CENWP-EC-HR

May 13, 2011

**Memorandum for:** Portland District, Operations Division, Regulatory Branch (Taylor)

**Subject:** Project Review Group Technical Memorandum Re: Review of the Port of Portland's March 14, 2011 Level 2 *Sediment Characterization Report – Terminal 6, Berths 603, 604, and 605, N Marine Drive, Portland, Oregon* (SCR) (NWP-2006-635).

**Reviewers:** The following summary reflects the consensus determination of the Portland District Project Review Group (PRG) agencies (U.S. Army Corps of Engineers, Environmental Protection Agency, National Marine Fisheries Service, Washington Department of Ecology, and Oregon Department of Environmental Quality) re: the applicability of the consistency of this SCR with the 2009 *Sediment Evaluation Framework for the Pacific Northwest* (SEF). This determination does not constitute final agency approval of the project. Project reviewers included: James McMillan (Corps), Jim Turner (NMFS), Laura Inouye (Ecology)[1], Peter Anderson (DEQ), and Jonathan Freedman (EPA). U.S. Fish and Wildlife Service did not review the document.

**Prepared by:** James M. McMillan (CENWP-EC-HR)

**Applicable Authorities Governing the Project:** Section 10 of the Rivers and Harbors Act, Section 404/401 of the Clean Water Act, Section 7 of the Endangered Species Act; Section 305 of the Magnuson-Stevens Act; et al.

**Project Description:** The Port of Portland (Port) received a 10-year Department of the Army permit (dated January 17, 2007) to deepen berths 604 and 605 and maintain berths 603, 604, and 605. Terminal 6 is located on the south bank of the Oregon Slough (of the Columbia River), between River Mile (RM) 0.0 to 0.4. Oregon Slough RM 0.0 roughly corresponds to Columbia RM 102.4.

The Port would dredge their berths to the following design elevations:

- Berth 603. The permitted design depth is -40 feet CRD plus up to 2 feet of over-dredge allowance for in-fill and dredging tolerance. The leave surface would likely average -41 feet CRD. The estimated volume of sediment to be dredged ranges from approximately 200 to 2,000 cubic yards (cy).
- Berth 604-West. The permitted design depth is -43 feet CRD plus up to 2 feet of overdredge allowance for in-fill and dredging tolerance. The leave surface would likely average -44 feet CRD. The estimated volume of sediment to be dredged ranges from approximately 500 to 1,500 cy.
- Berths 604-East and 605. The permitted design depth is -45 feet CRD plus up to 3 feet of overdredge allowance for in-fill and dredging tolerance. The leave surface would likely average -46 feet CRD. The estimated volume of sediment to be dredged ranges from approximately 4,000 to 12,000 cy.

[1] Washington Department of Ecology has no regulatory authority on this project; Ecology is only providing technical assistance for this project.

Dredging Method: The Port would use a clamshell dredge to remove sediments using a close-lipped bucket operated either from the dock or from a floating crane. The depth and position of the bucket and dredge would be monitored by visual and positioning computer systems, including a global positioning system.

Dredged Material Transport and Placement: The dredge material will be placed in a barge for transport and placement at an in-water placement site, an upland placement facility (West Hayden Island or Suttle Road Placement Facilities), or another approved beneficial use site. Placement of this dredged material at the placement facilities is not anticipated to generate return water to the Columbia River.

**Management Area Ranking/ Recency:** Based on the summary of 2005 and 2006 data provided by the Port, a Moderate management area ranking is appropriate for these berths. A moderate ranking was assigned because the project is a working port facility and tri-n-butyltin (TBT)(dry-weight) was detected above the 2006 SEF freshwater screening levels for benthic toxicity; additionally, porewater TBT was detected.

**Sampling and Analysis Description:** Sediment was sampled on February 1st and 4th, 2011. The Port initially designated one dredged material management unit (DMMU). Based on recommendations in the PRG's January 26, 2011 sampling and analysis plan (SAP) technical memorandum, three DMMUs were designated for comparison of the dredge prism (DP) material and the new surface material (NSM) to assess anti-degradation. However, it is important to note that the Port would dredge the three DMMUs as a single unit.

Five sediment cores were collected from Berths 604 and 605. Core C1 represented the DP material and NSM in the eastern part of Berth 605 (DMMU 3). Cores C2-C4 represented the DP material and NSM in Berth 604-East and the western part of Berth 605 (DMMU 2). The shoaling locations and volume of material in Berth 603 were small enough that a sample was not collected in this berth. However, sediment quality data generated from the western-most core, C5, are representative of the DP material in Berth 603 and the western-most portion of Berth 604 (DMMU 1).

Samples were submitted to Analytical Resources, Inc. (ARI), of Tukwila, Washington, for analysis. In the dredge prism samples, ARI analyzed for chemical and physical parameters including:

- Grain size
- Total solids
- Total organic carbon (TOC)
- Total sulfides
- Ammonia
- Metals (Ag, As, Cd, Cr, Cu, Ni, Pb, Sb, Zn & Hg) by method 6010 or 6020 & 7471 series)
- Tri-n-butyltin (TBT)(dry weight)
- Semi-volatile compounds by 8270C SIM method or other low level detection method
    - Polynuclear aromatic hydrocarbons (PAHs)
    - Phenols

    - Phthalates
    - Chlorinated organic compounds
    - Misc. extractables
- Pesticides/PCBs by 8081/ 8082
- Total petroleum hydrocarbons (TPH) as diesel and oil (using the NWTPH method)

The 5 NSM samples were analyzed separately for the following chemicals of concern:

- Total solids
- Total sulfides
- Ammonia
- TBT (dry-weight)
- Bis(2-ethylhexyl) phthalate (DEHP)
- DDx 8081/ 8082
- Total petroleum hydrocarbons (TPH) as diesel and oil (using the NWTPH method)

Applicable holding times, sample volumes, and storage requirements were described in Section 5 of the Port's January 2011 SAP. Reference samples were also collected in the event that additional biological testing is necessary.

