Evaluation concludes that the Coos Bay East crossing is technically feasible on the basis of three new bore holes for a crossing of almost 9,000 feet.[256] This crossing requires the use of specialized "Direct Pipe" installation technology. The Applicant discloses that the use of Direct Pipe technology itself would require an additional feasibility study prior to developing more specific design and installation recommendations. Site-specific studies regarding the feasibility of the use of Direct Pipe technology in Coos Bay are provided in neither the 2019 DEIS nor the Revised HDD Feasibility Evaluation.

The longest recommended distance of pipeline installation using Direct Pipe is 1,000 yards (about 3,000 feet). Both the Coos Bay East and West crossing are substantially greater in length than the recommended range. Publicly available evidence also suggests that the machinery associated with Direct Pipe installation requires anchoring and should not be installed in soft soils to avoid sinking under its own weight. The proposed location for this equipment appears to be Kentuck Slough, which has soft soils. Without more information on the feasibility of the use of HDD technology to cross Coos Estuary generally and a feasibility study on the use of Direct Pipe specifically, the FERC should not move forward with a substantive decision. A supplemental DEIS addressing the aforementioned issues should be provided to the public for comment prior to the publication of the final EIS in this matter.

e. Neither the 2019 DEIS nor the Revised HDD Feasibility Evaluation contains a discussion of the alternatives to be used should the use of HDD technology prove infeasible.

If the Coos Bay East and the Coos Bay West crossings cannot be accomplished by the use of HDD technology, the open trench cutting method across the bay will likely have to be utilized. The 2019 DEIS discusses the use of trenching for Pipeline installation in upland areas without any relevant discussion on potential adverse impacts. The use of open trench cutting has potentially serious environmental and public health impacts, and have not been adequately addressed. A supplemental DEIS addressing these impacts should be issued.

[256] *See Revised HDD Feasibility Evaluation*, Fig. 2, 91.

f. Within the Revised HDD Feasibility Study, a borehole used in the study of the Coos Bay West crossing is not located on or in close proximity to the conceptual line.

The Revised HDD Feasibility Evaluation concludes on the basis of four boreholes that the Coos Bay West crossing, with a span nearly 6,000 feet, is technically feasible.[257] The conceptual site plan, however, shows the location of a borehole (HIB-2) not situated on the conceptual line.[258] The HIB-2 borehole is noted as 265 feet off the alignment.[259] The 2019 DEIS suffers from similar deficiencies in testing for feasibility. PGCP must test the soils in the actual proposed installation location prior to any substantive decision in this matter. The results of those studies should be made available for public comment prior to the publication of the final EIS.

g. Concerns related to drill hole stability regarding the Coos Bay East Crossing.

The Revised HDD Feasibility Evaluation states that "the subsurface conditions anticipated along the conceptual HDD path include very soft silts and loose sands along the east side entry tangent."[260] It warns that "the HDD contractor may encounter hydraulic fracture, steering difficulty, and difficulty maintaining drilling fluid returns along the east side entry tangent."[261] The 2019 DEIS does not adequately discuss the proposed use of contractors to accomplish the HDD crossings. Logistical challenges such as hydraulic fracture should not be left to the discretion of the HDD contractor, but instead be addressed by PCGP prior to any final decision in this matter. A supplemental DEIS addressing this concern should be provided for public comment.

h. The 2019 DEIS does not contain a meaningful plan for drilling fluid management, and does not sufficiently address the risks of inadvertent drilling fluid release and frac-out for both the Coos Bay East and the Coos Bay West crossings.

Neither the 2019 DEIS nor the Revised HDD Feasibility Evaluation meaningfully address the risk of inadvertent fluid returns to surface waters of the bay during the proposed HDD crossings. Specific issues include:

i. Analyses of fluid release are based on assumptions and estimates.

The analysis of fluid release contained within the Revised HDD Feasibility Evaluation notes that it is based on assumptions and estimates.[262] The contingency plan referenced within the 2019 DEIS suffers from a similar reliance on assumptions and estimates.[263] This is insufficient given

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[257] *See Revised HDD Feasibility Evaluation*, Fig. 2A, 91.
[258] *See Revised HDD Feasibility Evaluation*, Fig. 2A, 91.
[259] *See Revised HDD Feasibility Evaluation*, Fig. 2A, 91.
[260] *See Revised HDD Feasibility Evaluation*, 81.
[261] *Id.*
[262] *See Revised HDD Feasibility Evaluation*, 51; *See Revised HDD Feasibility Evaluation*, 146.
[263] 2019 DEIS, 2-62 - 2-63 (citing Appendix H.2 to Resource Report 2 as part of Pacific Connector's 2017 application to the FERC).

the known risks of frac-out. The Applicant should conduct further testing and present a more robust analysis of impacts alongside a more concrete fluid management plan. Further, the Revised HDD Feasibility Evaluation also discloses that it only addresses the potential for inadvertent fluid release during pilot hole operations. The Applicant must also address the potential risk of fluid release during the reaming process prior to a final decision in this matter. A supplement DEIS adequately addressing these potential adverse impacts should be provided for public comment.

j. Concerns regarding fluids management system for the Coos Bay East crossing.

The Applicant discloses that "there is a high risk of drilling fluid release within approximately 520 feet of the east side entry point" of the Coos Bay East crossing.[264] The Revised HDD Feasibility Evaluation discusses the importance of maintaining fluid returns during reaming, and states "a drilling fluid recycling system and high-pressure drilling fluid pump will likely be required on the exit side of the crossing to facilitate the pumping and recycling of the drilling fluid at exit."[265] Information regarding the exact locations of these systems and a substantive analysis of their impacts is omitted from both the Evaluation and the 2019 DEIS. Most concerningly, the Evaluation refers to an "east side drilling fluid returns pit."[266] Apart from the FERC wetland requirements document, no substantial discussion of this pit is provided. The digging, dewatering, and management of this pit could have serious potential impacts on the estuary and should be disclosed and explained in a supplemental DEIS.

k. Concerns regarding drilling fluid surface releases or "frac-outs".

The Revised HDD Feasibility Evaluation states that "If the accumulation of cuttings creates a blockage downhole, the annulus may become over-pressurized, leading to hydraulic fracturing and potentially drilling fluid surface releases."[267] The analysis "does not account for this over-pressurized condition."[268] The 2019 DEIS does not address this issue. A supplement DEIS addressing this concern must be issued for public comment prior to publication of the final EIS.

E. Coos River HDD Crossing

In addition to the two HDD crossings proposed for Coos Bay, the applicants propose to use HDD technology to cross the Coos River at MP 11.13R. Due to the soft silts and clays located at the exit and entry points proposed for the Coos River crossing, the 2017 GeoEngineers report states:

The hydraulic fracture and drilling fluid surface release model indicates the risk of drilling fluid surface release is high along the first approximately 250 feet of the drill path. The risk becomes

[264] *See Revised HDD Feasibility Evaluation*, 81.
[265] *See Revised HDD Feasibility Evaluation*, 16.
[266] *Id.* at 85.
[267] *See Revised HDD Feasibility Evaluation*, 61; *See Revised HDD Feasibility Evaluation*, 156.
[268] *Id.*

low from the northern edge of the Coos River Highway and across Coos River to approximate station 17+00. The risk becomes high within approximately 150 feet of the exit point.[269]

Further, the 2017 GeoEngineers report in Table 4 establishes relative risk in terms of factor of safety from less than 1 (Very High Risk) to greater than 2 (Low Risk). The report cautions that the factors of safety "drop significantly," in other words demonstrate an increased risk, when the HDD passes through certain soil types:

The factors of safety, however, drop significantly when the HDD passes through the fat clay, organic silt and clay, and shallow sandy silt units as shown in Figure 6 between Stations 4+00 (Entry) and 7+00 and 17+00 and 20+00 (Exit). Figure 6 also shows the factors of safety against hydraulic fracture generally decrease as the HDD progresses towards the exit point as the required drilling fluid pressure increases with length.[270]

The 2017 GeoEngineers report describes how HDD alignment through fat clay soils is "typically more challenging than in other non-cohesive soils" and the potential for hydraulic fracture and drilling fluid surface release increases dramatically.[271] The report further concludes that:

It is our opinion that there is a relatively high risk of hydraulic fracture and drilling fluid surface releases along the first 500 feet and last 300 feet of the HDD, respectively.[272]

Additionally, the applicants do not provide adequate information regarding impacts to groundwater as a result of HDD. The September 2017 GeoEngineers report states:

During our borings, we were not able to measure groundwater levels due to the presence of drilling fluid. However, based on the observed relative moisture content of the samples, and the locations and elevations of the borings relative to the Coos River, we estimate that groundwater was at or near the ground surface at the time of drilling. We anticipate that groundwater levels will fluctuate with precipitation, site utilization and other factors. During heavy prolonged precipitation, and probably during most of the winter months, we expect that groundwater will be near or at the surface of the site.[273]

The applicant provides very limited details regarding how potential sediment pollution as a result of developing the temporary work areas and other construction activities associated with the HDD crossing will be minimized:

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[269] Coos River HDD Pacific Connector Gas Pipeline Project. GeoEngineers. 1 September 2017. P. ES-1. PCP Part 2 Appendix B. P. 1471.
[270] Coos River HDD Pacific Connector Gas Pipeline Project. GeoEngineers. 1 September 2017. P. 9. PCP Part 2 Appendix B. P. 1480.
[271] Coos River HDD Pacific Connector Gas Pipeline Project. GeoEngineers. 1 September 2017. P. 13. PCP Part 2 Appendix B. P. 1484.
[272] Coos River HDD Pacific Connector Gas Pipeline Project. GeoEngineers. 1 September 2017. P. 13. PCP Part 2 Appendix B. P. 1484.
[273] Coos River HDD Pacific Connector Gas Pipeline Project. GeoEngineers. 1 September 2017. P. 5. PCP Part 2 Appendix B. P. 1476.

To reduce the potential for migration of sediment off site and into adjacent receiving waters during HDD operations, we recommend that state and local regulations be followed during and after construction operations. Proper BMP should be implemented in accordance with the PCGP Project's Erosion Control and Revegetation Plan (ECRP).[274]

The DEIS should fully evaluate the potential for a frac-out and BMPs to address sediment pollution from the applicants.

F. Removal of Riparian Vegetation

Construction of the pipeline would require removal of riparian vegetation across a wide construction easement, which would increase stream temperatures. Removal of riparian vegetation increases stream temperature by decreasing shade, which is particularly problematic for numerous streams within the Coos Subbasin that have salmon and steelhead spawning use, core cold water habitat use, salmon and trout rearing and migration use, or migration corridor use. The DEIS does not provide specific information about baseline temperatures in streams where riparian vegetation would be removed.

Removal of riparian vegetation has the potential to both reduce shade and increase sedimentation. Increased sedimentation can impact interactions between surface water and groundwater by decreasing porosity in the hyporheic zone, resulting in reduced cool water inputs to streams. [275] Further, as stream temperature increases, dissolved oxygen levels decrease. Removing riparian vegetation also decreases Large Woody Debris that is an important component of stream morphology and habitat for aquatic species. Both the Coos River and Coos Bay are already impaired for temperature, sedimentation, and dissolved oxygen.

The Coos Subbasin supports habitat for threatened and endangered species listed under the ESA that are sensitive to temperature, sedimentation, and dissolved oxygen levels.

DEQ in its denial of the 401 certification for the project specifically identifies the removal of effective riparian shade as a factor for its denial, stating:

Given the incomplete thermal impact assessment and the lack of thermal mitigation plan to restore effective shade DEQ is unable to determine that JCEP's operation of the pipeline will comply with Oregon's temperature standard.[276]

The DEIS should full evaluate the direct, indirect, and cumulative effects of riparian vegetation removal at stream crossings within the Coos Subbasin.

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[274] Coos River HDD Pacific Connector Gas Pipeline Project. GeoEngineers. 1 September 2017. P. 18. PCP Part 2 Appendix B. P. 1489.
[275] "Chapter 2: Temperature." Rogue River Basin TMDL. Oregon DEQ. December 2008. P. 2-20.
[276] Evaluation and Findings Report: Section 401 Water Quality Certification for the Jordan Cove Energy Project. Oregon Department of Environmental Quality. May 2019. P. 68.

G. Roads

The applicants propose construction of temporary access roads (TARs) at 10 locations impacting 3.8 acres and construction of 15 permanent access roads (PARs) impacting 2.16 acres.[277] As the project continues to change throughout the public process, impacts to streams may be significantly altered as well. The applicant does not provide site-specific details to minimize impacts of temporary or permanent road construction to waterways beyond general descriptions of BMPs. Not only is road construction inadequately described, but the measures to prevent significant sedimentation and turbidity in streams are neither site-specific nor reliable.

In DEQ's denial of the 401 certification for the project, the agency identifies multiple locations where the applicant has not identified ownership of access roads that they propose to use. Specifically, DEQ lists Logging Spur 6.64R-7.34R, Carlson Heights Road 7.34R-7.44R, Willanch Slough 8.44R, and Logging Spur 8.17R as access roads proposed for use by the applicant where the ownership is not identified.[278] The DEIS should require that all access roads proposed for use by the applicant are identified and evaluated. Further, the DEIS should include information about the current status of all proposed access roads.

The DEIS cannot rely upon future analysis to determine now how construction of permanent or temporary roads will impact wetlands, streams, and rivers. The DEIS should require specific design details and technical support for each TAR and PAR to determine whether new permanent and temporary roads will be hydrologically disconnected to waterbodies and in compliance with state and federal laws. The DEIS should require the applicant to provide selection criteria it will use to propose new roads that avoid impacts to waterways. The DEIS should also require information regarding the specific location with GPS coordinates for all road maintenance treatments the applicant proposes to implement to protect water quality on all access roads that are currently hydrologically connected to waterbodies.

H. Hydrostatic Testing

The applicant proposes to use the Coos Bay-North Bend Water Board as the source of hydrostatic testing water within the Coos Subbasin.[279] Water withdrawals from the Coos Subbasin for hydrostatic testing and other related uses should be carefully reviewed in the DEIS to evaluate the direct, indirect, and cumulative impacts on water quality. The applicant provides minimal information regarding the source and discharge of hydrostatic testing water. Not only would these water withdrawal impact existing water rights, but reducing flows can also impair water quality, in violation of water quality standards.[280] Further, in DEQ's denial of the 401 certification, the agency notes that the applicant has failed to submit an application for Individual

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[277] Pacific Connector Pipeline Resource Report 1 General Project Description. p. 31, PCP Part 2 Appendix B 8 May 2018. p. 329.
[278] Evaluation and Findings Report: Section 401 Water Quality Certification for the Jordan Cove Energy Project. Oregon Department of Environmental Quality. May 2019. P. 37.
[279] Pacific Connector Pipeline Resource Report 1 General Project Description. 8 May 2018. P. 58. PCP Part 2 Appendix B from DEQ 8 May 2018. P. 352.
[280] PUD No. 1 of Jefferson Cty v. Washington Dept. of Ecology. 511 U.S. 700 (1994). https://www.law.cornell.edu/supct/html/92-1911.ZO.html.

Industrial Water Pollution Control Facility Permit for the proposed discharges of hydrostatic testing wastewater that must include the location of each point of discharge.[281]

I. South Coast Basin – Coquille Subbasin

The South Coast Basin stretches across 1.9 million acres and consists of the Coos, Coquille, Sixes, Chetco, and part of the Smith subbasins.[282] The proposed pipeline route would cross through the Coos and Coquille subbasins. Impacts to the Coos subbasin are discussed above. The Coquille subbasin drains 1,058 square miles and the Coquille is the longest river in the South Coast Basin.[283] Waterways in the Coquille subbasin are impaired for dissolved oxygen, sedimentation, temperature, habitat modification, and biological criteria. In 1994, DEQ established a TMDL for the Coquille River for dissolved oxygen.[284]

The applicant proposes to cross multiple streams within the Coquille subbasin that are already impaired for multiple water quality parameters, including but not limited to dissolved oxygen, temperature, biological criteria, and sedimentation.

Table 2. 303(d) Listings for Streams Crossed by Pacific Connector Pipeline in the South Coast Basin – Coquille River Subbasin[285]

Waterbody Crossed by Pipeline	Dissolved Oxygen	Habitat Modification	Temperature	Biological Criteria	Sedimentation	Turbidity
Belieu Creek			X			
Big Creek		X	X		X	
Coquille River			X		X	X
East Fork Coquille River	X	X	X	X	X	
Elk Creek	X		X	X	X	
Middle Creek	X		X	X		
Middle Fork Coquille River	X	X	X		X	
North Fork Coquille River	X	X	X	X	X	X
Rock Creek	X	X	X	X	X	

[281] Evaluation and Findings Report: Section 401 Water Quality Certification for the Jordan Cove Energy Project. Oregon Department of Environmental Quality. May 2019. Information Request. P. 14 of 15.

[282] South Coast Basin Report. 2016. Oregon DEQ.
[283] Coquille River & Estuary Water Quality Report. Total Maximum Daily Load Program. Oregon DEQ. March 1994. https://www.oregon.gov/deq/FilterDocs/scCoquilleRiverTMDL.pdf. P. 1.
[284] Coquille River & Estuary Water Quality Report. Total Maximum Daily Load Program. Oregon DEQ. March 1994. https://www.oregon.gov/deq/FilterDocs/scCoquilleRiverTMDL.pdf. P. 3.
[285] Oregon's 2012 Integrated Report Assessment Database and 303(d) list. Oregon DEQ. https://www.deq.state.or.us/wq/assessment/rpt2012/search.asp.

The Coquille subbasin supports multiple native fish species, including coho salmon, winter steelhead, fall chinook, spring chinook, coastal cutthroat trout, rainbow trout, and green and white sturgeon.[286] The Oregon Coast coho ESU was listed as a threatened species under the ESA in 1998.[287] According to the Oregon Coast coho 2012 Recovery Plan, the primary threats to the species include reduced amount and complexity of habitat as well as degraded water quality.[288] The 2007 Coquille River Subbasin Plan specifically points to water quality impairments from sedimentation and temperature as threats to Oregon Coast coho:

Excessive sedimentation from erosion in the watershed was identified as a potential cause for concern by the Soil and Water Conservation District (1983) and in the Preliminary Statewide Nonpoint Source Assessment (ODEQ 1988 in CWA 1997). Elevated turbidity and sediment loads in all zones can be attributed to the effects of soil disturbing activities such as management practices associated with road building, timber harvest, agriculture and active bank erosion above the head of tide.[289]

Further, the 2007 Coquille River Subbasin Plan also identifies temperature as an existing water quality impairment that threatens salmonids:

Warm season water temperatures appear to be one of the most critical, potential limiting factors in the Coquille drainage: 21 out of the 25 303(d) listed stream segments are listed for temperature. In addition, elevated water temperatures work in concert with other limiting factors to exacerbate their impacts. Salmonids and some amphibians appear to be of the most temperature-sensitive species. Stream temperatures during the salmonid spawning, incubation and emergence life stages are desirable, but are elevated during the summer rearing life stage.[290]

Additionally, the North and South Forks of the Coquille River were identified as Tier 1 Key Watersheds under the Northwest Forest Plan that "serve as refuge areas critical for maintaining and recovering habitat for at-risk stocks of anadromous salmonids on federally administered land (CWA 1997)."[291]

1. Stream Crossings

All of the proposed stream crossings within the Coquille Subbasin would use the dry open cut method. The DEIS should provide a comprehensive environmental review and require site-

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[286] "Chapter 2: The Coquille Fishery." Coquille Watershed Action Plan. 16 May 2003. https://www.coquillewatershed.org/wp-content/uploads/2016/02/CHAP2.pdf.
[287] Oregon Coast Coho Salmon Recovery Plan Summary. NOAA Fisheries. December 2016. http://www.westcoast.fisheries.noaa.gov/publications/recovery_planning/salmon_steelhead/domains/oregon_coast/oc_coho_plan_exec_summary_12_16.pdf.
[288] Oregon Coast Coho Salmon Recovery Plan Summary. NOAA Fisheries. December 2016. http://www.westcoast.fisheries.noaa.gov/publications/recovery_planning/salmon_steelhead/domains/oregon_coast/oc_coho_plan_exec_summary_12_16.pdf. P. 6.
[289] Coquille River Subbasin Plan. NOAA Fisheries. June 2007. https://www.coquillewatershed.org/wp-content/uploads/2017/01/CoquilleRiversub-basinplan.pdf. P. 29.
[290] Coquille River Subbasin Plan. NOAA Fisheries. June 2007. https://www.coquillewatershed.org/wp-content/uploads/2017/01/CoquilleRiversub-basinplan.pdf. P. 29.
[291] Coquille River Subbasin Plan. NOAA Fisheries. June 2007. https://www.coquillewatershed.org/wp-content/uploads/2017/01/CoquilleRiversub-basinplan.pdf. P. 18.

specific plans for each stream crossing, particularly for those crossings identified as moderate or high risk. Further, the DEIS should require a topographic survey, longitudinal survey of the stream profile, top and bottom of banks, and the top and bottom floodplain slopes for each stream crossing.

As demonstrated in the table below, the applicant identifies seven stream crossings in the Coquille Subbasin as Level 1 (moderate) risk of channel migration, avulsion, and/or scour. Two stream crossings within the subbasin are identified as a Level 2 (high risk) of channel migration, avulsion, and/or scour (Middle Creek and South Fork Elk Creek).

Table 3. Moderate and High Risk Stream Crossings in the Coquille Subbasin

Waterbody crossed by pipeline	**Level 1 (moderate) risk of channel migration, avulsion, and/or scour**	**Level 2 (high) risk of channel migration, avulsion, and/or scour**
North Fork Coquille River (MP23.06)	X	
Middle Creek (MP 27.04)		X
Trib. To E Fork Coquille River (MP 28.86)	X	
East Fork Coquille River	X	
Elk Creek	X	
South Fork Elk Creek		X
Upper Rock Creek (MP 44.21)	X	
Deep Creek (MP 48.27)	X	
Middle Fork Coquille River (MP 50.28)	X	

The DEIS should fully evaluate the direct, indirect, and cumulative effects of stream crossings, particularly those identified as moderate and high risk. For example, there is no site-specific analysis for Middle Creek or the South Fork of Elk Creek, which are both identified as high risk sites for channel migration, avulsion, and/or scour.

Limited detail is provided regarding the methods proposed for the North Fork and East Fork Coquille River crossings as well as methods to mitigate sediment pollution. The DEIS should comprehensively analyze potential impacts to water quality, including but limited to increased stream temperature as a result of removing riparian vegetation, increased sedimentation, decreased dissolved oxygen, or degraded habitat.

In addition to the potential for increased erosion, channel migration, avulsion, and/or scour as a result of pipeline crossings, many of the proposed crossings cut through waterbodies that are already impaired for sedimentation. Specifically, the North Fork of the Coquille, East Fork of the

Coquille, Elk Creek, Middle Fork of the Coquille, and Rock Creek are all water quality limited for sedimentation and also have at least a moderate risk of channel migration, avulsion, and/or scour.

Channel modifications that increase sedimentation can decrease the depth and frequency of pools, which decreases the assimilative capacity for thermal loading of a stream. Elk Creek, East Fork of the Coquille, Middle Creek, Middle Fork Coquille River, North Fork Coquille River, and Rock Creek are all impaired for temperature.[292]

Proposed activities to conduct dry open cut technology have the potential to increase sedimentation, modify habitat, decrease dissolved oxygen, and impair the aquatic habitat.

2. Removal of Riparian Vegetation

The proposed action would likely cause stream temperature increases by removing riparian vegetation across a wide construction easement. Removing riparian vegetation will increase water temperature by decreasing shade in numerous streams identified as having salmon and steelhead spawning use, having core cold water habitat use, having salmon and trout rearing and migration use, or having migration corridor use. Further, removing riparian vegetation also decreases Large Woody Debris that is an important component of stream morphology and habitat for aquatic species.

The Coquille River already has a TMDL for dissolved oxygen. The proposed pipeline would cross the East Fork, Middle Fork, and North Fork of the Coquille which are impaired for dissolved oxygen, as well as Elk Creek, Middle Creek, and Rock Creek.

Not only is riparian vegetation critical for water quality, but removing riparian vegetation has direct, indirect, and cumulative impacts on threatened salmonids. Specifically, NOAA Fisheries identifies protection of stream buffers and riparian forests as a priority action to protect Oregon Coast coho in the Coquille subbasin:

Improve timber management activities, including road management, by protecting riparian forests and providing stream buffers sufficient for OC coho salmon recovery through protection and enhancement of shade to reduce stream temperatures and improve water quality.[293]

The DEIS should fully evaluate the direct, indirect, and cumulative effects of removing riparian vegetation in the Coquille subbasin.

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[292] Oregon's 2012 Integrated Report Assessment Database and 303(d) list. Oregon DEQ. https://www.deq.state.or.us/wq/assessment/rpt2012/search.asp.

[293] 6.3.5 Strategies and Actions for the Mid-South Coast Stratum. ESA Recovery Plan for Oregon Coast Coho Salmon. NOAA Fisheries. http://www.westcoast.fisheries.noaa.gov/publications/recovery_planning/salmon_steelhead/domains/oregon_coast/final_mid-south_coast_stratum.pdf. P. 7.

J. Umpqua Basin

The South Umpqua fifth-field watershed is 141,575 acres and begins at the confluence of the South Umpqua River and Elk Creek and flows 28 miles to the confluence with Cow Creek.[294] The proposed pipeline would enter the South Umpqua watershed with a crossing at Olalla Creek-Lookingglass Creek at pipeline milepost 55.9 and cross approximately 85 streams until leaving the watershed with a crossing of Upper Cow Creek.

The South Umpqua is impaired for temperature, dissolved oxygen, sediment/turbidity, and habitat modification.[295] These water quality parameters would be both directly and indirectly impacted by the proposed activities. There are at least 13 different waterways that are 303(d) listed for temperature, sedimentation, biological criteria, habitat modification, and dissolved oxygen within the South Umpqua watershed.[296] In addition to statewide numeric and narrative criteria, the Umpqua watershed has basin-specific water quality standards for turbidity, pH, and total dissolved solids.[297]

Table 4. 303(d) Listings for Streams Crossed by Pacific Connector Pipeline in the South Umpqua Watershed

Waterbody Crossed by Pipeline	Dissolved Oxygen	Habitat Modification	Temperature	Biological Criteria	Sedimentation
Bilger Creek	X				
Days Creek	X	X	X		
East Fork Cow Creek	X		X		
Fate Creek			X		
Kent Creek		X	X		
North Myrtle Creek	X	X	X	X	X
Olalla Creek			X	X	X
Rice Creek		X	X		
Saint John Creek			X		
Shields Creek				X	
South Myrtle Creek	X		X	X	X
South Umpqua River	X	X	X	X	X

[294] South Umpqua River Watershed. Institute for Natural Resources. Oregon State University. http://oregonexplorer.info/content/south-umpqua-river-watershed.
[295] Umpqua Basin Status Report and Action Plan. Oregon DEQ. 30 July 2014. https://www.oregon.gov/deq/FilterDocs/BasinlUmpquaAssess.pdf.
[296] Oregon's 2012 Integrated Report Assessment Database and 303(d) list. Oregon DEQ. https://www.deq.state.or.us/wq/assessment/rpt2012/search.asp.
[297] OAR 340-041-0326.

Wood Creek	X		X		

Additionally, the project area within the South Umpqua watershed includes designated critical habitat for threatened Oregon Coast Coho listed under the ESA. The 2014 DEIS acknowledged that the project is likely to adversely affect Oregon Coast Coho and its critical habitat.[298] Fish use designations for the Umpqua, as identified by DEQ, include salmon and steelhead spawning, core coldwater habitat, and salmon and trout rearing and migration use. [299,300] The South Umpqua River is also designated as a Tier 1 Key Watershed under the Northwest Forest Plan. Key Watersheds serve as strongholds or potential strongholds for Oregon Coast coho. The Northwest Forest Plan states of Key Watersheds:

Refugia are a cornerstone of most species conservation strategies. They are designated areas that either provide, or are expected to provide, high quality habitat. A system of Key Watersheds that serve as refugia is crucial for maintaining and recovering habitat for at-risk stock of anadromous salmonids and resident fish species. These refugia include areas of high quality habitat as well as areas of degraded habitat. Key Watersheds with high quality conditions will serve as anchors for the potential recovery of depressed stocks. Those of lower quality habitat will have a high potential for restoration and will become future sources of high quality habitat with the implementation of a comprehensive restoration program.[301]

1. Stream Crossings

According to the DEIS, the applicant proposes to cross 68 waterways in the South Umpqua Subbasin.[302] As part of the DEQ Joint Permit Application, the applicant proposed to cross 85 waterways within the watershed.[303] Many of the proposed crossings are waterways that are already impaired for dissolved oxygen, habitat modification, temperature, biological criteria, and sedimentation.

In its denial of the 401 certification for the project, DEQ identifies the likelihood of violating state water quality standards as a result of proposed stream crossings throughout the pipeline route, including waterway crossings in the South Umpqua Subbasin. Specifically, DEQ states:

Many of the proposed dry open-cut crossings occur in headwater streams that are tributaries to fish-bearing streams lower in the watershed. Headwater streams provide a critical source of cold water particularly in summer months when flows decline and a higher fraction of base flow is derived from subsurface groundwater. In addition, JCEP proposes many waterbody crossings at streams listed as impaired for temperature on Oregon's 303(d) list of impaired waterbodies. Dewatering actions proposed by JCEP would reduce the volume of cold groundwater available

[298] DEIS at 4-644, 4645.
[299] See Subbasin maps and tables set out in OAR 340-041-0101 to 340-041-0340: Figure 320A Fish Use Designations, Umpqua Basin. https://www.oregon.gov/deq/Rulemaking%20Docs/figure320a.pdf.
[300] See Subbasin maps and tables set out in OAR 340-041-0101 to 340-041-0340: Figure 320B Salmon and Steelhead Spawning Use Designations, Umpqua Basin. https://www.oregon.gov/deq/Rulemaking%20Docs/figure320b.pdf
[301] Northwest Forest Plan at B-18.
[302] 2019 DEIS at 4-274.
[303] See Table A.2-2.

for hyporheic exchange in the reach below each waterbody crossing. This reduction in groundwater exchange below crossings would reduce the assimilative capacity for thermal loading. JCEP proposes to alter groundwater flow at numerous stream to construct its pipeline. Many of these streams are currently impaired for temperature. For example, at pipeline stream crossing at Milepost 58.78, Ollala Creek is limited for temperature year round and is under an approved TMDL. Similarly, DEQ has placed Rice Creek (Milepost 65.76), South Umpqua River (Milepost 71.27), North Myrtle Creek (Milepost 79.12), South Myrtle Creek (Milepost 81.19), and many others on the 303(d) list for temperature. These streams are under an approved temperature TMDL.[304]

Proposed activities to conduct dry open cut technology have the potential to increase sedimentation, modify habitat, decrease dissolved oxygen, and impair the aquatic habitat. The DEIS identifies ten total stream crossings throughout the pipeline route that are Level 2 (high potential for migration, avulsion, or scour). This list includes five crossings within the South Umpqua watershed: Olalla Creek, western crossing of the South Fork Umpqua River, North Myrtle Creek, South Myrtle Creek, and the eastern crossing of the South Fork Umpqua River.[305]

The DEIS should require a comprehensive environmental review for each stream crossing, particularly for those crossings identified as moderate or high risk. Further, the DEIS should require a topographic survey, longitudinal survey of the stream profile, top and bottom of banks, and the top and bottom floodplain slopes for each stream crossing.

2. South Umpqua River Crossings

Specific to the South Umpqua, the applicant proposes to use Direct Pipe technology for the first crossing of the South Umpqua River near Milepost 71 concurrently with the crossing of I-5. The applicant then proposes to cross the South Umpqua a second time at MP 94.73 near Milo using a diverted open-cut method. Direct Pipe technology is a new technology and, according to the applicants, "is still in its infancy with respect to construction and wide-spread adoption."[306] The DEIS should closely evaluate the feasibility of this new technology and potential problems that may not be identified by the applicants.

Regarding the potential release of drilling fluid directly into the South Umpqua River, the applicant states:

Fractures and voids in the rock, if encountered, could result in a loss of fluid (formational fluid loss) into the subsurface. The lost slurry or lubrication fluid could then potentially emerge at the ground surface or within the South Umpqua River and/or sensitive area as a slurry surface release. We believe the risk of formational fluid loss to be low to moderate. We judge the risk of

[304] Evaluation and Findings Report: Section 401 Water Quality Certification for the Jordan Cove Energy Project. Oregon Department of Environmental Quality. May 2019. P. 66.
[305] 2019 DEIS at 4-108.
[306] Appendix J.2 Direct Pipe Technology Overview Memo I-5/South Umpqua Direct Pipe Feasibility Evaluation. P. 3. 8 May 2018 JPA. PCP Part 2 Appendix B 8 May 2018 P. 1800.

slurry surface release resulting from formational fluid risk to be low, provided that the contractor responds rapidly and appropriately to unexpected changes in fluid pressures during mining.[307]

The DEIS should comprehensively evaluate the direct, indirect, and cumulative effects of pollution from Direct Pipe Technology discharged into the South Umpqua River. This is even more important because the South Umpqua River is already water quality limited for dissolved oxygen, habitat modification, temperature, biological criteria, and sedimentation.[308]

According to the 2013 Umpqua Basin Report from DEQ:

The South Umpqua River at HWY 42 (Winston) shows a decreasing trend in water quality. Temperature, bacteria, nutrients and fine sediment have been identified as pollutant stressors that affect fish and other aquatic life throughout the basin. TMDLs were approved by EPA for bacteria, temperature, algae/aquatic weeds, dissolved oxygen and pH for the Umpqua Basin in 2007.[309]

The use of a diverted open-cut method to cross the South Umpqua River combined with removal of riparian vegetation to create the 75-foot clear-cut buffer will likely result in increased temperature, increased sedimentation, and degraded habitat and biological conditions in violation of state water quality standards.

K. Rogue Basin

The Rogue Basin stretches 3.3 million acres in southwestern Oregon and northern California. According to the 2012 303(d) list, waterbodies in the Rogue watershed do not meet state water quality standards for temperature, dissolved oxygen, sedimentation, bacteria, pH, and nuisance weeds and algae.[310] The table below lists the waterbodies in the Upper Rogue sub-watershed (HUC 17100307) that the applicants propose to cross that do not meet water quality standards for dissolved oxygen, temperature, and sedimentation. These proposed crossings include: Big Butte Creek, Indian Creek, Lick Creek, Little Butte Creek, Trail Creek, and the Rogue River. Additionally, Little Butte Creek and the Rogue River are also impaired for multiple toxics, including but not limited to cadmium, selenium, mercury, nickel, silver, and zinc.[311]

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[307] Appendix J.2 Direct Pipe Technology Overview Memo I-5/South Umpqua Direct Pipe Feasibility Evaluation. P. 8. 8 May 2018 JPA. PCP Part 2 Appendix B 8 May 2018 P. 1815.
[308] Oregon's 2012 Integrated Report Assessment Database and 303(d) list. Oregon DEQ. https://www.deq.state.or.us/wq/assessment/rpt2012/search.asp.
[309] Umpqua Basin Report. Oregon DEQ. 2 June 2013. P. 145.
[310] Oregon's 2012 Integrated Report Assessment Database and 303(d) list. Oregon DEQ. https://www.deq.state.or.us/wq/assessment/rpt2012/search.asp.
[311] Oregon's 2012 Integrated Report Assessment Database and 303(d) list. Oregon DEQ. https://www.deq.state.or.us/wq/assessment/rpt2012/search.asp.

Table 5. 303(d) Listings for Streams Crossed by Pacific Connector Pipeline in the Rogue Basin[312]

Waterbody Crossed by Pipeline	Dissolved Oxygen	Habitat Modification	Temperature	Biological Criteria	Sedimentation
Big Butte Creek	X		X		X
Indian Creek	X		X		
Deer Creek			X		X
Lick Creek	X			X	
Little Butte Creek	X		X		X
Trail Creek	X		X		X
West Fork Trail Creek	X		X		X
Rogue River	X		X		X

The Rogue Basin supports coho salmon, spring chinook salmon, fall chinook salmon, summer steelhead, winter steelhead, cutthroat trout, Pacific lamprey, green sturgeon, and other native freshwater species. In 1997, the Southern Oregon/Northern California Coast (SONCC) coho salmon were federally listed as threatened.[313] The Rogue Basin TMDL states:

Urbanization, agriculture, water withdrawals, warm water temperatures, and loss of stream/floodplain connectivity in the greater Rogue River Basin inhibit the recovery of coho salmon (USFS 1995).[314]

Further, the 2014 Southern Oregon/Northern California Coast (SONCC) Coho Recovery Plan identifies impaired water quality as one of the key limiting stressors for the Upper Rogue River population.[315] Among six high priority recovery actions, the Recovery Plan identifies increasing Large Woody Debris as a priority recovery action. The proposed pipeline route would cross waterbodies that support threatened SONCC or have high Intrinsic Potential to support habitat.[316]

[312] Oregon's 2012 Integrated Report Assessment Database and 303(d) list. Oregon DEQ. https://www.deq.state.or.us/wq/assessment/rpt2012/search.asp.

[313] Rogue River Basin TMDL. Oregon DEQ. December 2008. P. 1-6. https://www.oregon.gov/deq/FilterDocs/rogueChapter1andExecutiveSummary.pdf.

[314] Rogue River Basin TMDL. Oregon DEQ. December 2008. P. 1-8. https://www.oregon.gov/deq/FilterDocs/rogueChapter1andExecutiveSummary.pdf

[315] "Upper Rogue River Population." Southern Oregon/Northern California Coast (SONCC) Coho Recovery Plan. NOAA Fisheries. 2014. P. 32-1.

[316] "Upper Rogue River Population." Southern Oregon/Northern California Coast (SONCC) Coho Recovery Plan. NOAA Fisheries. 2014. P. 32-3.

1. Stream Crossings

With the exception of the proposed Rogue River crossing upstream from Shady Cove, all of the proposed stream crossings within the Rogue Basin will use the dry open cut method. The DEIS should comprehensively review the direct, indirect, and cumulative effects of these crossings and provide site-specific analysis for each proposed crossing.

The applicant identified seven stream crossings in the Rogue Basin as Level 1 (moderate) risk of channel migration, avulsion, and/or scour. The crossing of North Fork Little Butte Creek, which is already impaired for dissolved oxygen, temperature, and sedimentation, is identified as having a high risk of channel migration, avulsion, and/or scour. The DEIS should require site-specific information including, but not limited to the specific location of access roads, details of proposed blasting, and the location of temporary coffer dams.

Table 6. Stream Crossings Identified with Moderate and High Risk of Channel Migration, Avulsion and/or Scour in the Rogue Basin

Waterbody crossed by pipeline	Level 1 (moderate) risk of channel migration, avulsion, and/or scour	Level 2 (high) risk of channel migration, avulsion, and/or scour	Bore	HDD
West Fork Trail Creek (MP 118.89)	X			
Canyon Creek (MP120.45)	X			
Rogue River (MP 122.65)				X
Deer Creek (MP 128.49)	X			
Neil Creek (MP132.12)	X			
Medford Aqueduct (MP 133.38)			X	
Lick Creek (MP 140.27)	X			
Salt Creek (MP 142.57)	X			
North Fork Little Butte Creek (MP 145.69)		X		
South Fork Little Butte Creek (MP 162.45)	X			

The 2015 FEIS from the previous iteration of the proposed pipeline specifically addressed the potential water quality impairments as a result of channel migration, avulsion, and/or scour. The 2015 FEIS states:

Fluvial erosion represents potential hazard to the proposed pipeline where streams are capable of exposing the pipe as a result of channel migration, avulsion, widening, and/or streambed scour. The principal hazard resulting from channel migration and streambed scour is complete or partial exposure of the pipeline within the channel from streambed and bank erosion or within the

floodplain from channel migration and/or avulsion….two crossings were identified that require additional field reconnaissance; West Fork Trail Creek and North Fork Little Butte Creek.[317]

In addition to the potential for increased erosion, channel migration, avulsion, and/or scour as a result of pipeline crossings, many of the proposed crossings cut through water bodies that are already impaired for sedimentation. According to the 2008 Rogue Basin TMDL:

There are six segments in the Rogue River Basin that were listed in the 2004/2006 WQ Assessment as sedimentation impaired (Table 1.12 and Figure 1.10). The impairments were determined based on Oregon Department of Fish and Wildlife (ODFW) reporting that a high percentage of fine sediment was measured in most reaches during a 1994 survey. At the time of the writing of this TMDL, DEQ is in the process of developing a sedimentation assessment methodology that could be used for implementing the narrative sedimentation standard. When the methodology and associated guidance is completed, the agency will establish sedimentation TMDLs for those waterways on the 303(d) list. DEQ also intends to re-visit the Rogue River Basin sedimentation impairments when the temperature and bacteria TMDLs are reviewed, on a 5 year basis.[318]

Disturbances that change riparian vegetation, increase the rate or amount of overland flow, or destabilize a stream bank may increase the rates of stream bank erosion and result in sedimentation increases. Disturbances in the uplands that remove vegetation, reduce soil stability on slopes, or channel runoff can increase sediment inputs (DEQ 2003, DEQ 2007). Sediment created from upland erosion is delivered to a stream channel through various erosional processes. Wide mature riparian vegetation buffers filter sediment from upslope sources as well as stabilize stream banks from erosion. System potential riparian vegetation measured by percent effective shade is a surrogate measure that has been used in other TMDLs to address sedimentation (DEQ 2003).

Modifications to the stream channel, as a result of the proposed activities that can result in channel migration, avulsion, and/or scour, will also impact temperature. As described in the Rogue Basin TMDL, channel modifications that increase sedimentation can decrease the depth and frequency of pools, which decreases the assimilative capacity for thermal loading of a stream.[319]

Specifically, Little Butte Creek and the South Fork of Little Butte Creek are both listed as impaired for sediment.[320] The South Fork Little Butte Creek crossing is identified as a moderate risk for channel migration, avulsion, and/or scour while the North Fork Little Butte Creek is identified as high risk. At a minimum, the DEIS should require further field assessments and site-specific analysis for these high risk crossings in water bodies that are already impaired for sediment.

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[317] FEIS at 4.3-36.
[318] Rogue River Basin TMDL. Oregon DEQ. December 2008. P. 1-19. https://www.oregon.gov/deq/FilterDocs/rogueChapter1andExecutiveSummary.pdf.

[319] "Chapter 2: Temperature." Rogue River Basin TMDL. Oregon DEQ. December 2008. P. 2-20.
[320] Rogue River Basin TMDL. Oregon DEQ. December 2008. P. 1-20. https://www.oregon.gov/deq/FilterDocs/rogueChapter1andExecutiveSummary.pdf.

In its denial of the 401 certification for the project, DEQ identifies the likelihood of violating state water quality standards as a result of proposed stream crossings throughout the pipeline route, including waterway crossings in the Rogue Basin.

Further, the DEIS states that the project is likely to adversely affect designated critical habitat for coho salmon in the SONCC ESU because:

- failure of dry open-cut crossing would cause moderate or more severe habitat degradations in some crossing areas;
- increases in turbidity are expected to temporarily affect the water quality downstream from stream crossing sites during construction;
- food resources would potentially be affected over the short term by dry open-cut and diverted open-cut construction methods that would remove substrate and benthos at crossing sites;
- freshwater migration corridors would potentially be affected over the short term by dry open-cut and diverted open-cut construction methods that would create temporary barriers to in-stream movements; and
- approximately 17 acres of native riparian vegetation (forest, wetlands, unaltered, and nonforested habitats) and altered habitat would be removed during construction within riparian zones associated with designated critical habitat. Adverse effects on riparian zones associated with critical habitat would be long term or permanent depending on whether mid-seral riparian forests (7 acres) or LSOG riparian forests (2 acres) are removed.[321]

The DEIS should require a comprehensive environmental review for each stream crossing, particularly for those crossings identified as moderate or high risk. Further, the DEIS should require a topographic survey, longitudinal survey of the stream profile, top and bottom of banks, and the top and bottom floodplain slopes for each stream crossing.

2. Rogue River HDD Crossing

The applicant proposes to use Horizontal Directional Drilling (HDD) technology to cross the Rogue River at MP 122.65. The use of HDD also poses the risk of an unintended release of drilling fluid known as a frac-out. The DEIS fails to comprehensively disclose and analyze the likelihood and frequency of frac-out events. The State re-iterated these concerns in its 2017 scoping comments.[322] Additionally, the DEIS fails to conduct a numerical hydraulic fracture analysis, instead relying upon a qualitative analysis.[323] As part of the qualitative analysis supplied by the applicant, GeoEngineers identifies the presence of gravels and cobbles near the HDD entry point and cautions that:

[321] 2019 DEIS at 4-332.
[322] Stat of Oregon 2017 Scoping comments at 15.
[323] Rogue River HDD Pacific Connector Pipeline Project Jackson County, Oregon. 1 September 2017. P. 7. Pacific Connector Pipeline Part 2 Appendix B. P. 1578.

If cuttings are not effectively removed from the hole during HDD operations, pullback forces could be excessively high during pullback of the 36-inch-diameter product pipe, or the product pipe could become lodged in the hole. The failure to effectively remove cuttings from the hole could potentially result in failure of the HDD installation. Therefore, we recommend that the drilling contractor maintain drilling fluid returns at all times, and use appropriate means and methods (appropriate penetration rates, drilling fluid management, mechanical methods) to ensure that cuttings are adequately removed from the hole during the HDD process.[324]

Further, the qualitative assessment of the potential for a frac-out results in the following conclusion from GeoEngineers:

It is our opinion that there is a low risk of drilling fluid surface release along the proposed HDD profile, except within about 50 to 100 feet of the entry and exit points where the HDD profile passes through alluvial and colluvial soils, and the cover between the HDD profile and the ground surface is relatively thin. As is typical with most HDD installations, the risk of drilling fluid surface release within about 100 feet of the entry and exit points is relatively high.[325]

Additionally, the DEIS does not comprehensively review the direct, indirect, and cumulative impacts to groundwater as a result of HDD. The September 2017 GeoEngineers report states:

We did not measure groundwater levels upon completion of the borings because of the presence of drilling fluid in the holes at the time of drilling. We anticipate that groundwater levels will mimic the elevation of the Rogue River around 1,410 feet mean sea level (MSL). We anticipate that groundwater levels will fluctuate with precipitation, site utilization and other factors. During heavy prolonged precipitation, and probably during most of the winter months, we expect that groundwater will be near or at the surface of the site on the east side of the Rogue River. [326]

Merely "anticipating" impacts to groundwater is not a comprehensive and site-specific review of the potential consequences of a frac-out related to HDD crossing of the Rogue River. The DEIS identifies the Rogue River HDD crossing at MP 122.65 as a "high" sensitivity crossing to hyporheic zone alterations where water quality, including water temperature and dissolved oxygen, could be impaired.[327]

Further, the DEIS fails to adequately disclose the direct, indirect, and cumulative impacts of HDD crossing and potential frac-out for the Rogue, which is designated as a Wild and Scenic River from the boundary of Crater Lake National Park to approximately 20 miles upstream from the crossing and from the confluence with the Applegate River downstream to the Lobster Creek bridge. The DEIS at 4-547 states:
Indirect effects could occur if the pipeline crossing were to cause sedimentation that could run downstream and affect water quality of the federally designated Wild and Scenic River portion

[324] Rogue River HDD Pacific Connector Pipeline Project Jackson County, Oregon. 1 September 2017. P. 11. Pacific Connector Pipeline Part 2 Appendix B. P. 1582.
[325] Rogue River HDD Pacific Connector Pipeline Project Jackson County, Oregon. 1 September 2017. P. 12. Pacific Connector Pipeline Part 2 Appendix B. P. 1583.
[326] Rogue River HDD Pacific Connector Pipeline Project Jackson County, Oregon. 1 September 2017. P. 6. Pacific Connector Pipeline Part 2 Appendix B. P. 1577.
[327] 2019 DEIS at 4-113.

of the Rogue River. However, the pipeline would cross the Rogue River using an HDD, which would avoid direct effects on this river. Also, while this segment of the Rogue River was found eligible for Wild and Scenic designation by the BLM Medford District (BLM 1995f), its river-related values are only protected on BLM-managed lands (approximately one mile from the pipeline crossing). The pipeline would not cross any protected segments of the Rogue River on BLM- managed lands. The values for which the river was found eligible are not expected to be affected by the pipeline construction and operation.[328]
The DEIS should fully evaluate the potential for a frac-out and BMPs to address water quality pollution, including but not limited to temperature, sediment, and dissolved oxygen from the applicants.

4. Medford Aqueduct Crossing

In addition to the dry open-cut methods and the HDD proposed for the Rogue River, the applicants also propose to bore below the Medford Aqueduct. The 31-inch Medford Aqueduct pipeline was constructed in 1927 and carries approximately 40 cubic feet per second of drinking water from Big Butte Springs to the City of Medford and communities within the Bear Creek watershed.[329] The DEIS should comprehensively evaluate the direct, indirect, and cumulative effects of construction of this crossing. The plan and profile for the Medford Aqueduct state that the depth of the aqueduct is unknown.[330] The DEIS should require more information regarding the depth of the bore and site-specific details to evaluate the potential direct, indirect, and cumulative impacts of the proposed pipeline crossing the main source of the City of Medford's drinking water.

5. Removal of Riparian Vegetation

The proposed action would cause stream temperature increases by removing riparian vegetation across a wide construction easement. Removing riparian vegetation will increase water temperature by decreasing shade in numerous streams identified as having salmon and steelhead spawning use, having core cold water habitat use, having salmon and trout rearing and migration use, or having migration corridor use.

Riparian vegetation is critical to overall stream health and water quality. Removing riparian vegetation, as proposed by the applicants, will likely impair water quality in violation of the Clean Water Act. As described in the Rogue Basin TMDL:

Near-stream vegetation disturbance/removal reduces stream surface shading via decreased riparian vegetation height, width and/or density, thus increasing the amount of solar radiation reaching the stream surface (shade is commonly measured as percent-effective shade or open sky percentage). Furthermore, forests even beyond the distance necessary to shade a stream can influence the microclimate, providing cooler daytime temperatures (Chen et al. 1999). Riparian

[328] 2019 DEIS at 4-547.
[329] "Big Butte Creek." Eagle Point Irrigation District. https://www.eaglepointirrigation.com/big-butte-creek.html.
[330] Pacific Connector Gas Pipeline Project. Plan and Profile – Medford Aqueduct. PCP A-B Part 7. 6 February 2018. P. 1.

vegetation also plays an important role in shaping channel morphology, resisting erosive high flows, and maintaining floodplain roughness.[331]

Not only will removing riparian vegetation likely increase water temperature, but it is also likely to result in increased sedimentation. As stated in the Rogue Basin TMDL:

> Increased sediment loading can result from agricultural, logging and mining activities which can result in increased runoff, landslides, debris torrents and other mass wasting events. Lastly, removal of riparian vegetation can lead to bank instability and increased erosion.[332]

Further, removal of riparian vegetation that results in increased sedimentation can impact interactions between surface water and groundwater, further impairing streams for temperature. As stated in the Rogue Basin TMDL:

> Excess fine sediment can also decrease permeability and porosity in the hyporheic zone, greatly reducing hyporheic flow, and resulting in less cool water inputs (Rehg et al. 2005).[333]

Stream temperature is also closely related to dissolved oxygen levels. Removing riparian vegetation will not only increase stream temperature, but also likely result in decreased dissolved oxygen. As stated in the Rogue Basin TMDL:

> Stream temperature has a significant impact on the dissolved oxygen level in a stream in two ways. As stream temperatures decrease, the amount of oxygen that can remain dissolved in water increases, and as temperatures decrease the amount of oxygen consumed by biological processes decreases.[334]

Multiple streams that would be crossed by the pipeline are also impaired for dissolved oxygen (e.g. Big Butte Creek, Little Butte Creek, and the Rogue River). The Ninth Circuit Court of Appeals made clear that new dischargers may not add a pollutant into a water body that is water quality limited.[335]

Removing riparian vegetation also decreases Large Woody Debris that is an important component of stream morphology and habitat for aquatic species.

The Rogue Basin supports habitat for threatened and endangered species listed under the ESA that are sensitive to temperature, sedimentation, and dissolved oxygen levels. Specifically, the Upper Rogue provides habitat for threatened SONCC coho. Regarding the Upper Rogue River population of SONCC coho, NOAA Fisheries stated:

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[331] "Chapter 2: Temperature." Rogue River Basin TMDL. Oregon DEQ. December 2008. P. 2-19.
[332] "Chapter 2: Temperature." Rogue River Basin TMDL. Oregon DEQ. December 2008. P. 2-19.
[333] "Chapter 2: Temperature." Rogue River Basin TMDL. Oregon DEQ. December 2008. P. 2-20.
[334] Rogue River Basin TMDL. Oregon DEQ. December 2008. P. 1-18.
[335] See Friends of Pinto Creek v. United States Environmental Protection Agency, No. 05-70785, (9th Cir. Oct. 4, 2007).

> The most pervasive problem affecting coho salmon is water temperature. Very few reaches in the Upper Rogue River Sub-basin meet ODEQ (2008) water standards compatible with coho salmon recovery…Flow depletion reduces water volume and slows water velocity, thus promoting warming, stagnation, and depressed dissolved oxygen (D.O.) (Thompson and Fortune 1970). Nawa (1999) documented loss of coho salmon juveniles in Trail Creek due to flow depletion and low D.O. Little Butte Creek is similar to Trail Creek and has both low flow and D.O. problems.[336]

Further, regarding the Upper Rogue River population, the 2014 SONCC Recovery Plan states:

Poor pool frequency and depth throughout the Upper Rogue River basin (URWA 2006) are likely due to elevated levels of fine sediment partially filling pools, a lack of scour-forcing obstructions such as large wood, and in some reaches diminished scour due to channel widening.[337]

The DEIS should comprehensively evaluate the direct, indirect, and cumulative effects of removing riparian vegetation for pipeline construction and operation, particularly for waterways that are already impaired for pollutants such as temperature, sediment, and dissolved oxygen. The DEIS should also require information about baseline temperatures in streams that would suffer removal of riparian vegetation and stream shading.

6. Road Construction

Runoff and sedimentation from roads is a major source of pollution to the streams of southwest Oregon. The Rogue Basin TMDL states:

Excessive summer water temperatures have been recorded in a number of tributaries. These high summer temperatures are reducing the quality of rearing and spawning habitat for chinook and coho salmon, steelhead and resident rainbow trout. The potential causes of high water temperatures in the Rogue River subbasins include urban and rural residential development near streams and rivers, reservoir management, irrigation water return flows, past forest management within riparian areas, NPDES regulated point sources, agricultural land use within the riparian area, water withdrawals, and road construction and maintenance.[338]

Increased sediment as a result of road construction, operation, and maintenance is also identified as a risk to threatened SONCC coho under the 2014 Recovery Plan:

> Sediment contribution from landslides and erosion occurs naturally in the Upper Rogue River basin; however, roads, timber harvest, and bank erosion following removal of

[336] "Upper Rogue River Population." Southern Oregon/Northern California Coast (SONCC) Coho Recovery Plan. NOAA Fisheries. 2014. P. 32-15.
[337] "Upper Rogue River Population." Southern Oregon/Northern California Coast (SONCC) Coho Recovery Plan. NOAA Fisheries. 2014. P. 32-17.
[338] "Chapter 2: Temperature." Rogue River Basin TMDL. Oregon DEQ. December 2008. P. 2-2.

> riparian vegetation have elevated fine sediment input. Excess fine sediment directly impacts coho salmon egg viability and can reduce food for fry, juveniles and smolts.[339]

The applicant proposes construction of temporary access roads (TARs) at 10 locations impacting 3.8 acres and construction of 15 permanent access roads (PARs) impacting 2.16 acres.[340] Not only is road construction inadequately described, but the measures to prevent significant sedimentation and turbidity in streams are neither site-specific nor reliable.

In its denial of the 401 certification for the project, DEQ specifically identifies inadequate information related to TARs and PARs in its rationale for denying the permit. The DEIS fails to disclose site-specific information or conduct adequate analysis for the water quality impacts of proposed TARs and PARs.

Within the Rogue Basin, DEQ provides a specific example where the applicant failed to disclose or provide critical information related to water impacts. According to DEQ's analysis, PAR 132.66 is located in a Potential Rapidly Moving Landslide Hazard Area and near landslides identified by aerial photography and LiDAR. DEQ states:

> Moreover, PCGP is proposing to reconstruct BLM's Beaver Springs road (BLM Noninv 32-2-36.A) by widening it. According to PCGP's Geologic Hazard Map, this BLM road identified for widening is located above a landslide area that drains to intermittent stream discharging into Dead Horse Creek. PCGP has not provided DEQ with design information regarding the need for the creation of fill slopes for this proposed new road in an area with unstable slopes. PCGP has not provided DEQ with design information for the reconstruction of the BLM road above unstable slopes. Has PCGP conducted a geotechnical investigation of this road- widening project? If performed, does this geotechnical investigation indicate the need for reinforced fill for this road- widening project? Where will PCGP discharge the post-construction stormwater for this PAR? Given the lack of design details, these questions surface for DEQ while reviewing PCGP's submittal.

