COLUMBIA RIVER INTER-TRIBAL FISH COMMISSION

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Via U.S. Mail and Electronic Mail

November 29, 2016

U.S. Army Corps of Engineers
Seattle District Regulatory Branch, CENWS-OD-RG
Attention: Ms. Danette L. Guy
2108 Grand Boulevard
Vancouver, Washington 98661
NWS.MBTL@usace.army.mil

RE: Millennium Bulk Terminals - Longview, LLC; Project NWS-2010-1225
Draft Environmental Impact Statement

Dear Colonel Buck and the U.S. Army Corps of Engineers, Seattle District:

Once again, we examine another fossil fuel transport project that will have profound repercussions to the Columbia River and the tribal people who rely on the river's resources for their livelihood and cultural identity. The Millennium Bulk Terminal project (Project) is a massive coal export terminal that is a major step backwards for efforts to turn to clean fuels and slow climate change. The Project is fundamentally antithetical to the billions of dollars invested in fishery recovery in this region, and the Columbia River Inter-Tribal Fish Commission (CRITFC) opposes its construction. CRITFC requests that the Corps of Engineers honor its trust responsibility and obligations to the tribes and deny the permits for the Project.

The Draft Environmental Impact Statement (DEIS) is flawed and lacking in comprehensive information. Its analysis is too narrow to adequately and appropriately analyze the true environmental impacts of the project. In addition, the only alternative provided in the DEIS (excluding the no-action alternative) is a false alternative. It is an adjacent property to the current proposal that would have all the same impacts – albeit a few more – than the proposed site. In other words, the DEIS merely provides analysis on one legitimate option to compare to a no-action option. In our view, the no-action option is the most appropriate direction for the Project.

<u>The Project will Impact Tribal Fishing.</u>

The DEIS narrowly concludes that the project would "not be expected to measurably impact tribal fishing", ostensibly because there are no gill nets currently tied to the shore in Longview, Washington. Impacting the tribal fishery, however, is more than impeding gill nets.

The tribal fishery is not limited to a section of the Columbia River. True, there is a management agreement that currently identifies "Zone 6" as an area where the treaty fishery has priority.

However, as Paul Lumley testified in the Tesoro Savage proceeding, the tribes have never given up their usual and accustomed fishing rights to any area of the river. (Lumley Testimony at 4332).

The courts determined that the right to fish means the right to have a supply of fish. The Supreme Court in *Washington v. Washington State Commercial Passenger Fishing Vessel Ass'n*, 443 U.S. 658 (1979) interpreted the tribes' treaty fishing clauses as promising protection for the tribes' supply of fish, not merely their share of the fish. The Court wrote:

> Governor Stevens and his associates were well aware of the "sense" in which the Indians were likely to view assurances regarding their fishing rights. During the negotiations, the vital importance of the fish to the Indians was repeatedly emphasized by both sides, and the Governor's promises that the treaties would protect that source of food and commerce were crucial in obtaining the Indians' assent.

Id. at 676. Since the Project will add adverse impacts the health of the fish, by extension it does affect the tribal fishery and tribal fishing.

Healthy fish need clean water and habitat. The U.S. Fish and Wildlife Service (USFWS), in their comments on Washington's SEPA DEIS, noted that the Project will measurably increase toxic pollutant concentrations in soils, sediments, and water, and will very likely result in exposures, potential toxic effects, and impacts to the Service's trust resources. Dr. Penney, in his testimony, noted that fish that are stressed (such as when they are in warm water), are more susceptible to infection and mortality from other stressors. (Penney Testimony at 4031).

> When fish get stressed or they have to move around obstacles, whether they're natural or manmade, energy gets used. If fish experience stresses maybe outside of their control, that also stresses the fish and it requires energy and that can be disruptive to that process.

(Penney Testimony at 4029). The Project will add more ships and more toxic stressors to the river system that will hinder the health and recovery of the tribal fishery.

The Project will directly impact the Estuary, which is important to the lifecycle of tribal fish, including salmon and lamprey. The Lower Columbia River Estuary (Estuary) is a vital component to the lifecycle of the fisheries. NOAA Fisheries (or NMFS), in its 2011 estuary recovery plan noted that the estuary supports over 150 populations of salmon and steelhead, among many other species. There is also a great deal of salmonid mortality in the Estuary coming from avian predation, loss of rearing habitat and refugia, and effects from ship traffic, which can cause habitat destruction, slope erosion, and wake stranding. The Millennium Bulk Terminal project will increase the annual large marine vessel traffic by approximately 80%. This is a major growth in an activity that will harm tribal fishery resources.

The Project will increase the risk to and impede access for tribal fishing along the Columbia River. The DEIS inadequately examines the very real effects of increased rail traffic in the Columbia River Gorge. The operation of this Project will increase rail traffic by approximately 400% of current traffic. This will pose a very real safety risk – and impediment – to tribal members in exercising their treaty fishing rights. Many tribal fishers have stories of family members who

were lost to train strike, including Kathryn Brigham, who testified to losing members of her family while they were accessing their fishing sites. (Brigham Testimony at 3828). At current rail traffic volumes, this risk is still too high. If the Project is permitted, that risk would be increased by an order of magnitude.

Coal dust, especially in the Columbia River Gorge, disproportionately affects tribal fishers who live and work along the river. This is a documented and measured problem that affects the health of people, even at current rates of coal transport, which is a "mere" two to three trains a day. The coal industry has been reluctant to cover coal rail cars, instead relying on surfactants that do not adequately control fugitive coal dust in windy places such as the Columbia River Gorge. In comparison, the DEIS notes that marine vessels, which are not a source of fugitive coal dust emissions, are fully enclosed. At a minimum, the Corps should require that the Project accept only fully covered rail cars. Only then can this health and water quality issue be reduced.

In sum, the DEIS fails to recognize that "measurable impacts" to the tribal fishery are far-reaching and variable, and cannot be appropriately examined in such a narrow frame.

<u>The Project Conflicts with Tribal and State Goals in Reducing Climate Change</u>

The tribes are on the front working on the challenge of climate change, because they will bear a significant amount of the burden from its effects. As Kathryn Brigham noted in her testimony: "And as tribal leaders and tribal people, we have been taught more than once to talk about and think about our next seven generations. One of the things that my grandfather said was that you fight real hard for today, but not at the expense of your children, your children's children and their children. That's why we talk about the next seven generations and beyond." (Brigham Testimony at 3825). The State of Washington has also been a leader in defining impacts of future climate change and has been moving to establish renewable energy alternatives to fossil fuel consumption. The Millennium Bulk project is in direct conflict with these efforts.

Greenhouse Gases. The DEIS states that the proposed project would cause 61 million tons per year increase in carbon dioxide emissions or a 12.3% increase over the life-cycle greenhouse gas ("GHG") emissions of the 2005 U.S. GHG emissions target. The total operational GHG emissions from proposed project operation is estimated by the DEIS at 3,192,548 metric tons per year, or 37,950,823 metric tons over the proposed 18 year project lifespan, with an upper bound estimate an order of magnitude higher.

The United States has committed to reduce its greenhouse gas emissions by approximately 17% from 2005 levels (7,350.2 million metric tons of CO2e) by 2020—a decrease of about 1,250 million metric tons of CO2e (Executive Office of the President 2013). As part of the climate policy agreement with China and the Intended Nationally Determined Contribution levels submitted to the United Nations in 2015, the United States has set a target to reduce emissions 26% to 28% below 2005 emissions (6,428 million metric tons of CO2e) by 2025 (White House Office of the Press Secretary 2015). This policy would reduce annual emissions to a level of 4,628 to 4,757 million metric tons of CO2e by 2025. The reduction in annual emissions would range from 1,035 to 1,163 million metric tons of CO2e below 2013 annual emissions. If the target were reached through consistent annual reductions, the United States would have to reduce annual emissions by 86 to 97

million metric tons of CO2e each consecutive year, beginning in 2014. Under the 2015 Energy Policy Scenario, the Proposed Action would add 0.9 million metric tons of CO2e annually to domestic emissions by 2028, and 3.2 million metric tons of CO2e globally. The Millennium Bulk project is simply inconsistent with U.S. and Washington's climate policies.

Climate Change Information and Consequences. Recent climate global circulation models from the International Panel on Climate Change (CMIP 5) includes atmospheric and oceanic circulation models and treats GHGs as representative concentration pathways (RCPs) that include methane, aerosols and other climate change gases. The additional warming effect that will influence Columbia River hydrology and flooding is likely substantial (Figure 2).

The proposed project creation of GHGs must be reexamined in context with updated Washington State emission limit criteria that comports with updated climate science and international assessments. This includes the recent global climate change pacts that indicate that without substantial reductions of GHGs, global temperatures are projected to increase by 2 degrees C which would cause melting of global ice sheets, sea level rise, extreme droughts and floods and other serious consequences for the world community. The Paris Agreement, strongly advocated by the U.S., calls on the developed countries to "…. achieve a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gasses in the second half of this century" indicating that much of the world's remaining reserves of coal, gas and oil must remain in the ground. For the Pacific Northwest, such impact projections include extreme low river flows and summer temperatures with major consequence for human and ecological systems.

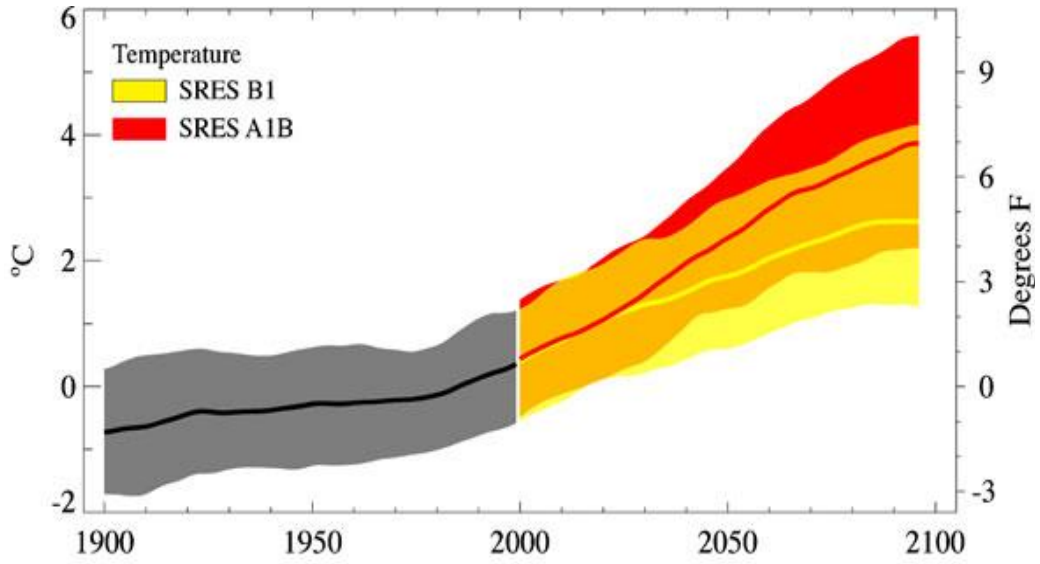

Figure 1. Air temperature projections from two CMIP 3 future climate global circulations models based upon CO2 emissions downscaled for the Pacific Northwest relative to the 1970-1999 mean air temperature. This projection indicates that air temperatures could increase by about 5 degrees C. From Mote and Salathe 2010.

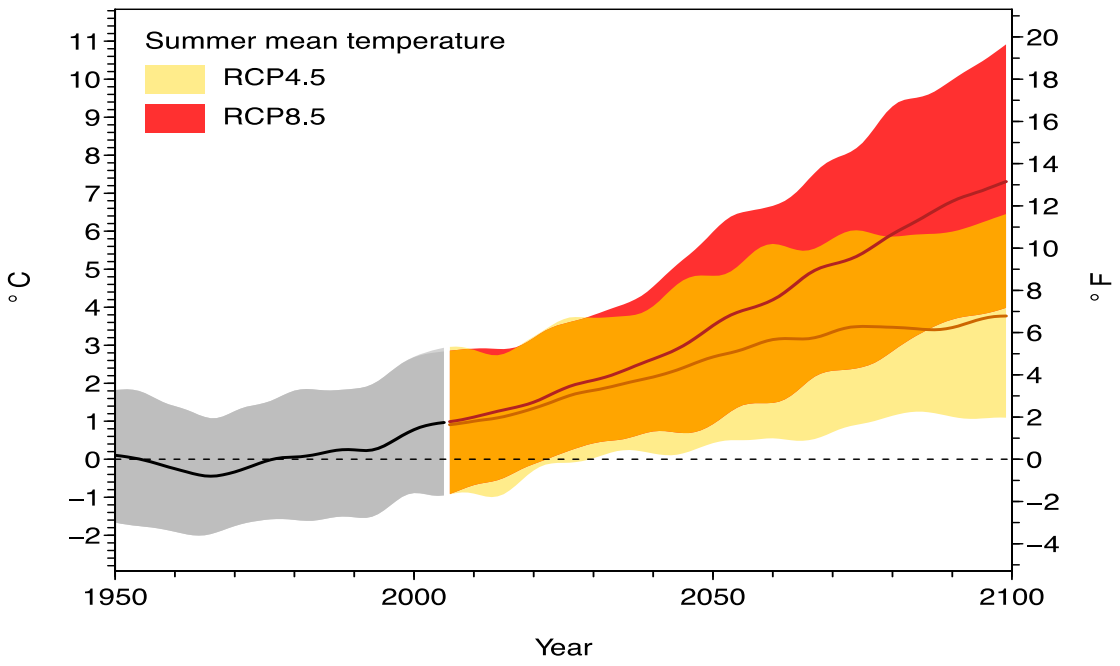

Figure 2. Projected Air Temperatures in the Pacific Northwest under two representative concentration pathways downscaled from CMIP 5 global circulation models. The current path based upon updated GHG emissions is the RCP 8.5 trend line that would result in air temperatures increasing by about 11 degrees C by the end of the century. From D. Rupp, Oregon Climate Change Research Institute 2014.

The State of Washington's integrated climate response strategy, "Preparing for a Changing Climate" (Ecology 2012; Publication No. 12-01-004) notes that if substantial actions are not taken to reduce GHGs, impacts to Washington State are projected to reach "nearly $10 billion per year in costs to human health, storm damage, coastal destruction, rising energy cost, increased wildfires, drought and other impacts." As evidenced in 2015, impacts from low flows and high temperatures resulted in massive salmon losses that directly impacted CRITFC's member treaty resources. Ecology, in a report to the Washington Legislature, recommended that Washington State GHG emission limits need to be adjusted to better reflect current science and that the results of the December 2015 Paris Climate Change Pact should be used to better inform how Washington's limits should be adjusted to meet state, national and international targets (Ecology 2014-Publication 14-01-007). This is consistent with the recommendation of the Carbon Emissions Reduction Taskforce (CERT) Report to the Washington State Governor's Office (CERT Final Report, November 14, 2014) that emission limits need to be "…updated based on the science on human-caused climate change reported in global or national assessment of climate change science".

In Executive Order 14-04, Washington State Governor Jay Inslee established the Carbon Emissions Reduction Taskforce (CERT). Among other things, the task force needs to respond to the University of Washington's finding that "decisions made today about greenhouse gas emissions will have a significant effect on the amount of warming that will occur after mid-century". The Taskforce responded by creation of a report to the Governor's office submitted on November 14, 2014. A major tenet of the report was the creation of a carbon reduction emissions program to

"establish a cap on carbon pollution emissions with binding requirements to meet statutory emission limits" established by the legislature.

Figure 2. Washington's Historical GHG Emissions, Business-As-Usual Projection, and Emissions Limits.[8]

Shaded areas show expected reductions from existing[9] and potential policies[10] and the remaining "gap"[11].

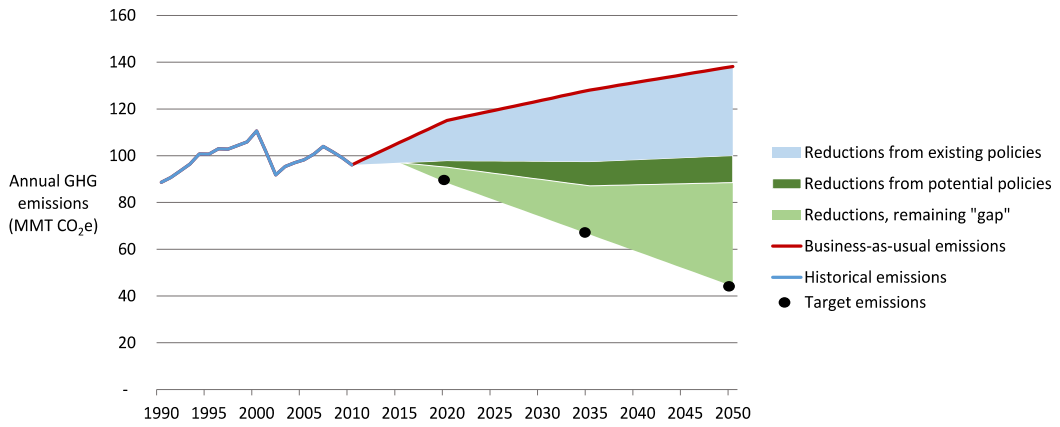

Figure 3. Washington State GHG Historical and Future Projections and Emission Limits. From Washington State Carbon Emission Removal Task Force Final Report to the Washington State Governor's Office, November 2014).

In a November 10, 2014 letter to the Governor from the Taskforce, the group stated that Washington State was not on track to meet Washington State GHG emission limits, committed to by state law. The group identified transportation as the largest source of GHG emissions in the State, comprising almost 50% of the State's emissions. Without a proper compensatory offset based on updated climate and GHG emission science and intergovernmental obligations, the proposed project could substantially violate updated emissions restrictions, setting the State further from necessary and legal limits.

While increased summer temperatures are also mentioned in several recent reports as an impact of future climate projections, [1]the DEIS does not identify this impact. Synergistic effects of high river temperatures, with corresponding extreme low flows on fish habitat and populations, particularly in concert with other proposed project impacts such as release of saltwater ballasts from vessels and dredging and vessel disruption of critical fish habitat are serious.

Portions of the proposed facility site are located within the 500-year floodplain, but there are portions located within the 100-year floodplain, thus portions of the proposed facility site are within the 100-year floodway of the main river channel.

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[1] *Preparing for a Changing Climate* (Ecology 2012; Publication No. 12-01-004; National Climate Assessment (2014); Northwest Climate Assessment Report 2013; Climate Change in the Northwest- *Implications for our landscapes, waters and communities* (Dalton et al. 2013)

Quantitative analysis of floodplain damage either at the proposed site or along railroad corridors necessary for the proposed project is lacking.

The current 100 year and 500 year floodplains that would be occupied by the proposed project facility and rail corridors are designated by FEMA based upon the historical flow records from the Willamette and Columbia Rivers. These floodplain statistics fail to take into account the impacts of changing climate and the best available future hydrologic projections based on climate projections. In general, winter precipitation will increase and snow lines will drop as the region and proposed project site change from a transition snow/rain climate to a rain dominated climate. Areas above the project, such as the Snake River Basin that have little storage, will have likely have runoff earlier in the year, and the Willamette System will also have runoff earlier in the year due to a change from snow/rain to rain dominated climate (National Climate Assessment- Northwest 2014; Dalton et al, 2013; "Preparing for a Changing Climate" (Ecology 2012; Publication No. 12-01-004).

The scientific evidence clearly indicates that under future climate conditions- there will be more variability in flows and little capacity to store water, particularly in the Snake River basin and lower Columbia River. This will increase the frequency, magnitude and duration of flood risk at the proposed project site. Dalton et al. 2013 state:

The Columbia River Basin, whose reservoir storage capacity is much smaller than its annual flow volume, is ill-equipped to handle the projected shift to earlier snowmelt and peak flow timing and will likely be forced to pass much of these earlier flows out of the system, under current operating rules.

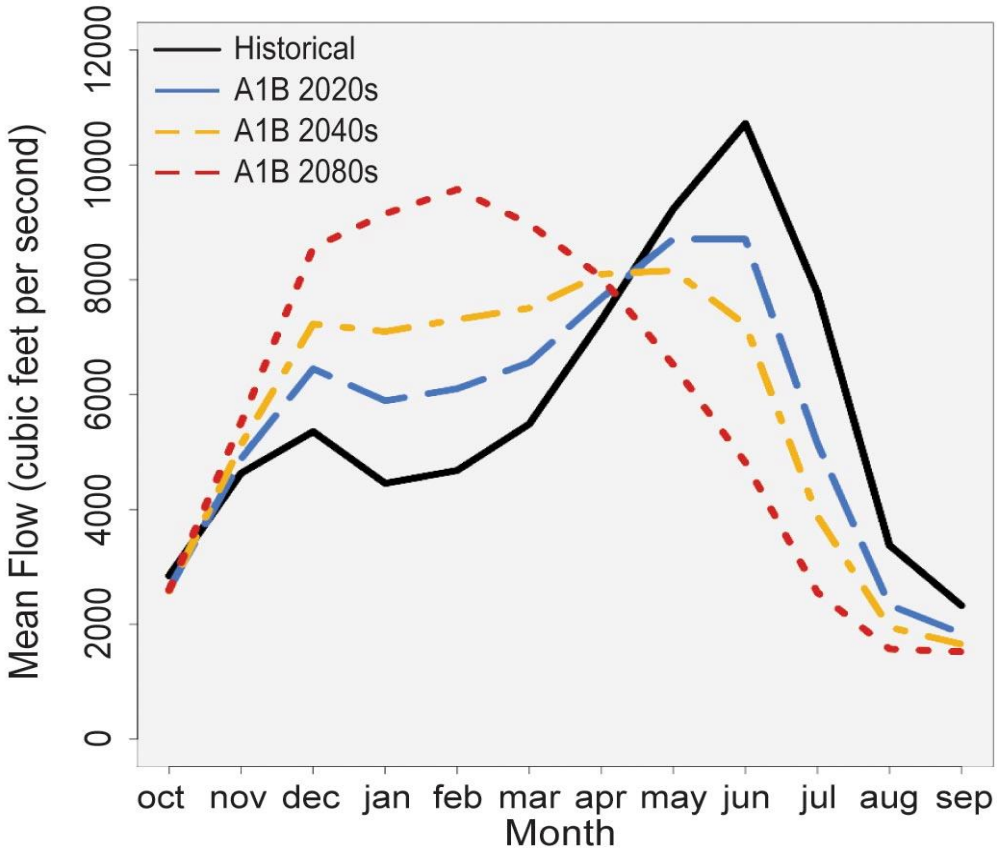

Figure 4. General trends for the historical hydrograph of the Columbia, Willamette and Snake Rivers compared to a range of projected future hydrographs from global circulation models downscaled for the Pacific Northwest (National Climate Assessment- Northwest Chapter, 2014).

In addition, extreme weather events, such as atmospheric rivers in the Pacific Northwest and lower Columbia will become more frequent in duration and intensity ("Preparing for a Changing Climate" (Ecology 2012; Publication No. 12-01-004; Dalton et al. 2013; Mauger et al. 2015). These events, along with reduction of snow lines and increased overall winter precipitation will likely increase overall flood risk and change the frequency of flood risk designations.

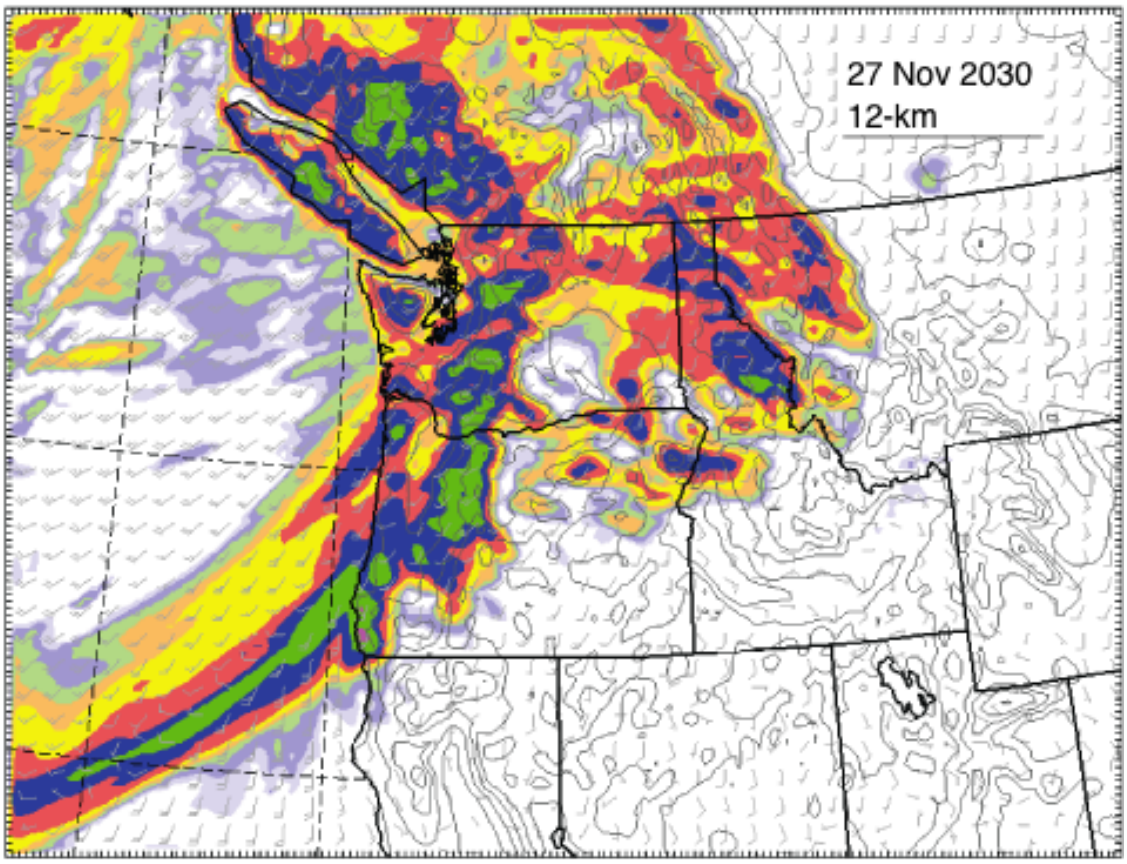

Figure 5. Simulated future atmospheric river storm from a regional climate model. There is growing evidence that the frequency, magnitude and intensity of such events are already occurring and will increase in the future. From Mauger et al. 2015.

Rain/snow dominated basins show a high sensitivity to change across the Northwest, with some under future climate change scenarios showing a 30% increase in flood magnitude and frequency (Dalton et al. 2013). For example, Mauger et al. (2015) project that by the 2040's the 10 year flood event will occur every 5 years and the 100 year event will occur as a 30 year event. Tohver and Hamlet (2010), using CMIP3 future climate projections downscaled for the Columbia Basin, estimated flood frequency magnitudes for 20 and 100 year flood events. Flood ratios for Columbia basin rain/snow basins, including the Columbia River were well above 1.0 for both the 20-year and 100 year flood metric (See Figures 5 and 6 below).