Modifications to the SAP: The following modifications were made to the SAP:

- Sample location A in the SAP was moved from the berthing area of Berth 603 to the berthing area of Berth 604-East (location C3) per the PRG's recommendation. The anticipated volume of dredge material at Berth 603 was relatively low, and moving this location to an area of greater dredging volume would better characterize the Berth 604-East area (DMMU 2).
- As stated above, the PRG recommended three DMMUs so that chemical results on each DMMU dredge prism samples could be directly compared with its underlying NSM sample.
- Due to equipment availability, a grab sampler was used to obtain the reference sample instead of using a vibracore. The purpose of reference sampling was to obtain sediment similar to the site and is not depth or method dependent.
- The PRG recommended collecting sediment for possible analysis for TBT in porewater should TBT be detected in bulk sediment above its SEF SL. The analysis for TBT in porewater was used to assess for bio-availability (dissolved fraction) of TBT in lieu of biological testing. Porewater TBT was analyzed in samples where the bulk TBT concentrations exceeded the SEF SL of 75 ppb. Porewater TBT results were compared to the marine SL (0.15 ppb).

**Results and Discussion:** The sediment quality data appearing in Table 1 were adapted from Table 3 in the SCR. Table 1 is located at the end of this memorandum.

Dredge Prism Material: Silver and antimony were not detected in the DP material samples. The other SEF metals were detected below their respective SEF SLs. Bulk TBT in DMMU 1 (Core C5) was detected above the SL, however, the porewater TBT concentration in the same sample was well below the SL. PAHs were also detected at levels well below the SLs. Other CoC were not detected. DDE was detected at estimated concentrations in Cores C1 and C5.

New Surface Material: Silver and antimony were not detected in any NSM samples. Other SEF metals were detected below the SEF SLs. Bulk TBT in all DMMUs was below the SL or not detected. Porewater TBT was not analyzed in the NSM. PAHs were detected at levels well below the SLs. Other CoC were not detected. Pesticides were not detected in any of the NSM samples.

Tributyltin: As stated above, three DMMUs were designated solely for the purposes of comparing the DP material and the NSM chemistry to assess anti-degradation in the dredge area. As indicated in Table 1, bulk TBT concentrations are higher in the DP material than in the NSM, and degradation of sediment quality would not occur with the maintenance dredging event.

The dredge prism material will be dredged as a single unit, and so it is appropriate to determine the volume-weighted average of CoCs that exceeded the SEF SL in the dredge prism for the suitability determination. Because the project volumes were reported as a range, the volume-weighted average is reported as a range as well.

The weighted-average concentrations of bulk TBT for the DP material are summarized in Table 2, and ranged from 18.8 to 27.1 ppb. These are well below the SEF SL of 75 ppb. As described above, the bio-available, porewater TBT was also analyzed in samples that exceeded the bulk TBT SL; the DP material sample from Core C5 was the only sample that exceeded the bulk TBT SL. Porewater TBT in the DP material at C5 was reported at 0.048 ppb, which is well below the marine SL of 0.15 ppb.

**Suitability Determination:**
Dredge Prism Material: Per the data presented in the Port of Portland's March 14, 2011 SCR and the freshwater SEF SLs in the 2006 SEF, the DP material from Berths 603 to 605 is suitable for unconfined, aquatic placement without additional testing.

New Surface Material: Per the data presented in the Port of Portland's SCR and the freshwater SEF SLs in the 2006 SEF, the NSM from Berths 603 to 605 is suitable for unconfined, aquatic exposure without additional testing. Maintenance dredging would result in similar or reduced concentrations of SEF CoCs between the DP material and NSM.

Consideration of Bioaccumulative CoCs: Because TBT is a bioaccumulative CoC, if aquatic placement of the dredged material were proposed, then the Port of Portland would likely need to address the concerns of Oregon DEQ's Water Quality Program and NMFS regarding the bioaccumulation potential of this chemical.

**Contact:** This memorandum was prepared by James McMillan (CENWP-EC-HR). If the Regulatory Project Manger or the Port has questions regarding this memorandum, please call James McMillan at (503) 808-4376 or e-mail to: james.m.mcmillan@usace.army.mil.

James M. McMillan
Sediment Evaluation Specialist

**References:**


Dredged Material Management Program (DMMP). 2010. Sediments Exposed by Dredging (Z-layer) Testing. http://www.nws.usace.army.mil/PublicMenu/documents/DMMO/Z-layer-Clarification-Draft-2010-SMARM.pdf

Hart Crowser. 2011. Sediment Characterization Report – Terminal 6, Berths 603, 604, and 605, N Marine Drive, Portland, Oregon. March 14, 2011, Principal: Rick Ernst, Registered Geologist, Hart-Crowser Project No. 15737-00, 29 pp + Tables, Figures, and Appendices.

Hart Crowser. 2011. Sampling and Analysis Plan: Sediment Characterization – Terminal 6, Berths 603, 604, and 605, N Marine Drive, Portland, Oregon. January 226, 2011, Principal: Rick Ernst, Registered Geologist, Hart-Crowser Project No. 15737-00, 29 pp + Tables, Figures, and Appendices.

U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, Washington Department of Ecology, Washington Department of Natural Resources, Oregon Department of Environmental Quality, Idaho Department of Environmental Quality, National Marine Fisheries Service, and U.S. Fish and Wildlife Service. 2006. *Interim Final Sediment Evaluation Framework for the Pacific Northwest*. Published September 30, 2006, by the U.S. Army Corps of Engineers, Northwestern Division, 194 pp + Appendices.