As discussed in DEQ's review of PCGP's response to Comment 15, the management of stormwater discharge and the design of cut and fill slopes are important engineering considerations when constructing roads on steep and unstable slopes. The intent of DEQ's request for information on PCGP's selection criteria is to evaluate PCGP's efforts to minimize impacts to water quality from debris flows during new road construction. As noted below, PCGP should analyze the various options for accessing sections of the pipeline alignment for construction and operation as part of its efforts to address the National Environmental Protection Act requirements and, based on this analysis required by NEPA, determine the need to build new roads such as TAR 101.70 discussed above. To evaluate PCGP's efforts to avoid and minimize impacts to water quality, DEQ is requesting that PCGP provide its selection criteria for

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[339] "Upper Rogue River Population." Southern Oregon/Northern California Coast (SONCC) Coho Recovery Plan. NOAA Fisheries. 2014. P. 32-17.

[340] Pacific Connector Pipeline Resource Report 1 General Project Description. p. 31, PCP Part 2 Appendix B 8 May 2018. p. 329.

determining the need and location of TARs and PARs that PCGP used in its alternative analyses to comply with NEPA. [341]

The DEIS fails to comprehensively analyze the management of stormwater discharge and the design of cut and fill slopes for many of the proposed PARs and TARs for the project. The applicant should have developed selection criteria for choosing both the need for and the location of new access roads for pipeline construction and operation to minimize impacts to water quality. The DEIS should also require information regarding the specific location with GPS coordinates for all road maintenance treatments the applicant proposes to implement to protect water quality on all access roads that are currently hydrologically connected to waterbodies. The DEIS should require specific design details and technical support for each TAR and PAR to determine whether new permanent and temporary roads will be hydrologically disconnected to waterbodies and in compliance with state and federal laws. The DEIS should require the applicant to provide selection criteria it will use to propose new roads that avoid impacts to waterways.

7. Hydrostatic Testing

Potential sources of hydrostatic test water from the Rogue Basin include the Rogue River, the Medford Aqueduct, Eagle Point Irrigation, or the North Fork of Little Butte Creek.[342] The DEIS lists the Rogue River, Star Lake, the Medford Aquifer, Klamath River, and Lost River as potential sources for hydrostatic testing in Table 4.3.2.2-7.[343] The DEIS should comprehensively review the direct, indirect, and cumulative effects of water withdrawals from the Rogue Basin for hydrostatic testing and other uses. The applicant provides minimal information regarding the source and discharge of hydrostatic testing water. Not only would these water withdrawals impact existing water rights, but reducing flows can also impair water quality, in violation of water quality standards.[344] DEQ's denial of the 401 certification notes that the applicant has failed to submit an application for Individual Industrial Water Pollution Control Facility Permit for the proposed discharges of hydrostatic testing wastewater that must include the location of each point of discharge.[345]

L. Upper Klamath and Lost River Subbasins

The Upper Klamath Basin covers approximately 5.6 million acres and includes six hydrologic sub-basins above Iron Gate dam. As stated in the Upper Klamath and Lost Subbasins TMDL:

The Klamath River basin is of vital economic and cultural importance to the states of Oregon and California, as well as the Klamath Tribes in Oregon; the Hoopa, Karuk, and Yurok tribes in California; the Quartz Valley Indian Reservation in California, and the Resighini Rancheria in

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[341] Evaluation and Findings Report: Section 401 Water Quality Certification for the Jordan Cove Energy Project. Oregon Department of Environmental Quality. May 2019. P. 49.
[342] Pacific Connector Pipeline Resource Report 1 General Project Description. 8 May 2018. P. 58. PCP Part 2 Appendix B from DEQ 8 May 2018. P. 352.
[343] 2019 DEIS at 4-110.
[344] PUD No. 1 of Jefferson Cty v. Washington Dept. of Ecology. 511 U.S. 700 (1994). https://www.law.cornell.edu/supct/html/92-1911.ZO.html.
[345] Evaluation and Findings Report: Section 401 Water Quality Certification for the Jordan Cove Energy Project. Oregon Department of Environmental Quality. May 2019. Information Request. P. 14 of 15.

California…. Historically, the Basin once supported vast spawning and rearing fishery habitat with cultural significance to the local Indian tribes. The watershed supports an active recreational industry, including activities that are specific to the Wild and Scenic portions of the river designated by both the states and federal governments in both Oregon and California.[346]

The proposed pipeline would enter the Upper Klamath watershed with a crossing of Spencer Creek at MP 171.07 and cross approximately 10 streams within the watershed. The Upper Klamath has TMDLs for Dissolved Oxygen, Chlorophyll a, pH, and Ammonia Toxicity.[347] These water quality parameters would be both directly and indirectly impacted by the proposed activities. Multiple streams crossed by the pipeline within the Upper Klamath subbasin are impaired for dissolved oxygen, temperature, habitat modification, biological criteria, sedimentation, and toxics.[348]

The headwaters of the Lost River are located in California and the sub-basin stretches across both Oregon and California.[349] Approximately 109 waterways would be crossed by the pipeline in the Lost River watershed. The Lost River subbasin also has TMDLs for Dissolved Oxygen, Chlorophyll a, pH, and Ammonia Toxicity.[350] Regarding water quality in the Lost River subbasin, DEQ states:

> High nutrient loading in the Lost River subbasin contributes directly to exceedances of the ammonia toxicity and nuisance phytoplankton water quality criteria. In addition, nutrient loading promotes the production of aquatic plants and algae (macrophytes, epiphyton, periphyton, and phytoplankton), resulting in exceedances of water quality criteria for dissolved oxygen (DO) and pH. Biochemical oxygen demand (BOD), in the water column and sediment, also contributes to the dissolved oxygen limitation.[351]

Table 7. 303(d) Listings for Streams Crossed by Pacific Connector Pipeline in the Upper Klamath and Lost River Subbasins

Waterbody Crossed by Pipeline	Dissolved Oxygen	Habitat Modification	Temperature	Biological Criteria	Sedimentation	Toxics
Klamath River	X	X	X		X	X
Clover Creek		X	X	X	X	
Spencer Creek		X	X	X	X	

[346] Upper Klamath and Lost River Subbasins TMDL. Oregon DEQ. December 2017. https://www.oregon.gov/deq/FilterDocs/UpperKlamathandLostRiverTMDL.pdf. P. 15.
[347] Upper Klamath and Lost River Subbasins TMDL. Oregon DEQ. December 2017. https://www.oregon.gov/deq/FilterDocs/UpperKlamathandLostRiverTMDL.pdf.
[348] Oregon's 2012 Integrated Report Assessment Database and 303(d) list. Oregon DEQ. https://www.deq.state.or.us/wq/assessment/rpt2012/search.asp.
[349] Upper Klamath and Lost River Subbasins TMDL. Oregon DEQ. December 2017. https://www.oregon.gov/deq/FilterDocs/UpperKlamathandLostRiverTMDL.pdf.
[350] Upper Klamath and Lost River Subbasins TMDL. Oregon DEQ. December 2017. https://www.oregon.gov/deq/FilterDocs/UpperKlamathandLostRiverTMDL.pdf.
[351] Upper Klamath and Lost River Subbasins TMDL. Oregon DEQ. December 2017. https://www.oregon.gov/deq/FilterDocs/UpperKlamathandLostRiverTMDL.pdf. P. 92

Lake Ewauna	X					

Additionally, the Upper Klamath subbasin supports threatened and endangered species listed under the ESA, including the shortnose sucker, Lost River sucker, Bull trout, and Redband/Rainbow trout.[352] As discussed in more detail in Section VI, the proposed activities will likely create conditions deleterious to these threatened and endangered species, in violation of OAR 340-041-0007(10). According to the USFWS, factors that impact the persistence and abundance of Lost River and shortnose suckers include habitat fragmentation and "decreases in water quality associated with timber harvest, removal of riparian vegetation, livestock grazing, and agriculture practices."[353]

Regarding impacts of decreased water quality on threatened and endangered fish within the Upper Klamath and Lost River subbasins, DEQ states:

Water quality problems are of great concern because of their potential impact on native fish populations in the Klamath basin including the Shortnose sucker (*Chasmistes brevirostris*), Lost River sucker (*Deltistes luxatus*), and interior redband trout (*Oncorhynchus mykiss ssp.).* Both sucker species were listed as endangered under the Endangered Species Act in 1988, and water quality degradation has been identified as a probable major factor in their declines. Populations of listed sucker species in the main stem of the Lost River, and Tule Lake are small and consist primarily of adults. Suckers have been eliminated entirely from the middle portion of the main stem of the Lost River and Lower Klamath Lake (NRC 2004).[354]

1. Stream Crossings

The DEIS should provide a comprehensive environmental review for each stream crossing, particularly for those crossings identified as moderate or high risk. With the exception of the Klamath River crossing, all of the proposed crossings will use either a dry open cut method or a bore. The crossing of Clover Creek at MP 177.76 is identified as a Level 1 moderate risk of scour, channel migration, and/or avulsion. However, no site-specific analysis of this higher risk crossing is provided. The DEIS should require site-specific information including, but not limited to the specific location of access roads, details of proposed blasting, and the location of temporary coffer dams. Further, the DEIS should require a topographic survey, longitudinal survey of the stream profile, top and bottom of banks, and the top and bottom floodplain slopes for each stream crossing.

Additionally, the applicant proposes to cross streams that are already impaired for dissolved oxygen, habitat modification, temperature, biological criteria, and sedimentation. Proposed activities to conduct dry open cut technology have the potential to increase sedimentation, modify habitat, decrease dissolved oxygen, and impair the aquatic habitat. Specifically, the

[352] Upper Klamath and Lost River Subbasins TMDL. Oregon DEQ. December 2017. https://www.oregon.gov/deq/FilterDocs/UpperKlamathandLostRiverTMDL.pdf. P. 30.
[353] Upper Klamath and Lost River Subbasins TMDL. Oregon DEQ. December 2017. https://www.oregon.gov/deq/FilterDocs/UpperKlamathandLostRiverTMDL.pdf. P. 32.
[354] Upper Klamath and Lost River Subbasins TMDL. Oregon DEQ. December 2017. https://www.oregon.gov/deq/FilterDocs/UpperKlamathandLostRiverTMDL.pdf. P. 96.

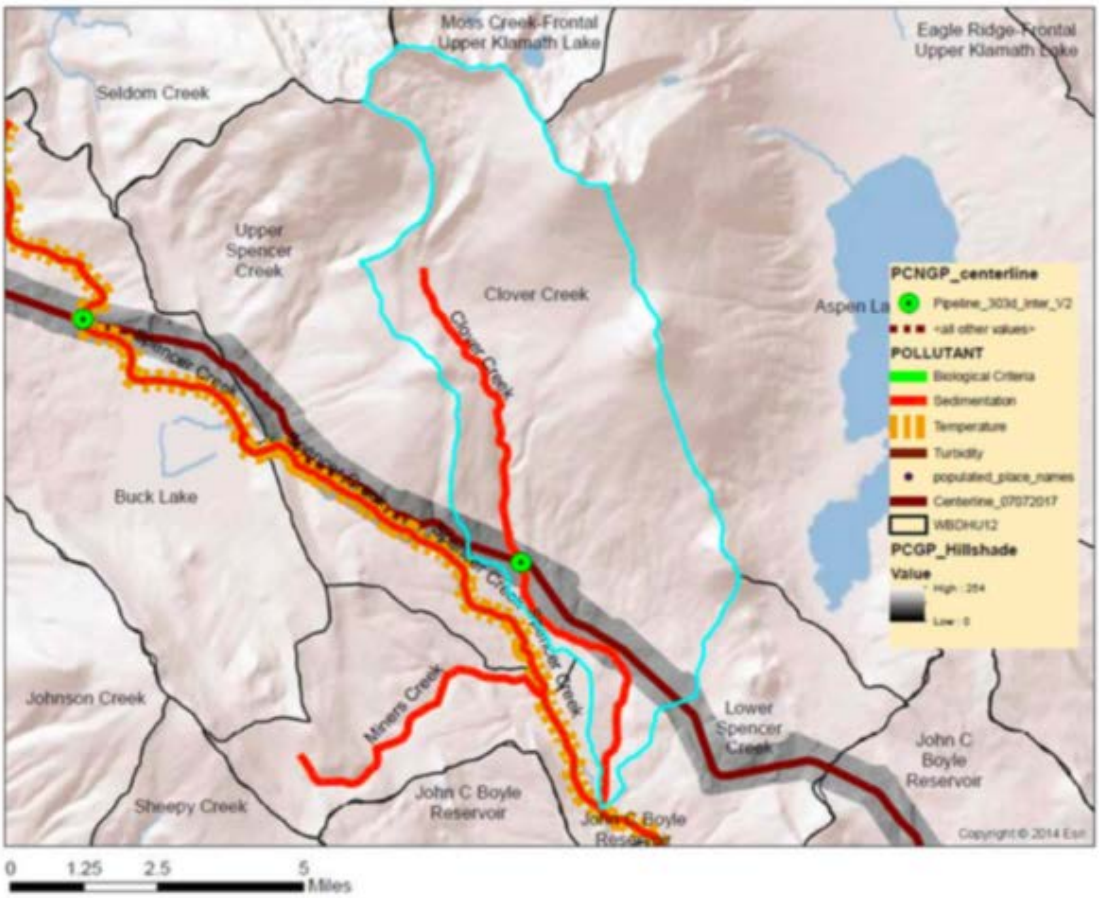
crossing of the Klamath River, Clover Creek, and Spencer Creek should be carefully evaluated because these waterways are already listed as impaired for multiple water quality parameters.

DEQ in its denial of the 401 certification for the project raises significant concerns regarding stormwater discharges near streams, particularly for the proposed permanent ROW that would cross or run parallel to 303(d) listed streams impaired for sediment and other pollutants. DEQ identifies Spencer Creek and Clover Creek as two examples within the Klamath and Lost River Subbasins. Specifically, DEQ states:

> Figure 10 shows one of several examples of the permanent ROW crossing or paralleling streams on the 303(d) list for sediment or crossing streams discharging to these sediment-listed streams. Based on its proposed conceptual approach for operating the ROW, the permanent ROW has the potential to discharge sediment at stream crossings. Ongoing increases in sediment loading to a waterbody that is listed on the 303(d) list for sediment in not allowed without either a TMDL allocation, or an implementation plan showing that there will be no increase in loading. OAR 340-41-0004(7)("Water quality limited waters may not be further degraded except in accordance with paragraphs (9)(a)(B), (C) and (D) of this rule." JCEP has not provided the analyses for the discharges that would occur at each slope breaker for each stream crossing. In addition, JCEP has not performed an analysis to demonstrate that the herbaceous area in the permanent ROW between the last slope breaker and stream is an effective BMP by itself and would not contribute to or cause a water quality standard violation, particularly near waterbodies that are not meeting standards for sediment. As noted in DEQ's September 7 (Page 11 of 15 of, Attachment B) and December 2018 (Page 66 – 68 of Attachment A) information requests, DEQ requested that JCEP evaluate the efficacy of these proposed BMPs using modeling. JCEP has not provided DEQ with this evaluation of the water quality impacts from this slope breaker discharge nor has it provided DEQ with the analysis of the proposed treatment for the discharge from slope breakers immediately upslope of a steam.[355]

[355] Evaluation and Findings Report: Section 401 Water Quality Certification for the Jordan Cove Energy Project. Oregon Department of Environmental Quality. May 2019. P. 38-39.

Figure 10: Pipeline Parallel to and Crossing Spencer Creek and crossing Clover Creek, near Milepost 177



Evaluation and Findings Report: Section 401 Water Quality Certification for the Jordan Cove Energy Project. Oregon Department of Environmental Quality. May 2019. P. 39.

The DEIS fails to adequately address the effectiveness of proposed BMPs in the permanent ROW to minimize sediment pollution using quantitative modeling and site-specific analysis. Further, the DEIS fails to comprehensively analyze the proposed treatment of discharge from slope breakers immediately upslope from streams.

The DEIS should require a comprehensive environmental review for each stream crossing, particularly for those crossings identified as moderate or high risk. Further, the DEIS should require a topographic survey, longitudinal survey of the stream profile, top and bottom of banks, and the top and bottom floodplain slopes for each stream crossing.

Additionally, the DEIS should fully evaluate the direct, indirect, and cumulative effects of the pipeline overlying an unconsolidated-deposit aquifer in the Klamath Basin over 23 miles between MPs 191.9 and 214.9. According to the DEIS:

These aquifers consist primarily of sand and gravel and are the most productive and widespread aquifers in Oregon. These unconsolidated-deposit aquifers typically provide freshwater for most public-supply, domestic, commercial, and industrial purposes (USGS 1994).[356]

2. Klamath River HDD Crossing

The applicant proposes to use Horizontal Directional Drilling (HDD) technology to cross the Klamath River at MP 199.38. The HDD crossing is given a Level 1 moderate risk of channel migration, scour, and/or avulsion. The use of HDD also poses the risk of an unintended release of drilling fluid known as a frac-out. The DEIS fails to comprehensively disclose and analyze the likelihood and frequency of frac-out events. The State re-iterated these concerns in its 2017 scoping comments.[357]

The September 2017 GeoEngineers report regarding the Klamath River HDD states:

> As is typical of HDD installations, we anticipate that there is a relatively high risk of hydraulic fracture and drilling fluid surface release within about 100 feet of the entry and exit points.[358]

This assessment emphasizes both the uncertainty and likelihood of a frac-out event using HDD technology to drill under the Klamath River. The Klamath is already water quality impaired for dissolved oxygen, toxics, sedimentation, habitat modification, and temperature. Further, the Klamath River provides habitat for threatened and endangered fish. A frac-out as a result of HDD would impair water quality and designated beneficial uses, in violation of state water quality standards and the Clean Water Act.

Additionally, the applicant does not provide adequate information regarding impacts to groundwater as a result of HDD and the DEIS fails to comprehensively evaluate these impacts. The September 2017 GeoEngineers report states:

> We did not measure groundwater levels upon completion of the borings because of the presence of drilling fluid in the holes at the time of drilling. We anticipate that groundwater levels will mimic the elevation of the Klamath River around 4,092 feet MSL. We anticipate that groundwater levels will fluctuate with precipitation, site utilization and other factors.[359]

Merely "anticipating" impacts to groundwater is not a comprehensive and site-specific review of the potential consequences of a frac-out related to HDD crossing of the Klamath River.

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[356] 2019 DEIS at 4-78.
[357] Stat of Oregon 2017 Scoping comments at 15.
[358] Klamath River HDD Pacific Connector Gas Pipeline Project Klamath County, Oregon. 1 September 2017. P. ES-1. PCP Part 2 Appendix B 8 May 2018. P. 1662.
[359] Klamath River HDD Pacific Connector Gas Pipeline Project Klamath County, Oregon. 1 September 2017. P. ES-6. PCP Part 2 Appendix B 8 May 2018. P. 1671.

The DEIS should fully evaluate the potential for a frac-out and BMPs to address water quality pollution, including but not limited to temperature, sediment, and dissolved oxygen from the applicants.

3. Removal of Riparian Vegetation

The proposed action would cause stream temperature increases by removing riparian vegetation across a wide construction easement. Removing riparian vegetation will increase water temperature by decreasing shade in numerous streams identified as having salmon and steelhead spawning use, having core cold water habitat use, having salmon and trout rearing and migration use, or having migration corridor use. The DEIS should require specific information about baseline temperatures in streams where riparian vegetation would be removed.

The Upper Klamath watershed supports habitat for the following threatened and endangered species listed under the ESA that are sensitive to temperature: shortnose sucker, Lost River sucker, Bull trout, and Redband/Rainbow trout. The Klamath River, Spencer Creek, and Clover Creek are all listed as water quality impaired for temperature. Any temperature increases in these streams as a result of the proposed activities would exacerbate existing violations of state water quality standards. The Ninth Circuit Court of Appeals recently made clear that new dischargers may not add a pollutant into a water body that is water quality limited.[360]

Additionally, removing riparian vegetation also decreases Large Woody Debris that is an important component of stream morphology and habitat for aquatic species.

The DEIS should comprehensively evaluate the direct, indirect, and cumulative effects of removing riparian vegetation for pipeline construction and operation, particularly for waterways that are already impaired for pollutants such as temperature, sediment, and dissolved oxygen. The DEIS should also require information about baseline temperatures in streams that would suffer removal of riparian vegetation and stream shading.

4. Road Construction

The applicant proposes construction of temporary access roads (TARs) at 10 locations impacting 3.8 acres and construction of 15 permanent access roads (PARs) impacting 2.16 acres.[361] The DEIS fails to provide site-specific analysis of road construction, operation, and maintenance. Not only is road construction inadequately described, but the measures to prevent significant sedimentation and turbidity in streams are neither site-specific nor reliable.

DEQ in its denial of the 401 certification for the project specifically identifies the failure of the applicant to provide site-specific information about operations and maintenance of TARs and PARs in its rationale for the denial. The DEIS should require the applicant to specify the actions it will take to maintain these roads and identify what road maintenance standards they will

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[360] See Friends of Pinto Creek v. United States Environmental Protection Agency, No. 05-70785, (9th Cir. Oct. 4, 2007).

[361] Pacific Connector Pipeline Resource Report 1 General Project Description. p. 31, PCP Part 2 Appendix B 8 May 2018. p. 329.

follow. The DEIS fails to disclose how the TARs and PARs will be kept free from mud and other road debris resulting from construction activities.

Further, the DEIS should require information and analysis regarding how the applicant will manage all BOR access roads, including but not limited to: inventory method the applicant will use to evaluate the current condition of existing roads and current capacity to protect water quality; need for maintenance treatments prior to use by the applicant; design standards and specifications for construction that the applicant will use to ensure that access roads are improved as needed to protect water quality; information on the selection criteria the applicant used to site the proposed PARs and TARs; and engineering designs the applicant will use to construct stormwater treatment controls for post-construction stormwater discharge to water conveyance structures connected to waters of the state.

The DEIS should also require information regarding the specific location with GPS coordinates for all road maintenance treatments the applicant proposes to implement to protect water quality on all access roads that are currently hydrologically connected to waterbodies. The DEIS should require specific design details and technical support for each TAR and PAR to determine whether new permanent and temporary roads will be hydrologically disconnected to waterbodies and in compliance with state and federal laws. The DEIS should require the applicant to provide selection criteria it will use to propose new roads that avoid impacts to waterways.

5. Hydrostatic Testing

The applicant provides minimal information regarding the source and discharge of hydrostatic testing water. As stated in Resource Report 1:

Water for hydrostatic testing will be obtained from commercial or municipal sources or from surface water right owners (see Table 1.3-2). If water for hydrostatic testing is acquired from surface water sources, PCGP will obtain all necessary appropriations and withdrawal permits (see Appendix C.1). As required by ODFW, pumps used to withdraw surface water will be screened according to National Marine Fisheries Service screening criteria to prevent entrainment of aquatic species.[362]

For the Klamath watershed, the applicant proposes hydrostatic testing water withdrawals from "Klamath River, or Lake of the Woods, or Keno Reservoir, or John C. Boyle Reservoir."[363] According to Table 1.3-2 Potential Hydrostatic Source Locations, the applicants could withdraw 5.6 million gallons from Lake of the Woods, 5.6 million gallons from John C. Boyle Reservoir, 5.6 million gallons from the Klamath River, and 4.6 million gallons from the High Line Canal. The DEIS identifies the Klamath River and the Lost River as potential sources, including the Lost River Anthony Blair Deep Well, Gavin Rajnus Deep Well, and Ryan Hartman Deep Well as additional potential sources.[364]

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[362] Pacific Connector Pipeline Resource Report 1 General Project Description. 8 May 2018. P. 53. PCP Part 2 appendix B from DEQ 8 May 2018 p. 351.
[363] Pacific Connector Pipeline Resource Report 1 General Project Description. 8 May 2018. P. 58. PCP Part 2 Appendix B from DEQ 8 May 2018. P. 352.
[364] 2019 DEIS at 4-110.

The DEIS fails to fully evaluate the availability of this surface water for the proposed hydrostatic testing, even with cascading water from one test site to the next. As the applicant admits:

If determined to be feasible for hydrostatic testing requirements, water would be returned to its withdrawal source location after use; however, cascading water from one test section to another to minimize water withdrawal requirements may make it impractical to release water within the same watershed where the water was withdrawn. If it is impracticable to return hydrostatic test source water to the same water basin from which it was withdrawn, PCGP would employ an effective and practical water treatment method (chlorination, filtration, or other appropriate method) to disinfect the water that would be transferred across water basin boundaries. The hydrostatic test water would be treated after it is withdrawn and prior to hydrostatic testing.[365]

The DEIS fails to comprehensively analyze the feasibility of withdrawing and discharging water for hydrostatic testing within the same watershed. Further, the DEIS fails to comprehensively disclose the direct, indirect, and cumulative effects of discharging chlorinated water on fish and other aquatic life.

Not only would these water withdrawal impact existing water rights, but reducing flows can also impair water quality, in violation of water quality standards. In the U.S. Supreme Court decision in *Jefferson City Public Utility District v. Ecology Dept. of Washington* in 1994, Justice O'Connor wrote:

> In many cases, water quantity is closely related to water quality; a sufficient lowering of the water quantity in a body of water could destroy all of its designated uses, be it for drinking water, recreation, navigation or, as here, as a fishery. In any event, there is recognition in the Clean Water Act itself that reduced stream flow, *i.e.*, diminishment of water quantity, can constitute water pollution. First, the Act's definition of pollution as "the man made or man induced alteration of the chemical, physical, biological, and radiological integrity of water" encompasses the effects of reduced water quantity. 33 U.S.C. § 1362(19). This broad conception of pollution--one which expressly evinces Congress' concern with the physical and biological integrity of water--refutes petitioners' assertion that the Act draws a sharp distinction between the regulation of water "quantity" and water "quality." Moreover, §304 of the Act expressly recognizes that water "pollution" may result from "changes in the movement, flow, or circulation of any navigable waters . . . including changes caused by the construction of dams." 33 U.S.C. § 1314(f).[366]

The DEIS should carefully review the direct, indirect, and cumulative impacts of water withdrawals from the Klamath and Lost River Basins on water quality and ESA-listed species.

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[365] Pacific Connector Pipeline Resource Report 1 General Project Description. 8 May 2018. P. 52. PCP Part 2 Appendix B from DEQ 8 May 2018. P. 350.
[366] PUD No. 1 of Jefferson Cty v. Washington Dept. of Ecology. 511 U.S. 700 (1994). https://www.law.cornell.edu/supct/html/92-1911.ZO.html.

M. Road Construction.

Although not delineated on Pacific Connector's Environmental Alignment Sheets (Resource Report 1, Appendix H.1) or discussed in their Erosion Control and Revegetation Plan, typical drawings for right-of-way cross-sections in Resource Report 1 clearly show the use of a construction access road in the right-of-way. Without a durable surface, the soil in this corridor would experience compaction during the construction of the right-of-way, and during the trenching for pipe installation. The resulting soil compaction would increase runoff and, subsequently, erosion of native soils via rill and gully erosion without additional BMPs for the construction access road surface Pacific Connector has not provided BMPs for the 229-mile construction access roadway in the form design standards, specifications, and measures necessary to support the anticipated traffic load.

During a severe rain event such as an atmospheric river, a durable unpaved road surface is essential to prevent fine soil particles from migrating to the road surface under truck traffic. Once on the road surface, stormwater entrains this soil during wet weather transporting it to swales (e.g., zero order streams), first order streams (e.g., bedrock hollows), and to streams. With the proposed pipeline alignment traversing 117 miles of steep slopes and 94 miles of severe erosion potential soils, careful selection of BMPs and the application of treatment methods are essential for water quality protection. Pacific Connector has failed to identify construction access road design standards, specifications and design drawings that adequately control discharge points to direct stormwater discharge to structural stormwater treatment controls or vegetated areas with permeable soils. Pacific Connector has failed to spatially explicit identify the location of discharge points for concentrated stormwater flow from swales and channels collecting this runoff to avoid initiating catastrophic landslides on the extensive area of unstable slopes along the pipeline ROW. Water quality impacts to streams would likely result from discharges of stormwater to landslide prone slopes, as well as from the placement of fill or spoils on such slopes. Pacific Connector has not provided specific designs for the construction access road stormwater management system adjacent to steep slopes (>30%) and landslide susceptibility zones. Section 4.1 of the proposed ECRP, Pacific Connector proposes a list of temporary erosion control BMPs for the construction ROW that are evaluated below.

The DEIS fails to acknowledge severe sedimentation of streams caused by the construction of a much smaller gas pipeline from Roseburg to Coos Bay. (See Register Guard Article dated 7/25/2004 "Enterprise goes Sour") . The DEIS fails to discuss scientific uncertainty and scientific controversy regarding the effectiveness of sediment control measures identified in the DEIS (see DEQ 2019). Since sediment control measures failed catastrophically during the construction of a previous gas pipeline, similar sediment discharges are possible for this gas pipeline because this pipeline traverses the same unstable steep terrain in Tyee sandstone geology. This 36 inch pipe is much larger, and the area of deforestation is much larger than smaller 12" pipeline constructed in 2004. The DEIS fails to address the credibility issue surrounding gas pipeline construction in southwest Oregon and associated severe sediment impacts to many miles of coho salmon streams. from previous gas line construction. Assertions of "not noticeable", "minor" or "negligible" sediment impacts for this pipeline are not scientifically or empirically substantiated (DEIS 4-68).

N. Construction right-of-way BMPs are inadequate to prevent excessive sediment from reaching streams.

Pacific Connector would use temporary slope breakers (i.e., water bars) to prevent rill and gulley erosion when construction stormwater discharges from the ROW, the 229-mile construction access road, and the non-working side of the ROW. If properly spaced, slope breakers may effectively serve as a runoff control, preventing rill and gully erosion in the construction ROW and construction access road. We assert that these temporary slope breakers would not function as predicted under anticipated traffic loads. Without additional design considerations, this traffic would compact the berm of the slope breaker and modify the excavated channel form, potentially modifying its flow path (see Resource Report 1, Drawing Number 3430.34-X-0008). Stormwater moving out of slope breaker and back onto the ROW would form rill and gully erosion and potentially affect the proper function of downstream temporary slope breakers.

Stormwater with suspended sediment from the construction ROW and construction access road would collect in the excavated channel in front of each slope breaker and would flow towards a discharge point. Pacific Connector has not identified specific BMPs, for example, to prevent (1) rill and gully erosion from concentrated flow at discharge points and (2) sediment discharge from exposed soil to zero order streams. Zero order streams refer to swales such as bedrock hollows and are an integral part of stream networks serving as conduits to first order streams. Pacific Connector has not identified the distance between the discharge point of slope breakers and other erosion control BMPs in relation to zero order streams. Pacific Connector has not demonstrated that how it would avoid stormwater discharge to areas of landslide susceptibility connected to zero order streams.

Pacific Connector's proposed construction ROW would place grading spoils and, if needed, fill to level working surface. Construction of the pipeline appears likely to discharge stormwater to these landslide susceptibility zones commonly referred to convergent headwalls, as exhibited in DEQ 2019 Fig. 4a and 4b. Research and technical manuals identified in DEQ 2019 indicate that adding water and weight to unstable slopes would increases the risk of catastrophic slope failure but the DEIS fails to fully analyze this risk or provide site specific and effective mitigations.

In Section 4.1.4 of the ECRP, Pacific Connector proposes to use mulch (i.e., effective ground cover). The application of mulch to exposed soil is an effective BMP presuming stormwater run-on controls are in place to prevent stormwater from mobilizing the mulch in runoff. Pacific Connector states that it would use this BMP when permanent stormwater controls such as reseeding and permanent slope breakers installed on the operational ROW are delayed beyond 20 days. During wet weather and especially during anticipated atmospheric rivers, the exposed soil is subject to splash erosion initiating runoff and the potential for rill and gully erosion carrying sediment to streams. The criteria of a 20-day delay in installing permanent controls establishes a window of water quality at risk not analyzed in the DEIS. During wet weather, and especially during extreme rainfall during atmospheric rivers excessive sediment is likely to reach streams and contrary to assertions in the DEIS. Moreover, on its Environmental Alignment Sheets, Pacific Connector has not delineated the travel ways into and within TEWAs or selected a durable surface for these travel way as a source control for these exposed soil surfaces. Durable surfacing for construction travel ways is a typical BMP that was not addressed in Pacific

Connector's erosion control planning. The DEIS fails to identify durable surfacing as a BMP for the ROW as described by DEQ 2019.

Pacific Connector proposes to use a silt fence parallel to the ROW to control sediment discharge from the 229-mile construction access road and construction right-of-way. The construction ROW with its construction access road on ridgetops above steeps slopes has numerous adjacent areas with zero order streams that would serve as a channel carrying sediment from the ROW to first order streams. For areas of concentrated flow such as a swale, a silt fence is not designed to treat concentrated flow nor treat silt or clays deeper than sheet or overland flow. Additionally, according to the EPA, a silt fence has limits on the drainage area it can treat. In its submittal, Pacific Connector provides no evaluation for the drainage area for silt fences, and does not identify alternative means of managing flow where a silt fence is inadequate. Sediment discharge overland within 200 feet of a waterbody *or a swale connected to a waterbody* has the potential to discharge sediment to this water body. Pacific Connector and the DEIS appears to have limited the analysis to roadways and other land disturbances within 200 feet of a perennial or intermittent stream. Analysis in the DEIS is missing for the ROW as it affects highly sensitive swales/zero order basins adjacent the ROW. The DEIS fails to admit that silt fences are unlikely to prevent potential initiation of catastrophic debris flows (landslides) from swales/zero order basins adjacent the ROW.

Pacific Connector proposes to use biobags, straw wattles, and slash filter windrows to control sediment discharge from the construction ROW. The DEIS fails to report that check dams constructed of biobags and straw wattles are only <u>moderately effective</u> in trapping sediment and preventing channel erosion even if properly spaced (ODEQ 2019:24). Moreover, when used in a drainage swale, they provide only a secondary design benefit. The DEIS fails to report that their application requires primary controls such as durable construction access road surfacing and stormwater management to avoid concentrated flows, thus these sediment controls are inadequate to support claims of sediment minimization in the DEIS. Additionally, Pacific Connector would use slash filter windrows as a perimeter control for the construction right-of-way as indicated on Environmental Alignment Sheets. Slash filter windrows are typically placed on a contour at the toe of constructed road fill slopes to intercept sediment. Research cited in ODEQ: 2019 shows these windrows can reduce sediment leaving a fill slope by 75 to 85 percent which means 15-25% of sediment would be free to travel downslope and pollute into waterways. The DEIS fails to report that slash filter windrows are not effective and not designed for treating concentrated flows in rills, swales, and drainage channels arising from construction areas. Sediment would not be minimized as asserted. Pacific Connector has not provided information showing that forest slash when placed on soil surfaces dissected with rills, swales, and natural drainage channels would provide a continuous "seal" along the soil surface. Such a seal at the surface assures that a control measure for sheet runoff would trap suspended sediment. This seal at the soil surface may be achieved with a properly installed straw wattle countersunk into the soil. However, the rigid structure of forest slash would leave depressions from rills, swales, and channels below the windrow providing a path of least resistance for runoff and the sediment it carries. In the highly erosive Tyee Core Area, Pacific Connector proposes to place slash filter windrows below fill and spoils storage on headwalls. For example, in Drawing Number 3430.29-006 (Sheet 6 of 226) in the Environmental Alignment Sheets, Pacific Connector proposes to use windrows on the border of the construction ROW where fill and/or grading spoils would be

placed. Pacific Connector would locate these windrows in a zero order stream below steep headwalls located along Pipeline Mileposts 8.56 to 8.75 (see Figure 5 in ODEQ 2019: 24). These windrows and their construction stormwater discharged are directly connected to zero order streams (i.e., bedrock hollows) and, ultimately, first order streams. The DEIS fails to admit that slash filters would not prevent substantial amounts of concentrated sediment laden water from entering swales/zero order basins that are conduits for first-order streams. The DEIS fails to adequately disclose the extent of increased risk for severe gully erosion and/or debris flows from the ROW despite identified BMPs.

Pacific Connector proposes to use temporary slope breakers to concentrate and channel stormwater away from the construction ROW and construction access road. Research cited in ODEQ 2019 shows that rills and gullies resulting from concentrated road surface discharge reduces the effectiveness of mulch treatments on fill slopes and carries sediment long distances below these slopes. Uniform drainage from the road surface would minimize erosion on the fill slopes. However in areas of steep slopes, Pacific Connector is proposing to use temporary slope breakers (i.e., water bars) that would concentrate stormwater discharge onto fill slopes above slash filter windrows. These slash filter windrows are intended to manage sheet flow on fill slopes rather than concentrated flow from a temporary slope breaker. The DEIS fails to acknowledge that the combination of slope breakers and windrows are not appropriate on steep, unstable slopes that are common in the coast range. The DEIS fails to provide BMPs that would address storm runoff from the ROW on steep slopes. The DEIS has failed to use modeling (see DEQ 2019) to evaluate the efficacy of its proposed construction ROW BMPs to ensure Pacific Connector is providing the highest and best treatment controls. We and DEQ assert this modeling is essential to determining consistency with Oregon's statewide narrative water quality standard given the prevalence of steep slopes and zero order streams in close proximity to the construction ROW. In summary, the DEIS fails to adequately describe the BMPs used for variable steepness of the ROW and geomorphic features such as swales, headwalls and zero order basins.

O. The DEIS proposed action fails to adequately consider water quality impacts from ROW construction along unstable slopes.

Pacific Connector/DEIS fails to provide site specific engineering drawings for its stormwater management system for the construction ROW and the 229-mile construction access road in areas of steep slopes and landslide susceptibility zones. Pacific Connector is proposing to place grading spoils and, potentially, fill to level working surfaces, on geologically unstable slopes to support the 95-foot construction ROW including the Temporary Extra Work Areas (TEWAs). The DEIS fails to discuss the increased risk of erosion/landsliding affecting water quality from this proposed action. Pacific Connector Geologic Hazard Maps show geologically unstable slopes such as mapped landslides and rapidly moving landslide hazard areas in close proximity to the construction ROW (Appendix F, Geologic Hazards Maps for Pacific Connector Gas Pipeline. Part 2: Appendix C, Resource Report 6). The Oregon Department of Geology and Mineral Industries (DOGAMI) has documented landslide hazards in Oregon and developed peer-reviewed procedures for identifying site-specific landslide hazards. For example, the Tyee Core Area in Oregon's Coastal Range is an area of high landslide activity including both shallow and deep-seated landslides. The proposed pipeline traverses the Tyee Core Area from approximately

Milepost 6 to 55. Research and technical references on slope stability are clear that land managers should avoid adding water or weight to unstable slopes and avoid cutting into unstable slopes without appropriate geotechnical engineering. (See technical citations in ODEQ 2019:25). Oregon has seen other linear infrastructure development (i.e., roads, pipelines) initiate landslides, particularly in the Oregon coast range (State Highway 20, and Coos County Natural Gas Pipeline).Depending on the landslide type and proximity to streams, landslides can deposit substantial amounts of organic and inorganic debris into streams impacting the aquatic life dependent on these streams. Although landslides are a natural geomorphic process for streams in the Coast and Cascade Ranges, human-caused debris torrents affect water quality by changing the natural cycles of sediment delivery to stream systems. The DEIS fails to adequately analyze increased risk of landsliding from the ROW and subsequent impacts to water quality and aquatic life.

The DEIS fails to specifically acknowledge and adopt technical guidance under the Oregon Forest Practice Act intended to ensure forest operations such as road use and road building do not initiate landslides. Oregon Department of Forestry uses the Forest Practices Act rules to comply with Oregon water quality standards. OAR 629-625-0200 provides that "operators shall avoid locating roads on steep slopes, slide areas, high landslide hazard locations, and in wetlands, riparian management areas, channels or floodplains where viable alternatives exist." The DEIS is defective because it has not demonstrated that viable alternatives do not exist and failed to take a hard look at viable alternatives in the DEIS. The DEIS fails to formerly adopt OFA requirements: OAR 629-625-0310(2)-(4) provides that "(2) operators shall end-haul excess material from steep slopes or high landslide hazard locations where needed to prevent landslides[;] (3) Operators shall design roads no wider than necessary to accommodate the anticipated use[;] (4) Operators shall design cut and fill slopes to minimize the risk of landslides[;] (5) Operators shall stabilize road fills as needed to prevent fill failure and subsequent damage to waters of the state using compaction, buttressing, subsurface drainage, rock facing or other effective means. Similarly, OAR 629-625-0330 includes other direction on management of drainage from forest land roads. We assert that these regulations apply to the ROW because it will be used as "forest road" during construction. We also assert the DEIS is defective because it principally analyzed landslide potential as it would affect the pipeline integrity to function safely but failed to adequately assess landslide potential as it would affect water quality and aquatic life (e.g. coho salmon).

P. The DEIS proposed action fails to adequately identify shallow landslide susceptibility along the ROW and prescribe appropriate mitigation

In Section 4.5.1 of Resource Report 6 (Geologic Resources), Pacific Connector presents their three-phase methodology for a landslide hazard evaluation. Phase I involved an office review of geologic maps and publications, county and state hazard maps, Natural Resource Conservation Services soil surveys, topographic maps, LiDAR hillshade models, and stereo aerial photographs. Phase II involved an aerial reconnaissance, and Phase III involved a surface reconnaissance. In Section 4.5.2, Pacific Connector clarifies its statements of risk in the landslide hazards evaluation report for Resource Report 6. The DEIS is defective because hazard evaluation principally evaluated the potential for damage or failure of the pipeline from earth

movements. Pacific Connector landslide hazard evaluation did not consider the risk of pipeline construction and operation initiating a landslide impacting water quality and aquatic life.

In Section 4.5.3.1 of Resource Report 6, Pacific Connector recognizes that rapidly moving landslides typically occur on steep slopes within zero order stream basins. In this section, Pacific Connector notes that these landscape features can fail and generate a debris torrent that travels great distances along defined stream channels. DEQ 2019:22 figure 4 provides examples of this type of unstable landscape feature. DEQ 2019:24 Figure 5 shows a segment of the pipeline that clearly shows the working side of the construction ROW with its construction access road and Temporary Extra Work Area above three headwalls (i.e., unstable slopes). These areas would support trenching and grading spoils and may require fill to level this working surface. The weight of the fill and/or trench and grading spoils, the anticipated traffic loads, and the stored material in combination with additional runoff due to the lack of a forest canopy present a substantial water quality risk to streams as well as a risk to worker and public safety. The DEIS fails to acknowledge these risks or provide mitigations at this specific location and numerous others. DEQ performed a preliminary review of the LiDAR maps in a sample section of the Tyee Core Area and found many areas of concern. Two of these areas are illustrated in DEQ 2019:27 Figures 6 and 7. The DEIS is defective because it does not provide site-specific geo-engineering measures for fills and cuts on unstable slopes . DEQ (2019) determined that Pacific Connector did not include the area from between Milepost 8.56 to 8.75 in its field data collection and risk assessment. Pacific Connector also did not conduct a surface reconnaissance for the areas of concern featured in Figures 6 and 7. On Page 31 in Section 4.5.3.2 of Resource Report 5 (Geologic Resources), Pacific Connector indicates it used LiDAR, 10-meter DEM, and aerial photography to identify moderate and high RML sites. This section provides the risk criteria Pacific Connector used to identify the RML sites selected for surface reconnaissance and included in Table B-3a. Pacific Connector's selection criteria was to identify the potential for a RML to induce strain on the pipeline and for RML erosion to expose a pipeline. These two selection criteria would not ensure the identification of RML sites posing a risk to streams and water quality. The DEIS is defective because it did not adequately consider the landslide hazard risks to streams initiated by the construction and operational ROW.

The DEIS is also defective because it did not use Special Paper 42 (inventory methods) and SP-45 for site specific landslide evaluation as described by DEQ 2019:28 and recommended by DOGMI. The results from an inventory using the SP-42 protocol support the identification of shallow-landslide and deep-seated landslide susceptibility zones to complete a scientifically credible landslide hazard assessment (best available information). Existing data in the DEIS is not accurate and increases risk of failing to take appropriate protective measures as described in DEQ 2019. Using the SP-42 inventory, DOGAMI recommends following the procedure in Special Paper 45 (SP-45) to identify shallow landslide susceptibility maps and SP-48 for identifying deep-seated landslide susceptibility zones. Using the site specific landslide inventory from SP-42, the procedure in SP-48 can assist in identifying and mitigating existing deep-seated landslides and slopes. The use of SP-42 in conjunction with SP-45 and SP-48 ensures identification of all the sites within and along the pipeline ROW where geo-engineering controls are needed to prevent spoil storage, cuts, and fills from pipeline construction and stormwater discharge from initiating unwanted landslides depositing organic and inorganic debris into

streams. Current inventory methods used by Pacific Connector have been shown to be inadequate by DEQ to protect water quality.

Q. The proposed action fails to identify BMPs adequate to mitigate landslides that will pollute streams with sediment.

Pacific Connector's proposed activities create a significant risk of sediment transport to both perennial and intermittent streams. Pacific Connector JCEP identifies three ways that pipeline construction methods would reduce slope stability and create a risk of sediment transport:1) deep excavation perpendicular to the slope (i.e., creating a cut across a slope); 2) capturing and concentrating stormwater along the ROW and discharging this stormwater to potentially unstable slopes; and 3) placing fill on a headwalls (see Section 4.6.1 of Resource Report 6-(Geologic Resources), In Section 4.6.2 of Resource Report 6, Pacific Connector states that it would engineer fill slopes constructed at gradients of 30 percent or greater to ensure long-term slope stability and it would identify side-slope ROW construction segments on steep slopes during the final design phase for this project. The DEIS fails to include "final design phase" which means there are no site specific BMPs identified for high risk sites. Pacific Connector references its Erosion Control and Revegetation Plan for BMPs to manage surface water and groundwater near unstable slopes but it is generic with no site specificity. Pacific Connector identifies the use of temporary and permanent slope breakers (i.e., water bars) which concentrate stormwater in an excavated channel in front of a berm. Runoff would substantially increase after removal of the forest and shrub canopy and herbaceous vegetation. During construction and for several years post construction, the drainage area for each temporary slope breaker is the 95-foot wide construction ROW and the 100 feet of ROW to the next temporary slope breaker based on FERC's spacing requirements. The DEIS proposed action is a threat to water quality because it does not identify the locations of the discharge points for the concentrated flow in relation to unstable geologic features. Contrary to what is stated in the DEIS, the temporary slope breakers could increase the likelihood for discharge that would reduce slope stability. The generic BMPs identified in the DEIS are not likely to succeed in keeping waste materials out of public waters and minimizing erosion of cut banks, fills, and road surfaces. The risk of failure is especially high in the coast range Tyee geology. Pacific Connector cannot assure water quality with generic BMPs applied at set intervals with inadequate consideration of geologic and geomorphic context for each pipeline segment.

R. The DEIS proposed action fails to provide site specific controls to prevent excessive sedimentation, turbidity and stream damage from dry open-cut waterbody crossings.

The proposed action fails to provide site specific mitigation measure for each stream crossing, i.e. "context" as per NEPA. It appears that the principal consideration for steam crossings in Table I-2 was if the pipe could be installed: "Dry open-cut methods feasible/practical on small non- fish intermittent tributary if flowing at the time of construction". Table I-2 has no column for mitigations based on site conditions i.e. context. For example, there is no site specific consideration of hill slope stability, stream slope, valley width or stream channel incision. DEQ 2019 reports that on steep unstable slopes, a dewater structure can saturate the area round the structure creating a positive soil pore pressure. A positive soil pressure can destabilize a slope

causing a small slope failure that discharges a debris flow into a stream. In addition, on steep slopes, spoils from trenching can discharge sediment to the stream if there is no spatially explicit planning to properly site these spoils and prevent the decant water with suspended sediment from discharging into the stream. The DEIS relies on a single set of generic drawings to be applied to hundreds of highly variable stream valleys. The DEIS provides no technical method to assure that the bankfull width and depth is restored to pre-disturbance elevations. The DEIS fails to acknowledge the potential for aggradation in front of the crossing and/or stream incision below the crossing. High gradient streams in constricted valley may have greatly increased impacts with the standard dry open-cut method. The DEIS erroneously claims that nearly all streams can be crossed with dry open-cut as depicted and fails to provide and analyze alternative methods at locations that may be more environmentally damaging (wet open- cut) or less damaging (HDD).

S. The DEIS proposed action fails to provide site-specific controls to prevent excessive sedimentation and turbidity from dry open-cut dewatering discharge.

Pacific Connector describes general procedures for dewatering work areas during dry open-cut waterbody crossings. These methods rely on upland containment areas to promote sediment settling and infiltration of the turbid discharge. Pacific Connector expects to site these structures in areas that can infiltrate the overflow from the dewatering structure into the surrounding area. Discharging water to upland areas can locally saturate shallow soils causing slope failure and mass movement. DEQ (2019) identified several crossing locations where existing terrain and soil conditions may cause slope instability. For example, the pipeline alignment crosses Steinnon Creek at two locations, at MP 20.02BR, and 24.32BR. Steinnon Creek is a Level 0 stream and is upstream of spawning and rearing habitat for Endangered Species Act (ESA) listed Coho salmon. In Table B.3-4, Pacific Connector notes steep topographic conditions for this reach near Milepost 20.20BR. Roering et al. (2005) and Pacific Connector's Geologic Hazard Map (see Figure 5 of 47) identify contrasting steep and dissected terrain and a bench-like, low gradient form adjacent to this reach suggesting remnants of a deep seated landslide and therefore an unstable slope. Steinnon Creek is crossed again at MP 24.32BR using a dry open cut procedure. The slopes adjacent to this crossing are landslides 126 and 127 identified from the Department of Geology and Mineral Industries Open File Report. The DEIS proposed action is inadequate to protect water quality because it fails to identify a stable location for each dewater structure and the number of these structures. Pacific Connector has not identified the maintenance schedule for these dewater structures. DEQ 2019 noted additional crossing locations characterized by aquatic habitat value and steep, potentially unstable hillsides (See waterbody crossings at mileposts 34.46, 44.21, 55.71, 55.90, 55.94, 56.28, 56.34, 57.11, and others.) The pipeline alignment is located in portions of the Tyee Core Area of the Oregon Coast Range characterized by steep hillsides and shallow rapidly moving landslides (e.g. debris flows). To reduce the risk of landslides, the Oregon Department of Forestry recommends not discharging water or placing material on or near headwall areas. Pacific Connector waterbody crossing procedures do not include site-specific information necessary to demonstrate that the DEIS proposed action would site and operate the dewatering structures to prevent turbid discharge, sediment discharge, and debris flows into streams. Assertions in the DEIS that turbid discharge, sediment discharge and debris flow risk at dry open –cut stream crossings would be minimized have been shown to be unsupported statements with site specific analysis (DEQ 2019).

T. The DEIS proposed action fails to provide site specific controls to prevent excessive sedimentation and turbidity from Road Construction and use of existing access roads.

The DEIS proposes to use approximately 660 miles of existing access road to construct the pipeline. The DEIS identifies these existing access roads as gravel, dirt, rock, and pit run surfaced roads. As presented on Drawing Number 3430.31-Y-Map 1 through 34 of the submittal, many of these access roads traverse steep slopes and landslide hazard areas that are in close proximity to zero order streams (swales). During wet weather, the existing roads would experience traffic loads moving heavy equipment, logs, and construction overburden (e.g., soil, rock, slash) during the preparation for and the construction of the pipeline. Unpaved roads require careful attention to the selection o construction design and maintenance standards to support the anticipated traffic loads and prevent sediment laden water from roads entering stream channels directly or via overland flow in zero order basins. Proper selection of design standards for road surfaces prevent the failure of these surfaces under traffic loads. Heavy traffic on unstable road surfaces can result in excessive fine sediment discharge to streams during wet weather.

The DEIS fails to specifically identify BMPs that would disconnect portions of the road system from the stream system to minimize sediment delivery to roads from streams. Pacific Connector would use both existing privately-owned and public access roads for access to clear trees from the construction right-of-way, Temporary Extra Work Areas, and other areas necessary for building and operating the pipeline. Tree harvesting on non-federal lands would require compliance with Oregon's Forest Practices Act (FPA) rules. Oregon Department of Forestry (ODF) administers these FPA rules. FPA rules regulate road construction and maintenance on privately owned roads during forest harvesting operations in wet weather. ODF uses the FPA rules to ensure forest operations comply with water quality standards such as OAR 340-041-0007(1), (7), and (11). Maintenance standards for public and private roads tree harvesting and pipeline construction would also require compliance with road construction and maintenance standards for the U.S. Department of Agriculture Forest Service and U.S. Department of Interior Bureau of Land Management. These Forest Service and BLM standards include potential BMPs that could help assure compliance with the Statewide Narrative Criteria for road building and maintenance. These construction and maintenance standards would also help assure compliance with the DEQ turbidity water quality standards. The DEIS failed to explicitly adopt BLM Resource Management Plan BMP R-26 which would disconnect much of the road system from the stream system: "Disconnect road runoff to the stream channel by outsloping the road approach. If outsloping is not practicable, use runoff control, erosion control and sediment containment measures. These may include using additional cross drain culverts, ditch lining, and catchment basins. Prevent or reduce ditch flow conveyance to the stream through cross drain placement above the stream crossing." SWO RMP:171.

When DEQ lists waterbodies as water quality limited (not meeting standards) on the Clean Water Act 303(d) list, the Forest Service and BLM develop Water Quality Restoration Plans (WQRP) to guide Forest Service and BLM actions to protect water quality standards. The WQRP for the

South Umpqua. River identified roads as a source of sediment from erosion (see Page 43, DEQ 2019).

DEQ (2019) provided Pacific Connector with example requirements from the Forest Service regarding road maintenance. These Forest Service requirements stem from the Forest Service Handbook and provide Pacific Connector with water quality BMPs in the form of design and maintenance standards for unpaved roads on federal forestlands. DEQ (2019) reviewed Table A.8-1 in Part 2 of Appendix B and highlighted the lack of information on maintenance treatments and needed road improvements in this table. Road upgrades needed to prevent sedimentation of streams from motorized vehicle access during the wet season have not been adequately identified in the DEIS and supporting documents. Lack of upgrades means access roads will bleed coho killing sediment into the stream system.

Once tree harvesting is complete, Pacific Connector proposes to grade a construction right-of-way including a construction access road for trenching and pipe laying equipment. This construction access road would require a durable surface to support heavy traffic loads and prevents fine soil particles from being pushed to the road surface and carried by stormwater to drainage swales along the construction right-of-way. This durable surface as well as its stormwater management system would require monitoring and periodic maintenance to avoid erosion and subsequent sediment discharge to zero order and first order streams on ridge tops and along steep slopes. The DEIS has not demonstrated on exactly how Pacific Connector would perform maintenance on each constructed access roads as well as the vast system of existing access roads.

U. Northwest Forest Plan, Late-Successional Reserves, and Mitigation.

The Northwest Forest Plan (NWFP) Late Successional Reserve (LSR) standards and guidelines state (C-17) that pipelines should be planned to have the least possible adverse impacts on LSRs. "New access proposals may require mitigation measures to reduce adverse effects on Late-Successional Reserves. In these cases, alternate routes that avoid late-successional habitat should be considered." The DEIS failed to document that alternate routes around all LSRs were considered. The NWFP also states (C-17) that these types of proposals will be reviewed on a case-by-case basis and may only be approved when adverse effects can be minimized and mitigated. The DEIS fails to minimize the impacts, and fails to properly mitigate the impacts, as documented in these comments. Thus, the project violates the Northwest Forest Plan and its Standards and Guidelines.

The NWFP only allows new developments like this in LSRs when the developments "address public needs or provide significant public benefits" (C-17). The NWFP gives examples, and exporting domestic fossil fuels to Asia was not included as having a significant public benefit or public need. Therefore, the pipeline is not allowed in the LSRs described by the Northwest Forest Plan.

The NWFP does not allow some of the mitigation offered for clearcutting endangered species habitat. For instance, concerning the mitigation of placing wood in streams, the NWFP says (B-32): "In-stream structures should only be used in the short term and not as a mitigation for poor

land management practices." FERC has not demonstrated that its mitigation will be effective or is even permitted under the NWFP.

The DEIS failed to compensate for the increased Equivalent Clearcut Area (ECA) within each watershed. If the watershed has too many clearcuts, the additional ECA caused by the pipeline could cause peak flow increases, not allowed by the Aquatic Conservation Strategy of the Northwest Forest Plan.

Other ACS objectives are not being met. For instance, some mitigation proposed to meet ACS objectives repairs damage caused by the pipeline, but does not restore habitat above that. This is the case with the 6.4 miles of fencing proposed on the Winema NF to keep cattle out of pipeline right-of-way. This should not be counted as mitigation. It is simply the cost to build the pipeline.

Plants and wildlife on the Survey and Manage list of the Northwest Forest Plan have inadequate protections. Moving the pipeline around them, instead of the weak mitigations offered for destroying them, could have protected many of these areas.