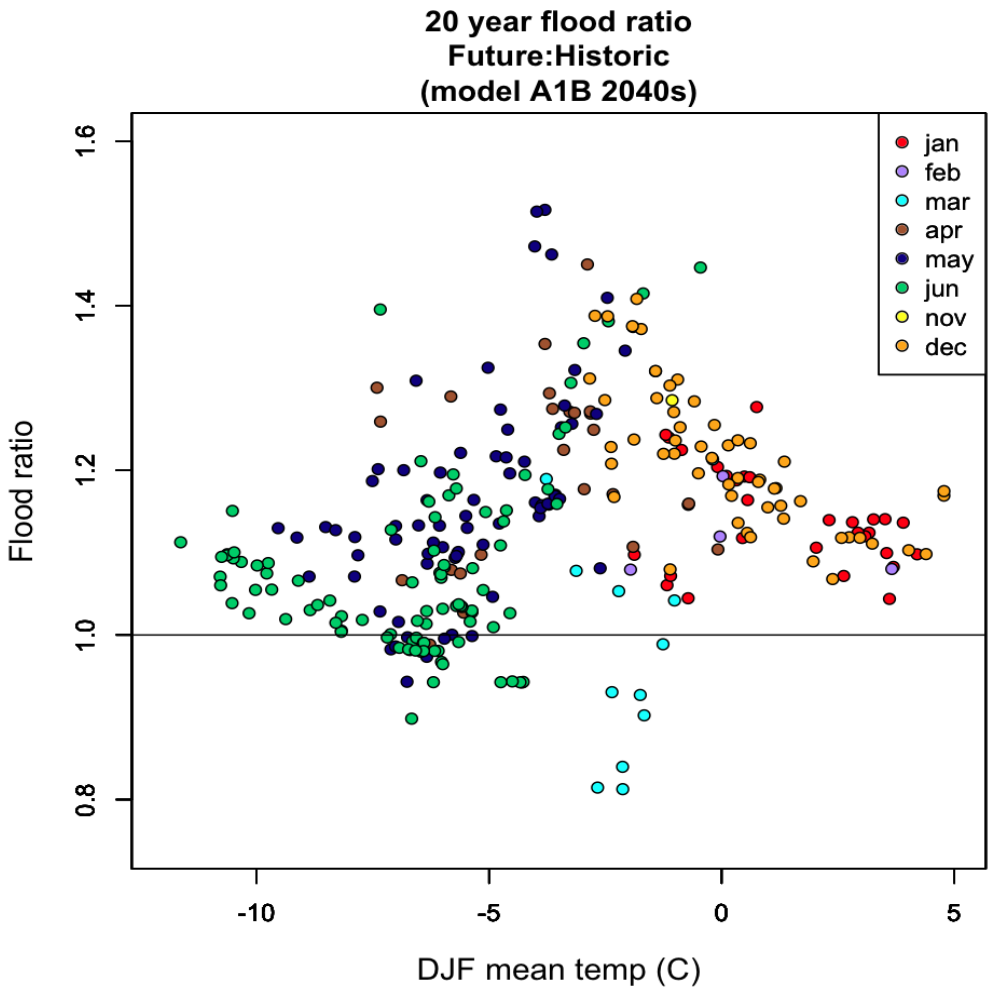

Figure 6. Plots of the mean winter temperature and flood magnitude of projected future and historical 20 year flood for Columbia River subbasins. Dot colors indicate month of historical flood occurrence. This Figure and Figure 7 below from Tohver and Mote (2010).

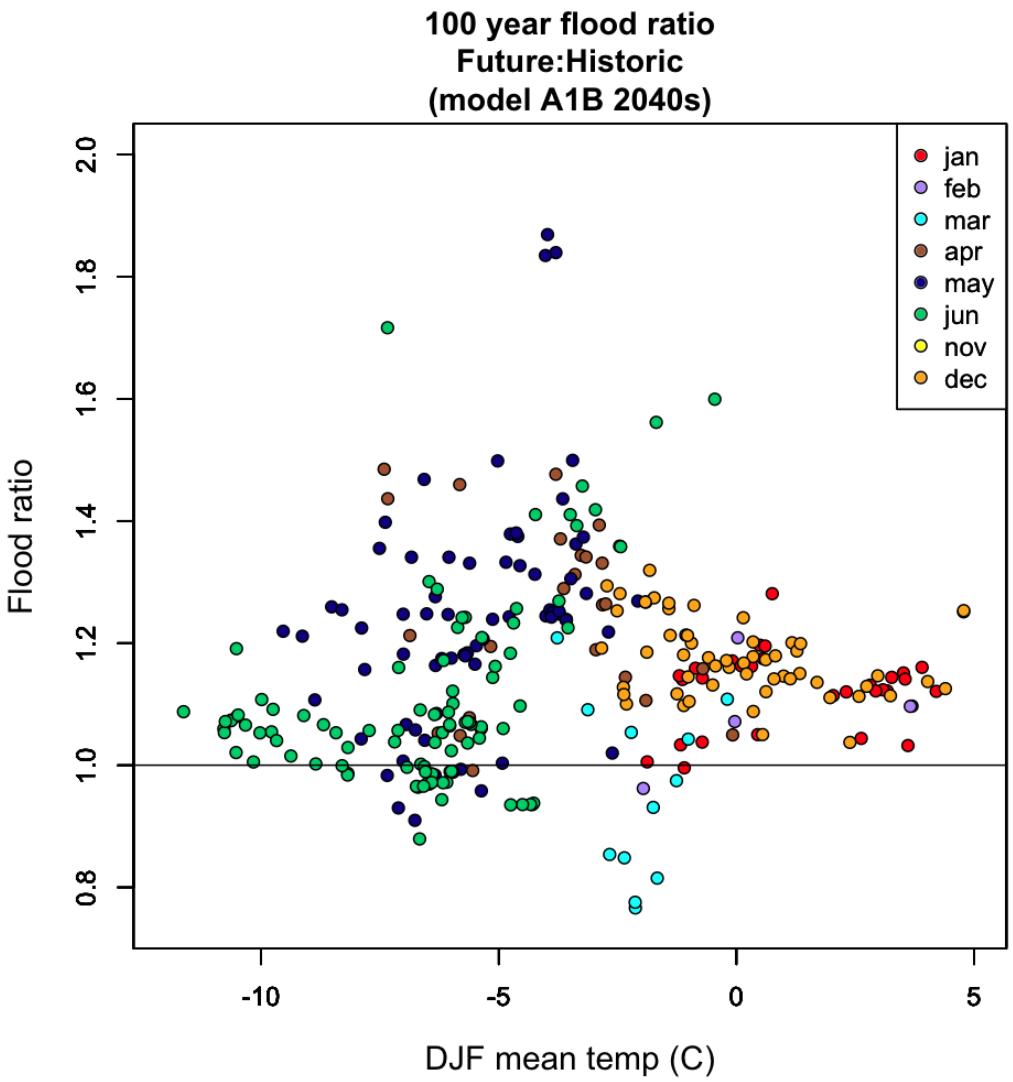

Figure 7.

To address these climate impacts, the Washington State Department of Ecology issued a comprehensive report on climate change and response with recommended actions (Preparing for a Changing Climate, Ecology 2012):

- raising or elevating infrastructure to prevent it from flooding;
- develop a common framework and methodology for transportation infrastructure risk assessment for all transportation modes;
- encourage owners and operators to evaluate vulnerability to the impacts of climate change including risks of damage and potential for disruptions and outages for flooding and extreme weather events;
- gather and provide the best scientific information on climate impacts and areas at high risk of flooding…use to assist in making informed decisions to prepare for and adapt to climate change; and

- accelerate modernized flood mapping and implement fundamental reforms to incorporate risk from climate change.

The risks of flooding from both the proposed project facility and rail transportation area have not been adequately assessed in the DEIS. Under flooding conditions, toxic materials and other pollutants from these areas would enter into the waterways of the Columbia River, in violation of clean water laws and regulations and would negatively impact tribal treaty fisheries resources and essential fish habitat.

We understand that the Corps of Engineers and FEMA are in the process of reassessing floodplain risks and adaptation under climate change scenarios. Among other things, this work must be completed and incorporated into regional planning before there is any consideration of floodplain development in the proposed areas.

Floodplains under Columbia River Treaty. The Columbia River Treaty (CRT), signed between Canada and the United States in 1964, provides for the operation of CRT dams to provide flood control and hydropower benefits to both countries in the Columbia River Basin. Under the CRT, Canada was pre-paid to build dams and operate for 8.45 (now 8.95) Maf of storage to minimize flood damages in both Canada and the U.S. until September 2024. The agreement also calls for Canada to provide additional Canadian storage, at additional cost, if "Called Upon" by the U.S. when potential flooding could reach peak discharges in excess of 600 kcfs at The Dalles.

After 2024, Canada's obligation to provide up to 8.95 Maf for flood control ends. The U.S. may still call upon Canada for flood control assistance, at a high cost, but it must first attempt to control the flood with its own reservoirs. Significant changes will have to be made to dam operating procedures to address flood risk under this changed regime. These changes and future flood risk management needs are not yet known. Moreover, discussions are currently underway between the countries to modify the treaty to rebalance CRT benefits, particularly to include ecosystem-based function, and associated higher flows, in the priorities and provide benefits for fish and wildlife and other water-related resources.

The change in assured flood control and the rebalancing of priorities are both likely to allow for increased flood risk to the lower Columbia River. This increased flood risk may take the form of higher regulated flows in normal years and/or greater risk of exceeding the 600 kcfs mark at The Dalles during high flow events.

Conclusion

CRITFC opposes the Millennium Bulk Terminals coal project and urges the U.S. Army Corps of Engineers to deny permits related to the Project. The DEIS is far too narrowly construed to adequately assess all of the actual impacts of this massive project. Even with its limited review, there is much in the document to confirm that the Project will impart substantial impacts on the resources of the region. The Project represents a major step backwards in our fight to curb climate change, and as such should not be constructed.

CRITFC supports and incorporates by reference all comments filed on this project by our member tribes, including, but not limited to, the comments of the Yakama Nation and the Confederated Tribes of the Umatilla Indian Reservation (CTUIR). We also support the comments filed by the Cowlitz Indian Tribe and the coalition groups represented by EarthJustice. Finally, we reserve the right to supplement these comments as new information comes available regarding this project.

CRITFC also submits several attachments, including our comments on the SEPA DEIS, the DEIS for the Tesoro Savage Vancouver Energy Distribution Terminal and the tribal parties' brief submitted in that proceeding. To the extent that our comments apply to this NEPA analysis, we incorporate them by reference.

Sincerely,

Robert C. Lothrop
Interim Executive Director

Attachments:

1. Direct Examination of Paul Lumley, *In Re: 2013-01 Tesoro Savage Vancouver Energy Distribution Terminal*, Before EFSEC (July 25, 2016) (Excerpt).
2. Direct Examination of Zachary Penney, *In Re: 2013-01 Tesoro Savage Vancouver Energy Distribution Terminal*, Before EFSEC (July 22, 2016).
3. Direct Examination of Kathryn Brigham, *In Re: 2013-01 Tesoro Savage Vancouver Energy Distribution Terminal*, Before EFSEC (July 21, 2016).
4. CRITFC Comments on Draft SEPA Environmental Impact Statement for the Millennium Bulk Terminals – Longview Coal Terminal (June 13, 2016).
5. CRITFC Comments on Tesoro Savage, Vancouver Energy Distribution Terminal – Application No. 2013-01 (January 22, 2016).

1 were present for Mr. Ellis' testimony last Thursday,
2 correct?
3 A. Correct.
4 **Q. Okay. This exhibit was presented by opposing**
5 **counsel. And it's -- I would like you to describe this.**
6 **What is this?**
7 A. This is a map that shows the mainstem Columbia
8 River from the mouth of the Columbia up to McNary Dam.
9 And it is divided up into two sections. One of them has
10 a label that says Zone 6 Treaty Indian Fishery, and the
11 other one is Zones 1 to 5, Drift Gillnet Fishery.
12 And one of the -- back up here. All maps have a
13 story. This one has a pretty rich story. The relations
14 we have with the non-Indian community were very
15 difficult for many decades. Soon after Bonneville Dam
16 was built, we were struggling, trying to figure out new
17 ways to fish, and the non-Indian commercial fishery, and
18 sport fishery too, were harassing us, as well as the
19 state game wardens.
20 And so there was a decision made that -- the
21 states especially agreed that the tribes did have a
22 right to go fishing, and they said up in this area above
23 Bonneville Dam, we won't go fish up there; we will not
24 have our non-Indian commercial fishery up there. That
25 would be an area of exclusivity to the tribes. And you

CARTER / LUMLEY

1 won't find that as a contract anywhere. It's just a
2 handshake agreement.
3 And the reason why is because the tribes were
4 very nervous about declaring that that would be the only
5 place that they could fish. That's not -- that map does
6 not show the only place where we can fish. In fact, I
7 fished down on the lower Bonneville Dam. I fished for
8 smelt with my father. And I've also -- well, actually
9 at Sandy River, I believe, the Cowlitz -- Cowlitz or I
10 want to say Burkett, down in that area, I remember it
11 was on the Washington side, also at Willamette Falls.
12 So we've had both commercial and noncommercial activity
13 outside of that area.
14 It was not something the tribes would ever want
15 to put down on paper, that they were giving up their
16 rights to fish commercially outside of Zone 6. In fact,
17 earlier this year, there's a coalition of tribal
18 fishermen who have banded together or lobbied the tribes
19 to extend a much more commercial season for the tribal
20 fishery down below the Bonneville Dam, down to what's
21 called zones -- about Zone 3, as I recall. And so I've
22 been asked to conduct an analysis of what it would take
23 to organize a structured commercial fishery all the way
24 down to about Zone 3, which would entail questions of
25 funding, because I'll have to extend my enforcement

1 program down there; we'll have to have a management crew
2 that would keep track of sales and probably deal with
3 legal issues and also social issues in the area. And so
4 I've been asked to give that a more serious
5 consideration.
6 So the area in particular, Vancouver is not an
7 area that we have ever given up on, don't necessarily
8 have a commercial season there right now because of
9 social pressures, but the tribes are serious about
10 fishing there again someday in the future.
11 **Q. So just keeping it to Zone 6, based on your**
12 **knowledge, do unit trains full of crude transit the rail**
13 **through Zone 6?**
14 A. I'm sorry, I couldn't hear your question. One
15 more time.
16 **Q. Yeah, sorry. I was too fast. Keeping it to**
17 **Zone 6, based on your knowledge, do unit trains full of**
18 **crude transit the rail along Zone 6?**
19 A. Oh, yes. I see trains there -- I go up and down
20 the Columbia River on a fairly regular basis. So I see
21 oil trains definitely on both sides of the river.
22 **Q. So switching a little bit. Mr. Carrico's**
23 **testimony asserted that there were no tribal usual and**
24 **accustomed fishing places at the Vancouver Energy**
25 **terminal and downstream. This is at the Port of**

CARTER / LUMLEY

1 Vancouver. How would you respond to Mr. Carrico's
2 testimony?
3 A. Well, we certainly have usual and accustomed
4 fishing rights in that area. There's no question about
5 it. We have rights to all of our first foods in that
6 area, in fact, not just for fish. I mentioned before
7 some of the other game and roots and berries in that
8 area. We've never given up our rights in that area
9 ever. Never given that up. Might also add that we're
10 not the only tribes in this area. We have the Cowlitz
11 Indian tribe there in the area, and if you also go
12 downriver, non-federally-recognized tribes, the Chinook,
13 and I've also heard the Grand Ronde tried to lay claims
14 to this area as well. So we're not the only tribes that
15 have an interest. We are, however, the only tribe that
16 has tribes in this area that have our rights guaranteed
17 to first foods in treaties with the United States in
18 1855.
19 **Q. Is it also fair to say that the fish that tribal**
20 **people eat swim past the proposed facility in the Port**
21 **of Vancouver?**
22 A. Yes, they do. They swim in both directions. As
23 salmon smolts, they swim out of the Columbia River past
24 that facility. When they go out to the ocean and come
25 back as adults to spawn, they also swim past that

1 facility.
2 **Q. Do some of these fish that the tribal people eat**
3 **also live or rear in the estuary below the Port of**
4 **Vancouver?**
5 A. Almost all of our androgynous fish that we catch
6 have been reared in an estuary. The only exception
7 would be sturgeon who are landlocked from Bonneville
8 Dam, but all of our salmon, all of our lamprey that we
9 catch, they've all been reared in the estuary, there's
10 no question about it.
11 **Q. So switching gears a little bit. Why are the**
12 **tribes concerned about chemical contamination of their**
13 **first foods?**
14 A. The work we've done at the Columbia River
15 Inter-Tribal Fish Commission has been focused on salmon,
16 and we leave it up to the tribes to deal with the other
17 first foods, although we do have some discussions with
18 them about potential contamination and some of their
19 other first foods, especially the roots and the berries
20 and the deer. But -- so in our work with the salmon, we
21 heard complaints about the water, that it's getting
22 dirtier. And some of our fishermen were getting sores
23 on their body from the water, especially at -- even at
24 Willamette Falls.
25 And so they asked us to do a study on what's in

LOTHROP / PENNEY

1 JUDGE NOBLE: Would you please call your
2 next witness.
3 MR. LOTHROP: Your Honor, members of the
4 council, I would like to call Dr. Zachary Penney.
5 JUDGE NOBLE: Dr. Penney, would you raise
6 your right hand, please.
7 (Witness sworn.)
8 JUDGE NOBLE: Thank you. Please be seated.
9 Mr. Lothrop.
10 MR. LOTHROP: Thank you.
11 ZACHARY PENNEY,
12 having been first duly sworn,
13 testified as follows:
14 DIRECT EXAMINATION
15 BY MR. LOTHROP:
16 **Q. Dr. Penney, do you adopt your written prefiled**
17 **direct testimony as a true and correct version of your**
18 **testimony in this proceeding?**
19 A. Yes, I do.
20 **Q. Thank you. I'd like to acquaint you with the**
21 **council a little bit as we proceed. I think your**
22 **qualifications are unique, in my experience, and worthy**
23 **of a little bit of time in your testimony. So can you**
24 **please describe your educational background.**
25 A. Sure. I did my bachelor's degree in science at

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1 Sheldon Jackson College in Sitka, Alaska, which is a
2 wonderful place to study salmon.
3 JUDGE NOBLE: Dr. Penney?
4 THE WITNESS: Yes.
5 JUDGE NOBLE: You are speaking too fast for
6 the court reporter.
7 THE WITNESS: Okay. I'll slow it down.
8 JUDGE NOBLE: Thank you.
9 A. For my master's degree, I did that at the
10 University of Victoria in Victoria, British Columbia, in
11 earth ocean sciences.
12 BY MR. LOTHROP:
13 **Q. Slower.**
14 A. Wow. And I did my Ph.D. at the University of
15 Idaho in 2013, and that was in natural resources with an
16 emphasis in fisheries.
17 **Q. Thank you. Does your family have history**
18 **working with salmon or fishing for salmon?**
19 A. Yes, they do. I am an enrolled member of the
20 Nez Perce tribe. I grew up in Idaho. The Nez Perce are
21 one of the four member tribes of the Columbia
22 Inter-Tribal Fish Commission.
23 **Q. Slow.**
24 A. My brother -- most of my family are educators,
25 but a lot of my family are involved in the restoration

of fisheries, particularly salmon and steelhead in tributaries to the Columbia, that includes the Snake River, the Clearwater and others, and so my family has a deep investment in salmon and steelhead restoration. I grew up -- this is something you won't find on my CV. Being a Nez Perce tribal member, unlike Wilbur Slockish and others that fished in the lower Columbia, my family fished in the tributaries of Idaho using traditional methods that includes dip net, gaff and spear. And so my relationship to the salmon is in a different area, but it's also quite old. So in a way I kind of grew up in two different worlds; one in academics and the other one from the Nez Perce culture.

Q. Are any of your family members directly involved with the fisheries for the Nez Perce tribe?

A. Many are, but if I were to keep the list low, my brother is the hatchery manager for Nez Perce Tribal Hatchery which is a fall Chinook hatchery.

Q. What's the migratory pathway of Snake River fall Chinook?

A. Like a lot of Pacific salmon, Snake River fall Chinook, generally, when they leave freshwater out of the Columbia, the majority of them turn north and swim as far as the Gulf of Alaska. Migration routes vary by salmon species, but fall Chinook are often feeding in

1 herring-rich areas like in -- near Sitka, where I did my
2 bachelor's, and they'll spend several years feeding,
3 putting on size before they return back to freshwater to
4 spawn. So a lot of our fish go north, but there are
5 some stocks, like there are some coho that do turn
6 south. They're generally smaller populations. And then
7 steelhead have a tendency to go a variety of places.
8 They've found steelhead as far, I guess in this case,
9 west as Japan and in parts of Asia in ocean migration.
10 **Q. So is it just coincidence that your educational**
11 **background followed the migratory pathways of the Snake**
12 **River fall Chinook?**
13 A. I think it's coincidence, although it was
14 quite -- you know, it's always nice to see where they
15 go. As some of the tribal testimony this morning
16 described, we're very intimately connected with those
17 fish. And so in the Nez Perce culture, we were always
18 told that salmon would leave our native areas to go out
19 to far off places and bring back gifts back to the
20 people. So that was a good part of my education, to
21 actually go see where they go and who -- it isn't just
22 the Nez Perce people they enrich, but residents of
23 British Columbia and Alaska and all sorts of places.
24 **Q. Let's talk a little bit about your areas of**
25 **study and your master's and Ph.D. programs, if you**

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1 wouldn't mind. Can you talk about those generally and,
2 if necessary, we can have a conversation about that, and
3 if you use some technical terms, you may need to help
4 the court reporter through them.
5 A. Okay. I'll try not to speak too esoterically.
6 You know, bachelor's, kind of your basic core courses in
7 fisheries. But for my master's degree, I specialized in
8 Sockeye salmon, Sockeye salmon stocks that will trail to
9 southeast Alaska. A lot of my focus as a researcher in
10 academics has been related to life history. And what
11 that means is the overall life cycle in terms of
12 spawning, generally, so the adult portion, as we say, of
13 the salmon life cycle. I'll try to keep it slow.
14 So for my master's, I studied otolith
15 microchemistry of Sockeye, which is essentially ear
16 bones in bony fish. They're wonderful structures. The
17 best way I can describe them are kind of like getting --
18 like an onion. They have several layers, growth layers;
19 they grow as the fish grows. And as they grow, it
20 records some environmental information. And so my
21 master's dealt with some technology that more or less
22 analyzed all those different growth regions in that
23 otolith to reconstruct the life history, as well as
24 provide some information in relation to where that fish
25 actually came from.

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1 So a lot of the -- as I think has been discussed
2 in some of the testimony, salmon and steelhead have high
3 site fidelity, meaning they generally return to the
4 region to spawn where they were born, and those areas
5 have very specific chemical signatures in the water.
6 And so that's what my master's dealt with.
7 My Ph.D. work was focused on steelhead returning
8 to the Columbia, specifically the Snake River. And that
9 study was in bioenergetics, so more or less the science
10 of how energy is used in fish, how they get that energy,
11 how they use that energy. And steelhead are different
12 than their salmon counterparts. So like Chinook,
13 Sockeye, coho, pink salmon, they all spawn once.
14 They're known as semelparous species. And a lot of
15 people are aware of that. They spawn once.
16 **Q. Can you say it, semelparous, again?**
17 A. Yeah, semelparous, s-e-m-e-l-p-a-r-o-u-s.
18 **Q. Thank you.**
19 A. And steelhead are iteroparous,
20 i-t-e-r-p-a-r-o-u-s [sic]. Humans are iteroparous,
21 meaning we can spawn more than once. But steelhead
22 rarely spawn more than once. And a lot of that has to
23 do with energy. So just to -- I could go way in the
24 weeds. I get excited when I talk about fish and talk
25 faster, so I'll try to keep this slow.

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1 When fish return to freshwater to begin spawning
2 migrations, in general they stop feeding. When they
3 stop feeding, it's actually -- this might sound
4 counterintuitive but, it's actually to save energy. It
5 takes a lot of energy to run your digestive tract;
6 sometimes up to 40 percent of your basal metabolism goes
7 to running the digestive tract. So fish turn that off
8 when they get back to freshwater on their way back to
9 spawn.
10 **Q. When you say "fish," you mean salmon or --**
11 A. Salmon and steelhead.
12 **Q. Okay.**
13 A. And I don't want to get too far into the
14 evolution of why. Maybe we can later, but -- of why
15 salmon and steelhead developed into that life history to
16 go to the ocean leaving freshwater. But they come back,
17 they stop feeding and, depending on the species and how
18 far they have to go, they arrive at various points of
19 maturation. So not all salmon arrive back to freshwater
20 immediately ready to spawn.
21 In the case of the Columbia and Snake Rivers,
22 they may have over 500 miles to swim. So it doesn't
23 make sense to arrive back in freshwater immediately
24 ready to spawn. There is a lot of -- it's scientific
25 jargon, gonadal maturation, the eggs need to still get

ready, the testes still need to be developed as these fish migrate and that sometimes can take months. Steelhead, summer-run steelhead, return the summer before they spawn in the following spring, so they're almost in freshwater for more than eight months before they actually spawn. So during that time that they're in freshwater, there's still a lot of development going on, even though they're not feeding.

So a lot of my Ph.D. research went into how the energy is used and, generally, what happens is steelhead run out of gas. They get up, they use all their energy to migrate, to develop secondary -- more or less develop sexually. A lot of energy has to go into eggs. Generally the females are a lot more important than the males, but that kind of goes for a lot of different species. And by the time they need to turn around back, they're more or less running on fumes. And the way the Columbia River and Snake River are now, it's reservoirs; whereas, they used to be able to return on the current, they're running on very limited energy supply and most of them are probably succumbing to exhaustion before they reach the ocean again.

Q. Thank you. Can you describe some of the research that the Columbia River Inter-Tribal Fish Commission is doing with regard to steelhead.

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A. Absolutely. Along the very same lines I just described, the Columbia River Inter-Tribal Fish Commission is involved in the science, the practicality of reconditioning steelhead kelts. So a post-spawn steelhead is known as a kelt. And because --

Q. You might want to spell kelt.

A. K-e-l-t. Because steelhead can spawn more than once, when you have very low populations of fish, this is different than what you get with a Chinook. Once those fish get up to spawn, it's over. You know, they spawn once, they die. Because steelhead do have that ability to spawn more than once, if you have an endangered fish or population and you can actually get those fish to spawn again, that can actually be a very powerful restoration tool. So the Columbia Inter-Tribal Fish Commission is looking at ways to do that with some of the steel populations that are either threatened or endangered.

Q. Thank you. In conducting that research, and I don't want you to get too far into the weeds, but could you give us a sense of the employees who are involved in that and what their qualifications -- some of their qualifications.