U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, Washington Department of Ecology, Washington Department of Natural Resources, Oregon Department of Environmental Quality, Idaho Department of Environmental Quality, National Marine Fisheries Service, and U.S. Fish and Wildlife Service. 2009. *Sediment Evaluation Framework for the Pacific Northwest*. Published May 2009, by the U.S. Army Corps of Engineers, Northwestern Division, 128 pp + Appendices.

| Table 1. Port of Portland T6 Maintenance (Berths 603 to 605) Sediment Quality Data | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Berth** | **604-West** | **604-East** | **605** | **604-West** | **604-East** | **605** | |
| | **Dredge Prism** | | | **New Surface Material** | | | |
| **Sample** | **C5** | **C2-4** | **C1** | **C5Z** | **C2-4Z** | **C1Z** | **SEF Fresh-water Screening Level** |
| **DMMU** | **1** | **2** | **3** | **NSM 1** | **NSM 2** | **NSM 3** | |
| **Approx. Volume (cy)** | **700-3,500** | **4,000-9,500** | **1,000-2,500** | -- | -- | -- | |
| | | | | | | | |
| **Metals (ppm)** | | | | | | | |
| Antimony | 0.017 U | 0.012 U | 0.012 U | - | - | - | 150a |
| Arsenic | **3.8** | **2.2** | **2.5** | - | - | - | 20 |
| Cadmium | **0.8** | **0.4** | **0.6** | - | - | - | 1.1 |
| Chromium | **19** | **14.4** | **17** | - | - | - | 95 |
| Copper | **27.9** | **19.2** | **22.8** | - | - | - | 80 |
| Lead | **9** | **5** | **7** | - | - | - | 340 |
| Mercury | **0.11** | **0.04** | **0.07** | - | - | - | 0.28 |
| Nickel | **17** | **14.4** | **15.7** | - | - | - | 60 |
| Silver | 0.077 U | 0.053 U | 0.056 U | - | - | - | 2 |
| Zinc | **99** | **61** | **80** | - | - | - | 130 |
| **Tributyltin (TBT)** | | | | | | | |
| TBT, Bulk (ppb) | **90** | **11** | 1.5 U | **61** | **8.1** | 1.6 U | 75 |
| TBT, PW(ug/L) - marine | 0.048 | - | - | - | - | - | 0.15 |
| **PAHs (ppb)** | | | | | | | |
| ***LPAHs*** | | | | | | | |
| *Total LPAHs* | **17** | **6.5** | **13** | - | - | - | 6,600 |
| Naphthalene | 1.8 U | 1.8 U | 1.7 U | - | - | - | 500 |
| Acenaphthylene | 1.4 U | 1.4 U | 1.3 U | - | - | - | 470 |
| Acenaphthene | 1.5 U | 1.6 U | 1.5 U | - | - | - | 1,100 |
| Fluorene | 1.4 U | 1.4 U | 1.3 U | - | - | - | 1,000 |
| Phenanthrene | **12** | **6.5** | **13** | - | - | - | 6,100 |
| Anthracene | 1.3 U | 1.4 U | 1.3 U | - | - | - | 1,200 |
| 2-Methylnaphthalene | **4.8** | 2.1 U | 2.0 U | - | - | - | 470 |
| ***HPAHs*** | | | | | | | |
| *Total HPAHs* | **76** | **21** | **98** | - | - | - | 31,000 |
| Fluoranthene | **21** | **7.5** | **26** | - | - | - | 11,000 |
| Pyrene | **16** | **7** | **23** | - | - | - | 8,800 |
| Benz(a)anthracene | **7.2** | 2.2 U | **6.5** | - | - | - | 4,300 |
| Chrysene | **10** | 1.7 U | **22** | - | - | - | 5,900 |
| Benzo(b+k)fluoranthenes | **3.2** | **6.5** | **11** | - | - | - | 600 |
| Benzo(a)pyrene | **7.7** | 2.2 U | **5.1** | - | - | - | 3,300 |
| Indeno(1,2,3-cd)pyrene | **4.8** | 1.7 U | 1.6 U | - | - | - | 4,100 |
| Dibenz(a,h)anthracene | 2.1 U | 2.2 U | 2.1 U | - | - | - | 800 |
| Benzo(g,h,i)perylene | **6.2** | 2.0 U | **4.7** | - | - | - | 4,000 |
| **Chlorinated Hydrocarbons (ppb)** | | | | | | | |
| 1,4-Dichlorobenzene | 2.7 U | 2.7 U | 2.7 U | - | - | - | 110 |
| 1,2-Dichlorobenzene | 2.9 U | 2.9 U | 2.9 U | - | - | - | 35 |
| 1,2,4-Trichlorobenzene | 3.8 U | 3.8 U | 3.7 U | - | - | - | 31 |
| Hexachlorobenzene | 3.3 U | 3.3 U | 3.3 U | - | - | - | 22 |