V. Forest Fire Threats.

Forest fires are a significant threat to the safety of the pipeline and the ecosystems of southern Oregon. For much of its length, the pipeline goes through fire-adapted forests, where forests burn naturally and often. Threats from fire include fire started by construction of the pipeline, other human-caused fire starts, and lightening.

The pipeline's lineal early-seral habitat could act as a wick, spreading the fire further and faster than if the pipeline were not there. A buried pipeline is also in danger of explosion if a sustained fire, such as in a slash pile or a fallen tree, burned over the buried pipe. Block valves also pose a threat if a fire burns over the above-ground pipes, especially if a block valve is within a fire perimeter and cannot be reached to turn it off. Wildland fire-fighting equipment is used on ridge-tops to create a fire-break, the same places where the high-pressure pipeline is buried. Most fires would occur in Class 1 areas, where the pipes are thinner and buried higher, increasing the fire-risk further.

The DEIS fails to adequately address these fire threats.

One suggested mitigation (DEIS 2-34) is to create "Fuel Breaks". Page 4-172 even suggests "that the cleared right-of-way could serve as a fire break for large crown fires, thereby reducing the extent of a fire's spread". Fuel Breaks do not work, as fire is spread by embers flying over even wide fuel breaks. The DEIS (4-450) says: "Stand density fuel breaks would reduce the threat of losing late-successional habitat to fire." Fuel breaks would NOT reduce threats. The DEIS failed to correctly analyze these claims.

The DEIS (4-172) admits to increased fire hazard by: "Certain activities associated with construction and operation of the Pacific Connector project (such as prescribed burning of slash, mowing, welding, refueling with flammable liquids, and parking vehicles with hot mufflers or tailpipes on tall dry grass) could increase the risk of wildland fires…" Plans to park vehicles on

tall dry grass is alarming. FERC should prohibit this.

The DEIS states (4-775) "In the event a fire was to occur on the surface in the vicinity of the pipeline, the presence of the pipeline would not increase fire hazards." This analysis is incomplete. It's not just the presence of the pipeline that would increase fire hazards. It is also the presence of the early-seral habitat in the right-of-way that increases fire hazards. Because these areas are sunnier and dryer, they are more fire-prone. Native and introduced brushes in the right-of-way instead of trees are also more volatile and burn hotter than in a mature forest. And because the right-of-way is linear, it has the ability to spread a hotter fire faster over the landscape. The DEIS only analyzed the risk of the pipeline to fire behavior when instead the DEIS should have included the risk of the right-of-way to fire behavior. Because the right-of-way will cause the fire to spread along the right-of-way, the damage to the forests, wildlife, and homes will increase near the right-of-way.

The DEIS also claims that "Fires on the surface are not a direct threat to underground natural gas pipelines because of the insulating effects of soil cover over the pipeline. Soil is a poor conductor of heat…" The DEIS failed to consider impacts to the buried pipe when a slash pile or fallen tree sustain a fire over the pipeline. Sustained heat could compromise the pipe. Also, the pipeline will be buried as little as 18" in many places, especially rocky areas. The FERC should present some scientific evidence that heat, especially from a sustained fire, cannot penetrate 18" in rocky soils.[367]

The DEIS claims (4-775) that "Pacific Connector would also have facilities built along the pipeline to aid in protecting the pipeline from wildfires. Along with Pacific Connector's pipeline control there are MLV sites on the pipeline to aid in isolating which portions of the pipeline have product in them." However, MLV sites (block valves) are above ground sections of the pipeline, not protected by soil. The DEIS should have considered the impacts if a MLV site, in a wooded area, were to experience a fire directly on the pipe. Also, the DEIS failed to consider the impacts if a MLV site is not accessible due to the presence of fire. MLV sites could be more of a fire danger than a fire control.

There are longer distances between block valves in Class 1 areas, which would add to the problem of reaching a MLV in time. These valves are placed in forested areas, thus, it could be impossible for personal to drive through a forest fire to reach them. Take for instance Block Valve #9, that had been proposed near MP 106 in the middle of the 2015 Stouts Creek Fire. If there had been a pipeline with gas during that fire, it would have been impossible to reach that MLV. In the newest proposal, that MLV has been moved to private industrial forest land[368], at even greater risk of a wildland fire.

The DEIS claims (4-775) that: "In past situations, local operation personnel have protected above ground mainline valves by burying the valves with sand and earth material." Is Jordan Cove claiming that they will do this to protect block valves threatened by fire? If so, there should be some assessment of where the sand or dirt will come from, how much sand is needed to burry a

[367] DEIS 4-770: "Pipelines constructed on land in Class 1 locations must be installed with a minimum depth of cover of 30 inches in normal soil and 18 inches in consolidated (solid) rock".
[368] Table 2.1.2.1-1 page 2-19.

40’ section of pipe 10’ off the ground, and how the block valve will be accessed if it means driving through the middle of a wildland fire.

The DEIS failed to analyze what would happen if there is a rupture in the pipeline. A catastrophic fire will result. The location of the pipeline is a very rural, very rugged area without prompt access to any kind of first responders, much less fully equipped crews to suppress a gas-fueled fire. As history indicates, professional fire crews from the State of Oregon, Forest Service, Bureau of Land Management, and other federal and state agencies rarely are able to suppress wildfires in this country, much less a fire fueled by natural gas. The DEIS does not analysis the likelihood that such a fire could occur, or what the environmental consequences would be. The lack of analysis is arbitrary, capricious, and not in accordance with law. 5 U.S.C. § 706(2)(A).

Another problem is the right-of-way will cause more fire suppression. It is environmentally advantageous and economical to treat many wildland fires as a controlled burn, and not suppress them in the backcountry when it doesn’t threaten homes or other infrastructures. However, the presence of a pipeline in the back-country will mean that more wildland fires will have to be suppressed, fires that otherwise would have been treated as natural, beneficial fires. The DEIS failed to consider this problem.

The pipeline would be buried as little as 18” deep in class one areas (DEIS 4-770). However, just 4 pages later, in the DEIS section called “Pipeline Standards to Minimize Fire Risk to Forest Lands”, the DEIS contradicts itself, saying the pipe would have “at least 24 inches of cover in consolidated rock”. Even if 24” is the correct answer, it is still too shallow to protect the pipe from a sustained surface fire.

This section, “Pipeline Standards to Minimize Fire Risk”, has NO proposed standards to minimize fire risk, which is a high risk in Oregon’s fire-adapted forests that burn naturally and burn often. The only standard proposed is to communicate with local fire officials, and proposed increase training, of which a substantial portion of the cost would be born by local fire officials[369].

Pipeline in-water construction activities, many of them highly fire hazardous, are planned to take place almost entirely during southern Oregon’s increasingly intense fire season, thereby posing a serious risk of sparking wildfires and resultant costs to public health and safety [ORS196.825(3)(e)] and water quality.

The Applicant plans for pipeline construction to begin in January 2021 and be completed in December 2022, with peak work during the summer of 2021. They anticipate a total of 1,500 workers across the five crews.[370] Construction of a buried pipeline requires the use of heavy equipment and explosives, activities that carry with them significant risk of starting wildfires. For example, to create a 95-foot-wide clear-cut right-of-way, trees would be felled using chain

[369] DEIS 4-775: “Pacific Connector would participate in any simulated emergency exercises and post-exercise critiques…. The majority of the training costs would be borne by Pacific Connector…” The other portion of the training costs could be significant.
[370] DSL Application APP0060697, Section 2 PCGP, Attachment A.2, Resource Report 1, General Project Description, “Construction Procedures,” PDF p. 2138.

saws and feller-bunchers; brush would be cleared, including by bull-dozing across rocky ground; 10-foot-deep trenches would be dug, using where necessary rock-saws, rock drills, and blasting; and pipe would be laid and welded. Trenches would then be backfilled to bury the pipeline, again with heavy equipment in rocky terrain.

To comply with Oregon's Fish Passage Law and Oregon Department of Fish and Wildlife (ODFW) guidelines, the company has agreed to confine pipeline construction activities in almost all water crossings to ODFW's "fisheries in-water construction windows." These windows are set so impacts to fish through damming, dredging, removal and fill, and blasting occur when key fish species are least likely to be present.[371] These windows also correspond to fire season. The construction windows for the pipeline route indicate that 90% of highly hazardous work at water crossings in Coos, Douglas, and Jackson County would occur primarily when fire danger is "high" to "extreme." Using Jackson County as an example, all but one of 77 crossings would occur between June 15 and September 15.[372] In 2017, the Oregon Department of Forestry (ODF) instituted "high danger" level in Jackson and Josephine Counties from June 30 to September 17--"extreme danger" ran for 52 days from July 24 to September 14. In 2018, "high danger" level ran from July 3 to September 30—fire danger was "extreme" for 54 days from July 20 to September 12.[373] PCGP's Construction Procedures do not discuss the above ODF compliance in terms of their overall work schedule so it is not clear when they intend on performing out-of-water construction activities.

The proponent would need to obtain permits or authorizations to operate heavy equipment from landowners, including the ODF, the U.S. Forest Service, and the BLM. For example, ODF requires a Permit to Operate Power Driven Machinery (PDM). Authorizations require the Applicant to agree to comply with prescribed practices to minimize the risk of a fire being ignited and be prepared to respond in the event of fire.[374] ODF evaluates requests for waivers of restrictions by fire danger level on the basis of conditions at the time and place of work and the willingness of the operator to agree to take precautions to make the operation fire safe.[375] PCGP can be expected to commit to comply with necessary procedures, but fire officials can expect public apprehension about all summertime pipeline construction, let alone waivers allowing work during Industrial Fire Prevention Level IV periods when work stoppage is generally enforced. In recent years, due at least to climate change caused increased temperatures and drier conditions, the risk and incidence of accidental, human-caused fires getting out of hand is increasing. More fires are becoming conflagrations. Circumstances in the wake of the two most recent destructive and deadly fires in California may suggest liability issues could be raised.
The last step of the pipeline construction process is reclamation. Among other activities, an average of 1 ton per acre of slash left by the original clearcutting would be spread over the right-

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[371] *Ibid*, PDF p. 2139; ODFW, *Oregon Guidelines for Timing of In-Water Work to Protect Fish and Wildlife Resources*, June 2008.
[372] DSL Application APP0060697, Section 2 PCGP, Table B.3-4, "Fish Utilization, EFH, Crossing Techniques/Rationales, In-Water Work Windows, and Bridges for Waterbodies," PDF pp.1525-85.
[373] Email Herb Johnson, ODF Forest Officer/Prevention Coordinator to Ron Garfas-Knowles, Ashland Fire & Rescue, January 29, 2019
[374] Oregon Department of Forestry, "Industrial Fire Precaution Levels (IFPLs) for Oregon Department of Forestry Protection west of the Cascades."
https://www.oregon.gov/ODF/Fire/Documents/2017%20IFPL%20for%20Web.pdf
[375] Email from Dave Lorenz dated 1.8.2019.

of-way, adding to already existing fuel loads. This amount exceeds the FERC's "Upland Plan;" the Applicant has indicated that they will seek a waiver.[376]

Southern Oregon communities already endure months-long summertime periods when wildfire smoke makes air quality unhealthy and makes outdoor activities unsafe. These conditions are having a heavy economic impact. The state and impacted counties are struggling to pay for the fires that are getting out of hand with just the risky circumstances of human-caused fire we now face. Concerns about this reality are among those raised by the Jackson County Commission in its January 22, 2019 comment to DSL, urging denial of the current removal-fill permit application we are considering.

W. The DEIS Does Not Clearly Identify All Affected Waterbodies and fails to fully comply with 40 CFR §1502.22 "Incomplete or unavailable Information."

The DEIS fails to clearly identify all affected waterbodies. According to the DEIS, the pipeline, associated workspace, and equipment bridges would be located across 19 HUC-5 watersheds and an additional 5 watersheds would be crossed by the proposed access roads. The pipeline would be constructed across or near 352 waterbodies, including 69 perennial streams, 270 intermittent streams, 9 perennial ponds, and 4 estuaries.[377] However, according to Resource Report 2 provided by the applicant, the pipeline would cross 400 waterbodies. [378] The DEIS does not address this discrepancy and there may be additional waterbodies that may be impacted by the proposed activities that are not identified in the analysis.

The DEIS 4-130 states**: "**Pacific Connector conducted wetland delineations of pipeline related workspaces. For areas where on-site delineation was not possible due to lack of landowner permission, Pacific Connector used USGS topographic maps, NRCS soil surveys, FWS NWI maps, and aerial photography to identify wetland type and boundaries." (i.e. desktop analysis).

DEIS 4-135 states: "Pacific Connector surveys have identified a number of springs and seeps, as noted in appendix H of this EIS. Pacific Connector has stated that it would further verify exact locations of springs and seeps during easement negotiations with land managers." and "Pre-construction surveys would be conducted to confirm the presence and locations of all groundwater supplies within and adjacent to the pipeline right-of-way." Apparently Pacific Connector has not obtained on-site delineation of all springs, seeps and groundwater supplies. This is important because the DEIS:4-135 states "Spring and seeps supplied by shallow groundwater, however, may be effected by the pipeline project, particularly if the pipeline is directly up-gradient of a spring or seep location.

Wetlands, stream crossings, seeps, springs, groundwater supplies typically require onsite evaluation to determine the feasibility of installing the pipeline by minimizing or eliminating the impact to the wetlands, stream crossings, seeps, springs and groundwater supplies. For example, onsite soil core sampling are needed to determine the feasibility of HDD or Direct Pipe that

[376] DSL Application APP0060697, Section 2, PCGP, Attachment A.2 (RR1 General Project Description), "Construction Procedures," PDF pp. 2146-47.
[377] 2019 DEIS at 4-92.
[378] Resource Report 2, 6)

would eliminate most impacts (e.g. riparian veg destruction, turbidity, streambank damage) to streams.

Onsite evaluations are relevant to alternative selection (route selection and technique for pipe installation) and impact analysis (minimization vs. elimination of impacts) but the DEIS fails to indicate that obtaining the onsite information involves "exorbitant costs"(see 40 CFR §1502.22 (a)). Each wetland and stream crossings where access has been denied and where onsite evaluations have not been made is not listed or evaluated as per 40 CFR §1502.22. Even if the proponents assert "exorbitant costs' preclude onsite evaluations, the DEIS fails to fully comply with 40 CFR §1502.22 b (1)(2)(3)(4) for an undisclosed but significant number of wetland and stream crossings.

(1) The DEIS fails to state that lack of onsite evaluations results in incomplete information
(2) The DEIS fails to make a statement of the relevance of the incomplete or unavailable [onsite] information to evaluating reasonably foreseeable significant adverse impacts on the human environment
(3) The DEIS fails to provide a summary of existing credible scientific evidence for each wetland and stream crossing (for each location with no onsite evaluation) which is relevant to evaluating the reasonably foreseeable significant adverse impacts on the human environment.
(4) The DEIS fails to provide evaluation of such impacts based upon theoretical approaches or research methods generally accepted in the scientific community. We assert that "desktop analysis" for wetland and stream crossings are not generally acceptable for placement of a 36" diameter pipe in highly variable and unstable mountainous terrain in SW Oregon.

40 CFR §1502.22(b) states: "For the purposes of this section, "reasonably foreseeable" includes impacts which have catastrophic consequences, even if their probability of occurrence is low, provided that the analysis of the impacts is supported by credible scientific evidence, is not based on pure conjecture, and is within the rule of reason." We assert that the DEIS failed to state that the risk for "catastrophic consequences" is higher for pipeline crossings with no onsite evaluation.

PCGP has identified over 660 miles of existing access roads that it would use to access the pipeline during construction. These include roads on federal, municipal and private lands. PCGP identifies numerous miles of these existing access roads as gravel, dirt, rock, and pit run surfaced roads. PCGP has not provided a field inventory of these roads to ensure a realistic understanding of upgrades and/or best management practices that would be needed to prevent sediment runoff to receiving streams. The DEIS fails to indicate that obtaining the road inventory information involves "exorbitant costs"(see 40 CFR §1502.22 (a)). Even if PCGP asserts that "exorbitant costs' preclude a road inventory, the DEIS fails to fully comply with 40 CFR §1502.22 b (1)(2)(3)(4) for 660 miles of access roads..

(1) The DEIS fails to state that lack of access road inventory results in incomplete information

(2) The DEIS fails to make a statement of the relevance of the incomplete or unavailable road inventory information to evaluating reasonably foreseeable significant adverse impacts on the human environment (i.e. sediment laden water from roads entering the stream system)
(3) The DEIS fails to provide a summary of existing credible scientific evidence for each uninventoried road segment which is relevant to evaluating the reasonably foreseeable significant adverse impacts on the human environment.
(4) The DEIS fails to provide evaluation of such impacts based upon theoretical approaches or research methods generally accepted in the scientific community. We assert that each road segment will have a variety of sediment causing features that will require specific treatments to prevent sediment laden water from the entering the stream system.

X. Impaired Waterbodies

According to the DEIS, the pipeline would cross 31 Category 4 and 5 water quality impaired waterbodies. The applicant proposes to use dry/diverted open-cut crossing techniques to cross 26 impaired waterbodies. Conventional boring, DP, or HDD would be used to cross 5 impaired waterbodies.[379] Both Coos Bay and the Coos River are water quality impaired for different pollutants, including but not limited to temperature, sedimentation, and toxics such as lead.[380] The applicant proposes to cross multiple streams within the Coquille Subbasin that are already impaired for multiple water quality parameters, including but not limited to dissolved oxygen, temperature, biological criteria, and sedimentation.[381] Within the South Umpqua Subbasin, there are at least 13 different waterways that are 303(d) listed for temperature, sedimentation, biological criteria, habitat modification, and dissolved oxygen.[382] Within the Upper Rogue watershed, the following crossings do not meet water quality standards for dissolved oxygen, temperature, and sedimentation: Big Butte Creek, Indian Creek, Lick Creek, Little Butte Creek, Trail Creek, and the Rogue River. Additionally, Little Butte Creek and the Rogue River are also impaired for multiple toxics, including but not limited to cadmium, selenium, mercury, nickel, silver, and zinc.[383] Multiple streams crossed by the pipeline within the Upper Klamath subbasin are impaired for dissolved oxygen, temperature, habitat modification, biological criteria, sedimentation, and toxics.[384]

The DEIS fails to comprehensively analyze the direct, indirect, and cumulative effects of increased pollution to impaired waterbodies. Specifically, the applicant has not demonstrated and the DEIS fails to assess whether there is sufficient reserve capacity in existing TMDLs for

[379] 2019 DEIS at 4-95.
[380] Oregon's 2012 Integrated Report Assessment Database and 303(d) list. Oregon DEQ. https://www.deq.state.or.us/wq/assessment/rpt2012/search.asp.
[381] Oregon's 2012 Integrated Report Assessment Database and 303(d) list. Oregon DEQ. https://www.deq.state.or.us/wq/assessment/rpt2012/search.asp.
[382] Oregon's 2012 Integrated Report Assessment Database and 303(d) list. Oregon DEQ. https://www.deq.state.or.us/wq/assessment/rpt2012/search.asp.
[383] Oregon's 2012 Integrated Report Assessment Database and 303(d) list. Oregon DEQ. https://www.deq.state.or.us/wq/assessment/rpt2012/search.asp.
[384] Oregon's 2012 Integrated Report Assessment Database and 303(d) list. Oregon DEQ. https://www.deq.state.or.us/wq/assessment/rpt2012/search.asp.

increased pollution as a result of the proposed activities. The Rogue Basin TMDL was completed in 2008, the Coquille Subbasin TMDL was completed in 1996, and the Umpqua TMDL was completed in 2007.

For example, the 2008 Rogue TMDL covers temperature and bacteria. The Rogue TMDL allocates reserve capacity to accommodate future growth as well as to provide an allocation to any existing source that may not have been identified during the development of the TMDL. The applicants have not demonstrated that there is sufficient reserve capacity in the Rogue TMDL for increased temperatures to accommodate this project and allow for anticipated growth and development of the Rogue Valley, one of the fastest growing areas in the state. The DEIS fails to adequately disclose and analyze compliance with TMDL allocations for temperature in the Rogue Basin.

Additionally, in 303(d) listed waterbodies where no TMDL has yet been adopted, DEQ states clearly in its denial of the 401 certification for the project that:

> In water bodies that are on the 303(d) list, where no TMDL has yet been adopted, new discharges may be allowed only if it is demonstrated that they would not increase the applicable pollutant load or that any such increase is mitigated.[385]

The Upper Klamath and Lost River TMDL for nutrients was issued in 2010, but the temperature component of the TMDL was not approved by the U.S. Environmental Protection Agency. DEQ issued a draft temperature TMDL for the Upper Klamath and Lost subbasins on May 15, 2019.[386] The Coos subbasin TMDL has been initiated, but is not completed.

Additionally, DEQ intends to develop sedimentation TMDLs for 303(d) listed waters. For example, the 2008 Rogue TMDL states:

At the time of the writing of this TMDL, DEQ is in the process of developing a sedimentation assessment methodology that could be used for implementing the narrative sedimentation standard. When the methodology and associated guidance is completed, the agency will establish sedimentation TMDLs for those waterways on the 303(d) list. DEQ also intends to re-visit the Rogue River Basin sedimentation impairments when the temperature and bacteria TMDLs are reviewed, on a 5-year basis.

In its denial of the 401 certification for the project, DEQ specifically identifies the lack of reasonable assurances that the project will comply with state water quality standards for turbidity. Specifically, DEQ consistently points out the inadequate information and lack of site-specific analysis provided for BMPs to address sediment discharges to impacted waterbodies. DEQ states:

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[385] Evaluation and Findings Report: Section 401 Water Quality Certification for the Jordan Cove Energy Project. Oregon Department of Environmental Quality. May 2019. P. 14.
[386] Klamath Basin. Oregon Department of Environmental Quality. https://www.oregon.gov/deq/wq/tmdls/Pages/TMDLs-Klamath-Basin.aspx.

Based on its proposed conceptual approach for operating the ROW, the permanent ROW has the potential to discharge sediment at stream crossings. Ongoing increases in sediment loading to a waterbody that is listed on the 303(d) list for sediment in not allowed without either a TMDL allocation, or an implementation plan showing that there will be no increase in loading. OAR 340-41-0004(7)("Water quality limited waters may not be further degraded except in accordance with paragraphs (9)(a)(B), (C) and (D) of this rule." JCEP has not provided the analyses for the discharges that would occur at each slope breaker for each stream crossing.

Further, DEQ provides specific examples of impacted waterbodies that are already 303(d) listed as impaired for sediment where a TMDL does not exist. Specifically, DEQ identifies the proposed stream crossing of Lick Creek near MP 140.27, stating:

> Lick Creek is listed on the 303(d) List for biocriteria. Sediment discharge from pipeline construction and debris flows from landslides initiated by the construction of the right-of-way could affect aquatic life in Lick Creek and the attainment of the biocriteria standard in this impaired waterbody. As noted earlier in this report, for a 303(d) listed waterbody, without a TMDL, no ongoing detrimental impact is authorized. Although natural landslides are an integral part of stream form and function, human-caused debris torrents and sedimentation impact water quality by changing the natural cycles of sediment delivery to systems, which impacts the aquatic environment; thus, affecting aquatic life (Castro and Reckendorf 1995).[387]

In its denial of the 401 certification for the project, DEQ identifies multiple waterbodies where stream crossings are proposed that are 303(d) listed for temperature: North Fork Coquille River at Milepost 23.06, Middle Creek at Milepost 27.04, East Fork Coquille River at Milepost 29.85, Elk Creek at Milepost 32.40, Upper Rock Creek at Milepost 44.21, Middle Fork Coquille River at Milepost 50.28, Spencer Creek at Milepost 171.07, and Lost River at Milepost 212.07. Specifically, DEQ states:

> For streams listed as impaired for temperature on the 303(d) list but not under temperature TMDL, Pacific Connector may not increase thermal loading leading to higher stream temperatures without effective mitigation. In Oregon's 2012 Integrated Report Assessment Database and 303(d) list, these streams are assigned an assessment category of five indicating a TMDL is needed to ensure these streams achieve the water quality standard. The lack of a temperature TMDL for Category 5 streams means DEQ has not established a human use allowance and reserve capacity for these streams. The reserve capacity in a TMDL ensures that loading capacity has been set aside for a safety margin and is otherwise unallocated. Moreover, the human use allowance in the temperature standard does not permit a source to cause more warming than allowed under this allowance as stated in OAR 340- 041-0028(12)(b).[388]

[387] Evaluation and Findings Report: Section 401 Water Quality Certification for the Jordan Cove Energy Project. Oregon Department of Environmental Quality. May 2019. P. 46.
[388] Evaluation and Findings Report: Section 401 Water Quality Certification for the Jordan Cove Energy Project. Oregon Department of Environmental Quality. May 2019. P. 65.

The DEIS fails to comprehensively assess the direct, indirect, and cumulative effects of proposed activities on impaired waterbodies.

Y. Peak Flows

The DEIS fails to comprehensively analyze impacts to peak flows due to forest clearing disturbance within the transient snow zone. In comparison, the 2015 DEIS provided some quantitative analysis of impacts to peak flows as a result of proposed activities. For example, the 2015 DEIS analyzed peak flows and increased impacts to 303(d) listed streams. Specifically, the 2015 DEIS stated:

> The greatest forest clearing disturbance within the transient snow zone on a percentage basis would occur within the Spencer Creek Watershed. The pipeline would disturb a total of about 126 acres of forest within the 21,913-acre transient snow zone within the 54,242-acre watershed....
>
> When considering forest vegetation disturbance within the transient snow zone, the pipeline would also have the highest percentage of forested disturbance within the Trail Creek Watershed, disturbing about 107 acres of forested vegetation types within the 30,107-acre transient snow zone in the 35,343-acre Trail Creek Watershed. The Little Butte Creek fifth-field watershed would have the largest area disturbance by the Project that is located within the transient snow zone with about 434 acres ...[389]

All three streams discussed in the 2015 DEIS would be crossed in the current proposal. Trail Creek and Little Butte Creek within the Rogue Basin are both impaired for dissolved oxygen, temperature, and sedimentation. Spencer Creek in the Klamath Basin, which is also listed as a Tier 1 Key Watershed, is impaired for habitat modification, temperature, biological criteria, and sedimentation.[390] However, the DEIS fails to comprehensively analyze the direct, indirect, and cumulative effects to peak flows due to forest clearing disturbance within the transient snow zone.

Z. Unstable Slopes

The DEIS fails to disclose and analyze the direct, indirect, and cumulative effects to affected waterbodies from proposed activities on or near unstable slopes. Specifically, the DEIS fails to identify and comprehensively assess the location of discharge points for concentrated stormwater flow from swales and channels collecting runoff from the pipeline ROW. Discharging stormwater to landslide prone slopes or placing fill or spoils on unstable slopes will likely result in water quality impacts. The analysis in the DEIS relies upon generic BMPs listed by the applicant, such as trench breakers and slope breakers, rather than conducting a site-specific analysis for each location.[391]

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[389] 2015 DEIS at 4-398.
[390] Oregon's 2012 Integrated Report Assessment Database and 303(d) list. Oregon DEQ. https://www.deq.state.or.us/wq/assessment/rpt2012/search.asp.
[391] 2019 DEIS at 4-23.

In its denial of the 401 certification for the project, DEQ raises significant concerns regarding the applicant's analysis of slope stability and BMPs, stating:

> JCEP has not demonstrated that the proposed pipeline construction, access road construction and maintenance, and pipeline right-of-way activities would employ state-of-practice methods to identify landslide susceptibility zones and mitigate landslide risks to control discharge of organic or inorganic debris, as required by OAR 340- 041-0007(11)…[392]

And further that the applicant has not provided reasonable assurances that the project complies with the state biocriteria water quality standard (OAR 340-041-0011), stating:

> JCEP has not demonstrated that the proposed pipeline construction, access road construction and maintenance, and pipeline right-of-way activities would identify and avoid or mitigate increases in landslide frequency that would result in detrimental changes in the resident biological communities…[393]

DEQ specifically identifies the lack of information regarding slope stability along the ROW and the potential for pipeline ROW construction and stormwater discharge from the pipeline ROW to initiate landslides. In its December 20, 2018 information request, DEQ specifically asked that the applicant use one of three slope stability models to objectively identify landslide risk areas and guide the siting of stormwater discharge points from slope breakers, siting of grading and trench spoil storage, and design of fill on landslide susceptibility zones within or adjacent to the ROW.[394]

Further, DEQ demonstrates that the use of LiDAR, 10-meter DEM, and aerial photography by the applicant to identify moderate and high rapidly moving landslide (RML) sites was not sufficient to identify potential RML sites. DEQ acknowledges that this type of analysis can be useful as a screening tool, the agency specifically points to recommendations from DOGAMI that site-specific landslide evaluations be used in areas of high potential risk.[395]

The DEIS should comprehensively evaluate and require identification of each dewater structure and the number of structures for each stream crossing. DEQ in its denial of the 401 certification for the project states:

> Discharging water to upland areas can locally saturate shallow soils causing slope failure and mass movement. DEQ identified several crossing locations where existing terrain and soil conditions may cause slope instability. For example, the pipeline alignment crosses Steinnon Creek at two locations, at MP 20.02BR, and 24.32BR. Steinnon Creek is a

[392] Evaluation and Findings Report: Section 401 Water Quality Certification for the Jordan Cove Energy Project. Oregon Department of Environmental Quality. May 2019. P. 44.
[393] Evaluation and Findings Report: Section 401 Water Quality Certification for the Jordan Cove Energy Project. Oregon Department of Environmental Quality. May 2019. P. 53.
[394] Evaluation and Findings Report: Section 401 Water Quality Certification for the Jordan Cove Energy Project. Oregon Department of Environmental Quality. May 2019. P. 25.
[395] Evaluation and Findings Report: Section 401 Water Quality Certification for the Jordan Cove Energy Project. Oregon Department of Environmental Quality. May 2019. P. 28.

> Level 0 stream and is upstream of spawning and rearing habitat for Endangered Species Act (ESA) listed Coho salmon. In Table B.3-4, JCEP notes steep topographic conditions for this reach near Milepost 20.20BR. Roering et al. (2005) and JCEP's Geologic Hazard Map (see Figure 5 of 47) identify contrasting steep and dissected terrain and a bench-like, low gradient form adjacent to this reach suggesting remnants of a deep- seated landslide and therefore an unstable slope. Steinnon Creek is crossed again at MP 24.32BR using a dry open cut procedure. The slopes adjacent to this crossing are landslides 126 and 127 identified from the Department of Geology and Mineral Industries Open File Report. JCEP has not provided DEQ with the proposed location of each dewater structure and the number of these structures for each crossing. JCEP has not presented the maintenance schedule for these dewater structure. DEQ noted additional crossing locations characterized by aquatic habitat value and steep, potentially unstable hillsides.[396]

The DEIS should analyze the pipeline ROW as effectively a permanent road alignment, as identified by DEQ. Additionally, the DEIS fails to comprehensively analyze the direct, indirect, and cumulative impacts of new road construction and increased use of existing roads on unstable slopes. The DEIS fails to conduct an inventory of existing access roads to identify road segments that are hydrologically connected to streams, which is critical to developing a maintenance and improvement plan for existing access roads to prevent and minimize sediment discharge to streams.[397]

In conclusion, the DEIS should evaluate the direct, indirect, and cumulative impacts of construction, operation, and maintenance of the pipeline ROW on unstable slopes. The DEIS fails to disclose and analyze the direct, indirect, and cumulative effects to affected waterbodies from proposed activities on or near unstable slopes.

AA. Sedimentation and Turbidity from Stream Crossings

The DEIS is not based on the best available science because it fails to adequately disclose, analyze or monitor fine sediment deposition subsequent to stream crossings. The DEIS fails to assess how pipeline construction and operation will persistently and significantly elevate sediment delivery to affected streams in numerous and additive ways. There is a considerable body of information indicating that ground-disturbing activities that occur within several hundred feet upslope of streams and water bodies have numerous negative and enduring sediment-related impacts on those water bodies and streams.

The DEIS is not based on best available science because it has not established baseline physical and biological conditions at and below stream crossings. The DEIS cannot assert "minor" impacts if it has not established baseline conditions. A project of this size must establish baseline stream conditions for "miles" of stream habitat because of the numerous and variable stream conditions along the pipeline route.

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[396] Evaluation and Findings Report: Section 401 Water Quality Certification for the Jordan Cove Energy Project. Oregon Department of Environmental Quality. May 2019. P. 31.
[397] Evaluation and Findings Report: Section 401 Water Quality Certification for the Jordan Cove Energy Project. Oregon Department of Environmental Quality. May 2019. P. 55.

The model estimates of suspended sediment are inadequate to assess potential impacts from sedimentation and compliance with the state water quality standard for turbidity. The DEIS should conduct site-specific analysis rather than relying upon models of "representative crossings."[398] The DEIS at 4-279 states:

> Estimates were made for 9 to 99 stream crossings per fifth-field watershed (average 51 per fifth- field watershed) for which sufficient data were available to conduct the analysis. These crossings were representative of the Project regions and ranges of stream width/gradient that would have normal dry open-cut crossings. Streams not modeled included the Upper Klamath River (except Spence Creek) and Lost River subbasins crossings, other HDD or boring sites, and bedrock stream crossings that would have low sediment during crossings. Due to the dynamic nature of sediment movement in streams, however, some bedrock crossings may have other substrate at the time of crossing.[399]

The applicant proposes dry open-cut methods, including both flume and dam and pump methods, for the stream crossings where HDD or Direct Pipe technology is not proposed. HDD is proposed for Coos Bay, the Coos River, the Rogue River, and the Klamath River and Direct Pipe technology is proposed for the South Umpqua. In the Stream Crossing Risk Analysis 2017 report, GeoEngineers reviewed 173 crossings that will be trenched out of 330 total crossings.[400] The Channel Migration and Scour Analysis 2017 report identified 10 Level 2 crossings that have a high potential for migration, avulsion, and/or scour and 44 Level 1 crossings with a moderate potential for migration, avulsion, and/or scour.[401] Channel migration and streambed scour not only increases sediment pollution and potential violations of the turbidity standard, but increases the potential for complete or partial exposure of the pipeline within the channel or floodplain.

The applicant acknowledges in Pacific Connector Pipeline Resource Report 2: Water Use and Quality that "some turbidity will result during instream activities and when the water is diverted to the backfilled areas."[402] The DEIS 4-107 states "Constructing the pipeline would modify streambanks, resulting in an increase in the rates of erosion, turbidity, and sedimentation into the crossed waterbody." Further, the DEIS at 4-106 states:

> The *Turbidity-Nutrients-Metals Water Quality Impact Analysis* (GeoEngineers 2017e) concluded that turbidity may exceed Oregon numerical water quality standards for short distances and short durations downstream from each crossing, either during and shortly after construction (in perennial waterbodies) or after fall rains begin (for intermittent and ephemeral streams). Such exceedances are allowed as part of the narrative turbidity standard if recognized in a CWA Section 401 water quality certification if every practicable means to control turbidity has been used.

[398] 2019 DEIS at 4-279.
[399] 2019 DEIS at 4-279.
[400] Stream Crossing Risk Analysis. 29 August 2017. Resource Report 2 Appendix O.2. P. 3. PCP A-B P. 505.
[401] Channel Migration and Scour Analysis. 29 August 2017. Resource Report 2. Appendix T.2. PCP A-B P. 253.
[402] Pacific Connector Pipeline Resource Report 2: Water Use and Quality. P. 22. PCP A-B part 6 p. 233.

In May 2019, the Oregon Department of Environmental Quality (DEQ) denied 401 certification of the Jordon Cove project.[403] Thus there is no legal allowance for exceedances for short durations or short distances because Jordon Cove has been denied 401 certification.

Regarding stream crossings and turbidity, DEQ in its 401 certification denial states that:

> 1. JCEP's proposed activities do not employ the highest and best treatment to control turbid discharges by failing to:
> a. Demonstrate the deployment of effective BMPs during pipeline construction and operation.
> b. Demonstrate the use of effective BMPs during road maintenance.
> c. Provide a site-specific waterbody crossing and restoration plans to minimize turbid discharges and restore stream form and function supporting water quality.[404]

DEQ further states that:

> 5. JCEP's proposed activity would likely violate the Turbidity water quality standard for the following reasons:
> a. JCEP has not provide an NDPDES 1200-C required Erosion and Sediment Control Plan demonstrating sediment and erosion controls with installation techniques have been properly deployed during the construction of the Terminal and Off-Site Project Areas to control turbidity from construction activities. [405]

DEQ concludes that:

> Based upon these findings, violations of the turbidity water quality standard are likely to occur and DEQ concludes that it lacks a reasonable assurance that the proposed activities will be conducted in a manner that will not violate the Turbidity water quality standard.[406]

The DEIS fails to adequately assess the concerns raised by DEQ and does not comprehensively assess the direct, indirect, and cumulative effects of increased sediment delivery to streams related to proposed stream crossings. The DEIS should evaluate site-specific construction procedures that the applicant will utilize at each stream crossing. The DEIS should fully analyze site-specific waterbody crossing plans that identify proposed crossing methodology, dewatering procedures dewatering discharge sites, spoils placement locations, mobilization and demobilization, and monitoring procedures. The DEIS should also address the removal of dams, dewatering locations, temporary bridges, or other temporary construction elements and include procedures to avoid or minimize sediment mobilization or turbidity.

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[403] Evaluation and Findings Report: Section 401 Water Quality Certification for the Jordan Cove Energy Project. Oregon Department of Environmental Quality. May 2019.
[404] Evaluation and Findings Report: Section 401 Water Quality Certification for the Jordan Cove Energy Project. Oregon Department of Environmental Quality. May 2019. P. 76
[405] Evaluation and Findings Report: Section 401 Water Quality Certification for the Jordan Cove Energy Project. Oregon Department of Environmental Quality. May 2019. P. 76
[406] Evaluation and Findings Report: Section 401 Water Quality Certification for the Jordan Cove Energy Project. Oregon Department of Environmental Quality. May 2019. P. 76

BB. The DEIS fails to adequately address sediment impacts from riparian vegetation removal

The DEIS does not adequately assess increased sediment delivery to streams from riparian vegetation removal related to stream crossings.

The DEIS at 4-107 states:

> Constructing the pipeline would modify streambanks, resulting in an increase in the rates of erosion, turbidity, and sedimentation into the crossed waterbody. An increase in soil compaction and vegetation clearing could also potentially increase runoff and subsequent streamflow or peak flows. The extent of these impacts would depend on streambank composition and vegetation stream type, velocity, and sediment particle size.

The DEIS does not analyze or require site-specific waterbody crossing plans specifically related to riparian vegetation removal. In the DEIS, NMFS expressed concerns regarding the potential use of riprap or barb/flow deflectors to address sediment delivery to streams as a result of riparian vegetation removal.[407]

Increased sedimentation can impact interactions between surface water and groundwater by decreasing porosity in the hyporheic zone, resulting in reduced cool water inputs to streams. [408] Further, as stream temperature increases, dissolved oxygen levels decrease. Removing riparian vegetation also decreases Large Woody Debris that is an important component of stream morphology and habitat for aquatic species. Not only is riparian vegetation critical for water quality, but removing riparian vegetation has direct, indirect, and cumulative impacts on threatened salmonids. The DEIS does not evaluate compliance with riparian protection rules adopted by the Oregon Department of Forestry (ODF) that require retention of all trees within specific distances of streams with salmon, steelhead, and bull trout under OAR 629-642-0105.

Further, the DEIS does not address discrepancies raised by DEQ regarding the proposed "necking down," or narrowing" of the construction right-of-way from 95-feet to 75-feet through wetlands and waterbody crossings. Specifically, DEQ points out that the applicant's Environmental Alignment Sheets do not actually show this proposed narrowing of the construction ROW at any of the steam crossings.[409] The DEIS should evaluate this proposed "neck down" and further comprehensively assess riparian vegetation removal related to pipeline alignment when it runs parallel to waterbodies, such as in the case of Spencer Creek.

CC. The DEIS fails to comply with requirements in 40 CFR §1502.14

The DEIS fails to identify and analyze known alternative methods to install the pipe at each medium and large perennial stream that would eliminate impacts from proposed dry open- cut

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[407] DEIS at 4-107.
[408] "Chapter 2: Temperature." Rogue River Basin TMDL. Oregon DEQ. December 2008. P. 2-20.
[409] Evaluation and Findings Report: Section 401 Water Quality Certification for the Jordan Cove Energy Project. Oregon Department of Environmental Quality. May 2019. P. 62.

method (e.g. ,HDD, DP or conventional bore methods). The DEIS 2-62 states “Pacific Connector proposes to use the HDD method to cross under the Coos Bay Estuary (MPs 0.3–1.0 and 1.5–3.0) and three major waterbodies (Coos River at MP 11.1R; Rogue River at MP 122.7; and Klamath River at MP 199.4). The DEIS 2-63 states : “Pacific Connector proposes to use DP technology to install its pipeline under the western crossing of the South Umpqua River at about MP 71.3 and the associated crossings under I-5, Dole Road, and the Central Oregon & Pacific Railroad. These construction methods will be utilized in an attempt to **avoid impacts** to these riverine systems and the aquatic resources that they support.(emphasis added)” For example DEIS 4- 106 states “Contribution of turbidity or sediment from other crossing methods, including DP, bore, and HDD, would be unlikely. DPs and bores would go under waterbodies and avoid contact with flowing streams.”

The DEIS proposes to avoid impacts with HDD and DP at only 4 of 66 perennial stream crossings. For example, proposed HDD beneath the Rogue River would avoid having to mitigate/minimize streambed disturbance, loss of riparian vegetation, and elevated turbidity caused by removal and fill in the wetted channel. However, the PCGP proposes removal and fill on 62 perennial crossings. In most instances the rationale for using dry open-cut does not even consider avoiding impacts with HDD, conventional bore, direct pipe or some other subsurface drilling method (see Table B.3-4). On 62 perennial stream crossings the PCGP proposed action has chosen to ignore the possibility to avoid stream crossing impacts via HDD, DP or conventional bore design in the DEIS. In some instances PCGP has simply not chosen HDD as an alternative when they admit it’s technically feasible. FERC makes no further analysis requirements for PCGP preferences to adversely impact streams with dry-cut methods when other techniques are available that would completely avoid most stream related impacts.

Numerous impacts and risks would be would be completely **avoided** with HDD, DP or conventional bore for perennial stream crossings as compared to dry open-cut method but the DEIS fails to make a side by side comparison of construction methods. The dry open-cut method would require blasting on 34 fish streams that would likely kill and injure some fish despite mitigations. The dry open-cut method would destroy riparian vegetation that shades and cools streams and provides a permanent supply of large wood for fish habitat. The dry open-cut method would destabilize stream banks and put the pipe at risk of exposure due to channel migration. The dry open-cut method would increase turbidity and violate state water quality standards. Visual quality of our forested streams would be degraded. Some fish would die during salvage removal with the dry open cut method. Conversely, HDD, DP or conventional bore would provide for retention of streamside shade, future large wood inputs, stable stream banks, no turbidity, no stream temperature increases, no fish mortality, no visual impacts and no possibility for pipe exposure during channel migrations.

For example, the Lost River is a major perennial stream with endangered fish species and has an orange rating for the stream crossing. PCGP admits HDD or conventional bore is possible but instead they propose the environmentally damaging dry open-cut method that has high risk at this site. We assert that the each and every waterway crossing must be considered for “project design” subsurface drilling that would avoid most impacts to waterways and wetlands. PCGP typically claims that conventional bore at specific waterway crossings is not possible due to topographic constraints. This is true for some but not all waterways. PCGP has failed to provide

a valley cross section for each waterway crossing to demonstrate that topographic limitations prevent subsurface drilling. Topographic constraints may be relevant for many but not all waterway crossings. Many waterway crossings are in broad alluvial valleys, several hundred ft wide, where conventional bore appears to be technically possible but is not being considered as an "alternative design" to avoid impacts. Many of these waterways (streams) are habitat for anadromous fishes including the federally listed coho salmon.

We assert that the FERC must not approve dry open- cut with mitigation (minimization) of adverse impacts when these adverse impacts to wetlands and waterways can be completely avoided with conventional bore or some other subsurface drilling method. The DEIS discusses alternative alignments (sites) in great detail but fails to adequately or objectively discuss alternative pipeline construction methods at perennial stream crossings that could avoid most removal/fill impacts with HDD, DP or conventional bore.

By failing to consider and propose alternative designs for waterways and wetland crossings the FERC is denied the opportunity to require implementing the environmentally preferable methods for crossing perennial streams. The DEIS failed to consider design such as HDD, conventional bore or DP to eliminate the need for mitigating or minimizing impacts associated with dry open-cut on numerous perennial streams and diverted wet open-cut method for the South Umpqua (east).

We identified 21 perennial stream crossing sites from DEIS Appendix I. Table I-2. (Fish Utilization, EFH in, and Crossing Techniques and In-Water Work Windows for Waterbodies Crossed by the Proposed Route [revised April 2018]) where alternative construction methods appear feasible for alternative analysis in the DEIS (Steinnon Cr., North Fork .Coquille River, Middle Cr., East Fork Coquille River, Deep Cr. , Middle Fork Coquille River, Olalla Cr., Rice Cr, North Myrtle Cr, South Myrtle Cr, Fate Cr, Days Cr, South Umpqua River[east] MP 94.73, West Fork Trail Cr., Deer Cr., Indian Cr. , Neil Cr., Salt Cr. N.F. Little Butte Cr., S.F. Little Butte Cr. and Lost River)

1. Steinnon Creek (MP 24)

Pacific Connector proposes dry open-cut method for crossing Steinnon Creek (BR-S-63) on BLM land (Table I-2.4). Steinnon Creek is an intermediate perennial stream providing habitat for coho salmon, Chinook salmon, winter steelhead and Pacific lamprey. Conventional bore that would avoid impacts to the stream channel was rejected: "A conventional bore (geotechnical conditions unknown) would require additional riparian impacts because TEWAs to accommodate the bore pits would be required closer to the waterbody in forested riparian areas.." We contend that the DEIS violated the NEPA process by failing to analyze alternative methods to cross Steinnon Creek by comparing impacts from conventional bore vs. dry open cut in the DEIS. The DEIS is inadequate because it failed to analyze design that would avoid impacts to the waterway (e.g. conventional bore). The admission that "geotechnical conditions unknown" was not followed up with statements to comply with 40CFR 1502.22 "Incomplete or unavailable information". The DEIS single proposed action of dry open-cut for Stiennon Creek lacks information from regulating agencies (e.g. ODFW, NMFS,DEQ, DSL) to concur with the use of dry open-cut method when impacts to the waterway could be avoided with conventional bore. In

addition, Pacific Connector failed to propose HDD as an alternative that could avoid all impacts to the stream and riparian forests entirely. The single alternative in the DEIS undermines subsequent discussions with regulating/permitting agencies about the crossing of Steinnon Creek because discussion would be about minimizing impacts and not impact avoidance. This is contrary to pursuing avoidance (if possible) through project design (i.e. environmentally preferable alternative).

2. North Fork Coquille River (MP 23.06)

Pacific Connector proposes dry open-cut method for crossing the North Fork Coquille River (BSP-207) on private land (Table I.2-4). The N.F. Coquille is an intermediate perennial stream providing habitat for coho salmon, Chinook salmon, winter steelhead and Pacific lamprey. HDD that would avoid impacts to the stream channel was rejected because Pacific Connector state that "topographic conditions on east side of the crossing prevent HDD crossing methods because of elevation differences between entry/exit and necessary workspace grading requirements." The DEIS/application provides no data to support these assertions. We note that elevation differences of 80 ft did not prevent Pacific Connector from proposing HDD for the Rogue River. The application to FERC contains no HDD feasibility report for crossing the N.F. Coquille. Access is noted as being denied and no onsite data is available. The DEIS failed to make statements to comply with 40 CFR 1502.22 "Incomplete or unavailable information". The DEIS failed to analyze project design that avoids impacts to the North Fork Coquille River and/or failed to provide technical information in the application to justify rejecting HDD technique. HDD, DP, Conventional bore or other subsurface drilling techniques to avoid stream channel impacts were not considered in the DEIS.

3. Middle Creek (MP 27.04)

Pacific Connector proposes dry open-cut method for crossing Middle Creek (BSP-207; MP 27.04) on Coos Bay BLM land (Table I.2-5). Middle Creek is an intermediate perennial stream providing habitat for coho salmon, Chinook salmon, winter steelhead and Pacific lamprey. Both HDD and conventional bore that would avoid impacts to the stream channel were rejected as alternative methods for crossing the stream. Pacific Connector states "A conventional bore crossing is not feasible because of topographic constraints on west side of creek because of grading/excavation requirements for bore pit. An HDD is not feasible because of topographic/geometry conditions." The application provides no data to support these assertions. The application contains no HDD and/or conventional bore feasibility report for crossing Middle Creek. The DEIS failed to analyze project design that avoids impacts to Middle Creek and/or failed to provide technical information in the application to justify rejecting HDD, DP or conventional bore techniques.

4. East Fork Coquille River (MP 29.85)

Pacific Connector proposes dry open-cut method for crossing the East Fork of the Coquille River (BSP-71) on private land (Table I.2-6). The E.F. Coquille is an intermediate perennial stream providing habitat for coho salmon, fall Chinook salmon, spring Chinook salmon, winter

steelhead and Pacific lamprey. HDD that would avoid impacts to the stream channel (e.g. bank erosion, loss of riparian vegetation, turbidity) was rejected. Pacific Connector states:

"An HDD is probable at the approximate crossing location based on the topography, geometry and expected geotechnical conditions. Significant HDD costs, HDD time requirements and the need for a crossing bridge were the determinants for the proposed dry-open cut crossing method."

The application provides no data to support these assertions. The application contains no HDD and/or conventional bore feasibility report for the crossing. The DEIS is defective because it failed to analyze HDD that would avoid impacts to the E.F. Coquille. Pacific Connector cannot use their time schedule or lack of planning to circumvent the NEPA to consider alternatives that avoid impacts with HDD. Pacific Connector has not provided comparisons of costs for dry open- cut versus HDD. Whatever the increased cost, it is certain to be negligible when compared to the cost of the project as a whole. Pacific Connector via the DEIS proposed action is saying that they could avoid impacts to the E.F Coquille with HDD but they are not going to propose HDD as a NEPA alternative because it takes too much time and money. Disregard to the intent of the NEPA to propose and analyze alternatives that avoid impacts violates NEPA. We are not saying HDD must be the proposed action. We are saying that HDD must be analyzed in the DEIS as an alternative to proposed dry open-cut method.

5. Deep Creek (MP 48.27)

Pacific Connector proposes dry open-cut method for crossing Deep Creek (BSP-257) on Roseburg BLM land (Table I.2-13). Deep Creek is an intermediate perennial stream with resident cutthroat trout. PCGP state: "Dry open-cut methods feasible/practical on broad stream and associated wetlands." PCGP failed to even consider HDD or conventional bore that would avoid impacts of removal/fill with dry open-cut method. We assert that PCGP knows these alternative methods are technically feasible at this site but chose not to even consider them as an alternative to the proposed action. This omission is contrary to the intent of the NEPA to analyze alternatives that avoid impacts.

6. Middle Fork Coquille River (MP 50.28)

Pacific Connector proposes dry open-cut method for crossing Middle Fork Coquille River (BSP-30) on private land (Table I.2-14). Middle Fork Coquille is an intermediate perennial stream with resident cutthroat trout. PCGP state: "Dry open-cut methods feasible/practical on broad stream during low flows within ODFW in water work windows." Pacific Connector failed to even consider HDD or conventional bore that would avoid impacts of removal/fill and blasting inherent with dry open-cut method. We assert that PCGP knows that alternative methods (HDD, DP, conventional bore) methods are technically feasible at this site but chose not to even consider them as alternatives for the DEIS. This omission is contrary to the intent of the NEPA to analyze alternatives that avoid impacts.

7. Olalla Creek (MP 58.78)

Pacific Connector proposes dry open-cut method for crossing Olalla Creek (BSP-155) on private land (Table I.2-16). Olalla Creek is an intermediate perennial stream providing habitat for coho salmon, winter steelhead, Pacific lamprey and resident cutthroat trout. PCGP state: "Dry open-cut methods feasible/practical on broad stream during low flows within ODFW in water work windows." We assert that Pacific Connector knows that alternative methods (HDD, DP, conventional bore) methods are technically feasible at this site but chose not to even consider them as alternatives for the DEIS. This omission is contrary to the intent of the NEPA to analyze alternatives that avoid impacts.

8. Rice Creek (MP 65.76)

Pacific Connector proposes dry open-cut method for crossing Rice Creek (S2-04;BSP-227) on private land (Table I.2-17). Rice Creek is an intermediate perennial stream providing habitat for coho salmon, winter steelhead and resident cutthroat trout. Pacific Connector states: "Dry open-cut methods feasible/practical during low flows periods within ODFW in- water work windows. Alignment is defined by residential development in immediate area." We assert that PCGP knows that alternative methods (HDD, DP, conventional bore) methods are technically feasible at this site but chose not to even consider them as alternatives for the DEIS. This omission is contrary to the intent of the NEPA to analyze alternatives that avoid impacts.

9. North Myrtle Creek MP79.12 (No Access no onsite data)

Pacific Connector proposes dry open-cut method for crossing North Myrtle Creek (NSP-37) on private land (Table I.2-21). North Myrtle Creek is an intermediate perennial stream providing habitat for coho salmon, winter steelhead and resident cutthroat trout. PCGP states: "Dry open-cut methods feasible/practical during low flow periods within ODFW in- water work window." Apparently this determination was made without access to the site and no onsite data. The DEIS fails to make statements to comply with 1502.22 "Incomplete or Unavailable Information". We assert that PCGP knows that alternative methods (HDD, DP, conventional bore) methods may be technically feasible at this site but chose not to even consider them as alternatives for the DEIS. This omission is contrary to the intent of the NEPA to analyze alternatives that avoid impacts.

10. South Myrtle Creek MP 81.19 (No Access no onsite data)

Pacific Connector proposes dry open-cut method for crossing South Myrtle Creek (S-T02-003;BSP-172) on private land (TableI.2-21). South Myrtle Creek is an intermediate perennial stream providing habitat for coho salmon, winter steelhead and resident cutthroat trout. PCGP states: "Dry open-cut methods feasible/practical during low flow periods within ODFW in- water work window." And further state that "Conventional bore not feasible/practical because of grading/excavation requirements on north side of stream." Apparently this determination was made without access to the site and is based on incomplete information. The DEIS fails to make statements to comply with 1502.22 "Incomplete or Unavailable Information". The PCGP application has no supporting data for choosing dry open-cut instead of conventional bore. PCGP failed to even consider HDD and failed to provide adequate (onsite) information about the

feasibility to use conventional bore. We assert that PCGP knows that alternative methods (HDD, DP, conventional bore) methods may be technically feasible at this site but chose not to even consider them as alternatives for the DEIS. This omission is contrary to the intent of the NEPA to analyze alternatives that avoid impacts.

11. Fate Creek (MP 88.48)

Pacific Connector proposes dry open-cut method for crossing Fate Creek (BSP-232)) on private land (Table I.2-24). Fate Creek is an intermediate perennial stream providing habitat for coho salmon, winter steelhead, and resident cutthroat trout. Conventional bore that would avoid impacts to the stream channel was rejected as an alternative construction method. PCGP states:

"A conventional bore is probable based on topography and geometry but geotechnical investigations have not been completed to confirm. A bridge is required at the crossing which would require bank grading for access. Significant costs, time requirements and the need for a bridge were the determinants for the proposed dry open-cut crossing method. Significant cultural resource sites occur in the area and a dry open-cut crossing will minimize excavation/grading disturbance compared to conventional bore."

PCGP provides no supporting data to support these assertions. Apparently the dry open-cut determination and rejection of conventional bore was made without access to the site. >>). The DEIS fails to make statements to comply with 1502.22 "Incomplete or Unavailable Information" for the Fate Creek crossing. The PCGP has not provided comparisons of costs for dry cut versus conventional bore. Whatever the increased cost, it is certain to be negligible when compared to the cost of the project as a whole. In addition the application contains no HDD and/or conventional bore feasibility report for the crossing. Pacific Connector is saying that they could avoid impacts to Fate Creek with conventional bore but they are not going to choose conventional bore as an alternative because it takes too much time and money. We assert these unsupported assertions are not adequate for dismissing less damaging alternative methods for pipeline construction across Fate Creek which would be analyzed in the DEIS.

12. Days Creek (MP 88.60)

Pacific Connector proposes dry open-cut method for crossing Days Creek (BSP-233)) on private land (Table I.2-25). Days Creek is an intermediate perennial stream providing habitat for coho salmon, winter steelhead and resident cutthroat trout. Conventional bore that would avoid impacts to the stream channel and consistent with NEPA alternative direction was rejected. PCGP states:

"A conventional bore is probable based on topography and geometry but geotechnical investigations have not been completed to confirm. A bridge is required at the crossing which would require bank grading for access. Significant costs, time requirements and the need for a bridge were the determinants for the proposed dry open-cut crossing method. Significant cultural resource sites occur in the area and a dry open-cut crossing will minimize excavation/grading disturbance compared to conventional bore."

