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SUBMITTED VIA EMAIL TO: [russ.klassen@state.or.us](mailto:russ.klassen@state.or.us)

Russ Klassen  
Oregon Department of State Lands  
775 Summer Street NE, Suite 100  
Salem, Oregon 97301-1279

**Re: Comments on the Interstate 5 Columbia River Crossing Project Addendum to Removal-Fill Permit Application, No. APP0052419**

Dear Mr. Klassen:

The Northwest Environmental Defense Center (“NEDC”) submits the following comments on the Interstate 5 Columbia River Crossing (“Project”) addendum to the application submitted by the Oregon Department of Transportation and Washington Department of Transportation (collectively, “CRC”) on May 22, 2013 for a removal-fill permit from the Oregon Department of State Lands (“DSL”), No. APP0052419 (“addendum”). NEDC has and continues to seek to ensure that all state and federal environmental laws and regulations are complied with throughout the development and planning of this Project. Given NEDC’s mission to protect the environment and natural resources of the Pacific Northwest, we are concerned about the environmental impacts likely to result from the construction of the Project.

Due to numerous failures on the part of the CRC, NEDC requests that DSL deny the removal-fill permit. First, NEDC is concerned that the CRC’s piecemeal approach to “refining” the bridge design will prevent meaningful public comment. DSL should recognize that the CRC’s latest iteration of the bridge design is a new proposal, and provide for a full public notice and comment period on the Project as a whole. Second, the addendum lacks essential information and fails to provide the information identified as missing in the original Joint Permit Application (“JPA”), submitted by the CRC in January of 2013. Finally, DSL should deny the amended JPA because the CRC’s Project is inconsistent with Oregon’s policy for preserving its waters. At the very least DSL should require the CRC to submit the missing information.

If DSL decides to authorize the requested removal-fill permit, it should include permit conditions that will ensure the protection, conservation, and best use of Oregon’s water resources, consistent with the public policy stated in DSL’s regulations. With this second round of comments and review, even though limited in scope, DSL has the opportunity to correct the deficiencies of the CRC’s original JPA. We hope that DSL recognizes the magnitude of the

Project and carefully reviews the adequacy of the CRC's information and environmental analysis.

## Discussion

### **I. Due to new studies, new information, and the growing complexity of the proposed Project, DSL should provide a full comment period to allow the public to assess the permit application as a whole.**

An application for a removal-fill permit must provide complete and accurate information with "sufficient detail . . . to enable [DSL] to render the necessary determinations and decisions." OAR 141-085-0550. The addendum states that this amendment is sought "as a result of further refinement in design," but that other elements of the original permit request remain unchanged from the JPA. *See* Addendum, page 1. Since the CRC submitted its application for a removal fill permit in January of 2013, however, the CRC has completed numerous studies and provided new information to the United States Coast Guard ("USCG") that was not considered by DSL nor available for public review during the comment period for the JPA.

In fact, the CRC has been "refining" and changing the bridge design, as well as presenting new information, continuously. For example, in 2011 the Federal Highway Administration and Federal Transit Administration issued a Final Environmental Impact Statement ("FEIS") and Record of Decision ("ROD") that identified the locally preferred alternative ("LPA") as the replacement for the Interstate 5 Bridge. The LPA was designed to be 95 feet above zero Columbia River Datum ("CRD") ("95 foot bridge"). In November of 2012, the agencies published an internal re-evaluation to support a design that changed the bridge to 116 feet above zero CRD ("116 foot bridge"). *See* Columbia River Bridge Vertical Clearance NEPA Re-evaluation, December 2012 ("Re-evaluation"). The amount of vertical clearance for a proposal to build a new bridge over a major interstate waterway is a basic and essential element of that proposal. Increasing the amount of vertical clearance by 21 feet (more than 20%) is not a design "refinement." The CRC is now proposing a bridge that is significantly different from the LPA addressed in the FEIS and approved by the 2011 ROD.

In January of 2013, the CRC submitted its JPA to DSL and the United States Army Corps of Engineers for filling, excavation, in-water structures, and maintenance or repair of existing structures as these activities relate to the proposed Project. NEDC commented on the permit application in March of 2013, highlighting the major reasons why DSL should deny the CRC's request. Specifically, NEDC noted that the CRC failed to seriously consider a reasonable range of alternatives, failed to clearly identify or mitigate likely adverse impacts, including failing to analyze or mitigate the negative impacts due to extended in-water work windows, and failed to include measures that would protect and preserve critically imperiled salmon species.