| Table 1. Port of Portland T6 Maintenance (Berths 603 to 605) Sediment Quality Data | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Berth** | **604-West** | **604-East** | **605** | **604-West** | **604-East** | **605** | |
| | **Dredge Prism** | | | **New Surface Material** | | | |
| **Sample** | **C5** | **C2-4** | **C1** | **C5Z** | **C2-4Z** | **C1Z** | |
| **DMMU** | **1** | **2** | **3** | **NSM 1** | **NSM 2** | **NSM 3** | **SEF Fresh-water Screening Level** |
| **Approx. Volume (cy)** | **700-3,500** | **4,000-9,500** | **1,000-2,500** | -- | -- | -- | |
| **Phthalates (ppb)** | | | | | | | |
| Dimethyl Phthalate | 3.7 U | 3.7 U | 3.6 U | - | - | - | 46 |
| Diethyl Phthalate | 3.7 U | 3.7 U | 3.7 U | - | - | - | 200 |
| Di-n-butyl Phthalate | 4.6 U | 4.6 U | 4.6 U | - | - | - | 1,400 |
| Butyl Benzyl Phthalate | 4.1 U | 4.1 U | 4.0 U | - | - | - | 260 |
| Bis (2-ethylhexyl) Phthalate | 8.6 U | 8.6 U | 8.5 U | 8.4 U | 8.5 U | 8.5 U | 220 |
| Di-n-octyl Phthalate | 5.2 U | 5.2 U | 5.1 U | - | - | - | 26 |
| **Phenols (ppb)** | | | | | | | |
| 2,4-Dimethylphenol | 7.9 U | 7.9 U | 7.8 U | - | - | - | 29 |
| 2-Methylphenol | 5.3 U | 5.3 U | 5.2 U | - | - | - | 63 |
| 4-Methylphenol | 4.8 U | 4.8 U | 4.7 U | - | - | - | 670 |
| Pentachlorophenol | 27 U | 27 U | 27 U | - | - | - | 400 |
| Phenol | 3.8 U | 3.8 U | 3.7 U | - | - | - | 420 |
| **Misc. Extractables (ppb)** | | | | | | | |
| Benzoic Acid | 42 U | 42 U | 42 U | - | - | - | 650 |
| Benzyl Alcohol | 46 U | 45 U | 45 U | - | - | - | 57 |
| Dibenzofuran | 1.6 U | 1.7 U | 1.6 U | - | - | - | 400 |
| Hexachlorobutadiene | 2.8 U | 2.9 U | 2.8 U | - | - | - | 11 |
| n -Nitrosodiphenylamine | 13 U | 13 U | 13 U | - | - | - | 28 |
| **Pesticides (ppb)*** | | | | | | | |
| 4,4'-DDD | 0.13 U | 0.13 U | 0.12 U | 0.13 U | 0.13 U | 0.13 U | 16 |
| 4,4'-DDE | *1.2 J* | 0.12 U | *1.0 J* | 0.12 U | 0.12 U | 0.12 U | 9 |
| 4,4'-DDT | 0.19 U | 0.19 U | 0.19 U | 0.19 U | 0.19 U | 0.19 U | 12 |
| Aldrin | 0.054 U | 0.055 U | 0.054 U | - | - | - | 9.5 |
| alpha -Chlordane | 0.050 U | 0.051 U | 0.050 U | - | - | - | 2.8 |
| Dieldrin | 0.098 U | 0.099 U | 0.098 U | - | - | - | 1.9 |
| Heptachlor | 0.13 U | 0.13 U | 0.13 U | - | - | - | 1.5 |
| gamma -BHC (Lindane) | 0.047 U | 0.048 U | 0.047 U | - | - | - | 10 |
| **PCB Aroclors (ppb)** | | | | | | | |
| Aroclor 1016 | 1.0 U | 1.0 U | 0.99 U | - | - | - | - |
| Aroclor 1221 | 1.3 U | 1.4 U | 1.3 U | - | - | - | - |
| Aroclor 1232 | 1.3 U | 1.4 U | 1.3 U | - | - | - | - |
| Aroclor 1242 | 1.3 U | 1.4 U | 1.3 U | - | - | - | - |
| Aroclor 1248 | 1.3 U | 1.4 U | 1.3 U | - | - | - | - |
| Aroclor 1254 | 1.3 U | 1.4 U | 1.3 U | - | - | - | - |
| Aroclor 1260 | 1.3 U | 1.4 U | 1.3 U | - | - | - | - |
| Aroclor 1262 | 1.3 U | 1.4 U | 1.3 U | - | - | - | - |
| Aroclor 1268 | 1.3 U | 1.4 U | 1.3 U | - | - | - | - |
| Total PCBs | 1.3 U | 1.4 U | 1.3 U | - | - | - | 60 |

**Bolded value** = detected at or above the method reporting limit (MRL)
*Italicized value* = "J" flagged, estimated concentration between method detection limit and MRL
**Highlighted value** = SL exceedence

| Table 2. Dredge Prism Tributyltin (Bulk and Porewater) Weighted Average | | | | |
|---|---|---|---|---|
| Core(s) | DMMU | TBT (ppb) | Min Vol. | Max Vol. |
| C5 | 1 | 90 | 700 | 3500 |
| C2-4 | 2 | 11 | 4000 | 9500 |
| C1 | 3 | 0 | 1000 | 2500 |
| | | Total Vol. | 5700 | 15500 |
| | | Bulk TBT, Wtd. Avg. | 18.8 ppb | 27.1 ppb |
| | | Porewater TBT (DMMU 1 only) | 0.048 ug/L | |

CENWP-EC-HR

February 24, 2011

**Memorandum for:** Portland District Operations Division, Regulatory Branch (Taylor)

**Subject:** Project Review Group Technical Memorandum for the Port of Portland's January 14, 2011 Recency Evaluation of Sediment Characterization Data, Terminal 6, Berths 601 and 607 (Recency Letter) (Columbia River).

**Reviewers:** The following summary reflects the final consensus determination of the Portland District Project Review Group (PRG) agencies (U.S. Army Corps of Engineers, Environmental Protection Agency, National Marine Fisheries Service, Washington Department of Ecology, and Oregon Department of Environmental Quality) re: the recency of the Port of Portland's sediment quality data and bioassay testing per the 2009 *Sediment Evaluation Framework for the Pacific Northwest* (SEF). Reviewers included: James McMillan (Corps), Jim Turner (NMFS), Peter Anderson (DEQ), Jonathan Freedman (EPA), Laura Inouye (Washington Department of Ecology). U.S. Fish and Wildlife Service did not review the document.

**Prepared by:** James M. McMillan (CENWP-EC-HR)

**Applicable Authorities Governing the Project:** Section 10 of the Rivers and Harbors Act, Section 404/401 of the Clean Water Act, Section 7 of the Endangered Species Act; Section 305 of the Magnuson-Stevens Act; et al.

**Project Description:** Terminal 6 is located at 7201 N. Marine Drive in Portland, Oregon, along the south bank of the Columbia River on the Oregon Slough. The terminal spans approximately 1.5 miles beginning at river mile (RM) 102 on the Columbia River and ending upstream at RM1 on the Oregon Slough.

Berths 601 and 607 are used for the unloading of Hyundai and Honda automobiles, respectively. Maintenance dredging is needed due to the gradual deposition of river sediment in the berthing areas that compromises the authorized navigational depth clearances required for ships.