Apparently this determination was made without access to the site and apparently due to lack of access, the application provides no supporting data to support these assertions. The application contains no HDD and/or conventional bore feasibility report for the crossing. The DEIS fails to make statements to comply with 1502.22 "Incomplete or Unavailable Information" for the Days Creek crossing. The PCGP has not provided comparisons of costs for dry cut versus conventional bore. Whatever the increased cost, it is certain to be negligible when compared to the cost of the project as a whole. In addition the application contains no HDD and/or conventional bore feasibility report for the crossing. PCGP is saying that they could avoid impacts to Days Creek with conventional bore but they are not going to choose conventional bore as an alternative because it takes too much time and money. We assert these unsupported assertions are not adequate for dismissing less damaging alternative methods for pipeline construction across Days Creek which would be analyzed in the DEIS.

13. South Umpqua River (MP 94.73; easternmost crossing #2)

Pacific Connector proposes diverted open-cut method for crossing the South Umpqua River (ASP-196) on private land (I.2-26). The South Umpqua River is major perennial stream providing habitat for coho salmon, fall Chinook salmon, spring Chinook salmon, winter steelhead, Pacific lamprey and resident cutthroat trout. Assuming the PCGP rejection of HDD is appropriate, we assert that PCGP could have identified an alternative location for this second crossing of the South Umpqua where HDD or DP would be technically feasible. We note that PCGP found an alternative location for implementing DP for crossing the South Umpqua River at MP 71.27 (Table I.2-1)

Conventional bore that would avoid impacts to the stream channel and consistent with NEPA direction to develop less damaging alternatives was rejected. PCGP states:

"A conventional bore is feasible based on topography and geometry but geotechnical investigations have not been completed to confirm. If subsoils are similar as surface conditions (cobbles), a bore would be infeasible. Because a bridge is required at the crossing which would require bank grading for access the diverted open cut crossing method was selected as most appropriate crossing method based on feasibility/practicality and the method with the least risk."

The application provides no supporting data to support the assertions for rejecting conventional bore. The application contains no conventional bore feasibility report for the crossing. The application contains no risk analysis for crossing the South Umpqua River. The DEIS fails to make statements to comply with 1502.22 "Incomplete or Unavailable Information" for the South Umpqua River crossing. The PCGP has not provided comparisons of costs for dry open- cut versus conventional bore. Whatever the increased cost, it is certain to be negligible when compared to the cost of the project as a whole. In addition the application contains no HDD, DP or conventional bore feasibility report for the crossing. The unsupported assertions are not adequate for dismissing less damaging alternative methods for pipeline construction across the South Umpqua River which would be analyzed in the DEIS. We are not asserting that the less damaging methods must be used, only that they be analyzed in the DEIS.

14. West Fork Trail Creek (MP 118.80)

Pacific Connector proposes dry open-cut method for crossing West Fork Trail Creek (SS-100-032) on private land (Table I.2-28). West Fork Trail Creek is an intermediate perennial stream providing habitat for coho salmon, winter steelhead and resident cutthroat trout. PCGP states: "Dry open-cut methods practical/feasible during low flow periods during ODFW in-water work window. " PCGP failed to even consider HDD or conventional bore that would avoid impacts of removal/fill inherent with dry open-cut method. We assert that PCGP knows that alternative methods (HDD, DP, conventional bore) methods may be technically feasible for West Fork Trail Creek site but chose not to even consider them as alternatives for the DEIS. This omission is contrary to the intent of the NEPA to analyze alternatives that avoid impacts.

15. Deer Creek (MP 128.49)

Pacific Connector proposes dry open-cut method for crossing Deer Creek (ASP-307) on private land (Table I.2-30). Deer Creek is an intermediate perennial stream with unknown fish species. PCGP waterbody crossing rationale states: "Dry open-cut methods feasible/practical during low flow periods within ODFW in- water work window. No additional workspace required. Coho spawn 950 feet below crossing." " PCGP failed to even consider HDD or conventional bore that would avoid impacts of removal/fill inherent with dry open-cut method. We assert that PCGP knows that alternative methods (HDD, DP, conventional bore) may be technically feasible for Deer Creek site but chose not to even consider them as alternatives for the DEIS. This omission is contrary to the intent of the NEPA to analyze alternatives that avoid impacts.

16. Indian Creek (MP 128.61)

Pacific Connector proposes dry open-cut method for crossing Indian Creek (ASP-278) on private land (Table I.2-31). Indian Creek is a minor perennial stream assumed to provide habitat for coho salmon. PCGP waterbody crossing rationale states: "Dry open-cut methods feasible/practical small < 10' wide stream low flow periods within ODFW in-water work window. Stream located in heavily grazed irrigated pasture and riparian vegetation consists of emergent pasture species. Coho spawn 600 feet below crossing." We assert that PCGP knows that alternative methods (HDD, DP, conventional bore) are technically feasible for Indian Creek site but chose not to even consider them as alternatives for the DEIS. This omission is contrary to the intent of the NEPA to analyze alternatives that avoid impacts.

17. Neil Creek (MP 132.12)

Pacific Connector proposes dry open-cut method for crossing Neil Creek (ASP-252) on private land (Table I.2-32). Neil Creek is a minor perennial stream that provides habitat for coho salmon, summer steelhead and resident trout. PCGP waterbody crossing rationale states: "Dry open-cut methods feasible/practical during low flow within ODFW in-water work window. ROW narrowed to 75 feet and TEWAs placed in pasture to minimize riparian impacts." We assert that PCGP knows that alternative methods (HDD, DP, conventional bore) are technically feasible for

Neil Creek site but chose not to even consider them as alternatives for the DEIS. This omission is contrary to the intent of the NEPA to analyze alternatives that avoid impacts.

18. Salt Creek (MP 142.57)

Pacific Connector proposes dry open-cut method for crossing Salt Creek (ASP-ESP-34) on private land (Table I.2-35). Salt Creek is an intermediate perennial stream that provides habitat for coho salmon, summer steelhead, winter steelhead and resident trout. PCGP waterbody crossing rationale states:

"Dry open-cut methods feasible/practical on creek during low flow period within ODFW in water work window. ROW necked down to 75' and TEWAs located in existing disturbed pasture to minimize riparian impacts. Bore not practical because both bore pits would be located in wetland likely requiring significant dewatering efforts to access bore pits."

The statement about bore pits requiring significant dewatering are speculative and not verified with field testing. We assert that PCGP know that alternative methods (HDD, DP, conventional bore) may be technically feasible for Salt Creek site but chose not to consider them as alternatives for the DEIS. This omission is contrary to the intent of the NEPA to analyze alternatives that avoid impacts.

19. N.F. Little Butte Cr. (MP 145.69)

Pacific Connector proposes dry open-cut method for crossing N.F.Little Butte Creek (ESP-66) on private land (Table I.2-37). N.F. Little Butte Cr. is an intermediate perennial stream that provides habitat for coho salmon, all Chinook, summer steelhead, winter steelhead and resident trout. PCGP waterbody crossing rationale states:

"Dry open-cut methods feasible/practical on stream during ODFW in-water work window. USGS Gage Station 1434300 reports that mean monthly flow are 89, 111, 105 and 67 for Jun, Jul, Aug and Sep, respectively. Flows in Jul and Aug are highest yearly flow periods for creek TEWA set back and located primarily in previously disturbed (pastures) areas to minimize riparian impacts."

We assert that PCGP/FERC know that alternative methods (HDD, DP, conventional bore) may be technically feasible for N.F. Little Butte Creek site, but chose not to consider them as alternatives for the DEIS. This omission is contrary to the intent of the NEPA to analyze alternatives that avoid impacts.

20. S.F. Little Butte Cr. (MP162.45)

Pacific Connector proposes dry open-cut method for crossing S.F.Little Butte Creek (ASP-165). On Rogue River-Siskiyou N.F (Table I.2-37). S.F. Little Butte Cr. is an intermediate perennial stream that provides habitat for native trout species. PCGP waterbody crossing rationale states:

Dry-open cut feasible and practical on creek. ODFW fish passage barrier data (RecordID 51163) indicates that downstream irrigation diversion dam/barrier (~ 0.5 miles): is unladdered and impassible. USGS Gage Station 14339500 – located below diversion reports monthly mean flow of 14, 12 and 11 cfs respectively for Jul, Aug & Sep ROW necked down to 75 feet and TEWAs set back to minimize riparian impacts.

We assert that PCGP know that alternative methods (HDD, DP, conventional bore) may be technically feasible for S.F. Little Butte Creek site, but chose not to consider them as alternatives for the DEIS. This omission is contrary to the intent of the NEPA to analyze alternatives that avoid impacts.

21. Lost River (MP 212.07; landowner restricted access)

Pacific Connector proposes Dry Open-Cut method for crossing the Lost River (NSP-001) on private land (Table I.2-44). Lost River is a **major perennial** stream that provides habitat for feudally listed Lost River Sucker, Short Nose Sucker, and sensitive species redband trout. PCGP waterbody crossing rationale states:

"Dry open-cut methods feasible/practical during low flow periods during ODFW in-water work window. An HDD and conventional bore are likely probable at the approximate crossing location based on the topography, geometry and expected geotechnical conditions. Landowner restricted access for geotechnical investigations. Significant costs, time requirements were the determinants for the proposed dry open-cut method."

PCGP provides no supporting data to support the assertions for rejecting HDD or conventional bore. Lost River has an orange rating for risk. PCGP failed to obtain access to conduct geotechnical investigations for HDD or conventional bore at this site. PCGP has had at least 10 years to plan for using HDD or conventional bore at this site. Whatever the unstated increased cost for HDD or conventional bore, the increased cost is insignificant when compared to the total cost of the project. PCGP via the DEIS proposed action is saying that impacts to Lost River could be avoided with HDD but they are not going to propose HDD because it takes too much time and money. Purposeful disregard to the intent of the NEPA to propose and analyze alternatives that avoid impacts violates NEPA. We are not saying HDD must be the proposed action. We are asserting that HDD must be analyzed in the DEIS as an alternative to dry open-cut method. In addition the DEIS fails to make required statements to comply with 40 CFR §1502.22" Incomplete or unavailable Information'.

The DEIS I-6 states

> In addition to complying with NEPA, our purposes for preparing this EIS include:
> - identify and assess potential impacts on the human environment that would result from the implementation of the proposed action;
> - <u>identify and assess reasonable alternatives to the proposed action that would avoid or</u>
> - <u>minimize adverse impacts on the human environment</u>;

- identify and recommend specific mitigation measures to minimize environmental impacts; and
- facilitate public involvement in identifying significant environmental impacts on specific resources." (emphasis added)

PCGP and FERC fail to comply with NEPA and the purpose of the EIS by failing to analyze alternative perennial stream crossing methods such as HDD, DP and conventional bore in the DEIS.

The DEIS fails to adequately inform FERC and the public about state water quality violations for turbidity by implementing dry open- cut methods for crossing perennial streams when alternative methods such as HDD are available that would cause no turbidity. The DEIS 4-106 states:

> The *Turbidity-Nutrients-Metals Water Quality Impact Analysis* (GeoEngineers 2017e) concluded that turbidity may exceed Oregon numerical water quality standards for short distances and short durations downstream from each crossing, either during and shortly after construction (in perennial waterbodies) or after fall rains begin (for intermittent and ephemeral streams). Such exceedances are allowed as part of the narrative turbidity standard if recognized in a CWA Section 401 water quality certification if every practicable means to control turbidity has been used.

The DEQ has denied 401 certification of the Jordon Cove project. https://www.oregon.gov/deq/Programs/Pages/Jordan-Cove.aspx Thus there is no legal allowance for exceedances for short durations or short distances because Jordon Cove has been denied 401 certification.

Road construction and use of roads would cause sediment laden water from road surfaces to enter numerous streams and violate state standards during and after intense winter rainfall that is expected along the pipeline route every year.

The DEIS 4-103 states "Given the locations of these roads, a total of 4 TARs, 3 PARs, and 21 EAR road segments related to the Project could potentially deliver sediment to streams, either from directly crossing streams or being with 200 feet upslope of them. Such sediment delivery would increase turbidity and fine sediment deposits, especially if BMPs were not properly instituted in these areas." The DEIS and ECRP fail to identify which BMPs will be used for each road segment to prevent sediment laden water from entering the waters of the state. The DEIS and ECRP fail to identify which streams would be polluted by access roads.

The DEIS 4-104 states that "Turbidity and sedimentation resulting from dry open-cut methods are generally minor and temporary.." The DEIS 4-105 states "There would be short-term turbidity increases for short distances, lasting for several hours during portions of the installation and removal of the diversion structures for the proposed diverted open cut crossing [of the South Umpqua River].". Although minor and temporary the turbidity caused by pipeline construction at flowing streams would violate state standards because it would persist for 1 hr or longer and

exceed the 10% standard. Unlike road related sediment delivered during winter rains, pipe construction would muddy streams that are normally clear during summer low flows.

The DEIS 4-107 states "Constructing the pipeline would modify streambanks, resulting in an increase in the rates of erosion, turbidity, and sedimentation into the crossed waterbody." The DEIS fails to admit that despite restoration efforts streambanks disturbed by pipeline construction may bleed sediment into streams for years following construction during winter rains. Since NMFS will not allow for rip rap of disturbed streambanks, the tradeoff will be increased risk of sediment delivery and resulting turbidity.

The DEIS: 4- 334 states that "Blasting at 22 streams (12 known or assumed to have Coho salmon at the crossing) could cause mortality to fish by rupturing swim bladders but active fish removal from the area prior to blasting would reduce risk of occurrence." Besides killing coho salmon the blasting would increase subsequent turbidity due to creation fines and subsequent mobilization of fines when streamflows are returned. Increased turbidity from blasting will likely violate state standards.

DD. Impacts, Risks, and Contingencies for Horizontal Directional Drilling

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. According to Williams' own experience, large-diameter HDDs frequently fail. In recent history, 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.

The 2009 FEIS states at 2-97:

> ...there are two problems that may occur during the use of an HDD. First, there may be an unintentional release of drilling mud, forcing its way to the surface through underground fissures. This situation is termed a 'frac-out.' Second, the drill may be blocked by unexpected substrata soils or geological conditions (such as gravel boulders).

The DEIS should fully evaluate the feasibility of proposed HDD for Coos Bay; evaluate and disclose HDD additives; and comprehensively analyze the direct, indirect, and cumulative effects of frac-out. Further the DEIS does not sufficiently mitigate the high risk of hydraulic facture and drilling fluid surface release at Kentuck Slough; does not comprehensively evaluate the Coos Bay estuary variations, does not adequately model effects of suspended sediment; does not adequately evaluate the direct, indirect, and cumulative noise effects of HDD on fish; and does not sufficiently analyze the impacts of HDD on hyporheic zones.

1. The DEIS should evaluate and disclose HDD additives

HDD technology is proposed for Coos Bay, the Coos River, the Rogue River, and the Klamath River. Bentonite clay is highly detrimental to salmon spawning habitat. In addition, the prior DEIS states that drilling mud "can include additional additives specific to each drilling operation" and "Pacific Connector would approve any additive compounds" but does not disclose what these additives might include.[410] The State of Oregon has specifically requested a list of the additives used in drilling fluids and their potential effects on the aquatic environment.[411]

HDD crossings, even when successful, have impacts in areas adjacent to waters 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. In recent history, 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. In addition, the prior DEIS states that drilling mud "can include additional additives specific to each drilling operation" and "Pacific Connector would approve any additive compounds" but does not disclose what these additives might include.[412] The State of Oregon has specifically requested a list of the additives used in drilling fluids and their potential effects on the aquatic environment.[413] The state re-iterated these comments yet again in its 2017 scoping comments to FERC.[414]

[410] 2014 DEIS at 4-387.
[411] 2017 State of Oregon Scoping comments at 18.
[412] 2014 DEIS at 4-387.
[413] 2017 State of Oregon Scoping comments at 18.
[414] State of Oregon 2017 Scoping comments at 18.

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 the Rogue River would severely impact water quality and salmon habitat. Bentonite clay is highly detrimental to salmon spawning habitat. In addition, the DEIS states that drilling mud "can include additional additives specific to each drilling operation" and "Pacific Connector would approve any additive compounds" but does not disclose what these additives might include. DEIS at 4-387.

2. The DEIS should comprehensively analyze the direct, indirect, and cumulative effects of frac-out

Horizontal directional drilling requires the use of drilling mud (bentonite) as a lubricant. This fluid is under pressure and there is a possibility of an inadvertent release of drilling mud through a substrata fracture, allowing it to rise to the surface.[415] The 2019 DEIS repeatedly concludes that environmental impacts would not result "unless a frac-out were to occur." Bentonite clay and sediment released through frac-outs can disrupt fish spawning habitat, increase turbidity, and potentially introduce other contaminants to impacted waterways. The DEIS also states a frac-out would likely affect sensitive fish populations, including the Endangered species the Lost River Sucker and the Shortnose Sucker, the Threatened North American Green Sturgeon, the Marbled Murrelet, a Federal Threatened Species with Critical Habitat, and benthic organisms, such commercial oyster beds located in South Slough, Haynes Inlet, and Upper Coos Bay.[416] Despite the significant impact a frac-out would have on aquatic life in region, the DEIS fails to disclose and analyze the likelihood and frequency of frac-out events. Without this information in the current application, FERC cannot evaluate whether the project is likely to have significant

[415] 2019 DEIS, 4-284
[416] 2019 DEIS, 4-268, 284, 324, 337, 339, 341, 616

impacts on the environment.

Williams pipeline company's own data show that HDDs for 36-inch pipelines fail unacceptably often.[417] In its own experience, recent HDDs for this size of pipeline have failed one out of every three attempts – a full 33% of the time.[418]

The DEIS also fails to address past frac-out events. In the region, many HDD attempts along the 12-inch Coos County pipeline failed, resulting in frac-outs and release of sediment and bentonite clay into the Coquille River. More recently, the Rover LNG Pipeline in Ohio released 50,000 gallons of drilling fluid from HDD operation into a wetland in Richland County, Ohio in April 2017. A second spill as a result of HDD operation for the Rover Pipeline released an estimated 2 million gallons of drilling fluid into the Tuscarawas River.[419]

The Oregon Department of Fish & Wildlife ("ODFW") has also described some of their concerns regarding frac-outs several times, first in 2008:

"Between August and October of 2003, MasTec North America Inc. was cited by DEQ for a series of water-quality violations which occurred between August and October of 2003. The violations were a result of frac-outs during the horizontal drilling work for the construction of a natural gas pipeline under the North Fork of the Coquille River in Coos County. If similar frac-out related turbidity discharge impacts were to occur at the proposed Rogue River crossing, they would likely impact last known significant spawning habitat for Spring-run Chinook salmon in the Rogue River Basin. This EIS should include analysis of the potential environmental impacts of a frac-out related turbidity discharge due to the proposed action and alternatives."[420]

And again in 2015:

"Pipeline crossings using HDD or other subsurface methodologies can be expected to cause frac-outs in Coos County geology and possibly throughout the project. The Applicant should be prepared for construction stoppages, cleanup, and remediation of damages caused by frac-outs. HDD and other subsurface boring or drilling crossing design locations should pro-actively address the risks associated with the potential for a "Frac out" or inadvertent loss of drilling fluid..."[421]

The DEIS should fully evaluate the direct, indirect, and cumulative impacts of frac-out.

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[417] See FLOW 2008 DEIS Comments at 102-103.
[418] *See* Williams Sept. 2007 Presentation, Williams Sept. 2007 documentation of its HDD Experience.
[419] Letter from Buffy Thomason to Aaron Wolfe and Kurt Kollar, Ohio EPA. (April 17, 2017), https://www.scribd.com/document/345647356/Notice-of-Violation-Rover-Pipeline-LLC.
[420] STATE OF OREGON, Jordan Cove Draft Environmental Impact Statement 24 (2008)
[421] STATE OF OREGON, Jordan Cove Draft Environmental Impact Statement 102 (2015)

3. The DEIS does not sufficiently mitigate the high risk of hydraulic fracture and drilling fluid surface release at Kentuck Slough

The 2017 GeoEngineers Memo concluded there is a high risk of hydraulic fracture and drilling fluid surface release at the east end of the crossing approaching Kentuck Slough.[422] The evaluation identifies potential mitigation for this risk, such as large-diameter casing, but it is unclear from the DEIS and supporting documents what specific mitigation measures JCEP is currently proposing. Any measures designed to mitigate the potential for hydraulic fracture during HDD are applied broadly to all HDD sites. The DEIS also fails to include the memo's finding of high risk of hydraulic facture and drilling fluid surface release at the Kentuck Slough crossing. Without specific discussion and mitigation measures of this risk, FERC cannot conclude that the HDD crossing of Kentuck Slough presents no significant impact.

4. The DEIS does not adequately model effects of suspended sediment

The applicant incorporated site data, regional data, and available literature-based models to provide an estimate of both suspended sediment level and extent of effects on aquatic resources from pipeline stream crossing construction based on their estimates of sediment concentration and exposure duration. Streams not modeled included the Upper Klamath River and Lost River subbasins crossings, other HDD or boring sites, and bedrock stream crossings that would have low sediment during crossings.[423] The DEIS unjustifiably excludes HDD sites from sedimentation modeling based on the presumption that low sedimentation would occur during the crossing, particularly in light of the known sedimentation increases that result from frac-out. Without data that indicates the probability of a frac-out event, the DEIS cannot conclude the likelihood of sedimentation is negligible enough as to avoid modeling effects of suspended sediment for HDD crossings. Therefore, FERC cannot conclude that no significant impact will result from the Project if the DEIS fails to include modeling of sedimentation of waterbodies crossed using HDD.

5. The DEIS does not adequately evaluate the direct, indirect, and cumulative noise effects of HDD on fish

Increased noise from HDD operations creates conditions that are deleterious to fish or other aquatic life. The average time a given point along the pipeline would be disturbed by construction noise is approximately 8 weeks. This would vary, as the speed at which a crew would be able to work would be affected by terrain, construction methods, weather, and environmental windows. HDD operations may occur 24 hours per day, seven days a week. HDD operations are estimated to last from 20 to 100 days depending on the location.[424]

Pacific Connector proposes to cross the Coos, Rogue, and Klamath Rivers, and Coos Bay at two separate locations, and a BPA powerline corridor using HDD technology. Noise studies conducted for the HDD of each proposed crossing determined that, with the use of mitigation measures (such as special vinyl fabric acoustic tents or other barriers), noise levels at the seven

[422] GeoEngineers Memorandum, Coos Bay West HDD Crossing (Sept. 14, 2017) at 9.
[423] 2019 DEIS, 4-278
[424] 2019 DEIS, 4-212

crossings are not expected to exceed the Oregon State noise regulations of 55 dBA during the day and 50 dBA at night within 25 feet of an NSA. A comparable HDD project in Whatcom County, Washington, experienced noise levels between 47 and 52 dBA at the study area.[425]

The DEIS includes findings from a study of behavioral and physiological reactions of animals to known noise levels, stating "fish demonstrate reduced viability, survival, and/or growth (20 dB for 11 to 12 days)."[426] Despite the DEIS's estimated noise level for the HDD area of 47 to 52 dBA, a level significantly higher than that found to reduce viability, survival, and/or growth in fish populations, the DEIS concludes that "noise effects on wildlife from the operation of the drilling equipment from the HDD crossings at Coos, South Umpqua, Rogue, and Klamath Rivers should be negligible."[427]

Given the contradictory data provided in the DEIS, the FERC should consider whether these potential impacts can be adequately addressed.

6. The DEIS does not sufficiently analyze the impacts of HDD on hyporheic zones

The hyporheic zone is the region of sediment and porous space beneath and alongside a stream bed, where there is mixing of shallow groundwater and surface water. The flow dynamics and behavior in this zone is important for surface water/groundwater interactions, as well as fish spawning, among other processes.

GeoEngineers (2017) developed weighting factors to assign criteria of high, moderate, and low sensitivity to the crossing locations based on qualitative observations of bed and bank material, stream gradient, location within a watershed, and morphological features. The analysis used these qualitative parameters to rank how sensitive a stream crossing may be to potential hyporheic zone alteration.[428]

Water quality parameters, including water temperature and intragravel dissolved oxygen, might potentially be affected at crossings where hyporheic exchange is extensive and active. Thus, streams with a "high" and "moderate" sensitivity would be the streams where water quality could potentially be compromised due to alteration of the hyporheic zone.

Fifteen stream crossings were categorized as having a high sensitivity to hyporheic zone alteration. 'High' sensitivity hyporheic zones are associated with coarse textured sediment that allows for greater hydraulic conductivity.[429] Two of the 'high' sensitivity crossings, including the Coos River crossing at MP 11.13R and the Rogue River crossing at MP 122.65, would be crossed by horizontal directional drilling.[430]

Not only are the Coos River and Rogue River HDD crossings identified as 'high' sensitivity

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[425] 2019 DEIS, 4-214
[426] 2019 DEIS, 4-212
[427] 2019 DEIS, 4-214
[428] 2019 DEIS, 4-116
[429] Wondzell, S. M. (2011). The role of the hyporheic zone across stream networks. *Hydrological Processes, 25*(22), 3525-3532.
[430] 2019 DEIS, 4-217

crossings regarding the hyporheic zone, but both crossings also have coarse sands and gravel units with low percentages of silt and clay that have the highest susceptibility for drilling fluid loss and frac-out, which most often occurs near entry and exit points.[431] Therefore, the Rogue and Coos rivers' 'high' sensitivity hyporheic zones seem to suggest the viability of HDD crossings is limited. Additionally, a frac-out occurring at the entry or exit points of the drill at either of these streams could have magnified consequences due to the greater hydraulic conductivity associated with their 'high' hyporheic sensitivity. The DEIS fails to adequately analyze possible impacts related to the hyporheic zone from HDD crossings.

7. The DEIS fails to analyze effects of HDD crossings on pH of Butte Creek, and Rogue and Klamath Rivers

Surface waters are susceptible to changes in pH caused by several factors including chemical releases, elevation, temperature, and biological processes such as photosynthesis and algal respiration. Surface water pH varies regionally throughout Oregon.

Butte Creek, Rogue River, and Klamath River are all water quality limited for pH during the summer. HDD boring is proposed for the crossing of all three of these waterbodies. Despite the possibility of a frac-out during the HDD process, which releases chemicals into the surrounding waterbodies, thus potentially affecting the stream's pH, the DEIS fails to include any analysis of the impacts a frac-out event may have on the pH of these already water quality limited streams. Without data that indicates the probability of a frac-out, the DEIS cannot ignore the potential for such an event to alter the waterbodies' pH. Therefore, FERC cannot conclude that no significant impact will result from the Project if the DEIS fails to include analysis of pH on waterbodies crossed using HDD.

Further, DEQ in its denial of the 401 certification for the project specifically states that violation of the state water quality standard for pH may occur as a result of the proposed activities. In its denial findings, DEQ states:

Based upon these findings, violations of the pH standard may occur in a few locations where the standard is not currently being met. JCEP has not identified methods to assure that no additional loading will occur in these areas whether the pipeline would cross a waterbody that is limited for pH. DEQ concludes that it does not have a reasonable assurance that the proposed activities will be conducted in a manner that will not violate the pH water quality standard at OAR 340-41-0021.[432]

Particularly in light of DEQ's denial of the 401 certification, FERC cannot conclude that no significant impact will result from the Project if the DEIS fails to include analysis of pH on waterbodies crossed using HDD.

[431] GeoEngineers Memorandum, Coos Bay West HDD Crossing (Sept. 14, 2017) at 4.
[432] Evaluation and Findings Report: Section 401 Water Quality Certification for the Jordan Cove Energy Project. Oregon Department of Environmental Quality. May 2019. P. 57.

EE. Hydraulic Alteration at Each Pipeline Stream Crossing

The pipeline will cross tributaries and mainstream rivers within the Coos, Coquille, South Umpqua, Rogue and Klamath basins, most of which are impaired for several water quality parameters. The dry open cut crossings proposed for many of these stream crossings may result in increased erosion, channel migration, avulsion, and/or scour. Channel modifications that increase sedimentation can decrease the depth and frequency of pools, which decreases the assimilative capacity for thermal loading of a stream.[433] Proposed activities to conduct dry open cut technology have the potential to increase sedimentation, modify habitat, decrease dissolved oxygen, and impair the aquatic habitat. In addition to comprehensively reviewing hydraulic alterations at proposed stream crossings related to state water quality standards for parameters including but not limited to sediment, dissolved oxygen, and temperature, the DEIS should also fully evaluate the impacts to threatened salmonids.

Oregon DEQ in its denial of the 401 certification for the project points to the potential for proposed waterbody crossings to "cause short- and long-term alterations of stream habitat and hydrology."[434] Specifically, DEQ expressed concerns regarding compliance with the state biocriteria water quality standard in its rationale for the denial.

The DEIS should specifically review at the minimum the five stream segments listed as impaired for the biocriteria water quality standard regarding hydraulic alterations at proposed stream crossings. DEQ specifically identifies Olalla Creek (MP 58.78) and North Myrtle Creek (MP 79.12) as impaired for biocriteria and including spawning and rearing habitat for Oregon Coast coho, listed under the Endangered Species Act. Both of these crossings have been identified by the applicant as Level 2 with a high potential for migration, avulsion, and/or scour. Additionally, the DEIS should assess the direct, indirect, and cumulative impacts to stream crossings proposed to headwater streams that are hydrologically connected to upper watershed habitat networks. The DEIS acknowledges potential hydraulic alterations, stating at 4-107 that:

> Constructing the pipeline would modify streambanks, resulting in an increase in the rates of erosion, turbidity, and sedimentation into the crossed waterbody. An increase in soil compaction and vegetation clearing could also potentially increase runoff and subsequent streamflow or peak flows. The extent of these impacts would depend on streambank composition and vegetation stream type, velocity, and sediment particle size.[435]

Further, the DEIS specifically identifies fluvial erosion as a potential hazard, stating:

> Fluvial erosion represents a potential hazard to the pipeline where streams can expose the pipe as a result of channel migration, avulsion, widening, and/or streambed scour.[436]

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[433] "Chapter 2: Temperature." Rogue River Basin TMDL. Oregon DEQ. December 2008. P. 2-20.
[434] Evaluation and Findings Report: Section 401 Water Quality Certification for the Jordan Cove Energy Project. Oregon Department of Environmental Quality. May 2019. P. 48.
[435] 2019 DEIS at 4-107.
[436] 2019 DEIS at 4-108.

The DEIS must conduct a comprehensive environmental review and require detailed and site-specific plans for each stream crossing, particularly for those identified as at a high or moderate risk of scour, channel migration, and/or avulsion. The DEIS should comprehensively review the potential risk for hydraulic and geomorphic alteration upstream and downstream from the impact areas.

In addition, the DEIS should fully evaluate temporary and permanent displacement of native soils that may alter in-situ characteristics, including intrinsic permeability. According to DEQ:

> Zones of higher permeability can cause local infiltration, partial stream capture, and create a fish passage barrier. Project-related actions that reduce streamflow may limit habitat availability, alter channel hydrology, and modify hyporheic exchange in riparian areas.[437]

Further, DEQ finds that in places where blasting, rock-sawing, or jackhammering are required, open-cut trenches may be needed that can alter stream geomorphology and create fish passage barriers. Specifically, DEQ states:

> Open cut trenches in bedrock-dominated stream channels are susceptible to upstream propagation of knickpoints created by fractures and joints in the stream's bedrock created during the excavation process. Knickpoint propagation in bedrock-dominated streams can alter stream geomorphology and potentially develop into barriers to fish migration.[438]

The DEIS should comprehensively review construction practices related to flume installation and removal, site restoration, and other proposed activities that can increase sediment releases that may impact substrate characteristics, oxygen availability, and habitat complexity.

Additionally, the DEIS should comprehensively evaluate the direct, indirect, and cumulative effects of altering in-stream flow as a result of the proposed activities. The DEIS identifies hydrostatic testing and dust control as sources of water withdrawals. The applicant estimates that 31 million to 65 million gallons of water would be required for hydrostatic testing. [439] The DEIS states:

> Potential effects on stream flow associated with hydrostatic testing include reduced downstream flows, erosion and scouring at release points, and the transfer of aquatic nuisance species through the test water from one water basin to another. Estimates of potential water intake amounts from streams indicate flows below intake would be reduced by less than 10 percent of typical monthly instantaneous flow rates during the month of withdrawal for all but one (at 35 percent of flow) potential locations during withdrawal (duration about 6 to 11 days at each potential location; Ambrose 2018, see also table 4.5.2.3-6 in section 4.5 for withdrawal amounts by stream). Final selection of

[437] Evaluation and Findings Report: Section 401 Water Quality Certification for the Jordan Cove Energy Project. Oregon Department of Environmental Quality. May 2019. P. 48.
[438] Evaluation and Findings Report: Section 401 Water Quality Certification for the Jordan Cove Energy Project. Oregon Department of Environmental Quality. May 2019. P. 48.
[439] 2019 DEIS at 4-109.

> intake rates and sites would be reviewed by ODFW and OWRD prior to testing, so that potential effects from flow reductions would be unlikely.[440]

The DEIS should thoroughly evaluate the direct, indirect, and cumulative impacts on water quality of proposed water withdrawals for hydrostatic testing. The applicant provides minimal information regarding the source and discharge of hydrostatic testing water. Not only would these water withdrawal impact existing water rights, but reducing flows can also impair water quality, in violation of water quality standards.[441]

Further, the DEIS does not evaluate the impacts of water withdrawals for dust control, instead stating that "it is not possible to know how much water would be needed for dust suppression on the pipeline construction right-of-way, during dry seasons."[442] The applicant estimates that approximately 75,000 gallons for 25 water trucks per day would be needed. The DEIS does not comprehensively evaluate the impacts of water withdrawals related to dust control. If, as the DEIS states, the "total amount of water needed is unknown,"[443] then FERC cannot conclude as the DEIS states that "the overall change in any specific reduction in streamflow from this water use would likely be unsubstantial."[444]

FF. Potential Interference of Subsurface Flow Regimes from Pipeline Construction

The DEIS fails to comprehensively analyze the direct, indirect, and cumulative effects of the proposed activities on subsurface flow regimes. The DEIS acknowledges that pipeline construction can affect surface waters, stating:

> Surface waters could be affected due to alteration of groundwater flow where the pipeline intersects waterbodies. The hyporheic zone is a region beneath and alongside a stream bed where there is mixing of shallow groundwater and surface water. The flow dynamics and behavior in this zone is recognized to be important for surface water and groundwater interactions, as well as fish spawning, among other processes.[445]

The DEIS specifically states that detailed site-specific analysis is necessary to analyze potential interference with subsurface flow regimes. However, the DEIS only relies upon qualitative analysis provided by the applicant. Specifically, the DEIS states:

> It is difficult to measure hyporheic exchange without detailed site-specific study, but qualitative observations of bed and bank material, stream gradient, location within a watershed, and morphological features can help indicate whether a stream has an active and functional hyporheic zone. GeoEngineers (2017g) developed weighting factors to assign criteria of high, moderate, and low sensitivity to the crossing locations. The

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[440] 2019 DEIS at 4-111.
[441] PUD No. 1 of Jefferson Cty v. Washington Dept. of Ecology. 511 U.S. 700 (1994). https://www.law.cornell.edu/supct/html/92-1911.ZO.html.
[442] 2019 DEIS at 4-111.
[443] 2019 DEIS at 4-111.
[444] 2019 DEIS at 4-111.
[445] 2019 DEIS at 4-112.

> analysis used these qualitative parameters to rank how sensitive a stream crossing may be to potential hyporheic zone alteration.[446]

The DEIS identifies fifteen stream crossings that the GeoEngineers report categorized as having a high sensitivity to hyporheic zone alteration.[447] However, although these crossings may be identified in the GeoEngineers report, the DEIS provides no additional analysis of the sensitivity of these crossings or the direct, indirect, or cumulative effects of pipeline construction on the hyporheic zone for these sensitive sites.

The DEIS does provide some additional analysis for one stream crossing at South Fork Little Butte Creek in the Rogue Basin. Specifically, the DEIS states:

The Forest Service has expressed concern that the crossing of South Fork Little Butte Creek would go through basalt and andesite bedrock, and therefore a site-specific crossing would need to address the potential for groundwater interception and flow at and near the crossing. A site-specific drawing for Little Butte Creek located on NFS land was included in Appendix 2E of Resource Report 2 with Pacific Connector's September 2017 application to the FERC. The crossing would need to address the potential for groundwater interception and flow at and near the crossing since it is a critical coho stream which flows through andesite and basalt. The *Stream Crossing Hyporheic Analysis* (GeoEngineers 2013c; 2017g) determined that South Fork Little Butte Creek crossing had high hyporheic sensitivity. Therefore, BMPs would be implemented to mitigate for this possible effect.[448]

However, the DEIS does not provide additional analysis for the South Fork Little Butte crossing nor does it provide comprehensive analysis of the direct, indirect, and cumulative effects of hyporheic zone alterations at the other stream crossings identified as highly sensitive.

Additionally, the DEIS fails to comprehensively evaluate the direct, indirect, and cumulative effects of stream crossings proposed for 303(d) listed waterbodies and hyporheic zone alterations. DEQ in its denial of the 401 certification for the project notes that the applicant proposes stream crossings in many waterbodies that are impaired for temperature. Regarding impacts to the hyporheic zone as a result of proposed activities, DEQ states:

> Dewatering actions proposed by JCEP would reduce the volume of cold groundwater available for hyporheic exchange in the reach below each waterbody crossing. This reduction in groundwater exchange below crossings would reduce the assimilative capacity for thermal loading. JCEP proposes to alter groundwater flow at numerous stream to construct its pipeline. Many of these streams are currently impaired for temperature. For example, at pipeline stream crossing at Milepost 58.78, Ollala Creek is limited for temperature year round and is under an approved TMDL. Similarly, DEQ has placed Rice Creek (Milepost 65.76), South Umpqua River (Milepost 71.27), North Myrtle Creek (Milepost 79.12), South Myrtle Creek (Milepost 81.19), and many others

[446] 2019 DEIS at 4-112.
[447] 2019 DEIS at 4-113.
[448] 2019 DEIS at 4-140.

> on the 303(d) list for temperature. These streams are under an approved temperature TMDL.[449]

The DEIS does not adequately assess the potential impacts to the hyporheic zone, such as reduced groundwater exchange and decreased assimilative capacity for thermal loading, from the proposed stream crossings that are already impaired for temperature.

Further, DEQ states that the proposed activities, including but not limited to dry open-cut trenching, backfill placement, and restoration actions could temporarily displace native soils that might alter intrinsic permeability. The DEIS should comprehensively evaluate the direct, indirect, and cumulative effects of proposed activities that would displace native soils and alter permeability.

Additionally, the DEIS fails to adequately assess the direct, indirect, and cumulative effects of temporary and permanent access roads in shallow groundwater areas on subsurface flow regimes.

The DEIS also does not comprehensively evaluate the potential impacts to groundwater as a result of HDD. The September 2017 GeoEngineers report states:

> During our borings, we were not able to measure groundwater levels due to the presence of drilling fluid. However, based on the observed relative moisture content of the samples, and the locations and elevations of the borings relative to the Coos River, we estimate that groundwater was at or near the ground surface at the time of drilling. We anticipate that groundwater levels will fluctuate with precipitation, site utilization and other factors. During heavy prolonged precipitation, and probably during most of the winter months, we expect that groundwater will be near or at the surface of the site…[450]
>
> We did not measure groundwater levels upon completion of the borings because of the presence of drilling fluid in the holes at the time of drilling. We anticipate that groundwater levels will mimic the elevation of the Rogue River around 1,410 feet mean sea level (MSL). We anticipate that groundwater levels will fluctuate with precipitation, site utilization and other factors. During heavy prolonged precipitation, and probably during most of the winter months, we expect that groundwater will be near or at the surface of the site on the east side of the Rogue River.[451]

In its denial of the 401 certification for the project, DEQ specifically identifies the lack of

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[449] Evaluation and Findings Report: Section 401 Water Quality Certification for the Jordan Cove Energy Project. Oregon Department of Environmental Quality. May 2019. P. 66.
[450] Coos River HDD Pacific Connector Gas Pipeline Project. GeoEngineers. 1 September 2017. P. 5. PCP Part 2 Appendix B. P. 1476.
[451] Rogue River HDD Pacific Connector Pipeline Project Jackson County, Oregon. 1 September 2017. P. 6. Pacific Connector Pipeline Part 2 Appendix B. P. 1577.

subsurface data for the Coos Bay HDD, stating:

> JCEP prepared a HDD Feasibility Report that includes geotechnical engineering, recommendations, and HDD design criteria for the three proposed HDD river crossings. The report also includes a feasibility analysis of completing a HDD crossing beneath Coos Bay estuary. However, JCEP's consultant states that the "* * *feasibility evaluation of the proposed Coos Bay East HDD is based on limited subsurface data. Our conclusions should be considered preliminary pending completion of a subsurface exploration program. Resource Report 2, Appendix G.2. The feasibility analysis generally finds a low risk of drilling fluid releases. However, at the east end of the crossing approaching Kentuck Slough there is a high risk of hydraulic facture and drilling fluid surface release. Resource Report 2, Appendix G.2., at 9. The evaluation identifies potential mitigation for this risk, but it is unclear what specific mitigation measures JCEP is currently proposing.

The DEIS should fully evaluate the potential alterations to the subsurface flow regime as a result of HDD crossings.

Further, removal of riparian vegetation that results in increased sedimentation can impact interactions between surface water and groundwater, further impairing streams for temperature. As stated in the Rogue Basin TMDL: "Excess fine sediment can also decrease permeability and porosity in the hyporheic zone, greatly reducing hyporheic flow, and resulting in less cool water inputs (Rehg et al. 2005)."[452]

Without information demonstrating the potential effects of pipeline construction, including streambed and bank disturbance and placement of pipe and backfill, on the hyporheic regimes of affected waterbodies, FERC does not have the requisite information to determine the environmental impacts of the Project.

GG. Post-Construction Restoration at Stream Crossings

The DEIS fails to comprehensively evaluate the direct, indirect, and cumulative effects of construction and post-construction restoration at stream crossings. For many stream crossings, the applicant proposes to use dry open-cut methods (dam and flume, or dam and pump). According to the DEIS, this effectively means "allowing trenching across streams in the dry."[453] The DEIS acknowledges that many of these dry open-cut stream crossings are proposed for waterbodies that support or are likely to support anadromous salmon and/or steelhead, coldwater resident fish, estuarine fish, or important endemic species.[454]

In its denial of the 401 certification for the project, DEQ identifies significant concerns with dry open-cut crossing methods, particularly for streams that are impaired for pollutants such as temperature and sediment. Specifically, DEQ states:

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[452] "Chapter 2: Temperature." Rogue River Basin TMDL. Oregon DEQ. December 2008. P. 2-20.
[453] 2019 DEIS at 4-93.
[454] 2019 DEIS at 4-271.

> To reduce impacts, JCEP proposes to complete these stream crossings in dewatered areas isolated from normal streamflow using temporary dams. JCEP's Stream Fluming Procedures and Dam and Pump Procedures describe the method for removing the flume upon completion. Upon removal, JCEP expects that short-term turbidity "could increase considerably" as the "streambed flushed clean of sediments left over from construction". DEQ has identified three waterbody crossings that are listed on the DEQ's 2012 303(d) list as impaired for sedimentation (S. Fork Little Butte Cr., MP 162.45; Spencer Cr. MP 171.07; Clover Cr. MP 177.76). In these particular areas, any increase in sediment loading is prohibited, at least until completion of a Total Maximum Daily Load that includes an allocation for the proposed activity, or until completion of an implementation plan that demonstrates that increased loading would be avoided. Under a Clean Water Act Section 404 Permit, DEQ would allow limited duration turbid discharges, but only if the project applies all practicable turbidity controls to minimize these discharges. JCEP's proposed methodologies include dewatering of construction areas, and dewatering and removal of temporary dams. JCEP has not presented how it would minimize sediment and turbid discharges during these activities.[455]

Further, DEQ specifically requested site-specific construction and restoration plans for dry open-cut stream crossings. DEQ states:

> The importance of careful, detailed, site-specific planning for pipeline crossing construction and stream restoration is well-documented in the construction of the Ruby Pipeline. In the Ruby Pipeline project, a team of experts developed an approach to minimize impacts at 849 stream crossings. DEQ's March 11, 2019 information request is consistent with the approach used in the Ruby Pipeline project.[456]

DEQ identifies specific concerns with the construction, operation, and maintenance of pipeline stream crossings and their potential to discharge sediment and other pollutants to streams. In fact, the agency determines that the permanent pipeline ROW will function as a primitive road and is likely to discharge sediment to streams at a rate equivalent to a gravel road with ruts. Further, the slope breakers that the applicant proposes to install within 200 feet of streams would also likely deliver sediment to those streams during and following construction.[457] The DEIS fails to require and analyze site-specific waterbody crossing and restoration plans to minimize pollution.

HH. The Pipeline, and Pipeline Stream Crossings in Particular, Will Violate Oregon's Antidegradation Policy.

The Jordan Cove pipeline must comply with Oregon's antidegradation policy, which ensures the full protection of all existing and beneficial uses by preventing unnecessary degradation of water quality from new sources of pollution and protecting, maintaining and enhancing existing surface

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[455] Evaluation and Findings Report: Section 401 Water Quality Certification for the Jordan Cove Energy Project. Oregon Department of Environmental Quality. May 2019. P. 30.
[456] Evaluation and Findings Report: Section 401 Water Quality Certification for the Jordan Cove Energy Project. Oregon Department of Environmental Quality. May 2019. P. 30.
[457] Evaluation and Findings Report: Section 401 Water Quality Certification for the Jordan Cove Energy Project. Oregon Department of Environmental Quality. May 2019. P. 50.

water quality. For all waters, the "[e]xisting in stream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected."[458] This level of protection is the absolute floor of water quality.[459] Oregon's antidegradation policy mirrors the federal language, requiring the protection of "all existing beneficial uses" from "point and nonpoint sources of pollution."[460]

In its denial of the 401 certification for the project, DEQ clearly states that the proposed activities would not meet the minimum requirements of Oregon's antidegradation policy. Specifically, DEQ states:

> The preceding sections of this Evaluation and Findings report conclude that proposed activity would affect certain water quality standards and result in a lowering of water quality. Oregon's antidegradation policy requires DEQ to undertake a review of these actions in accordance with procedures established in the Antidegradation Internal Management Directive. ***The construction and operation of the Pacific Connector Pipeline would not meet the minimum requirements of Oregon's antidegradation policy*** because the applicant has not fully considered feasible alternatives to avoid, minimize, or mitigate for impacts to waters of the state. Absent an evaluation of feasible alternatives DEQ is prevented from considering the economic and social benefits of the proposed action against the environmental impacts of lowered water quality.[461]

DEQ continues its analysis to find that the applicant did not provide the information necessary to find that the project is in compliance with Oregon's antidegradation policy, particularly regarding temperature, sediment and turbidity, and biocriteria. DEQ further states:

> JCEP failed to provide information necessary to complete such a review. Absent plans that demonstrate JCEP considered methods to avoid and minimize water quality impacts to temperature, turbidity, sedimentation, and biocriteria, DEQ finds the project does not meet the requirements of DEQ's antidegradation policy.

The DEIS fails to disclose the DEQ's finding that the project is not in compliance with Oregon's antidegradation policy and further fails to comprehensively evaluate the direct, indirect, and cumulative effects of the proposed activities in light of the project's failure to comply with the state's policy.

II. Wildlife Issues.

1. Marbled Murrelets (*Brachyramphus marmoratus*)

[458] 40 C.F.R. § 131.12(a)(1); 40 C.F.R. § 131.3(e) ("Existing uses are those uses actually attained in the water body on or after November 28, 1975, whether or not they are included in the water quality standards.").
[459] Questions and Answers on: Antidegradation, EPA Office of Water Regulations and Standards, August 1985, at 4.
[460] OAR 340-041-0004(1).
[461] Evaluation and Findings Report: Section 401 Water Quality Certification for the Jordan Cove Energy Project. Oregon Department of Environmental Quality. May 2019. P 78. Emphasis added.

The pipeline right-of-way runs through prime old-growth marbled murrelet habitat, some of the last of the murrelets Coast Range habitat.

Marbled murrelet populations have declined over much of their range, mostly due to current and historic loss and fragmentation of older-aged forest breeding habitat. Primarily because of logging, populations have been plummeting by 3.7% per year[462]. The primary reason for declines continues to be sustained low recruitment from the loss of quality nesting sites and increases in predation in nesting habitat. In Oregon, nest success has been estimated at only 36%.[463] In fact, the Oregon Department of Fish and Wildlife recognizes that emerging anthropogenic threats to murrelets are "energy development projects"[464] such as the Jordan Cove project.

The Jordan Cove Project will further reduce murrelets in their prime habitat. Construction of the Project would remove a total of about 806 acres of Marbled murrelet habitat (suitable, recruitment, capable), including about 78 acres of suitable habitat removed from 37 occupied stands. There is the potential that effects could extend over a total of 7,145 acres of suitable nesting habitat in the terrestrial nesting analysis area where Project-related noise may affect murrelet behavior, including breeding activities. (DEIS 4-323-324)

The DEIS (4-323-324) also discloses there are 175 occupied and presumed occupied MAMU stands within 0.25 mile of the proposed action, or within 0.5 mile of federally-designated critical habitat that would be affected by the proposed action.

Concerning the effects to murrelets extending over 7,145 acres of suitable nesting habitat in the "terrestrial nesting analysis area" (DEIS 4-324), it is unclear in the DEIS if the "terrestrial nesting analysis area" (not defined in the DEIS) includes the edge effects that would harm murrelet reproduction. While the 2019 DEIS is unclear, the 2015 DEIS told us (4-469) that 2,264 acres of murrelet habitat would be within 300 feet of newly created edges. Thousands more acres will have edge-impacts within 700 feet of clearcuts.

The 2019 DEIS failed to fully consider edge effects to murrelets even though the Pacific Connector Pipeline right-of-way would create miles of new edge habitat. Marbled murrelets currently have low fecundity levels in Oregon caused mostly by nest predation because of edges caused by forest fragmentation. The vast majority of murrelet nest failure is due to predation from corvids who otherwise cannot penetrate interior forest habitat. The DEIS failed to fully consider this impact on murrelets.

The right-of-way corridor, plus the Temporary Extra Work Areas (TEWA) to be clearcut, will essentially cause all the murrelets in nearby stands to be unsuccessful in nesting, and allow predators unprecedented access to what was murrelet-secure interior forest habitat.

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[462] Oregon Department of Fish and Wildlife. Status Review of the Marbled Murrelet. January 2018. https://www.dfw.state.or.us/agency/commission/minutes/18/02_Feb/Exhibit_D/2%20ODFW%20Marbled%20Murrelet%20Status%20Review%201.18.18.pdf
[463] id. Page iii
[464] id. Page iv

The Oregon Department of Fish and Wildlife finds that "Forest fragmentation and "edge effects" can increase predation rates [of murrelets] and may result in other adverse effects to remaining patches (e.g., greater windthrow damage, micro-climates less suitable to epiphyte growth)."[465]

The DEIS (4-166) points out that studies show edge effects in "old-growth Douglas-fir forests in the Pacific Northwest" can extend to more than 785 feet past the pipeline corridor. However the DEIS never quantified how many acres in murrelet habitat this would be. The DEIS (4-166) did disclose that 1,449 acres of late successional old growth forests would be impacted by being within 100 meters of newly created edges. However, 100 meters is not inclusive of edge impacts to murrelet habitat, as edge effects penetrate further into forests.

The DEIS also failed to consider the impacts of the Uncleared Storage Areas (UCSAs) running for 100' on either side of the clearcut in murrelet habitat. This could push some impacts of edges out an additional 100'. UCSAs will impact ground vegetation and understory trees, opening up the canopy and degrading adjacent interior forests. UCSAs will put noise disturbance another 100 feet into edges.

On page 4-518-519 of the DEIS there is a discussion of edge effects on LSRs on National Forest Service lands. This same analysis should have been considered for Marbled murrelet impacts on BLM and private lands. The DEIS simply failed to do the same analysis for impacts BLM lands. Only on Forest Service lands does the DEIS consider that "effects are considered to extend for 100 meters from the created edge in LSOG forest", and, "effects extend out approximately two times the average tree height" on Forest Service lands. In the Coast Range, home of the Marbled murrelet, the average tree height of a 200-year-old tree (site-potential tree height) is 220 feet tall[466]. Therefore, impacts for Marbled murrelets could have been considered further than 440 feet on either side of the pipeline corridor. Jordan Cove never analyzed how many acres of this would be impacting murrelets.

Windthrow especially can result from the clearcutting areas on ridges exposed to high winds, exactly where the pipeline is located in the coast range. Studies found that sites at clearcut edges had less moss than interior murrelet nest sites and natural edge sites (stream corridors) due to stronger winds, higher temperatures, and lower moisture retention when compared with interior sites. Maintaining microclimate is critical to maintaining moisture in murrelet habitat to help moss development and aid in proper thermo regulation of marbled murrelet adults and chicks. The worst forest-type combination for murrelets is suitable murrelet habitat adjacent to clearcuts and regenerating forests with berry producing plants, which is optimal habitat for predators. This is exactly what the Pacific Connector Pipeline does, clearcuts next to suitable habitat (unoccupied or occupied) with plans to plant berry producing plants in the outer parts of the clearcut[467]. This attracts known predators at active murrelet nests, such as Common Ravens (Corvus corax), Steller's Jays (Cyanocitta stelleri), and American Crows (Corvus brachyrhynchos).

The DEIS (4-325) for the proposed action admits that the Project is likely to adversely affect

[465] Oregon Department of Fish and Wildlife. Status Review of the Marbled Murrelet. January 2018. page iii
[466] Coos Bay BLM watershed analysis.
[467] POD Appendix I. Erosion Control and Revegetation Plan. Table 10.12-1. Page 39.

Marbled murrelets because:

- 82 MAMU stands are within 0.25 mile of the pipeline that could be constructed during the breeding season.
- 168 MAMU stands are within 0.25 mile of access roads that could be used during pipeline construction in the breeding season.
- The Pacific Connector Pipeline Project would remove approximately 78 acres of suitable nesting habitat within the range of the MAMU; or approximately 0.5 percent of the 14,310 acres of suitable habitat available in the terrestrial nesting analysis area.
- The Pacific Connector Pipeline Project would modify approximately 656 acres of suitable, 2,058 acres of recruitment, and 2,449 acres of capable habitat.
- Turbidity generated during HDD if a frac-out occurred could affect local major prey species for chicks such as anchovy, sand lance, and smelt.
- LNG carrier traffic in the estuarine analysis area to the Jordan Cove terminal would cause potential behavioral effects on foraging MAMU, and fuel and lubricant spills from LNG carriers would cause injury or mortality to foraging MAMUs.

Additionally, the quality of the remaining habitat would be reduced due to habitat fragmentation and the addition of edge along the pipeline corridor. Removal of suitable nesting habitat by harvest of old-growth timber has been cited as the primary reason for the species' decline (FWS 1992a). Suitable MAMU nesting habitat takes a long time to develop (more than 250 years on average); therefore, any removal of suitable habitat may affect the recovery of the MAMU. Jordan Cove has not proposed compensatory mitigation. In the absence of mitigation the Project would result in long-term negative effects on this this threatened species.

Project related noise above ambient levels will disturb or disrupt Marbled murrelets and interfere with essential nesting behaviors. Blasting for the pipeline trench may occur within 0.25 mile of 11 MAMU stands between April 1 and September 30. Helicopter use within 0.25 mile of eight occupied MAMU stands during the breeding period (between April 1 and September 15) could occur and disturb MAMU adults and nestlings. In fact, little nestling murrelets could be blown out of the nest tree in at least six occupied MAMU stands from rotor wash due to blasting. (2019 DEIS 4-325)

Blasting for the pipeline trench may occur within 0.25 of Marbled murrelet stands between April 1 and September 30. Helicopter use for removal of timber during pipeline construction within 0.25 mile of 9 Marbled murrelet stands during breeding season and potentially disturb adults and nestlings and blow another 7 little nestlings out of nest trees within seven Marbled murrelet stands due to rotor wash for logging. (2019 DEIS 4-325)

Construction of the pipeline (including clearing of timber, access road use, helicopter use, and blasting), as well as pipeline operation and maintenance, would occur within the MAMU breeding season and within 0.25 mile of known MAMU stands. These activities will disturb or disrupt MAMUs and interfere with essential nesting behaviors during the breeding season. (2019 DEIS 4-325)

Jordan Cove has not proposed compensatory mitigation, and the BLM is not allowed to ask for

it. In the absence of mitigation the Project would result in long-term negative effects on this threatened species. (DEIS 4-326)

DEIS 4-197, table 4.5.1.2-3 lists Birds of Conservation Concern with 50 miles of pipeline. For some reason, the Marbled Murrelet is listed has having “no analysis”, and insufficient or no data, even on confirmed breeding dates! Jordan Cove should look again. There is abundant analysis and data on the Marbled murrelet.

