

Fracked Gas Export Will Harm Our Waters

The proposed Pacific Connector Gas Pipeline and the Jordan Cove liquefied natural gas (LNG) terminal will dramatically impact water resources throughout the region. This paper is meant to summarize some of the key impacts on water that will occur if this project is built and operated. The project would become Oregon's largest source of climate-changing greenhouse gas pollution.

The proposed Pacific Connector and Jordan Cove LNG terminal represent an enormous step backwards for water and salmon. This comes at a time when people all across the Northwest are struggling to address the impacts of dams on salmon, investing hundreds of millions in dam removal and salmon recovery.

The impacts from the Pacific Connector Pipeline and Jordan Cove LNG terminal will harm tribal people directly by diminishing water quality, degrading salmon habitat, and undermining the livelihoods of tribal members who depend on these resources. By bringing salmon closer to extinction, the project poses a huge threat to people who rely on salmon throughout Southern Oregon and Northern California.

The Proposal

The Pacific Connector pipeline would be 36 inches in diameter. It would carry fracked gas, which is mostly made up of methane. Methane is much more potent as a greenhouse gas than carbon dioxide. The pipeline *would not* carry liquid oil or liquid methane. Instead, the pipeline would be full of high-pressure, flammable gas that is not odorized.

The pipeline would be approximately 230 miles in length. It would carry high-pressure fracked gas from Malin, near the California border, to the proposed Jordan Cove liquefied natural gas (LNG) export terminal. The source of the gas in the pipeline is gas wells throughout North America, both in the U.S. and Canada. Most of this gas is produced through hydraulic fracturing, "fracking."

At the Jordan Cove terminal, the gas would be super-cooled into a liquid – liquefied natural gas (LNG). Once liquefied, the gas would be shipped overseas in LNG tankers. The project involves massive dredging in Coos Bay to facilitate very large LNG tankers.

At each step of the project the project will impact water resources. Fracking pollutes groundwater near fracking wells to produce the gas. The pipeline would harm wetlands, rivers and streams in its path. And the



Map of Pacific Connector - from Pacific Connector Application.

terminal and dredging would degrade the Coos Bay estuary where gas would be liquefied and shipped. The damage extends overseas as well. Dredge disposal and shipping will impact ocean waters, and overseas water resources will be impacted near gas-fired industrial sites. Finally, the project's massive global warming pollution will contribute to climate change, which impacts water resources everywhere.

The Pipeline Will Harm Water

The Pacific Connector Pipeline will pollute water in a number of ways. It's important to recognize that, although the pipeline does not pose the risk of an oil spill, it does have enormous impacts because fracked gas pipelines carry their own dangers that would be felt throughout the region. These impacts include harms to clean water, fishing, and wildlife habitat that sustain people in the Klamath region and beyond. These negative effects are felt first and worst by people in tribal communities who rely on healthy fish runs, clean water, and the livelihoods they support.

The pipeline will harm the streams, rivers, and wetlands it crosses:

- Construction of the pipeline will impact hundreds of streams and rivers. Pacific Connector says it will cross 326 waterbodies and involve over 6 miles of construction in wetlands. ***The table listing the pipeline's waterbody crossings is 17 pages long.***
- In most stream crossings, the pipeline will be placed in the stream in an open trench while the streambed or riverbed is deprived of water. In many places, this involves damming the stream temporarily or diverting the stream so that construction can take place in the streambed. This type of "open cut" crossing will be used for the North, Middle, and East forks of the Coquille River, multiple forks of Myrtle Creek, one crossing of the South Umpqua River, Lost Creek, many tributaries in the Rogue and Klamath basins, and dozens of additional streams and rivers. Many fish-bearing streams would be crossed by "dry open cut" methods. This will impair the ability of fish to migrate, reproduce, and grow in Oregon's streams and rivers.
- In most wetlands, the pipeline would be constructed while water is still present. This is called a "wet crossing." Pipeline construction compacts soils, pollutes water, and destroys vegetation.
- At each place where the pipeline crosses streams, the construction will degrade fish habitat and water quality. Construction of the pipeline will remove shade from streams, warming water to make it harder for fish to survive. Construction will increase sediment and turbidity (murkiness) in the stream. This also harms fish and fish habitat. These and other water quality impacts will diminish the quality of habitat for fish. It may also harm people's drinking water supplies.
- According to the Federal Energy Regulatory Commission (FERC) review of this project, "Construction of the pipeline would remove riparian (streamside) vegetation, reduce shade, and increase the exposure of surface water to radiant energy (sunshine), including those within