- Berth 601. The permitted design depth is -36 feet CRD plus up to 2 feet of overdredge allowance for in-fill and dredging tolerance. The leave surface would likely average -37 feet CRD. The estimated volume of sediment to be dredged ranges from approximately 7,500 to 9,000 cubic yards (cy).
- Berth 607. The permitted design depth is -36 feet CRD plus up to 2 feet of overdredge allowance for in-fill and dredging tolerance. The leave surface would likely average -37 feet CRD. The estimated volume of sediment to be dredged ranges from approximately 1,500 to 2,200 cy.

Dredging Method: A clamshell dredge will remove sediments using a close-lipped bucket operated either from the dock or from a floating crane. The depth and position of the bucket and dredge would be monitored by visual and positioning computer systems, including a global positioning system.

Dredged Material Transport and Placement: The dredge material will be placed in a barge for transport and placement at either an approved in-water placement site, upland placement facility (West Hayden Island or Suttle Road Placement Facilities), or another approved beneficial use site. Placement of this dredged material at any of the listed upland placement sites will not generate return water to the Columbia River.

**Prior Sampling, Sediment Testing, and Bioassays:**
Berth 601: Based on the sediment quality data collected using the 2006 SEF, dredge prism material and new surface material (NSM) were determined suitable for aquatic exposure; freshwater benthic toxicity screening levels (SL1s) were not exceeded in the dredge prism or NSM samples from Berth 601.

Berth 607: Based on sediment quality data collected using the 2006 SEF, dredge prism material and portions of the new surface material (NSM) were determined unsuitable for aquatic placement/ exposure without additional biological testing. Tributyltin (TBT) concentrations in the dredge prism sample exceeded the SL1. The zinc concentrations were exceeded in one NSM sample, and TBT concentrations were exceeded in another NSM sample.

The Port ran bioassays [28-day amphipod (*Hyalella azteca*); 20-day midge (*Chironomus dilutus*)] on NSM sample material only, because the NSM material contaminant concentrations were similar to the dredge prism TBT concentrations. Berth 601 material was used as the reference material for bioassays. Bioassays passed the SEF success criteria, and the dredge prism material was determined suitable for unconfined, aquatic placement; NSM material was also determined suitable for unconfined, aquatic exposure.

**Changed Conditions:** Based on Section 2.2 of the Port of Portland's January 14, 2011 Recency Letter (prepared by Hart Crowser, Inc.), site conditions have not changed, and the PRG recency determination (below) is valid.

**Management Area Ranking/ Recency:** Based on one round of sediment testing and the project area landuse (marine industrial), a moderate management area ranking is appropriate for Berths 601 and 607. Dredged material and NSM suitability determinations issued for Berths 601 and 607 by the PRG are valid through October 2013, unless site conditions change. An additional round of testing in Berth 601 may confirm a lower management area ranking in the future.

**Contact:** This memorandum was prepared by James McMillan (CENWP-EC-HR). If the Regulatory Project Manger or permit applicant (or agent) has any questions regarding this memorandum, please call James McMillan at (503) 808-4376 or e-mail to: james.m.mcmillan@usace.army.mil.

James M. McMillan
Project Review Group Lead

**UNITED STATES DEPARTMENT OF COMMERCE**
**National Oceanic and Atmospheric Administration**
NATIONAL MARINE FISHERIES SERVICE
Northwest Region
7600 Sand Point Way N.E., Bldg. 1
Seattle, WA 98115

**Refer to NMFS No.:**
**2011/01748**

September 30, 2011

Kevin Moynahan
U.S. Army Corps of Engineers
Regulatory Branch, CENWP-CO-GP
P.O. Box 2946
Portland, Oregon 97208-2946

Re: Reinitiation of Endangered Species Act Section 7 Formal and Conference Consultation for the Port of Portland's Marine Terminal 6 Berth Maintenance Dredging along the Columbia River (HUC 170900120501), Multnomah County, Oregon (Corps No.: NWP-2006-635)

Dear Mr. Moynahan:

On July 22, 2011, the National Marine Fisheries Service (NMFS) received a request from the U.S. Army Corps of Engineers (Corps) for reinitiation of formal consultation pursuant to section 7(a)(2) of the Endangered Species Act (ESA) on the effects of a proposal by the Portland District of the U.S. Army Corps of Engineers to authorize maintenance dredging of three berths under the authority of section 10 of the Rivers and Harbors Act.

The Corps is requesting reinitiation of formal and conference consultation for eulachon (*Thaleichthys pacificus*) and its proposed critical habitat, as well as concurrence that the proposed maintenance dredging is not likely to adversely affect (NLAA) Steller sea lions (*Eumetopias jubatus*). In addition, the Corps has determined that the proposed action will have no effect on green sturgeon (*Acipenser medirostris*). The action area is not critical habitat for Steller sea lions or green sturgeon. The Corps has requested reinitiation of consultation for eulachon and Steller sea lions since they were not considered in the original consultation on this action (refer to NMFS No.: 2005/06006, dated December 22, 2006) and the action may affect these species.

The proposed dredging of berths 603, 604 and 605 at the Port of Portland's Marine Terminal 6, as well as its impacts, have been described in detail in the biological assessment for the dredging provided to NMFS on April 7, 2005 and in the biological opinion for the Port of Portland Terminal 6, Berths 603,604,605 Berth Deepening and Maintenance Dredging at the Columbia River issued by NMFS on December 22, 2006.

Maintenance dredging is needed at Terminal 6 due to the gradual and persistent deposition of sediment in the berthing areas that impacts the authorized navigational depth clearances. The Port of Portland completed the berth deepening during the 2007-2008 Oregon Department of Fish and Wildlife (ODFW) in-water work window.

An addendum to the 2005 biological assessment was received on April 25, 2011 (revised addendum received on June 15, 2011), and states that the Port currently anticipates it will need to dredge approximately 9,500 cubic yards of material from these berths in the 2011-2012 in-water work window and a further 10,500 cubic yards of material during the 2014-2015 in-water work window. These dredge volumes fall below the total amount allowed under the current Corps permit (dated January 17, 2007). Any dredging performed after January 2017 would be subject to a new Corps permit and section 7 ESA consultation. In addition to the dredging itself, the initial consultation on this action covered the effects of placing the dredged material at the Suttle Road Rehandle Facility, the Oregon Slough In-Water Placement Site, and the West Hayden Island Upland Facility. For the maintenance dredging proposed here, all material will be placed upland at the Suttle Road Rehandle Facility or the West Hayden Island Upland Facility.