A. Absolutely. So my capacity at the Columbia Inter-Tribal Fish Commission is the science department

1 manager. I'm relatively new, but it is the largest
2 department at the Columbia Inter-Tribal Fish Commission.
3 I have over 30 scientists, more than, I do believe, 15
4 of them have master's or a Ph.D. level. I have a
5 world-renowned genetics lab in Hagerman, Idaho, which
6 are doing some pretty incredible things with thermal
7 adaptation in salmonids or salmon steelhead.
8 In addition to that, I have habitat experts.
9 The Columbia Basin is a highly modified area. And
10 looking at ways that improve habitat can increase fish
11 populations. I even have data management specialists to
12 help our tribal members with dealing with lots of
13 numerical data. And I also, of course, have a lot of
14 scientists that look at the impacts of hatcheries and
15 how hatcheries can be used to restore fish in the
16 Columbia Basin.
17 **Q. Thank you. So your prefiled direct testimony**
18 **does -- addresses the overall salmon life cycle, but I**
19 **would like to spend just a little bit more time talking**
20 **about the -- sort of the back 25 percent of the salmon**
21 **life cycle, the adult phase. And what kind of physio --**
22 **you mentioned physiological changes. What's going on**
23 **and what kind of factors might affect the success or**
24 **lack thereof for those fish?**
25 A. Certainly. So I think better as it pertains

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1 today --
2 **Q. Slower.**
3 A. What Rob was talking about is the spawning
4 migration portion. So let's just keep that as when fish
5 re-enter freshwater and are beginning their migration.
6 It varies upon species, about the time that they return,
7 how far they have to go. But a lot of salmon and
8 steelhead return to freshwater in an immature state,
9 which you will hear a lot of times somebody refer to
10 salmon migrating back upstream as adults. You go by
11 more or less the fish definition of adult. An adult is
12 actually a fish that has the ability to reproduce, that
13 is, sexually mature.
14 Most of the salmon returning up the Columbia,
15 essentially the early ones, like spring Chinook, are
16 sexually immature. There're still a lot of things going
17 on internally and it may take, as I said, several weeks
18 to months before those fish actually reach maturity.
19 And for them to reach maturity, one of the reasons that
20 salmon and steelhead go to the ocean is to get bigger
21 but also accrue a lot of fat. I kind of treat the
22 salmon life history and steel life history almost like
23 an energy game. In order to move from one phase to
24 another, you have to have enough energy to move onto
25 that next phase. So while they're out in the ocean,

1 they're building energy to be able to complete migration
2 back to their spawning grounds to be able to finish the
3 development of either their eggs or their testes and in
4 some cases changes in their morphology.
5 So if you've ever seen a spawning salmon, you've
6 seen that they have sometimes very vibrant colorization.
7 The heads change. They get what we know as kypes, which
8 is just k-y-p-e-s. A lot of stuff happens when they
9 return back. And that energy has to come from
10 somewhere.
11 So you heard me mention earlier that they stop
12 eating. All of that energy is coming more or less
13 internally. It's coming from their muscle tissues.
14 It's coming from their fat that's stored in their guts,
15 essentially. All that energy is coming from within
16 them, and that has to be used to finish those maturation
17 processes.
18 When fish get stressed or they have to move
19 around obstacles, whether they're natural or manmade,
20 energy gets used. If fish experience stresses maybe
21 outside of their control, that also stresses the fish
22 and it requires energy and that can be disruptive to
23 that process.
24 **Q. So, Dr. Penney, would you consider spilled oil**
25 **could potentially be a stressor for these fish that are**

1 becoming adults?
2 A. I do believe it would be a stressor, just as any
3 chemical spill would.
4 **Q. Could you talk a little bit about Sockeye, and**
5 **with particular reference to the migration in 2015 of**
6 **Sockeye into the Columbia River.**
7 A. So in 2015, the Columbia Basin was in draught in
8 a variety of places. It did not have the snow pack that
9 we normally do. And because Sockeye tend to migrate
10 right around the peak time of the summer when our water
11 temperature is warm in the Columbia, they ran into
12 unprecedented water temperatures. I didn't mention
13 this, but perhaps it's obvious, but salmon and steelhead
14 are cold-water fish. That's one of the main reasons why
15 they like to go north.
16 So in 2015, the water temperatures were well
17 beyond their thermal optimum -- as we say, more or less
18 the temperature they would rather not be in. It was too
19 warm. And that warm water stressed out the fish.
20 Because these fish had a spawning migration to make,
21 they had a place to get to, a lot of them tried to wait.
22 There are places on the way up the Columbia that are
23 cold-water, as we'd say, refuges. Some of those are
24 near the Deschutes River, some of them are near the
25 Little White Salmon River. So the fish tried to wait,

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1 but they can't wait forever. So some of those fish did
2 have to enter that really warm water. And it is
3 important to note, warm water is a stress. It doesn't
4 matter if a fish enters -- if a Sockeye enters 75 degree
5 water, it doesn't automatically kill them. What it does
6 is it stresses them. It will eventually kill them, but
7 what eventually kills them is sometimes a secondary
8 problem from that stress.
9 So in a lot of cases last year in 2015, a lot of
10 those fish got different types of infections. And while
11 they're also trying to battle those infections over --
12 the estimates I saw most recently, between 80 to
13 90 percent of those fish did not make the final
14 migration to the spawning grounds. They succumbed due
15 to warm temperature and the secondary effects of that.
16 How we know that is that we based our estimates
17 of the migration of what we see in Bonneville Dam, the
18 lower-most passable dam, and we kind of look at how
19 those Sockeye make their way up to the known Sockeye
20 tributaries. And we just saw the numbers decrease and
21 decrease and decrease.
22 One of the problems in the fisheries is it's
23 hard to actually see fish. You often don't know where
24 they died and what killed them. But in this case, a lot
25 of the Sockeye that disappeared in the Columbia likely

1 died due to a variety of infections and either became
2 sturgeon food or just went back to the environment, but
3 we know a majority of those fish did not spawn.
4 **Q. Is the fish commission staff involved in marking**
5 **the Sockeye at Bonneville Dam?**
6 A. We are. We do have a crew at Bonneville Dam
7 that does mark fish on their way up to help us get an
8 estimate of how passage works, but we also are very
9 careful that when water temperatures are getting close
10 to the thermal optimum of many of these fish, we stop
11 marking as to not stress them out.
12 **Q. Let's talk a little bit about fish populations**
13 **using Sockeye as an example. Can you give the council a**
14 **sense of the Sockeye populations that are present in the**
15 **Columbia Basin and their relative sizes?**
16 A. I think I can from a very general sense. There
17 are several separate Sockeye populations in the Columbia
18 Basin. Some of them are much larger than others. If I
19 was to think back to the five-year estimates, Sockeye
20 returning to the Okanagan Basin, which actually enters
21 into Canada, was one of the most robust populations we
22 have in the Columbia. We have just a tad under 250,000
23 fish that have on average returned to that system.
24 Lake Wenatchee is also -- which is in
25 Washington, another Sockeye population that is quite a

1 bit more robust than some of the others that we have,
2 and I do believe that that -- those numbers on average
3 for the past five years are just a bit under 50,000 is a
4 close estimate. There are other places in the Columbia
5 Basin where the populations are not robust. One of
6 those just happens to be in Idaho in the Snake River in
7 Redfish Lake. On average, those Sockeye numbers have
8 been deemed about 1200 fish. So it's kind of a good
9 example. We're talking between 250,000 versus 1200
10 fish. They're -- in the '90s, Redfish Lake was in
11 pretty bad shape. There was one year when -- if you've
12 ever heard of the term "Lonesome Larry," when one poor
13 male Sockeye returned back to the lake with nobody to
14 spawn with. So that lake's on life support.
15 And there are other lakes that the tribes and
16 the states are working to reintroduce Sockeye where they
17 have been extirpated by either dams or other habitat
18 factors. In the Deschutes, there's generally less than
19 100 fish that return, and in the Yakima, generally I
20 think there's less than 500 adults that return. So we
21 do get a fair amount of variation in terms of the
22 overall population numbers between some of those
23 systems. Some systems are very healthy or healthy and
24 some systems are almost extinct.
25 **Q. Is any one of those populations listed under the**

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1 Endangered Species Act?
2 A. I do believe the Redfish Sockeye, for sure, is
3 listed.
4 **Q. Thanks. So Mr. Challenger talked a little bit**
5 **about population effects and an oil spill. What -- can**
6 **you share your view with the council about what concerns**
7 **you might have about an oil spill occurring during the**
8 **large migration of Sockeye up the Columbia River?**
9 A. A lot of what Mr. Challenger said, you know, it
10 made sense to me, but he was perhaps generalizing a bit
11 too much, you know, when he says it might affect some
12 individual fish. I think -- you know, I would disagree
13 with him on that. It's not so much about individuals.
14 When it comes to Sockeye, I would probably be more
15 concerned about individual populations.
16 The Columbia River is a mixed stock system. We
17 have stocks going to Washington, to Idaho, to Oregon, to
18 Canada, and oftentimes they like to swim in aggregate.
19 They like to swim in schools together. And so the
20 effects of, you know, acute -- maybe acute toxicity
21 killing a lot of fish. So maybe you have 15,000
22 Okanagan fish, but if you only have so many Redfish
23 Bay -- or Redfish Lake Sockeye, that's a pretty
24 substantial number. So to overgeneralize like that, I
25 do think that is dangerous.

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Q. So the conditions that Sockeye encountered in 2015, you said this very warm water, have the commission scientists also been looking at potential climate change effects in water temperatures?

A. Yes. We have several scientists that are evaluating different aspects that climate change might cause to fish in the basin. A lot of those studies aren't necessarily always directly related to fish, but related to the environment that fish live in, water temperature obviously being a big one. Fish being cold-blooded animals, more or less, their metabolism is regulated by the temperature in the water. If you get increases in the water temperature, you get increases in metabolism. So if you have a limited gas tank and you're not refilling it, elevated water temperatures can cause you pretty substantial problems. But also for -- not just adults, but these are cold-water fish. They rely on cold-water systems, and I think if the predictions are correct about -- the Columbia used to be what I would call a two-flood system. We have high mountains in Idaho and in British Columbia. We would get melting that would create one flood pulse, and eventually the higher mountains would melt -- or snow in the higher mountains would melt and we'd get a second flood pulse and keep the river cool well into the early

1 summertime and the fish relied on that.
2 What we're faced with you is snow melt coming
3 off much earlier, the hydrological cycle has completely
4 changed. Can the fish adapt fast enough to that? Maybe
5 not. Probably not. Especially with reservoirs in the
6 system. So a lot of our research is looking at how that
7 change in hydrograph by some of these extreme weather
8 changes that we're seeing -- doesn't necessarily need to
9 be warming. It could be the loss of snow melt at
10 strange times. We're looking at the effects that might
11 have on different populations within the territories of
12 the four tribes that make up the Columbia Inter-Tribal
13 Fish Commission.
14 **Q. Thanks. So just to make sure I got this. So**
15 **that -- those climate change scenarios may --**
16 MR. JOHNSON: Objection.
17 MR. LOTHROP: Go ahead.
18 MR. JOHNSON: Your Honor, for the record, we
19 object to this line of questioning. The whole point of
20 prefiled testimony in this case was to allow the parties
21 to understand the issues so that we could plan our case
22 accordingly and prioritize witness testimony. This
23 witness is now testifying about something that was not
24 included in his prefiled testimony. He's testifying
25 about a topic that wasn't addressed by Mr. Challenger.

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1 And it puts us in the situation now of, two days away,
2 having to reassess our case, bring back additional
3 witnesses, prepare them to address an issue that has
4 been on the radar screen for months and months and
5 months, and it appears that what the tribes are doing
6 here is they are making up their case as they go along,
7 and that eviscerates the purpose for why we did prefiled
8 testimony in this case.
9 We raised this issue yesterday, you know,
10 and then we heard witnesses talk -- changing positions
11 with regard to ballast release. We had new testimony
12 about cultural resources, and none of this is new. So
13 we're going to object to this line of questioning
14 related to climate change and its impacts on the
15 Columbia River. It just does not comport with how the
16 system that we worked for months to complete in terms of
17 issue identification and prefiled testimony was intended
18 to work.
19 JUDGE NOBLE: Response?
20 MR. LOTHROP: Thank you, Your Honor. The
21 record in this proceeding I think would benefit from
22 additional information on climate change. It's a very
23 significant issue facing the northwest, as well as the
24 resources on the Columbia River. Mr. Johnson I think
25 fairly enough points to the absence of climate change

1 information in our direct filed testimony. That doesn't
2 mean it's not an issue. We did file substantial
3 commentary on that document we can't name regarding
4 climate change. And I think importantly, there are some
5 fundamental equities at stake here with respect to our
6 participation in this proceeding. We have not had years
7 and years to prepare for it. We're doing our best with
8 limited resources, and I'd say that Dr. Penney is here,
9 testifying roughly four days earlier than he actually
10 anticipated testifying. He had to change personal
11 appointments to do that. That's fine, we're happy to
12 make that accommodation. It's important to the
13 tribunal.
14 But that said, one of the equities that
15 we're looking at is an -- a very substantial application
16 that was -- an amendment to the application that was
17 filed weeks before the proceeding. We really had
18 limited opportunity to respond to that. The record's
19 staying open. And I think with regard to the duration
20 of the record in this proceeding, you know, if
21 Mr. Johnson's clients need to respond to this, I think
22 there's probably opportunity for them to do so. So with
23 that, Your Honor, I conclude my remark.
24 JUDGE NOBLE: All right. Thank you. First
25 of all, with regard to the prefiled testimony, there

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1 really weren't constraints placed upon that such that
2 the testimony couldn't be added to, and almost
3 everything witness has done just that. When prefiled
4 testimony has been filed, there has been additional
5 testimony that was direct testimony that was presented
6 live in this hearing. And so I see no reason why this
7 witness can't do that.
8 It seems essentially an issue of notice, as
9 you're discussing, Mr. Johnson, and a concern about
10 being able to rebut or respond to the testimony. I
11 certainly would be open to or accepting testimony in
12 rebuttal that was responsive to it and would actually
13 expect that.
14 And then with regard to the issue of climate
15 change, first of all, it is an issue; it is a stated
16 issue. I made an abstract of all the issues before this
17 started so that I would remember everything that was
18 safe to be an issue, among the many, many issues that
19 were presented in the written material. So it is an
20 issue -- it is at issue.
21 And also, several of the witnesses have
22 mentioned climate change as a background condition to
23 what they were testifying about, general warming of
24 waters and other conditions related, as they said in
25 their testimony, to climate change. And this witness

1 seems to be also doing the same thing. I don't see him
2 testifying about climate change, per se. I think he's
3 testifying about the effect of warming waters on fish
4 and he's attributing that to climate change just as a
5 background statement, from what I can see. And I ask
6 you, Mr. Lothrop, is this witness going to continue to
7 expound upon climate change as a subject in and of
8 itself?
9 MR. LOTHROP: No, Your Honor.
10 JUDGE NOBLE: Well, because of all of those
11 reasons, I'm going to overrule the objection and allow
12 this testimony.
13 MR. LOTHROP: Thank you, Your Honor.
14 JUDGE NOBLE: He was in the middle of his
15 answer.
16 BY MR. LOTHROP:
17 **Q. Go ahead, Dr. Penney.**
18 A. I was going to ask, where were we?
19 JUDGE NOBLE: Would you like the court
20 reporter to read the question back?
21 THE WITNESS: Yes, please.
22 JUDGE NOBLE: You were in the middle of an
23 answer. So let's -- the court reporter can read the
24 question, though.
25 MR. LOTHROP: Certainly.

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1 (Requested portion read back.)
2 BY MR. LOTHROP:
3 **Q. And I will continue on from there. May be a**
4 **stressor that could add to the stresses associated with**
5 **a potential oil spill?**
6 A. Yes. I mean, I think that's exactly what we're
7 going at. It's not so much about climate change. It's
8 about the amount of stresses that these fish can take.
9 That is an added one that will be exacerbated in just
10 the way the Columbia River exists now with reservoirs
11 which kind of act as solar sinks. The water's not
12 moving very fast. And so that is just, yeah, an added
13 stressor onto those fish that will occur in the future.
14 If I was to be able -- let me just bring this
15 back to the fish. You know, I talked about these fish
16 coming back in more or less -- say, they're trying to
17 complete reproduction. They still have maturation they
18 need to complete. While they're not carrying fertilized
19 embryos, to me in a way, it's never good to stress out a
20 creature that's pregnant or about to be pregnant. So
21 that's -- I think if there's something you get from my
22 testimony, added stresses, whether it be warm water,
23 whether it be a chemical spill, it doesn't need to be
24 oil, can disrupt that portion of the life cycle.
25 **Q. Thank you. So shifting a little bit,**

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1 Mr. Challenger also talked about, I believe, the
2 differences between impacts to a wetland versus impacts
3 to wetlands, plural. Can you describe the role that
4 wetlands play in the Columbia River Basin and your
5 perspective on the question of wetland versus wetlands.
6 A. Well, it's -- it should be broad. There are
7 different types of wetlands. There are wetlands that
8 occur in the estuary and there are wetlands that occur
9 in the freshwater areas. I'm assuming that
10 Mr. Challenger was talking about wetlands in the
11 estuary. Those areas can be important, particularly for
12 juvenile salmon or smolts in route to the ocean. They
13 do provide areas of refuge for foraging. Some species
14 like chum salmon, which spend a very limited amount of
15 time in freshwater before they head out, utilize those
16 areas to put on a fair amount of growth before leaving.
17 Unlike the main river system, which tends to have
18 currents, these areas slow the water down, provide a lot
19 of different types of habitat, cover for fish to hide
20 under and provide areas for insects and things like that
21 to breed and can provide a very rich feeding ground
22 before they undertake the final marine migration. So
23 wetlands, especially in the estuary, can be a very
24 important point that salmon stop, especially young
25 salmon, before going out to the main ocean.

1 **Q. Are the wetlands in the Columbia River now**
2 **similar to what they were a hundred years ago?**
3 A. No, they're not. Like the rest of the river
4 system, you know, shipping traffic has changed the --
5 well, through diking and through dredging, has changed
6 how that lower portion of the Columbia looks, just
7 people building in the floodplain, which is something
8 humans tend to like to do, has changed the floodplains
9 and the wetlands substantially. So I do believe there's
10 somebody else's testimony in here, maybe the Columbia
11 River estuary group, did provide some numbers and my
12 recollection of those numbers is probably about
13 70 percent of the vegetative wetlands in the Columbia
14 River are gone. So I think to your point, it's not so
15 much wetland versus wetlands. If you have very little
16 of something left, one wetland can be substantial.
17 MR. LOTHROP: Thank you, Dr. Penney. That's
18 all the questions I have for now.
19 JUDGE NOBLE: Cross-examination,
20 Mr. Johnson?
21 MR. JOHNSON: No questions, Your Honor.
22 JUDGE NOBLE: Council questions?
23 MR. MOSS: I have a question.
24 JUDGE NOBLE: Mr. Moss?
25 MR. MOSS: Good afternoon. You mentioned at

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1 one point in your testimony that due to some sort of
2 warm water stressing and so forth, that there was an
3 occasion in 2015 when 80 to 90 percent of returning fish
4 of some population that I didn't write down did not make
5 it back to the spawning grounds. Do you recall that?
6 THE WITNESS: I do recall that.
7 MR. MOSS: What type of salmon was that?
8 THE WITNESS: Those are Sockeye salmon.
9 MR. MOSS: My question, though, is what is
10 the usual percent that make it?
11 THE WITNESS: That make it to the spawning
12 grounds?
13 MR. MOSS: Yeah.
14 THE WITNESS: It is highly variable on
15 environmental conditions. But generally, again, not to
16 get too far in the weeds, usually when the fish return
17 back -- or maybe I can explain it this way. There will
18 be fishery harvests. There's not a ton of natural
19 predators left like we see in Alaska, so there are not a
20 whole lot of predation by bears and things like that.
21 So generally harvest from sport anglers, tribal anglers
22 is the main probably mortality those fish are
23 experiencing and that varies. It varies based on the
24 size of the run. If it's a very low run size,
25 oftentimes fisheries are constrained. So if there's a

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1 low number of Sockeye coming back, we're going to say,
2 well, we're not going to fish that many because there's
3 only so many that we should take. In big years, there
4 might be a lot more take, but generally there are -- we
5 deal with individual populations, there are what we
6 would call escapement numbers that we're after, so the
7 number of spawners that we want there to actually be
8 make sure the population stays robust. So it is highly
9 variable. It's not a hundred percent, but it's
10 generally much better than, in this case, 10 to
11 20 percent.
12 MR. MOSS: What would be a healthy return?
13 THE WITNESS: In terms of number or
14 percentage back?
15 MR. MOSS: Percentage.
16 THE WITNESS: Let's see. If we had 100,000
17 Sockeye pass Bonneville Dam, I would expect -- they're
18 highly fecund animals, you know, something between 40
19 and 50 percent, but generally I think it's higher than
20 that.
21 MR. MOSS: Okay. Good. Although we don't
22 have too many Sockeye sport fishing seasons anymore.
23 THE WITNESS: No, we don't. Hopefully we
24 will. It's another good year this year and the water
25 temperatures are staying relatively cold, so let's hope

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1 that that trend continues.
2 MR. MOSS: That would be great. You
3 mentioned the term "thermal optimum," and I just
4 wondered what that is.
5 THE WITNESS: Sorry. Yeah, that -- that was
6 jargony. As a cold-water fish, you know, through time,
7 there's been measurements about, kind of, what
8 temperatures fish prefer to be in, and there are levels
9 of temperatures that fish operate best in -- as the cold
10 water, operate best in. That they run -- you know, just
11 further physiology, that that's, you know, all metabolic
12 function is at its optimum. If the water gets too cold,
13 they slow down.
14 There is a point, though, if it gets too
15 warm that it causes, you know, a lot of different types
16 of heat stress, just like humans can get heat
17 exhaustion. Different fish have different levels of
18 temperature that they can tolerate. So like a large
19 mouth bass, which can live in warm water, can tolerate
20 temperatures up to 80 degrees. A Sockeye, once
21 temperature gets probably above 70 degrees, is starting
22 to feel pretty bad. It's just the way those fish
23 evolve. They're evolved to a certain temperature. So a
24 thermal optimum is probably for a Sockeye similar,
25 between 60 and 65 degrees. Once you start getting

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1 outside of that, the fish get stressed.
2 MR. MOSS: And are the temperatures in the
3 Columbia River during recent periods on average higher
4 and lower within an acceptable range of that optimum, or
5 are we seeing a trend in one direction or the other?
6 THE WITNESS: From what I have seen, again,
7 I have to attribute some of this to the reservoirs which
8 have slowed the water down, so they do tend to heat up
9 faster. I do believe that we've seen water temperatures
10 warming up. As we see that in other things too, like
11 more plant growth in places where you never saw plants
12 before. The water is slow enough for plants to grow.
13 So I do believe we are seeing the water warming.
14 MR. MOSS: So this would become a persistent
15 source of stress to which the addition of other stresses
16 would magnify the difficulty of having these populations
17 remain robust.
18 THE WITNESS: Yes. There's a lot of work
19 right now going into what I mentioned earlier, these
20 thermal refuges. A lot of the fish that come into the
21 Columbia, especially in the summertime, steelhead are
22 probably the best example of this, do utilize thermal
23 refuges, so cold-water tributaries that tend to stay
24 cold longer. And if they can, they'll hold in those
25 areas until the mainstem cools down enough for them to

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1 move out. Steelhead sometimes can spend weeks to months
2 in a refuge -- a cold-water refuge before they decide to
3 take off for their final migration. So there's a lot of
4 work right determining how can those salmon and
5 steelhead utilize that while the mainstem continues to
6 get warmer.
7 MR. MOSS: Thank you for your responses.
8 JUDGE NOBLE: Mr. Stohr?
9 MR. STOHR: Thanks, Dr. Penney. A couple of
10 questions. You talked quite a bit about stress impacts
11 on mature or nearly mature salmonids. I didn't hear you
12 say much about other life stages, even though your
13 testimony refers to some of those portions of a life
14 cycle. Could you talk a little bit more about potential
15 impacts of stress on -- or stressors on other life cycle
16 stages?
17 THE WITNESS: Absolutely. I was trying to
18 stay away from that because I do believe Dr. Rice will
19 talk in length about the embryonic period, which I would
20 agree is probably -- the embryonic period or marble
21 stage are probably the most sensitive to -- again, it
22 doesn't need to be oil, but any type of chemical
23 stressor.
24 So I think, you know, if I was to think
25 about my testimony, if I put it at the most basic level,

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1 it was, you know, adult salmon swim up and juveniles
2 swim down. When the juveniles swim down, the
3 physiological process, there's also another -- the
4 physiological process occurs in the smolting process,
5 which that is where this -- the juvenile salmon are more
6 or less adapting to life or getting ready to adapt to
7 life in the ocean. And it's -- that's also stressful,
8 and they may spend several weeks in the estuary more or
9 less going through the changes that they need to live in
10 salt water. For example, in freshwater, a lot of the
11 water exchange occurs between the gills and the
12 bloodstream. When fish get into the ocean, they have to
13 drink more water because salt more or less dehydrates
14 them. So I mean, there's all these physiological
15 changes occurring. And so, again, as -- it's just an
16 added stressor and, you know, disruptions to that. If I
17 was to put this even more simply, the Columbia River is
18 a highway, and a lot of different populations have to
19 use that. Whether you're going to destinations
20 upstream, back home in Idaho, Washington, Oregon,
21 British Columbia, if everybody gets held up going down,
22 that causes problems to the life cycle. Now, are they
23 acute? Does it kill them? I don't have the research to
24 back that up. Does it cause stressors and stress them
25 out? I would be comfortable in saying, probably, yeah.

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1 MR. STOHR: Thank you. Another topic. You
2 briefly mentioned shipping vessels and -- as being one
3 of many impactors of wetlands. Could you talk a little
4 bit more about what you see in terms of -- what you know
5 about shipping vessels and their impacts to wetlands or
6 other critical habitat?
7 THE WITNESS: It would be mostly -- I
8 actually think speculation. I was more thinking about
9 the broad terms of how, you know, to keep shipping
10 channels open and stuff. We're constantly modifying
11 that area. There certainly are plenty -- there's
12 research of, you know, the effects that large ships and
13 their wakes cause to erosion and things like that, but
14 I'm not an expert on that and so I would be out of my
15 element by telling you one way or the other that those
16 are the effects. But certainly just answer -- human
17 impacts in that lower river to make sure that those
18 shipping channels remain open does have habitat effects.
19 But getting into the -- deep in the weeds about, you
20 know, the various ecosystem functions that it might
21 affect, I probably shouldn't go there.
22 MR. STOHR: Great. Thank you.
23 JUDGE NOBLE: Mr. Snodgrass, if you could
24 just -- Mr. Siemann had a question.
25 MR. SIEMANN: Good afternoon. You mentioned

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1 that the chemical signature of the water sort of helps
2 guide these salmon back to their natal streams, right?
3 THE WITNESS: Yes.
4 MR. SIEMANN: And I was just curious if
5 there's a possibility that an oil spill could alter that
6 chemical signature such that it could mess with that
7 guidance mechanism.
8 THE WITNESS: I think it could, but it
9 really depends on when and where that oil spill occurs
10 and what life stage is swimming through it. Basic
11 definition of what we call imprinting juvenile salmon
12 occurs where they were born. So their olfactory system
13 more or less identifies the signature and, you know,
14 they have an amazing ability to -- I mean, they're out
15 in the middle of the ocean, all of a sudden they decide
16 they know exactly where to go back to, it's kind of
17 amazing.
18 If an oil spill or some chemical spill and
19 they had water occurring during that period, it
20 certainly could cause issues to that imprinting. I
21 think some of the areas we're talking about aren't
22 necessarily close to tributaries. It depends on I guess
23 to the extent of that spill and how masked it might make
24 signatures in the water. You know, I guess it would
25 depend on the matter of degree of the spill. But I do

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1 think that if it occurred at the right time and the
2 right place, it could have impacts. Now, the -- yeah,
3 it would really depend on when it happened and where it
4 happened.
5 MR. SIEMANN: Could that potentially have
6 population impacts as opposed to individual impacts?
7 THE WITNESS: It certainly could. You know,
8 if -- if fish can't find their way back and they spawn
9 where they're not supposed to or they just get lost and
10 don't make it, yeah, that could be a problem.
11 MR. SIEMANN: Do you know of any sort of
12 examples in the literature of something like this
13 occurring where there's been some study of that? I'm
14 just sort of curious as to what the fish might do or if
15 there's any evidence, I suppose.
16 THE WITNESS: There is stuff in the
17 literature, but, again, I would be without -- I don't
18 know that intimately. Dr. Rice will be testifying later
19 today, or perhaps next week, could probably speak more
20 to that. There is some literature, but, again,
21 sometimes when we talk about literature, sometimes
22 there's a big difference between what happens in a
23 laboratory and what actually happens to field -- what
24 happens in field studies. So I don't think I'm
25 comfortable enough with myself to say, you know, one way

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1 or the other kind of what the actual effects would be on
2 the natural system. But there could be.
3 MR. SIEMANN: Thanks.
4 JUDGE NOBLE: Mr. Snodgrass?
5 MR. SNODGRASS: Good afternoon. Just a
6 question on -- essentially on rates of recovery. I
7 think the state -- the point made earlier in the
8 testimony, I think of Dr. Challenger, distinguishing
9 between an individual and population impacts sort of
10 implied to me that there would be a relatively quick
11 rate of recovery if a species or subspecies was impacted
12 by an oil spill. And so I just wonder what your
13 knowledge is about that.
14 THE WITNESS: Yeah, I mean, it did make me a
15 little uncomfortable. You know, sometimes we see with
16 fisheries, assuming you leave everybody alone and
17 there's no other big stressors in the environment, which
18 I don't know if we can say that for the Columbia River,
19 but you leave them alone and you don't fish on them, if
20 they tend to make a lot of babies, sometimes fish
21 populations can bounce back really quickly if humans let
22 them.
23 In the case of the Columbia, which is
24 already a highly modified system and my point earlier
25 about the different fish stocks that might be traveling

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1 together, certainly if you -- if the Okanagan Sockeye
2 stock took a big hit, is there -- there's still probably
3 enough spawners that they would be okay. If something
4 like the Redfish Lake Sockeye population took a big hit,
5 I'm not sure that it would be okay.
6 MR. SNODGRASS: Related to that, have the --
7 I think you mentioned the Snake, Yakima and Deschutes
8 Rivers as examples of some of those lower number
9 populations. Have they been low for a long time?
10 THE WITNESS: They have been actually. Some
11 of them have been zero. They're more or less being
12 brought back from the dead. The Deschutes and I do
13 believe Cle Elum are reintroduction projects. And so
14 they're trying to kick-start those populations back
15 again, which is -- sometimes what happens when you
16 kick-start a population, they're just not going to come
17 back in gangbusters; sometimes it takes time for them to
18 build again. So I guess to a degree, you know,
19 another -- a disruption like that can cause issues to
20 restoration efforts.
21 MR. SNODGRASS: Thank you.
22 JUDGE NOBLE: Any other questions, to my
23 right?
24 To my left?
25 Mr. Rossman?