riparian reserves.”¹ The pipeline developer tries to downplay these rising stream temperatures by saying they would only be significant for small streams. Yet, small streams feed big streams, and high water temperatures are one of the biggest obstacles to healthy fish habitat.

- Many of the watersheds in the path of the pipeline, including the Upper Klamath Basin, already have high stream temperatures. And the state does not yet have a plan to lower temperatures, even as the proposed pipeline would worsen this hot water problem.
- NOAA Fisheries wrote about the pipeline in 2009, “...pipeline crossings would elevate stream temperatures within vicinity of the crossing 0.4 to 0.5 degrees C...Many of the streams crossed by the pipeline are at or above the optimal temperature for salmonids. An increase this large will increase stress and disease, and decrease fitness of rearing juveniles.”² In short, a key fisheries agency has identified that the pipeline could cause dramatic harm to fish and fish habitat where stream temperatures are already too high.
- Even FERC found that, “Clearing and grading of streambanks, removal of riparian vegetation, instream trenching, trench dewatering, and backfilling could result in streambank modification, increased sedimentation, turbidity, increase in temperature, decreased dissolved oxygen concentrations, releases of chemical and nutrient pollutants from sediments; and introduction of chemical contaminants, such as fuel and lubricants. An increase in soil compaction and vegetation clearing could potentially increase runoff and subsequent streamflow or peak flows. Surface waters could be impacted due to alteration of groundwater flow where the pipeline intersects waterbodies.”³

- In short, FERC anticipates that construction of the pipeline would harm fish and fish habitat. According to FERC, the pipeline may impact both surface water (like streams and rivers) and groundwater. The picture to the right shows how pipeline construction in Coos County exposed small streams and caused turbid, murky water runoff.



- In a few locations, the pipeline is proposed to cross underneath a stream or river. The company would use a method called “horizontal directional drilling” – basically drilling a hole under the stream and pulling the pipe through it. In other sites, the company will use boring, which is similar. Directional drills or bores are proposed for the Rogue River, Klamath River, Coos River, Coos Bay, and one crossing of the South Umpqua River.

¹ FERC Final Environmental Impact Statement (FEIS). P. 4.3-44.

² NOAA Fisheries Comment on Jordan Cove & Pacific Connector. June 24, 2009.

³ FERC FEIS. P. 4.3-31.

- Directional drills are meant to avoid impacts to the waterbody. However, they pose risks to water in a couple of ways. First, the drill might fail or get stuck. This might make the pipeline company abandon the drill and use an in-water installation method, instead. Second, the drilling activity may rupture the bottom of the streambed. This is called a “frac-out.” Frac-outs can release huge amounts of drilling lubricants into streams, fouling fish habitat and downstream drinking water supplies.
- Southern Oregon experienced dozens of frac-outs during the construction of a much smaller pipeline – a 12-inch pipeline – in Coos County. The frac-outs harmed several streams and rivers. (See images below).