Critical Habitat: The proposed action would also jeopardize the continued existence of the Marbled murrelet and critical habit supporting this species. A likely to adversely affect determination is warranted for Marbled murrelet critical habitat because the project may remove or damage trees with potential nesting platforms, or the nest platforms, decreasing the value of the trees for future nesting use as well as damage to trees adjacent to nesting platforms that provide habitat elements essential to the suitability of the potential nest tree or platform.

Ten occupied and 24 presumed occupied MAMU stands occur within CHU OR-06 (b, c, and d) within the proposed terrestrial nesting analysis area. Overall, construction of the Pacific Connector Pipeline Project would remove about 4 acres of suitable MAMU nesting habitat (PBF- 1) and about 12 acres of recruitment habitat and 15 acres of capable habitat (both of which make up PBF-2) within CHU OR-06-d. (DEIS 4-324)

Pacific Connector claims (4-324) to implement measures to reduce effects on MAMU habitat, by using UCSAs, and replanting conifer trees outside of the 30-foot-wide maintenance corridor on certain federal lands and non-federal lands. These measures are completely inadequate. Trees planted in the 30-foot-wide maintenance corridor won’t mitigate edge effects for decades, maybe centuries, at which time any impacted murrelet nests will be long gone. And it is unclear how Uncleared Storage Areas (UCSAs) will reduce effects on murrelet habitat. In fact, UCSAs will bring some impacts further into murrelet habitat, like reduced canopy covers, increased noise, and increased slash and fire danger.

Elsewhere the 2019 DEIS claims (4-166) to minimize fragmentation, and thus impacts to murrelets, by trees that would be planted in the outer half of clearcut right-of-way. As stated above, this will not minimize fragmentation for many decades, so any wildlife impacted by fragmentation will already be dead before this kicks in. The DEIS also claims (4-167) that in 50 years those planted trees could be 120 feet tall. That is a stretch. The DEIS fails to offer any data to back up this exaggerated growth claim.

Finally, Marbled murrelet nests are notoriously difficult to locate because of their cryptic nesting behavior and the fact that nests occur high up in trees in the Coast Range and are often in rugged terrain. Therefore, when the pipeline clearcuts near occupied stands, it is impossible to tell if the actual nest tree is being cut down.

2. Northern Spotted Owl (*Strix occidentalis caurina*).

2008 is apparently the last survey done for Northern Spotted Owls (NSO) along the pipeline route. At that time, over a decade ago, surveys found NSO pairs at 20 locations. Six sites had

resident single owls. (DEIS 4-327)

Direct effects on NSOs would include the removal of nest trees during the breeding season and noise disturbance due to road and pipeline construction during the breeding period. Noise includes blasting and helicopter use during construction. (DEIS 4-327).

The Project would affect habitat within 97 NSO home ranges and 9 nest patches. 37 miles of the pipeline route would cross 7 designated critical habitat sub-units. Construction would remove 517 acres of nesting, roosting, or foraging (NRF) habitat for the spotted owl. Additionally, 214 acres of nesting roosting foraging (NRF) habitat would be used as Uncleared Storage Areas (UCSAs) where equipment would be parked, and used as disposal for forest slash. (DEIS 4-327

Additionally 1,158 acres of dispersal habitat would be clearcut. 919 acres of spotted owl capable habitat would be clearcut. Edge impacts include 13,294 acres of spotted owl habitat occur within 328 feet of the clearcut. 4,326 acres of interior spotted owl habitat would be affected by these edge effects. (2019 DEIS 4-327).

These are significant long term impacts to the northern spotted owl. DEIS, 4-327. The DEIS offers insignificant mitigation for these impacts, especially on BLM lands and impacts during the late breeding season for the owl.

Activities from pipeline construction during the late breeding period (July 16 through September 30) could disrupt or disturb spotted owls at 10 activity centers within 0.25 mile of the pipeline ROW. Construction activities off the ROW would occur during the entire breeding season and could disturb spotted owls at two known activity centers located within 0.25 mile of the pipeline project. Noise from blasting during pipeline construction within 0.25 mile of NSO sites during the late breeding season would occur and could increase the risk of predation to fledglings that are not able to escape during the latter part of the breeding season. (DEIS 4-328)

The removal of 517-acres of high quality NRF habitat would result in effects on nest patches, core areas, and home ranges of spotted owls, *some of which are currently below thresholds needed to sustain NSOs*. Once suitable NRF habitat is reduced in the spotted owl's home ranges, there is an increased likelihood that spotted owls remaining in the Project area would be subject to displacement from nesting areas, decreased survival, increased predation and diminished reproductive success for nesting pairs (DEIS 4-328, 329).

Considering the current poor status of the spotted owl, this amount of clearcutting and other impacts to their habitat would be difficult, if not impossible, to recover from. The impacts to 97 spotted owl home ranges includes 58 which are below sustainable threshold levels of suitable habitat for continued persistence in their home range and/or core area. (DEIS 4-329).

The project would impact designated critical habitat for the Northern Spotted Owl. The DEIS admits that a likely to adversely affect determination is warranted for Northern Spotted Owl critical habitat. (DEIS 3-111). The proposed action would remove or downgrade the physical and biological features (PBFs) in critical habitat subunits ORC-6, KLE-1, KLE-2, KLE-3, KLE-4, KLE-5, and ECS-1. (DEIS 4-329).

No mitigation or "best management practices" will fix these problems. The quality of the remaining habitat would be reduced due to habitat fragmentation and the addition of miles of edge along the pipeline corridor. Habitat loss due to forest clear-cutting has been the primary factor causing declines of the spotted owl (FWS 1992c) and will affect survival and reproduction of the owls. (DEIS 4-329)

Jordan Cove has not proposed compensatory mitigation, therefore the Project would result in long-term negative effects on the Northern Spotted Owl. (DEIS 4-326)

442 acres would be clearcut from designated spotted owl sanctuaries, Late Successional Reserves (LSRs). (DEIS 4-327) Over half of that is on BLM lands (DEIS 4-443), where 268 acres of LSRs would be clearcut, plus riparian reserves, impacting the spotted owl and marled murrelet habitat on Roseburg and Coos Bay BLM lands.

DEIS page 4-517 says there are no "unmapped" reserves on national forest lands impacted by the pipeline. However, TABLE 4.7.3.3-2 describes an acre of unmapped reserve impacted in the Rogue River National Forest.

The DEIS describes on page 4-517 how clearcutting LSRs are mitigated on Forest Service lands, but fails to offer any mitigation for BLM lands, where LSRs and Riparian Reserves, designed to protect Northern Spotted Owls and Marbled Murrelet's, there is no mitigation offered. On Forest Service lands, one offered mitigation is to "protect" matrix lands by redesignating them as LSRs. However, the DEIS failed to determine if those matrix lands were ever threatened with logging. Just changing a designation is no mitigation for the spotted owl. Meaningful mitigation would have been to increase acres of public lands, or obtaining conservation easements on private land.

2. Mitigation of Impacts to Marbled Murrelets and Northern Spotted Owls Is insufficient.

The pipeline would impact over 750 acres of late stage old-growth forest that provides habitat to marbled murrelet, northern spotted owl, and other federally-listed threatened and endangered species. (DEIS ES-4). Up to 3,504 acres of forest would be affected by being within 100 meters of newly created edges. Including 1,449 acres of LSOG forests. (DEIS 4-166). Therefore, the Project is likely to adversely affect 13 federally listed threatened and endangered species including the marbled murrelet, northern spotted owl, and coho salmon (ES-5). These significant impacts on federal resources are in addition to the loss of LSOG forests since 1850 in the Coast Range, West Cascades, and Klamath Mountains ecoregions of Oregon, which is estimated to be almost 90 percent (ODFW 2016a). (DEIS 4-158)

In order to compensate for significant adverse impacts to federal public land resources, the DEIS proposes a series of planned mitigation measures on and off National Forest lands (DEIS 2.1.5 and appendix F.2). The BLM is proposing no compensatory mitigation measures. Forest Service "mitigation" includes planned timber harvest, road reconstruction, fire suppression activities, thinning, land reallocation, hazardous fuels reduction, snag creation and other measures. The DEIS states that this "mitigation" is required to account for adverse effects from forest plan

amendments that permit the violation of forest plan requirements.

Notably, however, the DEIS does not analyze the environmental consequences of undertaking this "mitigation" on Forest Service lands, or the lack of mitigation on BLM lands. If the mitigation is required as part of FERC's (or the land management agencies') authorization of the proposed project, then the DEIS is required to assess the environmental consequences of those actions. 40 C.F.R. §§ 1508.25, 1508.25(a)(1) (connected actions); *Robertson v. Methow Valley*, 490 U.S. at 352 ("mitigation [must] be discussed in sufficient detail to ensure that environmental consequences have been fairly evaluated"); *Neighbors of Cuddy Mountain v. United States Forest Service*, 137 F.3d 1372, 1381 (9th Cir. 1998) ("mere listing of mitigation measures is insufficient to qualify as the reasoned discussion required by NEPA") (setting aside EIS in part on grounds that the USFS's mitigation analysis contained only "broad generalizations and vague references"); *Idaho Sporting Congress v. Thomas*, 137 F.3d 1146, 1151 (9th Cir. 1998) ("Without analytical detail to support the proposed mitigation measures, we are not persuaded that they amount to anything more than a 'mere listing' of good management practices").

If the mitigation is not required, then the adverse effects of violating several Forest Service forest plans are not accounted for in the DEIS, in violation of NEPA. *Southwest Ctr. for Biological Div. v. Bartel*, 470 F. Supp. 2d 1118 (S.D. Cal. 2006); *Sierra Club v. Marsh*, 816 F.2d 1376, 1386 (9th Cir. 1987); *Sierra Club v. Babbitt*, 15 F.Supp.2d 1274, 1282 (S.D. Ala. 1998); *Nat'l Wildlife Fed'n v. Nat'l Marine Fisheries Serv.*, 524 F.3d 917, 935-36 (9th Cir. 2008).

Moreover, it appears impossible that FERC can guarantee that the proposed mitigation on Forest Service lands occurs. While the DEIS assumes that Jordan Cove will provide funding to the land management agencies to support the suite of mitigation, there is no estimation of the cost of such mitigation, or guarantee that it will occur. For example, mitigation projects will require additional NEPA analysis (DEIS 1-10) and public involvement, which by definition may – and in fact should – result in change to the action. Those changes may not fully compensate for the adverse effects from the Jordan Cove pipeline that required an obviation of forest plan requirements. Furthermore, there is no guarantee that the mitigation projects will survive legal scrutiny, which would result in an unmitigated effect stemming from the implementation of the Jordan Cove pipeline project.

Given that FERC and the applicant cannot guarantee that any of the mitigation proposed to compensate for the violation of forest plan requirements, the DEIS conclusion that amending the various forest plans is arbitrary and capricious. 5 U.S.C. § 706(2)(A).

a. Marbled Murrelet and NSO mitigation on BLM lands.

The DEIS mitigation offers no new habitat for murrelets. In fact, the DEIS offers no mitigation at all for the significant impact on Marbled murrelet habitat on BLM lands.

The proposed Right-of-Way on BLM-managed lands would not conform to the Southwestern Oregon RMP and the Northwestern and Coastal RMP (RMPs for Western Oregon), which allow for the construction of linear rights-of-way within the LSR "as long as northern Spotted Owl (NSO) nesting-roosting habitat continues to support nesting and roosting at the stand level, and

NSO dispersal habitat continues to support movement and survival at the landscape level," and construction of linear rights-of-way "as long as the occupied stand continues to support marbled murrelet nesting" (BLM 2016b: 71; BLM 2016a: 65).

BLM evaluated that the proposed right-of-way would cross approximately 268 acres of LSR and approximately 116 acres of known or presumed occupied Marbled murrelet habitat and/or NSO nesting roosting habitat within LSR, plus hundreds of additional acres of edge impact. The BLM concluded that the clearing and removal of vegetation required within the LSR for the proposed Project would likely result in some NSO habitat no longer continuing to support nesting and roosting at the stand level, and some MAMU habitat no longer continuing to support nesting at the stand level. (DEIS 2-22).

Other impacts to the Murrelet will occur in the ocean due to the increased ship traffic, as well as impacts on BLM lands from motorized recreation on the pipeline right-of-way and access roads. The DEIS failed to consider the impacts of off-road recreation in the right-of-way as an additional threat to owls and murrelets. Pipeline right-of-ways in Oregon attract abundant offroad recreation. This human activity has the potential to increase impacts to murrelets by leaving food trash, attracting more corvids. Sound from Off Highway Vehicles (OHVs) on the right-of-way will also impact nest initiation and nest success. The DEIS failed to consider these impacts, as required by NEPA.

Due to these impacts, as well as the clearcutting of Late Successional Reserves and Riparian Reserves, significant impacts to the spotted owl and Marbled murrelet will occur on BLM lands.

The July 24, 2018 BLM Instruction Memorandum No. 2018-093[468], forbids the BLM from requesting compensatory mitigation for any of these impacts. The BLM can accept offered mitigation, but Jordan Cove has not offered any. "In the absence of mitigation other than avoidance and minimization, the Project would result in long-term negative effects" on endangered species (DEIS 4-326 and 329-330).

BLM management direction in the RMPs for Western Oregon specific to wildlife prohibits activities that "disrupt marbled murrelet nesting at occupied sites ... within all land use allocations within 35 miles of the Pacific Coast and... within reserved land use allocation between 35-50 miles of the Pacific Coast" (BLM 2016b:118; BLM 2016a: 98). Construction of the Project would likely result in disruption of Marbled murrelet nesting at some occupied sites within these two discrete geographic ranges. (DEIS 2-22).

To address these inconsistencies, other than forbidden mitigation projects, the BLM proposes to amend their RMPs to re-allocate all lands within the proposed temporary use area and right-of-way to a District-Designated Reserve, with management direction to manage the lands for the purposes of the Pacific Connector Gas Pipeline Right-of-Way. Approximately 885 acres would be reallocated. The BLM failed to analyze the impacts of loosing hundreds of acres of our local wildlife reserves, changing them into a reserve for the benefit of a foreign corporation instead.

[468] "Except where the law specifically requires, the BLM must not require compensatory mitigation from public land users. While the BLM, under limited circumstances, will consider voluntary proposals for compensatory mitigation, the BLM will not accept any monetary payment to mitigate the impacts of a proposed action."

Also, the DEIS does not have a map of the 885 acres of the Pipeline Reserve. If this EIS is the NEPA for creating this reserve, a map must be made available for the public to comment on.

District-Designated Reserves are reserved from sustained-yield timber production. Because no-net-reduction in O&C lands is allowed, all O&C lands allocated to the Pipeline Reserve would have to be replaced. The DEIS failed to consider this impact.

The 885-acre Pipeline Reserve would be to "maintain the values and resources necessary for construction, operation, maintenance, and decommissioning of the proposed Project" (DEIS 2-22, 2-23). While the DEIS tells us these reserves would be to "maintain the values" of the pipeline, the DEIS doesn't list the "values" that must be maintained. The EIS should spell out if the "value" of the reserve we must maintain is to provide profits to foreign corporations.

This project should be denied as long a Jordan Cove offers no mitigation for impacts to Marbled murrelets and the spotted owl. While the BLM cannot ask for mitigation, they can accept offered mitigation. The best mitigation for murrelets would be to buy up private land in the BLM checkerboard of Zone 1, where private land borders productive murrelet habitat. This would allow the murrelet to recover in the future without the threat of future forest fragmentation.

b. Mitigation for spotted owls on National Forest lands

Mitigation for spotted owls on National Forest lands includes converting some matrix lands to LSRs. 585 acres on the Umpqua National Forest would be changed from Matrix to LSR and 522 acres would be changed on the Rogue River National Forest. (DEIS 2-27 and 2-30). This is insufficient mitigation for a number of reasons. For example, occupied owl sites in the matrix are automatically converted to an LSR anyway, so there is no extra benefit to endangered birds for this being done as mitigation.

The DEIS implies that spotted owl occupied habitat in the matrix would become LSR. This is wrong. Occupied habitat in the Matrix is considered an LSR as soon as it is determined to be occupied. This mitigation gives us no additional protected lands. If the matrix land slated to be converted to LSR contains unoccupied owl nesting habitat, the Forest Service couldn't log it anyway because the Spotted Owl Recovery Plan (RA 32) requires that this habitat cannot be degraded. So habitat on matrix lands (and unmapped LSRs) being converted to LSR is no mitigation for clearcutting habitat.

Proposed mitigation that converts matrix to LSR in young forests, especially managed plantations, is also no help to the spotted owls because the endangered birds need the quality of habitat being clearcut, not future habitat they cannot use until after they go extinct.

Fire suppression should not be used as mitigation. Tools for fire suppression are the most common mitigation offered in the DEIS for the pipeline's impacts to spotted owls. This includes fuel reduction projects, commercial timber sales that thin forests, and fuel breaks.

The basic concept in the DEIS that fire-suppression is necessary to protect wildlife from wildland fire is flawed. The DEIS claims (4-450) that "Stand density fuel breaks would reduce

the threat of losing late-successional habitat to fire. High intensity fire has been identified as the single factor most impacting late successional and old growth forest habitats on federal lands in the area of the NWFP". No studies were cited to back up this claim, likely because this is unfounded. Studies disagree and come to a different conclusion. The DEIS failed to consider these other relevant studies.

For instance, FERC must consider the Baker Study[469]. Instead of claiming that fire harms spotted owl habitat, the Baker study finds the opposite. It uses records in dry forests where northern spotted owns are known to exist to demonstrate they were historically mixed-severity-fire adapted. Such fires actually maintained habitat for owls. They did not degrade habitat.

This is significant in terms of whether thinning to push these forests into lower fuel loads, as proposed in the DEIS, can be justified as ecologically restorative. The Baker study concludes: Mixed- and high-severity fires strongly shaped historical dry forests and produced important components of historical NSO habitat. Focus on short-term loss of nest sites and territories to these fires is mis-directed. Fuel treatments to reduce these natural fires, if successful, would reduce future habitat of the NSO in dry forests.

The Odion study[470] also shows that most fire systems in western North America were mixed severity systems and that thinning can be a bigger risk than the presumed fire risks to the northern spotted owl. If anything, we currently have a fire deficit in much of Oregon. The Odion study found that:

> … the future amount of spotted owl habitat that may be maintained with these rates of high-severity fire and ongoing forest regrowth rates with and without commercial thinning. Over 40 years, habitat loss would be far greater than with no thinning because, under a "best case" scenario, thinning reduced 3.4 and 6.0 times more dense, late successional forest than it prevented from burning in high-severity fire in the Klamath and dry Cascades, respectively. Even if rates of fire increase substantially, the requirement that the long-term benefits of commercial thinning clearly outweigh adverse impacts is not attainable with commercial thinning in spotted owl habitat. It is also becoming increasingly recognized that exclusion of high-severity fire may not benefit spotted owls in areas where owls evolved with reoccurring fires in the landscape.
>
> Therefore, the DEIS assumption that wildland fire is bad for owls is flawed, which has produced flawed mitigation proposals in the DEIS demanding further evaluation.

Thinning and fuel breaks should not be used as mitigation. Thinning can increase fire risks by drying out the forest with increased sunlight and logging slash. Fuel breaks are also ineffective because the landscape is "fuel rich" and the fuel breaks are relatively narrow. Wind driven embers can easily jump the pipeline clearance. Any fuel break that is over a few years old will be thick with small trees and brush, increasing the fire hazard. The DEIS offers no plan to maintain

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[469] William L. Baker, Historical Northern Spotted Owl Habitat and old-growth dry forests maintained by mixedseverity wildfires (December 2014). Published in Landscape Ecology . December 2014. (Baker, 2014)
[470] Dennis C. Odion, et al., Effects of Fire and Commercial Thinning on Future Habitat of the Northern Spotted Owl (2014). Published in The Open Ecology Journal , 2014. (Odion, 2014).

these impractical firebreaks over time rendering them even more useless as a mitigation measure.

The PCGP plans to replant the outer half of the right-of-way with trees. This replanting will occur between the fuel break and the permanently cleared right-of-way. Therefore, in just a few years, the fuel-break will not be directly connected to the cleared right-of-way, making it less effective. Mitigation projects should provide benefits beyond just a few short years.

Studies[471] have found fuel breaks ineffective:

> …fuel break performance and benefit is based on the questionable expectation that fire suppression will be capable of "stopping" fires after initial attack fails… Utilizing fuel breaks involves a large burnout operation, which may be of a size equal to the original wildfire, take place regardless of the fire behavior at its current location, and produce negative effects on wildland vegetation greater than the original wildfire. Maintenance costs of fuel breaks are often ignored by proponents but maintenance is a perpetual burden that is likely to divert efforts from managing fuels and vegetation on the remaining majority of the landscape.

The DEIS also fails to conclude that a wildland fire will only happen on Federal land and that the fuel reduction will be fresh enough that it can actually reduce the fire spread.

The commercial aspect of the mitigation is also problematic. Mitigation projects that are commercial, i.e., makes money and pays for itself with timber sales, is not helpful mitigation. Mitigation should be for projects that would otherwise not get done due to financial constraints. The DEIS failed to account for the timber sale receipts received from selling the logs.

Using commercial logging as mitigation allows Pacific Connector to extract far more trees from an LSR than otherwise would be allowed.

c. Other mitigation.

Fire suppression should not be used as mitigation. Tools for fire suppression are the most common mitigation offered in the DEIS for the pipeline's impacts to spotted owls and marbled murrelets. This includes fuel reduction projects, commercial timber sales that thin forests, and heli-ponds.

Pacific Connector would fund various projects on federal lands that would improve forest structure and health, and reduce the effects of wildfires. The DEIS erroneously considers fire-suppression to have caused a problem in the stand structure of moist forests in the Coast Range. Scientists have refuted this. Moist forests in the western half of the proposed pipeline do not suffer the effects of fire-suppression because the natural fire-return interval is hundreds of years. Any DEIS reference to problems caused by fire suppression in the first 70 miles of the pipeline must be corrected.

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[471] Mark Finney and Jack Cohen, Expectation and Evaluation of Fuel Management Objectives (2003). 364 USDA Forest Service Proceedings RMRS-P-29. 2003. (Finney & Cohen, 2003)

Even in dry forests, the basic concept in the DEIS that fire-suppression is necessary to protect wildlife from wildland fire is flawed. Thinning can increase fire risks by drying out the forest with increased sunlight and logging slash. However, the DEIS claims: "Stand density reductions in riparian zones have the dual benefit of reducing the risk of stand replacing fire, while also accelerating the development of late successional stand conditions by accelerating growth of remaining trees." Riparian zones are especially sensitive to logging and are some of the areas least threatened with fire. Additionally, it does no good to accelerate the development of late successional stand condition by thinning in late successional stands.

Thinning and fuel breaks should not be used as mitigation. The thinning and fuel reduction is also ineffective on BLM lands for the alleged purpose of suppressing future wildland fires because it is in such short segments. The BLM land is checkerboarded, so the thinning occurs in lines under one-mile long, with sometimes dozens of miles of the pipeline route between the short thinning segments. This is the case with the proposed fuels reduction near Milo, Trail, the South Umpqua River and the Rogue River – it is broken up into little segments. The DEIS fails to conclude that a wildland fire will only happen on Federal land and that the fuel reduction will be fresh enough that it can actually reduce the fire spread.

Fuel breaks are also ineffective because the landscape is "fuel rich" and the fuel breaks are relatively narrow. Wind driven embers can easily jump the pipeline clearance. Any fuel break that is over a few years old will be thick with small trees and brush, increasing the fire hazard. The DEIS offers no plan to maintain these impractical firebreaks over time rendering them even more useless as a mitigation measure.

The PCGP plans to replant the outer half of the right-of-way with trees. This replanting will occur between the fuel break and the permanently cleared right-of-way. Therefore, in just a few years, the fuel-break will not be directly connected to the cleared right-of-way, making it less effective. Mitigation projects should provide benefits beyond just a few short years.

Studies[472] have found fuel breaks ineffective:

> …fuel break performance and benefit is based on the questionable expectation that fire suppression will be capable of "stopping" fires after initial attack fails… Utilizing fuel breaks involves a large burnout operation, which may be of a size equal to the original wildfire, take place regardless of the fire behavior at its current location, and produce negative effects on wildland vegetation greater than the original wildfire. Maintenance costs of fuel breaks are often ignored by proponents but maintenance is a perpetual burden that is likely to divert efforts from managing fuels and vegetation on the remaining majority of the landscape.

The commercial aspect of the mitigation is also problematic. Mitigation projects that are commercial, i.e., makes money and pays for itself with timber sales, is not helpful mitigation. Mitigation should be for projects that would otherwise not get done due to financial constraints.

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[472] Mark Finney and Jack Cohen , *Expectation and Evaluation of Fuel Management Objectives* (2003). 364 USDA Forest Service Proceedings RMRS-P-29. 2003. (Finney & Cohen, 2003)

The DEIS published the million dollar cost to Pacific Connector for this mitigation, but failed to account for the timber sale receipts received from selling the logs.

Using commercial logging as mitigation allows Pacific Connector and BLM to extract far more trees from an LSR than otherwise would be allowed.

3. Grey Wolf.

The DEIS determined the impacts to the wolf to be "not likely to adversely affect." Because of additional threats not considered in the DEIS, the assessment should be changed to LAA.

The Rogue Wolf Pack is in the vicinity of the proposed pipeline. According to the Oregon Department of Fish and Wildlife[473], the Rogue Pack area of known wolf activity centers on the Jackson County and Klamath County line, south of highway 62 and north of highway 140.

The DEIS discloses (4-312) that "As currently mapped", the Area of Known Wolf Activity "is less than 5 miles from the pipeline route in Jackson and Klamath Counties." Additionally, 2.48 miles of the proposed pipeline route would pass through a corridor for wolves moving between Oregon and California. (DEIS 4-312-313).

Grey wolves are protected under the federal ESA in Oregon west of the Cascade Mountains. The "Rogue Pack" (OR-7 pack) currently occupies areas of the Rogue River-Siskiyou National Forest in Douglas and Klamath counties. The pipeline route would cross the area where OR-7 has become established. The DEIS acknowledges that the territory size of a wolf pack can range up to 1,500 square miles and that individual wolves are known to disperse from packs sometimes more than 600 miles from a home range. (DEIS 4-312).

The DEIS states that the pipeline would be located six miles from the OR-7 den location, but nevertheless concludes that its construction, clearcutting, and permanent right of way will not adversely affect the species. This analysis fails to acknowledge the impact of road development and clearing on grey wolf habitat suitability, the increase in accessibility that the pipeline route and maintenance roads could have, increasing possible human-caused mortality or harassment of wolves.

Human activity tends to create an avoidance response, which can interfere with necessary activities such as hunting and breeding. In addition, increased human presence also increases the risk of exposure to new diseases and parasites to wolf populations, such as heartworm, Parvo, and Lyme disease. Although the DEIS dismisses potential impacts to grey wolves resulting from the project, the FERC must engage in formal consultation regarding this species to ensure its recovery and survival under the ESA.

The DEIS (4-313) claims that "No active denning sites are known within 1 mile of the pipeline" condoning construction-related noise. However, denning sites are not always known, especially in future years of construction and operation. Noise could be a major problem to current and future wolf reproduction.

[473] https://www.dfw.state.or.us/Wolves/Packs/Rogue.asp

The DEIS lists impacts to the Grey Wolf on page 4-314, and includes noise and increased human presence. However, the DEIS failed to include the threat of being shot and killed because of increased human presence.

The DEIS claims that "3 percent" of wolf deaths "are due to accidental human interactions including vehicle collisions and capture mortality". The DEIS should have considered that 3 percent of Oregon wolf deaths could heavily impact the small numbers in this area of Oregon. Also, the DEIS failed to consider intentional human interactions instead of "accidental". Poaching is an issue that the DEIS failed to address. The presence of a pipeline route would allow greater intentional hunting, especially if the wolf is federally delisted in the future.

The DEIS (4-314) concludes that the project is not likely to adversely affect the gray wolf because a known den is 6 miles away from the pipeline. However, six miles for a wolf is not a great distance. Also, the DEIS (4-312) documents that the Rogue Pack is 5 miles away from the pipeline route, not 6 miles. And the DEIS documents that a wolf pack territory is up to 1,500 square miles. Impacts can also still occur on unknown den sites.

The DEIS describes (4-314) the benefits to wolves from the "restored and revegetated pipeline corridor," which the DEIS claims will increase forage used by ungulates such as deer, which are prey for gray wolves. However, the 2019 DEIS also discloses (4-216) that "Few studies have evaluated the establishment of forage in pipeline corridors and utilization by big game." This is especially true since the permanent right-of-way will be kept free of most vegetation.

However, if there could be an advantage to the wolf with increased prey, the increased prey would be lineal following the pipeline route. If the wolf were to take advantage of this, they would follow the ungulates down the pipeline right-of-way, away from safer high-elevation forest habitat and directly into the ranches and farms in the valleys. The DEIS failed to consider the impact to livestock, and the increased chances of the wolf being shot.

Formal consultation with USFWS may reveal more specific impacts resulting in a "Likely to Adversely Affect" determination to protect the fragile wolf population in Oregon.

4. Pacific Fisher.

Fishers are forest-dwelling mammals related to weasels, mink, and martens. During the 1800s and early 1900s, hunting and habitat alteration dramatically reduced fisher populations in the West. This shy animal continues to be threatened by logging and development in the West Coast's mature and old-growth forests, which has decimated the large blocks of forest the species needs to thrive.

As the DEIS notes, linear infrastructure, such the proposed pipeline, can also affect fisher populations and their habitat, since they result in permanent removal or alteration of potential fisher habitat and can disrupt movement patterns. Approximately 657.9 acres of fisher habitat would be cleared for the construction of the pipeline. This has the potential to have devastating impacts on the local fisher population, and in turn the genetic viability of the species.

The U.S. Fish and Wildlife Service proposed to list the West Coast DPS of the Pacific fisher as threatened under the ESA on October 7, 2014 (79 FR 60,419). In April 2016, the FWS determined that the fisher does not warrant listing under the ESA (81 FR 22,710). However, on September 21, 2018, the decision to deny the fisher protected status was rescinded and the comment period for the proposed rule to list the West Coast DPS of the fisher was reopened (84 FR 644). At this time, no final determination has been issued, however as a candidate species, FERC must confer with FWS regarding the potential for the project to harm fishers.

As the DEIS notes, the fisher's historic range includes the area proposed for the pipeline, and fishers may be adversely affected by construction-related noise, human activities, vehicle collisions, and habitat loss and fragmentation; yet the DEIS fails to describe the potential amount of take that may occur (i.e. number of fishers that would be killed or otherwise harmed) in order to determine whether local populations would be potentially extirpated or reduced such that the population becomes genetically limited. Nor does it discuss how these impacts could cumulatively affect fishers regionally, especially in light of climate change, would will continue to reduce available habitat for this imperiled species. While the DEIS acknowledges that the species is likely to be adversely affected, the analysis provided simply does not provide the "hard look" that NEPA requires regarding the potential for the project to cause harm to this already imperiled species.

In fact, while the species is being considered for listing as "threatened," the harm associated with the project could push local populations to the brink, creating a genetic bottleneck that would render it "endangered," or even jeopardize its continued existence. FERC should therefore request a conference with the FWS, and fully analyze the impacts to fishers as part of the formal consultation for the project under the ESA.[474] If consultation reveals jeopardy to the species as a result of project activities, FERC cannot approve the permit. Furthermore, the results of the conference should be provided in a supplemental EIS, so that the public may review and provide comment on this important issue.

5. Salmonids

As we explain above, construction of the pipeline (including clearing the right of way and constructing stream crossings), as well as construction and use of associated roads, will have numerous severe environmental impacts. In this section, we summarize the effect of these

[474] According to the FWS Consultation Handbook at 1-6, "it is Service policy to consider candidate species when making natural resource decisions." Available at https://www.fws.gov/endangered/esa-library/pdf/esa_section7_handbook.pdf. Furthermore, the Handbook states (at 3-7) that:

> Service biologists should notify agencies of candidate species in the action area, and may recommend ways to reduce adverse effects and/or request studies as appropriate. These may be added as conservation recommendations. Legally, the action agency does not have to implement such recommendations. However, candidate species may later be proposed for listing, making conference necessary in the future if proposed actions are likely to jeopardize the continued existence of such species. Service biologists should urge other Federal agencies to address candidate species in their Federal programs. The Services are eager to work with other Federal agencies to conserve candidate species. Addressing candidate species at this stage of consultation provides a focus on the overall health of the local ecosystem and may avert potential future conflicts.

impacts on aquatic habitat in particular. Activities that create or incite impacts on aquatic resources, and salmonid viability in particular, include but are not limited to:

- Permanent loss of vegetative shading at corridors for pipeline stream crossings construction and operation
- Permanent loss of base flows from pipeline
- Stream width increases from sedimentation related to pipeline construction and operation
- Soil, vegetation, bank destabilization and increased sedimentation from pipeline construction and implementation
- Permanent degradation of riparian areas in pipeline corridors at stream crossings
- Permanent loss of Large Wooded Debris areas from degradation of riparian areas and increased sediment transport in stream and river channels
- Deforestation in pipeline corridors combined with wetlands damage and long-term soil compaction and new road creation and use, plus decreases in hydrologic connectivity due to all of the above
- Increased, prolonged sedimentation of waterways

These Project impacts affect the following elements or processes, many of which are critical "pathway indicators" used in NMFS' framework for assessing impacts on ESA-listed salmonids:

- Water temperature: will increase and degrade already degraded conditions
- Turbidity & suspended sediment: will increase and degrade already degraded conditions
- Substrate: quality and quantity will be degraded and lost
- Presence of Large Woody Debris: will decrease availability and degrade already degraded conditions
- Pool frequency & quality: will be lessened and existing, minimal conditions further degraded
- Off-channel habitat: will be lessened and existing conditions further degraded
- Refugia: will be degraded beyond existing, degraded condition
- Width/depth ratio: will be degraded beyond already degraded condition
- Streambank health: will degrade beyond already degraded condition
- Floodplain connectivity: will degrade beyond already degraded condition
- Peak flows/base flows: will fluctuate causing further degradation from existing degraded conditions
- Watershed disturbance level: will rise to significant levels given intensity and duration of Project actions and activities
- Wetland hydrology & health: will degrade already degraded conditions

The FEIS must rely on the final Coho Salmon Recovery Plan as the "best available" science and must review the recovery plan for possible recovery actions relevant to mitigation for pipeline and road construction. It is available at:
http://www.nmfs.noaa.gov/pr/recovery/plans/cohosalmon_soncc.pdf.

The DEIS failed to rely on the recovery plan as the "best available" science and failed to identify for possible recovery actions relevant to mitigation for pipeline and road construction. The DEIS failed to identify wetland mitigation for SONCC streams within the SONCC ESU area.

We suggest that Pacific Connector file with the Secretary a commitment to acquire conservation easements on a substantial number of private land stream miles that are occupied critical habitat fo SONCCr coho salmon. These conservation easements along coho salmon spawning streams would be assigned to FWS for administration.

We dispute the implied or stated assertion that sediment effects of the proposed action can be fully mitigated on-site. Once pipeline associated sediment is delivered to stream channels it cannot be mitigated. The use of log placement to mitigate increased sediment is not a proven technique because of the transient nature of sediment and the finite ability of log placement to retain very much sediment. We believe that conservation easements on private lands would best secure coho habitat well into the future and help compensate for despoiled stream reaches from pipeline construction.

The DEIS 4-104 falsely asserts that

> While some additional sediment may enter streams, several factors would minimize or eliminate these occurrences:
> - the relatively small area that would be disturbed from these actions,
> - the provisions in the *Transportation Management Plan* that would be followed, and
> - the ECRP and BMPs that would be implemented for Project roads, right-of-way clearing, and TEWAs. The result would be that noticeable adverse effects on stream sediment or water quality are unlikely to occur.

First, the use of qualitative and subjective descriptors (e.g. "noticeable") is not adequate technical analysis for a project of this size and variability. Corridor clearing on steep erosive slopes is certain to generate more sediment than the same action on stable flat ground. The DEIS is defective because it fails to estimate the <u>amounts</u> of sediment generated from clearing and construction. Sediment generated from forest clearing (i.e. logging) on steep topography is well documented even with the measures identified (DEIS 4-23). For example, the DEIS identifies the use of silt fences as an effective technique to reduce sediment to streams but fails to disclose silt fences actually allow considerable amount of <u>fine</u> sediment to pass by them and into streams. The DEIs fails to assess the effectiveness of BMPs (DEIS 4-23) as they relate to "minimizing" sediment impacts to streams and coho salmon. The DEIS failed to take a hard look at effectiveness of barriers in preventing sedimentation of streams. Forest Service researchers have compiled a literature review titled: "Effectiveness of Best Management Practices that have Application to Forest Roads: A Literature Synthesis" available at <https://www.nrs.fs.fed.us/pubs/53428>. The literature synthesis by Edwards et al. 2016:96 states:

> "Larger particles, particularly sands, dominate the settling process because settling velocities of smaller particles (silts and clays) are too low for deposition to occur during the time that water is ponded (Barrett et al. 1998a, Keener et al. 2007). Clays also are affected by Brownian forces that can keep them in suspension almost indefinitely (Smith 1920); thus, particles less than 0.02-mm diameter (i.e., medium-sized silt and smaller particles) are not removed effectively by ponding or by filtering/clogging with nonreactive barriers (Kouwen 1990). To illustrate, silt fence materials tend to remove 80 to 99 percent of sands compared to 50 to 80 percent of silt loams, and only up to 20 percent of silty clay loams (U.S. Environmental Protection Agency [EPA] 1993). Consequently, as the percentage of smaller particles in runoff increases, the trapping efficiency of nonreactive barriers decreases (Wishowski et al. 1998)

This scientific analysis means that barriers such as silt fences are least effective at trapping fines that are the most detrimental to coho salmon spawning habitat. The DEIS failed to disclose the inefficiency of barriers to retain fine sediment which will make its way past them and adversely affect coho critical habitat.

Methods and models are available for estimating volumes (i.e. cubic yards) of sediment generated from clearing (aka logging), road building, road use with heavy equipment, and large scale excavations. Quantitative analysis commensurate with the scale of disturbance (xxx acres of initial deforestation, xx miles of temporary road, millions of cubic yards excavated) would reveal a range of sediment amounts generated for each pipeline segment based on site characteristics (i.e. context as per NEPA). Some pipeline segments, but certainly not all, may warrant a "not noticeable" or minor descriptor . Segments in Tyee sandstone will generate substantial chronic sediment and possible episodic sediment pulses with the magnitude of disturbance proposed.

6. Oregon Spotted Frogs

Many of the waterbodies being crossed by the pipeline (e.g. Lost River) are historic habitat for Oregon spotted frogs and some frogs may continue to persist at low densities at these historic sites. The DEIS 4-652 cannot assume that because critical habitat has not been identified that Oregon spotted frogs are not present. New detections of Oregon spotted frogs is likely for Klamath County, especially on private lands. Accordingly, Pacific Connector must survey all perennial wetlands and streams east of Buck Lake into Klamath County for federally listed Oregon spotted frogs that could be affected by pipeline construction or road building.

Many of the waterbodies being crossed by the pipeline (e.g. Lost River) are historic habitat for Oregon spotted frogs and some frogs may continue to persist at low densities at these historic sites. The DEIS 4 342-344 cannot assume that because critical habitat has not been identified that Oregon spotted frogs are not present. Surveying is likely to find new detections of Oregon spotted frogs in Klamath County, especially on private lands.

7. Cumulative Effects to Wildlife Species.

40 C.F.R. § 1508.7 requires the FERC to consider the cumulative impacts of the proposal. FERC's analysis, therefore, is not limited to the region directly adjacent to the terminal and pipeline. 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. The terminal, along with the proposed pipeline and potential lateral pipelines, will have a tremendous adverse impact on each of the factors listed above.

The FERC must adequately accord weight to important past, ongoing, and future actions that will create significant adverse impacts for local and regional ecosystems, as well as negatively affect the recovery of sensitive wildlife, fish, and their habitats. Further, the FERC must likewise accord weight to significant upstream disturbances, particularly road-building and the long-term use of access and logging roads, have and will have in National Forests. The proposed pipeline will also disturb upstream forestland; the FERC must consider the cumulative effects on headwater, riparian, and wetland areas within contemplated and reasonably foreseeable pipeline construction areas.

As part of the cumulative effects analysis, the FERC must specifically consider the project's degradation of fish habitat in light of the already tenuous state of salmon, sturgeon and groundfish in the Pacific Northwest. First, the wetland and shallow water habitat in Coos Bay has been significantly degraded over the last century. The remaining habitat, therefore, takes on added importance. The proposed massive channel deepening will fundamentally alter the Bay, further eroding and undermining the integrity of shallow water habitats. In addition, the FERC must consider the cumulative economic effect of the project on the fishing and oyster industry and communities dependent upon fishing and shellfish revenue. The direct harm to the Bay will harm the fishing and shellfish industries, as will the lack of access to traditional fishing areas. Finally, the FERC must consider the impacts of increased natural gas production that will result from this project.

Forests play an essential role in water purification.[475] Scientific literature clearly establishes the link between percent forest cover and water quality; for example, reductions in forest cover are directly correlated with negative changes in water chemistry, such as increased levels of nitrogen, phosphorus, sodium, chlorides, and sulfates as well as reduced levels of macroinvertebrate diversity.[476] Reducing forest cover decreases areas available for aquifer recharge, increases erosion, stormwater runoff, and flooding, and adversely affects aquatic habitats.[477] Already in Pennsylvania, researchers have correlated areas of high natural gas well

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[475] Robert A. Smail & David J. Lewis, Forest Service, U.S. Dep't of Agric., Forest Land Conversion, Ecosystem Services, and Economic Issues for Policy: A Review 12 (2009), available at http://www.fs.fed.us/openspace/fote/pnw-gtr797.pdf

[476] Jackson, J.K. & Sweeney, B.W., "Expert Report on the Relationship Between Land Use and Stream Condition (as Measured by Water Chemistry and Aquatic Macroinvertebrates) in the Delaware River Basin," Stroud Water Research Center, Avondale, PA, available at http://www.state.nj.us/drbc/Sweeney-Jackson.pdf

[477] State of N.J. Highlands Water Prot. and Planning Council, Ecosystem Management Technical Report 39 (2008).

density with decreased water quality, as indicated by lower macroinvertebrate density and higher levels of specific conductivity and total dissolved solids.[478]

Both deforestation and pipeline construction and operation lead to greatly increased levels of erosion, sedimentation, and stormwater runoff affecting surface water quality. Excess sedimentation is associated with a number of detrimental effects on water quality, stream morphology, and aquatic life, and has been identified by the EPA as one of the primary threats to US surface waters.[479] Furthermore, heavy truck traffic on rural roads, especially unpaved roads, that were not built to withstand hundreds or thousands of truck trips also leads to significant erosion and sedimentation problems.[480] The prospect of industrial equipment and trucks are required to not only construct necessary pipeline roads, but also to maintain such. Ditches and natural watercourses along rural roads are the primary pathways for the conveyance of polluted runoff bearing sediments and nutrients to streams, and increase runoff volume and energy as well, contributing to flooding.[481] In addition, access roads constructed or modified to enter gas exploration or extraction facilities contribute significantly to sedimentation and surface water quality degradation.

Pipeline construction and right-of-way maintenance creates significant land use impacts. Pipelines also create significant erosion and sedimentation problems during construction as well as over the decades-long maintenance of cleared rights-of-way. In joining well pads to transmission infrastructure, a single gathering line may cross numerous streams and rivers, especially in states such as Pennsylvania with a high density of stream mileage per unit of land. Stream and wetland pipeline crossings cause erosion and sedimentation whether implemented through dry ditch or wet ditch crossings.[482] Though erosion and sediment control permits may be required for stream crossings—indeed, in practice permit requirements are routinely violated.[483] Both dry and wet ditch crossings necessitate the clearing of area stream banks. Because riparian vegetation functions as a natural barrier along the stream edge, both removing sediment and other pollutants from surface runoff and stabilizing stream banks,[484] its clearing necessarily increases a stream's susceptibility to erosion events. Cumulatively, the construction of numerous crossings across a single watercourse may significantly degrade the quality and flow rate of the

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[478] Academy of Natural Sciences of Drexel University, "A Preliminary Study of the Impact of Marcellus Shale Drilling on Headwater Streams," available at http://www.ansp.org/research/pcer/projects/marcellus-shale-prelim/index.php

[479] Entrekin, S. *et al*., "Rapid expansion of natural gas development poses a threat to surface waters," Frontiers in Ecology and Environment 2011, 9(9), 503-11 (Oct. 6, 2011), at 507, 509, available at http://www.esajournals.org/doi/abs/10.1890/110053

[480] *See* C.J. Randall, Hammer Down: A Guide to Protecting Local Roads Impacted by the Marcellus Shale (Dec. 2010), available at http://www.greenchoices.cornell.edu/downloads/development/marcellus/Marcellus_Randall.pdf

[481] Yen Hoang & Keith Porter, Stormwater Management in the Rural New York Headwater Areas of the Chesapeake Bay Watershed, Journal of Water Law 21:6 (2010) at 8.

[482] The Nature Conservancy, "Natural Gas Pipelines," Excerpt from Report 2 of the Pennsylvania Energy Impacts Assessment, December 16, 2011, at 7, available at http://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/pennsylvania/ng-pipelines.pdf

[483] Beth Brelje, Pike Conservation Official Fed Up With Gas Company's Violations, Pocono Record, Sept. 20, 2011, http://www.poconorecord.com/apps/pbcs.dll/article?AID=/20110920/NEWS/109200330/-1/rss01 (noting numerous violations documented on Tennessee Gas Pipeline Company project).

[484] David J. Welsch, Forest Service, U.S. Dep't Agric., NA-PR-07-91, Riparian Forest Buffers: Function and Design for Protection and Enhancement of Water Resources (1991), available at http://na.fs.fed.us/spfo/pubs/n_resource/buffer/cover.htm

water body.[485] Erosion and sedimentation problems are often exacerbated by the staging of construction, during which soils are exposed for long periods and over long distances by clearing, grading, and trench cutting before final pipeline installation and revegetation.[486]

The FERC must also consider cumulative impacts to conservation, aesthetics, and environmental concerns. These include the cumulative impacts to wetlands, fish and wildlife values, flood hazards, floodplain values, water supply and conservation, and water quality. As discussed above, the proposed project will have significant and far-reaching impacts on all of these values, throughout southern Oregon and beyond.

8. Plants and Invertebrates.

a. Kincaid's Lupin.

Kincaid's lupine is found in upland prairie remnants and ecotones between grassland and forest. It usually occurs in heavy, well-drained soils at elevations below 838 m (2750 ft). Major threats to Kincaid's lupine include habitat loss due to urbanization, agriculture, forestry practices, and roadside maintenance; competition from non-native plants; and successional encroachment by woody plants due to changes in historic disturbance regimes. Importantly, Kincaid's lupine is the primary larval host plant of the federally endangered Fender's blue butterfly (*Icaricia icarioides fenderi*) and according to FWS recovery efforts for these species should be coordinated. It is therefore notable that the DEIS makes no mention whatsoever of Fender's blue butterfly.

Kincaid's lupine is listed as threatened under both the federal ESA and Oregon ESA. While the DEIS notes that the Pacific Connecter pipeline is likely to adversely affect this imperiled plant species, it provides scant information on the actual level of take that would be anticipated, and does not provide sufficient information on plans for mitigation, noting that there will be a conservation plan, but failing to provide specifics on which the public can provide comment. DEIS at 4-348. The mitigation measures that *are* mentioned in the DEIS, including flagging, buffers and safety fences, may help reduce impacts, yet it is not clear whether route adjustments and neckdowns would be sufficient to avoid key lupine habitat.

The pipeline is located within known or historical Kincaid's lupine range between MPs 46.8 and 99.3. According to the DEIS, multiple populations of lupine have been identified in the Project's botanical analysis area within Douglas County, including 11 sites within 2.5 miles of the pipeline. One of the largest populations of this plant is found between MP 57.84 and 57.92 of the pipeline route. Here, according to the 2015 DEIS (the current DEIS does not provide specific population counts) Pacific Connector found seven sub-populations, almost 200 plants, within a 5-acre area centered on the pipeline. The DEIS claims that "No direct impacts are anticipated to the population near MP 59.60, as plants are located at least 67 feet from pipeline facilities;"

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[485] Canadian Association of Petroleum Producers, Canadian Energy Pipeline Association, and Canadian Gas Association, "Pipeline Associated Watercourse Crossings," 1-4 (2005).
[486] Comments on Environmental Assessment of MARC I Hub Line Project, Exhibit G, FERC Docket No. CP10-480-000, Submittal 20110711-5189 (filed Jul. 22, 2011) (statement of Susan Beecher, Executive Director, Pike County PA Conservation District (Jul. 8, 2011)), available at http://elibrary.ferc.gov/idmws/docket_sheet.asp

however, this ignores the fact that the 95'-wide right-of-way clearing width goes directly into this sub-population.

Moreover, the DEIS states that "not all suitable habitats within the Project area have been surveyed to date, indicating that additional unknown populations may be present within areas that could be affected by the Project." DEIS at 4-357. In fact, "991.6 acres of potential suitable habitat that has not been surveyed." *Id.* The analysis is therefore admittedly incomplete for this species, and the impacts may be much greater than have been anticipated. The DEIS therefore does not provide the hard look that NEPA requires.

Incredibly, Pacific Connector also appears to have placed Temporary Extra Work Areas (TEWA) and pipe storage yards immediately adjacent to populations of the plant. *Id*. The DEIS notes that these areas, as well as the pipeline ROW, may be moved if further surveys show that such mitigation measures are necessary, yet this suggests that the project has not fully analyzed the impacts or taken appropriate measures at this time to minimize and mitigate harm to listed species. Virtually every sub-population of lupine adjacent to the right-of-way clearing has a TEWA located nearby. This is an unnecessary impact to the plant, and the DEIS must fully account for these impacts.

b. Rough Popcornflower

The DEIS notes that Rough Popcornflower, which is listed under both the Federal ESA and Oregon ESA as endangered, occurs in the project area and may be adversely affected by construction of the pipeline, as well as the Winchester pipe storage yard. The DEIS concludes that the species will not be adversely affected by the project; however, this conclusion is based on inadequate information, as "Pacific Connector has not been granted access to approximately 99.83 acres of potentially suitable rough popcornflower habitat within the analysis area, the majority of which is associated with the Winchester pipe storage yard." DEIS at 4-358. The potential for take of the species has therefore not been adequately analyzed.

While the DEIS states that surveys will be done "prior to ground disturbing activities" and that if any plants are identified, conservation measures would be developed to avoid or minimize effects on documented plants, this is insufficient. It remains unclear whether sufficient mitigation measures (i.e. alterations to the pipeline route) to avoid take of the species would even be possible. Further, the DEIS indicates that "consultation with the FWS would be reinitiated if this species is found to be present in the area and effects cannot be avoided," yet this consultation, and a full analysis of the actual impacts, must be included *before* FERC can make a determination on the project. Putting this analysis off until a later date is a clear violation of both NEPA and the ESA.

c. Vernal Pool Species: Vernal Pool Fairy Shrimp, Large-Flowered Meadowfoam, Cook's Lomatium

These three endangered species all rely on vernal pools in the Rogue River Valley in Jackson County that will be adversely affected by the storage of pipes in, or adjacent to their habitat,

including areas very close to designated critical habitat. Additional surveys are required to determine their presence in or near other pipe-storage areas.

The DEIS notes that vernal pools may be adversely affected by construction of the pipeline. DEIS at 4-133. However, the extent of the potential harm has not been adequately discussed, as no actual acreage, location or specific vernal pools have been identified in the DEIS. The DEIS, does, however, note that "Suitable vernal pool habitat occurs within and adjacent to Project facilities, some of which has not been surveyed." It is therefore readily apparent that the potential for harm to species that rely on vernal pools, particularly the federally endangered vernal pool fairy shrimp, has not been adequately analyzed.

Moreover, while the DEIS correctly found that vernal pool fairy shrimp are likely to be adversely affected by the project, it goes on to claim that critical habitat for the species would not be adversely affected, even though it acknowledges that "a proposed pipe storage yard is in the Burrill Lumber industrial yard adjacent to the vernal pool fairy shrimp critical habitat unit VERFS 3A." DEIS at 4-346. It is therefore entirely erroneous for the DEIS to determine that the project is not likely to adversely affect critical habitat for the species, especially given that it admits that "Potential effects on vernal pool fairy shrimp and critical habitat include possible disturbance to pools from **driving** or storing equipment or pipes near or on pools or wetlands, and alteration of hydrology." There is nothing provided in the DEIS to support this conclusion, other than the presence of Agate Road and the applicant's promise to "implement proper sedimentation control barriers to minimize potential effects on the species." *Id*. It remains entirely unclear whether sediment barriers would be sufficient to prevent harm, and even if such measures may reduce the effects of runoff, harm to critical habitat may still occur, regardless of the presence of the road, especially since dirt and debris may be blown across the road. Moreover, the DEIS clearly states that "driving" near the pools may cause adverse impacts, and therefore the presence of Agate road is a source of harm, rather than a barrier to prevent harm to the critical habitat.

The analysis of harm to vernal pools and the species that rely on them is therefore inadequate, and the effects determination for vernal pool fairy shrimp critical habitat is unsupported by sufficient information. As set forth above, FERC may not avoid the "hard look" that NEPA requires by stating that "More details will be provided in the pending BA." FERC has thereby failed to fulfill its NEPA duties.

d. Cox's Mariposa Lily

As with many of the other species considered in the DEIS, FERC has failed to provide a complete analysis of the potential for harm to the State endangered Cox's mariposa lily. The DEIS provides that:

Based on existing data, the Pacific Connector pipeline route would cross one population between MP 74.1 and 75.0 on lands administered by the BLM Roseburg District (ORBIC 2017a). In 2012, surveys conducted by the BLM documented approximately 1,300 plants within and adjacent (within 100 meters) to the Project, with approximately 300 plants occurring in the construction ROW (BLM 2017c). However, modifications have been made to

the pipeline route subsequent to these surveys. In 2018, surveys for Cox's mariposa lily were conducted during the flowering season on approximately 65 acres between MPs 74 and 75 of the revised pipeline route. The 2018 survey data are currently under review by the BLM. Additionally, there are approximately 45.3 acres of potential suitable Cox's mariposa lily habitat on private lands within the pipeline route that have not been surveyed.

DEIS at 4-365. The lack of surveys on private land, and the fact that BLM is still reviewing more recent data, suggests that the potential for harm remains unresolved. Yet, while the DEIS admits that "construction and operation of the Project would directly and indirectly affect this species and this species' habitat," it suggests that any harm would be addressed through a mitigation plan, which does not appear to have been provided for public comment. Furthermore, the proposal to protect the lily relies on the collection of bulbs and efforts to replant them after the pipeline is built. But there is no discussion regarding whether replanting lily bulbs will effectively mitigate the impacts of the pipeline construction. Moreover, the DEIS fails to consider that after the pipeline is built, OHV traffic will be abundant, especially on BLM land. BLM has acknowledged that controlling ORV use in the pipeline area will be extremely difficult, if not impossible. The DEIS does not resolve this issue, which may result in unexamined effects to the lily.

JJ. The Proposed Mitigation Is Inadequate

The DEIS often assumes BMP effectiveness, while science and practical experience has proven that BMPs have limits on effectiveness, particularly for streams in steeper terrain. Rather than assessing impacts resulting from the pipeline with the understanding that BMPs and mitigation will have limited effectiveness, the DEIS arbitrarily assumes impacts will be eliminated or significantly reduced. For example, construction mats will not wholly prevent or retard soil compaction, particularly in saturated and soft soils (where many pipeline related actions will occur). The DEIS does not account for the degree, extent, or persistence of inevitable compaction nor the long-term impacts it creates, such as infiltration rates, saturation capacity, runoff volume, and affected wetlands processes, including the ability to absorb, store, and slowly release water. Compaction thus has direct, indirect, and cumulative impacts such as erosion, sediment delivery, water quality, peak flows and low flows on aquatic resources and salmonids, yet these impacts – which affect salmonid survival and production – were not given a hard look.

The same flawed analyses of impacts to salmonids are present in the context of pipeline construction and operation in riparian zones. The DEIS is replete with assumptions of BMP effectiveness in eliminating runoff and sediment impacts to waterways. Conversely, best available science indicates that such BMPs do not eliminate such impacts from vegetation removal and significant soil disturbance in close proximity to waterways, on steep slopes adjacent waterways, and/or in areas with high levels of precipitation and runoff like the Pacific Northwest. The same flawed assumption of BMP effectiveness applies to the DEIS' assumption that post-construction revegetation will be effective in mitigating sediment-related impacts from pipeline construction on aquatic resources. Scientific studies have documented that post-construction revegetation is largely ineffective at reducing erosion and sedimentation.