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1 MR. ROSSMAN: If you'll forgive a couple of
2 ignorant questions along that same line, I guess I'm
3 wondering if a species is extirpated from a particular
4 area, what is involved in trying to reintroduce it?
5 THE WITNESS: Generally -- okay. I mean I
6 think it varies on a case-by-case basis, but before I
7 pursued my Ph.D., I did run a project restoring coho to
8 the Clearwater River. They were extirpated by the
9 Lewiston Dam, which is no longer there. In this case in
10 Idaho, the reason why coho never restored is they had
11 trouble with the donor stock to begin with and then
12 there also just actually wasn't a whole lot of public
13 support for it, but it was important to the tribes.
14 And so generally, what you want to do is, if
15 you're going to restore something to a specific area, we
16 found through genetics that, you know, salmon in many
17 geographic areas have very specific genetics that allow
18 them to either make a long migration distance or, you
19 know, have a certain life history type. So you want to
20 try to match that as close as you can. Sometimes you're
21 trying to pull from a stock that's already robust that
22 can actually provide some donor individuals. But from a
23 perfect perspective, we also like to give enough credit
24 to these species in that they do have sometimes quite a
25 plastic life history. Before all these areas were here,

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1 this was covered in glaciers. And there are natural
2 catastrophic events that happen, Mount St. Helens, for
3 example, can wipe out salmon stocks and salmon do find
4 ways to recall. So sometimes if you just give them a
5 chance, one of the things that we would also always want
6 to make sure of is we're not making a genetic bottleneck
7 either. You can't generally start with, you know, a few
8 individuals and get continually inbreeding. It does --
9 you do need to have some genetic diversity in there. So
10 that's something that we also consider.
11 MR. ROSSMAN: Thank you. That's helpful.
12 And I guess -- to what extent would it be possible
13 analytically to identify the particular populations that
14 were most stressed and the particular times that they
15 were most likely to be in the river such that one could
16 understand particular times that a spill or other impact
17 would be harmful, or is it such that they're so many
18 different stages of those and so many different
19 populations that much of the year some population that's
20 got a small number would be vulnerable?
21 THE WITNESS: We do have a decent grasp
22 right now. Again, our lab is just one of many that does
23 genetic analysis. And whether it's a hatchery or wild
24 stock, we're doing better at identifying those fish in
25 the times they come up because a lot of the

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1 identification doesn't necessarily need to be related
2 to, you know, if there was going to be an oil spill or
3 something like that. Even our fisheries, we want to
4 make sure our fisheries aren't having strong impacts on
5 stocks that are really low. And so that's something
6 that we're already trying to get a grasp on. You know,
7 if somebody's catching this many Snake River Redfish
8 Sockeye, maybe we want to stop that fishery, those fish
9 are passing through them. So we actually -- it's not
10 perfect and it's getting better every day. So we
11 already do have some of those capabilities. There is
12 literature even through just basic tagging information,
13 some of those Sockeye stocks, they have various tags
14 that we put on them to identify them and we can identify
15 those tags when they pass a dam so we say oh, geez,
16 those Snake River Sockeye pass mainly during this time
17 of year. And so we do have some idea of when fish are
18 in the river. But sometimes when they're in very large
19 groups, that's where the problem is -- gets into -- we
20 get into problems. So we do have a decent idea of, you
21 know, kind of when certain stocks are moving through,
22 but, you know, if -- but if they're caught, like in a
23 fishery, we can at least sample them and we know where
24 they -- you know, where they die. Something that's
25 environmental, where we can't see them or sample them

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1 after they die, that's kind of -- we have no idea.
2 MR. ROSSMAN: Got it. So conceptually, at
3 least, would it mitigate the risk to those populations
4 to limit when trains were running at those times?
5 THE WITNESS: It's certainly something, you
6 know, people would want to consider, that we don't want
7 to put these stocks at risk, so don't do that then.
8 That seems almost like common sense.
9 MR. ROSSMAN: All right. Thank you very
10 much.
11 JUDGE NOBLE: Could I just ask you about
12 predation. You mentioned that the fish basically can
13 run out of energy and so it would be subject to
14 predation by something like sturgeon, I think. But you
15 didn't mention anything about any other kind of
16 predation. I suppose they're at the top of the food
17 chain in some ways, if they're not being eaten. What
18 about on the smolts coming downstream? Is there any
19 effect from the condition of the water on other life
20 cycle stages?
21 THE WITNESS: Absolutely. I think predation
22 is worse when they're smaller. Part of the whole
23 evolution of why salmon went out to the ocean to get
24 bigger is that when you come back bigger, there's less
25 things that can actually eat you. And you come --

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1 there's a variety of competitive advantages to being
2 bigger. And sturgeon aren't really predators. Sturgeon
3 are really only eating dead things on the bottom. So
4 generally when a sturgeon eats a salmon, it's because
5 it's already died.
6 But on the way back down, when they're
7 smolts, there are many things that can eat them.
8 There's native predators, could be northern pikeminnows,
9 but there's a lot of introduced predators, fish
10 predators, that thrive in warm water. I mentioned bass
11 earlier. The Columbia River is a prime smallmouth bass
12 destination now. We have them all over the place. We
13 have walleye, which are a big fish predator in the
14 Columbia Basin. These fish do very well in reservoir
15 situations and those fish have to swim by them. So
16 predation by those fish is a huge -- has a huge impact.
17 We also have issues with predation with a
18 variety of different birds as well. And I guess I'm
19 more attributing this to the reservoir, but warm water
20 doesn't help with that either.
21 JUDGE NOBLE: Is it just warm water that
22 encourages that kind of negative predation or is there
23 anything else, like any sort of chemical introduction
24 into the water, that could be a problem with regard to
25 predation?

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1 THE WITNESS: I would guess I could put it
2 in -- again, about the stressors. If there's anything
3 that disorients fish or stresses them out to where
4 they're not able to swim, to see, anything that causes
5 that fish not to operate at its, I guess, maximum level,
6 anything that kind of constrains it, it could make it
7 much more easier for a predator to eat it.
8 JUDGE NOBLE: And hasn't that always been
9 the case?
10 THE WITNESS: In the Columbia --
11 JUDGE NOBLE: Is it any different now than
12 it always has been historically?
13 THE WITNESS: No. There's brand-new
14 introduced predators. And with the hydro system, a lot
15 of the deprivation of fish actually occurs below dams.
16 So whether it's smolt or fry, it goes through a turbine
17 or goes over the top, that's a long drop, and sometimes
18 they come out disoriented. So fish are subject to a lot
19 more potential predation events when they're
20 disoriented.
21 JUDGE NOBLE: Thank you, Dr. Penney.
22 Are there any questions related to council
23 questions?
24 MR. JOHNSON: None, Your Honor.
25 MR. LOTHROP: I have one, Your Honor, with

1 regard to Mr. Rossman's questions.
2 REDIRECT EXAMINATION
3 BY MR. LOTHROP:
4 **Q. And I can't think of a better way perhaps for**
5 **the council to help share an understanding with the**
6 **council about the Hagerman laboratory than to ask how**
7 **many peer-reviewed scientific publications have they**
8 **produced in recent years? Can you pick the nearest --**
9 A. It's got to be over a hundred easily. The
10 genetics field is just exploding and I'm very happy that
11 our group is there. There's so many things that we're
12 finding out that we can do with genetics now that can
13 help the fish. So hundreds.
14 MR. LOTHROP: Thank you. That's all.
15 JUDGE NOBLE: Thank you, Dr. Penney.
16 THE WITNESS: Thank you.
17 JUDGE NOBLE: You are excused as a witness.
18 Are there any other witnesses?
19 MR. LOTHROP: Yes, Your Honor. I would like
20 to call Dr. Rice, but I believe he will be our last
21 witness of the day, and if it would be appropriate, this
22 might be a good time to take a break.
23 JUDGE NOBLE: It is. Thank you. That's a
24 good suggestion. So we will be in recess for
25 15 minutes. It's about 20 minutes of 3 we'll come back.

1 KATHRYN BRIGHAM,
2 having been first duly sworn,
3 testified as follows:
4 DIRECT EXAMINATION
5 BY MR. HALL:
6 **Q. Ms. Brigham, could you state your name and spell**
7 **it for the record.**
8 A. My name is Kathryn Brigham, K-a-t-h-r-y-n,
9 Brigham, B-r-i-g-h-a-m.
10 **Q. Thank you, Kat. I'm going to start with the**
11 **same comment we start with every witness in this**
12 **proceeding. We have a court reporter taking down your**
13 **testimony. So to the extent you can speak slowly, I**
14 **think that will help all of us.**
15 A. Okay.
16 **Q. Kat, did you file written direct testimony in**
17 **this proceeding?**
18 A. Yes, I did.
19 **Q. And do you adopt that testimony under oath**
20 **today?**
21 A. Yes, I do.
22 **Q. Can you briefly summarize your qualifications?**
23 A. Well, I was appointed to the Confederated Tribes
24 of the Umatilla Indian Reservation's Fish and Wildlife
25 Commission in August of 1976. Slow down. Okay. All

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1 right.
2 I have been involved in fish issues up until
3 December of 2015. I was a Fish and Wildlife Commission
4 member and an elected official for the Confederated
5 Tribes. I attended a number of fish issue meetings,
6 such as the Columbia River Inter-Tribal Fish Commission,
7 the Pacific Salmon Commission, the North Falcon
8 Fisheries Management Council meetings that occurred, and
9 I was a policy member to the US v Oregon process.
10 And during that time frame, I met a lot of
11 people. One of the ones I really -- we really enjoyed
12 working together with was Billy Frank, Jr. He was the
13 chairman of the Northwest Indian Fish Commission. And
14 one of the things we talked about and how we need to be
15 working together was because we all agreed that this was
16 all Indian country at one time. But we still have a
17 place in the Pacific Northwest for Pacific salmon. And
18 so we got together in 2008 and we developed a brochure
19 that was brought back to Washington, D.C. to educate and
20 to let federal agencies know how important salmon is to
21 the Pacific Northwest.
22 We were really pleased with that brochure, and
23 so in 2012 we did the same thing, only this time we were
24 able to bring in three additional commissions from the
25 Great Lakes area. So we had five commissions who were

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1 talking about the importance of salmon to our way of
2 life, our future and our history.
3 So salmon is important and it's part of our
4 culture, part of today and part of the next seven
5 generations and beyond. And as tribal leaders and
6 tribal people, we have been taught more than once to
7 talk about and think about our next seven generations.
8 One of the things that my grandfather said was that you
9 fight real hard for today, but not at the expense of
10 your children, your children's children and their
11 children. That's why we talk about the next seven
12 generations and beyond.
13 And as part of this process we went to
14 Washington, D.C. I would say more than one -- it
15 averaged out about once a year, where we would go to
16 Washington, D.C. to talk about the importance of salmon,
17 what the tribes were doing and testified at a number of
18 different hearings.
19 **Q. Thank you, Kat. That's once a year going back**
20 **to D.C. for the last 40 years?**
21 A. Yes.
22 **Q. Thank you. Now, you mentioned you've been**
23 **involved on fish issues since December 2015. You didn't**
24 **stop fishing in December 2015?**
25 A. No, those are -- that was as an elected

1 official. I married my husband in 1965, and he's a
2 commercial fisherman on the Columbia River, and I have
3 been fishing on the Columbia River since then. In the
4 beginning I fished on a regular basis, but once I got on
5 as an elected official, it was off and on, but I was
6 very lucky I was able to go fishing last week on the
7 Columbia River. And so it's something we still do as a
8 family and it keeps us together. And I think it's also
9 important for you to know -- I know you were asking
10 questions about families.
11 The Brigham family and many other tribal
12 families have been fishing on the Columbia River from
13 generation to generation. And as our family, we have
14 currently four generations in our family who are
15 fishing. My great-grandson was able to go fishing last
16 year and is looking forward to fishing this year and
17 next year. And one of the questions he asked me was, is
18 my children going to be able to fish? I said,
19 hopefully, yes, so you'll be able to teach your children
20 and their children that this is something we've been
21 doing from generation to generation.
22 **Q. Thank you, Kat. I would like to move into the**
23 **rebuttal portion of your testimony today. Have you had**
24 **the opportunity to review the prefiled testimony of**
25 **Brian Carrico?**

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1 A. Yes, I have. And I have three concerns. One is
2 the timing in which we started fishing, the second is
3 the area in which we were fishing and the third is the
4 safety risks. So I'll go to the first one, to the
5 timing. It kind of sounds like we started in 1977
6 fishing in the Columbia River. Actually we've been
7 fishing on the Columbia River since time immemorial.
8 Like I said earlier, this is four generations -- not
9 counting, you know, my father -- my husband, my
10 daughter, my grandson and my great-grandson. That's
11 just four generations. And before then there was
12 several generations before then. And so we've been
13 fishing on the Columbia River for a very long time, for
14 generations.
15 The other one is the area in which we fish.
16 There was some discussion about the Zone 6 area. Yes,
17 that's a Zone 6 area which we have a commercial fishery,
18 but at the same time, like I said earlier, when Billy
19 Frank and I were talking about it, this was all Indian
20 country at one time and we used to travel and fish all
21 over the Pacific Northwest. We have fishing rights that
22 go down to the mouth and up into the tributaries of the
23 Columbia River. Right now we are even having annual
24 trips up to Montana to go hunting for Buffalo. So our
25 travel as tribal people has been over the Pacific

1 Northwest quite a bit. So to say that we were just
2 fishing in Zone 6 is not accurate at all.
3 **Q. I think the third one was the potential impacts**
4 **from rail traffic.**
5 A. Yes, the third impact was safety risk. I read
6 that and my thought is, you know, he's identified some
7 crossing areas. Well, I'm just going to give myself as
8 an example. My daughter and I were fishing, and we went
9 and drove up I -- Highway 14, we pulled off the road, we
10 parked our pickup and we walked over the tracks.
11 There's no path. The path across that is one we made.
12 And so it's -- and we went down to fish off of our
13 platform. And I know for a fact that we are one example
14 of people going over tracks, and it's not because
15 there's a road there or a path there; it's because
16 that's where we're going to go cross to go to our
17 fishing platforms along the side of the river. So
18 there's a lot of areas that are not necessarily on the
19 map that shows where we have been going across the
20 tracks to go fishing along the Columbia River.
21 The other thing is the safety. I guess just
22 within my family alone -- I didn't think I would cry.
23 **Q. Take your time, Kat.**
24 A. I'm sorry. Just within my family alone, I've
25 lost three members to the railroad crossing and all of

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1 them were fishermen and it was in the spring of each
2 year. I lost a nephew. He was a very young man and he
3 was coming back to the in-lieu site after fishing, and
4 later lost his sister, and that was in 2006. And then
5 in 2008, lost my niece, who was also fishing along the
6 Columbia River. Then in 2010, I lost my cousin, who was
7 fishing up at Alderdale, and he was crossing the tracks
8 with his boat and trailer and he got hit by the train as
9 well.
10 And so when you talk about the safety risks
11 of -- to tribal people, I think it's much higher than
12 what is actually stated there. Because we cross those
13 tracks on a regular basis to get to those fishing sites.
14 And the other thing too is we have talked to each other
15 about saying why didn't you hear the trains, and it's
16 because of the wind and, you know, things like that,
17 that you don't -- and the train coming around the bend
18 that you don't necessarily hear those things. So the
19 risk is high. It's not something that is -- that just
20 because we've got a guard that keeps us from crossing
21 the tracks doesn't mean that's where we're going to
22 cross.
23 **Q. Kat, I'm sorry to ask you one more question on**
24 **this topic. Can you tell the council whether the cousin**
25 **you lost in 2010 near Alderdale was crossing at a grade**

1 or somewhere off the road?
2 A. He was crossing on Alderdale. He was going
3 across the area -- I don't think they had a crossing at
4 that time, and so he was just crossing the tracks to
5 go -- bring his fish home. Because I think it was the
6 end of the season.
7 **Q. And, Kat, when you say "Alderdale," that's the**
8 **Alderdale in-lieu site?**
9 A. Yes, it's up there on the John Lake Pool.
10 **Q. Thank you. Kat, let's move on.**
11 A. Okay.
12 **Q. Let's talk about the testimony of Dr. Elliott**
13 **Taylor. Have you had a chance to review that testimony?**
14 A. Yes, I have. And, again, I have two concerns.
15 One was that the -- I mean, if water were to spill -- it
16 was more likely to spill on land than in water. And so
17 out of curiosity yesterday, I drove from -- I'm from
18 Pendleton, Oregon. And so I drove across the river just
19 below McNary Dam, and I came down into Vancouver. And
20 in coming down here, I identified three different -- 23
21 sites where a railroad is actually crossing the water or
22 the railroad track is -- has water on both sides because
23 of a pond or -- you know, that's been created by the
24 railroad tracks going along the Columbia River. And so
25 the tracks are right along the Columbia River and

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1 they're -- if you get -- the sand didn't make them stay
2 there. These are huge rocks that were brought there.
3 So if the oils were to occur -- spill were to occur, the
4 rocks will not absorb them. They would go into the
5 water.
6 And then the other thing would be the water
7 itself, a long time ago, when my husband and I first
8 started fishing, we were able to put our nets in on
9 Monday and pull them out on Friday without a lot of
10 vegetation on it. And as Stuart was talking about, now
11 we have to take our nets out and some places we're lucky
12 that we can leave them in. It's not -- we can shake
13 them out, the nets out, and remove the vegetation. But
14 in other places, we have to take the nets out every
15 morning while we're pulling our gear, bring them to
16 shore and use the power wash to clean those nets out so
17 they're fishable so that we can catch fish in the
18 evening.
19 **Q. And, Kat, what do you think this vegetation**
20 **means for some of the conclusions Dr. Taylor drew about**
21 **oil and water?**
22 A. I don't think it's going to move very fast. I
23 think, you know, the vegetation in the Columbia River
24 has grown substantially. I can tell you from some of
25 the fishing experiences, sometimes we've caught more

1 seaweed than fish. We've got a boat load of seaweed and
2 very few fish. So the vegetation in the Columbia River
3 has grown considerably.
4 **Q. Kat, I think you mentioned you went fishing last**
5 **week.**
6 A. Yes, I did.
7 **Q. And did you see vegetation in the water at that**
8 **time?**
9 A. Yes, I did.
10 **Q. And --**
11 MR. HALL: I'm laying a foundation, Your
12 Honor.
13 BY MR. HALL:
14 **Q. And did you take pictures?**
15 A. Yes, I did.
16 **Q. Thank you.**
17 MR. HALL: Ms. Mastro, could you bring up
18 Exhibit 5330-1 TRB, please. Thank you, Ms. Mastro.
19 BY MR. HALL:
20 **Q. Kat, do you recognize this picture?**
21 A. This is a picture of my daughter putting out the
22 net after we've washed it, power washed it. It's going
23 out in the evening so we can run it the following day.
24 **Q. Thank you.**
25 MR. HALL: Your Honor, the tribes would move

to enter Exhibit 5330-1 into evidence.

JUDGE NOBLE: Is there any objection?

MR. JOHNSON: No objection.

JUDGE NOBLE: 5331 [sic] will be admitted.

MR. HALL: Thank you. Ms. Mastro, can you go to 5330-2, please.

BY MR. HALL:

Q. Kat, do you recognize this photo?

A. Yes, I do. This is a picture, again, of my daughter Terry and then my grandson Brigham. They're running the gear. And this is one of the nets that we're able to keep out at night, but at the same time while we're running the gear -- you can't see it, my grandson has his hand up like this, but in his hand is a stick that he's weeding the net with to clean the net. And then my daughter -- and then you'll see on the side of the boat, the black marks, that's where the algae's falling from his shaking and moving the net, and then my daughter Terry is also shaking the net as it's going out, to try to remove the vegetation from the net so it can be fishable in the evening.

Q. And, Kat, does this activity they are doing with the net always clean the net so that you can keep fishing it?

A. Always. This is -- I don't have an all-girl

1 crew anymore, but I used to. I was -- as they said --
2 not the chief, but I was the head of the crew and I had
3 my daughters. I have three daughters and my sister, and
4 all of us were fishing on the Columbia River. But one
5 of the things we always made sure that happened was when
6 these nets were pulled, we pulled out all of the
7 vegetation that we could. And one of my daughters
8 says -- used to tell me, we had to pull every morsel.
9 That was just to be able to get the nets clean so that
10 they would be able to catch fish.
11 **Q. Kat, I'm going to try one more time. Do you**
12 **ever have to do anything else than what they're doing to**
13 **get the nets cleaned?**
14 A. Power wash them. Yes. We have power washed our
15 nets to keep them clean. And like I said earlier, when
16 we power wash them, we pull nets and the fish in at the
17 same time, and then we take the nets out and bring them
18 to shore and get a power washer to wash them. And we
19 pull -- as we're pulling the net out of the boat, we'll
20 pull the net out and somebody will stand there and power
21 wash the net as it's being pulled out and then it
22 will -- the net will fall onto the ground, and then once
23 we've got it ready to go out, then we put the clean net
24 back onto the boat so that it can go back out onto the
25 river.

JUDGE NOBLE: Mr. Hall, I think -- I'm not sure, but it seems like there's a numbering issue with these exhibits. I think it's 5530, photograph 1 and photograph 2.

MR. HALL: You are right, Your Honor, and I just realized -- I didn't remember that's the numbering protocol being used in this proceeding. So I think having -- have Ms. Brigham talk about these two photos, now I'll offer Exhibit 5330 into evidence.

JUDGE NOBLE: Correct. 5330 is admitted and it consists of two photographs. So I don't think there is a 5331?

MR. HALL: That is correct, Your Honor.

JUDGE NOBLE: Change that.

MR. HALL: I have one more question of Ms. Brigham, Your Honor.

BY MR. HALL:

Q. How many generations are on this boat?

A. Four. My husband, our three -- my husband, my daughter and my grandson.

MR. HALL: Thank you. No further questions at this time, Your Honor.

JUDGE NOBLE: Cross-examination of Ms. Brigham?

MR. JOHNSON: No questions from me.