- A frac-out in the Rogue, Umpqua, or Klamath River could have major impacts on water quality. It could release tons of bentonite – a fine clay used as a drilling lubricant – into water. This substance, potentially mixed with other pollutants, would harm fish, fish habitat and water quality.
- While directional drills pose problems, they can avoid some of the impacts of dry open cut crossings (if the direction drill is successful). Other proposed LNG projects in Oregon – Oregon LNG and Bradwood LNG – proposed to use directional drills for almost every crossing of a fish-bearing stream. Yet, Pacific Connector proposes to use open-cut trenching through fish-bearing streams and rivers instead of attempting to use directional drilling. Pacific Connector may be avoiding directional drills because they are more expensive and complicated, despite their potential to avoid surface water impacts in many fish-bearing streams. In short, Pacific Connector isn’t attempting to minimize the impacts on many fish-bearing streams.
- In some areas, Pacific Connector proposes blasting through solid rock to install the pipeline. Blasting has the potential to harm nearby streams, wetlands, and wildlife habitat. According to FERC, “Blasting could alter the in-channel characteristics and hydrology of the stream, potentially decreasing flows due to increased infiltration where bedrock would be fractured.”⁴ Basically, FERC is stating that blasting could permanently alter streams near where it occurs. According to the application, there are 36 streams with “bedrock” conditions in the path of the

⁴ FEIS. 4.3-34.

pipeline, where the company may decide to use blasting or hammering to place the pipeline through a solid rock streambed.⁵

- Construction of the pipeline on steep, unstable slopes can cause landslides and sedimentation into streams. The pictures below shows how construction of the 12-inch pipeline in Coos Bay triggered slides on steep slopes, overwhelmed erosion control devices (hay bales and silt fences), and dumped tons of sediment into nearby streams. These impacts bury salmon spawning grounds and take years to recover. (See photos below).



- The pipeline would cross rivers or streams that are drinking water sources for 12 public drinking water systems.⁶ The access roads and other construction activities involved with the pipeline would impact even more. And even more private drinking water sources – wells, streams, and rivers – could be harmed by construction and operation of the pipeline. For example, a frac-out or large release of sediment into a stream could clog a downstream drinking water intake. And digging a trench or blasting near a shallow well can permanently impact how the well is recharged with water.
- Construction of the pipeline also involves developing access roads to build the pipeline in rough, remote terrain. These access roads could increase runoff, remove trees and other vegetation, and pollute rivers and streams with sediment. In many areas, construction involved with the pipeline will disturb an area hundreds of feet wide on steep slopes. These wide “extra temporary workspace” areas will have a major, long-term impact along the pipeline route.
- The pipeline would involve a linear clear-cut of hundreds of acres of forest, and it would impact over 5,000 acres during construction and operation.⁷ Long-term alterations to these forests will involve changes to streamside vegetation and impair the health of the forests that make up the watersheds of many streams and rivers in Southern Oregon.

⁵ Resource Report 3. Table 3.2-16.

⁶ Resource Report 2. P. 12.

⁷ Resource Report 1. P. 27.

Construction and testing of the pipeline will require enormous quantities of fresh water.

- Construction of the pipeline involves testing the pipeline with huge volumes of water. The company will pump water through the pipeline to ensure that it can hold fracked gas. This water could be polluted with materials used to construct the pipeline and could be discharged into streams and rivers. Regardless of the discharge point, testing the pipeline will require over 60 million gallons⁸ of freshwater, including over 15 million gallons of freshwater in the Klamath Basin, alone.⁹ If the pipeline re-uses the same water to test multiple segments of pipe, it would still consume at least 15 million gallons of water across the entire route.¹⁰
- Overall, construction of the pipeline could use almost **90 million gallons of water!!!!**¹¹

The pipeline poses major fire risks and other hazards in the case of a rupture.

- **What happens if the pipeline fails?** If the pipeline breaks, it will release fracked gas into the air. (It won't spill oil or LNG.) This gas can be ignited when it mixes with air. When gas makes up between 5 % and 15% of a mixture with air, a spark from a ruptured pipe or passing vehicle can ignite it. Gas pipeline failures can cause massive fires. The pictures below show the damage from a gas pipeline rupture on a Williams Pipeline-owned 30-inch pipeline in Appomattox, Virginia.



- Other major pipeline failures, such as a PG&E pipeline rupture in San Bruno, California, have destroyed homes and caused fatalities. The picture to the right shows the San Bruno pipeline fire, which killed eight people and burned for several hours.
- It's hard to overstate the fire risks with a high-pressure, fracked gas pipeline. First – if a pipeline



⁸ Resource Report 1. P. 58. Table 1.3-3. (These numbers are so high, I felt the need to cite them to show I wasn't making it up!)