Furthermore, the DEIS assumes – without supporting evidence – that project activities in riparian areas will "minimize" their impacts and thereby apparently sufficiently mitigate changes in water temperature, runoff, and sediment delivery. The DEIS does not explain what "minimized" impacts means, nor does the DEIS factor in any explanation of available scientific data corroborating the limited effectiveness of BMPs in preventing impacts to aquatic resources and salmonids from stormwater runoff, vegetation removal, and elevated erosion.

Thus, if the Project is approved, additional mitigation is necessary. We suggest that Pacific Connector file with the Secretary a commitment to acquire conservation easements on a substantial number of private land stream miles that are occupied critical habitat for coho salmon. These conservation easements along coho salmon spawning streams would be assigned to FWS for administration.

We dispute the implied or stated assertion that sediment effects of the proposed action can be fully mitigated on-site. Once pipeline associated sediment is delivered to stream channels it cannot be mitigated. The use of log placement to mitigate increased sediment is not a proven technique because of the transient nature of sediment and the finite ability of log placement to retain very much sediment. We believe that conservation easements on private lands would best secure coho habitat well into the future and help compensate for despoiled stream miles from pipeline construction.

A particular problem with mitigation is mitigation or avoidance of impacts on private lands. The DEIS has numerous instances and whole sections documenting a suite of protective standards for NFS and BLM lands. Much lower protective standards for private lands are explicitly stated or implied.

The DEIS fails to discuss quantitatively the higher risk or higher expected impacts to stream miles on private lands due to lower and scientifically inadequate protection standards. The tradeoffs of reduced environmental protection on private lands versus increased costs are not made explicit as required by NEPA.

We know that FERC would not allow lesser engineering or safety standards for pipeline construction on private lands. We assert that the FERC must insist that the same protective standards for public lands be implemented on adjacent private lands. Implementation, contracting, EI monitoring, impact assessment, legality, etc. would be simplified by using the same standards for all land ownerships where practical, rather than reducing environmental standards on private lands to reduce short term construction costs while burdening everybody else with conflicting standards and inevitable stream degradation.

KK. Public Safety.

We continue to object to weaker Pipeline Safety standards for rural areas. Most of southern Oregon is in a "Class 1" location because there are 10 or fewer buildings on a one-mile length of pipeline. This could put rural Oregonians in greater danger than people in urban areas. Examples of how southern Oregon would be treated differently than urban areas include:

- Fewer welds are required to be inspected or tested, 10% verses, 100% in urban areas.
- Thinner pipes are permitted.
- No internal inspections are required on the pipeline once it is in the ground.
- Pipelines are buried 6” higher.
- Maximum distance to block valves is greater.
- Hydrostatic test pressures are weaker.
- Maximum allowable operating pressure is greater.
- Frequency of pipeline patrols and leak surveys are less often.

At minimum, stricter standards ought to be considered as a reasonable alternative, so that the effects of the difference can be meaningfully evaluated. The Draft EIS says that this consideration can’t be done because FERC lacks jurisdiction to require it. DEIS, 4-771. But jurisdiction is no reason not to consider impacts. Additionally, the applicant here is voluntarily exceeding those standards, so the implications need to be explored and revealed.

Even if the possibility of better mitigation is ignored, the DEIS still needs to consider and disclose the ways that safety risks *increase* as a result. The PHMSA risk-based systems put priority on populations, so many of the rural areas passed by the pipeline will not receive much attention. We noted too that the PHMSA safety standard metrics are geared to permanent residences and year-round occupied structures, so many of the important populated areas passed by the pipeline will not receive any attention. Camps for example, which are not occupied much of the year, but can house hundreds for periods of time, as well as highways and rivers, will be at heightened risk in light of these safety standards.

The discussion of PHMSA safety standards is fine as far as it goes, but does not achieve NEPA’s mandate to disclose and consider effects. This section comes a long way from justifying FERC’s later conclusion that, given the existence of PHMSA regulatory regime, there is no significant safety impact of the pipeline. Pipeline safety standards are always controversial, and major pipeline incidents are routine.

The Draft EIS never explains the risks associated with this pipeline. It generally says only that “pipeline system emergencies can include gas leaks, fire or explosion, and/or damage to the pipeline and aboveground facilities.” DEIS, 4-773. That is a very dry and uninformative way of describing the potential for <u>huge</u> fires and explosions created by the proposed action.

The Draft EIS presentation of pipeline accident data is biased and misleading. Apparently calibrated to offer assurance, it fails to meet NEPA’s duty to provide high-quality information taking a hard look at impacts.

Some of the details presented are perplexing. Why is it helpful to know, to the tenth of a percentage point, what percentage of pipeline incidents in the country are caused by corrosion and pipeline material, weld or equipment failure? DEIS, 4-776. Or the distribution of causes of outside force incidents? This sort of false-precision gives the appearance of a hard look, while actually obfuscating the real picture.

Fundamentally the approach taken by the DEIS is wrong. The duty here is not to look at this project from the perspective of the national pipeline system, but to look at it on its own terms. NEPA requires consideration of the impacts *on the human environment*, not on national pipeline statistics. The public here don't care how this pipe compares with the hazards posed by all pipelines, but the alternatives compare in the risk they present. From the point of view of a person living along the route, the change in risk is massive— going from zero to … whatever it is.

This leads to the further problem that, while accident data is presented in a few unhelpful ways, the DEIS never does crunch the numbers and tell us what the relative risk of accidents is on the proposed pipeline. How often, based on past experience, do pipelines such as this result in accidents?

The Draft EIS does not offer any analysis whatever regarding the relative safety of this pipeline compared with others. The risks here appear to be larger than usual in light of (1) the complex project, (2) inexperience of the region with gas transmission lines, and especially (3) dynamic instability of the pipeline route.

The gas pipeline explosion hazard is significant and alarming. We find this risk to public safety unacceptable, and a powerful weight against the project being in the public interest. It is outrageous that the Draft EIS fails to confront this risk is a realistic way.

The Draft EIS relies entirely on a generalized statistical presentation. DEIS, 4-778 – 4-780. Because the overall number of injuries and fatalities on natural gas transmission lines in the last five years is a relatively "small" number (is three deaths really a small number!?), we are assured that pipeline failures are "rare." DEIS, 4-779.

First, the statistical method here is unsupported. Why are only gas transmission lines considered, and why only the last five years? Why are only releases resulting in fatalities or serious injuries revealed, when there are a much higher number of accidents and releases that just miss? Revealing the truly absurd and biased nature of the Draft EIS statistics, it actually goes to the trouble to make a table of accidental deaths all-in-all, to make the point that the "fatality rate" for gas pipelines is "much lower" than fatalities from lightning. This information serves no useful purpose except to fill space with meaningless numbers, and bias reviewers against considering pipeline risks to public safety.

Second, the purely generalized and statistical method entirely fails to address the many important site-specific risks and hazards associated with the pipeline. This is an especially egregious error because the present review is the last and only chance to make any siting determinations or explore alternative pipeline routes that might be safer. Landslides and soil movement in particular are a serious threat to pipeline safety, as is recognized by recent PHMSA guidance. The pipeline here is unstable in many specific areas, and each of those is at risk of a pipeline breach and release.

Wildland Fires are a major compounding risk that the Draft EIS does not address. *See* comments on this docket of Firefighters United for Safety, Ethics and Ecology (FUSEE). Overlays show

that a large portion of this pipeline route is through areas that are at high risk of high-intensity wildfires. Wildfire needs to be considered reasonably foreseeable and site-specific risks considered.

That approach also hides reasonable alternatives that would result in a safer pipeline. Higher-quality leak detection which is available (*See e.g.* Shaw et al. (Sept. 28, 2012), PHMSA, *Leak Detection Study – DTPH56-11-D-1*.) ought to be required along the pipeline, with priority for detection at:

- Private properties;
- Wild-fire risk areas (e.g. high risk fire stands; firebreaks);
- Roads;
- Major river crossings;
- Recreational facilities (e.g. boat ramp, picnic spots).

Third, the information provided, even with its bias, does not support the conclusion that this pipeline will be "a safe, reliable means" of transportation. DEIS, 4-780. Three dead and nine injured each year is significant. The pipe will not be "safe," but will be one of the biggest hazards in the region, and will present risks of entirely new character. The casual treatment of this issue in the Draft EIS suggests complacency, which further increases our alarm.

LL. Geological Hazards.

The DEIS notes that the pipeline will cross areas of high liquefaction and/or lateral spreading as well as rapidly moving landslides. In these areas, the applicant proposes to monitor conditions and possibly implement additional mitigation measures at these locations. DEIS at 5-4. According to FEMA, "Large, permanent ground movements in the form of surface faulting, soil liquefaction, and landslides, are the most troublesome sources of damage to gas and liquid fuel pipelines (O'Rourke, 1987)." *See* FEMA, *Earthquake Resistant Construction of Gas and Liquid Fuel Pipeline Systems Serving, or Regulated by, the Federal Government*, at 1 (FEMA-233, July 1992).

Therefore, a primary concern for buried pipelines is their ability to accommodate abrupt ground distortions or differential displacements. (ASCE, 1984). The amount and type of ground displacement across a fault or fault zone is one of the most important factors to be considered in seismic design of pipelines crossing active faults (ASCE, 1983). Since ground displacements are in most cases difficult to predict, it is also difficult to develop designs which will protect pipelines against their effects. The most common forms of ground displacements are faulting, lateral spreading caused by liquefaction, and slope failures (landslides).

In addition to these severe direct effects on pipelines, secondary effects from earthquakes can also damage pipelines. For example, flooding, hazards from fallen power lines, and explosion hazards when gas lines are ruptured can all result as secondary effects of an earthquake. The proposed monitoring outlined in the DEIS does not adequately address these risks or explain how the pipeline itself, including choice of pipe material, type of

joints, arrangement of the network, length of segments, location and details of fittings and accessories are made. In addition, there is no evidence that where the pipeline is proposed in the vicinity of active landslides and liquefaction zones that any proposed measures can adequately protect against pipeline damage and disturbance to protect the environment and communities of Southern Oregon. The DEIS acknowledges as much, stating that "it is not possible to completely mitigate the risk of pipeline damage in Coos Bay resulting from lateral spreading during a megathrust seismic event."

The DEIS recognizes "that the consequences of a pipeline failure may be catastrophic and involve fire and/or explosion." Nevertheless, the DEIS fails to take a hard look at alternatives that would avoid locating the pipeline in areas of seismic activity that pose a risk to the safety of the pipeline and the communities around it.

The DEIS is clear, and based on our experience it is true, that the Pacific Connector pipeline will cross very unstable and steep slopes, as well as other areas that are geologically unpredictable. Where these areas exist on public lands, the Northwest Forest Plan requires that unstable and potentially unstable areas be designated as riparian reserves and put off limits to management. NFP S&Gs, C-31. There is no indication that FERC or the project proponent has complied with this requirement. 5 U.S.C. § 706(2)(A).

MM. Use of Eminent Domain Is Inappropriate For This Pipeline, Because It Will Not Serve A Public Purpose.

1. The Project Does Not Benefit The American Public

Many of the undersigned previously protested the application, explaining that the project was contrary to the public interest. FERC has not responded to those protests. We reiterate those concerns herein.

FERC asserts that the public benefit determination is entirely within the hands of the Department of Energy (DOE), and the DOE has already made a determination that exporting LNG would have a public benefit. DOE's evaluation is only conditional, and DOE has explicitly committed to revisiting this evaluation. In particular, DOE has not yet considered how the numerous and severe environmental impacts of the project influence DOE's public interest analysis. Even on purely non-environmental issues, however, we contend that DOE's conditional assessment is flawed, for reasons stated in our prior comments to DOE and FERC. Because DOE's conditional authorization is not final, is flawed, and is subject to future challenge, FERC cannot rely on it here.

Moreover, FERC has an independent duty to assess the public interest as part of its Natural Gas Act and NEPA analyses.

The DEIS adopts the IMPLAN-based economic projections offered by Jordan Cove. The problems with this modeling were discussed in Sierra Club's protest of the application. We reiterate those concerns here, and incorporate that argument by reference.

We can see the effects of a dynamic world on Coos County by looking at the last four decades. In 1970, Coos County had about 60,000 residents and lots of them were engaged in primary jobs such as timber cutting and commercial fishing. Today, most of the timber and fishing jobs are gone, so you might think the number of residents would have declined. In fact, it still has about 60,000 residents, partly because something else replaced those jobs, largely retirement money. The LNG terminal might create some new primary jobs, but it also might kill some primary jobs since some potential retirees may decide they don't want to live in a county with an LNG terminal.

The Jordan Cove EIS relies on ECONorthwest to use and interpret IMPLAN results. But ECONorthwest itself has challenged the use of IMPLAN to estimate the employment effects of another project. In a March, 2013 Critique of Substitute Environmental Document: "IMPLAN overestimates the true employment and economic impacts of alternatives" partly because economies "are not static."[487]

FERC should find that United States citizens do not benefit from the profits of a corporation in a foreign country. Little of the profits made by Veresen in Canada on this project will trickle down to Oregonians. Landowners stretched across the southern part of the state will be made poorer as a result of land condemnations, lowered property values, and unjust and unequal compensatory remuneration. Taxes and payments offered to local counties are miniscule compared to their budgets and will likely not even cover the actual expenses of increasing emergency services to address increased hazards in rural Oregon.

Eminent domain was established for, and is useful for, projects that have a public use, like highways and electric lines. But a pipeline whose main purpose is to export gas to Asia does not have any benefit to U.S. citizens.

Likewise, Oregon does not substantially benefit from the approximately 200 permanent jobs this project is expected to produce, of which only a small percentge will be local hires. There are robust alternatives to producing these local jobs. For instance, there is a drastic shortage of solar-panel installers in southern Oregon. A recent report found that we could create 2,500 permanent jobs through renewable energy development in Oregon.

More than 90% of the private landowners along the 229-mile long pipeline rejected the initial offers made by PCGP in the summer of 2013. Many of the landowners do not want a high-pressure, 36" unodorized gas pipeline near their homes, especially as we hear about pipeline explosions on the nightly news. Many landowners scoffed at the very low offers being made.

At one public meeting landowners asked a representative of PCGP if they would pay an annual payment, similar to royalties, for the annual landowner expenses, such as having to pay property taxes on the PCGP right-of-way. The response was a quick "No. You can take your one-time payment and invest it, and the interest will be like royalties." Later, when landowners received their very low-ball offers, this statement appeared to be a joke.

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[487] "Critique of Substitute Environmental Document in Support of Potential Changes to the Water Quality Control Plan for the San Francisco Bay- Sacramento/San Joaquin Delta Estuary: San Joaquin River Flows and Southern Delta Water Quality," prepared by ECONorthwest for Michael Jackson, March, 2013.

Veresen Inc. will be making billions and billions of dollars by using private land in southern Oregon. They have an unfair advantage over families to start with, because they have well-paid staff trained to justify low payments and get our land for the cheapest price possible. Landowners are even more crippled when they have the threat of eminent domain hanging over the negotiations for property.

To help U.S. citizens gain an equal footing with Veresen, the Commission should not find that this project has a public benefit and should not allow eminent domain. The DEIS 1-12 points out that under section 3 of the NGA, the Commission considers "all factors" bearing on the public interest. This should include how the threat of eminent domain interferes with fair negotiations for using private property.

2. Purpose of Pipeline.

One of the purposes of the pipeline is "to supply additional volumes of natural gas to markets in southern Oregon...Pacific Connector intends to deliver about 40 million cubic feet of natural gas per day to Northwest's existing Grants Pass Lateral through an interconnection with the proposed Clarks Branch Meter Station." What the DEIS failed to disclose is how much natural gas will be withdrawn from the Grants Pass Lateral, through the Coos Bay 12" line that is north of the proposed Clarks Branch Meter Station. If Jordan Cove uses 40 million cubic feet from the Grants Pass Lateral through the 12" Coos Bay line, and then puts 40 million cubic feet back in at Clarks Branch, that equals *no* extra gas for Oregon, which does not meet the stated purpose of the Pacific Connector Pipeline.

At the FERC public hearings at Canyonville, John Clark testified and presented paperwork showing Jordan Cove had a contract to remove as much natural gas from the Grants Pass Lateral (via the Coos Bay 12" line) as they claim they will put back in.

FERC must fully disclose the net amount of gas that would be supplied to Oregon to determine if the purpose of the PCGP is being met and if there is a true public benefit for Oregon.

3. Blanket Certificate.

The Commission cannot issue a blanket certificate to allow unknown impacts to landowners along the pipeline. Because the DEIS did not define the scope of a "blanket certificate", it could allow PCGP to do anything to private land that PCGP considered a "minor action", like construction of buildings, new roads, etc. What PCGP might consider "minor", the landowner might not. "Minor" should have been, but was not, well defined.

The DEIS says that future actions allowed under this blanket certificate is "subject to individual environmental reviews by FERC staff..." However, the DEIS failed to clarify if this would be a review in compliance with the National Environmental Policy Act (NEPA), or if it would simply be an internal review not subject to public input. We have asked Paul Friedman this question twice, in writing , and have received no answer. FERC should clarify that any action taken under the "blanket certificate" is subject to NEPA review, allowing full public and scientific input.

A “blanket certificate” allowing unknown impacts is not allowed by NEPA. “NEPA procedures must insure that environmental information is available to public officials and citizens before decisions are made and before actions are taken. The information must be of high quality.” The DEIS violates this requirement.

NN. Rural Emergency Services.

The DEIS failed to consider that rural areas in Oregon are not prepared to deal with the emergencies that a high-pressure gas pipeline could cause. There are going to be only 17 mainline block valves on the entire 229 miles of the pipeline. Therefore, if there is an accident or natural disaster, there could be significant damage done before a person can drive to one of the valves to turn it off and then let the gas burn out of 1/17th of the pipeline.

The taxes PCGP is providing the counties is not nearly enough to upgrade the needed rural emergency services to address potential problems.

The DEIS has underestimated the difficulty in road-building and trenching on Oregon’s steep, unstable, landslide prone, earthquake susceptible mountain slopes. This puts rural Oregonians in additional peril from accidents that occur due to heavy rain or geologic events, especially since the pipes are thinner in rural areas, and we have inadequate emergency response capabilities.

Increased fire-fighting expenses are also not covered by PCGP. Because of the short vegetation maintained in the right-of-way, forest fires will be able to travel across the landscape quicker than without a clear path of short, dry brush. The money given to local governments does not cover the extra forest-fire fighting costs, thus endangering rural residents even more.

OO. Bonding.

The DEIS states that the “bond or letter of credit” posted by Jordan Cove “to cover the amount in the estimate to retire the facility.” FERC should also require Jordan Cove and PCGP to post a bond to cover damages from the pipeline while it is service, not just at retirement. For instance, if the pipeline blows up and starts a forest fire, impacted families should be assured that PCGP can pay for the damages they cause.

PP. Forest Plan Amendments.

1. Forest Service Amendments.

a. Plan amendments generally.

The proposed pipeline construction across federal public forestlands involves numerous actions that are inconsistent with the planning documents and management intent for those lands. The proposed violations of the underlying land use plans are significant, irreversible and irretrievable, and may retard and prevent accomplishments of the goals and objectives of the land management plans (Resource Management Plans, RMPs on BLM lands; Land and Resource Management

Plans, LRMPs on Forest Service lands). Reliance on site-specific forest plan amendments violates NFMA's requirement that forest plans "form one integrated plan for each unit of the National Forest System, incorporating in one document or one set of documents, available to the public at convenient locations, all of the features required by this section." 16 U.S.C. § 1604(f)(1).

NFMA imposes substantive constraints on management of forest lands, such as a requirement to insure biological diversity. *Native Ecosystems Council v. Dombeck*, 304 F.3d 886, 898 (9th Cir. 2002). NFMA and its implementing regulations subject forest management to two stages of administrative decision making. At the first stage, the Forest Service is required to develop a Land and Resource Management Plan, also known as a Forest Plan, which sets forth a broad, long-term planning document for an entire national forest. At the second stage, the Forest Service must approve or deny individual, site-specific projects. These individual projects must be consistent with the Forest Plan. *Great Old Broads for Wilderness v. Kimbell*, 709 F.3d 836, 851 (9th Cir. 2013) ("the NFMA prohibits site-specific activities that are inconsistent with the governing Forest Plan"); *see also Neighbors of Cuddy Mtn. v. Alexander*, 303 F.3d 1059, 1062 (9th Cir.2002) ("[s]pecific projects ... must be analyzed by the Forest Service and the analysis must show that each project is consistent with the plan"). The Forest Service's "interpretation and implementation of its own forest plan is entitled to substantial deference." *Great Old Broads*, 709 F.3d at 850 (9th Cir. 2013) (internal quotation marks omitted).

In 2012, the Forest Service finalized new planning regulations that are relevant to forest plan amendments. 36 C.F.R. Part 219 (2012). In 2016, the agency amended the 2012 Planning Rule to more specifically address forest plan amendments. The preamble to the 2016 Amendments to the 2012 Rule explain:

> Under the 2012 rule, "[p]lan amendments may be broad or narrow, depending on the need for change" (36 CFR 219.13(a)); and amendments "could range from project specific amendments or amendments of one plan component, to the amendment of multiple plan components." (77 FR 21161, 21237 (April 9, 2012)). Unlike for a plan revision, the 2012 rule does not require an environmental impact statement for every amendment; such a requirement would be burdensome and unnecessary for amendments without significant environmental effect, and "would also inhibit the more frequent use of amendments as a tool for adaptive management to keep plans relevant, current and effective between plan revisions." (Preamble to final rule, 77 FR 21161, 21239 (April 9, 2012)).
>
> The Department's position is that the 2012 planning rule gives responsible officials the discretion, within the framework of the 2012 planning rule's requirements, to tailor the scope and scale of an amendment to a need to change the plan. This position means that, while the 2012 planning rule sets forth a series of substantive requirements for land management plans within §§ 219.8 through 219.11, not every section or requirement within those sections will be directly related to the scope and scale of a given amendment.

> However, a plan amendment must be done "under the requirements of" the 2012 rule (36 CFR 219.17(b)(2)). Therefore the responsible official's discretion is not unbounded. An amendment cannot be tailored so that the amendment fails to meet directly related substantive requirements or is contrary to any substantive requirement. Rather, when responsible officials identify a need to change a plan, they must determine which substantive requirements within §§ 219.8 through 219.11 of the 2012 rule are directly related to such a change, and propose an amendment that would meet those requirements and not contradict other requirements.

81 Fed. Reg. 70,375 (Oct. 12, 2016). The preamble goes on to explain that

> During the Department and Agency's conversations with the [Planning Rule Federal Advisory] Committee about the Agency's early efforts to use the 2012 rule to amend 1982 rule plans, the Committee advised that some members of the public have suggested interpretations of the 2012 rule that conflict with the Department's position. For example, some members of the public suggested that because the 2012 rule recognizes that resources and uses are connected, changes to any one resource or use will impact other resources and uses, and therefore all of the substantive provisions in §§ 219.8 through 218.11 must be applied to every amendment.
>
> Other members of the public suggested an opposite view. They believe that the 2012 rule gives the responsible official discretion to selectively pick and choose which, if any, provisions of the rule to apply, allowing the responsible official to avoid 2012 rule requirements or even propose amendments that would contradict the 2012 rule. *Under this second interpretation, members of the public hypothesized that a responsible official could amend a 1982 plan to remove plan direction that was required by the 1982 rule without applying relevant requirements in the 2012 rule.*
>
> *The Department intends in this preamble and proposed amendment to the rule to clarify that neither of these interpretations is correct.*
>
> *…the 2012 rule does not give a responsible official the discretion to amend a plan in a manner contrary to the 2012 rule by selectively applying, or avoiding altogether, substantive requirements within §§ 219.8 through 219.11 that are directly related to the changes being proposed. Similarly, an interpretation that the 2012 rule gives responsible officials discretion to propose amendments "under the requirements" of the 2012 rule that actually are contrary to those requirements, or to use the amendment process to avoid both 1982 and 2012 rule requirements, is in opposition with the Department's position described earlier in this discussion that the responsible official's discretion to tailor the scope and scale of an amendment is not unbounded.*

Id. at 70,376 (emphasis added).

The requirements of the 2016 Amendments have been interpreted by the Fourth Circuit Court of Appeals in the same factual situation present here, e.g. a natural gas pipeline across national

forestlands necessitating forest plan amendments. The Court in *Sierra Club v. Forest Service* explained these requirements:

> Specifically, the 2016 Revisions provide that the Forest Service "shall ... [d]etermine which specific substantive requirement(s) within §§ 219.8 through 219.11 are directly related to the plan direction being added, modified, or removed by the amendment," and then "apply such requirement(s) within the scope and scale of the amendment." 36 C.F.R. § 219.13(b)(5) (emphasis supplied). Conversely, "[t]he responsible official is not required to apply any substantive requirements within §§ 219.8 through 219.11 that are not directly related to the amendment." Id. (emphasis supplied).
>
> Thus, the issue we consider here turns on whether the requirements in the 2012 Planning Rule are directly related to the instant Forest Service amendments to the Jefferson Forest Plan.

Sierra Club, Inc. v. United States Forest Serv., 897 F.3d 582, 601 (4th Cir.), *reh'g granted in part*, 739 F. App'x 185 (4th Cir. 2018). In examining the "purpose" of the proposed amendments, the Court went on to explain that

> The Forest Service admittedly needed to change the Forest Plan because the MVP project could not meet its requirements otherwise. See J.A. 1280 ("The amendment [to the Forest Plan] is needed because the MVP Project cannot achieve several Forest Plan standards that are intended to protect soil, water, [and] riparian ... resources." (emphasis supplied)). Of note, elsewhere in the ROD, the Forest Service characterizes the purpose of the amendment as "ensur[ing] consistency between provisions of the Forest Plan and the proposal to construct, operate, and maintain [the pipeline] on National Forest System land." J.A. 1284. But there would be no need to "ensure consistency" if the Forest Plan need not be amended in the first place. Thus, the clear purpose of the amendment is to lessen requirements protecting soil and riparian resources so that the pipeline project could meet those requirements.
>
> Having determined the purpose of the amendment, it is clear the Planning Rule sets forth substantive requirements directly related to that purpose: "soil and soil productivity" (36 C.F.R. § 219.8(a)(2)(ii)); "water resources" (36 C.F.R. § 219.8(a)(2)(iv)); "the ecological integrity of riparian areas" (36 C.F.R. § 219.8(a)(3)(i)). Therefore, there is no question that the 2012 Planning Rule requirements for soil, water, and riparian resources are directly related to the purpose of the Forest Plan amendment. The Forest Service acted arbitrarily and capriciously in concluding otherwise.

Id. at 603.

In a substantially similar Fourth Circuit case that relied on *Sierra Club* for its reasoning, the Court further explained in *Cowpasture River Pres. Ass'n v. Forest Service* that

> If the substantive requirement is directly related to the amendment, then the responsible official must "apply such requirement(s) within the scope and scale of the amendment."

> Sierra Club, 897 F.3d at 601 (quoting 36 C.F.R. § 219.13(b)(5)). Conversely, if the substantive requirement from the 2012 Planning Rule is not directly related to the amendment, the responsible official is not required to apply it to the amended Forest Plan. *See id*. Thus, Petitioners' arguments on this point turn on whether the requirements in the 2012 Planning Rule are directly related to the Forest Service's amendments to the GWNF and MNF Plans.
>
> A substantive requirement is directly related to the amendment when the requirement "is associated with either the purpose for the amendment or the effects (beneficial or adverse) of the amendment." *Sierra Club*, 897 F.3d at 602 (quoting 2016 Amendment to 2012 Rule, 81 Fed. Reg. 90,723, 90,731 (U.S. Dep't of Agric. Dec. 15, 2016)); see also 36 C.F.R. § 219.13(b)(5)(i) ("The responsible official's determination must be based on the purpose for the amendment and the effects (beneficial or adverse) of the amendment, and informed by the best available scientific information, scoping, effects analysis, monitoring data or other rationale."). Further, regarding the adverse effects of an amendment, "[t]he responsible official must determine that a specific substantive requirement is directly related to the amendment when scoping or NEPA effects analysis for the proposed amendment reveals substantial adverse effects associated with that requirement, or when the proposed amendment would substantially lessen protections for a specific resource or use." 36 C.F.R. § 219.13(b)(5)(ii).

Cowpasture River Pres. Ass'n v. Forest Serv., 911 F.3d 150, 161–62 (4th Cir. 2018). The Fourth Circuit then analyzed whether the Forest Service had conducted the requisite analysis.

> In its ROD, the Forest Service decided to apply project-specific amendments to a total of 13 standards in the GWNF and MNF Plans for the purpose of construction and operation of the ACP. The amendments exempt the ACP project from four MNF Plan standards and nine GWNF Plan standards that relate to soil, water, riparian, threatened and endangered species, and recreational and visual resources.
>
> Petitioners assert that the Forest Service violated the NFMA and the 2012 Planning Rule because it skipped the "purpose" prong of the "directly related" analysis. Consistent with our decision in Sierra Club, we conclude that Petitioners are correct.

Id. at 162 (also explaining that "Faced with a nearly identical situation in *Sierra Club v. Forest Service*, we concluded that the Forest Service acted arbitrarily and capriciously by failing to analyze the *purpose* of the amendment in its ROD (and instead focusing on only the effects) when "the clear purpose of the amendment [was] to lessen requirements protecting soil and riparian resources so that the pipeline project could meet those requirements." *Sierra Club*, 897 F.3d at 603."). The Court concluded that

> There would be no need to amend the Forest Plans to "ensure consistency" if the ACP project could meet the Forest Plan standards in the first place. In other words, the ROD makes clear that the purpose of the amendments was to lessen certain environmental requirements in the GWNF and MNF Plans because the ACP project could not meet those Plans' existing requirements." *Id*. In failing to "apply the substantive provisions of

> the 2012 Rule," the Forest Service violated NFMA. *Id.* at 163 ("This failure is significant, because it is clear that the amendments (intended to lessen protections for soils, riparian areas, and threatened and endangered species in the GWNF and MNF Plans) are directly related to the 2012 Planning Rule's substantive requirements for these same categories: "soil and soil productivity" (36 C.F.R. § 219.8(a)(2)(ii)); "water resources" (id. § 219.8(a)(2)(iv)); "ecological integrity of riparian areas" (id. § 219.8(a)(3)(i)); "ecological integrity of terrestrial ... ecosystems" (id. § 219.8(a)(1)); "appropriate placement and sustainable management of ... utility corridors" (id. § 219.10(a)(3)); and "recovery of federally listed ... species" (id. § 219.9(b)).").

Taken together, it is clear that the 2016 Amendments to the 2012 Rule do not permit forest plan amendments that simply eliminate forest plan requirements. Instead, site-specific forest plan amendments – such as those at issue in *Sierra Club*, *Cowpasture*, and the present project – must: 1) analyze the scope and scale of a project's effects necessitating a forest plan amendment (i.e., analyze "the purpose for the amendment and the effects (beneficial or adverse) of the amendment, and informed by the best available scientific information, scoping, effects analysis, monitoring data or other rationale"); 2) determine whether the proposed amendment is "directly related" to the substantive provisions of the 2012 Rule, e.g. 36 C.F.R. §§ 219.8 – 219.11; 3) apply those substantive provisions of the Rule to the amendment; and 4) create new forest plan components that address the same resource protection needs of the forest plan components that the proposed project cannot meet.

Turning to the JCEP, it is clear that the DEIS fails to comply with the 2012 Rule. All of the proposed forest plan amendments propose to exempt the Pacific Connector pipeline from numerous forest plan requirements that serve to protect wildlife, soil, water, riparian areas, Late-Successional Reserves, and visual resources including recreational resources. *See*, Appendix F2 Forest Service Proposed Amendments and CMP. Because the "effect" of the amendments is to lessen environmental protections for numerous natural resources, and the amendments are "directly related" to substantive provisions of the 2012 planning rule,[488] the Forest Service (and FERC) should have proposed new plan components that apply the substantive provisions of the 2012 Rule to the proposed amendments and created new plan components that meet the resource protection needs of the forest plan components that the Pacific Connector pipeline project cannot meet.

Instead of following the requirements of the 2012 Rule, the DEIS specifically exempts the pipeline from forest plan requirements (i.e., "with the exception of the operational right-of-way and the construction zone for the Pacific Connector Pipeline") and instead relies on "applicable mitigation measures identified in the POD and Pacific Connector project design requirements." DEIS, 4-462, 4-452, 4-457, 4-462, 4-463, 4-467, 4-468, 4-473, 4-477, 4-482. However, this

[488] For example, including but not limited to: 36 C.F.R. § 219.8(a)(2) Air, soil, and water; 36 C.F.R. § 219.8(a)(3) Riparian Areas; 36 C.F.R. § 219.9 Diversity of plant and animal communities; 36 C.F.R. § 219.10(a)(1) (a) Aesthetic values, air quality, cultural and heritage resources, ecosystem services, fish and wildlife species, forage, geologic features, grazing and rangelands, habitat and habitat connectivity, recreation settings and opportunities, riparian areas, scenery, soil, surface and subsurface water quality, timber, trails, vegetation, viewsheds, wilderness, and other relevant resources and uses; and 36 C.F.R. § 219.11(c) Timber harvest for purposes other than timber production.

vague reference to the POD[489] – no specific provisions in the POD are referenced, or tied to specific amendments – fails to comport with the 2012 Rule's definition of plan content and plan components, which generally requires plan content and components to be concise, measurable, and time-specific. 36 C.F.R. §§ 219.7(e)(1)(i) – (v). This approach also violates NFMA's requirement that each national forest land and resource management plan "form one integrated plan for each unit of the National Forest System," because the "requirements" of the LRMPs for the Umpqua, Rogue River, and Winema National Forests will be scattered across several documents including the PODs, CMPs, and other documents. 16 U.S.C. § 1604(f)(1).

The DEIS fails to comply with the 2012 Planning Rule and NFMA because the Forest Service and FERC have attempted to exempt the Pacific Connector pipeline from the requires of the Umpqua, Rogue River, and Winema National Forest Land and Resource Management Plans. This is a decision expressly precluded by the 2016 Amendments to the 2012 Rule. 81 Fed. Reg. 70,376 ("the 2012 rule does not give a responsible official the discretion to amend a plan in a manner contrary to the 2012 rule by selectively applying, or avoiding altogether, substantive requirements within §§ 219.8 through 219.11 that are directly related to the changes being proposed"); *Sierra Club*, 897 at 601, 603 (4th Cir.), *Cowpasture River Pres. Ass'n*, 911 F.3d at 161–63 (4th Cir. 2018).

b. Additional forest plan amendments are required.

In addition to the 18 forest plan amendments recognized and proposed by FERC and the Forest Service in the DEIS, there are numerous additional amendments that should have been proposed and analyzed in the DEIS. For example, the pipeline will cross numerous waterways on national forestlands that will require permanent removal of vegetation over the centerline of the pipeline right-of-way. However, the Northwest Forest Plan Aquatic Conservation Strategy (NFP ACS) precludes permanent removal of vegetation within Riparian Reserves. Northwest Forest Plan Standards and Guidelines, B-11. Therefore, forest plan amendments are required that adequately substitute for the aquatic protections afforded by the NFP ACS.

Additional necessary forest plan amendments include:

- Transferring Matrix land use allocation lands to the Late-Successional Reserve land use allocation as proposed by the CMP implicates 36 C.F.R. § 219.11 (Timber requirements based on the NFMA), because timber harvest in LSRs is restricted, whereas timber harvest in the Matrix is much less so;

- Amendments exempting the pipeline from Survey and Manage requirements implicate 36 C.F.R. § 219.8(a) because the Survey and Manage program was intended to address upland wildlife connectivity requirements. Current proposed amendments do not address wildlife connectivity that will be compromised by the pipeline;

- The proposed soil, water quality, and riparian area amendments fail to acknowledge that the Northwest Forest Plan, which amended the Umpqua, Rogue River-Siskiyou,

[489] Some PODs, such as that for plants, have not yet been developed. Other analysis, such as that for sensitive soils, has yet to be undertaken and may result in the requirement of additional forest plan amendments.

and Winema National Forest land and resource management plans, contains additional requirements related to soil, water quality, and riparian areas that are additive to similar – but different – provisions in individual forest plans. *See generally,* NFP S&Gs, C-1 – C-61. Additional amendments that address the soil, water quality, and riparian area provisions of the NFP are required.

- For pipeline sections that cross steep, unstable, or other geologically unsecure slopes and areas, the NFP requires these areas to be designed as Riparian Reserves and for management actions to comply with the ACS. NFP S&Gs, C-31. Because the DEIS failed to designate such areas as Riparian Reserves, either the FEIS must do so, or forest plan amendments are required to address this resource concern.

- The DEIS indicates that construction of the pipeline would be required during seasonal closure periods to protect deer and elk habitat. DEIS, 4-227. A forest plan amendment is therefore required to address the effects of project construction activities during this critical biological period.

- Water withdrawals from waterways on federal lands must comply with the ACS, and any changes in the timing, quality, etc. of water quality require a forest plan amendment.

- Temperature changes caused by the permanent clearing of vegetation at water crossings violate the NFP ACS, and therefore require a forest plan amendment.

- Within Riparian Reserves, the NFP states "Do not use mitigation or planned restoration as a substitute for preventing habitat degradation." NFP S&Gs, C-37. Therefore, any use of mitigation measures – for example, the CMP – requires a forest plan amendment.

- The DEIS states that turbidity will be increased at the stream- and watershed-level, DEIS, 4-280, but the ACS prohibits this change in water quality. *Pac. Coast Fed'n of Fishermen's Ass'n, Inc. v. Nat'l Marine Fisheries Serv.*, 265 F.3d 1028 (9th Cir. 2001). Therefore, a forest plan amendment is required to address this inconsistency.

c. Proposed compensatory mitigation measures are inadequate.

As compensatory mitigation for irreparable adverse impacts on national forestlands, the applicant proposes to conduct timber harvest that it describes as "restorative" in nature. The DEIS fails to demonstrate that logging will compensate for the permanent loss of old growth forests and other wildlife habitat: indeed, there is no scientific information cited for this premise. Similarly, there is no information provided in the DEIS demonstrating the effectiveness of any of the compensatory (or other) mitigation measures.[490] And, because subsequent environmental review

[490] For example, the DEIS acknowledges that pipeline construction and ROW maintenance is likely to result in the increase in illegal off-road vehicle trespass. DEIS, 4-630. However, the DEIS also defers until some point in the future the development of mitigation measures to address illegal trespass, and therefore does not analyze how effective these mitigation measures may be. DEIS, 4-544. Similarly, a public lands public safety POD has yet to be

will be required for implementation of these logging compensatory mitigation, there is no guarantee that these projects will in fact be implemented. Therefore, it is impossible to know whether the proposed timber harvest will in fact compensate for the permanent loss of this natural resource.

2. Bureau of Land Management.

The BLM has proposed to make the pipeline right-of-way a "district reserve" that exempts the pipeline from the otherwise applicable Resource Management Plan requirements for the various BLM Districts. The BLM has failed to demonstrate that this approach complies with FLPMA, for the same reasons discussed above with respect to amendments proposed for national forestlands.

QQ. Compliance with the Northwest Forest Plan.

Across the Pacific Northwest within the range of the northern spotted owl, the land management agencies and the consulting agencies have relied on the NFP as the basis for listed species conservation and conservation of regional biodiversity, water quality, and other public land amenities. Exempting a single linear project from compliance with NFP requirements undermines the regional framework, and casts into doubt the legality of any historic and subsequent projects. For example, FWS and NMFS rely on the inviolable nature of the ACS and Riparian Reserve standards and guidelines when assessing the effects of timber harvest and other land management decisions on listed species and their habitat. However, if the requirements of the ACS and the NFP are no longer assured, then the agencies cannot rely on the conservation benefit from these requirements, and will be required to create a new framework against which to gauge environmental impacts.

The FEIS must fully analyze the pipeline's compliance with the many provisions of the Northwest Forest Plan.

The DEIS 4-508 states "No Project-related impacts that would retard or prevent attainment of ACS objectives have been identified (appendix F.4, table 2-44). Impacts, as they relate to relevant ecological processes, are within the range of natural variability for watersheds in the Western Cascade and Klamath- Siskiyou Provinces, although some of these processes have been altered from their natural condition (appendix F.4, p. 2-105-109, table 2-40)."

The DEIS is in error because the project will inevitably have impacts that would retard or prevent attainment of ACS objectives. We specifically identify ACS Objective 5. "*Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport*."

First, we assert the project has failed to make spatially explicit identification of riparian reserves as required in the NW Forest Plan 1994. NW Forest Plan B-17 states: "Riparian Reserves

developed. DEIS, 4-774. NEPA requires this analysis, and public review and comment, prior to authorizing a project.

include the body of water, inner gorges, all riparian vegetation,100-year floodplain, landslides and landslide prone areas."

The NW Forest Plan C-31 states:

> *"Seasonally flowing or intermittent streams, wetlands less than 1 acre, and unstable and potentially unstable areas* - This category applies to features with high variability in size and site-specific characteristics. At a minimum, the Riparian Reserves must include: The extent of unstable and potentially unstable areas (including earthflows),"

The DEIS 4-25 states "Six moderate risk, deep-seated landslides [i.e. earthflows] were identified for additional surface inspection; the landslides are identified in Pacific Connector's Resource Report 652 (as #AM, #126, #127, #AV, #AW, and #AU) and are located at MPs 14.3-14.4, 23.8-24.2, 24.4-24.6, 65.2-65.5, 65.3-65.5, and 72.7-72.9. These areas represent approximately 1.2 miles of the pipeline route." The DEIS violates the Northwest Forest Plan because it failed to map these deep-seated landslides as "Riparian Reserves". Consistency with ACS objectives cannot be assured when Riparian Reserves are not mapped where the project is currently proposed.

The DEIS 4-22 states: "All of the moderate- and high-hazard deep-seated landslides identified along the alignment were avoided where feasible during final route selection." Thus the DEIS failed to identify deep-seated landslides as Riparian Reserves where it was not feasible to avoid them as well as six deep-seated landslides where "additional surface inspection" is needed.

The DEIS 4-20 states: "Pacific Connector identified moderate and high risk RML [rapidly moving landslide, i.e. debris flows] sites along the proposed route" and "Based on the risk assessment, approximately 128 of these sites were considered to be a potentially moderate or high risk and were selected for further study." The DEQ 2019:37 identifies potentially unstable headwalls in Figure 9. The DEIS violates the Northwest Forest Plan because it failed to identify "unstable and potentially unstable areas" as Riparian Reserves. In addition, the DEIS failed to identify as Riparian Reserves all " unstable and potentially unstable areas (including earthflows)" associated with all <u>connected actions</u> such as construction of new roads, TEWAs, and the vast system of existing access roads.

The DEIS failed to assess the damage to Forest Service streams from landslides associated with the project during its construction and its 30 years of operation. Assertions that " Impacts, as they relate to relevant ecological processes, are within the range of natural variability for watersheds in the Western Cascade and Klamath- Siskiyou Provinces,.." cannot be demonstrated with anticipated sediment from landslides during construction and the 30 year operation period. In addition, analysis at the 5th field watershed scale is inadequate because it dilutes the impacts of any single landslide that would have significant impact at the 6th or 7th field scale of analysis. Coho salmon typically spawn and rear in these smaller catchments and would be adversely impacted due to the volume and frequency of landslide sediment. Attainment of ACS objective 5 would not be met due to high risk of landslides and excessive sediment deposition. The linear nature of the project means numerous headwalls will be encountered (estimated 128 moderate

and high risk) and there will be debris flows that will impact streams with coho and retard attainment of ACS objective #5,

Watershed analyses in Appendix F provides numerous statements about increased landsliding in watershed due to ground disturbances, forest removal and road construction as proposed in the DEIS.

The DEIS Appendix F4 p.2-21 falsely states for Days Creek- South Umpqua 5th field watershed "Landslide prone areas have been avoided in routing of the project right-of-way. All areas crossed by the project are classified as having a very low to low risk due to the low probability of mass wasting movement and having no significant consequences (Geoengineers 2009)." The DEIS fails to identify unstable and potentially unstable areas as Riparian Reserves in relation to routing, TEWAs, proposed access roads and existing access roads within the Days Creek–South Umpqua River 5th field watershed. The analysis in Geoengineering 2009 and the DEIS is about risk of mass wasting to the integrity of the pipeline and does not consider the broader scope of connected actions and the risk of landsliding impacts on Riparian Reserves. The DEIS Appendix F p. 2-24 states: "No landslides have been identified that pose a threat to the project." The analysis is deceptive in that landslides associated with the project and connected actions do pose a threat to Riparian Reserves. The DEIS Appendix F p. 2-24 states "The project does not cross earthflow (a type of landslide) terrains in the watershed. " but the project and connected actions will cross RML terrain which is unstable or potentially unstable.

Similar errors and deficiencies are repeated for Project Effects and Relevant Ecological Processes Described in the Elk Creek–South Umpqua River Fifth-Field Watershed Assessment (DEIS Appendix F4 p.2-40), Upper Cow Creek Fifth-Field Watershed Analysis (DEIS Appendix F$ p. 2-79, Trail Creek Fifth-Field Watershed Assessment (DEIS Appendix F4 p.2-104), and Little Butte Creek Fifth-Field Watershed Assessment (DEIS Appendix F4 p.2-137).

The DEIS 4-22 states "Because the pipeline would cross a predominance of rugged terrain within BLM and NFS lands, there is potential for previously unidentified landslides or new landslides to affect the pipeline after it is installed." Similarly there are previously unidentified locations "where the Project, if constructed, would likely become a chronic source of sediment." Despite these scientific uncertainties, the DEIS takes the indefensible position that since no others sediment sites have been identified by third parties, then no others exist. The best available science would certainly indicate that there are other known (but undisclosed) or unknown sites where "the Project, if constructed, would likely become a chronic source of sediment". The DEIS fails to discuss the significance of this scientific uncertainty with respect to sediment impacts to stream reaches of critical coho salmon habitat.

RR. Compliance with the Oregon and California Lands Act.

The Pacific Connector pipeline will cross approximately 40 miles of BLM lands. On those lands, the Oregon and California Lands Act (O&C Act) proscribes the purposes for which those lands may be utilized. The O&C Act states that the O&C lands

> ...shall be managed...for permanent forest production, and the timber thereon shall be sold, cut, and removed in conformity with the principal [principle] of sustained yield for the purpose of providing a permanent source of timber supply, protecting watersheds, regulating stream flow, and contributing to the economic stability of local communities and industries, and providing recreational facilities: Provided, That nothing herein shall be construed to interfere with the use and development of power sites as may be authorized by law.

43 U.S.C. § 1181a. The case law interpreting the O&C Act indicates that the O&C lands must be managed for "permanent forest production." *Headwaters v. BLM*, 914 F.2d 1174 (9th Cir. 1990). In *Headwaters*, the Ninth Circuit held that "There is no indication that Congress intended "forest" to mean anything beyond an aggregation of timber resources." *Id.* at 1183.

The DEIS acknowledges that the pipeline right-of-way will be managed to be free of vegetation over a 15 feet in height, which will preclude the reforestation of the cleared right-of-way. DEIS, 4-22, 4-77. The right-of-way will no longer produce trees for "forest production" as required by the O&C Act. Consequently, these acres will be permanently lost to forest production, in violation of the Act. 43 U.S.C. § 1181a; 5 U.S.C. § 706(2)(A).

III. ENVIRONMENTAL CONSEQUENCES OF THE COMPRESSOR STATION.

Compressor stations provide the force which propels gas through pipelines. They emit significant amounts of air pollution, both from the operation of the engine which powers the pump as well as from venting. When the pressure in the pipeline exceeds levels meant to ensure safety (by not creating dangerous pressure on the pipeline), the contents of the pipeline are vented intentionally and directly into the ambient air. Fugitive leaks may occur as well. Compressor stations and meter stations, which also vent methane, VOCs and PM, are often located every 40 to 100 miles along fracked gas pipelines. A meter station is proposed for Coos County as part of the Jordan Cove LNG project. The Klamath Compressor Station for the Pacific Connector Gas Pipeline would be located in a rural area with 16 homes in the vicinity. Two compressor stations related to existing large pipelines are already located near this proposed compressor station.

In New York State a study on the health effects of the emissions from 18 fracked gas compressor stations found that, collectively, these sites released 40 million pounds of 70 different contaminants over a 7-year period (the seventh largest point source of air pollution in the state for that time period). The largest emissions (by volume) were nitrogen oxides, carbon monoxide, volatile organic compounds (VOC), formaldehyde and particulate matter.[491]

Studies of gas compressor stations in Pennsylvania and New York demonstrated that compressors emitted highly variable plumes of methane that spread downwind and were measurable a full mile away at levels that could expose nearby residents, especially during temperature inversions.[492] High levels of methane, especially in an enclosed space, can cause suffocation, loss of consciousness, headache and dizziness, nausea and vomiting, weakness, and loss of coordination.

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[491] (Russo, 2017) https://www.albany.edu/about/assets/Complete_report.pdf
[492] (Payne, 2017) doi: 10.1016/j.scitotenv.2016.12.082

High levels of formaldehyde were found near compressor stations in Arkansas, Pennsylvania, and Wyoming. Formaldehyde is a byproduct of incomplete combustion from the gas-fired engines. It is also created when fugitive methane, which escapes from compressor stations, is exposed to sunlight. Other hazardous air pollutants detected near compressor stations in this study were benzene and hexane. One air sample collected near a compressor station in Arkansas contained 17 different volatile compounds.[493]

According to the JCEP Resource Report 9, monitoring stations in proximity to the proposed route focus primarily on monitoring of PM10 and PM2.5 (related to particulate matter emissions from wood heating in the region). No stations monitor for SO2 and NO2 in the multi-county area of southern/southwestern Oregon and northern California. Monitoring for CO was performed in Medford through 2010, after which the monitor site was closed. Per this report, NAAQS are met at the Klamath Compressor Station and along the path of the PCGP with the exception that approximately 4.3 miles of pipeline would be located within the Klamath Falls PM2.5 nonattainment area (out of compliance with NAAQ standards) and approximately 300 feet of pipeline would be located within the PM10 maintenance area (formerly out of compliance). Hazardous air pollutants (HAPs) are also generated both with construction and operation of the Compressor Station and Pipeline, primarily formaldehyde. The JCEP Resource Report 9 states that these levels meet current standards, although no safe levels have been established.

During 2014 and 2015, Klamath Falls experienced elevated PM2.5 ambient concentrations due to wildfires in southern Oregon.[494] During the 2018 fire season the highest concentration of wildfires in the state was in Southern Oregon and air quality alerts were issued to residents of Klamath Falls.[495] However, the DEIS for Jordan Cove does not consider cumulative effects of toxic pollution from fires with ongoing toxic emissions, particularly from compressor stations.[496]

IV. ENVIRONMENTAL JUSTICE CONSIDERATIONS.

Adult and child mortality are higher in nearly every locale. Infant mortality is particularly high in Klamath County. Over all death rates are higher in targeted counties, sometimes strikingly so, and especially for cancer, heart and lung disease, and suicide (a marker for community socio-economic stress).

These are locales that are already experiencing the deadly intersections of depressed economies, environmental degradation, and ill health. Fracked gas infrastructure will not bring the hoped-for economic prosperity necessary for healthy communities. It will only further degrade living conditions.

[493] (Macey, 2014) doi: 10.1186/1476-069X-13-82
[494] (Jordan Cove LNG, 2017)
[495] (Linares, 2018)
[496] (Office of Energy Projects: Federal Energy Regulatory Commission, 2019)

Race, Ethnicity, Language[497]*							
	% Non-Hispanic African American alone	% American Indian and Alaskan Native alone	% Asian alone	% Native Hawaiian/ Other Pacific Islander alone	% Hispanic or Latino	% Non-Hispanic White alone	% Who Do Not Speak English at Home
Oregon State	2.2%	1.8%	4.7%	0.4%	13.1%	75.8%	15.2%
Coos	0.8%	2.9%	1.3%	0.3%	6.5%	85.2%	5.1%
Douglas	0.5%	2.1%	1.1%	0.2%	5.9%	87.8%	3.8%
Jackson	0.9%	1.6%	1.5%	0.4%	12.9%	80.9%	9.5%
Klamath	1.0%	4.9%	1.2%	0.2%	13.1%	77.8%	8.3%

*2017 Population Estimates

Social and Economic Factors				
	Unemployment*	Median Household Income**	Persons in Poverty ***	High School Graduation****
Oregon State	3.9%	$56,119	13.2%	75%
Columbia	4.9%	$57,449	12.3%	73%
Coos	5.3%	$40,848	19.9%	58%
Douglas	5.2%	$44,023	14.9%	64%
Jackson	4.8%	$48,688	14.3%	75%
Klamath	6.3%	$42,531	19.2%	72%

*Oregon Unemployment, 11/2018[498];
** 2013-2017, in 2017 dollars[499]
*** Percentage of persons living in poverty from the Small Area Income and Poverty Estimates[500]
**** Percentage of ninth-grade cohort that graduates in 4 years, 2014-2015[501]

[497] (U. S. Census Bureau, n.d.)
[498] (State of Oregon Employment Department, n.d.)
[499] (U. S. Census Bureau, n.d.)
[500] (U. S. Census Bureau, n.d.)
[501] (Robert Wood Johnson Foundation, n.d.)

Mortality			
	Premature Age-adjusted Mortality*	Child mortality**	Infant Mortality***
Oregon State	310	40	5
Coos	420	50	#
Douglas	390	60	6
Jackson	330	40	4
Klamath	390	60	9

*Number of deaths among residents under age 75 per 100,000 population (age-adjusted) 2010-2013.
**Number of deaths among children under age 18 per 100,000, 2010-2013.
***Number of all infant deaths (within 1 year), per 1,000 live births. 2006-2012
no data available

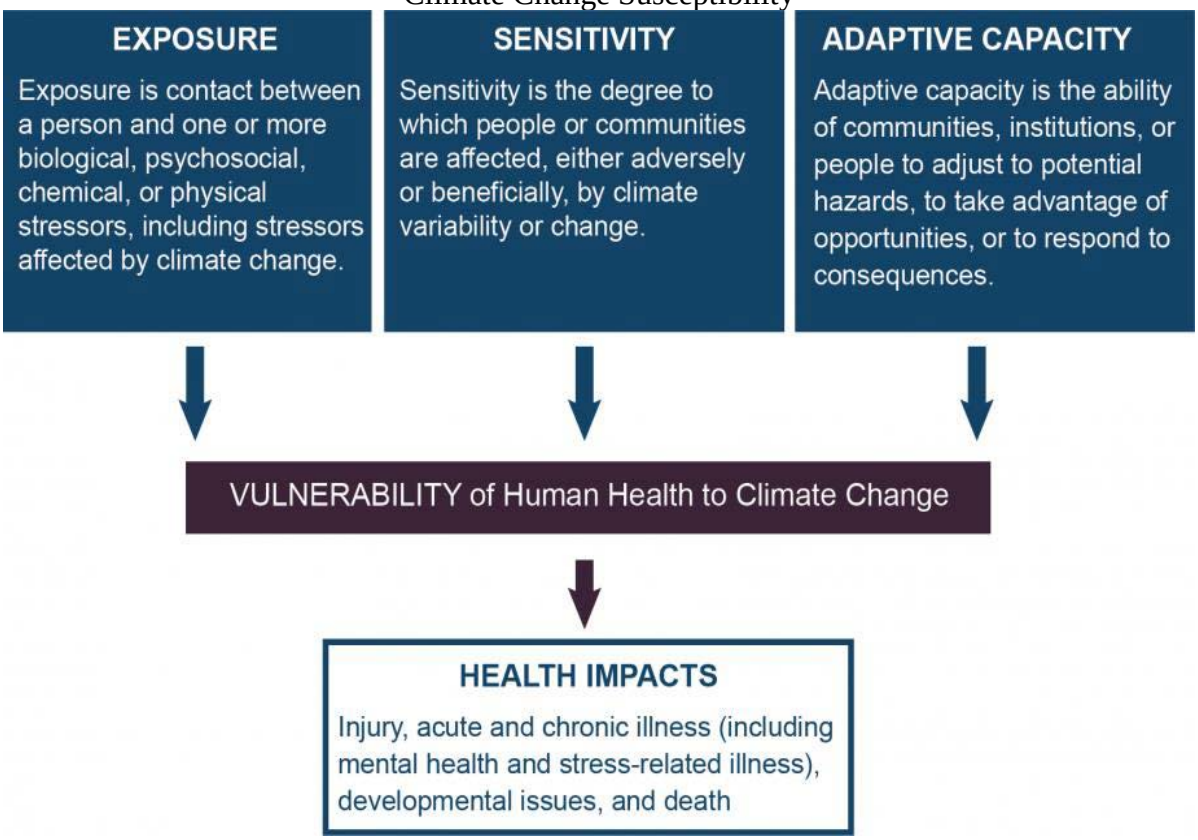
Age-adjusted Death Rate per 100,000[502] *								
	All Causes	All Cancer	Heart Disease	Stroke	Chronic Lung Disease	Diabetes	Homicide	Suicide
Oregon State	834.1	198.4	191.8	68.8	49.1	66.6	3.3	15.0
Coos	949.9**	224.1**	226.3**	66.4	59.9**	78.8**	4.7	22.6**
Douglas	905.5**	209.5	203.0	63.0	62.4**	78.5**	3.4	16.7
Jackson	830.8	199.0	186.4	71.5	51.4	61.3	3.3	20.4**
Klamath	947.3**	204.8	217.6**	56.4**	70.5**	79.1**	4.6	23.3**

* Age-adjusted death rate per 100,000 population, 2017
** Statistically significant difference

The U.S. Global Change Research Program is a federal program mandated by Congress to conduct scientific assessments of the global environment. They determined that vulnerability to the adverse health effects of climate change depend on three factors: exposure, sensitivity, and adaptive capacity, which are illustrated in Figure 4.[503] All three factors are at play in the cities, towns, and rural locales that would host new fracked gas infrastructure.