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1 JUDGE NOBLE: Council questions?
2 Mr. Stohr?
3 MR. STOHR: Thank you, Ms. Brigham. We've
4 talked quite a bit about harvests, and a little bit
5 about comanagement, et cetera, but I'm interested in
6 your view as a tribal leader on the habitat issue and
7 how you think that issue might relate to our decision
8 about this facility.
9 THE WITNESS: Well, as Stuart stated, you
10 know, we view habitat as a very important part of
11 rebuilding salmon. And he's right, in that it takes a
12 while for salmon to rebuild there, but there's also many
13 other benefits for the habitat. When we rebuild,
14 protect and restore the habitat, not only are we
15 rebuilding that habitat for salmon, but we're also
16 creating cleaner water, cooler water. We're also
17 creating the habitat for the trees to have the air, you
18 know, cleaner.
19 So we view the habitat as something that is
20 very important. In fact, one of the things that we have
21 been taught prior to the treaty, is that we have to take
22 care of the land so the land can take care of you. If
23 you don't take care of the land, where are you going to
24 go?
25 And so we have been working on rebuilding

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1 the habitat for generations so that we can have the land
2 in which we live on that we love and want our future
3 children -- future generations to live on. Because I
4 don't think any of us are going away. I do know that,
5 you know, on the Hanford, this was an area that was a
6 tribal area, but we had to move from there. But I also
7 know that non-Indians lived there, and nobody can live
8 there now. And so that's what we're trying to prevent.
9 MR. STOHR: Thank you.
10 JUDGE NOBLE: Any other questions, to my
11 right? To my left?
12 Mr. Rossman.
13 MR. ROSSMAN: Thank you for traveling and
14 for your testimony today.
15 You had mentioned in your testimony most
16 recently working with tribes in the Great Lakes area on
17 the salmon brochure; is that right?
18 THE WITNESS: Yes.
19 MR. ROSSMAN: Do you know if those tribes
20 have a similar reservation of rights to take fish at
21 their usual and accustomed places?
22 THE WITNESS: Some of them do. And it's
23 just like what Stuart was talking about, some tribe --
24 well, there are over 500 tribes in the United States.
25 And some of them have a treaty where the treaty

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1 guarantees us the right to go fishing, hunting, all of
2 those types of things. Some of them have executive
3 orders and some terms have been terminated and then
4 restored. But all of the -- our first foods, our
5 traditional foods, are something that we all work to
6 protect and restore.
7 MR. ROSSMAN: Thank you.
8 THE WITNESS: You're welcome.
9 JUDGE NOBLE: Before we go, Ms. Brigham, I
10 have a question. Could you tell the council what -- of
11 what importance -- the salmon and other fish that you
12 take, of what importance are they to you, your family
13 and your tribal members?
14 THE WITNESS: The importance of salmon is
15 part of our history. I mean, we have stories about how
16 we have fished on the Columbia River. So it's part of
17 our history, part of our future today -- operations
18 today. I mean, it's our way of life. I mean -- and
19 just -- just like I said, I'm one example of a family
20 that fishes. But out of our family, all of us fish, all
21 of us take care of the fish, all of us are planning for
22 the future and all of us live off of that fishing
23 income.
24 In fact, because of the tribes working with
25 the states to rebuild salmon runs, we -- we're one of

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1 the successful families, and we have just opened up what
2 we call Brigham Fish Market in Cascade Locks two years
3 ago. If we hadn't had fish as part of our income or
4 part of our livelihood, this would not be possible; but
5 at the same time we are also like some of the fishermen
6 that Stuart talked about, over the bank sets. That's
7 how we made our living. And the process is that we have
8 ceremonial fish first, where we have our traditional
9 gatherings to share the salmon, and then the subsistence
10 fish, where we catch fish for ourselves and for our
11 families and for other tribal people, and then the
12 commercial.
13 So subsistence is generally in the spring,
14 and then the summer -- or ceremonial is generally in the
15 spring where we catch all our fish to put it away for
16 traditional reasons. And then for -- then the summer is
17 subsistence and then the fall is the commercial. And
18 that's when we -- that's why the big difference in the
19 nets, but it's a very important part of our livelihood.
20 JUDGE NOBLE: You mentioned the ceremonial
21 importance as well. Could you explain to the council
22 briefly about the cultural importance of salmon annual
23 fish.
24 THE WITNESS: Annually, we have ceremonies
25 for salmon. I mean, each tribe has what we'd call a --

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1 well, there's a Salmon Feast on the Columbia River which
2 is held, we like to say, generally the first weekend in
3 April, but it's when the salmon come. And then it's the
4 Root Feast and the Huckleberries -- oh, I forgot our
5 Celery Feast is in February, but all of those feasts are
6 where we are giving thanks to our food returning, but we
7 also are sharing that food with our community for it
8 coming back.
9 But ceremonial is not only for the first
10 foods returning, but ceremonies are for weddings, for
11 namegivings, tribal members receiving their Indian name,
12 and then also for services and rejoinings. Because once
13 you've lost a family member, you're not supposed to
14 participate in activities for a year, and then generally
15 within a year, or up to a year, people will rejoin so
16 they can participate in traditional activities again.
17 JUDGE NOBLE: And are you familiar with the
18 term "first foods," I think it is?
19 THE WITNESS: Yeah, yeah.
20 JUDGE NOBLE: Could you -- is salmon part of
21 that concept?
22 THE WITNESS: It is very much. Our first
23 foods are water, salmon, big game, roots and berries.
24 For the Umatilla tribe, we've taken a whole different
25 approach on planning for our first foods, in that we are

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1 now looking at our Department of Natural Resources,
2 where when they look at land management for grazing, for
3 hunting, they look at what impacts it has to our salmon
4 and to our big game.
5 And then for our planning department, which
6 is the zoning part and for grazing, those types of
7 things, they look at the impacts to our salmon and our
8 big game and our roots and berries.
9 So our first foods are things that are very
10 important to us. In fact, our treaty of 1855 would not
11 have been signed if it hadn't been guaranteed access to
12 our first foods so that we can practice our culture,
13 continue our way of life and plan for the future.
14 JUDGE NOBLE: Thank you, Ms. Brigham.
15 Questions based upon council questions?
16 MR. JOHNSON: None, Your Honor.
17 MR. HALL: No further questions, Your Honor.
18 Thank you.
19 JUDGE NOBLE: Ms. Brigham, thank you very
20 much for your testimony. You are excused as a witness.
21 THE WITNESS: Thank you. And I apologize
22 for being emotional, but I didn't expect it.
23 JUDGE NOBLE: Not necessary. Thank you.
24 All right. Am I understanding correct that
25 we have a 1:00 phone call?

COLUMBIA RIVER INTER-TRIBAL FISH COMMISSION

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June 13, 2016

Millennium Bulk Terminals EIS, c/o ICF International
710 Second Avenue, Suite 550
Seattle, WA 98104

RE: Comments on Draft SEPA Environmental Impact Statement for the Millennium Bulk Terminals - Longview Coal Terminal.

To Whom it May Concern:

Once again, the Pacific Northwest is confronted by a proposal for a large-scale energy project that will use the Columbia River Gorge and her lower river estuary as a transit point to serve energy markets in other parts of the globe. Once again, the greatest risks and burdens of development will be placed on those with the least amount to gain. In all ways this project, as well as similar projects in the region, is an affront to the tribal people who have worked tirelessly to restore their way of life and the river that sustains it. Billions of dollars have been invested throughout the Columbia River Basin for fish recovery. To add projects such as the Millennium Bulk Terminals – Longview, LLC coal distribution terminal (Millenium coal terminal) to the River Basin would be a major setback to these efforts.

The Columbia River Inter-Tribal Fish Commission (CRITFC) requests that Washington state and Cowlitz County use their respective authorities to deny the Millennium coal terminal. Individually the project will result in a significant increases in rail traffic through the Columbia River Gorge and deep draft vessel traffic through the fragile Columbia River estuary. Collectively with other fossil fuel transport projects, notably the Tesoro Savage crude-by-rail project proposed for the Port of Vancouver, the amount of coal train traffic would increase by 400%, oil trains by 180% and deep draft vessel traffic by 80%. The Columbia River Gorge and the Columbia River estuary are not the place for a fossil fuel corridor.

The treaty tribes of the Columbia River have been a part of this region since time immemorial. For the last two centuries, the tribal people have born the greatest burdens from development and resource extraction. The proposed Millennium coal terminal is the latest in a long line of developments where the tribes would unfairly carry the risks associated with energy projects at the cost of the environment, treaty reserved fishing rights, and the Columbia River.

There are hundreds of tribal fishing families' members who use in-lieu and treaty fishing access sites; treaty-protected usual and accustomed fishing places within the rail corridor are extensive. In negotiating and assenting to the Stevens and Palmer treaties, the Columbia River tribes reserved not

only the right to take fish at their usual and accustomed places, but also retained a property right in adjacent lands "to the extent and for the purpose mentioned" in the treaties. *U.S. v. Winans*, 198 U.S. 371, 381 (1905). *Winans* affirms the rights of tribal members to make such use of the land surrounding the usual and accustomed sites as is essential to the full exercise of their treaty fishing right. The *Winans* Court considered the treaty language as a whole, and found that this language, taken together with the social and factual setting of the treaty negotiations, supported the right of access. The contingency of the future ownership of the lands, therefore, was foreseen and provided for -- in other words, the Indians were given a right in the land -- the right of crossing it to the river -- the right to occupy it to the extent and for the purpose mentioned. No other conclusion would give effect to the treaty. *Winans* at 381.

The circumstances of the treaty negotiations and the specific language of the treaties illustrate the dependence of the Indian's way of life on the salmon harvest, and the emphasis they placed on protecting their existing fishing activities on the Columbia River. There are hundreds of gillnet sites in the Columbia River and many of these are accessed by both land and water. Almost all land access in the area requires crossing the railroad tracks. As discussed below, many of the crossings are dangerous.

Coal Dust

The Millennium coal terminal would increase the current weekly average of coal trains from 18 to 55, a nearly 400% increase in coal train traffic. This would result in significant air quality impacts and direct health concerns for tribal people living along the railroads. Coal dust is currently a nuisance and health concern for tribal fishers along the rail line. The nature of the famous Columbia Gorge winds makes dust a significant and predictable problem, even with the application of surfactants. Dr. Daniel Jaffe incredible coal dust study found that coal trains emit *twice* as much respirable particulate matter as other diesel-powered freight trains. In addition, 5.4% of those trains are considered “super dusters”. (Jaffe, et al. 2015). This report quantifies anectodal stories by tribal fishers of coal dust originating from these trains. Coal dust and particulates of various sizes can be found all over the rail line from McNary dam to Vancouver. At the railroad crossing at Horse Thief Butte, one has to merely dip one’s hand into the sediments near the rail to see the amounts of coal residue.

Coal dust found at Columbia Hills State Park (Horsethief Butte) railroad crossing.

Contrary to what the Draft Environmental Impact Statement (DEIS) seems present, coal dust is significant issue that will result in greater than "limited" impacts. To tribal people who live and work along the river, coal dust is an ongoing issue of concern, even with the current low level coal train traffic (14-19 trains each week). Rail companies have admitted in the past that as much as 600 pounds of coal dust is released from each rail car per trip. CRITFC demands that nothing short of total containment of coal and fugitive coal dust during transport, storage, and shipping should be acceptable to Washington state.

Railroad companies, including BNSF, have acknowledged that coal dust can also affect rail safety. Coal dust itself can be combustable and cause fires under certain conditions. It has also been shown to affect the ballast strength and stability of rails leading to train derrailments. Adding more coal dust to the Gorge rail system will add to the unsafe conditions for those living along the river.

Increased Risk of Train Strike

This massive increase in rail traffic will undoubtedly increase the number of people killed by train strike, especially tribal people trying to access treaty fishing sites. The more traffic, the greater the risk of accidents. Over the years, tribal fishers transiting to or from fishing sites have been killed or injured by trains. In addition, a CRITFC Enforcement Officer was also killed by a train while on duty. In many of the areas along the river, when the wind is blowing, one cannot hear a train coming until it is too late. The inability to hear the trains, coupled with difficult lines of site in many places leads to very dangerous areas that tribal fishers encounter on a regular basis. Increasing the numbers of trains through this area will magnify an existing, deadly risk to tribal fisheries as well as CRITFC's enforcement officers and site maintenance staff.

On the Washington side of the Columbia River there are nine In-lieu and Treaty Fishing Access sites with at grade crossings, four more sites adjacent to the railroad tracks, and all other sites within the vicinity of the railroad. On the Oregon side of the Columbia River, there are 10 more in lieu and treaty fishing access sites. These sites provide vital access to the river for treaty fishers, they are key sites for commercial buyers and several of the sites are occupied year round by tribal members and their families. http://www.critfc.org/for-tribal-fishers/in-lieutreaty-fishing-access-sites The ability to cross the railroad to get on these sites or access the River is already encumbered by rail transportation through the corridor. Adding more trains could further reduce access to the sites affecting tribal members' commercial enterprises.

Deep Draft Vessel Impacts to lower Columbia River estuary

The DEIS also minimizes the potential effects of the additional deep draft vessels that this project will require. In the Columbia River, the current annual average of vessel traffic is 1,500 (or 3,000 trips). The Millennium coal project will add 840 deep draft vessels (or 1,680) trips per year, a nearly 60% increase. These ships, primarily "panamax" sized, will be the largest currently in the river. This is not insignificant. More vessels in the river increases risk of grounding as deep draft vessels have to work to avoid collision in the limited navigation channel of the Columbia river. The Tesoro Savage project is proposed to add an additional 365 deep draft oil tankers (730 trips) per year. Cumulatively this would represent an 80% increase in deep draft vessels in the lower Columbia River, crossing a notoriously dangerous bar with highly volatile materials. Interestingly, Washington State is Washington State is currently conducting a vessel safety study to determine the

effect of these projects on the safety of the lower Columbia River. It would be pragmatic for Ecology to delay approving the Millenium coal terminal until this study is complete.

The lower Columbia River estuary provides essential rearing habitat for many stocks of salmonids and other aquatic species. In the Biological Opinion for the Federal Columbia River Hydropower System, the estuary is given great weight for its value in recovering ESA-listed salmonids. There is general concern that high numbers of outmigrating salmonid smolts are lost between the dams and the ocean. Increasing vessel traffic in the estuary could result in moderate to major long-term changes to tidal wetland, shallow water, and tidal flats. It makes no sense to continue degrading estuarine habitat and contributing more mortality by adding more deep-draft vessels to the estuary.

Berthed Vessels Impact Air Quality and Water Quality

As deep draft vessel are berthed to be loaded with product, their deisel auxiliary engines "idle", contributing particulates to the air and requiring cooling water to maintain cool engine temperatures. This thus becomes a major source of air quality concern as well as water quality, since the "warmed" cooling water is then discharged into the waterbody. The lower Columbia River is listed under the Clean Water Act section 303(d) as limited for temperature under both Oregon and Washington's programs (and particularly in summer), therefore point sources, such as these ships, introducing further thermal loading should be prohibited.

In order to remove the impact to air and water quality, best practices now necessitate that deep draft vessels to use "shore power" and tap landside electricity for their power needs at berth. According to estimates, shore power can reduce pollution by 95%. At a minimum, Washington Ecology and Cowlitz County should require the exclusive use of shore power for berthed ships at this project.

Thermal Pollution from Coal Storage Operations

Section 4.5 of the Draft Environmental Impact Statement does not consider the impact of thermal pollution from coal storage operations to water quality. As noted at 4.5-9 the Columbia River faces water quality issues and the vicinity of the project area is currently a candidate for Category 5 restrictions for temperature by Washington State Department of Ecology. As such any waters exiting facility operations that are returned to the natural environment at a higher temperature than ambient water temperature should be modeled and fully considered as a negative impact. Coal storage operations proposed for the site will involve dust suppression of 75 acres of coal stockpiles which together with heated stormwater runoff will be contributing excess thermal pollution to the Columbia River.

Ballast Water Discharge by Deep Draft Vessels

Deep draft vessels must carry ballast water from their origination for safety and navigation. Any analysis must take into consideration the chemical, physical, and biological impacts of dumping millions of cubic meters of foreign water into the Columbia River, as well as the changes in salinity in cases of low river flow that can change hydrology.

In addition to the direct chemical impact of the seawater, there is the high potential for the release and possible colonization of invasive plants, animals and pathogens, including those harmful to human health. Untreated ballast water is responsible for the introductions of numerous invasive species on the Pacific coast, Zebra and Quagga mussels in the Great Lakes, and potential human health risks like typhus. To prevent the potential introduction of foreign plants, animals and pathogens, all ballast water releases must be filtered of all organisms, including pathogens.

The introduction of Quagga and Zebra mussels originated from ballast water releases in the Great Lakes in the late 1980's, and their effects on the invertebrate community has been devastating. Mussels have spread to most areas of the United States except for the Pacific Northwest. If they arrive in this habitat, it could cause billions of dollars in damage to water related industries and municipalities as well as potentially change entire ecosystems.

Ships are required to conduct open water ocean exchange or utilize an onboard ballast water treatment to ensure that foreign low salinity organisms are not transported into the Columbia. However, these treatment options are not always conducted successfully, or, in the case of rough water, the vessel may not be able to release its ballast in the ocean. To address these risks Millennium coal terminal should include a closed-loop water treatment system on the terminal site. The absence of such treatment capability makes the proposal unacceptable.

Wake Stranding by Deep Draft Vessels

Juvenile salmonids and eulachon, some of which are listed under the ESA, may be stranded on the Columbia River shorelines due to the wakes of passing vessels. The fish are then deposited on shore by the wave generated by the vessel wake. Stranding typically result in mortality unless another wave carries the fish back into the water. Generally, a set of interlinked factors act together to produce stranding during ship passage:

- River-surface elevation low tides are generally more likely to result in strandings than high tides;
- Beach slope low-gradient beaches are generally more likely stranding locations than higher gradient ones;
- Wake characteristics, ship wakes that result in both the greatest draw-down and run-up on the beach are generally most likely to result in strandings. Wake characteristics are influenced by a number of dynamics included vessel size and hull form (short and fat vessels have a great displacement effect and generate larger wakes than long and thin vessels).
- Vessel draught – the smaller the under-keel clearance, the larger the wakes, thus loaded vessels are more likely to result in strandings than unloaded vessels;
- Vessel speed – fast moving vessels generate larger wakes than slow vessels;
- Distance between the passing vessel and the beach, where strandings are generally more likely.

There has been at least one study that examined the stranding effects on salmonids by a variety of vessels. Ackerman (2002) found that 21 juvenile Chinook (and 174 other species) were stranded in the lower Columbia River by 35 tug/barges and 56 deep draft vessels. For the Ackerman study, three locations were surveyed on two occasions. Furthermore, it may be inappropriate to draw reader's attention to deep water vessels, while neglecting the effects of smaller vessels. Pearson

and Skalski (2011) report, "At both river and beach scales, no one factor produces stranding; rather interactions among several conditions produce a stranding event and give stranding its episodic nature." Wake stranding also has the potential to result in make fish easier prey for avian predators.

NOAA's estuary recovery module identifies 23 management actions to improve the survival of salmon and steelhead migrating through and rearing in the estuary and plume environments.[1] With regard to ship wakes, the recovery module developed for Endangered Species Act implementation calls for "reduc[ing] the effects of vessel wake stranding in the estuary." In contrast, the proposed project would increase wake stranding in the estuary.

Vessel traffic safety evaluation and assessment for the Columbia River

The Washington Department of Ecology must complete an evaluation and assessment of vessel traffic management and vessel traffic safety within and near the mouth of the Columbia River. This includes an analysis of the amount of new oil being transferred onto vessels as a result of rail traffic. The assessment will help inform risk assessments that will be undertaken during the 2015-17 biennium. Ecology must consult with a number of organizations including tribes, the U.S. Coast Guard, Oregon pilots and public ports. The assessment must include, but is not limited to addressing: (a) the need for tug escorts for oil tankers, articulated tug barges, and other towed waterborne vessels or barges; (b) best achievable protection; and (c) required tug capabilities to ensure safe escort of vessels. Recommendations made to the Legislature must include vessel traffic management and vessel traffic safety measures, including recommendations for tug escort requirements for vessels transporting oil as bulk cargo. Any decisions on approving the Millenium Bulk Terminal should await the conclusion of this study (est. June, 2018) and its careful application to considering the effects of this and other proposals that would increase vessel traffic on the Columbia River.

Shoreline Erosion and Propeller Scour from Deep Draft Vessels

Prop wash from vessels as well as ship wakes breaking on shore could cause increased erosion along the shoreline and re-suspend the eroded material within the water column. Vessel wake and propeller scour could injure or otherwise impact substrate and invertebrates, as well as benthic-based fishes such as white and green sturgeon.

Terminal Operation Impacts: Noise

There is an important distinction between pressure waves and particle motion sound vibration and how they affect salmonids. Current criteria (and monitoring) for minimizing the effects of sound on fish rely solely on measurements of pressure. However, current scientific literature suggests that salmonids are very sensitive to particle motion sound vibration and less so to pressure waves. Consequently, a salmon may be much more sensitive to sounds generated in the water (e.g., piles being driven into substrate).

[1] http://www.westcoast.fisheries.noaa.gov/publications/recovery_planning/estuary-mod.pdf.

If the project only measures the effects of pile drivers on salmonids using pressure wave detection devices, a serious deleterious effect may not be detected. Particle motion sound and their effects on adult salmon are currently being studied by the U.S. Corps of Engineers at Lower Granite Dam. In association with the study at Lower Granite, a thorough literature review has been and should be considered in the DEIS (Hawkins).

Terminal Operation Impacts: Predators

The expansion of overwater habitat and trusses creates the potential for roosting habitat of Double Crested cormorants which is a key predator of juvenile salmonids will migrate by the terminal and thereby increase the potential for additional predation impacts. Additionally, an increase in overhead cover and shading by the expansion has the potential to create habitat for a number of predatory fish species and thereby increase predation on out-migrating juvenile salmonids.

Terminal Operation Impacts: Lighting

Similar to overhead cover, the additional lighting resources in the project area projected to be continuous creates permanent predation opportunities for both fish eating birds and piscivorous fishes that prey on juvenile salmonids. Juvenile salmonids migrate more actively at night and that combined with the attractive effect of lights has the potential to increase the predation impacts on listed salmonids.

Work Window for Terminal Construction

The work window of September 1 through December 31 is not consistent with full protection for spawning eulachon (smelt), juvenile sturgeon, and migrating adult salmonids. Eulachon may stage in the lower river weeks prior to spawning and therefore are vulnerable to impacts from the project outside of the work window. Fall runs of Chinook, Coho and Steelhead are fully underway by September 1 and the noise and construction impacts to these runs could be very significant and stressful to these fish, particularly in low flow years. In 2015, more than 1 million adult salmon and steelhead would have passed by the proposed project area between September 1 and November 30. The proposed work window is inconsistent with the work window used by the Corps of Engineers at its dams on the Columbia River. The work window is inconsistent with the policy of the Oregon Department of Fish and wildlife.[2]

Avoiding Pacific Lamprey During Terminal Construction

Adult abundance of Pacific lamprey in the Columbia River Basin has been dramatically reduced in the proposed project area to such low levels that Oregon has designated lamprey a sensitive species. (Pacific lamprey are currently a federal species of concern and are a "monitored" species in Washington). Adult and juvenile lamprey use the area around proposed terminal site as a migration corridor. They may also be present and use the area – or some areas nearby – as rearing habitat and could be negatively affected by pile-driving and turbidity related to the dock construction (Parametrix et al. 2010).

[2] http://www.dfw.state.or.us/lands/inwater/oregon_guidelines_for_timing_of_%20InWater_work2008.pdf.

The Vancouver USFWS Fisheries Assistance Office staff has employed a combination electrofishing/suction apparatus, developed to sample larval lamprey in the Great Lakes, in the Willamette, and the lower Columbia river. (Jolley et al. 2010; Jolley et al. 2011a; Jolley et al. 2011b). These researchers found a juvenile lamprey in bottom sediments while randomly surveying the Columbia River near Portland International Airport, about two miles upstream of the proposed dock construction site, showing that it is possible that juvenile lamprey may be rearing area. At a minimum, the applicant should survey the construction area for Pacific lamprey presence. Such survey would include:

- Conduct seasonal larval lamprey/ammocoete surveys within the entire project footprintbefore, during, and after project completion using a systematic sampling design such as that employed by Jolley et al. (2010), Jolley et al. (2011a) and Jolley et al. (2011b).
- Conduct multiple surveys throughout the year to assist in understanding temporal changes in ammocoete abundance and distribution. This could provide an indication when ammocoetes would be most affected by the proposed project (e.g., in the in-water work period) and help understand hydraulic changes on lamprey distributions within the area post construction.
- Assure that mitigation efforts are designed to provide a variety of habitats for lamprey (e.g., back water, depositional areas for ammocoetes and larval lamprey).
- Obtain other information from these surveys (e.g., lamprey distribution, toxicology loads, and genetics).

We understand that Ecology and Cowlitz County are statutorily required to close the public comment period after 45 days, but we reserve the right to supplement our comments as we investigate the Millennium coal terminal further. In addition, we support and incorporate by reference the comments of the Confederated Tribes and Bands of the Yakama Nation, Confederated Tribes of the Umatilla Indian Reservation (CTUIR), the Cowlitz Indian Tribe, and those of the Columbia Riverkeeper, *et al.*

Finally, it is important to remind the agencies that the propent of the Millennium coal terminal, i.e., Millennium Bulk Terminals – Longview, LLC, has not demonstrated a history of being an honest member of the community. The proponent visited CRITFC and presented information on a project far smaller and very different from the current project. There is still a significant amount of distrust.

In conclusion, the Columbia River Inter-Tribal Fish Commission respectfully requests that Washington state and Cowlitz County use their respective authorities to DENY the Millennium coal terminal. Thank you for your consideration. If you have any concerns or questions, please feel to contact our staff person, Julie Carter, at 503-238-0667.

Sincerely,

Babtist Paul Lumley
Executive Director

ASSOCIATED REFERENCES

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RE: Tesoro Savage, Vancouver Energy Project – Application No. 2013-01

Dear Mr. Posner:

The Columbia River Inter-Tribal Fish Commission (CRITFC) appreciates the opportunity to provide comments to Washington's Energy Facility Site Evaluation Council (EFSEC) on the Vancouver Energy Project proposed by the Tesoro and Savage companies (Project). CRITFC is a consortium of the four Columbia River treaty tribes, the Yakama, Nez Perce, Warm Springs and Umatilla, who established CRITFC in 1977 for the tribes to coordinate their management and regulation of off-reservation treaty fishing activities in and along the Columbia River. CRITFC maintains technical capabilities to assist its member tribes in these matters.

The four treaty tribes of the Columbia River have been a part of this region since time immemorial. These tribes reserved the right in their treaties to "take fish at all usual and accustomed" fishing locations. EFSEC must understand that these federally-protected treaty fishing locations are anywhere on the river, at any location where there are fish.

The tribal people of the Columbia River have a unique relationship with this great resource. The water, fish and other resources of the Columbia have sustained tribal people since time immemorial. Yet, for the last two centuries, tribal people have born the greatest burdens from development and resource extraction.

The proposed Vancouver Energy Project is the latest in a long line of developments where the tribes will unfairly carry the risks at a cost to their river resources, their treaty fishing rights, and their home. The Project will pose significant risks to aquatic resources of the river, threaten the safety of tribal members exercising their treaty rights, and add more burden to the ecosystem of the Columbia River. Washington, Oregon, tribes, and the federal government are working hard and spending billions of dollars to restore Columbia River ecosystem functions so that this

region can face the challenges of climate change. The Project is in absolute conflict with these efforts, and should not be approved.

CRITFC has diligently sought to analyze the multi-volume DEIS and provide these comments within the sixty days provided for review. The time and resources available to CRITFC and its member tribes to complete this review are very limited. We reserve the right to supplement our comments, particularly after reviewing the information submitted by other commenters on the DEIS. For example, our attached technical comments do not focus on important aspects of tank car and rail crossing safety or addressing gaps in first response. This is not due to the absence of tribal concerns, but due to the lack of resources available to CRITFC and its member tribes to address these complex matters in the time allotted.

The DEIS Fails to Adequately Analyze the Aquatic Resources, Upon Which the Tribal People Depend.

In the words of EFSEC Chair William Lynch, "what is the risk here for the Columbia River?"[1] The DEIS is deficient in analyzing various risks and threats to resources of the Columbia River, all the while ignoring many of the effects the project will have on the tribes. Further, the DEIS frequently underestimates the level and scope of impacts to resources it does analyze.

The DEIS's analyses of oil spill risk and consequences to important resources of the Columbia River are not adequate. The DEIS apparently assumes that a small or medium oil spill on the Columbia River can be contained, affecting no more than two to seven miles of this great river. Yet, actual experience from a 1984 spill demonstrates that a small oil spill can spread quickly and cause widespread damage. This spill, which occurred just downstream from Vancouver, Washington, oiled beaches within three days far downriver as the mouth of the Columbia River, as well as on the Washington coastline, and in Willapa Bay.

The DEIS neglects to analyze important aquatic species that would be very sensitive to the effects from the Project. Interestingly, the DEIS addresses pink salmon and green sturgeon, neither of which are focal species in Columbia River resources management. Yet, the DEIS fails to analyze effects to white sturgeon and Dungeness crab, both of which are iconic species of the Columbia River. Similarly, chum salmon, which are listed has threatened under the Endangered Species Act and whose spawning grounds are near the Washington shoreline adjacent to rail shipping lines and in the estuary in Washington's Grays River, are barely addressed in the DEIS.

The in-water work window for construction at the Project terminal is proposed to occur during the peak fall chinook run in the Columbia River, which last year totaled over 900,000 fish at Bonneville Dam. The DEIS does not consider the effects of constructing the project on these fish, nor does it consider that Pacific lamprey, an important tribal resource that has suffered a serious decline in numbers, may also live in the area around the terminal. Recent studies have demonstrated lamprey spawn in rear at locations in the Columbia River near the proposed project site that were unknown previously.

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[1] See, Verbatim Transcript of Monthly Council Meeting Washington State Energy Facility Site Evaluation Council (Buell Realtime Reporting LLC) at 30, lines 16 – 19 (Nov. 24, 2015).