Except for the listing of eulachon and the need to consider Steller sea lions, no other reinitiation criterion or threshold set out in the incidental take statement (ITS) accompanying the December 22, 2006 biological opinion for this action has been reached or exceeded. In addition, conferencing was requested to address the potential impacts to eulachon critical habitat that has been proposed.

All conservation measures from the 2005 BA will be implemented. In addition, the Port of Portland will keep abreast of eulachon spawning reports during maintenance dredging by notifying the ODFW District Biologist of the start of dredging operations and obtaining the most current information regarding the potential and anticipated timing of the upcoming eulachon run. The Port will work closely with the ODFW District Biologist throughout the project to keep abreast of any new information. If the District Biologist reports that eulachon are migrating past the Terminal 6 project area, the Port will notify NMFS immediately to determine the appropriate course of action. The Port will also attempt to commence work as early as possible in the in-water work window in order to avoid any eulachon run. The Port will immediately contact NMFS if any dead or dying eulachon are observed at the project site during maintenance dredging.

The action area has been previously defined in the 2005 BA and the December 22, 2006 biological opinion as extending from approximately Columbia River Mile (RM) 102 to 106. This geographic extent includes the Terminal 6 berths to be dredged as well as the possible disposal sites and the upstream and downstream areas where effects to listed fish species or their critical habitat could occur.

The above-referenced documents describe in detail the proposed action, as well as the analytical methods and analyses, the environmental baseline, and the potential effects on Snake River (SR) fall-run Chinook salmon, SR spring/summer run Chinook salmon, SR sockeye salmon, Snake River Basin (SRB) steelhead, Lower Columbia River (LCR) Chinook salmon, Upper Columbia River (UCR) spring-run Chinook salmon, Upper Willamette River (UWR) spring-run Chinook

salmon, Columbia River chum salmon, Middle Columbia River steelhead, LCR steelhead, UWR steelhead, UCR steelhead, and LCR coho salmon as well as any critical habitat proposed or designated for these species. This document addresses the potential effects to eulachon and its proposed critical habitat and the potential effects to Steller sea lions and provides an incidental take statement for use if a take prohibition goes into effect for eulachon (Enclosure 1).

Steller sea lions are known to occur in the Columbia River. However, their presence in the river is relatively low and their distribution is patchy. There is the potential for Steller sea lions to be present in the action area during dredging activities. If present, Steller sea lions could be exposed to temporary and localized increases in turbidity and noise associated with the dredging operation. The noise is expected to be similar to noises typically generated in a busy shipping channel. Steller sea lions can swim at the surface and would likely avoid project operations. Such avoidance would constitute the only likely behavioral change for Steller sea lions. The proposed action may indirectly affect prey availability (*i.e.*, salmonid prey of Steller sea lions) by changes to water quality and physical injury. Anticipated localized take of salmonids and other species associated with the proposed action would result in an insignificant reduction in adult equivalent prey resources for Steller sea lions.

NMFS finds that these likely effects to the ESA-listed Steller sea lions are discountable or insignificant and therefore concurs with Corps' determination of "may affect, not likely to adversely affect" Steller sea lions. Critical habitat for this listed species is not designated for the Columbia River.

On March 18, 2010, NMFS listed the southern distinct population segment (DPS) of eulachon as a threatened species (75 FR 13012). The southern DPS extends from the Skeena River in British Columbia, south to the Mad River in Northern California (inclusive), and thus all eulachon found within the action area are considered to be part of the threatened southern DPS of eulachon. Take prohibitions via section 4(d) of the ESA have not yet been promulgated, nor has critical habitat yet been designated for the southern DPS, although critical habitat was proposed on January 5, 2011 (76 FR 515).

Eulachon are endemic to the northeastern Pacific Ocean, ranging from northern California to southwest and south-central Alaska and into the southeastern Bering Sea (Wilson *et al.* 2006; Gustafson *et al.* 2010). In the portion of the species' range that lies south of the U.S./Canada border, most eulachon production originates in the Columbia River Basin (Gustafson *et al.* 2010). Within the Columbia River basin, the major and most consistent spawning runs return to the mainstem of the Columbia River and the Cowlitz River. Spawning also occurs in the Grays, Elochoman, Kalama, Lewis, and Sandy rivers.

Eulachon typically enter the Columbia River system from December to May, with peak entry and spawning during February and March (Gustafson *et al.* 2010). Eulachon eggs, averaging 1 mm in size (Hay and McCarter 2000), are broadcast over and attach to a variety of substrates from sand (Langer *et al.* 1977) to pea-sized gravel (Smith and Saalfeld 1955). Newly-hatched young, transparent and 4 to 7 mm in length, are carried to the sea with the current. After the yolk sac is depleted, eulachon feed on pelagic plankton. After three to five years at sea, they return as adults to spawn.

There are few direct estimates of eulachon abundance. However, the combination of catch records and anecdotal information indicate that eulachon were present in large annual runs in the past and that significant declines in abundance have occurred (Gustafson *et al.* 2010). Eulachon numbers are at, or near, historically low levels throughout the range of the southern DPS. The Columbia River and its tributaries support the largest known eulachon run.

Climate change impacts on ocean habitat are the most serious threat to persistence of the southern DPS of eulachon (Gustafson *et al.* 2010). Other threats to the species include bycatch in shrimp trawl fisheries, climate change impacts on freshwater habitat, and habitat alteration and degradation from a variety of activities. Hydroelectric dams block access to historical eulachon spawning grounds and affect the quality of spawning substrates through flow management, altered delivery of coarse sediments, and siltation. Dredging activities in the Cowlitz and Columbia rivers during the eulachon spawning run may entrain and kill fish, or otherwise result in decreased spawning success. The Columbia River mainstem provides spawning and incubation sites, and a large migratory corridor for eulachon.