[502] (Oregon Health Authority, n.d.)
[503] (Crimmins, 2016)

Figure 4
Climate Change Susceptibility



Researchers at Portland State University combined demographic variables of income, race, education, employment, and age with exposure variables to toxic air pollution.[504] The resulting index score identifies communities by census tract in Oregon that are most at risk to the effects of climate change. In Figure 5 the vulnerability index score is given as a percentage; a higher percentage reflects greater vulnerability.

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[504] (Zapata, 2017)

Figure 5
Census Tracts Most Vulnerable to Climate Change in Oregon

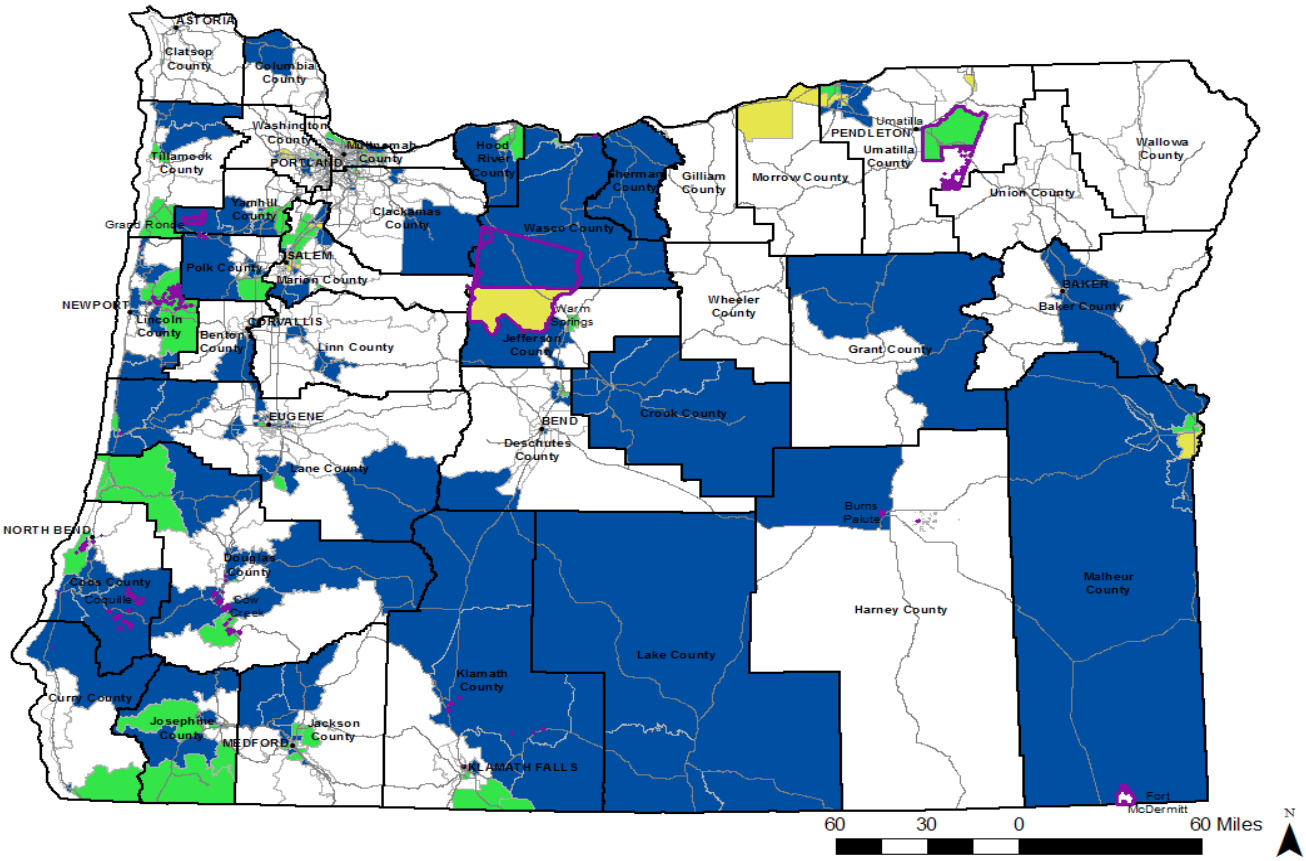

Figure 5: Top 10%, 25%, and 50% of Census Tracts Most Vulnerable to Climate Change in Oregon. *GIS data source: US Census Bureau and State of Oregon. Index scores are based on data from: U.S. Census American Community Survey (ACS) 2011-2015 5- year estimates and the National Air Toxics Assessments (NATA) 2011.*
Purple indicates Indian reservations, village, and towns.

	Top 10%		Top 25%		Top 50%

Figure 6 identifies economically distressed areas and the top 50% of Census Tracts Based on the Vulnerability Index. Figure 7 overlays this map with the location of already existing greenhouse gas emitting facilities.

Figure 6
Economically Distressed Areas of Oregon

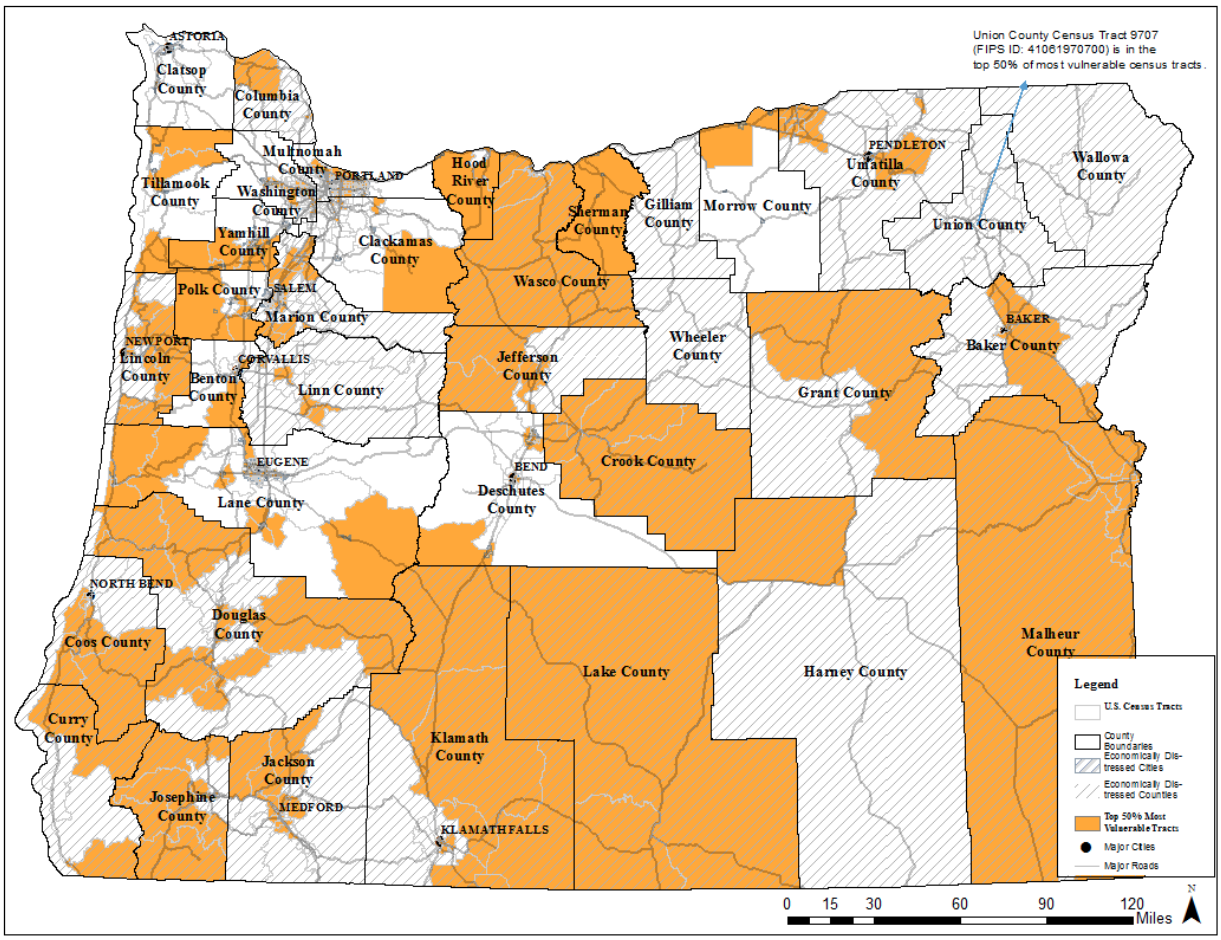

Figure 6: Economically Distressed Areas and Top 50% of Census Tracts Based on Vulnerability Index. *GIS data source: US Census Bureau and State of Oregon. Index scores are based on data from: U.S. Census American Community Survey (ACS) 2011-2015 5- year estimates and the National Air Toxics Assessments (NATA) 2011.*

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Figure 7
Distribution of Greenhouse Gas Emitting Facilities in Oregon

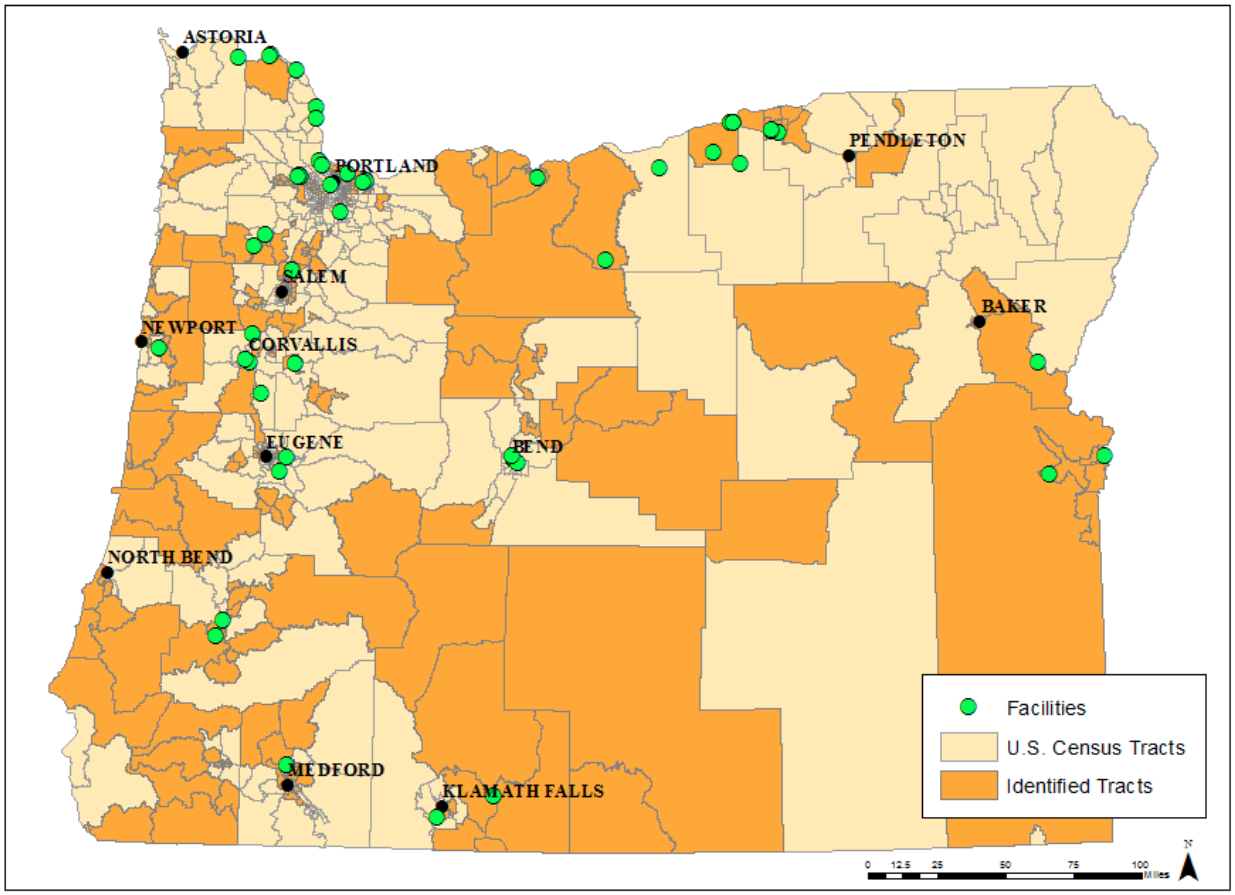

Figure 7: Distribution of Greenhouse Gas Emitting Facilities in Relationship to U.S. Census Tracts Identified as Most Vulnerable to Climate Change. *All facilities with Air Quality Permits from the Oregon Department of Environmental Quality that produced over 25,000 metric tons of CO2e emissions in 2015. Data source: Oregon Department of Environmental Quality 2015 Greenhouse Gas Facility Emissions (2017b). Most vulnerable to climate change census tracts include the top 50% of census tracts with the highest vulnerability index score.*

V. The DEIS Fails to Adequately Address Climate Change

The DEIS fails to take the required hard look at greenhouse gas emissions and climate change for multiple reasons. As noted above, the DEIS improperly excludes reasonably foreseeable indirect effects relating to the LNG lifecycle, including emissions of greenhouse gases resulting from the upstream and downstream production, transportation, processing, and use of gas. The DEIS uses outdated global warming potentials for greenhouse gases other than carbon dioxide, causing the DEIS to understate the impact of total emissions. And the DEIS fails to properly address the significance or impacts of greenhouse gas emissions: as the Ninth Circuit has recognized, merely identifying the tonnage of direct emissions and comparing with existing inventories does no

more than reveal that climate change is a cumulative impact problem, and fails to meaningfully inform the public and decisionmakers regarding the climate impacts of a particular project. *Ctr. for Biological Diversity v. Nat'l Highway Traffic Safety Admin.*, 538 F.3d 1172, 1201 (9th Cir. 2008)

A. The DEIS Uses Outdated Global Warming Potentials, Understating the Impact of Short-Lived Climate Pollutants

The figures provided in the DEIS underestimate emissions by using outdated estimates of the potency of greenhouse gases (GHGs) other than carbon dioxide. The DEIS addresses these other GHGs by converting them to CO_2e. *E.g.*, DEIS 4-666. However, the conversion factors (global warming potential or GWP) used for methane and nitrous oxide, the predominant non-carbon-dioxide greenhouse gas at issue here, is sorely outdated, and fails to account for short- and medium-term impacts. The DEIS uses a GWP value of 25 for methane and 298 for nitrous oxide, which it adopts "because these are the GWPs the EPA has established for reporting of GHG emissions and air permitting requirements." *Id.* However, as EPA explained when it adopted the reporting rule that uses these values, EPA selected these *for the GHG reporting program* because of that program's need to conform to specific internationally agreed reporting protocols. 78 Fed. Reg. 19,802, 19,808 (Apr. 2, 2013). Specifically, EPA's reporting rule, revised in 2013, conforms to a 2012 United Nations protocol, which at the time of the rule revision had not been updated to reflect more recent climate science. *Id.* However, even at the time EPA adopted this revised reporting rule, EPA explained that the best available science indicated that the 'true' global warming potentials of these pollutants were much higher. *Id.* EPA specifically endorsed the Intergovernmental Panel on Climate Change's 2013 Fifth Assessment report, *id.*, which presents 100-year and 20-year global warming potentials for fossil methane (such as is emitted by the project here) of 36 and 87, respectively.[505] The Department of Energy[506] and Environmental Protection Agency[507] have also endorsed these estimates as presenting the best available science. More broadly, EPA has recognized that "each successive [IPCC] assessment provides more accurate GWP estimates as experiments and improved computational methods lead to more accurate estimates of the radiative efficiencies, atmospheric lifetimes, and indirect effects of the various gases." 78 Fed. Reg. at 71,911.

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[505] Myhre, G. et al., Climate Change 2013: The Physical Science Basis Chapter 8: Anthropogenic and Natural Radiative Forcing (2013), *available at*: http://www.ipcc.ch/pdf/assessment-report/ar5/wg1/WG1AR5_Chapter08_FINAL.pdf at Table 8.7.

[506] See Department of Energy Order 3357-C at 30 (Dec. 4, 2015) ("We agree with Sierra Club that using 20- and 100-year methane GWPs of 87 and 36 is most appropriate for use today and that climate carbon feedbacks should be captured in the GWP values for methane.") *available at* https://fossil.energy.gov/ng_regulation/sites/default/files/programs/gasregulation/authorizations/2011/applications/ord3357c.pdf; *see also* Bradbury, et al., Dep't of Energy, Office of Energy Policy and Systems Analysis, *Greenhouse Gas Emissions and Fuel Use within the Natural Gas Supply Chain – Sankey Diagram Methodology* (July 2015), at 10, available at https://www.energy.gov/sites/prod/files/2015/07/f24/QER%20Analysis%20-%20Fuel%20Use%20and%20GHG%20Emissions%20from%20the%20Natural%20Gas%20System%2C%20Sankey%20Diagram%20Methodology_0.pdf.

[507] Environmental Protection Agency, Inventory of U.S. Greenhouse Gas Emissions and Sinks, 1-9 to 1-10 (Apr. 11, 2019), available at https://www.epa.gov/sites/production/files/2019-04/documents/us-ghg-inventory-2019-main-text.pdf, https://www.epa.gov/sites/production/files/2018-01/documents/2018_complete_report.pdf; *id.* Annex 6, A-419 to A-421, available at https://www.epa.gov/sites/production/files/2019-04/documents/us-ghg-inventory-2019-annex-6-additional-information.pdf

The 20-year GWP for methane is particularly relevant because it corresponds much more closely to the average time that methane actually remains in the atmosphere before decaying into CO2, which is 12.4 years.[508] There is no dispute that the Fifth Assessment Report values represent a more accurate estimate of the impact of each ton of methane emissions.

More broadly, courts have consistently recognized that the IPCC summaries represent the scientific consensus.[509] Here, the DEIS violates NEPA's obligation to use "high quality information," 40 C.F.R. § 1500.1(b) and provide "full and fair discussion of significant environmental impacts," 40 C.F.R. § 1502.1, by relying on an estimate of methane's impacts that was known to be outdated and an understatement of the true potency of this pollutant, by failing to disclose that the analysis it provided only considered long term (100-year) impacts, and by failing to use available tools, such as the estimate of methane's 20-year GWP, to address more near-term impacts. Each of these failures violates NEPA. *See W. Org. of Res. Councils v. U.S. Bureau of Land Mgmt.*, No. CV 16-21-GF-BMM, 2018 WL 1475470, at *16 (D. Mont. Mar. 26, 2018) (holding that agency violated NEPA by estimating emissions solely on the basis of methane GWP of 25).

B. The DEIS Fails to Take A Hard Look at the Impact of GHG Emissions

Finally, the DEIS fails to take a hard look at the impact or significance of greenhouse gas emissions. Ultimately, a key purpose of NEPA analysis is enable decisionmakers and the public to make an informed decision about whether a proposal's environmental impacts warrant modification or rejection of the proposal. The DEIS falls short of this.

Here, the DEIS estimates that "Direct emissions from the Jordan Cove LNG and Pacific Connector Pipeline Projects would result in annual CO_2e emissions of about 2.14 million metric tons of CO_2e." DEIS 4-807. But the DEIS provides no discussion of the consequences that will result from these emissions, no analysis of whether this emission increase would render the projects contrary to the public interest, and not even an opinion on whether this increase would be "significant." *Id.* The *only* discussion of the context or severity of these emissions is the general acknowledgement that they these emissions, like *all* greenhouse gas emissions, "would contribute incrementally to future climate change impacts," DEIS 4-806, and the statement that these emission increases "would represent 4.2 percent and 15.3 percent of Oregon's 2020 and 2050 GHG [reduction] goals, respectively," DEIS 4-807.

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[508] *See* Myhre, G., D. Shindell, F.-M. Bréon, W. Collins, J. Fuglestvedt, J. Huang, D. Koch, J.-F. Lamarque, D. Lee, B. Mendoza, T. Nakajima, A. Robock, G. Stephens, T. Takemura and H. Zhang, *Anthropogenic and Natural Radiative Forcing. In: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, at 731, Appendix 8.A, *available at* https://www.ipcc.ch/site/assets/uploads/2018/02/WG1AR5_Chapter08_FINAL.pdf

[509] *Massachusetts v. E.P.A.*, 549 U.S. 497, 508-512 (2007) (The IPCC is recognized as "a multinational scientific body … [d]rawing on expert opinions from across the globe); *Coal. for Responsible Regulation, Inc. v. E.P.A.*, 684 F.3d 102, 119 (D.C. Cir. 2012), *aff'd in part, rev'd on other grounds in part sub nom. Util. Air Regulatory Grp. v. E.P.A.*, 134 S. Ct. 2427 (2014), *and amended sub nom. Coal. for Responsible Regulation, Inc. v. Envtl. Prot. Agency*, 606 F. App'x 6 (D.C. Cir. 2015) (IPCC's "peer-reviewed assessments synthesized thousands of individual studies on various aspects of greenhouse gases and climate change and drew 'overarching conclusions' about the state of the science in this field.").

FERC can, and therefore must, do more. *Sierra Club v. FERC*, 867 F.3d 1357, 1374 (D.C. Cir. 2017) ("*Sabal Trail*"), *Ctr. for Biological Diversity v. Nat'l Highway Traffic Safety Admin.*, 538 F.3d 1172, 1201 (9th Cir. 2008). The DEIS mistakenly claims that FERC cannot provide any further analysis because "Currently, there is no universally accepted methodology to attribute discrete, quantifiable, physical effects on the environment to the Project's incremental contribution to GHGs." DEIS 4-806. This misstates both the relevant facts and the legal standard.

Factually, it is possible to meaningfully discuss the *incremental* impact of the emissions. The tools used to assess current and future impacts of climate change respond to different emission scenarios, *i.e.*, they provide forecasts of the physical impacts that will result from different emission totals. For example, in 2017, the U.S. Global Change Research Project again confirmed and quantified a broad range of environmental impacts resulting from greenhouse gas emissions,[510] including discussing how changes in temperature, rainfall, and flood risk from sea level rise will vary for individual regions in the United States.[511] In predicting future impacts, this report considered several future emission scenarios, defined as different emission volumes.[512] Comparison of these broad scenarios can be used to estimate the impact of an individual project's emissions because greenhouse gas emissions are largely interchangeable—an additional million tons of carbon dioxide emitted in 2030, for example, will have the same impact regardless of whether it is emitted as a result of the Jordan Cove Project or as a result of some other activity elsewhere in the world. Thus, the physical impacts of a ton of emissions can be as a proportion of the impacts that result from moving from one emission scenario to another. This approach was similarly used in developing estimates of the social cost of greenhouse gas emissions.[513] Although Executive Order 13,783 disbanded the Interagency Working Group on the Social Cost of Greenhouse Gases and stated that many of the group's publications would be "withdrawn as no longer representative of governmental policy," the Executive Order provides no disagreement with the underlying technical analysis.[514] Similarly, although the Council on Environmental Quality's June 26, 2019 "Draft National Environmental Policy Act Guidance on Consideration of Greenhouse Gas Emissions" provides that "an agency need not weigh the effects of the various alternatives in NEPA in a monetary cost-benefit analysis using any monetized Social Cost of Carbon (SCC) estimates and related documents (collectively referred to

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[510] U.S. Global Change Research Program, 2017: Climate Science Special Report: Fourth National Climate Assessment, Volume I, doi: 10.7930/J0J964J6 (Nov. 3, 2017), available at https://science2017.globalchange.gov/downloads/CSSR2017_FullReport.pdf. In late 2018, this same federal project discussed impacts that are *already occurring* in communities around the country. U.S. Global Change Research Program, 2018: Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II, doi: 10.7930/NCA4.2018 (Nov. 2018), available at https://nca2018.globalchange.gov/downloads/NCA4_Report-in-Brief.pdf.

[511] *See, e.g.*, U.S. Global Change Research Program, 2017 at 334.

[512] *Id.* at 19, 138.

[513] Social Cost of Carbon 2010, https://obamawhitehouse.archives.gov/sites/default/files/omb/inforeg/for-agencies/Social-Cost-of-Carbon-for-RIA.pdf, at 24-25; U.S. Interagency Working Group on the Social Cost of Greenhouse Gases (IWG), "Technical support document: Technical update of the social cost of carbon for regulatory impact analysis under executive order 12866 & Addendum: Application of the methodology to estimate the social cost of methane and the social cost of nitrous oxide" (August 26, 2016), available at https://obamawhitehouse.archives.gov/sites/default/files/omb/inforeg/scc_tsd_final_clean_8_26_16.pdf.

[514] Exec. Order. No. 13,783 § 5(b), 82 Fed. Reg. 16,093 (Mar. 28, 2017).

as 'SCC estimates'),"[515] the only basis provided for this assertion is a concern over monetization of impacts, not with assessment of the impacts themselves. Thus, FERC has not shown that available tools are insufficient to provide a meaningful discussion of incremental physical impacts.

Legally, the DEIS errs insofar as it contends that NEPA only requires agencies to use methodologies that have been "*universally* accepted." DEIS 4-806. Where, as here, a project will have reasonably foreseeable impacts but it is impossible to forecast the precise contours of those impacts, FERC must use methods that are "*generally*" accepted "*in the scientific community*." 40 C.F.R. 1502.22(b)(4). Criticism of a tool or methodology from outside the scientific community, or from a few isolated voices within that community, does not relieve FERC of the obligation to use that methodology.

A further legal error is the DEIS's conclusion that "Without the ability to determine discrete resource impacts, we are unable to determine the significance of the Project's contribution to climate change." DEIS 4-807. The DEIS juxtaposes the Project's emission *increases* with Oregon's greenhouse gas *reduction* targets. *Id.* Facially, it appears that the Project would flatly preclude attainment of those targets. The DEIS provides no analysis whatsoever of whether this is the case, or of whether the impact on Oregon's policy goals renders the impact significant. However, NEPA requires such analysis.

Thus, it is clear that FERC can do more to illustrate the impact of the project's greenhouse gas emissions than to simply juxtapose these emissions with Oregon's greenhouse gas reduction targets, and the DEIS fails to justify this failure to provide additional analysis. *See Sabal Trail*, 867 F.3d at 1374. The undersigned contend that the most effective form of additional analysis would be to both address Oregon's emission reduction targets and to illustrate the impact greenhouse gas emission increases using the Interagency Working Group's social cost of carbon protocol and related tools.[516] Use of this tool remains appropriate notwithstanding Executive Order 13,783 and the Council on Environmental Quality's recent draft greenhouse gas guidance. CEQ, in discussing the social cost of carbon, notes that NEPA does not generally require cost benefit analysis. 84 Fed. Reg. at 30098 (citing 40 C.F.R. § 1502.23).

But use of the social cost of carbon protocol does not require a full cost-benefit analysis. NEPA requires FERC to take a hard look at the "ecological …, aesthetic, historic, cultural, economic, social, [and] health," effects of its actions, "whether direct, indirect, or cumulative." 40 C.F.R. § 1508.8. In some cases, the only way to do effectively is to monetize impacts. *Columbia Basin Land Prot. Ass'n v. Schlesinger*, 643 F.2d 585, 594 (9th Cir. 1981) (explaining that monetization of costs may be required where available "alternative mode[s] of [NEPA] evaluation [are] insufficiently detailed to aid the decision-makers in deciding whether to proceed, or to provide the information the public needs to evaluate the project effectively."). Just as the public and decisionmakers "cannot be expected to convert curies or mrems into such costs as cancer deaths," the EIS's readership cannot be expected to understand whether an individual project's marginal contribution to increased temperature, sea levels, *etc*. is cause for concern. *Natural Res.*

[515] 84 Fed. Reg. 30097, 30098-99.
[516] Social Cost of Carbon 2010, https://obamawhitehouse.archives.gov/sites/default/files/omb/inforeg/for-agencies/Social-Cost-of-Carbon-for-RIA.pdf, at 24-25.

Def. Council, Inc. v. U. S. Nuclear Regulatory Comm'n, 685 F.2d 459, 487 n.149 (D.C. Cir. 1982) *rev'd on other grounds sub nom. Baltimore Gas & Elec. Co. v. Natural Res. Def. Council, Inc.*, 462 U.S. 87, 106-107 (1983). Because individual contributions to climate change are so small, but the cumulative problem is so large, meaningfully disclosing the impact of greenhouse gas emissions requires some tool beyond merely identifying physical changes in the environment attributable to an individual project's emissions.

Nor does Executive Order 13,783 provide a rational basis for failing to use the Social Cost of Carbon protocol. That Executive Order did not find fault with any component of the IWG's analysis. To the contrary, it encourages agencies to "monetiz[e] the value of changes in greenhouse gas emissions" and instructs agencies to ensure such estimates are "consistent with the guidance contained in OMB Circular A-4."[517] The IWG tool, however, is itself a tool for doing exactly this: OMB participated in the IWG and did not object to the group's conclusions. As agencies follow the Circular's standards for using the best available data and methodologies, they will necessarily choose similar data, methodologies, and estimates as the IWG, since the IWG's work continues to represent the best estimates presently available.[518] Thus, the IWG's 2016 update to the estimates of the social costs of greenhouse gases remains the best available and generally accepted tool for assessing the impact of greenhouse gas emissions, notwithstanding the fact that this document has formally been withdrawn.[519] Similarly, the IWG's protocols use of a central a 3% discount rate is consistent with Circular A-4.[520]

In other proceedings, FERC has offered various other arguments against using the social cost of carbon protocol that all seriously misunderstand the tool. The estimates of social cost are based on reasonable forecasts of the actual physical effects greenhouse gas emissions will have on the environment, including temperature, sea level rise, ecosystem services, and other physical impacts, together with assessments of how these physical changes will impact agriculture, human health, *etc*. The social cost protocol identifies the social cost imposed by a ton of emissions' pro rata contribution to these environmental problems. As explained above, this either amounts to an assessment of physical impacts or the best available generally accepted alternative to such an assessment; either way, the tool is appropriate for use under NEPA. 40 C.F.R. § 1502.22(b)(4).

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[517] Exec. Order. No. 13,783 § 5(b), 82 Fed. Reg. 16,093 (Mar. 28, 2017).

[518] Richard L. Revesz et al., *Best Cost Estimate of Greenhouse Gases*, 357 SCIENCE 6352 (2017) (explaining that, even after Trump's Executive Order, the social cost of greenhouse gas estimate of around $50 per ton of carbon dioxide is still the best estimate), available at http://policyintegrity.org/files/publications/Science_SCC_Letter.pdf.

[519] U.S. Interagency Working Group on the Social Cost of Greenhouse Gases (IWG), "Technical support document: Technical update of the social cost of carbon for regulatory impact analysis under executive order 12866 & Addendum: Application of the methodology to estimate the social cost of methane and the social cost of nitrous oxide" (August 26, 2016), available at https://obamawhitehouse.archives.gov/sites/default/files/omb/inforeg/scc_tsd_final_clean_8_26_16.pdf.

[520] The Circular itself provides a general recommendation for a 3 percent rate; and while it also identifies 7 percent rate as appropriate for use in other circumstances, the Circular itself states that the 7 percent figure should not be used when assessing impacts that, like climate change, will affect the public as a whole. Furthermore, OMB, together with the rest of the Interagency Working Group, has explicitly affirmed that the 7 percent rate is inappropriate when addressing climate change. Interagency Working Group on the Social Cost of Carbon, *Response to Comments: Social Cost of Carbon for Regulatory Impact Analysis under Executive Order 12,866* at 36 (July 2015), available at https://obamawhitehouse.archives.gov/sites/default/files/omb/inforeg/scc-response-to-comments-final-july-2015.pdf.

Nor is lack of consensus as to a single most appropriate intergenerational discount rate a reason for refusing to use the social cost protocols. As the 2010 Technical Support Document explained, a range of three discount rates—2.5, 3, and 5 percent—"reflect reasonable judgments" and "span a plausible range" of appropriate discount rates, and are consistent with OMB Circular A-4.[521] (The IWG also recommended use of a 3 recent rate at the 9^{5th} percentile to model climate "tipping points").

If anything, the IWG's social cost of carbon protocol understates impacts. For example, some analysts assert that any analysis of multi-generational, potentially catastrophic problem such as climate change merits a *lower* discount rate than this range reflects.[522] Nonetheless, the IWG's "central" value of 3 percent falls within the range supported by a majority of economists. Thus, as explained by the IWG, uncertainty as to the most appropriate discount rate is a reason to provide social cost estimates using the range of plausible rates—which FERC and other agencies have done in other proceedings[523]—but it is not a reason for ignoring the social cost of greenhouse gas emissions entirely. *Center for Biological Diversity*, 538 F.3d at 1200 (disagreement over cost of carbon emissions does not allow agency to forgo estimating cost where, "while the record shows … a range of values, the value of carbon emissions reduction is certainly not zero.").

Failure to grapple with the importance and consequences of greenhouse gas emissions undermines other aspects of the Project analysis. For example, had FERC concluded that the climate impacts were significant, this would have supported more meaningful evaluation of alternatives that could potentially reduce these impacts. More broadly, estimating social cost of greenhouse gas emissions will help the public and FERC understand whether the adverse consequences of the Project's emissions are severe enough to warrant consideration in the public interest/public convenience and necessity analyses, and, indeed, whether these emissions tip the balance toward the conclusion that the project is contrary to, and not required by, the public convenience and necessity. The current DEIS provides no information to use in answering these questions; it is indisputable that estimating the impacts of emissions using the social cost protocols would speak to these issues, regardless of whether FERC concludes that the monetized impact is or is not significant. Although FERC has discretion to choose among reliable methodologies for evaluating impacts, that discretion does not allow FERC to provide *no* evaluation whatsoever when a generally accepted methodology is available. 40 C.F.R. § 1502.22(b)(4), *see also N. Plains Res. Council, Inc. v. Surface Transp. Bd.*, 668 F.3d 1067, 1085 (9th Cir. 2011) (holding that agency decision not to survey for wildlife prior to approving project was not a valid exercise of discretion as to assessment methodology).

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[521] IWG 2010 Social Cost of Carbon TSD at 17-18, 23.

[522] *See* Peter Howard & Derek Sylvan, *The Economic Climate: Establishing Expert Consensus on the Economics of Climate Change* (Inst. Policy Integrity Working Paper 2015/1); M.A. Drupp, et al., *Discounting Disentangled: An Expert Survey on the Determinants of the Long-Term Social Discount Rate* (London School of Economics and Political Science Working Paper, May 2015) (finding consensus on social discount rates between 1-3%).

[523] *See, e.g.*, FERC, Final EIS, Constitution Pipeline and Wright Interconnect Projects, CP13-499 (Oct. 2014), Accession No. 20141024-4001, at 4-256 to 4-257 ("For 2015, the first year of project operation, … the project's social cost of carbon for 2015 would be $1,638,708 at a discount rate of 5 percent, $5,325,802 at 3 percent, and $8,330,100 at 2.5 percent.").

Thus, the DEIS's assertion that it is impossible to discuss the impact or significance of the Project's greenhouse gas emissions is arbitrary. DEIS 4-807. FERC must use available generally accepted tools to address the impact of these emissions, 40 C.F.R. 1502.22, and employ reasonable forecasting in its analysis. FERC's refusal to use available modeling tools, such as the estimates of the social cost of carbon and other greenhouse gases, violates NEPA.

Climate change also has the following health effects on susceptible populations in the Pacific Northwest:

Climate Change Health Effects and Susceptible Populations: Pacific Northwest		
	Outcomes	**Susceptible Populations**
Heat related illness	Heat rash, heat cramps, heat exhaustion, heat stroke	Very young and very old, pregnant women, people with chronic disease, socially isolated, houseless, outdoor workers
Heat related death	Heart attack, stroke, renal failure, heat stroke, respiratory failure	Very young and very old, people with chronic disease, socially isolated, houseless, outdoor workers
Heat related violence	Homicide and intentional injury	Children and young adults especially in communities with pre-existing higher rates of interpersonal violence
Heat related air pollution and ozone formation	Chest pain, coughing, throat irritation, exacerbation of emphysema, bronchitis and asthma, cancer and cardiopulmonary death	Children, those living in areas with pre-existing air pollution, persons with pre-existing cardiac and respiratory conditions
Drought related food insecurity	Hunger and malnutrition	Low income, communities of color, pregnant women, children
Smoke pollution from wildfires	Asthma, bronchitis, pneumonia, cardiopulmonary disease, motor vehicle crash, injuries, death	Very young and very old, those with pre-existing respiratory and cardiac disease, vehicle operators, passengers
Drought and heat related harmful algal blooms	Toxic contamination of drinking water affecting liver, skin, gastrointestinal tract, nervous system	Residents dependent on affected water systems
Wildfires	Accidental injury and death	Those who live or work in fire-prone areas
Heavy rains	Accidental injury and death	Those who live, work or attend school near or on unstable slopes, including houseless
Flooding	Accidental injury and death, water borne disease, exposure to toxins	Those who live, work or attend school in low lying areas, including houseless

Weather related increase in mold, pollens and other allergens	Exacerbation of asthma and allergic rhinitis	Those with pre-existing allergic disorders
Infectious disease	Vector borne disease, food and water borne disease, fungal disease	Low income, those with pre-existing chronic disease, very young and very old, immune-compromised
Stress related to extreme weather events	Anxiety, depression, suicide, substance abuse, violence	Those with pre-existing mental health disorders and pre-existing socioeconomic stressors
Stress from weather-related displacement	Anxiety, depression, suicide, substance abuse, violence	Low income, residents of flood- and fire-prone areas, coastal communities

VI. THE DEIS FAILS TO ADEQUATELY ADDRESS CONNECTED, INDIRECT, AND CUMULATIVE ACTIONS, INCLUDING PRODUCTION AND USE OF THE EXPORTED GAS

NEPA requires consideration of "indirect effects," which are "caused by the action" but:

> are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effect on air and water and other natural systems, including ecosystems.

40 C.F.R. § 1508.8(b).

The Pacific Connector Gas Pipeline and Jordan Cove Energy Project will increase North American gas production, increase North American coal use (principally in the electric sector), and increase global gas use. These impacts are reasonably foreseeable indirect effects which must be considered in the NEPA analysis. 40 C.F.R. § 1508.8(b). Indirect effects are "caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable." *Id.* An effect is reasonably foreseeable if it is "sufficiently likely to occur that a person of ordinary prudence would take it into account in reaching a decision." *Mid States Coal. for Progress v. Surface Transp. Bd.*, 345 F.3d 520, 549 (8th Cir. 2003) (quotations omitted). Indirect effects encompass both "growth inducing" and "economic" effects, including "induced changes in the pattern of land use, population density or growth rate." 40 C.F.R. § 1508.8(b). The indirect effects inquiry is therefore wide-ranging in its scope.

Although the DEIS recognizes that FERC received scoping comments calling for analysis of the effects of "induced production of natural gas; 'life-cycle' cumulative environmental impacts associated with the entire LNG export process; [and] downstream greenhouse gas emissions resulting from the combustion of exported gas;" the DEIS stated, without explanation, that "These issues are not addressed in this EIS." DEIS, 1-18. This omission violates NEPA.

A. FERC's Approval Is A "Legally Relevant Cause" of Impacts on Energy Markets, Gas Production, and Use

In other proceedings, FERC has routinely argued that FERC's approval is not the "legally relevant cause" of impacts on gas production or use, or the environmental effects thereof, in attempted reliance on *Department of Transportation v. Public Citizen*, 541 U.S. 752 (2004). *See, e.g.*, *Birckhead v. FERC*, No. 18-1218, 2019 WL 2344836, at *5 (D.C. Cir. June 4, 2019), *Sierra Club v. FERC*, 867 F.3d 1357, 1372 (D.C. Cir. 2017) ("*Sabal Trail*"). This argument has been squarely rejected as applied to FERC's approval of pipelines under section 7 of the Natural Gas Act:

> Congress broadly instructed the [Commission] to consider 'the public convenience and necessity' when evaluating applications to construct and operate interstate pipelines." … Because the Commission may therefore "deny a pipeline certificate on the ground that the pipeline would be too harmful to the environment, the agency is a 'legally relevant cause' of the direct and indirect environmental effects of pipelines it approves"—even where it lacks jurisdiction over the producer or distributor of the gas transported by the pipeline. … Accordingly, the Commission is "not excuse[d] ... from considering these indirect effects" in its NEPA analysis.

Birckhead, 2019 WL 2344836, at *5 (D.C. Cir. June 4, 2019) (quoting *Sabal Trail*, 867 F.3d at 1373) (internal citations omitted).

The fact that other agencies *also* have authority over, and therefore may be deemed to "cause," gas production and use does not remove these impacts from the scope of FERC's required analysis. NEPA would "wither away in disuse, [if] applied only to those environmental issues wholly unregulated by any other federal, state or regional body." *Calvert Cliffs' Coordinating Comm., Inc. v. U.S. Atomic Energy Comm'n*, 449 F.2d 1109, 1122-23 (D.C. Cir. 1971).

Commenters recognize that the D.C. Circuit, in *Sierra Club v. FERC*, 827 F.3d 36, 47-49 (D.C. Cir. 2016) ("*Freeport I*"), held that FERC's approval of LNG export infrastructure under Natural Gas Act section 3, 15 U.S.C. § 717b(e)(1), was not a legally relevant cause of export-induced gas production and use. *Freeport I* and related cases held that the Department of Energy, in delegating section 717b(e)(1) authority over export infrastructure to FERC, had retained exclusive authority over exports themselves, such that FERC had "had no legal authority to consider" the environmental impacts of gas production and use. *Sabal Trail*, 867 F.3d at1372 (summarizing *Freeport I*, 827 F.3d at 47, *Sabine Pass*, 827 F.3d at 68–69; *EarthReports*, 828 F.3d at 956). Because, as the DC Circuit has recognized, FERC's section 7 authority over pipelines is broader than FERC's section 3 authority over LNG infrastructure, *Id.* at 1373, *Freeport I* does not narrow the scope of FERC's review of the Pacific Connector Gas Pipeline.

Moreover, the D.C. Circuit's *Freeport I* holdings on this issue have not been followed by any court outside the D.C. Circuit, and lie in tension with—at least—the holdings of other circuits. For example, the Ninth Circuit has explained that *Public Citizen* only applies to *statutory* limits on agency authority. *Ctr. for Biological Diversity v. Nat'l Highway Traffic Safety Admin.*, 538 F.3d 1172, 1213 (9th Cir. 2008) (quoting *Sierra Club v. Mainella*, 459 F.Supp.2d 76, 105

(D.D.C. 2006)). Here, nothing in the text of the Natural Gas Act prohibits consideration of indirect effects as part of the section 717b(e)(1) LNG facility determination. Nor does the statute require a division of authority between FERC and the Department of Energy; this division arises entirely out of the Department's discretionary decision to delegate 717b(e)(1) authority to FERC. *See Freeport I*, 827 F.3d at 41 (quoting U.S. Department of Energy, Delegation Order No. 00-004.00A, § 1.21.A (May 16, 2006)).[524] Thus, the lack of authority underlying the D.C. Circuit's decision in *Freeport I* is the type of self-imposed limit that the Ninth Circuit explained was insufficient to support invocation of *Public Citizen* in *Ctr. for Biological Diversity*.

B. Even If Neither FERC's Natural Gas Act Section 3 nor Section 7 Approval Is a "Legally Relevant Cause" of Impacts On Gas Production, Use, and Energy Markets, DOE's Approval *Is*, and Is Also a "Connected Action" that Must Be Evaluated Here

Freeport I explicitly declined to address "the interplay between the Commission and the Department of Energy when the former is acting as the 'lead agency' in reviewing the environmental effects of a natural gas export operation under NEPA," whether FERC's decision to exclude gas production from its EIS "impermissibly 'segmented' its review of the [terminal] Projects from the larger inter-agency export authorization process," or whether "Commission's construction authorizations and the Department's export authorizations qualified as 'connected actions' for purposes of NEPA review." *Id.* at 45-46. The Court could not have been clearer about the fact that *Freeport I* did not resolve these issues: "Before addressing the merits of the Associations' NEPA claim, we pause to underscore what *we are not deciding in this case*." *Id.* at 45 (emphasis added). No subsequent case addressing LNG exports has discussed these issues.

Consideration of these issues left undecided by *Freeport I* and its progeny plainly demonstrates that the Department's authorization of exports *is* a "connected action," which must be fully analyzed in the terminal EIS. 40 C.F.R. § 1508.25(a)(1). According to NEPA's binding regulations, "actions are connected if they:

- Automatically trigger other actions which may require environmental impact statements.
- Cannot or will not proceed unless other actions are taken previously or simultaneously.
- Are interdependent parts of a larger action and depend on the larger action for their justification.

[524] Moreover, neither the Natural Gas Act nor DOE's delegation order compel the conclusion, adopted by *Freeport I*, that DOE and FERC's authorities are mutually exclusive. As DOE explained in conditionally authorizing the exports at issue here, it is DOE's position that DOE and FERC have "overlapping environmental review responsibilities." United States of America Department of Energy Office of Fossil Energy, *Order Conditionally Granting Long-Term Multi-Contract Authorization to Export Liquefied Natural Gas By Vessel From the Jordan Cove LNG Terminal in Coos Bay, Oregon to Non-Free Trade Agreement Nations*, DOE/FE Order No. 3413, at 152, (March, 24, 2014). https://fossil.energy.gov/ng_regulation/sites/default/files/programs/gasregulation/authorizations/2014/orders/ord3413.pdf

Id. "The point of the connected actions doctrine is to prevent the government from 'segmenting' its own 'federal actions into separate projects and thereby failing to address the true scope and impact of the activities that should be under consideration.'" *Big Bend Conservation All. v. FERC*, 896 F.3d 418, 423–24 (D.C. Cir. 2018) (quoting *Sierra Club v. U.S. Army Corps of Eng'rs*, 803 F.3d 31, 49–50 (D.C. Cir. 2015) and *Delaware Riverkeeper Network v. FERC*, 753 F.3d 1304, 1313 (D.C. Cir. 2014)).

It is clear that the decisions of cooperating agencies identified in part 1.3 of the DEIS, and the Department of Energy's anticipated completion of review of contingent non-free trade agreement export application in particular, *are* connected actions, the consequences of which must be fully considered in *this* EIS. 40 C.F.R. § 1508.25(a)(1). By refusing to consider the impacts of connected actions, FERC impermissibly segments NEPA review. *Delaware Riverkeeper Network v. FERC*, 753 F.3d 1304, 1313 (D.C. Cir. 2014). The proposed exports cannot proceed without construction and operation of the terminal and pipeline, and the various projects depend on one another for their justifications. 40 C.F.R. § 1508.25(a)(1)(ii)-(iii). The Department's evaluation of the expected application to export LNG to non-free-trade-agreement countries is an action that "may require [an] environmental impact statement[];" *Id.* § 1508.25(a)(1)(i); indeed, the Department has already concluded that "[a]pprovals or disapprovals of authorizations to import or export natural gas" involving construction or significant modification of export facilities, or even a "major increase in the quantity of [LNG] imported or exported" from existing facilities, will "normally require [an] EIS." 10 C.F.R. Pt. 1021 Subpt., D Appendix D, D8-D9.

The connection between FERC's decision and the Department's is made particularly clear by the Energy Policy Act of 2005, which, in FERC's own words, "amended the Natural Gas Act to require [FERC] to coordinate the environmental review and the processing of all federal authorizations relating to proposals for natural gas infrastructure under FERC's jurisdiction."[525] *See also Freeport I*, 827 F.3d at 41 (discussing 15 U.S.C. § 717n(b)(1), 42 U.S.C. § 7172(a)(2)(B)). Because Congress has instructed FERC to prepare the EIS the Department of Energy and other cooperating agencies will use in satisfying their NEPA obligations, FERC cannot reasonably contend that this EIS need not include the effects of these other agencies' actions.

C. The Projects Will Have Reasonably Foreseeable Impacts Relating to Effects on Gas Production and Use

The proposed projects will result in an increase in gas production, processing, and transportation, because the exported gas will have to come from somewhere. It is likely that FERC can foresee where, on at least a regional basis, this additional production will occur. Many of the impacts of additional gas production and associated activity can be evaluated at such a regional level. But even if the site of induced activity was entirely unknowable, FERC would still be able to meaningfully discuss the extent of climate impacts and the nature of non-climate effects. We discuss these issues in turn below.

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[525] Federal Energy Regulatory Commission, *Guidance for Federal and State Agencies for the Processing of Federal Authorizations in Cooperation with the FERC*, at 1 (August 30, 2007). Available at https://www.ferc.gov/industries/gas/enviro/epact-gas-guidance.pdf.

D. FERC Can Reasonably Foresee the Amount and Region of Additional Gas Production That Will Be Caused by the Projects

Generally available tools FERC to meaningfully estimate the amount and region(s) of additional gas production; moreover, FERC can and should supplement these tools by requiring the applicants to provide additional information on these issues.

The Energy Information Administration, Environmental Protection Agency, Department of Energy, and numerous private consultants have concluded that increasing LNG exports will lead to increased gas production. These entities have provided predictions of the amount by which a given volume of exports, from a specific location or locations, will increase gas production in an individual state or gas basin. *See, e.g.*, ICF International, U.S. LNG Exports: Impacts on Energy Markets and the Economy at 18 (May 15, 2013) (explaining that ICF's model predicts production in individual basins),[526] *Id.* at 14 (explaining that ICF's model addresses North American markets, not just the United States); ICF International, U.S. LNG Exports: State-Level Impacts on Energy Markets and the Economy, at 15 (Nov. 13, 2013) (showing state-level increases in gas production in response to specific export volumes);[527] ICF International, Impact of LNG Exports on the U.S. Economy: A Brief Update, at 15, 27 (Sept. 11, 2017) (updating these analyses and further explaining that ICF models integrated North American markets).[528]Another consultant has modeled how gas production in individual shale plays will respond to exports from an individual facility.[529]

Similarly, the Energy Information Administration has repeatedly studied how U.S. energy markets will respond to LNG exports, predicting the amount by which gas production is expected to increase in response to a given volume of exports in various scenarios.[530] In preparing this report, EIA predicted how different export scenarios would increase gas production in individual subregions (*e.g*., Gulf Coast, Southwest).[531] Moreover, the tool EIA

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[526] ICF International, *U.S. LNG Exports: Impacts on Energy Markets and the Economy* (May 15, 2013). Available at https://www.api.org/~/media/Files/Policy/LNG-Exports/API-LNG-Export-Report-by-ICF.pdff

[527] ICF International, *U.S. LNG Exports: Impacts on Energy Markets and the Economy* (November 13, 2013). Available at https://www.api.org/~/media/Files/Policy/LNG-Exports/API-State-Level-LNG-Export-Report-by-ICF.pdf

[528] ICF, *Impact of LNG Exports on the U.S. Economy: A Brief Update* (September 2017). Please find this available at https://www.api.org/~/media/Files/Policy/LNG-Exports/API-LNG-Update-Report-20171003.pdf.

[529] Deloitte MarketPoint, *Analysis of the Economic Impact of LNG Exports from the United States*, at 8, 14. Available at https://fossil.energy.gov/app/DocketIndex/docket/DownloadFile/137.
This was initially filed as *Excelerate Liquefaction Solutions I, LLC, FE Docket 12-146-LNG, Application for Long-Term, Multi-contract Authorization to Export Liquefied Natural Gas to Non-Free Trade Agreement Countries*, Appendix F (Oct. 5, 2012), Please find this available at https://fossil.energy.gov/ng_regulation/sites/default/files/programs/gasregulation/authorizations/2012/applications/12_146_lng_nfta.pdf.
Like ICF, Deloitte has since published updated analyses. Please see *Deloitte Center for Energy Solutions, Five years on: The outlook and impact of American LNG Exports* (2016). Please find this available at https://www2.deloitte.com/content/dam/Deloitte/us/Documents/energy-resources/us-er-five-years-on-the-outlook-and-impact-of-american-lng-exports.pdf

[530] U.S. Energy Information Administration, *Effect of Increased Levels of Liquefied Natural Gas Exports on U.S. Energy Markets*, 12 (October 2014). Available at https://www.eia.gov/analysis/requests/fe/pdf/lng.pdf.

[531] U.S. Energy Information Administration, *Annual Energy Outlook 2019, Table: Total Energy Supply, Disposition, and Price Summary (*2019). Please find this available online at https://www.eia.gov/outlooks/aeo/data/browser/

used to prepare this analysis—the National Energy Modeling System—is routinely used to provide more fine-grained analysis, estimating changes in production in individual gas plays. *See* Energy Information Administration, Annual Energy Outlook 2018, at 68 (Feb. 6, 2018)[532] (discussing individual predictions regarding gas production Eagle Ford, Haynesville, Permian, Utica, and Marcellus plays); Energy Information Administration, Oil and Gas Supply Module of the National Energy Modeling System: Model Documentation 2018, at 9 (June 2018) (explaining that NEMS is a "play-level model").[533] No agency has ever disputed that EIA's tools can be used to provide reasonable forecasts of how LNG exports from particular sites will increase gas production in individual gas plays.

Insofar as the record does not already provide information about where the gas transported by the project is (or is likely to be) produced, FERC and other agencies seeking to rely on the EIS must use their respective investigatory authorities to develop this information. *See Birckhead*, 2019 WL 2344836, at *5-*6 (criticizing FERC for failing to "further develop the record," by, for example, asking the applicant to seek out and provide information about gas supplies).

E. The Environmental Impacts of Increased Gas Production, Processing, and Transport are Reasonably Foreseeable

As explained above, the proposed projects will foreseeably increase gas production, processing, and transportation. The environmental impacts of these activities are also reasonably foreseeable.

First, at the most general level, as the Department of Energy has recognized, FERC can meaningfully estimate the climate impacts of additional gas production, *etc*. [534] These impacts are reasonably foreseeable even if FERC concludes—wrongly—that the location and manner of additional production are unforeseeable. Although knowing these particulars can provide with more sophisticated analysis, as emission rates vary across basins and production methods, if this information is unavailable, FERC can still meaningfully inform decision makers and the public by providing estimated based on general, average emission rates.

Second, several other impacts occur at the regional level, and can be meaningfully forecast on the basis of basin- or play-level predictions of gas production, precisely the types of forecasts that FERC can develop using the tools discussed in the previous section. Most importantly, FERC can foresee how regional increases in gas production will impact regional ozone levels (both in the region where the increase occurs *and in surrounding regions*). Ground-level ozone is formed by the interaction of volatile organic chemicals and nitrogen oxides, and has serious

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(select Publication: "Effect of Increased Natural Gas Exports on Domestic Energy Markets" and Table: "Lower 48 Natural Gas Production and Wellhead Prices by Supply Region").

[532] U.S. Energy Information Administration, *Annual Energy Outlook 2018, with projections to 2050* (February 6, 2018). Please find this available at https://www.eia.gov/outlooks/aeo/pdf/AEO2018.pdf.

[533] U.S. Energy Information Administration, Oil and Gas Supply Module of the National Energy Modeling System: Model Documentation 2018 (June 2018). Please find this available at https://www.eia.gov/outlooks/aeo/nems/documentation/ogsm/pdf/m063(2018).pdf.

[534] U.S. Department of Energy, *Addendum to Environmental Review Documents Concerning Exports of Natural Gas from the United States*, at 2 (August 15, 2014). ("*With the exception of greenhouse gases (GHG) and climate change*, potential impacts of expanded natural gas production and transport would be on a local or regional level.") (emphasis added). Available at https://www.energy.gov/sites/prod/files/2014/08/f18/Addendum.pdf.

impacts on human health and the environment. EPA has explained that ozone formation and impacts often occur "on a regional scale (*i.e.*, thousands of kilometers)." 76 Fed. Reg. 48,208, 48,222 (Aug. 8, 2011). In some regions, gas production is the primary contributor to ozone levels that violate EPA's national ambient air quality standards.[535]

Available models, including the Comprehensive Air-quality Model with extensions ("CAMx"), can predict how an increase in gas production in an individual gas play will affect ozone levels in neighboring regions. One study used this tool to predict that increasing gas development in the Haynesville Shale would significantly impact ozone throughout east Texas/west Louisiana region.[536] Nothing indicates that it would be infeasible or exorbitantly expensive to perform similar modeling here. 40 C.F.R. § 1502.22(a). To the contrary, the Bureau of Land Management has performed a similar CAMx analysis to evaluate how gas development on federal land would affect ozone in surrounding regions, as part of NEPA review for a land management plan revision.[537] Similarly, EPA demonstrated that it was feasible to model the impact a new rule regarding major sources of air pollution would have on individual ozone regions nationwide. U.S. EPA Office of Air and Radiation, *Regulatory Impact Analysis for the Federal Implementation Plans to Reduce Interstate Transport of Fine Particulate Matter and Ozone in 27 States; Correction of SIP Approvals for 22 States,* at 60-61 (June 2011).[538]

Third, even for impacts that are local in nature, uncertainty as to the specific locations where incremental gas production will occur does not permit FERC to ignore the impact entirely. Even if the precise "*extent*" of these effects is not reasonably foreseeable, the "*nature*" of these effects is, and as such, FERC "may not simply ignore the effect." [539] For example, in *Mid States Coal. for Progress v. Surface Transp. Bd.*, 345 F.3d 520, 549 (8th Cir. 2003), the court ruled that an agency must address the foreseeable possibility of an increase in coal consumption and the effects thereof, due to the construction of a railway reducing the cost of delivered coal.[540] An agency may not ignore "the construction of additional [coal-fired] power plants" that may result merely because the agency does not "know where those plants will be built, and how much coal these new unnamed power plants would use."[541] Thus, FERC must disclose, *in the EIS*, the fact and nature of these foreseeable effects of gas production that will be induced by the Project.