For all of these omissions, it is clear that the DEIS is not close enough to be finalized. EFSEC's work is not done; the DEIS must be supplemented – and reviewed – to analyze the effects of the project on these species.

The DEIS Fails to Analyze the Unique Impacts to Tribal People.

There are currently hundreds of tribal fishing families that use in-lieu and treaty fishing access sites. Many tribal people lost their homes when the United States built its series of hydropower dams and flooded villages and towns along the river. Now those who live along the river and the rail are concerned about their safety and welfare affected by fossil fuel transportation proposals.

The railroads on both sides of the river were constructed a millennia after the tribes were here, and the railroads do not hold greater rights than the tribal people who are exercising their treaty rights. The Project will add significantly more unit trains carry crude oil through the Columbia River Gorge which will have profound impacts to tribal members and their access to the river. Currently, the risk of train strike to tribal members crossing the railroad is too high; more trains will make this access even more treacherous.

Washington State has noted in various documents that the BNSF railroad through the Columbia River Gorge is nearing capacity, so that means building more railroad tracks in a national scenic area along our sacred river. That is unacceptable. Union Pacific is already shipping Bakken crude on the south side of the Columbia River and any assumption that all oil shipments to the Vancouver Energy facility would occur only on rail lines located in Washington challenges common sense.

Trains derail for various reasons, but the Gorge presents some very high risk challenges. The fact that these trains also carry highly volatile, toxic, and potentially damaging material elevates the risk to the environment by a magnitude. If a crude train derails carrying volatile Bakken crude, the explosion and fire could be devastating to our tribal members living along the river, our fishing communities, and the river that sustains them.

There are not enough first responders and related resources along the Columbia River to respond to any catastrophic event. Most of the communities in the area are supported by volunteer fire departments with few resources. It would take hours for any services to arrive on site. The fisheries enforcement department of CRITFC provides important first responder capabilities on the Columbia River itself and at treaty fishing access sites and In Lieu sites along the Columbia River. Their capabilities would be overwhelmed by an oil train derailment in the Columbia River Gorge.

We appreciate your time to review our comments. Attached to this cover letter are CRITFC's technical comments on the DEIS for the Vancouver Energy Project. We also herein incorporate by reference and adopt the comments of CRITFC's member tribes. Any questions regarding these comments may be directed to Julie Carter at CRITFC's offices.

Sincerely,

Babtist Paul Lumley
Executive Director

Attachment

Tesoro Savage Vancouver Energy Distribution Terminal
Draft Environmental Impact Statement
Technical Comments - Columbia River Inter-Tribal Fish Commission

The Vancouver Energy site is nearly 100 miles upstream from the ocean, on a dynamic river that has fourteen anadromous fish species listed under the Endangered Species Act (ESA). The environmental impacts to develop and operate the proposed action on this site, particularly in the face of certain climate change impacts, will be significant and are unwarranted.

The following comments are preliminary. The information gaps in the DEIS are so significant that the capability to fully address the gaps in this limited comment period was beyond the tribes' current means. The burden of filling these information gaps should rest on the applicant and the Energy Facility Site Evaluation Council, not the tribes.

I. THE DEIS DOES NOT ADEQUATELY CONSIDER THE PROJECT'S EFFECTS ON TRIBES AND TRIBAL RESOURCES.

The treaty tribes of the Columbia River have been a part of this region since time immemorial. There are hundreds of tribal fishing families' members that use in-lieu and treaty fishing access sites. Many tribal people lost their homes when the U.S. built its series of hydropower dams and flooded villages and towns along the river. Now those who live along the river and the rail are concerned about their safety and welfare.

1. Usual and Accustomed Fishing Places

Treaty protected Usual and Accustomed fishing places within the rail corridor are extensive and certainly not limited to the few sites noted in the DEIS. In negotiating and assenting to the their treaties, the Columbia River tribes reserved not only the right to take fish at their usual and accustomed places, but also retained a property right in adjacent lands "to the extent and for the purpose mentioned" in the treaties. *U.S. v. Winans*, 198 U.S. 371, 381 (1905). *Winans* affirms the rights of tribal members to make such use of the land surrounding the usual and accustomed sites as is essential to the full exercise of their treaty fishing right. The *Winans* Court considered the treaty language as a whole, and found that this language, taken together with the social and factual setting of the treaty negotiations, supported the right of access.

> The contingency of the future ownership of the lands, therefore, was foreseen and provided for -- in other words, the Indians were given a right in the land -- the right of crossing it to the river -- the right to occupy it to the extent and for the purpose mentioned. No other conclusion would give effect to the treaty.

Winans at 381. The circumstances of the treaty negotiations and the specific language of the treaties illustrate the dependence of the Indian's way of life on the salmon harvest, and the emphasis they placed on protecting their existing fishing activities on the Columbia River.

Although the DEIS notes the existence of the tribes' treaty rights, DEIS 3.13.2 (page 3.13-14), the discussion of impacts is fatally flawed. The one paragraph statement that increased rail traffic will not have much impact on access or treaty protected resources is devoid of any analysis. DEIS 3.13.3.2 (page 3.13-17). There are hundreds of gillnet sites within this area and many of these are accessed by both land and water. Almost all land access in the area requires crossing the railroad tracks. Many of the crossings are dangerous.

2. Train strike

Over the years, tribal fishers transiting to or from fishing sites have been killed or injured by trains. In addition, a CRITFC Enforcement Officer was also killed by a train while on duty. In many of the areas along the river, when the wind is blowing, one cannot hear a train coming until it is too late. The inability to hear the trains, coupled with difficult lines of site in many places leads to very dangerous areas that tribal fishers encounter on a regular basis. Increasing the numbers of trains through this area will magnify an existing, deadly risk to tribal fisheries as well as CRITFC's enforcement officers and site maintenance staff.

On the Washington side of the Columbia River there are nine In-lieu and Treaty Fishing Access sites with at grade crossings, four more sites adjacent to the railroad tracks, and all other sites within the vicinity of the railroad. On the Oregon side of the Columbia River, there are 10 more in lieu and treaty fishing access sites. These sites provide vital access to the river for treaty fishers, they are key sites for commercial buyers and several of the sites are occupied year round by tribal members and their families. http://www.critfc.org/for-tribal-fishers/in-lieutreaty-fishing-access-sites/ The DEIS fails to recognize that the ability to cross the railroad to get on these sites or access the River is already encumbered by rail transportation through the corridor. While there is a cursory acknowledgement in the DEIS that adding more trains could further reduce access to the sites, there is no discussion of the impacts reduced access will have on tribal members, their families, their commercial enterprises or the staff that patrol and service the sites.

3. Water quality and Tribal Fish Consumption Rates

The DEIS evaluates the risks of crude oil spills related to operations at the terminal and in the rail and vessel transport corridors. The DEIS considers actions in the event of potential crude oil spills and acknowledges the need for cleanups to meet Federal and state regulations. An important factor to consider in any cleanup liabilities along the Columbia River corridor and the terminal facility will be the requirement to use tribal fish consumption rates as the basis for cleanup levels and discharge limits, which the DEIS fails to acknowledge. Fish consumption rates are parameters in human health risk assessments and are used making regulatory decisions under the Clean Water Act and by states to establish minimum cleanup levels. In 1994 CRITFC

published a report entitled "A Fish Consumption Survey of the Umatilla, Nez Perce, Yakama, and Warm Springs Tribes of the Columbia River Basin" and reported that fish consumption rates of tribal people is significantly higher than the default vales used in most federal regulations. Surveys of tribal people in Washington indicate that fish consumption rates at the 95th percentile range from 176 – 306 grams/day.

Washington State is currently in the process of revising the fish consumption rates used in setting its water quality standards and environmental cleanup regulations. These changes will have considerable impact on the ability of the Facility to demonstrate the financial ability to compensate state and local governments for damages arising from a worst-case spill. Washington's Model Toxics Control Act (MTCA) Cleanup Regulation which are referenced in the Draft EIS, establishes cleanup levels for surface waters using a fish consumption rate of 54 grams/day (g/day) and a fish diet fraction of 0.5 (WAC 173-340-730, Equations 730-1 and 730-2). The default fish consumption rate and fish diet fraction results in an effective fish consumption rate of 27 g/day. For spills from the proposed Facility and along the transport corridors which are located in tribal usual and accustomed fishing areas, cleanups will require the use of higher fish consumption rates based on tribal data. WAC 173-340-730 (1)(e) states that "[t]he department may require more stringent cleanup levels than specified in this section where necessary to protect other beneficial uses or otherwise protect human health and the environment." WAC 173-340-708 (10) allows for the default fish consumption rate to be changed under MTCA "when necessary to establish a more stringent cleanup level to protect human health." Ecology provided this flexibility to change the default fish consumption rate in recognition of new evolving information that may become available for different fish-consuming populations and site-specific conditions.

II. THE DEIS GENERALLY UNDERESTIMATES THE EFFECTS OF THE PROJECT ON THE ENVIRONMENT.

The DEIS underestimates the scope and level of effects from this enormous proposal. The proposed terminal is very large and will be served by four unit trains (of 120 tank cars) per day, each carrying 30,000 gallons of crude oil. The shipping required to serve the terminal would result in a 223% increase in large deep-draft vessels in the lower Columbia River. Moreover, the project is contemplated to have a lifespan of multiple decades. Generally speaking, there is significant environmental risk associated with the project, chemically and physically, to aquatic species, water quality, air quality, and the area habitat.

The increased risk ranges from the small relatively subtle changes (that result from chronic chemical or physical damage such as PAH releases or wake stranding) to large but less likely spills. Both types of events can affect species and habitats for many decades, as shown in previous spill experiences in other locations. The existence of "increased risk" is relatively easy to identify and list (e.g. small spills, wakes, large spills, clean-up procedures), but these risks are very difficult to evaluate over a decadel periods. Some risk statistics can be helpful, such as frequency of spills and volumes of oil spilled from previous events (measureable parameters),

yet the biological significance of such events are very difficult to understand and quantitatively estimate. For example, the 1984 *Mobiloil* spill near RM 88 (arguably the most relevant spill to the proposed project), where the volume of oil spilled was estimated (over 3000 barrels) yet the number of birds killed remains unknown because collected carcasses were not enumerated, and bird populations were not monitored before or after the spill. The evaluation of risk for any future project is a very imprecise measure at best. High levels of risk and uncertainty merit precautionary approaches when important biological resources may be impacted.

III. THE DEIS UNDERESTIMATES THE SEVERITY AND SCOPE OF EFFECTS THAT AN OIL SPILL COULD HAVE IT WILL HAVE ON THE ENVIRONMENT.

Since the Exxon-Valdez oil spill in 1989, which affected Prince William Sound and the Kenai Peninsula, the scientific understanding of the effects of oil on fish, including salmon, has grown significantly. The effects of this spill were extensively studied and many papers were published in various scientific journals. This tragedy in Prince William Sound allowed a unique opportunity for scientists to evaluate the effects of a crude oil spill in a relatively pristine environment, as opposed to other developed regions where other pollutants can confound results. It is important to consider the scientific publications addressing the effects of the Exxon-Valdez spill, which the DEIS largely fails to do.

Effects of crude oil spills will vary based on where the spill occurs, the amount and type of crude oil spilled, and the ecosystem in which the spill occurs. Therefore, it is very important to review literature for a number of studies, which this DEIS fails to do. The Gulf of Alaska is different than the Gulf of Mexico, just as both of these places are different than the Columbia River. A list of pertinent studies can be found in the table of references following these comments with special regard to the physiological effects of crude oil on fishes and other aquatic organisms

In 2003, the journal *Science* published an article co-authored by seven scientists who studied the effects of the Exxon-Valdez oil spill over a multi-year period. (Peterson, 2003). The article synthesizes fourteen years of research following the Exxon Valdez oil spill and presents an emerging understanding of the potential long-term effects of an oil spill on aquatic organisms.

Often the most noticeable effects of a crude oil spill are the acute effects that occur shortly after a spill. In the case of the Exxon-Valdez spill, these acute effects were observed in a variety of sea mammals and sea birds that were either sickened or killed due to oil exposure (oiling) or ingestion. While acute effects on fish and wildlife are significant, these are the effects that we can usually see, because they are external in nature (e.g. oil in the fur or feathers). We know far less about the effects of oil that are internal, especially over long exposure periods. Below, Table 1 from that report is reproduced:

Old paradigm	Emerging appreciation
Physical shoreline habitat	
Oil that grounds on shorelines other than marshes dominated by fine sediments will be rapidly dispersed and degraded microbially and photolytically.	Oil degrades at varying rates depending on environment, with subsurface sediments physically protected from disturbance, oxygenation, and photolysis retaining contamination by only partially weathered oil for years.
Oil toxicity to fish	
Oil effects occur solely through short-term (~4 day) exposure to water-soluble fraction (1- to 2-ringed aromatics dominate) through acute narcosis mortality at parts per million concentrations.	Long-term exposure of fish embryos to weathered oil (3- to 5-ringed PAHs) at ppb concentrations has population consequences through indirect effects on growth, deformities, and behavior with long-term consequences on mortality and reproduction.
Oil toxicity to seabirds and marine mammals	
Oil effects occur solely through short-term acute exposure of feathers or fur and resulting death from hypothermia, smothering, drowning, or ingestion of toxics during preening.	Oil effects also are substantial (independent of means of insulation) over the long-term through interactions between natural environmental stressors and compromised health of exposed animals, through chronic toxic exposure from ingesting contaminated prey or during foraging around persistent sedimentary pools of oil, and through disruption of vital social functions (care giving or reproduction) in socially organized species.

Oil impacts on coastal communities	
Acute mortality through short-term toxic exposure to oil deposited on shore and the shallow seafloor or through smothering accounts for the only important losses of shoreline plants and invertebrates.	Clean-up attempts can be more damaging than the oil itself, with impacts recurring as long as clean-up (including both chemical and physical methods) continues. Because of the pervasiveness of strong biological interactions in rocky intertidal and kelp forest communities, cascades of delayed, indirect impacts (especially on trophic cascades and biogenic habitat loss) expand the scope of injury well beyond the initial direct losses and thereby also delay recoveries.

Table 1. Changing paradigms in oil ecotoxicology, moving from acute toxicity based on single species toward an ecosystem-based synthesis of short-term direct plus longer-term chronic, delayed, and indirect impacts

These observations are sound. The authors are leaders in this field of study and their results have been published in peer-reviewed journals. The authors represent teams of researchers from their respective institutions who aided them in their studies. The following general conclusions from this body of information are applicable to the proposed Vancouver energy project yet, are not synthesized in the DEIS or adequately analyzed with regard to potential effects of the project.

- After a crude oil spill a period of acute mortalities is often observed. These acute mortalities can affect the entire foodweb from phytoplankton to apex predators (Peterson, 2003). Acute exposure is also very damaging to organisms during early development, such as invertebrate and fish larvae (Incardona et al. 2014).

- Chronic long-term exposure of salmon to small amounts of residual oil, particularly multi-ringed polycyclic aromatic hydrocarbons (PAHs), has been associated with reductions in salmon and herring survival (Blanc et al. 2010; Carls et al. 2000). Laboratory experiments demonstrated that sublethal exposure of salmon embryos to crude oil reduced survival to adulthood by 50% compared to non-exposed groups of fish, although it is important to note that the period of sampling is also important (Brannon et al. 2001; Brannon et al. 2007).

- There are complex food web interactions that may be negatively and indirectly affected by an oil spill, which are generally effects that are not immediately obvious. In considering oil spill effects, it is important to consider indirect effects

that occur throughout the food web. (Peterson, 2003) Scientists from NOAA have developed food web understandings for the Columbia River estuary. (Diefenderfer, 2012, Coleman, 2015)

- Oil may be very difficult to remove from the environment. As has been shown, oil can remain in an environment long after the spill has occurred (>30 years). The residence of oil in an area will depend on a multitude of factors that will always be site specific, such as geology, climate, and geography (located close to a city or pristine environment).

IV. THE DEIS FAILS TO EXAMINE INFORMATION FROM THE MOST RELEVANT PREVIOUS SPILL ON THE COLUMBIA RIVER IN ORDER TO EVALUATE BEHAVIOR OF SPILLED OIL, OR BIOLOGICAL RISK.

The 1984 spill in the Columbia River caused by the grounding of the tanker *Mobiloil* at RM 88 yielded several key pieces of information that did not make it into the DEIS. Over 3000 barrels (equivalent to 4-5 rail tanker cars in this proposed project) of crude oil were released, although much of the cargo was pumped out prior to further releases. Several critical observations were evident (Kennedy and Baca 1985): (1) Oil behavior in the current mixed oil vertically and transport downstream was rapid; and (2) there were significant biological effects to birds, fish, and habitat.

Because of the current and shallowness of the Columbia River, oil can be expected to be mixed vertically throughout the water column. Oil from the *Mobiloil* spill was observed to be transported downstream on the surface, in the water column, and along the River bottom (Kennedy and Baca 1985). The current was estimated at 2 knots at the spill site, but slowed in the lower River on flood tides, increased on ebb tides, and influenced by release rates through the dams. The *Mobiloil* spill experience indicates that River currents will likely preclude containment by boons (observations demonstrated that oil was carried under the booms), and oil transport downstream will be rapid (2 knots meant that 48 nautical miles were contaminated in about 24 hours). The oil can be expected to mix into the water and contaminate the surface, water column, and bottom sediments (as was observed), as well as contaminating shorelines. Wind was not the dominant spreading force in the river compared to current, but the wind (from the south in this case) did determine which shoreline was most impacted in the river, and influenced the direction of the oil spread after exiting the river (contaminated many miles of Washington beaches). None of this information was presented in the DEIS.

The DEIS's projections of possible contamination are in conflict with the real life spill event reported in the *Mobiloil* spill report (Kennedy and Baca 1985). The DEIS attempts to "limit" the effects of different sized spills to relatively low numbers of river miles affected; for example, the DEIS in table 4-13 indicates that a small-medium vessel spill (up to 2,200 barrels) would only

impact “2 RM”, which directly conflicts with the field observations of the *Mobiloil* spill. The DEIS also indicates a large spill (up to 5,000 barrels) from the facility would only affect 7 RM contrast sharply with the field data from the *Mobiloil* spill, where shorelines more than 90 miles from the spill were impacted. This includes Washington coastal shorelines outside the Columbia River. Oil was transported from mile RM 88 to the mouth in 3 days. The estimates in Table 4-13 are inconsistent with the real life *Mobiloil* experience in 1984.

Biological effects of the *Mobiloil* spill were significant. Hundreds of birds mortalities were documented, though possibly thousands of birds were killed but not reported due to monitoring limitations, many bird carcasses were picked up and discarded, without identifying either species or enumerating the quantity. Some live birds were picked up for cleaning, and subsequent release, with some success.

White sturgeon were sampled in the lower Columbia by gill net (Kennedy and Baca 1985). Of the 55 sampled, one fourth had oil in their mouths, and PAH was detected chemically in their tissues. The biology of sturgeon (bottom dwelling life style), long lived prior to the onset of reproduction, and reproductive life stages in the Columbia make this species very vulnerable when oil is mixed down to the sediments. White sturgeon live in constant contact and often get their prey from sediments*. Corophium spp,* are amphipods, common in the estuary and are very important food for juvenile salmon and sturgeon. They live in the sediments and migrate vertically into the water column to feed, which could be expose them to oil constantly during a spill episode*.*

This oil behavior and transport will complicate containment and clean-up (as observed in the *Mobiloil* spill), and ensure that damages to birds, fish, and habitat can be expected from spills, at greater levels than predicted in the DEIS.

V. **THE DEIS ANALYSIS OF AQUATIC RESOURCES IS INADEQUATE AND MISSING INFORMATION**.

The DEIS fails to analyze impacts of the project on two regionally significant aquatic species, Dungeness crab and white sturgeon. Both are iconic members of the Columbia River ecosystem, support valuable commercial and subsistence fisheries, and have been affected by oil spills in the past. The omission of both the Dungeness crab and white sturgeon from the DEIS is a critical flaw and representative of other significant omissions from the DEIS.

Green sturgeon, an ESA-listed species, is mentioned in the document, but this fish is rarely found in the upper reaches of the Columbia River and it apparently does not reproduce in the Columbia River in stark contrast to the white sturgeon. In addition, green sturgeon are improperly lumped under the “groundfish” designation, which is generally reserved for ocean commercial species. In the section on stream crossings (DEIS 3.6.6 and 3.6.7) the DEIS neglects the crossings include habitat for Listed Kootenai River White Sturgeon in the Kootenai River and the Pallid Sturgeon in the Missouri River. The DEIS also fails to identify all the salmonid stocks

that are part of the Pacific Coast Salmon Essential Fish Habitat which includes sockeye, chum, and steelhead (in addition to chinook, chum, and pink).

1. **Both White Sturgeon and Dungeness Crab Would be Severely Impacted by Any Oil Release**.

The lack of discussion of white sturgeon in the DEIS is very concerning considering the value that the tribes of the region place on this ancient species. Both Oregon and Washington are heavily invested in management of white sturgeon.[1] (Jones et al. 2011; DeVore and James, 1999).

White sturgeon will be particularly sensitive to the effects of any oil that could spill from these trains. In the case of an oil spill, the mixing behavior of oil in river currents means that oil will mix vertically into the water column, and contaminate the sediments that are in intimate contact with sturgeon. The exposure potential was demonstrated in the *Mobiloil* spill (oil in mouths of one fourth of the gill netted white sturgeon sampled, and PAH were detected chemically in their tissues). The biology of sturgeon also contributes to their vulnerability. The benthic-focused life style on and near river sediments greatly increases their exposure potential, and their long lived reproductive biology (first reproduction delayed until +25 years for females, +15 years for males), will contribute to their slow recovery potential if impacted.

White sturgeon spawning zones have been diminished because of the lakes created by the dams. Sturgeon require high flows for spawning and use the substrate in the dam tailrace, therefore they are particularly vulnerable if the spawning substrate is contaminated by oil. Given the long term prognosis of oil remaining after a spill, and particularly if there is a rail car spill immediately upstream of critical spawning habitat, those spawning sites could be contaminated for generations. The embryo sensitivity detected in many other species applies to sturgeon embryos. Newly hatched larval sturgeons greatly resemble frog tadpoles and over the course of several weeks they gradually grow the fins, scutes, and body shape of the adult form. During this time they spend considerable periods in direct contact with the substrate and are very vulnerable to a number of abiotic and biotic factors (Parsley et. al. 2002).

Dungeness crab also has an intimacy with shallow sediments, and may be vulnerable to oil contaminated sediments because they often bury themselves when not actively feeding. Further, their embryos, incubated for several months on the underside of the female, will also be in intimate contact with sediments. The lengthy incubation of embryos in contaminated sediments will likely have reduced survival of released larvae, given the general sensitivity of early life stages.

The Invertebrates (3.6.2.5) category is given very little space in this section of the DEIS. Given that many of these animals are the bottom of the food webs. They are more delicate than most of the other species mentioned and most likely to suffer catastrophic losses in the event of

[1] See, generally, http://wdfw.wa.gov/publications/00936/wdfw00936.pdf, http://www.dfw.state.or.us/fish/crp/docs/lower_columbia_sturgeon/LCR_white_sturgeon_conservation_plan.pdf

accidents, construction activities, and oil spills. Many pages are given to other species that will likely have little or no impact from this project (ocean fish species, whales and other marine mammals).

2. **Work Window for Facility Construction**.

The work window of September 1 through January 15 is not consistent with full protection for spawning eulachon (smelt), juvenile sturgeon, and migrating adult salmonids. Eulachon may stage in the lower river weeks prior to spawning and therefore are vulnerable to impacts from the project outside of the work window. Fall runs of Chinook, Coho and Steelhead are fully underway by September 1 and the noise and construction impacts to these runs could be very significant and stressful to these fish, particularly in low flow years. In 2015, more than 900,000 adult salmon and steelhead passed by the proposed project area between September 1 and November 30. The proposed work window is inconsistent with the work window used by the Corps of Engineers at its dams on the Columbia River. The work window is inconsistent with the policy of the Oregon Department of Fish and Wildlife.[2] The DEIS's failure to properly describe Columbia River in water work windows is symptomatic of the many failings within the document. It appears that the DEIS's preparers simply were not familiar with the Columbia River's ecosystem and its management. The work window must be re-assessed in cooperation with Columbia River Treaty Tribes and CRITFC biologists.

3. **Avoiding Pacific Lamprey During Facility Construction**.

Adult abundance of Pacific Lamprey in the Columbia River Basin has been dramatically reduced in the proposed project area to such low levels that Oregon has designated lamprey a sensitive species. (Pacific lamprey are currently a federal species of concern and are a "monitored" species in Washington). Adult and juvenile lamprey use the area around proposed terminal site as a migration corridor (Keefer et al. 2013, Weitkamp et al. 2015). They may also be present and use the area – or some areas nearby – as rearing habitat and could be negatively affected by pile-driving and turbidity related to the dock construction (Parametrix et al. 2010, Jolley et al. 2012a, Jolley 2012b).

The Vancouver USFWS Fisheries Assistance Office staff has employed a combination electrofishing/suction apparatus, developed to sample larval lamprey in the Great Lakes, in the Willamette, and the lower Columbia river. (Jolley et al. 2010; Jolley et al. 2011a; Jolley et al. 2011b, Jolley et al. 2012a, Jolley 2012b). These researchers found larval and juvenile lamprey in bottom sediments while randomly surveying the Columbia River near Portland International Airport, about two miles upstream of the proposed dock construction site, showing that it is possible that larval and juvenile lamprey may be rearing area. At a minimum, the applicant should survey the construction area for Pacific Lamprey presence. Such survey would include:

[2] http://www.dfw.state.or.us/lands/inwater/oregon_guidelines_for_timing_of_%20InWater_work2008.pdf.

- Conduct seasonal larval and juvenile lamprey surveys within the entire project footprint before, during, and after project completion using a systematic sampling design such as that employed by Jolley et al. (2010-2012b).
- Conduct multiple surveys throughout the year to assist in understanding temporal changes in larval and juvenile lamprey abundance and distribution. This could provide an indication when larval and juvenile lamprey would be most affected by the proposed project (e.g., in the in-water work period) and help understand hydraulic changes on lamprey distributions within the area post construction.
- Assure that mitigation efforts are designed to provide a variety of habitats for lamprey at all life history stages (e.g., back water, depositional areas for larval and juvenile lamprey).
- Obtain other information from these surveys (e.g., lamprey distribution, toxicology loads, and genetics).

4. **Predators**.

The expansion of overwater habitat and trusses creates the potential for roosting habitat of Double Crested cormorants which is a key predator of juvenile salmonids will migrate by the terminal and thereby increase the potential for additional predation impacts. Additionally, an increase in overhead cover and shading by the expansion has the potential to create habitat for a number of predatory fish species and thereby increase predation on out-migrating juvenile salmonids.

5. **Lighting at the Terminal Facility**.

Similar to overhead cover, the additional lighting resources in the project area projected to be continuous creates permanent predation opportunities for both fish eating birds and piscivorous fishes that prey on juvenile salmonids. Juvenile salmonids migrate more actively at night and that combined with the attractive effect of lights has the potential to increase the predation impacts on listed salmonids.