⁹ Resource Report 1. P. 58. Table 1.3-3.

¹⁰ Resource Report 1. P. 54.

¹¹ Resource Report 1. P. 59. See "Grand Total" of **88,272,285 gallons.**

leaks, people won't smell the gas because Pacific Connector does not plan to odorize the gas in its pipeline. Second, the distance between shut-off valves is very long - almost 20 miles apart in some rugged rural areas. This means that, if a pipeline leaks, the gas between these valves will have to burn off before a fire is extinguished. This type of fire could severely impact dry, rugged, rural lands and people who live in them. The presence of the pipeline could also interfere with firefighting activities. Most rural communities are already struggling to fight fires: a high-pressure fracked gas pipeline makes this problem worse.

- Firefighting and fire effects on steep slopes, forests, and other lands can dramatically impact streams, rivers, and wetlands. The presence of a high-pressure fracked gas pipeline could cause a fire, exacerbate a fire, or interfere with firefighting.
- A pipeline failure under a stream or river could also release a large amount of fracked gas into a waterbody. This release could impact the stream, wetland or river until the gas bubbles out of the waterway. The pipeline will operate at up to 1600 pounds per square inch of pressure – an enormous amount of pressure. At this pressure, a pipeline leak in a stream would diffuse large amounts of fracked gas into the waterway, potentially impacting oxygen levels and water quality.

The pipeline poses other risks that are not yet fully understood.

- Herbicides will be used for this project, including picloram, which is known to be toxic to fish. This and other herbicides harm Coho salmon, other native fish and aquatic invertebrates. In addition, thousands of pounds of fertilizer will be used to reseed some of the project area. Lost Creek Reservoir on the Upper Rogue has experienced health warnings in recent years due to outbreaks of a toxic cyanobacteria. The best way to avoid these toxic blooms is to control and reduce fertilizer additions to the waterbody, which includes run-off and erosion from fertilized areas. There has been no analysis on the impacts of this project's fertilizer use in the Rogue Basin or other basins.
- The pipeline will impact the Coos Bay Estuary. The company now proposes to use a directional drill to cross the estuary to reach the North Spit of Coos Bay, the location of the proposed Jordan Cove LNG terminal. Drilling through the Bay may impact submerged tribal cultural resources. Additionally, any frac-out or drilling failure resulting in a trench installation could negatively impact water quality, shellfishing, and salmon habitat. If the drill under Coos Bay fails, will the company revert to its original plan – digging a trench through the bay? This would harm oyster beds in Coos Bay and habitat for other aquatic life.

Jordan Cove LNG Terminal Impacts on Water

The Jordan Cove LNG terminal and the dredging for the terminal and its tankers will fundamentally alter the Coos Bay estuary. Coos Bay is critical habitat for coho salmon. It also supports oyster farms, shellfish gathering, and a host of aquatic and estuarine life.

Dredging and its resulting turbidity (murky water) will harm the Coos Bay estuary.

- There are two dredging activities associated with the terminal. First, Jordan Cove LNG proposes to build a dock, a slip for ships to moor while loading, and a turning basin for ships to turn around. These activities involve approximately 5.7 million cubic yards of dredging and excavation. This alone dwarfs other LNG proposals in Oregon.
- The Port of Coos Bay is also considering a huge dredging project to deepen and widen the Coos Bay shipping channel. This will alter a huge swath of the Coos Bay estuary and remove approximately 18 million cubic yards from the Coos Bay estuary – by far the largest dredging proposal in recent Oregon history.
- The project will impact the bay by discharging dredged material, causing turbidity plumes (murky water). While Jordan Cove developers claim that they will create little turbidity, the sheer scale of the proposed dredging is sure to suspend sediment in the water, making the water murky and less health for fish and shellfish.
- Dredging may also stir up contaminated sediments from past industrial activities in the Coos Bay estuary. These contaminants include heavy metals, petrochemicals, pesticides, and other long-lived contamination that can enter the food web and accumulate in the tissues of animals and fish. Contaminated sediments pose a major risk to shellfish – such as oyster beds – in Coos Bay. Many of these toxins do not degrade over time, such as polycyclic aromatic hydrocarbons (PAHs) or polychlorinated biphenyls (PCBs). They can bind to sediment, but disturbances such as dredging can release them back into the water column and food web.
- The U.S. Fish and Wildlife Service summarized some of the impacts of a previous proposal to dredge Coos Bay, and the impacts would be even greater for the proposed Jordan Cove LNG terminal and Port of Coos Bay dredging:

“Changes in hydrology, salinity, water temperature, or turbidity due to dredging would affect changes in planktonic and benthic populations as well as overall habitat viability and function. Increased salinity could have serious negative impacts on saltmarsh vegetation although it would encourage eelgrass production. Turbidity and temperature changes would influence benthic populations, shellfish productivity, and fish distribution, all of which would negatively impact wildlife species that depend on this habitat or these populations for food and cover. The blasting of rock in the lower bay would disturb birds and marine mammals. Greater river traffic and increased maintenance dredging activities would also have adverse impacts on wildlife use of the bay.”¹²

- When it denied the Bradwood LNG terminal on the Columbia River, DEQ wrote, “Direct and indirect impacts of excessive turbidity to salmonids and other fish species is well documented in the literature (Rosetta, 2005). Impacts to endangered salmonids, other

¹² Larson, Impacts on Fish and Wildlife Resources of the Proposed Channel Deepening Project at Coos Bay, 1990, in 1993 FR and EIS, at 303.

migratory species and resident fish may reach lethality at times or cause behavioral impacts (Rosetta, 2005)..."

The Bradwood LNG terminal involved less than 1/20th – less than 5% - of the dredging proposed with the Jordan Cove and Port of Coos Bay dredging projects. Accordingly, we should expect that the Jordan Cove proposal and the related Port dredging project would cause dramatic, unavoidable harm to salmon and salmon habitat in Coos Bay.

- The Port of Coos Bay would dump dredged material in a new ocean disposal site. Dumping over 18 million cubic yards of dredged material at this site will negatively impact habitat in this area. Federal agencies have only just begun to assess these impacts. Other dredged material will be disposed of on Coos Bay's North spit in an attempt to raise the level of the site out of the tsunami inundation zone. Dredged material disposal is likely to cause turbidity and degrade the shoreline and the bay.
- The proposed dredging is the opposite 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. The proposed massive channel deepening will fundamentally alter the Bay, further eroding and undermining the integrity of shallow water habitats.

Operation of the LNG terminal will harm water quality, fish, and other aquatic life.

- LNG vessels have large wakes, potentially stranding juvenile fish. Engine cooling water intakes will suck up fish. This is called "entrainment." Dredging of the access channel and construction of the pipeline across Coos Bay could jeopardize the survival of aquatic species. The project will cause the permanent loss of high quality benthic (bottom of the bay) communities, locally increased water temperatures from discharges of cooling water, permanent loss of shoreline vegetation, introduction of exotic and invasive species, and harms to individual species.
- LNG vessels can strike marine mammals. Additionally, noise from LNG vessels can injure and disorient aquatic species, including whales. Increased ship traffic will harm whales both through noise and potential vessel strikes.
- Modifying the navigation channel will allow more vessels and increase ship traffic. Ships may transport exotic species on multiple surfaces and in water releases from ballast or engine cooling water. These species may harm the aquatic ecosystem.
- Each LNG tanker will use millions of gallons of ballast water (over 9 million gallons for even the smaller LNG tankers). When loading LNG, ships will discharge this ballast water into the Bay. This ballast water may include non-native species that could harm Coos Bay.
- Each LNG tanker will require millions of gallons of cooling water. Even smaller LNG tankers will use over 6 million gallons of estuary water, and then discharge this water at a much higher

temperature into the Bay. Cooling water discharges will be much hotter than ambient Bay temperatures, impacting water quality in the Bay. The company claims that water will only be 3.6 degrees F hotter than the bay. Yet, an analysis for a similar LNG terminal on the Columbia River found that cooling water temperatures would be over *19 degrees F higher than ambient temperatures*. At this temperature, the water would approach temperatures that are stressful to aquatic life and harmful to salmon.