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[535] U.S. Department of Energy, *Addendum to Environmental Review Documents Concerning Exports of Natural Gas from the United States*, at 28 (August 15, 2014). ("*With the exception of greenhouse gases (GHG) and climate change*, potential impacts of expanded natural gas production and transport would be on a local or regional level.") (emphasis added). Available at https://www.energy.gov/sites/prod/files/2014/08/f18/Addendum.pdf.
[536] Susan Kemball-Cook, *et al.*, *Ozone Impacts of Natural Gas Development in the Haynesville Shale*, 44 Environmental Science & Technology, 9357, 9360-61 (2010), DOI**:** 10.1021/es1021137.
[537] Bureau of Land Management, *Continental Divide-Creston (CD-C) Natural Gas Project*, FEIS, Air Quality Technical Support Document (Apr. 15, 2016). Available at https://eplanning.blm.gov/epl-front-office/eplanning/planAndProjectSite.do?methodName=dispatchToPatternPage&currentPageId=77531.
[538] U.S. EPA Office of Air and Radiation, *Regulatory Impact Analysis for the Federal Implementation Plans to Reduce Interstate Transport of Fine Particulate Matter and Ozone in 27 States; Correction of SIP Approvals for 22 States*, at 60-61 (June 2011). Please find this available at https://www3.epa.gov/ttn/ecas/docs/ria/transport_ria_final-csapr_2011-06.pdf.
[539] *Mid States Coal. for Progress v. Surface Transp. Bd.*, 345 F.3d at 549 (8th Cir. 2003..
[540] *Id*.
[541] *Id.*

F. Increasing LNG Exports Will Increase Overseas Gas Use

The Project will also have foreseeable indirect effects resulting from the shipping, regasification, and use of exported LNG. Each of these activities will emit foreseeable amounts of greenhouse gases. The Department of Energy has already demonstrated that it is possible to quantitatively estimate emissions from use of LNG for electricity generation, and other published literature estimates emissions from other foreseeable uses of LNG.[542]

These emissions are foreseeable, and must be disclosed, even if FERC is unsure as to how foreign energy markets as a whole will balance in response to exported LNG. In prior LNG facility proceedings, and in proceedings regarding non-export-related pipelines, FERC has argued that even if FERC can foresee the emissions that will result from use of gas made transported by the FERC-jurisdictional project, FERC cannot predict whether and to what extent the FERC project will displace other fossil fuel use, such as use of gas from other sources or coal use. But FERC cannot justify its failure to take a hard look at foreseeable emissions resulting from burning LNG exported via the Projects by speculating that other, more attenuated fuel substitution, might provide an unknown degree of mitigation. As the DC Circuit recently explained:

> the Commission is wrong to suggest that downstream emissions are not reasonably foreseeable simply because the gas transported by the Project may displace existing natural gas supplies or higher-emitting fuels. Indeed, that position is a total non-sequitur: as we explained in [*Sabal Trail*], if downstream greenhouse-gas emissions otherwise qualify as an indirect effect, the mere possibility that a project's overall emissions calculation will be favorable because of an "offset . . . elsewhere" does not "excuse[]" the Commission "from making emissions estimates" in the first place.

Birckhead, 2019 WL 2344836, at *4 (D.C. Cir. June 4, 2019) (quoting *Sabal Trail*, 867 F.3d at 1374–75).

Recent peer reviewed research concludes that US LNG exports are likely to play only a limited role in displacing foreign use of coal, and such that US LNG exports are likely to increase net global GHG emissions.[543] Although the D.C. Circuit previously upheld the Department of Energy's reliance on assumption that U.S. LNG exports would principally displace other fossil fuels and therefore have a negligible impact on global greenhouse gas emissions, this recent research was not before the agency in those cases. *See, e.g.*, *Sierra Club v. United States Dep't of Energy*, 867 F.3d 189, 202 (D.C. Cir. 2017) ("*Freeport II*"). More recent research demonstrates that there are now tools to perform a more careful and informative analysis than was done in that case.

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[542] Gilbert, A. Q. & Sovacool, B. K., *US liquefied natural gas (LNG) exports: Boom or bust for the global climate?*, Energy, Volume 141, at 1671-1680 (December 15, 2017). Available at https://doi.org/10.1016/j.energy.2017.11.098.
[543] Gilbert, A. Q. & Sovacool, B. K., *US liquefied natural gas (LNG) exports: Boom or bust for the global climate?*, Energy, at *supra* note 20 (December 15, 2017). Available at https://doi.org/10.1016/j.energy.2017.11.098.

And as *Sabal Trail* further demonstrated, sometimes the facts of a particular project will simplify the question of whether and if so how the project will displace other fossil fuel use. *Sabal Trail*, 867 F.3d at 1374 (explaining that the pipeline at issue there would deliver gas to known specific proposed and existing power plants with foreseeable emission characteristics). Here, FERC, the Department of Energy, and any other agency seeking to rely on the EIS must use their respective investigatory authorities to determine where the gas exported by the project would be likely to be used, and how.

G. The Projects Are Likely to Increase U.S. Coal Use

EIA studies indicate that LNG exports also increase domestic coal use. Although EIA predicts that the majority of the supply for exports will come from new production, EIA predicts that the next largest source of supply will be gas made available by gas-to-coal shifting among would-be gas consumers, who will curtail their gas use in response to export-driven increases in gas prices.[544] EIA predicts that exports will increase coal use even if policy measures are implemented to accelerate curtailment of coal.[545] This increase in coal use is foreseeable, and will have foreseeable environmental effects.

Other agencies have used modeling tools to predict both how agency action will affect coal use in individual regions across the country and the resulting impacts on air quality. *See Mayo Found.*, 472 F.3d at 555 (explaining that EIA's modeling tools "not only forecast[] coal supply and demand but also quantif[y] environmental impacts" of coal use); U.S. EPA Office of Air and Radiation, *Regulatory Impact Analysis for the Federal Implementation Plans to Reduce Interstate Transport of Fine Particulate Matter and Ozone in 27 States; Correction of SIP Approvals for 22 States*, at 60-61 (June 2011).

Increasing exports will foreseeably increase U.S. coal use, with foreseeable environmental impacts. NEPA required analysis of these impacts.

H. DOE's Prior Analyses of Indirect Effects Are Insufficient

FERC cannot provide the missing analysis of indirect effects by adopting, incorporating, or simply copying from the "Addendum" and related reports DOE published in 2014. [cite]. These reports discussed the general environmental impacts of natural gas production and the life-cycle greenhouse gas impact of U.S. LNG exports. However, they are untethered to the volume, location, or other details of any particular project. In addition, these studies are both incomplete and out of date. They do not provide the hard look at indirect impacts NEPA requires here.

First of all, NEPA, requires that discussion of environmental impacts be provided *in the EIS.* Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations, 46 Fed. Reg. 18026, 18034 (Mar. 23, 1981). The propriety of DOE's past reliance on these non-NEPA materials is another issue that the D.C. Circuit has explicitly declined to uphold, instead concluding that the issue was not before it. *Freeport II*, 867 F.3d at 197.

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[544] 2014 Export Study at 18.
[545] 2014 Export Study Table B5.

Moreover, these materials are out of date, and do not reflect the enormous amount of research regarding the impacts of gas production that has been published since they were issued. Physicians, Scientists, and Engineers for Healthy Energy maintains a database of peer-reviewed literature regarding the environmental and public health impacts of shale and tight gas production, the Repository for Oil and Gas Energy Research.[546] This database identifies 1,548 publications dated after August, 2014.[547] FERC cannot rely on material DOE published in 2014, years before the pending applications were even submitted, without taking a hard look at whether that material continues to constitute "high quality information," 40 C.F.R. § 1500.1(b) and provide "full and fair discussion of significant environmental impacts," 40 C.F.R. § 1502.1.

One example of how DOE's 2014 materials no longer represent the scientific consensus is that recent data indicates much higher greenhouse gas emission rates for gas production. These materials assert that 1.3 and 1.4 percent of extracted gas is released as methane between the well and liquefaction facility. This estimate was based on "bottom-up" methodology, which aggregated measurements of emissions from individual components—*e.g.*, measurement of an individual pneumatic controller. Even at the time these reports were published, "top-down" studies, which measure total changes in atmospheric methane concentrations around gas production sites, indicated that these figures were a gross underestimate of total emissions.[548] More recent and more thorough bottom up studies have affirmed that the DOE's 2014 estimates were too low, and has generally supported the estimates provided by earlier top-down analyses, estimating that roughly 2.3% of extracted natural gas leaks to the atmosphere.[549]

VII. ALTERNATIVES.

The alternatives analysis is "the heart of the environmental impact statement," designed to offer a "clear basis for choice among options by the decisionmaker and the public." 40 C.F.R. § 1502.14. Fundamentally, an agency must "to the *fullest* extent possible . . . consider alternatives to its action which would reduce environmental damage." *Calvert Cliffs' Coordinating Comm. v. U. S. Atomic Energy Comm'n*, 449 F.2d 1109, 1128 (D.C. Cir. 1971) (emphasis in original). Absent this comparative analysis, decisionmakers and the public can neither assess environmental trade-offs nor avoid environmental harms. *See id.* at 1114.

The alternatives analysis must include an adequate range of alternatives. This includes "reasonable alternatives not within the jurisdiction of the lead agency," as well as "appropriate mitigation measures not already included in the proposed action or alternatives." 40 C.F.R. §

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[546] Physicians, Scientists, and Engineers for Health Energy, *The ROGER Citation Database, PSE's Repository for Oil and Gas Energy Research (ROGER), PSE's ever-growing resource*. Please find this available at https://www.psehealthyenergy.org/our-work/shale-gas-research-library/.

[547] Physicians, Scientists, and Engineers for Health Energy, *The ROGER Citation Database, PSE's Repository for Oil and Gas Energy Research (ROGER), PSE's ever-growing resource*. Access ROGER at https://www.zotero.org/groups/248773/pse_study_citation_database/items/order/dateModified/sort/desc. (last visited Nov. 30, 2018).

[548] Brandt, A.R., *et al.*, *Methane Leaks from North American Natural Gas Systems*, Science, Vol. 343, no. 6172 at 733-735 (Feb. 14, 2014).

[549] Alvarez *et al.*, *Assessment of methane emissions from the U.S. oil and gas supply chain, Science 361, 186–188 DOI: 10.1126/science.aar7204.* (July 13, 2018), available at http://science.sciencemag.org/content/early/2018/06/20/science.aar7204.

1502.14. One way in which this requirement can be violated is where an agency defines the purpose and need of the project so narrowly as to preclude alternatives other than the preferred project.

The alternatives analysis must be deep as well as broad. Alternatives must be "rigorously explore[d]." 40 C.F.R. § 1502.14(a). Rigorous exploration requires that the degree of analysis devoted to each alternative must be substantially similar to the degree of analysis devoted to the proposed action.[550] Because alternatives are so central to decisionmaking and mitigation, "the existence of a viable but unexamined alternative renders an environmental impact statement inadequate." *Oregon Natural Desert Ass'n v. Bureau of Land Mgmt.*, 625 F.3d 1092, 1100 (9th Cir. 2010) (internal alterations and citations omitted).

A. The DEIS Fails to Consider Reasonable Alternatives to the LNG Terminal Design.

The DEIS violates NEPA by failing to consider reasonable design alternatives. The only alternatives considered in the DEIS are no action, use of entirely different sites, and "system alternatives" that would consist of other LNG export projects. The DEIS provides no analysis whatsoever of alternative designs for a facility at the proposed Jordan Cove site that would potentially have lower environmental impacts. Failure to take a hard look at these alternatives is unlawful. An EIS must include a robust analysis of alternatives to the proposed action: this discussion is "the heart of the [EIS]" and must "provid[e] a clear basis for choice among options." 40 C.F.R. § 1502.14. The Clean Water Act also requires evaluation of alternatives that would reduce wetland impacts. 40 C.F.R. § 230.10(a). Although these two requirements are similar, *id.* § 230.10(a)(4), the Clean Water Act goes beyond NEPA's procedural requirements and imposes substantive obligations to actually adopt reasonable less damaging alternatives. 40 C.F.R. § 230.10(a).

1. Electric Compressors with Grid Tie In and/or a Dedicated Power Plant.

One alternative that should have been considered is the terminal design that was proposed and evaluated in the prior application: namely, use of electrically driven liquefaction trains in lieu of liquefaction trains powered by combustion terminals incorporated into the terminal site.

The DEIS offers no explanation for the change in proposed facility design. Although the project applicant has presumably determined that the new design better suits its current needs, NEPA requires a searching analysis of whether alternatives would have lower environmental impacts, or of the tradeoffs inherent in the choice of one design over another. In review of other facilities, FERC has concluded, for example, that using electrical power to drive liquefaction equipment can result in lower net air emissions than the gas-fired liquefaction trains Jordan Cove currently proposes here.[551]

Although not a substitute for providing a comparison of alternatives in the DEIS, here, we attempted a cursory comparison of the air emissions of the current proposed design, as forecast

[550] Council on Environmental Quality, "Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations," 46 Fed. Reg. 18026, 18027, 18028 (1981), Question 5.
[551] *See, e.g.*, Final EIS for the Texas LNG project, Docket No. CP16-116, at 3-12 (March 2019).

in the DEIS at 4-670, with the emissions expected from the prior design, as forecast in the 2015 FEIS, at 4-921. The two documents do not enable an apples-to-apples comparison, as the two group emissions into different categories. Moreover, it is unclear whether the current DEIS and prior FEIS used the same methodology for estimating emissions, or to what extent differences in the estimates arise from factors other than differences in facility design or capacity. NEPA requires FERC to clarify these issues by providing a clear comparison between using electrically and mechanically driven liquefaction equipment designs to meet a specific capacity. This comparison must consider air emissions, facility footprint, wetlands fill, obstruction to aviation, etc.

FERC must also re-examine the question of whether an electrically-driven design can acquire some or all of its electricity from the existing grid, eliminating or reducing the South Dunes Power Plant that was proposed for the prior design. Although FERC must consider the indirect impacts of generating electricity taken from the grid, it is likely that those impacts are lower than the impacts on-site power generation, given the amount of renewables in Oregon's generation mix. FERC's analysis must consider not only Oregon's current generation mix, but how that mix is expected to change over the life of the Jordan Cove project. We suspect that an electrically driven facility that acquires as much energy as possible from the grid will have a lower environmental impact than other design alternatives.

2. Marine Slip Design and Foreseeable Future Uses.

FERC must consider a smaller marine slip, which omits the proposed "emergency lay berth." DEIS 2-14. In addition, insofar as FERC further considers alternatives incorporating the western berth that Jordan Cove now labels an emergency lay berth, FERC must address whether it is reasonably foreseeable that this berth will be used for other purposes, and the consequences of such use.

We are not aware of any US LNG facility that incorporates a lay berth into its design; most, if not all, LNG export facilities operate without any berths beyond those used for active loading and/or unloading. Moreover, LNG proponents have previously concluded that a west coast LNG facility can successfully operate with only a single berth. The now-abandoned Oregon LNG proposal included only a single vessel berth.[552] From 2007 through at least November 2014, Jordan Cove expected that it would operate an LNG import or export facility with only a single vessel berth: although Jordan Cove expected that a second berth would be constructed, Jordan Cove consistently stated that this second berth would be put to other uses, rather than available for a disabled LNG tanker.[553] Neither FERC nor jordanCove have shown that a design that omits what is now labeled an "emergency lay berth" would be infeasible or otherwise unreasonable. Accordingly, NEPA requires analysis of an alternative that omits this berth.

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[552] Oregon LNG DEIS at Appendix D (August 5, 2015), Accession 20150805-4003

[553] *See, e.g.,* Jordan Cove Energy Project, LP, Application for Authority to Site, Construct and Operate a Liquefied Natural Gas Import Terminal, Dkt. CP07-444, at 14 (Sept. 4, 2007), *available at* https://elibrary.ferc.gov/IDMWS/common/OpenNat.asp?fileID=11442927; Jordan Cove, Dkt. CP13-483, Draft EIS at 2-81, 3-14 to 3-15 (Nov. 5, 2014).

Because few, if any, other LNG facilities incorporate an emergency lay berth, and in light of the long history in which the western berth here was described as being built to serve additional purposes (according to the 2014 draft EIS, "a proposed dry bulk cargo terminal, a coal export terminal, an intermodal container terminal, a sea wind turbine assembly area at Henderson Marsh, using the western berth of the Jordan Cove slip, all considered under the general rubric of the Port's 'Oregon Gateway Marine Complex.'" DEIS 3-15), it appears that designating this berth as an emergency lay berth is merely pretextual. If FERC concludes that this berth really is needed as a lay berth, FERC must impose conditions on the project that ensure that it is used *only* for that purpose.

Similarly, FERC must fully analyze an alternative that would reduce the size of the LNG vessel slip to the minimum needed to accommodate the vessels Jordan Cove actually plans to use. The DEIS states that the "slip and berth would be designed to accommodate LNG carriers as large as 217,000 m3 in capacity." DEIS 2-14 n.25. 2-37. However, it appears that the Coos shipping channel is restricted to carriers of smaller size. Insofar as Jordan Cove appears to have no plans to use carriers of this size, FERC should consider an alternative design that reduces the slip dimensions, and thus the environmental impacts, to the minimum needed.

Insofar as FERC also considers a slip designed to accommodate larger carriers, FERC must treat expansion or modification of the shipping channel, etc., that would be needed to enable Jordan Cove to use such larger carriers as reasonably foreseeable, and thus consider the effects of such future actions in this EIS.

B. Alternatives Relocating Terrestrial Activities to Reduce Disturbance of Aquatic Sites.

Multiple alternatives exist that satisfy the basic project purpose while reducing disturbance of special aquatic sites. A proposed activity is not water dependent if it does not require access or proximity to or siting within a special aquatic site in order to fulfill its basic purpose. 40 C.F.R. § 230.10(a)(3). While the LNG terminal itself may be water-dependent, many other activities proposed in the DEIS are not.

For example, the proposed North Bend worker's camp, the Southwest Oregon Regional Safety Center, and the South Dunes Power Plant all involve discharge of fill material to special aquatic sites, but do not require access or proximity to or siting within the special aquatic sites that will be impacted.

For non-water dependent activities, practicable alternatives that do not involve special aquatic sites are presumed to be available. *Id.* In other words, a non-water dependent activity necessitates a more persuasive showing than otherwise concerning the lack of alternatives. Here, the DEIS fails to "clearly demonstrate" that practicable alternatives for non-water dependent activities are not available to overcome this presumption. The workers' camp proposal includes construction of a 3-span, 235 feet long and 43 feet wide bridge to span a tidal mudflat in Coos Bay. The bridge will require placement of fill in two wetlands and impacts to tidal waters of Coos Bay. The DEIS does not include a discussion of any alternatives to this alignment, let alone analysis clearly demonstrating that no practicable alternatives to these impacts are available.

C. Alternatives to Size and Design of Key Project Elements.

The alternatives analysis presented in the DEIS fail to assess important project design alternatives. For instance, the application should evaluate in detail a terminal design that involves a much smaller footprint, rather than assuming that the project must be sized for 1bcf/d and very large LNG tankers. Additionally, the FERC should evaluate an alternative in detail that uses only the 12-inch Coos County pipeline (which would entail reducing the scale of the LNG project).

The DEIS does not evaluate offshore design alternatives. The applicants should evaluate an offshore design in detail and describe why areas that regularly face harsh weather, such as hurricanes, are successfully sited and built. NMFS argues in its previous comments that the analysis, and rejection of an offshore proposal as an alternative is inadequate "[g]iven existing or proposed terminals or other similar structures located in harsh environmental conditions elsewhere (e.g. Calypso LNG terminal off the eastern coast of Florida, Troll Natural Gas Fields in the North Sea with depths of 1,100 feet)." The applicants should explain further why the placement of terminals offshore is not feasible. Proposals currently exist to site wind and wave energy structures off the coast of Oregon and Washington. In fact, an offshore wind project is proposed for location 3 miles offshore from Coos Bay. The DEIS acknowledges and describes this Principle Power project. DEIS at 3-17. The DEIS does not adequately address this potential alternative and fails to weigh the significant reduction in public safety risks and disturbance to the Coos Bay Estuary against potential added costs.

The DEIS does not provide an adequate analysis of dredging method alternatives and a clear indication of why the proposed methods will minimize impacts. The DEIS indicates that both mechanical and hydraulic dredging may be used. Hydraulic pipeline dredging has the potential to impact aquatic species through entrainment and impingement. Additionally, other dredge methods will result in significant turbidity in Coos Bay. Although some specially designed hydraulic cutterhead dredges may reach 0.5 percent spillage, the DEIS fails to disclose what kind of cutterhead dredge will be used for dredging. This is vitally important information for the public and the agencies to assess the veracity of the applicant's statements, because without knowing what type of cutterhead dredge will be used, the public cannot begin to evaluate what kind of sedimentation dredging activities will cause. Furthermore, any modeling conducted on behalf of the Project is suspect until a spillage rate can be determined. All cutterhead dredges are not the same. Studies indicate that conventional cutterhead dredging "can liberate considerable amounts of turbidity and associated contaminants to overlying water." Cooke, 2005.

Selection of the proper cutterhead for the type of sediment, in addition to correct rotational speed and hydraulic suction, to obtain reduced suspension rates of sediments is rarely achieved. Herbich, 2000. Therefore, knowing not just the type of dredge used but also the anticipated methods of using the dredging equipment are important factors that must be disclosed for the public and agencies to properly analyze the effects of dredging at the proposed project. The FERC must make specific findings on the types of dredging equipment. The DEIS should present an analysis of alternative methods in order for the FERC to fully analyze the impacts dredging will have on turbidity and overall pollution. In addition the DEIS does not discuss alternative locations for the disposal of dredged material.

The DEIS does not evaluate alternatives to avoid impacts to estuarine oysters. The pipeline route across Haynes Inlet between MP 1.7 and 4.1 has the potential to significantly impact both native Olympia oysters and commercially grown Pacific oysters. The proposed route would be directly adjacent to commercial oyster beds. The use of the open cut pipeline installation method in this area and the associated plumes in turbidity, as well as release of any existing contaminants in the bay muds, could have significant impacts on these oysters and the economic values they produce to the Coos Bay community. While Jordan Cove proposes to utilize turbidity curtains as practicable to prevent sediment transport, these measures cannot control release of bacteria or other contaminants that may be present. The DEIS does not discuss alternatives to avoid impacting these oyster species or the economic impacts that could result from these activities.

The DEIS fails to present a comprehensive description of alternative fish screen designs and their impacts. The current proposal appears to dismiss fish screening, totally ignoring ODFW's prior comments stating, the "Coast Guard's concerns should not be interpreted to mean that ballast and cooling water screening cannot occur. Screening can and should occur to reduce negative impacts to fish as a result of this project. Additional marine industry review and permitting may be necessary, but this has not eliminated the opportunity to develop and use fish screens." State of Oregon 2009 FEIS comments at 37. The DEIS should evaluate clearly fish screen alternatives and the impacts of the proposed screening alternative, which would negatively impact ESA protected Coho salmon.

The application does not adequately evaluate alternatives in timing of construction activities. The DEIS states that "in general" construction of the pipeline would be timed to avoid periods of major juvenile or adult anadromous salmonid migrations in freshwater based on allowed in-water work periods, but notes that there may be modifications to the timing of construction. DEIS at 4-596. The application fails to justify why certain crossings will be constructed outside of in-water work windows.

The DEIS also fails to provide adequate information regarding alternatives for stream crossings. The application does not justify the widespread use of open-cut crossings. Additionally, the application fails to adequately evaluate alternatives that will be necessary if HDD crossings fail. Mitigation measures for HDD failures are completely inadequate, and the Williams pipeline company's own data show that HDDs for 36-inch pipelines fail unacceptably often. *See* FLOW 2008 DEIS Comments at 102-103. In its own experience, recent HDDs for this size of pipeline have failed one out of every three attempts – that's a full 33% of the time. *See* Williams Sept. 2007 Presentation, Williams Sept. 2007 documentation of its HDD Experience. The DEIS does not include adequate information on alternative measures that will be used if the proposed crossing methods are unsuccessful.

The HDD failure issue is particularly critical for the Rogue River HDD. The ODFW has repeatedly commented that the HDD contingency plan for the Rogue River crossing is inadequate, and that a wet open-cut crossing of the Rogue River is not currently permissible. The ODFW commented: "ODFW does not consider a wet open-cut to be an acceptable alternative due to the impacts to fish, fish habitat, the river, as well as impacts to the sport fishery and the

economy of upper river communities. ODFW strongly disagrees with the wet open-cut as an alternative crossing method on the Rogue River." State of Oregon 2009 FEIS comments at 40.

The DEIS fails to provide an adequate analysis of mitigation alternatives. For instance, proposed mitigation measures to avoid and minimize sedimentation and erosion in stream crossings are inadequately site-specific and are generally outlined in the ECRP. FERC's analysis and the DEIS indicate that details of mitigation would depend on the source of the problem. According to the State of Oregon's 2008 DEIS comments, the lack of detailed mitigation measures and alternatives is inadequate. "In order to be effective, a mitigation measure must be supported by analytical data demonstrating why it will constitute an adequate buffer against the negative impacts that may result from the authorized activity. The DEIS's reliance on future modifications does not provide enough protection under this standard. The public must be able to review, in advance, how specific measures will bring projects into compliance with environmental standards." State of Oregon 2008 DEIS comments at 32. The DEIS does not resolve this outstanding issue.

Given the lack of analysis on the efficacy of mitigation measures, it is also unclear whether the pipeline should have been rerouted or altered to avoid key resources. For instance, proposed measures may be inadequate to avoid increased turbidity, temperature discharges, erosion and sedimentation in the proposed crossing of the Coquille River and other streams and rivers. The DEIS does not show that riparian clearing has been avoided and minimized in all areas. The ECRP includes general methods, but does not justify why limitations on construction activities in riparian areas cannot be increased. The State of Oregon noted that the 2008 DEIS did not include adequate analysis of avoiding impacts to waterbodies. "At some crossings, PC would reduce the construction ROW width to 75 feet at the crossing of forested and scrub shrub wetlands to minimize impacts to these resources. Alternative methods of crossings with less or no impact must be explored and presented. Boring underneath the forested wetlands could avoid impacts to high functioning wetlands." State of Oregon 2008 DEIS comments at 95. These issues remained unresolved in the current DEIS, and have not been adequately addressed in the alternatives analysis for stream crossings and mitigation measures in the DEIS.

The DEIS application does not provide adequate information to justify its route selection through Coos Bay. The selection of the route through Coos Bay unduly impacts the Coos Bay Estuary and Haynes Inlet, a sensitive area for both shellfish and fish habitat, as well as the economies that rely on those areas (such as oyster growers). The State of Oregon recommended, "Find another (upland) route to avoid impacts to the Coos Bay estuary to the maximum extent possible. This proposal maximizes impacts to waters of the state. More thorough alternatives analysis is required." State of Oregon 2008 DEIS comments at 94. The current proposal does not minimize impacts to the estuary. It also does not explain why an alternative involving a significantly reduced construction impact area would not be practicable.

In summary, the applicants do 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, little consideration of the relative costs, technologies, and logistics is present in the alternatives rejected or disregarded by the project proponents. The applicants provide cursory and inaccurate analysis of the impacts of its dredge/fill activities, and the FERC

must find that practicable alternatives exist to severely degrading the Coos Bay Estuary, 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). The alternatives analysis fails to address many alternatives, and some alternatives are given such cursory consideration that it is impossible to realistically conclude they are not practicable. This includes changes to terminal design, turning basin size and design, alternative LNG sites, and both major and minor route variations on the pipeline route.

VIII. INCOMPLETE AND MISSING INFORMATION.

There are many instances of missing information in the DEIS that make public review and comment impossible. For example, the biological assessment, which is referenced dozens of times in the DEIS, was not available to the public for review prior to the close of the public comment period. The regulations implementing the National Environmental Policy Act (NEPA) state that

> If an agency prepares an appendix to an environmental impact statement the appendix shall:
> (a) Consist of material prepared in connection with an environmental impact statement (as distinct from material which is not so prepared and which is incorporated by reference (§ 1502.21)).
> (b) Normally consist of material which substantiates any analysis fundamental to the impact statement.
> (c) Normally be analytic and relevant to the decision to be made.
> (d) Be circulated with the environmental impact statement or be readily available on request.

40 C.F.R. § 1502.18. The NEPA regulations also stated that if the agency elects to incorporate by reference material relevant to the environmental impact statement (EIS):

> Agencies shall incorporate material into an environmental impact statement by reference when the effect will be to cut down on bulk without impeding agency and public review of the action. The incorporated material shall be cited in the statement and its content briefly described. <u>No material may be incorporated by reference unless it is reasonably available for inspection by potentially interested persons within the time allowed for comment.</u> Material based on proprietary data which is itself not available for review and comment shall not be incorporated by reference.

40 C.F.R. § 1502.21 (emphasis added). Taken together, these provisions require FERC to make available, during the public comment process, information that is referenced in the EIS and is material to the public's understanding of the environmental consequences of the proposed action.

The failure to provide information relevant to the public's review of an EIS, and is referenced in – and has been incorporated by reference by – the EIS, violates the National Environmental Policy Act. The Oregon Federal District Court recently held based on similar facts that the

failure to provide specialist reports – similar to the biological assessment for the Jordan Cove/Pacific Connector project – violates the law. *League of Wilderness Defenders v. Connaughton*, No. 12-2271-HZ (D. Or. Dec. 9, 2014). Failure to make this information available to the public is arbitrary, capricious, and not in accordance with law. 5 U.S.C. § 706(2)(A).

To be clear, commentors are not arguing that biological assessments *per se* are subject to notice and comment. Instead, based on NEPA case law, if the DEIS relies on information for its conclusions and analysis, then that material must also be available to the public. In this case, the BA is not even complete, much less made available for public review, even though FERC relies on it for the vast majority of its effects analysis and conclusions. Not only does this violate 40 C.F.R. § 1502.18 and 40 C.F.R. § 1502.21, but also suggests that FERC has made a pre-determined conclusion without adequate support in the record. 5 U.S.C. § 706(2)(A).

Another example of missing information is the incomplete draft Hydrostatic Testing Plan. The DEIS states that the plan, "includes measures to prevent the transfer of aquatic invasive species and pathogens from one watershed to another." However, this draft Hydrostatic Testing Plan has not been provided to the public. Further, it does not appear from this brief description, that the draft plan includes the information related to discharge locations and dissipation measures necessary to evaluate the potential effects on water quality standards.

Other information was also omitted from the DEIS. For example, the DEIS notes that a great deal of information was lacking or not yet available, and provides several recommendations regarding providing FERC with that information. We request that that information be made publicly available as well, particularly submissions filed with the Secretary per recommendations 14 through 26, and 48 through 52, should be subject to a minimum of a 30 day public comment period with public comments taken into account before issuance of the Final EIS and any approval of the project by FERC. Please note that the numbering of Recommendations is incorrect. There are two separate Recommendations listed for numbers 17, 18 and 19.

We also note that on February 12th 2015, one day before the end of the comment period, the applicant filed additional information associated with recommendations (pertaining to missing information) 15, 16, and 45. Commenters are unable to review this information before the close of the comment period, and again reiterate that NEPA requires that any information relied upon by the agency must be available for public review before a decision is made. 40 C.F.R. § 1502.21. We therefore renew our request for an extension of the comment period for this DEIS, even though such a request is futile.

The DEIS 4-68 falsely states

> Some surface erosion is likely to occur; however, 85 to 95 percent of surface erosion can be prevented or trapped on-site by application of measures in the ECRP. Any surface erosion that does occur is expected to be minor, and within the range of natural variability for watersheds in southwest Oregon (see appendix F.4)"

The reference to "the range of natural variability" is in the context of compliance with the NW Forest Plan Aquatic Conservation Strategy (ACS) and BLM RMPs. Assertions of compliance with the ACS does not exempt the DEIS from disclosing in plain English what the sediment impacts to tens of miles of stream actually are. Furthermore, the best available science strongly suggests that the watersheds and stream channels traversed by the pipeline west of the Cascades are already degraded to a condition outside the "the range of natural variability" due to previous and ongoing logging, road building and gas pipeline construction (see Columbaroli and Gavin 2010,Anlauf 2011 attached). Since the 1950s sedimentation of streams has increased 5 fold due to logging and road building which is far greater than any sediment episode in the past 2,000 years. This means that any further human related deposition of sediment (e.g., pipeline construction) will cause an undisclosed number of stream reaches to be further outside the "the range of natural variability". The watersheds and critical coho salmon habitat impacted by the pipeline have no buffering capacity for additional sediment from pipeline construction due to historic and ongoing logging. Furthermore, the DEIS 4-95 states: "Pacific Connector proposes to cross 26 impaired waterbodies using dry/diverted open-cut crossing techniques. Conventional boring, DP, or HDD methods would be used to cross 5 of the impaired waterbodies." Several of these streams are 303(d) listed for sediment which means new sources of sediment from pipeline construction are not allowed.

The DEIS 4-114 states that "Blasting could alter the in-channel characteristics and hydrology of the stream, potentially decreasing flows due to increased infiltration where bedrock would be fractured." Stream flow in sandstone geology may be very sensitive to blasting. Since summer flows in sandstone streams are naturally very low, all flow could be lost. The DEIS fails to provide for flow measurements above and below the crossing site to establish baseline conditions. The lack of pre- project flow measurements would allow flow reductions form pipeline installation to go undetected. The DEIS fails to provide mitigations should blasting cause flows to decrease or be lost entirely. How will Pacific Connector restore flows lost due to pipeline crossings? The DEIS does not discuss or analyze that decreased or lost surface flow would decrease juvenile salmonid production. The lack of pre- project flow measurements would allow flow reductions form pipeline installation to go undetected.

The DEIS 4-297 states: "Blasting in stream channels can have adverse effects on fish, especially for fish with swim bladders. Explosives detonated near water produce shock waves that can be lethal to fish, eggs, and larvae by rupturing swim bladders and addling egg sacs (British Columbia Ministry of Transportation 2000)." and further states on p. 4-298 that "Currently, about 37 crossings have known bedrock, some of which may require blasting (table 4.5.2.3-2). Fish would be removed from the crossing area, in accordance with Pacific Connector's *Fish Salvage Plan*. Where blasting would occur near a crossing, fish would be excluded an additional 25 feet upstream and downstream from the crossing area by use of barrier nets." The DEIS is defective because it fails to state that if blasting is found to be killing or injuring fish then the exclusion area would have to be enlarged beyond 25ft. The DEIS fails to disclose that blasting could kill fish beyond the 25ft exclusion barrier and provide for monitoring by a biologist.

The DEIS is not based on the best available science because it has not established pre-project quantitative baseline upland erosion rates, baseline stream sedimentation rates, baseline stream

temperature, baseline dissolved oxygen, baseline salmonid densities, baseline riparian vegetation, baseline stream shade and baseline data for other aquatic parameters for the stream reaches that could be impacted. Baseline data for the "no action" alternative has not been established from actual pipeline crossing sites. Interpretation of post-pipeline monitoring will be difficult in the albescence of pre-construction data.

Pacific Connector has not surveyed stream channels at stream crossings for physical and biological parameters to establish required baseline "no action" data for this DEIS. Baseline data for fishes and fish habitat appears limited to "proposed" pre-construction surveys at stream crossings (DEIS 4-101). DEIS 4-286,287 states "Substrate characteristics and physical habitat features would be determined through pre-construction surveys, and the upper 1 foot of existing substrate would be replaced with clean cobble or gravel (not derived from crushed gravel), or a combination of both, or in some cases matching existing substrate during reconstruction after pipe installation." The Pacific Connector Is purposely not surveying affected stream reaches in a timely manner that would inform the DEIS. While we agree the surveys identified are needed prior to construction, these surveys are inadequate to fully establish baseline (pre-construction) stream conditions above and below stream crossings. Basic stream survey data must be considered "available" for NEPA purposes but Pacific Connector has chosen not to collect stream data until just prior to construction. For example, spawning surveys are needed to detect fish spawning sites below stream crossings that would be subjected to elevated sedimentation. Stream survey techniques are available from ODFW,EPA and USFS to document habitat conditions for stream reaches that could be affected from cumulative sediment effects during the life of the project but Pacific Connector has not done any stream surveys to inform the NEPA decision process. In the absence of baseline stream inventories, monitoring of sediment would be limited to anecdotal observations of EI's and not be based on the best available science. We assert that all stream reaches within 6th or 7th field watersheds that will have pipeline construction be stream surveyed with an emphasis on fine sediment deposition, pebble counts, quality/quantity of spawning and rearing habitat. See Anlauf et al 2011 and Firman et al. 2011 for the kinds of data needed.

In addition to stream surveys some watersheds would need cumulative effects analysis with regard to sediment and temperature. The East Fork Cow Creek is a one example of a smaller stream needing its own watershed analysis due to multiple pipeline crossings. Anecdotal observations of EI's about erosion and turbidity, while necessary, are not sufficient with respect to "best available science". Protocols for establishing baseline conditions for streams are available for NEPA purposes from ODFW, USFS and EPA. The DEIS fails to disclose expected increases of erosion/sedimentation because it has not established baseline conditions for streams and stream reaches at pipeline crossings. For example, the percent fines at the stream reach affected can be determined pre-construction and then monitored post- construction. The DEIS fails to estimate the range of increase that is likely to occur such that effective monitoring can be conducted. The DEIS fails to report the erosion rates/sedimentation rates for coho occupied stream reaches for "no action" and the proposed actions.

Scientific monitoring during the life of the project cannot document adverse impacts if baseline conditions are not established prior to disturbance. The DEIS is defective because it equates "no data" to mean "no sediment impact ". At a minimum, habitat conditions for critical coho

salmon habitat must be surveyed prior to construction to agency protocol standards that would allow for future scientific monitoring.

The DEIS is not based on the best available science because its sediment analysis appears to be limited to 5th field watershed scale (DEIS 4-587). This scale of analysis is not appropriate for a linear project that would adversely affect coho salmon and other fishes that spawn in much smaller 6th and 7th field watersheds. The science issue is that pipeline construction across, upstream, or upslope of spawning and rearing fish (e.g. coho salmon) will be impacted due to large scale disturbance on steep slopes that will deliver sediment to stream channels located below them. Currently, there is ongoing erosion and sedimentation from the forested areas associated with fish bearing streams. Deforestation and pipeline construction is certain to increase erosion rates and increase sedimentation. The DEIS fails to model or estimate <u>how much</u> sediment will be funneled into smaller 6th field and 7th field watersheds where coho salmon and other fishes spawn and rear. Repeated sediment denial in the DEIS with reference to "minor" or "not detectable" sediment impacts and repeated statements about reliance on anecdotal observations of EI's are not "best available science" when establishing ongoing and post-project sediment impacts to streams occupied by fish, especially the federally listed coho salmon. Pre- and post- stream surveys are a science based approach to monitor sediment impacts and the effectiveness of a suite of mitigations for this very large project but none seem to have been identified in the DEIS except for pebble counts prior to construction.

The DEIS 4-105 provides data and discussion about expected suspended sediment from studies of the dry open-cut method.

> For Project area streams, average watershed suspended sediment values within 50 meters downstream of the stream crossings were modeled. During a standard crossing using dam-and pump or flumed crossing methods, when water diversion and sediment control methods are in place, values would range from 27 to 153 mg/l for flumed crossing and 7 to 35 mg/l with dam-and-pump crossings for the affected watersheds. These values are similar to those found by Reid et al. (2004) noted above. However, values would be much higher should the crossing sediment control method fail, with modeled suspended sediment values ranging from 712 to 4,102 mg/l if wet open cut methods were used during crossing failure. Duration of elevated values from failure would likely be short, less than about 2 to 4 hours for small streams and possibly up to about 6 hours for large stream crossings. While failures of diversion control systems during crossings are uncommon (Reid et al. 2004), they would likely occur at some crossings during construction. Suspended sediment concentrations from any crossing method would decrease to background levels (about 2 mg/l) within about 0.6 to 19 km (approximately 0.4 to 11.8 miles) downstream of a crossing, among the 14 watersheds.

The DEIS admits that there would be some failures of the dry open-cut method and suspended sediment discharge could range up to 4,102 mg/l. The DEIS fails to acknowledge that this is a significant impact even if temporary. The DEIS 4: 273-284 provides detailed quantitative modeling of expected suspended sediment intensities and its effect on rearing salmonids. The

DEIS 4-282 states: “In the unlikely event that dry crossing methods fail completely and wet open-cut methods must be implemented to complete the crossing, if suspended sediment conditions are high, the longer duration of elevated levels could result in the potential for severity levels to be higher (e.g., SEV 9, reduced fish density) over a limited stream area.”

“Reduced fish density” means fish such as listed coho salmon will perish. The assertion of “unlikely” is contradicted by DEIS: 105 which states “While failures of diversion control systems during crossings are uncommon (Reid et al. 2004), they would likely occur at some crossings during construction.”

The DEIS fails to take a hard look at the adverse impacts of deposition of fine sediment from elevated suspended sediment. DEIS: 4-280 (TABLE 4.5.2.3-3) indicates that elevated suspended sediment would affect streams for 595 ft to 15,577 ft. below the crossing. This is significant because as the suspended fine sediment settles into the streambed, the fine sediment percent of the stream will be increased. This increase of fine sediment is significant because most stream fish bearing stream channels in coastal areas suffer from elevated fine sediment that is detrimental to salmonid production (Anlauf 2011). We assert that the DEIS has failed to take a hard look at the project’s cumulative effect for increasing fine sediment in streams which has already been greatly elevated by logging and road building. The DEIS:4-283 falsely states : “Sediment releases would affect primarily short-term stream habitat conditions. Sediment from stream crossings could affect spawning habitat below crossings as Project-generated sediment could increase gravel embeddedness downstream, although elevated fall and winter flows following crossing would likely flush fines from any local spawning sites.” This statement is conjectural and not supported by any data relevant to the streams being impacted. Even if some of the find sediment is flushed, it will simply move the adverse impact further downstream. We again reiterate that the streams affected are already suffering from elevated percent fines in the streambed and any additional fine sediment must be considered significant (see Anlauf 2011). The DEIS fails to adequately consider “context” as per NEPA with impact analysis.

The DEIS is not based on the best available science because it does not require systematic suspended sediment monitoring, turbidity monitoring , streambed percent fines monitoring and fish density monitoring during the first phase of construction in the coast range and Umpqua watershed where impacts are known to be the greatest due to the high amounts of fine sediments at these stream crossings due to ongoing and previous logging and road building While anecdotal observations by EI’s are certainly necessary, we assert that scientific monitoring of suspended sediment, turbidly, percent fine sediment in streambeds and salmonid densities is warranted for at least the first phase of construction where coho salmon are at most risk due to existing high amounts of fine sediment.

The DEIS is not based on the best available science because it fails to adequately disclose, analyze or monitor fine sediment <u>deposition</u> subsequent to construction at stream crossings. Increased fine sediment deposition below the stream crossing is likely to despoil fish spawning and rearing habitat. Assertions of minor or temporary impacts are speculative and not science based.

The DEIS is not based on best available science because it has not established baseline physical and biological conditions at and below stream crossings. The DEIS cannot assert "minor" impacts if it has not established baseline conditions. A project of this size must establish baseline stream conditions for each stream reach of stream habitat (generally 1,000 ft below crossing) because of the numerous and variable stream conditions along the pipeline route.

Stream habitat is linear and needs to analyzed as a linear phenomenon. The DEIS is not based on the best available science because it has not analyzed and reported possible impacts to linear stream reaches of fish habitat (e.g. 1,000 ft below each pipeline crossing).

DEIS 4-21 states "Risks associated with landslides include both the risk that installation of the pipeline may adversely affect slope stability, and that post-construction land movements could damage the pipeline .Pacific Connector selected its proposed route to avoid existing landslides and areas susceptible to landslides (i.e., unstable slopes where construction-induced landslides could occur)." DEIS 4-22 states "All of the moderate- and high-hazard deep-seated landslides identified along the alignment were avoided where feasible during final route selection." The DEIS fails to disclose the number and location of moderate and high-hazard deep seated landslides that could not be feasibly avoided. Similarly the DEIS does not disclose the number and location of moderate and high risk for shallow rapid landslides (i.e. debris flows) which are very common in the Tyee geology in the western 60 miles of the pipeline. While the new alignments reduced some of the risk for landslides induced by construction it did not eliminate all landslide risk. Alignment maps indicate that the pipeline route is located on ridges where it will it will be located close or on highly landslide prone headwalls of first order drainages. It is well documented that logging roads in similar locations have been associated with increased landslding that can run out for miles and adversely affect coho salmon spawning and rearing habitat.

The DEIS is defective because it fails to estimate the amounts of sediment generated from erosion during intense winter storms where several inches of rain can occur in a few hours. Sediment generated from forest clearing (i.e. logging) for the pipeline on steep topography is well documented even with the sediment control measures identified.

The DEIS is not based on the best available science because it fails to identify linear stream reaches that could be affected with elevated sediment deposition post-construction. Except for stream crossings during construction (DEIS 4 273-284), the DEIS fails to estimate the increase in turbidity (NTUs), the amount of suspended sediment (mg/ml), or the duration of sediment laden water that could affect many stream miles located downstream or down slope of pipeline construction.

The DEIS fails to acknowledge severe post construction sedimentation of streams caused by the construction of a much smaller gas pipeline from Roseburg to Coos Bay. (See attached Register Guard Article dated 7/25/2004 "Enterprise goes Sour"). The DEIS fails to discuss scientific uncertainty and scientific controversy regarding the effectiveness of sediment control measures identified in the DEIS for coastal areas with known potential for catastrophic erosion/sedimentation. Since sediment control measures failed catastrophically during the construction of a previous gas pipeline, similar sediment discharges are possible for this gas

pipeline because this pipeline traverses the same unstable steep terrain, this pipe is much larger, and the area of disturbance is much larger. The DEIS fails to address the credibility issue surrounding gas pipeline construction in southwest Oregon and associated severe sediment impacts to coho salmon streams from a previous gas pipeline. Assertions of "minor" sediment impacts for this pipeline are not scientifically or empirically substantiated. Data from pipelines constructed in Washington are not directly applicable to the Oregon Coast Range geology.

The DEIS fails to acknowledge likely (during the life of the project) catastrophic sedimentation from landsliding that is associated with pipeline construction or sedimentation that is greatly exacerbated due to the presence of the pipeline (e.g., explosions , fire, loss of stabilizing tree roots and forest cover along pipeline corridor, need to relocate pipeline). See for example: Seismically Induced Landslides and Rockfalls (DEIS 4-21); Landslide Hazards (DEIS 4-21); Rapidly Moving Landslide Risk Assessment (DEIS 4-19); Deep-seated Landslide Risk Assessment (DEIS 4-20).

We are not asserting that the installation of the pipeline will "cause" landslides, although it certainly could. The DEIS has inadequate analysis about how pipeline construction and connected actions induced landslides would affect coho salmon habitat. What is certain is that the pipeline will exacerbate sedimentation of streams when landslides of unknown causes entrain the pipeline corridor and landslide debris proceeds downslope to enter stream channels. The DEIS fails to discuss how the pipeline will exacerbate sedimentation of coho stream habitat from landslides certain to occur over the next 30 years. DEIS monitoring of pipeline strains caused by slow deep seated land movement will not be an effective deterrent for shallow rapid slides (debris flows).

The DEIS discussion (DEIS 4:11-25) is from the perspective of maintaining the pipeline infrastructure, avoiding damage to private property and public safety. The DEIS 4:21 states: "For the purposes of landslide hazard evaluation in this report, a distinction is made between the hazard associated with a landslide and the risk associated with that hazard. In the following discussions, statements of risk apply to the potential for damage or failure of the pipeline from earth movements. It is recognized that the consequences of a pipeline failure may be catastrophic and involve fire and/or explosion."

The almost certain delivery of large amounts of sediment to coho stream systems from pipeline ROW and access roads associated landsliding during the 30 year life of the project is not discussed or quantified. High risk coho stream reaches for landslides are not spatially identified. The DEIS discussion of landslides is incomplete because it focuses on the threat to the pipeline and ignores the threat to water quality, coho salmon and critical fish habitat from these geologic phenomena.

The DEIS contains no site specific erosion control structures that could ameliorate sedimentation of streams from large landslides. The DEIS fails to state that erosion control structures intended for surface erosion in the ECRP would likely be ineffective in preventing large landslide sediment from reaching stream channels (e.g. sediment fences). In fact, such erosion control structures could exacerbate the effects or landslides by funneling stormwater runoff on to landslide prone steep headwalls and steep zero order basin.

The DEIS 4:114-116 temperature analysis fails to consider pipeline ROW and access road related landslides (e.g. debris flows, aka rapid moving landslides) that would destroy large swaths of shade producing riparian vegetation. Debris flows would destroy shade for stream segments for up to a mile or more of perennial stream and would adversely affect stream temperatures of coho salmon rearing below the affected channels. The DEIS temperature analysis is not based on the best available science because it does not discuss how debris flows associated with pipeline construction/access roads would greatly increase stream temperature because large amounts of shade would be destroyed. Although the timing and location of debris flows that would destroy riparian vegetation cannot be predicted, there is high probability that these debris flows will occur during the life of the project (i.e. 30 years). Due to the severity of the impact (i.e. significant) the temperature impacts need to be discussed at least in general terms and a commitment made for restoration.

Similarly, the DEIS and BA are defective because they failed to discuss that the project is likely to adversely affect critical habitat for coho salmon because debris flows, either caused or exacerbated by pipeline construction and associated access roads, could seriously degrade significant linear reaches of coho critical habitat over the life of the project. The DEIS 4-288 limits discussion of unstable slopes to stream crossings when it is well known that debris flows originate at headwalls and zero order basins well upslope from actual stream channels. The DEIS and BA are not based on the best available scientific information.

The DEIS fails to quantify sediment from road construction and use and take site specific corrective action. Heavy vehicle use of unpaved access roads during construction will create large amounts of fines on the road surface that will be washed into streams during subsequent intense rainfall. This fine sediment delivery is likely to be substantial and will significantly add to baseline stream sediment that already exceed standards desirable for coho salmon (Anlauf 2011). The DEIS appears to lack any site specific mitigations for roads that would disconnect the sediment laden road surface runoff from entering streams and subsequently adversely affecting critical coho salmon habitat. Even with BMPs roads are known to be a major fine sediment sources impacting small coho streams because not all fine sediment can be contained. Even with watering, large amounts of dust is likely to enter streams as fine sediment. Dust has been found to be substantial source of fine sediment in heavy use areas.

Dismissing road related sediment impacts as “minor” or “undetectable” due to implementing BMPs is not credible when the DEIS/Pacific Connector fails to identify specific BMPs to disconnect the road sediment from streams at specific locations. Furthermore, the DEIS/Pacific Connector has failed to conduct a scientific road inventory of the vast access road system to identify specific locations where sediment laden water from the road surface will enter streams. Assuming the road surface generating sediment laden flow to streams is a mere 200 ft is not scientifically defensible in the very steep areas of identified access roads. Some roads may have no sediment controls for many hundreds of feet as they descend on steep slopes and cross stream channels. Rills and gullies for several hundred feet are likely present in some access roads that shunt sediment from the road surface directly into the stream. Merely grading these roads is not going to correct the underlying lack of erosion control structures on the road. Regardless of ownership, since Pacific Connector is using these roads with heavy equipment, logging

equipment etc.. they are responsible for preventing the pollution caused by vehicle activity on the roads. Access roads are a connected action whose sediment impact to coho salmon and water quality has not been fully addressed in the DEIS.

The DEIS is not based on best available science because it does not disclose the length of stream reaches (e.g. critical coho stream miles) that could be impacted by road construction and heavy road use. The DEIS is not based on best available science because it fails to identify pre-project surveys to establish baseline conditions for stream miles that could be affected by increased road related sediment caused by this project. For example, road inventory methods are available to estimate the percent of the road system connected to the stream system (baseline condition). The DEIS fails to explicitly state the extent to which this connectivity would be decreased, if any.

DEIS 4-23 states: Pacific Connector would install barriers at locations along its pipeline route to discourage unauthorized public access to the right-of-way. These barriers may include boulders, dirt berms, log barriers, signs, and locked gates. Slash from clearing operations would be redistributed on the right-of-way, to improve habitat and to make OHV travel difficult. These barriers should minimize OHV access to the right-of-way and reduce unauthorized hunting or poaching of game animals (see section 4.10.2.5 of this EIS for a further discussion about OHV traffic). The barriers identified are necessary but not sufficient to prevent significant damage by 4WD vehicles, ATVs and motorcycles. We have observed repeatedly that similar barriers are not effective in SW Oregon due to the determination of OHV vandals and poachers. We suggest that an alternative will be developed with adjacent private land owners to gate access roads at strategic locations where it is impossible to get around the barrier and Pacific Connector will fund the construction and maintenance of these gates. Merely putting barriers where the ROW begins is not going to be effective. This is common knowledge among land owners and land managing agencies.

The DEIS fails to acknowledge that portions of the pipeline corridor will be used by OHV despite barriers. The impact will be cumulative because OHV vandals will compromise barriers in the long term. Determined OHV users, especially hunters and loosely organized OHV groups, will find access around boulders placed to prevent OHV use. Motorized use will damage erosion prevention measures and newly planted vegetation. Vehicle ruts will funnel winter flows. Ruts will become gullies delivering more than “minor” amounts of sediment to stream channels. The DEIS fails to disclose that effective control of OHV will be very difficult due to the remoteness of the pipeline corridor and numerous points of access. The DEIS fails to establish baseline monitoring protocols to quantitatively and spatially assess OHV damage with some type of GIS system. The DEIS has failed to develop a coordinated plan with NFS, BLM and private land owners to prevent OHV. We assert that expected erosion control cannot be met if OHV access destroys newly planted vegetation, damages erosion control structures and create ruts, rills and gullies. Inevitable OHV use will be accompanied with the high risk of introducing POC root disease to critical stream habitat. The DEIS fails to disclose that introduction of the POC root disease would decrease shade along streams far more than stream crossings. Assuming effectiveness of mere boulders to prevent OHV use in SW Oregon is naïve to say the least.

IX. THE ECONOMIC ASSUMPTIONS OF THE PROJECT ARE FLAWED.

Independent economic analysis of the JCEP suggests that the economic premise of the Project is flawed. In May 2019, McCullough Research analyzed the project and concluded that

However, there are a number of good reasons to question whether this is a good location and a good project design. First, the supplies for Jordan Cove are taken from the Malin hub in southern Oregon. This puts the terminal at a six-hundred-mile disadvantage in transportation costs. Second, the announced costs of the terminal are high by market standards – significantly higher than its competitors. Third, the technology of Jordan Cove – using natural gas as opposed to electricity for compression – makes it less efficient than its competitors in British Columbia or the Gulf Coast.

Our analysis indicates that Jordan Cove will have a significant cost disadvantage compared to its competitors – approximately 25%. We also calculate the chance of Jordan Cove reaching operation is only one third.

McCullough Research, *The Questionable Economics of Jordan Cove LNG Terminal* (May 6, 2019). The FEIS should review this analysis and address how its conclusions are incorporated into FERC's FEIS for the Project.

X. CONCLUSION

For the reasons set forth above, the DEIS fails to take a hard look at the impacts of the proposed projects. The DEIS fails to support its conclusions that the projects would have only "some limited adverse environmental impacts," that "most of impacts would be reduced to less-than-significant levels," or that the projects "would be an environmentally acceptable action." DEIS 5-1. FERC therefore cannot proceed without revising its analysis. Because of the extent of revisions necessary, any revised analysis must be made available for further public comment prior to any FERC decision to grant the pending applications. More broadly, the undersigned continue to contend that the adverse environmental and other impacts of these projects demonstrate that the projects are contrary to the public interest and should be denied.

Any questions regarding this comment letter should be directed to Susan Jane M. Brown, Staff Attorney, Western Environmental Law Center (brown@westernlaw.org or 503-914-1323).

Sincerely,

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