VI. THE DEIS' ANALYSIS OF OIL SPILL RISK, SPECIFICALLY RISK TO EMBRYO SENSITIVITY, IS INADEQUATE.

The DEIS does not adequately analyze embryo sensitivity (as compared with juvenile or adult fish sensitivity) and fails to assign an appropriate significance. Three spills (1989 *Exxon Valdez*, 2007 *Cosco Busan*, and 2010 Gulf of Mexico spill) have documented high sensitivity of fish embryos to low concentrations of PAH. That research is absent from the DEIS's analysis. The significance is that the embryo life stage is the "weak link" in the survival chain, not by a little bit, but by three orders of magnitude, from acute toxicities of PAH in the parts per million for juvenile and adult life stages to toxicities in the parts per billion for embryos.

The DEIS report is misleading by reporting the acute toxicities of some PAH to juveniles/adults, but not embryos. Page 4-35, cites a table of acute toxicities of crude and PAH to invertebrates

and fish (LC50s). Data are in the PPM for the most part. The DEIS narrative indicates that fish embryos are more sensitive than other life phases but then does not present any data. The reader is left with the visual presentation of PPM toxicities in the table. The significant literature from *Exxon Valdez, Cosco Busan*, and Gulf of Mexico spills on embryo sensitivities in the parts per billion PAH is ignored.

The DEIS, page 4-77, cites Neff for the proposition that PAH contamination from the *Exxon Valdez* spill below the surface was low, in the parts per billion, and did not exceed acute toxicity levels, but fails to cite the papers by the Alaska Department of Fish & Game (ADFG) that measured elevated pink salmon embryo mortalities in streams with oiled banks for four years after the spill (Bue et al. 1996, & 1998; Rice 2010). The DEIS treatment of the scientific literature is unprofessionally one-sided. The DEIS cites only to literature that minimizes risk characteristics of the potential for toxicity and exposure. (Note: The table cites Moles and Rice 1983; Carls, et al 1999, but none of the species tested by these authors are in the table).

The DEIS ignores the sensitivity of fish embryos of multiple species measured from the 1989 *Exxon Valdez spill*, 2007 *Cosco Busan* spill, or the 2010 Gulf of Mexico spill. Embryo sensitivity emerged out of the Exxon Valdez damage assessment studies as part of the paradigm shift of oil spill damages as discussed by Peterson et al. 2003; this review noted the new findings of long term oil persistence, high sensitivity of fish embryos, and the long term damage in several species (fish, birds, sea otters, whales). Field studies by ADFG measured elevated pink salmon embryo mortalities over a four year period in streams with oiled banks (Bue et al 1996,1998), and stimulated laboratory studies to confirm that oil was the cause of the elevated embryo mortalities, at parts per billion PAH (Heintz et al. 1999). Concentrations as low as 5 ppb caused increased mortality, poor growth, but the most important study documented a 20% and 40% decrease in adult returns of embryos exposed to 5 and 18 ppb PAH during development (Heintz et al 2000). Exxon researchers (Brannon et al. 2001, 2007) contested these studies, but later studies have confirmed low parts per billion sensitivity in embryos from other fish species (herring; Carls et al.1999, Incardona et al. 2012; zebra fish, Hicken et al 2011); Gulf of Mexico species and an Australian tuna, Incardona et al. 2014, Mager et al 2014). White sturgeon embryos have been shown to be more sensitive to some chemicals than salmonids (Brannon et. al. 1985)

It is the life stage that is sensitive, not the specific oil used, nor the species. The source oil and type were found to be unimportant by Incardona et al. (2013); North Slope crude and the lighter Gulf of Mexico crude were similar in toxicity levels (measured as PAH in the exposure) and in the detailed effects on the developing hearts of fish embryos. The impact of PAH on developing fish embryo hearts (slowing of heart beats, malformations in hearts), has been similar to a variety of fish embryos (herring, pink salmon, zebra fish, several species of tunas), no matter the source oil. Not much has been done with invertebrate embryos in recent years, but similar sensitivities and mechanisms are likely to yield similar results.

Reliance on acute toxicity data can be misleading in general. Acute toxicity protocols were developed to compare toxicities of contaminants, such as different pesticide formulations,

using one species. They are adequate for that function, but inadequate to compare sensitivities across different species and life stages. Tests with embryos are an example of the inadequacy of short term acute toxicity to assess vulnerability: A "classical four day acute test with an embryo may find the organism alive at the end of four days (heart is beating), but fails to find abnormal heart morphology, or abnormally slow beat rates, or there is no assessment for future survival based on deformed skeletal abnormalities. The ability of embryos and larvae to cope with toxicity loads and interruptions in their developmental sequence are marginal at best, although short term survival may appear unaffected. The study of long term fitness following PAH exposures to pink salmon embryos was most revealing; exposures of embryos to 5 and 18 ppb PAH, then tagged and released to the environment, reduced adult salmon returns by 20% and 40% respectfully (Heintz et al 2000). Mager et al. (2014) assessed swimming performance of juvenile Mahi Mahi 30 days after the embryos had been exposed to 1.45 ppb PAH; swimming performance was reduced compared to controls. Subtle and difficult to measure impacts to embryos exposed to low PPB PAH can affect their ability to acquire prey and avoid predators, and have negative effects on their recruitment to the population.

The likelihood of oil spill exposure to salmon or sturgeon embryos below the facility as well as the miles of opportunity in the rail corridor where spawning habitat may be vulnerable to rail car spills was not meaningfully addressed by the DEIS. As pointed out, it is the life stage that is vulnerable, and there certainly will be embryos of other species in the lower river that could be exposed to any up-river spill.

Sensitive life stages have orders of magnitude more sensitivity than adult life stages for multiple reasons. The DEIS should thus focus on these life stages when assessing vulnerability. Instead, the DEIS underestimates the toxicity potential of oil spills by reporting the acute toxicity studies of the past, and omitting the more modern literature documenting embryo sensitivities. Embryos have long been recognized as a sensitive life stage, but the recent studies have quantified the three orders of magnitude increase in sensitivity to PAH. Because of their small size and intimacy with the environment, damaging exposures can be in the range of minutes, although effects may not be measureable in terms of survival for days or even months. Embryos in general are fragile, have limited energy reserves, and seldom have the tools to either cope or avoid a pollution load. The best evidence is for fish embryos, but embryos of other species types can be expected to be more sensitive than older life stages. The biological principles will be similar.

The concept of time and exposure are difficult to assess, but past experience indicates they can be significant, and should not be underestimated. Time lines of an oil spill are easily discounted from a "one time" event, once the gross cleanup has been finished. Experience from the 1979 *Florida* spill near West Falmouth, 1989 *Exxon Valdez*, and the 2010 Gulf of Mexico spill have demonstrated that oil can persist in sediments and wetlands for years (Short et al 2004, 2007; Reddy et al 2002, and Turner et al. 2014a,b). Without oxygen, oil degrades very slowly, if at all. When re-exposed at a later date through disturbance (possibly biological disturbance), the oil

can continue to cause harm to the habitat or toxicity to species. Sediment and wetland habitats are very difficult to clean without large scale damage.

Persistence of oil retention in habitats, coupled with destructive cleanup scenarios promote the potential use of dispersants, with the assumption that the increased toxicity because of dispersed oil (and increased dilution and flushing) is the lesser of evils (e.g. gulf spill where a million gallons of dispersant were applied). While attempts at booming and oil removal are a desired goal, they seldom are effective at more than about 10%. Habitat contamination will last many decades.

Oil contamination of sediments and wetlands will persist a long time. A "one time" oil spill event should be thought of in terms of a long lasting event, and not a short term. Oil is still present in West Fallmouth wetland and Prince William Sound beach sediments, some 27 and 37 years after those spills. Given the time span of this project, there will be risk to the Columbia River habitat and species for many decades.

VII. THE DEIS UNDERESTIMATES THE IMPACTS FROM ADDING MORE DEEP DRAFT VESSELS TO THE RIVER.

This project will increase the deep-draft vessel traffic in the Columbia River Estuary by 223%. This increase must also consider the potential increase in vessel traffic generally from other similar proposed crude-by-rail, crude refinery, and coal export terminals currently being evaluated in this area. Conservatively the number of vessels could triple from the current levels.

As the DEIS appropriately notes, the lower Columbia River estuary provides essential rearing habitat for many stocks of salmonids and other aquatic species. In the Biological Opinion for the Federal Columbia River Hydropower System, the estuary is given great weight for its value in recovering ESA-listed salmonids.[3] There is general concern that high numbers of outmigrating salmonid smolts are lost between the dams and the ocean. Increasing vessel traffic in the estuary could result in moderate to major long-term changes to tidal wetland, shallow water, and tidal flats. It makes no sense to continue degrading estuarine habitat and contributing more mortality by adding more deep-draft vessels to the estuary.

1. Wake Stranding.

Juvenile salmonids and eulachon, some of which are listed under the ESA, may be stranded on the Columbia River shorelines due to the wakes of passing vessels. Wake stranding occurs when juvenile salmonids become caught in a vessels wake. The fish are then deposited on shore by

[3] See, generally, http://www.salmonrecovery.gov/Files/BiologicalOpinions/2008/2008%20BiOp.pdf, http://www.westcoast.fisheries.noaa.gov/publications/hydropower/fcrps/2014_supplemental_fcrps_biop_final.pdf. See also http://www.westcoast.fisheries.noaa.gov/publications/hydropower/fcrps/rpatableappendix.pdf, at 84 – 87.

the wave generated by the vessel wake. Stranding typically result in mortality unless another wave carries the fish back into the water. Generally, a set of interlinked factors act together to produce stranding during ship passage:

- River-surface elevation low tides are generally more likely to result in strandings than high tides;
- Beach slope low-gradient beaches are generally more likely stranding locations than higher gradient ones;
- Wake characteristics, ship wakes that result in both the greatest draw-down and run-up on the beach are generally most likely to result in strandings. Wake characteristics are influenced by a number of dynamics included vessel size and hull form (short and fat vessels have a great displacement effect and generate larger wakes than long and thin vessels).
- Vessel draught – the smaller the under-keel clearance, the larger the wakes, thus loaded vessels are more likely to result in strandings than unloaded vessels;
- Vessel speed – fast moving vessels generate larger wakes than slow vessels;
- Distance between the passing vessel and the beach, where strandings are generally more likely.

The applicants stated that wake stranding studies have focused on deep-draft vessels. There has been at least one study that examined the stranding effects on salmonids by a variety of vessels. Ackerman (2002) found that 21 juvenile Chinook (and 174 other species) were stranded in the lower Columbia River by 35 tug/barges and 56 deep draft vessels. For the Ackerman study, three locations were surveyed on two occasions.

Furthermore, it may be inappropriate to draw reader's attention to deep water vessels, while neglecting the effects of smaller vessels. Pearson and Skalski (2011) report, "At both river and beach scales, no one factor produces stranding; rather interactions among several conditions produce a stranding event and give stranding its episodic nature." Wake stranding also has the potential to result in make fish easier prey for avian predators.

NOAA's estuary recovery module identifies 23 management actions to improve the survival of salmon and steelhead migrating through and rearing in the estuary and plume environments.[4] With regard to ship wakes, the recovery module developed for Endangered Species Act implementation calls for "reduc[ing] the effects of vessel wake stranding in the estuary." In contrast, the proposed project would increase wake stranding in the estuary.

2. **Ballast Water Discharge**.

The DEIS fails to adequately analyze the impacts of ballast water discharges, including the chemical, physical, and biological impacts of dumping millions of cubic meters of foreign water

[4] http://www.westcoast.fisheries.noaa.gov/publications/recovery_planning/estuary-mod.pdf.

into the Columbia River. The DEIS doesn't analyze the changes in salinity in cases of low river flow that can change hydrology.

Ships are required to conduct open water ocean exchange or utilize an onboard ballast water treatment to ensure that foreign low salinity organisms are not transported into the Columbia. However, these treatment options are not always conducted successfully, and the risk is compounded by the tremendous annual releases of ballast water. Additional studies are needed to determine whether the ballast water releases would create deleterious chemical and biological impacts to the Columbia River ecosystem.

In addition to the direct chemical impact of the seawater, there is the high potential for the release and possible colonization of invasive plants, animals and pathogens, including those harmful to human health. Untreated ballast water is responsible for the introductions of numerous invasive species on the Pacific coast, Zebra and Quagga mussels in the Great Lakes, and potential human health risks like typhus. To prevent the potential introduction of foreign plants, animals and pathogens, all ballast water releases must be filtered of all organisms, including pathogens.

The introduction of Quagga and Zebra mussels to the North American continent originated from ballast water releases in the Great Lakes in the late 1980's, and their effects on the invertebrate community has been devastating. Mussels have spread to most areas of the United States except for the Pacific Northwest. If they arrive in this habitat, it could cause millions of dollars in damage to municipalities as well as potentially change entire ecosystems.

The DEIS estimates that the annual ballast water discharge volume of 6 million cubic meters. To put this amount in context, this would represent approximately 50% of the entire volume of ballast water currently discharged into the Columbia downstream of Bonneville dam, which is currently discharging at 12 million cubic meters.

3. **Shoreline Erosion and Propeller Scour**.

Prop wash from vessels as well as ship wakes breaking on shore could cause increased erosion along the shoreline and resuspend the eroded material within the water column. Vessel wake and propeller scour could injure or otherwise impact substrate and invertebrates, as well as benthic-based fishes such as white and green sturgeon.

4. **Noise**.

The DEIS draws no distinction between pressure waves and particle motion sound vibration, referring to it only as "Noise". There is, however, an important distinction between pressure waves and particle motion, and how they affect salmonids. Criteria (and monitoring) for minimizing the effects of sound on fish in the DEIS rely solely on measurements of pressure. However, current scientific literature suggests that salmonids are very sensitive to particle motion sound vibration and less so to pressure waves. Consequently, a salmon may be much more sensitive to sounds generated in the water (e.g., piles being driven into substrate).

If the DEIS intends to only measure the effects of pile drivers on salmonids using pressure wave detection devices, a serious deleterious effect go unaddressed. Particle motion sound and their effects on adult salmon are currently being studied by the U.S. Corps of Engineers at Lower Granite Dam. In association with the study at Lower Granite, a thorough literature review has been and should be considered in the DEIS (Hawkins 2015).

VIII. **THE DEIS NEEDS TO CAREFULLY CONSIDER CLIMATE CHANGE EFFECTS**.

The State of Washington has been a leader in defining impacts of future climate change and has been moving to establish renewable energy alternatives to fossil fuel consumption. The Tesoro Savage project is in direct conflict with these efforts.

1. **Greenhouse Gases**.

The DEIS states that the proposed project would cause 61 million tons per year increase in carbon dioxide emissions or a 12.3% increase over the life-cycle greenhouse gas ("GHG") emissions of the 2005 U.S. GHG emissions target. The total operational GHG emissions from proposed project operation is estimated by the DEIS at 512,350 metric tons per year, or 10,246,995 metric tons over the proposed 20 year project lifespan. The total project is stated to increase U.S. generated GHGs by 1.0% and world GHGs by 0.1%.

However, DEIS estimates of GHGs from the proposed project do not contain GHG emissions from vessels after they leave the 3 mile State of Washington boundary and engage in round trip excursions to destinations hundreds of miles away. These may not be included in the Washington State emission criteria, but will contribute to U.S. and global GHG emissions. The DEIS states that nitrous oxide and sulfur dioxide emission from vessels in the open ocean within the 200 mile coastline of the U.S. would be controlled by the MARPOL Convention, and be reduced over time, however, carbon emissions from vessels beyond the 3 mile coast of Washington are not addressed. If vessels route oil shipments beyond the 200 mile coastline limit there are no restrictive actions or limits or mitigation in place to control any emissions from vessels in the DEIS.

The proposed project emissions are stated to be above the 2011, 25,000 metric ton/yr emission criteria from Ecology. Thus, mitigation requirements are stated to be required so that measures are instituted to reduce proposed project emissions by 11%. Again, these requirements are based upon older climate projections showing far less change than more recent projections.

2. **Lack of Updated Climate Change Information and Consequences in DEIS**.

More recent scientific climate change information indicates that the foregoing measures may likely not be adequate to reduce GHG emissions necessary to avoid serious climate change consequences. The DEIS apparently uses downscaled projections for the Columbia Basin from the older Coupled Model Intercomparison Project (CMIP 3) which is based climate impacts from carbon emissions (Figure 1). More recent climate global circulation models from the

International Panel on Climate Change (CMIP 5) includes atmospheric and oceanic circulation models and treats GHGs as representative concentration pathways (RCPs) that include methane, aerosols and other climate change gases. The additional warming effect that will influence Columbia River hydrology and flooding is likely substantial (Figure 2).

The proposed project creation of GHGs must be reexamined in context with updated Washington State emission limit criteria that comports with updated climate science and international assessments. This includes the recent global climate change pacts that indicate that without substantial reductions of GHGs, global temperatures are projected to increase by 2 degrees C which would cause melting of global ice sheets, sea level rise, extreme droughts and floods and other serious consequences for the world community. The DEIS is dated as it does not contain information recently generated from the historical Paris international climate change pact. The Pact, strongly advocated by the U.S., calls on the developed countries to "achieve a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gasses in the second half of this century", indicating that much of the world's remaining reserves of coal, gas and oil must remain in the ground. For the Pacific Northwest, such impact projections include extreme low river flows and summer temperatures with major consequence for human and ecological systems.

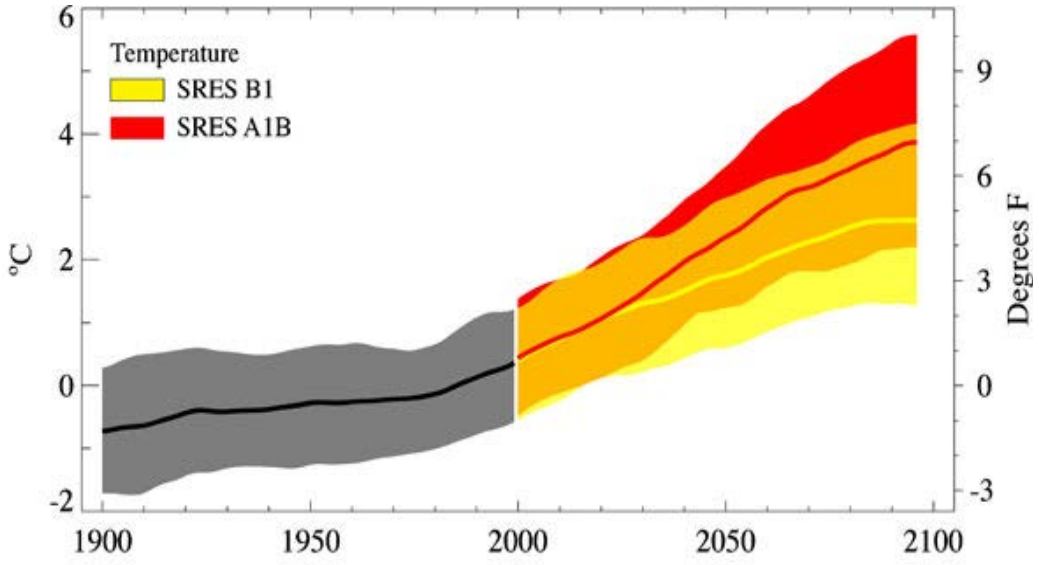

Figure 1. Air temperature projections from two CMIP 3 future climate global circulations models based upon CO2 emissions downscaled for the Pacific Northwest relative to the 1970-1999 mean air temperature. This projection indicates that air temperatures could increase by about 5 degrees C. From Mote and Salathe 2010.

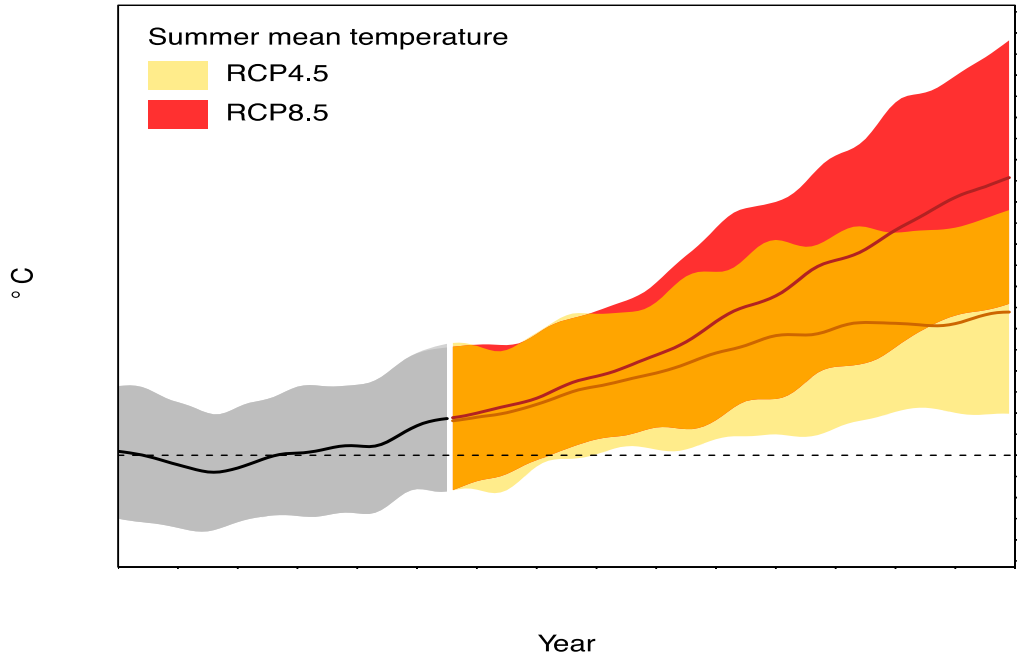

Figure 2. Projected Air Temperatures in the Pacific Northwest under two representative concentration pathways downscaled from CMIP 5 global circulation models. The current path based upon updated GHG emissions is the RCP 8.5 trend line that would result in air temperatures increasing by about 11 degrees C by the end of the century. From D. Rupp, Oregon Climate Change Research Institute 2014.

The DEIS does not include reference to the State of Washington‘s integrated climate response strategy, “Preparing for a Changing Climate” (Ecology 2012; Publication No. 12-01-004) that notes that if substantial actions are not taken to reduce GHGs, impacts to Washington State are projected to reach “nearly $10 billion per year in costs to human health, storm damage, coastal destruction, rising energy cost, increased wildfires, drought and other impacts.” As evidenced in 2015, impacts from low flows and high temperatures resulted in massive salmon losses that directly impacted CRITFC’s member treaty resources. Ecology, in a report to the Washington Legislature, recommended that Washington State GHG emission limits need to be adjusted to better reflect current science and that the results of the December 2015 Paris Climate Change Pact should be used to better inform how Washington’s limits should be adjusted to meet state, national and international targets (Ecology 2014- Publication 14-01-007). This is consistent with the recommendation of the Carbon Emissions Reduction Taskforce (CERT) Report to the Washington State Governor’s Office (CERT Final Report, November 14, 2014) that emission limits need to be “updated based on the science on human-caused climate change reported in global or national assessment of climate change science”. The emission criteria guidance stated in the DEIS is dated from a 2011 Ecology report and is not likely consistent with new GHG emission limits from new scientific assessments.

In Executive Order 14-04, Washington State Governor Jay Inslee established the Carbon Emissions Reduction Taskforce (CERT). Among other things, the task force needs to respond to the University of Washington's finding that "decisions made today about greenhouse gas emissions will have a significant effect on the amount of warming that will occur after mid-century". The Taskforce responded by creation of a report to the Governor's office submitted on November 14, 2014. A major tenet of the report was the creation of a carbon reduction emissions program to "establish a cap on carbon pollution emissions with binding requirements to meet statutory emission limits" established by the legislature.

Figure 2. Washington's Historical GHG Emissions, Business-As-Usual Projection, and Emissions Limits.[8]

Shaded areas show expected reductions from existing[9] and potential policies[10] and the remaining "gap"[11].

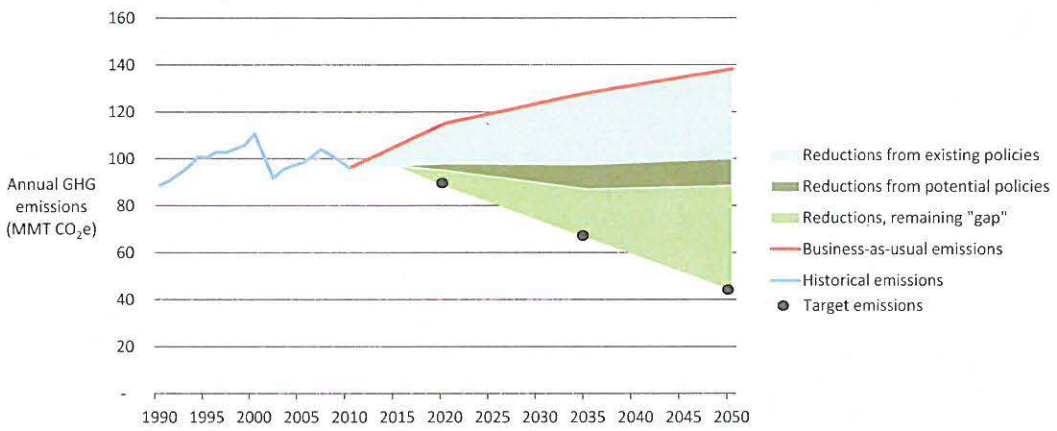

Figure 3. Washington State GHG Historical and Future Projections and Emission Limits. From Washington State Carbon Emission Removal Task Force Final Report to the Washington State Governor's Office, November 2014).

In a November 10, 2014 letter to the Governor from the Taskforce, the group stated that Washington State was not on track to meet Washington State GHG emission limits, committed to by state law. The group identified transportation as the largest source of GHG emissions in the State, comprising almost 50% of the State's emissions. Without a proper compensatory offset that could likely be more than the 12% stationary source reduction based on updated climate and GHG emission science and intergovernmental obligations, the proposed project could substantially violate updated emissions restrictions, setting the State further from necessary and legal limits.[5]

[5] In fact, the Project appears to fail to account for GHGs emissions from vessels traveling back and forth hundreds or even thousands of miles to and from refineries.

While increased summer temperatures are also mentioned in several recent reports as an impact of future climate projections,[6] the DEIS in Section 3.2.4.5 (Climate Change) does not identify this impact. With respect to cumulative project effects, the DEIS fails to mention, much less analyze likely synergistic effects of high river temperatures, with corresponding extreme low flows on fish habitat and populations, particularly in concert with other proposed project impacts such as release of saltwater ballasts from vessels and dredging and vessel disruption of critical fish habitat.

3. **Lack of Updated Energy Demands and Projections in the DEIS**.

The DEIS is dated with respect for the need for oil and future energy needs particularly for the Columbia River basin that is being specifically proposed to suffer physical, chemical, biological and socio-economic impacts from the proposed project.

The DEIS states that U.S. refineries will source more crude oil from the Bakken area oil shale formation in North Dakota in recent years and this is a major source, along with Canadian sources. This information is dated. Recent worldwide global markets, including increased oil placed on the market by Middle East sources has substantially reduced world- wide demand for oil and wholesale oil prices have become extremely depressed. For example, the NY Times recently reported that oil futures of American benchmark settled at $35.62 a barrel, down 3.1 % - the lowest level since December 2008 (NY Times December 12, 2015). They further reported that energy markets are reacting to a glut of oil driven in part by Saudi Arabia and other major producers continuing to “pump flat out” and that this action will remain for the “foreseeable future”. As a result, it is no longer profitable to extract oil from oil shale regions and many operations are closing down.