Since that time the CRC has conducted additional studies about the probable impacts of the Project. The CRC submitted additional new information to the USCG regarding its application for a General Bridge Permit, after the USCG initially denied that application as incomplete. *See* March 8, 2013 Letter from K. A. Taylor to Paula Hammond, Washington State Department of Transportation, and Matt Garrett, Oregon Department of Transportation; April 5, 2013 Transmittal from Heather Wills to Randall Overton, USCG Bridge Administrator; April 18,

2013 Letter from Matthew Garrett and Lynn Peterson to Rear Admiral Keith A. Taylor, USCG. This new information included reports on economics, necessary changes to the turning basin and navigational channels, marine facilities likely to be impacted by the Project, cultural assessments, and documents supporting the CRC's request to reinitiate consultation with the National Marine Fisheries Service ("NOAA Fisheries") under the Endangered Species Act ("ESA").

Although the CRC now seeks an addendum to its JPA, the addendum is expressly cabined to cover only the modified bridge design for the North Portland Harbor portion of the project. The addendum thereby ignores a multitude of new reports and information developed since the CRC submitted the JPA, all of which are directly relevant to DSL's removal-fill permit. Also not included in the addendum, as noted below, is the seismic calculations that apparently were the reason for changing the design of the bridge over North Portland Harbor. The CRC's failure to provide this information in the addendum is inconsistent with DSL's requirement that a permit application provide sufficient information for DSL to make the necessary determinations. In addition, DSL's failure to provide a full comment period regarding the entirety of the CRC's proposal as it currently exists, instead of an abbreviated public comment period on a limited portion of the project, subverts the purpose of a public notice and precludes meaningful public comment.

One of the most obvious reasons to provide a full comment period is the forthcoming Biological Opinion ("BiOp"), which will describe impacts to listed species and designated critical habitat in the region of the Project. *See* May 13, 2013 Letter from Michael P. Tehan, NOAA Fisheries, to John McAvoy, Federal Highway Administration, and R.F. Krochlis, Federal Transit Administration. NOAA Fisheries has explained that the BiOp will be done no later than August of 2013. *Id.* Thus the CRC has had knowledge of a forthcoming BiOp since May of this year. Rather than include that information in its addendum to the JPA, however, the CRC has chosen to ignore the forthcoming BiOp.

The information in the BiOp is important because it is likely to inform this removal-fill permit application. In an April, 2013 letter, the CRC cites two factors as triggering the re-initiation of formal consultation under Section 7(a)(2) of the ESA: (1) modifications to the original action that are likely to affect listed species in a manner not previously considered and (2) new designation of critical habitat. *See* April 4, 2013 Letter from John McAvoy, Federal Highway Administration, and R.F. Krochalis, Federal Transit Administration, to Kim Kratz, NOAA Fisheries. Of particular concern is the increased amount of in-water work during extended in-water work windows, much of which is the subject of this permit. The CRC's re-initiation states that "[r]ather than a concentrated in-water construction effort spanning approximately *five* years as proposed in the 2010 [biological assessment ("BA")], sequencing will require approximately *nine* years of in-water work, with impact pile driving occurring in *seven* of those years." *See* Columbia River Crossing, Endangered Species Act Reinitiation (April 2013), page 2-3 (emphasis added). The CRC admits that there will be more in-water work than previously planned. Because the information in the BiOp is likely to inform this permit application, and the BiOp is currently being drafted by NOAA Fisheries, DSL should provide a new comment period to review the entirety of the CRC's proposed Project and any impacts identified in the BiOp.

DSL should provide a second, full comment period to allow the public to assess the entirety of the CRC's application. The CRC has repeatedly attempted to evade the public process by parsing the Project and making so-called refinements, to the extent that the current Project no longer reflects the Project approved in the ROD. The massive scope, overwhelming complexity, and ongoing controversy surrounding the Project support the need for greater public scrutiny at all stages of the authorization process. DSL has not, however, provided for a comprehensive analysis of the impacts of the entire project. Because of the numerous changes to the project design and the fact that new information resulting from additional studies have drastically converted the proposed Project, DSL should reissue the entire permit application for a full public comment period.

## **II. The amended application lacks essential information.**

Not only does the addendum fail to provide a complete picture of the permit application as a whole and lack new information that has arisen since the submission of the original JPA, the addendum also lacks sufficient information for DSL to make a permit determination. *See* OAR 141-085-0550 (requiring an applicant provide "sufficient detail . . . to enable [DSL] to render the necessary determinations and decisions."). In addition to the information identified as missing in NEDC's first round of comments, the CRC again has omitted information essential for DSL to make its necessary determinations and decisions. In particular, the CRC's addendum omits the forthcoming BiOp, the new calculations regarding seismic standards that triggered this addendum, the specific in-water work windows for installing the additional cofferdams identified in the addendum, and information necessary to determine the scope of adverse impacts on water quality. Because the CRC has not provided sufficient information to demonstrate compliance with DSL's regulations, DSL should deny the permit addendum.