If eulachon are present during the maintenance dredging at Terminal 6, they will likely be exposed to short-term reductions in water quality from suspended sediments and contaminants during dredging, brief interactions with dredging equipment for fish migrating though or spawning in the action area and modifications to potential spawning substrates. These effects would likely cause death or injury to some individuals of the species, although due to the limited scale, location and timing of the proposed action, it is very unlikely that large numbers of eulachon would be harmed. These adverse effects will last for up to one in-water work window for each maintenance dredging event. Therefore, the proposed action is likely to adversely affect eulachon.

The project would result in localized, short-term reductions in water quality (*i.e.* turbidity, resuspension of sediment contaminants) within the immediate vicinity of the berthing areas. Sediment contaminants have been documented at Terminal 6 berths 603-605 over the past ten years (Hart Crowser 2000, 2011b; Parametrix 2005). Sediment sampling has identified the presence of low concentrations of total DDT, BBP (butyl benzyl phthalate), and TBT. However, recent sediment sampling (2011) for proposed maintenance dredging at berths 603-605 found only one sample that exceeded SEF Screening Level (SL) guidelines (90 µg/kg TBT at Berth 604) (Hart Crowser 2011b). Chemical concentrations were found to be lower in the new surface material (NSM) than within the dredge prism. Eulachon are sensitive to pollution in freshwater and could be exposed to water column contaminants through their tissues or gills during their migration runs even though they remain there only a few weeks (Rogers *et al.* 1990; WDFW and ODFW 2001).

The effects of suspended sediment and contaminants to eulachon are likely to be similar to the effects discussed in the December 22, 2006 biological opinion for this action, although adult eulachon are not known to feed while spawning (Scott and Crossman 1973) so effects to the prey base should not be an issue. A close-lipped bucket will be used for all dredging and this will help minimize the suspension of sediment and contaminants. Please refer to the December 22, 2006 biological opinion for further discussion of the effects of suspended sediment and contaminants in the action area.

If present during dredging, adult eulachon may be forced to migrate around the in-water work area. Eulachon avoiding the in-water work area means that the area would be temporarily unavailable for spawning. Those eulachon that pass through the work area may be subject to a slight increased risk for sublethal or lethal effects. Due to project timing, larvae are not expected to be present within the action area during dredging activities. Clamshell dredging (the proposed method) is not expected to entrain eulachon because pressure waves created by the bucket descending through the water column alert fish and allow them time to avoid the bucket. Also, adult eulachon migrating past the action area during the proposed action can utilize the entire water column and width of the river and have sufficient swimming ability to avoid entrainment.

Any localized substrate disturbing activities or turbidity increases (*e.g.*, from dredging) in the Lower Columbia River have the potential to adversely impact eulachon spawning or egg incubation. However, the project will briefly affect only a very small amount of the potential eulachon spawning habitat in the area and so is unlikely to affect many individuals of the species.

Maintenance dredging at Terminal 6 would result in some temporary, localized effects to a few of the physical and biological features identified as essential to the conservation of eulachon (76 FR 515) as part of their proposed critical habitat. The project could affect the water quality and substrate components of the freshwater spawning and incubation essential features as well as migration corridor and water quality components of the freshwater and estuarine migration corridor essential features. The proposed project would have no measurable effect on river flows, temperature, or food resources. Terminal 6 maintenance dredging would result in localized, short-term reductions in water quality (*i.e.* turbidity, resuspension of sediment contaminants) within the immediate vicinity of the berthing areas. Portions of berths 604 and 605 contain substrate that could provide spawning habitat for eulachon (Hart Crowser 2011a). If present during dredging, adult eulachon may be forced to migrate around the in-water work area. Those that pass through the work area may be subject to a slight increased risk for sublethal or lethal effects.

The NMFS assumes that future private and state actions will continue near the action area, increasing as population density rises. As the human population near the action area continues to grow, the demand for agricultural, commercial, and residential development is also likely to grow and increase in intensity. However, the NMFS is not aware of any specific future non-Federal activities within the action areas that would cause greater impacts to listed species than presently occur.

After reviewing the current status of the listed species, the environmental baseline within the action area, the effects of the proposed action, and cumulative effects, it is NMFS' biological opinion that the proposed action is not likely to jeopardize the continued existence of eulachon or to destroy or adversely modify its proposed critical habitat. In addition, NMFS concludes that the proposed action is not likely to adversely affect Steller sea lions.

Please direct questions regarding this opinion to Genevieve Angle in the Willamette Basin/Lower Columbia Branch of the Oregon State Habitat Office, at 503.231.2223.

Sincerely,

for William W. Stelle, Jr.
Regional Administrator

Enclosure. Incidental Take Statement for Use if a Take Prohibition Goes Into Effect for Eulachon (to be used in addition to the Incidental Take Statement already in effect for this project for salmonids)

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**Incidental Take Statement for the Reinitiation of Endangered Species Act Section 7 Formal Consultation for the Port of Portland's Marine Terminal 6 Berth Maintenance Dredging along the Columbia River (HUC 170900120501), Multnomah County, Oregon.**

## Incidental Take Statement

Section 9 of the ESA and Federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without a special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by regulation to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. For purposes of this consultation, we interpret "harass" to mean an intentional or negligent action that has the potential to injure an animal or disrupt its normal behaviors to a point where such behaviors are abandoned or significantly altered.[1] section 7(b)(4) and section 7(o)(2) provide that taking that is incidental to an otherwise lawful agency action is not considered to be prohibited taking under the ESA, if that action is performed in compliance with the terms and conditions of this incidental take statement.

## Amount or Extent of Take

Activities necessary to complete the proposed dredging activities at Terminal 6 will take place within the active channel of the Columbia River when individuals of eulachon considered in this Opinion are likely to be present. Adverse effects of the proposed action will include an increase in turbidity, sediment, and other pollutants such as DDT, TBT, BBP and PAHs, modification of potential spawning substrate, and potential interaction of eulachon with dredging equipment. The habitat that will be adversely affected by the proposed action is of poor quality and not limited at the site-specific or watershed scale. Nonetheless, these effects are reasonably likely to result in incidental take, harassment and/or injury of adults and juveniles within an area extending 1,000 feet upstream and 1,000 feet downstream from the three berths.