- The proposed project area includes designated critical habitat for the Federally Threatened Oregon Coast Coho in the Coos Subbasin, which includes the Coos Bay estuary. Coho will likely be impacted directly and by the pipeline and terminal, through turbidity plumes, dredging of the access channel, or entrainment by LNG vessels, as well as indirectly through the degradation of habitat as a result of the proposed project. By widening and deepening the channel, the proposed project would shift current shallow or intertidal habitat into deep water habitat.
- The LNG terminal and the tankers will harm marine mammals due to habitat destruction and vessel strikes. The large increase in deep draft vessels due to the LNG terminal will increase the risk of vessel strikes of marine mammals and turtles.
- When one stock of salmon becomes severely imperiled, this impacts fishing throughout Southern Oregon and Northern California. Already, fishing in the Klamath River and along the Northern California and Southern Oregon Coast is severely limited in many years because of low numbers of returning salmon. The developments associated with the Pacific Connector Pipeline and Jordan Cove LNG terminal will further degrade salmon habitat, impacting fishing throughout the region. This overall impact on salmon and fishing will impact tribal nations and their protected resources.

Fracked Gas Poisons Water & Harms the Climate

- The Jordan Cove LNG terminal and the Pacific Connector Pipeline will promote more fracking, which has enormous impacts throughout the continent. Most of the gas in the pipeline will come from Canada and the Rockies, where fracking is used to produce gas.
- Hydraulic fracturing (“fracking”) involves the injection of fluids into the ground to break open shale gas formations, releasing methane gas to be gathered in pipelines.
- Fracking releases methane, a potent greenhouse gas. Methane is 86 times more powerful as a greenhouse gas than carbon dioxide over a 20-year timeframe. The overall impact of fracked gas export on the climate is significant. Jordan Cove and the Pacific Connector would become the largest greenhouse gas polluters in Oregon, even before acknowledging the upstream impacts of fracking.

- Climate change impacts every water resource in the region—resources that sustain us. Climate change makes droughts more frequent and severe, increases water temperatures in streams and rivers, causes disease in forests, degrades watershed health, shifts ocean currents and increases sea levels. Climate change is having impacts now. These impacts are felt first and worst by tribal nations who depend on clean water and healthy fish populations.
- Fracking has led to significant groundwater contamination in the United States and Canada. It produces enormous quantities of wastewater that can seep into groundwater, poisoning water sources. This was graphically displayed in the Oscar-nominated film “Gasland,” where residents near fracking wells could light their water on fire and experienced illnesses from contamination.
- The Jordan Cove LNG Terminal and Pacific Connector Pipeline will induce environmentally harmful fracked gas production as well as increase prices domestic consumers and industry pay for natural gas. These harms translate into economic damage. If pollution sickens people, poisons groundwater near fracking wells, or restricts people’s choices, both people and the economy will suffer. If clean air, clean water, and adequate waste disposal capacity are not available, the pollution from fracking will harm people.
- Similarly, if the Coos Bay estuary and other landscapes along the pipeline route are damaged and industrialized, then salmon and other fishing, shellfish cultivation, tourism, agriculture, forestry, hunting and angling, and other place-dependent industries will suffer.

Additional Information:

This is just a summary of some key issues. You probably will recognize many additional problems with these projects.

More Information: NoLNGExports.org

Feel free to contact these folks if you have questions:

Stacey Detwilder – stacey@rogueriverkeeper.org

Sarah Westover – sarah@rogueclimate.org

Dan Serres – dserres@gmail.com (503) 890-2441