First and foremost, neither DSL nor the Corps should be considering amendments until the new BiOp has been completed. As explained above, NOAA Fisheries expects to complete the BiOp in August of this year. Since the BiOp will reflect the likely impacts of the Project on listed species and designated critical habitat, from the perspective of the expert Federal agency charged with ensuring the protection of those species, it is likely to contain information directly relevant to the DSL's analysis of the removal-fill activities proposed under this permit. The BiOp is essential information that should be included in the DSL's analysis and should be available for public review and comment. According to the Federal Highway Administration's April 4, 2013 letter requesting to reinstate consultation under the ESA, this new BiOp is necessary because of changes to the project that will cause impacts to listed species and because of newly designated critical habitat. Thus the BiOp resulting from the reinstated consultation process will differ materially from the BiOp issued in 2011.

Second, between the CRC's submittal of its JPA in January of 2013 and the submission of the addendum in May of 2013, the addendum explains that the "project team conducted additional calculations to ensure proposed structures would meet seismic standards." *See* Addendum, page 1. Nowhere in the addendum does the CRC explain what those calculations are or why they necessitated a change in the North Portland Harbor bridge design, except for the vague statement that the changes were necessary to meet seismic standards. Without knowledge of what those seismic standards are, or the specifics from the evaluation of the original bridge design, the public has no idea of the actual need for this addendum. The CRC's addendum

violates DSL's regulations by failing to provide sufficient detail for DSL to render the required determinations and decisions.

Finally, the addendum lacks essential information regarding impacts to water quality and aquatic life. The addendum fails to provide information regarding the scheduling of the in-water installation of the proposed cofferdams. The JPA, at least, outlined the expected timing of various activities, including in-water work windows for installing cofferdams on the Columbia River bridges. *See* JPA, page 10. This section notes that the installation and removal of cofferdams for the construction of the Columbia River bridges would take place year-round. The addendum, however, states only that the cofferdams will be required for about 30 to 36 days. *See* Addendum, pages 1 and 3. It does not specify whether the cofferdams will be used only within designated in-water work windows, extended in-water work windows, or year-round. Without the details for *when* the CRC plans to install the additional cofferdams proposed in this addendum, DSL cannot make a determination as to the adverse impacts of the proposed Project or the mitigation necessary to offset such impacts.

NEDC noted in its first round of comments that the CRC failed to provide information necessary for DSL to make the determinations and decisions required under the Removal-Fill Law regarding water quality. Here, again, the CRC's addendum lacks essential information regarding impacts to water quality. For example, the addendum states that the drilled shafts will be constructed within drilled shaft casing, and material excavated "will be disposed of in accordance with relevant permits." *See* Addendum, page 2. The CRC does not explain how or where the dredged material will be disposed. It also fails to outline the relevant permit requirements, or how those requirements might avoid or minimize adverse impacts from the removal activities.

Similarly, the addendum explains that water from within the cofferdams will be pumped to a holding tank and then "disposed of in accordance with permit requirements." *See* Addendum, page 2. Again, the CRC does not outline the relevant permit requirements or how those requirements might avoid or minimize adverse impacts to water quality. The CRC plans to pour a concrete seal around the drilled shaft casing within each cofferdam at the mudline to prevent water from entering. The top of the seal will be flush with the mudline or within one foot below existing mudline. The CRC fails to recognize or account for potential spills involved with the sealing.

The CRC also fails to provide information regarding adverse impacts to salmon. For example, the addendum states that the CRC will conduct fish salvage during and after isolation. Yet it does not explain what "fish salvage" measures will be used. The addendum states that "the project will perform measures to remove fish from the work area during and after the installation of casings/cofferdams." *See* Addendum, page 6. The CRC does not provide information about the specific measures it plans to use, does not identify who will be responsible for monitoring and ensuring fish are protected, and does not provide a schedule for conducting such monitoring. Without this information, NEDC is left to believe that the CRC has no plans and thus the permit application is incomplete. At bottom, the lack of information prevents meaningful public comment. DSL should either deny the CRC's addendum as incomplete or require the CRC to submit the information necessary to make the permit determinations required by DSL's own regulations.