The DEIS failed to examine the role of increased renewable energy in reducing oil demand and GHGs caused by oil extraction, transportation, refinement and consumption. For example, the recent draft Northwest Power and Conservation Council 7th Power Plan expects that even with climate change impacts, current energy generation in the Pacific Northwest will be sufficient at least until 2026 largely due to the influx of solar, wind and other renewable energy sources.

4. **Floodplains under Climate Change**.

DEIS Table 3.3.1 notes that portions of the proposed facility site are located within the 500-year floodplain and within the 100-year floodplain of the main river channel. The proposed facility elevation at the top of the riverbank is at 30 feet. The DEIS notes that in the post dam era (i.e. 1996) the maximum flood level of the river was 27.2 feet. Further, the DEIS notes that there are rail routes for the proposed transport of oil within 0.25 and 0.5 miles of the 100 year floodplain for substantial areas (i.e. over the Lower Columbia River). The DEIS further states that 9,949

[6] *Preparing for a Changing Climate* (Ecology 2012; Publication No. 12-01-004; National Climate Assessment (2014); Northwest Climate Assessment Report 2013; Climate Change in the Northwest- *Implications for our landscapes, waters and communities* (Dalton et al. 2013).

acres of 100 year floodplains are within the proposed project rail corridor and that in rural areas, floodplain mapping is incomplete and that additional areas of floodplain may be present. The project applicant assumes that since the railroad bed is "generally elevated above floodplains the risk of flood hazard is typically low, aside from crossing point where rail abutments could be vulnerable to flooding".

While the DEIS states that quantitative analyses and information are provided for water resources, quantitative analysis of floodplain damage either at the proposed site or along railroad corridors necessary for the proposed project is completely lacking.

The current 100 year and 500 year floodplains that would be occupied by the proposed project facility and rail corridors are designated by FEMA based upon the historical flow records from the Willamette and Columbia Rivers. These floodplain statistics fail to take into account the impacts of changing climate and the best available future hydrologic projections based on climate projections. In general, winter precipitation will increase and snow lines will drop as the region and proposed project site change from a transition snow/rain climate to a rain dominated climate. Areas above the project, such as the Snake River Basin that have little storage, will have likely have runoff earlier in the year, and the Willamette System will also have runoff earlier in the year due to a change from snow/rain to rain dominated climate (National Climate Assessment- Northwest 2014; Dalton et al, 2013; "Preparing for a Changing Climate" (Ecology 2012; Publication No. 12-01-004).

The DEIS perception that flows are controlled by upriver dams is not correct for at least two reasons. First, the guaranteed Canadian flood control operations for the Columbia River flows at Portland/Vancouver ends in 2024. Second, the scientific evidence clearly indicates that under future climate conditions there will be more variability in flows and little capacity to store water, particularly in the Snake River basin and lower Columbia River. This will increase the frequency, magnitude and duration of flood risk at the proposed project site. Dalton et al. 2013 state:

> The Columbia River Basin, whose reservoir storage capacity is much smaller than its annual flow volume, is ill-equipped to handle the projected shift to earlier snowmelt and peak flow timing and will likely be forced to pass much of these earlier flows out of the system, under current operating rules.

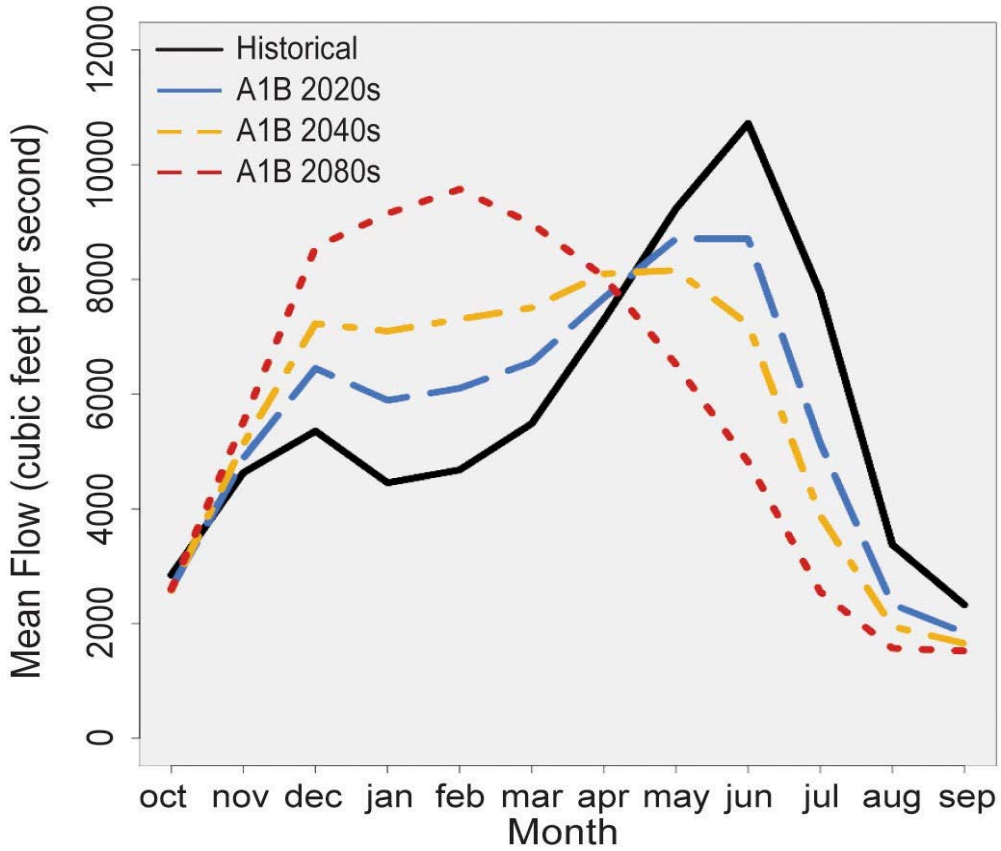

Figure 4. General trends for the historical hydrograph of the Columbia, Willamette and Snake Rivers compared to a range of projected future hydrographs from global circulation models downscaled for the Pacific Northwest (National Climate Assessment- Northwest Chapter, 2014).

In addition, extreme weather events, such as atmospheric rivers in the Pacific Northwest and lower Columbia will become more frequent in duration and intensity ("Preparing for a Changing Climate" (Ecology 2012; Publication No. 12-01-004; Dalton et al. 2013; Mauger et al. 2015). These events, along with reduction of snow lines and increased overall winter precipitation will likely increase overall flood risk and change the frequency of flood risk designations.

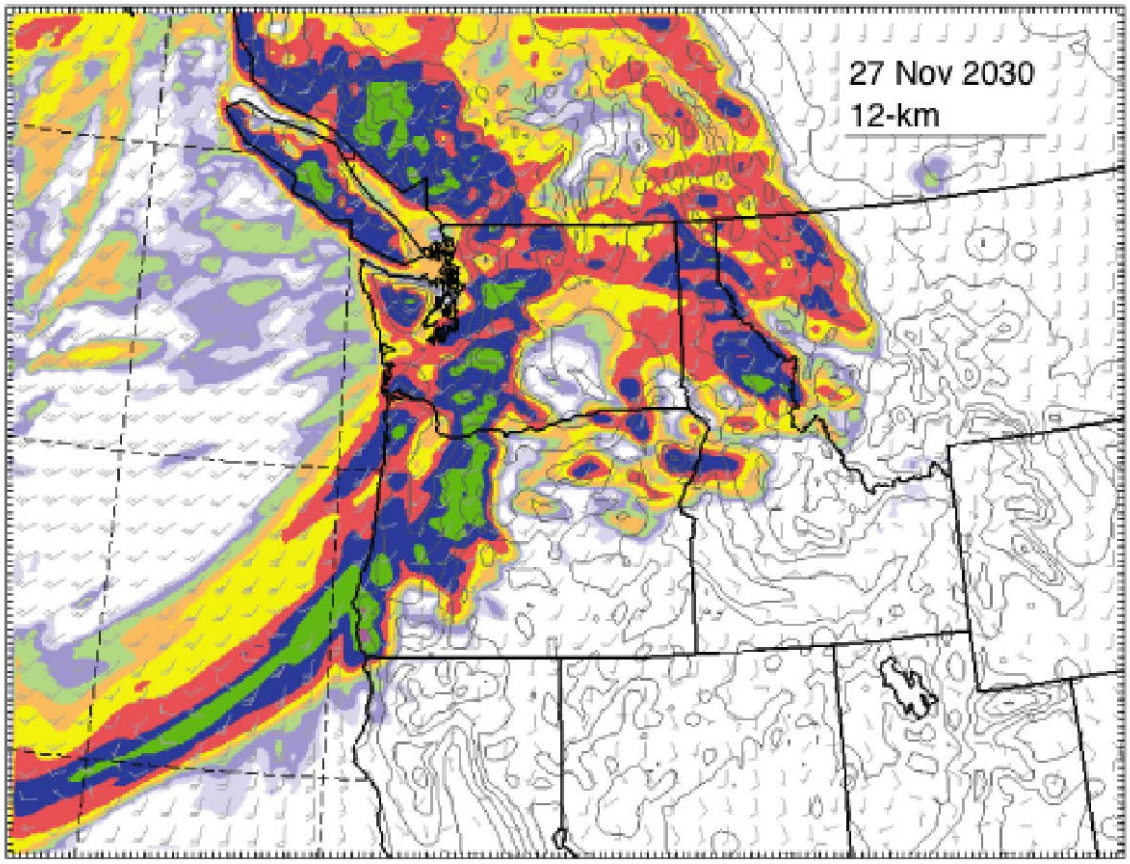

Figure 5. Simulated future atmospheric river storm from a regional climate model. There is growing evidence that the frequency, magnitude and intensity of such events are already occurring and will increase in the future. From Mauger et al. 2015.

Rain/snow dominated basins show a high sensitivity to change across the Northwest, with some under future climate change scenarios showing a 30% increase in flood magnitude and frequency (Dalton et al. 2013). For example, Mauger et al. (2015) project that by the 2040's the 10 year flood event will occur every 5 years and the 100 year event will occur as a 30 year event. Tohver and Hamlet (2010), using CMIP3 future climate projections downscaled for the Columbia Basin, estimated flood frequency magnitudes for 20 and 100 year flood events. Flood ratios for Columbia basin rain/snow basins, including the Columbia River were well above 1.0 for both the 20-year and 100 year flood metric (See Figures 5 and 6 below).

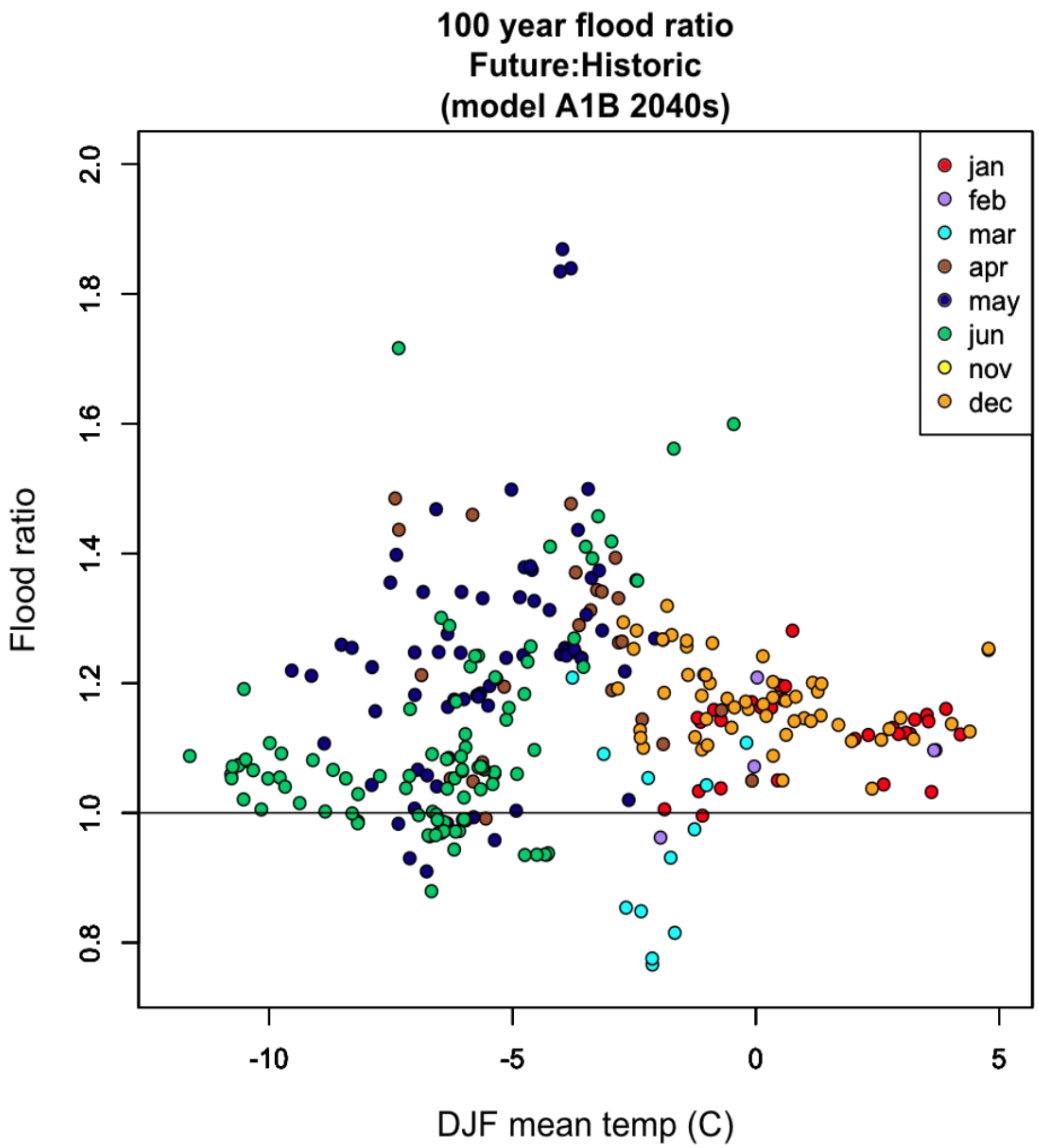

Figure 6: Plots of the mean winter temperature and flood magnitude ratio of the projected future and the historical 100-year floods for each basin. Colors of dots indicate month of historical flood occurrence.

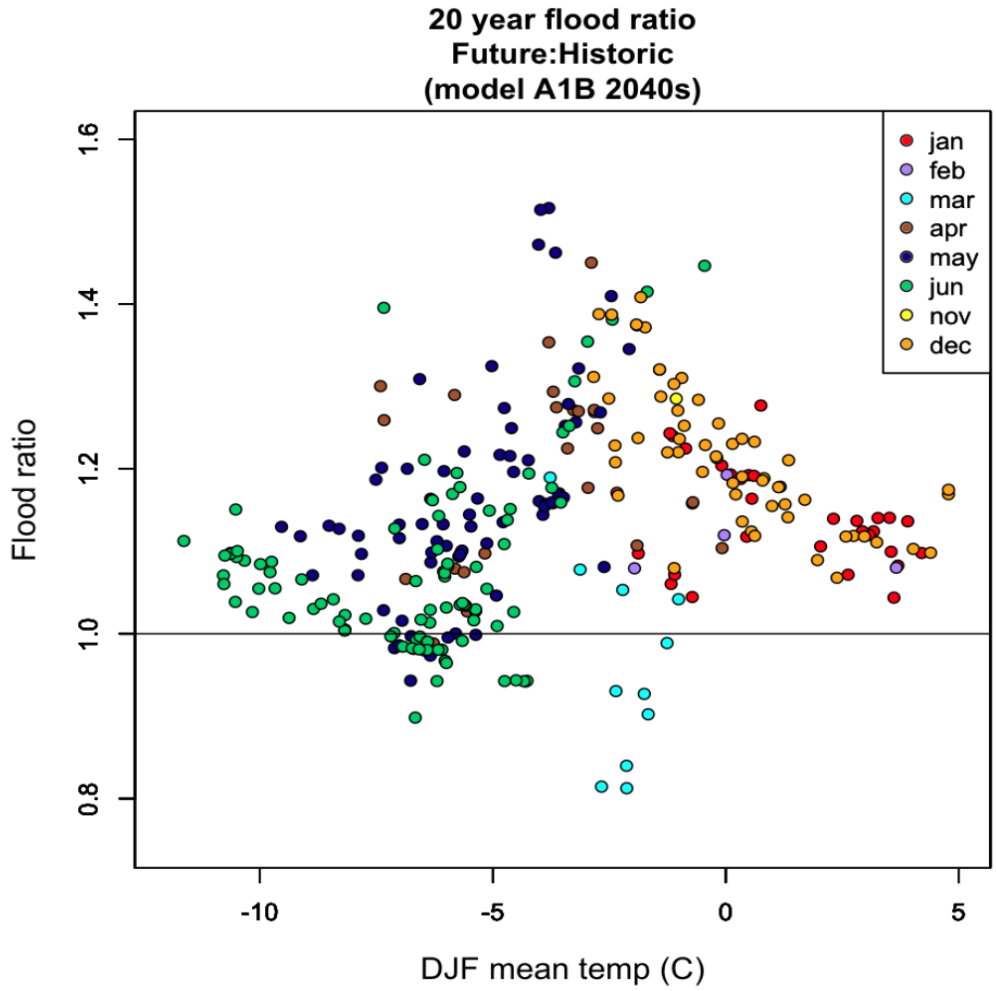

Figure 7. Plots of the mean winter temperature and flood magnitude of projected future and historical 20 year flood for Columbia River subbasins. Dot colors indicate month of historical flood occurrence. This Figure and Figure 6 (above) from Tohver and Mote (2010).

To address these climate impacts, the Washington State Department of Ecology issued a comprehensive report on climate change and response with recommended actions (Preparing for a Changing Climate, Ecology 2012).

- raising or elevating infrastructure to prevent it from flooding
- develop a common framework and methodology for transportation infrastructure risk assessment for all transportation modes
- encourage owners and operators to evaluate vulnerability to the impacts of climate change including risks of damage and potential for disruptions and outages fro flooding and extreme weather events

- gather and provide the best scientific information on climate impacts and areas at high risk of flooding…use to assist in making informed decisions to prepare for and adapt to climate change
- accelerate modernized flood mapping and implement fundamental reforms to incorporate risk from climate change

The risks of flooding from both the proposed project facility and rail transportation area have not been adequately assessed in the DEIS. Under flooding conditions, toxic materials and other pollutants from these areas would enter into the waterways of the Columbia River, in violation of clean water laws and regulations and would negatively impact tribal treaty fisheries resources and essential fish habitat.

We understand that the Corps of Engineers and FEMA are in the process of reassessing floodplain risks and adaptation under climate change scenarios. Among other things, this work must be completed and incorporated into regional planning before there is any consideration of floodplain development in the proposed areas.

5. **Floodplains under Columbia River Treaty**.

The Columbia River Treaty (CRT), signed between Canada and the United States in 1964, provides for the operation of CRT dams to provide flood control and hydropower benefits to both countries in the Columbia River Basin. Under the CRT, Canada was pre-paid to build dams and operate for 8.45 (now 8.95) Maf of storage to minimize flood damages in both Canada and the U.S. until September 2024. The 8.95 MAF of guaranteed Canadian storage represents more than 50% of the total flood storage in the Columbia Basin. The agreement also calls for Canada to provide additional Canadian storage, at additional cost, if "Called Upon" by the U.S. when potential flooding could reach peak discharges in excess of 600 kcfs at The Dalles.

After 2024, Canada's obligation to provide up to 8.95 Maf for flood control ends. The U.S. may still call upon Canada for flood control assistance, at a high cost, but it must first attempt to control the flood with its own reservoirs. Significant changes will have to be made to dam operating procedures to address flood risk under this changed regime. These changes and future flood risk management needs are not yet known. Moreover, discussions are currently underway between the countries to modify the treaty to rebalance CRT benefits, particularly to include ecosystem-based function, and associated higher flows, in the priorities and provide benefits for fish and wildlife and other water-related resources.

The change in assured flood control and the rebalancing of priorities are both likely to allow for increased flood risk to the lower Columbia River. This increased flood risk may take the form of higher regulated flows in normal years and/or greater risk of exceeding the 600 kcfs mark at The Dalles during high flow events.

IX. **ADDITIONAL COMMENTS**.

1. **Water Quality**.

The DEIS, chapter 3, discusses construction (pile removal, new piles driven, etc) and notes that those sediments will be disturbed, and probably re-suspended. Given that there are unknown legacy contaminants, and the potential for new PAH contaminant release during operation, some level of passive sampling on-site and down-stream should be considered (along with an up-stream control). Some level of salinity monitoring should be conducted to describe the saltwater plume of discharge and confirm the rapid level of dilution during ballast water discharge.

The DEIS does not consider long-term impacts of oil and other contaminants moving into the river and associated aquatic habitats via stormwater runoff from the rail tracks and surrounding rail bed. In addition, the DEIS does not propose mitigation for chronic discharges from rail transport into waterways along rail routes.

2. **Habitat**.

Changes in habitat, with or without mitigation elements should be monitored through habitat mapping over time, starting prior to construction. Some sites would be down river to monitor wet land stability from increased wakes. Habitat changes are often slow and subtle; this effort needs to have some long term aspect to the design.

3. **Crude Oil Composition**.

Chapter 4.5 of the DEIS describes the physical/chemical composition in two major oils that are intended to be transported; (1) Bakken oil, which is light and "sweet"; and (2) Dilbit, which is a diluted bitumen for transport, and that is heavy, and not sweet. These two primary types of crude oil present the extreme range of crude oils in terms of response, acute toxicity challenges, persistence, chronic long term toxicity, and habitat damage. From a response view point, the light oil is more dangerous, more volatile, more flammable, more explosive, and more of inhalation risk. From a toxicity view point, the light oil has more *acute* toxicity potential, because the low viscosity permits easier mixing in to the water column, and release the more soluble BTEX aromatic compounds. Surface slicks will be more toxic to the surface air breathers because of the volatility of BTEX in the Bakken oil.

The Dilbit has less acute toxicity potential, less mixing potential in to the water column, but has more persistence potential (larger heavier PAH that are toxic and difficult to breakdown), more habitat damage potential, more *chronic* long term toxicity potential.

4. **Weathering of Crude Oil**.

Weathering is an important process, but the picture reported in the DEIS pages 4-36 to 4-39 is incomplete and misleading. This part of the DEIS describes weathering processes and how oil is

eliminated from the environment, through a varied set of processes. However, the DEIS fails to mention a few very important points: First, the most important process that occurs in addition to the weathering processes is dilution. Dissolution, photo oxidation, and dispersives increase the dispersion of oil horizontally and vertically in the water, and increase dilution.

The DEIS also fails to mention that there are processes at work that retain crude oil. If oil is entrained in sediments, or in wetlands, where oxygen is limited, the oil will persist for decades, and is difficult to clean or remove. This retention leads to chronic toxicity. Although the photo oxidation process tends to breakdown oil into more soluble products, the DEIS fails to discuss that photo oxidation can have a biologically harmful effect of increasing toxicity, particularly to PAH that are already *in* tissues of relatively transparent eggs or larvae. Importantly, and not addressed in the DEIS, processes that tend to disperse crude oil, tend to limit the physical recovery of the oil for permanent removal from the environment.

5. **Effects to Marine Mammals and Birds**.

The DEIS does not adequately review effects of the project to marine mammals and birds. The air breathing biology of marine mammals and birds (air breathing of the vapors immediately above the oil slick), makes them acutely vulnerable to oil spills, and their fitness over a longer period of time can be impacted by ingestion of crude oil, further degrading their health and energy reserves. Long-lived marine mammals with low reproductive rates may take decades for populations to recover

The DEIS at page 4-81 cites Matkin et al 2008 ("Consumption of oiled prey is bad"), but fails to mention the primary point of the paper, which identified the mortality losses from two pods of killer whales resulting from the *Exxon Valdez* spill. The losses led to decades of poor population recovery of one pod and *no* recovery of the second pod (i.e., no surviving reproductive females). The second pod will become extinct. The mortality losses occurring after the Exxon Valdez spill are well documented for more than two decades because there were population baselines prior to the spill based on individual identifications. The mechanism of toxicity is unknown, however, since killer whales sink when dead and do not often beach themselves. No autopsies on these killer whales have been reported. A likely mortality scenario may be inhalation damage to lungs leading to poor fitness for survival over the following year.

Large numbers of birds have been lost in several oil spills (e.g., 250,000 *Exxon Valdez* spill, Esler et al. 2002), probably because of the vulnerability to heat loss from oil contaminated feathers that impairs their heat retention. Unlike most marine mammals, who have a well-developed fat layer circling the core of their body, birds rely on well-groomed feathers to keep their surface skin dry; oil coating severely damages their heat retention abilities. Unfortunately, the estimates for the 1984 *Mobiloil* spill are sketchy; bird carcasses were collected and disposed of, but were not enumerated (Kennedy and Baca 1985), but are suspected to over a 1000. Birds are probably more vulnerable because of the oil coating potential and hypothermic stress compared to marine mammals, but many of the marine mammals are long lived with low

reproductive rates (Matkin et al. 2008), so damages to these populations can have long recovery times.

Dispersants tend to shift the environmental burden of oil from the surface to the water column; probably a net benefit to birds and marine mammals, but a potential detriment to fish and other organisms inhabiting the water column.

6. **Miscellaneous Comments**.

- The 0.5 mile corridor designation for rail traffic impact is inadequate given the dangerous nature of the cargo and how easily it can spread through the air, water, and soil. When transported along water, the effective corridor should be the distance downstream cargo can travel and impact resources, water quality and human health once it has been introduced into the environment.
- Under the *Man-Made Structures* section, the DEIS refers to tribal fishing weirs. Is this a reference to tribal scaffolds and platforms?
- The DEIS should analyze the proposed project impacts to socioeconomic resources including employment, tax revenue and economic conditions. In addition, the DEIS does not identify disproportionate effects for environmental justice populations, specifically, it does not mention impacts to tribal economies.
- The DEIS should include oil spill fires, explosions at facility and along transportation routes to the list of significant unavoidable impacts.
- For reasonably foreseeable actions that contribute to cumulative impacts, the DEIS should add continual dredging on salmon and lamprey habitat, lack of flood assessment, lack of climate change assessment based on updated best scientific information
- There is no potential of reclaiming floodplains at proposed project site for fish habitat or flood mitigation
- Under No Action Alternative, the DEIS states that current demand by West Coast refineries for midcontinent crude oil would continue and that this demand would be satisfied by existing facilities or new sources. However the demand for crude oil has been greatly diminished due to gluts and reduced demands from world markets. This assumption is not correct.

X. **CONCLUSION**.

Although the DEIS lays out the project, provides many details of the operation, and identifies an inventory of risks, the document is unsatisfactory in evaluating the risks. While many possible impacts are listed, the DEIS fails to synthesize from published literature the most significant or important impacts. These risks are difficult to evaluate, to be sure, and the literature is voluminous, but better use can be made of the literature to provide a better focus on some of the risks. The information from other spills was generally not used in this EIS, including the

Mobiloil spill at Warrior Rock (RM 88, in 1984), or the embryonic sensitivity literature, thus undermining the credibility of the document.

This project will result in the transfer of billions of gallons of oil over a long period of time. Given experience with other spills, the damage that may result may be significant, and last a significant length of time. The persistence time factor does not receive the attention in this report. The “acute aspect” of a spill event may last days to weeks, yet the persistence of oil, the impacts to habitat, and the impacts to some species may last for decades, as has been observed in previous spills.

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