### **III. DSL should deny the CRC's application for a removal-fill permit because the amended Project design is inconsistent with Oregon's policy for preserving its waters.**

DSL should deny the CRC's request for a removal-fill permit as inconsistent with Oregon's policy for preserving its waters. DSL may issue a removal-fill permit if it determines the proposed activity "[i]s consistent with the protection, conservation and best use of the water resources of this state" and "[w]ould not unreasonably interfere with the paramount policy of this state to preserve the use of its waters for navigation, fishing and public recreation." ORS 196.825(1). Because, as explained in NEDC's first round of comments, the Project is inconsistent with Oregon's policy, DSL should deny the permit. This addendum only exacerbates the deficiencies of the CRC's application. Specifically, the addendum fails to consider alternatives to the proposed changes in the North Portland Harbor bridge design. The addendum also ignores likely significant adverse impacts and fails to provide commensurate mitigation.

#### **A. The CRC's addendum fails to consider reasonable alternatives.**

A permit application must include a purpose and need statement that "must be specific enough to allow [DSL] to determine whether the applicant has considered a reasonable range of alternatives." OAR 141-085-0550(5)(f). DSL's guidance explains that the alternatives analysis "is the heart of the removal-fill decision-making process." Here, the addendum explains this change in the North Portland Harbor bridge design was necessary "to ensure the proposed structures would meet seismic standards."

The permit application must also include an analysis of a reasonable range of alternatives. *See* OAR 141-085-0550(5)(o). The alternatives analysis is essential because although the CRC may be given deference for the "need" of improving the structural integrity and seismic stability of the bridge, DSL has a duty to ensure that the CRC has presented sufficient information on the available means for meeting that need. The alternatives analysis must include "[a] description of alternative project sites and designs that would avoid impacts to waters of this state altogether, with an explanation of why each alternative is, or is not practicable, in light of the project purpose and need" and "[a] description of alternative project sites and designs that would minimize adverse impacts to waters of this state with an explanation of why each alternative is, or is not practicable, in light of the project purpose and need." OAR 141-085-0550(5)(o).

In this case, the CRC failed to consider any alternative to the design proposed in the addendum. Contrary to DSL's guidance, explaining that a permit application should include "a clearly articulated range of alternative sites and designs that avoid and minimize impacts" as well as a "documented evaluation of each alternative site and design against the project criteria," the CRC only considered different forms of construction. The addendum states that to install the drilled shafts at each pier the CRC will need to use casings or cofferdams seated into the sediment with a vibratory driver. Yet the CRC offers no alternative to this installation process or an evaluation of those alternatives. The CRC's failure to identify any alternatives, much less a reasonable range of alternatives, is in blatant contravention of DSL's regulations. DSL should

either deny the CRC's permit application, or require additional information under OAR 141-085-0560(4)(a) to complete the required alternatives analysis.

**B. The CRC's addendum fails to identify significant adverse impacts that will result from the proposed Project.**

To meet the requirement that a removal-fill activity be "consistent with the protection, conservation and best use of the water resources of this state" and "not unreasonably interfere with the paramount policy of this state to preserve the use of its waters for navigation, fishing and public recreation," the permit application must identify the adverse impacts that will result from the project, including impacts to wetlands. OAR 141-085-0550(5)(i) and (k). The CRC's addendum is inconsistent with this requirement because it fails to identify the adverse impacts to water quality and fish populations that will result from the Project, as explained below. As a result, DSL should either deny the CRC's permit application or in the very least request additional information from the CRC to allow DSL to complete the necessary analysis.

The activities proposed in this addendum will undoubtedly have significant short and long term adverse impacts on the North Portland Harbor and the surrounding region. The addendum states that the modified bridge design will require about twice the number of shafts at each pier to maintain stability, resulting in, *inter alia*, more hydroacoustic impacts, a greater permanent footprint in the bed of the river, a higher project cost, reduced width available for watercraft (with safety implications), an increased volume of fill in the floodplain, restricted hydraulic flows, and a rise in water surface elevation. A major difference in the amended design is that the CRC intends to drill for the shafts below the mudline, in contrast to above the ordinary high watermark as originally planned. As a result, the CRC will need to use additional cofferdams and concrete seals to complete the work below ordinary high watermark. This additional in-water work will result in additional direct, adverse impacts. The modified design will negatively and permanently impact water quality of the Columbia River and the vitality of salmon populations that depend on that water quality.

**1. The CRC fails to identify adverse impacts to water quality and waters of the state that will result from the proposed Project.**

The CRC fails to identify significant adverse impacts to water quality that are likely to result from the proposed design changes. The addendum notes that the use of over-sized casings or cofferdams will cause impacts to water quality from turbidity, specifically from the vibratory drilling methods and removal of cofferdams. *See* Addendum, page 6. Yet the CRC fails to mention the increased turbidity and sedimentation that is likely to result when the first 6 feet of sediment is removed to create a stable foundation for concrete seal. The addendum also explains that any elevated turbidity resulting from the installation of cofferdams is expected to extend only 25 feet from the cofferdams. *Id.* This analysis, however, fails to account for the cumulative adverse effect on water quality. The addendum notes that as many as 16 of the 36 over-sized cofferdams will be placed in the water at any one time. *Id.*, page 2. The CRC's addendum fails to identify the significant adverse impact on water quality that is likely to result from the installation of multiple cofferdams at one time. When viewed in the cumulative or as a combined action, the proposed cofferdam installation is likely to cause significant direct adverse impacts in a localized region.

The CRC also fails to identify wetlands impacted and the addendum lacks a compensatory wetland mitigation plan. Pursuant to ORS 196.818, a permit applicant must submit a wetland delineation report to determine whether waters of the state are present at the proposed project site, where the boundaries of those waters are, and whether a proposed activity in waters of the state are subject to permit requirements. The CRC's website, [www.columbia-rivercrossing.org](http://www.columbia-rivercrossing.org), provides a link to a Wetland Delineation Report and DSL Concurrence Letter. See Columbia River Crossing Library/Maps, Oregon Removal-Fill Joint Permit Application – Attachment H, Wetland Delineation Report and DSL Concurrence Letter (2008). DSL's concurrence letter states that “[w]ithin the study area, 4 wetlands, totaling 2.61 acres . . . were identified,” and that those wetlands are subject to the permit requirements of the state Removal-Fill Law. The addendum, however, states that “no jurisdictional wetlands will be impacted within Oregon during construction or operation of the project.” See Addendum, page 4. The information in the addendum contradicts the conclusions of the CRC and DSL in the wetland delineation report. As a result, the CRC's addendum fails to identify impacts to waters of the state and is inconsistent with DSL's requirements for a permit application.

## **2. The CRC fails to identify adverse impacts on fish populations that will result from the proposed Project.**

The CRC's addendum not only fails to identify adverse impacts to water quality and wetlands, but it also fails to adequately identify adverse impacts to aquatic life and habitat. To issue this removal-fill permit, DSL must determine the proposed Project “is consistent with the protection, conservation and best use of the water resources of this state,” ORS 196.825(1)(a), including consideration of the potential adverse impacts to aquatic life. See ORS 196.800(13) (defining “water resources” as including “not only water itself but also aquatic life and habitats therein”). The modified bridge design described in the addendum will have direct adverse impacts on salmon and will negatively impact salmon habitat. The increased turbidity, described above, will also likely indirectly impact salmon by causing fish avoidance in work area, reducing fish foraging success, reducing eulachon spawning, and causing physiological stress to fish.

The CRC's addendum identifies some direct and indirect impacts to fish that will result from the proposed Project. For example, the addendum notes the Project will cause a temporary loss of shallow-water habitat, direct effects to fish from work area isolation and fish salvage (including adverse effects from the noise and visual disturbance during the installation of cofferdams), fish avoidance during construction of cofferdams, and a risk that fish will be caught in the cofferdams. See Addendum, page 6. The CRC explains the installation of the cofferdams through vibratory drilling “is likely to generate low level noise and visual disturbance.” *Id.* Such vibratory drilling, however, is likely to produce noise in excess of the threshold at which sound may cause behavioral interference with fish. See Anthony Hawkins, et al., *Assessing the impact of pile driving upon fish*, Proceedings of the 2005 International Conference on Ecology and Transportation (2006) (Abstract) (attached hereto as Attachment 1) (explaining that even with bubble curtains to minimize the impacts, the level of sound from vibratory pile driving was well above the hearing thresholds of fish and there was a risk that upstream migration may have been delayed or prevented with consequent effects on spawning populations).

The addendum also notes that the proposed Project will have a net areal increase of permanent structure below the ordinary high water mark and increase the volume of fill material placed into the river. *Id.*, page 7. Yet the CRC fails to identify this permanent loss of fish habitat as a direct adverse impact on salmon. The permanent new structures are also likely to modify salmon migration patterns. The addendum notes that habitat will not be accessible while the cofferdams are installed, which is for about 30-36 days per cofferdam. This means that salmon will be unable to reach spawning habitat, resulting in negative impacts on the reproductive success of the fish and negative impacts on the salmon population as a whole.

Finally, the CRC points to “measures to remove fish from the work area during and after the installation of casings/cofferdams” as a way to minimize impacts to fish, yet this measure itself is a direct impact to the fish. *See* Addendum, page 6. As noted above, the addendum does not describe the measures it will use to remove fish, but it will likely result in stress and disorientation to the fish, if not direct physical harm. The CRC’s failure to identify these adverse impacts to salmon not only directly contradicts DSL’s requirements for a removal-fill permit application, but also obscures the true impacts of the proposed Project. By concealing certain adverse impacts to water quality, wetlands and aquatic life, the CRC flouts the Removal-Fill Law and improperly discounts the impact of its proposed actions. DSL cannot issue a removal-fill permit in this context without ignoring its own regulations. Thus we urge DSL to seek more information regarding the impact of the proposed Project on salmon.

**C. DSL should deny the permit because the CRC does not plan to mitigate for the direct, adverse impacts likely to result from the proposed Project, in direct contravention of DSL’s regulations.**

An application for a removal-fill permit must provide mitigation plans to compensate for expected adverse impacts. *See* ORS 196.825(3)(i) (requiring DSL to consider “[w]hether the applicant has provided all practicable mitigation to reduce the adverse effects of the proposed fill or removal”). Mitigation efforts must be consistent with the statutory requirements, which establish a sequential preference for the type of mitigation used. ORS 196.800. First, mitigation requires an applicant to avoid adverse effects by not taking a certain removal-fill action or parts of an action. *Id.* 196.800(8)(a). Second, an applicant must minimize the effect by limiting the degree or magnitude of the action and its implementation. *Id.* 196.800(8)(b). Third, an applicant must rectify any unavoidable effects by repairing, rehabilitating or restoring the affected environment. *Id.* 196.800(8)(c). Fourth, an applicant must reduce or eliminate the effect over time by preservation and maintenance operations during the life of the action by monitoring and taking appropriate corrective measures. *Id.* 196.800(8)(d). Finally, an applicant must compensate for the unavoidable effects that cannot be rectified or reduced by creating, restoring, enhancing or preserving substitute functions and values for the waters that are lost as a result of the project. *Id.* 196.800(8)(e).

Based on the limited information provided in the addendum, it is unlikely that DSL will be able to determine that the CRC has adequately mitigated the impacts to water and aquatic life that will result. Lack of information aside, the CRC does *not propose any* additional mitigation for those adverse impacts that the CRC did identify in the addendum. *See* Addendum, page 7 (stating that “the CRC project team feels additional mitigation actions or areas are not required to mitigate for impacts presented in the DSL JPA and this amendment”). This is likely the most

blatant violation of DSL's regulations, given the certainty of additional direct, adverse effects resulting from this design modification.

As explained above, the proposed Project will have direct, adverse effects. The revised project design will require twice the number of shafts at each pier and will result in more hydroacoustic impacts for driven temporary piles and drilling equipment platforms, an increased permanent footprint in bed of river, a higher project cost, reduced safe width available for watercraft, increased volume of fill in the floodplain, restricted hydraulic flows, and a rise in water surface elevation. *See* Addendum, page 6. Ultimately the modified design will result in a net increase of permanent structure below the ordinary high watermark.

The CRC blindly points only to the volume of fill that will result in permanent impacts, and considers existing mitigation measures sufficient. This approach ignores the major additional impacts that will result from the increased in-water work, even if the ultimate structures are only in the water temporarily. The amendment wholly fails to support that no mitigation is necessary for the proposed additional physical obstructions, additional noise levels due to drilling, and increased turbidity. In fact, these are actual, direct impacts that must be mitigated.

The addendum states that the impacted region contains extremely limited spawning habitat with low primary and secondary productivity, and that the compensatory mitigation is approximately 5.8:1. *See* Addendum, page 7. Thus the CRC did not add mitigation for the changes presented in this amendment. The proposed changes, however, represent additional adverse impacts to the path for migrating fish. Regardless of whether this is spawning or rearing habitat, the additional in-water work will directly impact fish, migration patterns, and thereby require additional mitigation. The mitigation along the Sandy River, identified in the JPA, is largely worthless if fish are unable to pass through the Columbia River due to the actions outlined in this addendum. The CRC's failure to provide additional mitigation to offset the expected impacts from this addendum flouts DSL's regulations. DSL should deny the permit application for failing to provide all practicable mitigation to reduce the adverse effects of the proposed removal and fill activities.

#### **IV. DSL should impose additional permit conditions on the CRC**

State law allows DSL to "impose such conditions as the director considers necessary to carry out the purposes of ORS 196.805 and 196.830 and subsection (1) of [196.825] and to provide mitigation for the reasonably expected adverse effects of the project." ORS 196.825(5). *See also* ORS 196.805 (stating that "[t]he protection, conservation, and best use of the water resources of this state are matters of the utmost public concern"). Because the Project proposed in the addendum will cause significant adverse effects to water quality, wetlands, and salmon, and the CRC has failed to propose any mitigation for those effects, DSL must require additional mitigation if it decides to issue the removal-fill permit.

DSL should consider permit conditions to attenuate the sound from vibratory driving and limit the range of time that salmonids will be exposed to these hydro acoustic impacts, especially during sensitive peak migratory times. DSL should also consider a rest period for vibratory driving or the use of bubble curtains to lessen impacts on fish. These measures are especially

important, given Oregon's unique sovereign interest in the survival and recovery of listed salmon and steelhead in the Columbia River.

### **Conclusion**

NEDC again urges DSL to address the aforementioned deficiencies in the CRC's application for a removal-fill permit before authorizing any removal or fill activities for the proposed Project. Issuing the permit would turn a blind eye to the CRC's cursory and piecemeal approach to meeting the statutory and regulatory requirements under, *inter alia*, the Clean Water Act and Oregon's own state law requirements. Doing so would also prevent the public from providing meaningful comments on the entirety of the proposed Project, all without essential information. Finally, authorizing this removal-fill permit as proposed would contravene Oregon's decades-long fight to protect and ensure the recovery of the state's salmon populations.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Marla Nelson". The signature is fluid and cursive, with a long horizontal stroke at the end.

Marla Nelson  
Legal Fellow



**Title:**

Assessing the impact of pile driving upon fish

**Author:**

[Hawkins, Anthony](#), Loughine Ltd., Kincaig, Blairs, Aberdeen

**Publication Date:**

08-29-2005

**Series:**

[Recent Work](#)

**Publication Info:**

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**Additional Info:**

Hawkins A. 2006. Assessing the impact of pile driving upon fish. IN: Proceedings of the 2005 International Conference on Ecology and Transportation, Eds. Irwin CL, Garrett P, McDermott KP. Center for Transportation and the Environment, North Carolina State University, Raleigh, NC: p. 22. (Abstract)

**Keywords:**

reconstruction, jetty, monitored, harbor, Scotland, sound, levees, percussive, vibratory pile driving

**Abstract:**

Pile driving associated with the removal and reconstruction of a jetty was monitored at a busy harbor in the North East of Scotland, adjacent to an important Atlantic salmon river. The main concern was with the impact of noise upon salmon migrating through the lower part of the river estuary. Pile driving was allowed to proceed subject to an agreed program of works to monitor sound levels and ensure least disturbance to salmon. Both percussive and vibratory pile driving took place. Sound-pressure levels from both were measured. Percussive pile driving involved the repeated striking of the head of a steel pile by a double-acting hydraulic hammer, with a 5 tonne ram weight operated with a mean stroke of about 1 m. Vibratory pile driving was achieved by means of a variable eccentric vibrator attached to the head of the pile. The majority of piles were initially driven into the substrate by vibration, over a period of several minutes. Each pile was then subsequently driven to its full depth with a sequence of repeated hammer blows. Steel facing piles were inserted adjacent to the quayside and subsequently backfilled to provide a new frontage to the quay. Diagonal-bearing piles were also inserted well behind the quay to strengthen the adjacent roadway. Sound pressure levels generated by pile driving in water were measured using a calibrated hydrophone suspended 1 m above the bottom. The hydrophone was connected to a low-noise amplifier, which controlled the signal gain and bandwidth. The output was connected to

a laptop PC by a digital audio interface. When recording at close range, where sound levels were especially high, a less-sensitive hydrophone transducer was used, connected directly to the audio interface. All sound recordings were made as 16-bit WAV files. For some of the piles, particle-velocity amplitudes were measured by means of an assembly of three orthogonally mounted, calibrated geophones placed on the seabed. The sound-pressure levels (SPL) of the background noise and vibro-piling noise were measured as a root-mean-square (rms) level expressed in decibels relative to a reference level of one micro Pascal (dB re 1 $\mu$ Pa). The shorter-duration impulsive sounds generated by the individual blows of the pile-driver hammer were measured in several different ways: the peak pressure reached during the impulse, the rms pressure measured over the time period that contained 90% of the sound energy (rms impulse), and as the sound-exposure level (SEL) expressed in dB re 1 $\mu$ Pa<sup>2</sup>-s. The latter was defined as the constant sound level of 1s duration that would contain the same acoustic energy as the original sound. Sound levels were converted to source levels (SL), i.e., normalized to an equivalent noise level at a distance of 1 m. In all SL calculations, it was assumed that the spreading loss was represented by the expression 15 log R where R was the distance in meters. Received sound level in water may be expressed in terms of sound pressure, particle velocity, or intensity, all of which can vary with time over the duration of the sound. In this study, the majority of measurements were expressed in terms of sound pressure. However, it was recognised that it was really necessary to determine the particle velocities as this is the stimulus which is received by the ear of a fish like the salmon. On a few occasions, the particle velocities were measured and the acoustic intensity calculated. Background-noise levels within the harbor and even within the river itself were high, within the range 118 – 149 dB re 1 $\mu$ Pa rms over a bandwidth of 10 Hz-10 kHz. Much of the noise derived from manoeuvring and stationary ships. The sound-pressure levels generated in water by percussive pile driving were very high, but variable depending on the pile type, the substrate being penetrated, the distance from the source, and whether the bubble curtain was in operation. Within the harbor, they ranged from 142-176 dB re 1 $\mu$ Pa peak, with sound exposure levels (SELs) of between 133-154 dB re 1 $\mu$ Pa<sup>2</sup>-s, without the bubble curtain in operation. Estimated source levels ranged from 177-202 dB re 1 $\mu$ Pa peak. Within the river, more than 220 meters away from the pile driver and separated from it by a spit of land, the soundpressure levels reaching the fish ranged from 162-168 dB re 1 $\mu$ Pa peak, with SELs of between 129-145 dB re 1 $\mu$ Pa<sup>2</sup>-s. Sounds measured at a distance from the source within the harbor consisted of a low-frequency pre-pulse, followed by the main sound pulse. In this case, and in the river itself, the sound was propagated through the substrate, as well as the water, perhaps accompanied by flexural waves at interfaces between strata. Particle velocities within the harbor and in the river reached 110 dB re 1 nms<sup>-1</sup>, mainly in a vertical direction, and intensities of up to 0.023 Wm<sup>-2</sup> were registered. Chapter 2 22 ICOET 2005 Proceedings The main energy generated by the percussive pile driver extended up to and above 10 kHz close to the source, with most of the energy below 2 kHz. By the time the sound reached the river the higher frequencies had been removed and the predominant frequencies were below 1 kHz, still with considerable energy within the hearing range of salmon (which declines above 250 Hz). Vibro-piling also generated high sound levels in water, with sound-pressure levels within the harbor ranging from 142- 155 dB re 1 $\mu$ Pa rms and source levels between 173-185 dB re 1 $\mu$ Pa rms. Levels in the river ranged from 140-143 dB re 1 $\mu$ Pa rms. A bubble curtain was successful in reducing the peak amplitude of the sound from the pile driver by up to 5 dB and in reducing the high-frequency content of the sound. The bubbles therefore reduced the likelihood of damage or injury to fish. However, they did not reduce energy at the lower frequencies to which fish are sensitive, especially at a distance from the source. The principal purpose of monitoring the pile driving was to assess the impact upon salmon. There is some controversy and uncertainty about the actual levels of pile-driving sound which affect fish adversely. It is evident that sound affects different species to a differing degree. Thus, although in some instances a level of 180 db re 1 $\mu$ Pa has been adopted as a standard, above which sounds are likely to kill or cause damage to fish, this is a very uncertain figure which is open to question. It was concluded that the sound pressure levels (SPLs) and sound exposure levels (SELs) generated by percussive pile driving within the harbor were not likely to have killed fish, whether the fish were within the river or the harbor itself. However, the sound levels were high enough close to the pile driver to injure or induce hearing

loss in some species of fish. The noise from pile driving in the harbor was certainly high enough to be detected by salmon in the river at considerable distances from the source. The levels of sound from both percussive and vibro-piling were well above the hearing thresholds of the fish. As salmon could not be observed during this exercise, it was not possible to determine whether salmon reacted adversely to the sounds. However, there was a risk that their upstream migration may have been delayed or prevented with consequent effects upon spawning populations. The measurements indicated that any pile driving within the river itself would have the potential to injure or induce hearing loss in salmon and might have adverse effects upon their behavior. During this exercise, trains of low frequency 'thumping' sounds were recorded within the River Dee, similar to those made by fish. The sounds may be emitted by European eels, which are common at the location.



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