The distribution and abundance of fish that occur within an action area are affected by habitat quality, competition, predation, and the interaction of processes that influence genetic, population, and environmental characteristics. These biotic and environmental processes interact in ways that may be random or directional, and may operate across far broader temporal and spatial scales than are affected by the proposed action. Thus, the distribution and abundance of fish within the action area cannot be attributed entirely to habitat conditions, nor can NMFS

[1] NMFS has not adopted a regulatory definition of harassment under the ESA. The World English Dictionary defines harass as "to trouble, torment, or confuse by continual persistent attacks, questions, *etc.*" The U.S. Fish and Wildlife Service defines "harass" in its regulations as "an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering," 50 CFR 17.3. The interpretation we adopt in this consultation is consistent with our understanding of the dictionary definition of harass and is consistent with the U.S. Fish and Wildlife interpretation of the term.

precisely predict the number of fish that are reasonably certain to be injured or killed if their habitat is modified or degraded by the proposed action.

Here, the best available indicators for the extent of take will be described as the predicted modification of water quality, and modification of benthic substrate:

1. Removal of approximately of 9,500 cubic yards of sediment from berths 603, 604 and 605 in 2011-2012 and 10,500 cubic yards of sediment from the same berths in 2014-2015, with a maximum depth in Berth 603 of -42 feet CRD, and berths 604 and 605 of -48 CRD.
2. Increased suspended sediment from dredging activities with suspended sediment plumes 100 feet from the boundary of dredging activities at 10% over the background level.
3. The concentration of DDT (as a surrogate for contaminants) in the water column 100 feet downstream from the edge of dredging activities of 0.001 µg/L (if, however, background concentrations of DDT are greater than 0.001 µg/L, as measured within seven days of the initiation of in-water work, then the extent of take is no more than a 10% increase above background DDT concentration.).
4. No loss of shallow-water habitat in the area upstream from Berth 605.

NMFS determined that this level of incidental take is not likely to result in jeopardy to the species. The amount of sediment removed, turbidity concentrations, the concentration of DDT, and change in availability of shallow-water habitat are thresholds for reinitiating consultation. Exceeding any of these indicators for extent of take may trigger reinitiation of this consultation.

**Reasonable and Prudent Measures**

"Reasonable and prudent measures" are nondiscretionary measures to minimize the amount or extent of incidental take (50 CFR 402.02). "Terms and conditions" implement the reasonable and prudent measures (50 CFR 402.14). These must be carried out for the exemption in section 7(o)(2) to apply.

The following measures are necessary and appropriate to minimize the impact of incidental take of listed species from the proposed action:

The Corps shall:

1. Minimize incidental take from dredging-related activities by applying permit conditions to the proposed action that avoid or minimize adverse effects to water quality and the ecology of aquatic systems.
2. Ensure completion of a monitoring and reporting program to confirm this incidental take statement is meeting its objective of minimizing incidental take from permitted activities.

**Terms and Conditions**

The measures described below are non-discretionary, and must be undertaken by the Corps or, if an applicant is involved, must become binding conditions of any permit or grant issued to the applicant, for the exemption in section 7(o)(2) to apply. The Corps has a continuing duty to regulate the activity covered by this incidental take statement. If the Corps (1) fails to assume and implement the terms and conditions or (2) fails to require an applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. To monitor the impact of incidental take, the Corps or applicant must report the progress of the action and its impact on the species to the NMFS as specified in the incidental take statement.

1. To implement reasonable and prudent measure #1, the Corps shall ensure that:

   a. DDT. The applicant shall conduct DDT monitoring at the dredge site during dredging to ensure that extent of take indicator #3 (above) is not exceeded. Samples shall be taken from the water column.
   b. Suspended Sediment. The applicant shall conduct suspended sediment monitoring to ensure that extent of take indicator # 2 (above) is not exceeded. A representative background point must be used and monitoring take place 100 feet from the boundary of dredging activities.
   c. Dredging. A clamshell dredge with a close-lipped bucket will be used for all dredging. All digging passes of the bucket shall be completed without any material being returned to the wetted area. No dumping of partial or full buckets of material back into the project area will be allowed. No dredging of holes or sumps below the maximum depth and subsequent redistribution of sediment by dredging, dragging or other means will be allowed. All large anthropogenic debris shall be removed from dredged sediments prior to flow-lane disposal and transported to an appropriate disposal site.
   d. Upland Disposal Sites. The upland disposal sites shall be large enough to accommodate the quantity of material and water to be placed there to allow adequate settling. Best management practices shall be employed to reduce turbidity levels from the upland disposal locations to the maximum extent practicable. Filter bags, sediment fences, silt curtains, leave strips or berms, or other measures shall be inspected and maintained daily to ensure their proper function.
   e. The applicant will deploy an absorptive boom during all dredging activities to capture PAHs and other contaminants that may be floating on the water surface as a consequence of dredge activities.
   f. The applicant will implement a Pollution Control Plan to prevent pollution caused by dredging and disposal operations from entering the river.
   g. The applicant will conduct post-dredge bathymetry survey to ensure that only the specified material was removed.
   h. The applicant will confine dredging impacts to the minimum area necessary to complete the project.

i. If oil or other unknown substances appear on the water surface or in dredged material while dredges are being operated, the contractor shall cease operations to immediately identify the source of the contaminant.

2. To implement reasonable and prudent measure #2, the Corps shall ensure that:

a. Monitoring. The applicant will complete (and submit to NMFS) bathymetry surveys in June of each year. The bathymetry surveys will focus on the shallow-water habitat area from the upstream end of Berth 605 and extending 500 feet upstream, and from the ordinary high water level out to 150 feet from the shoreline. The surveys must show a minimum of one-foot contour intervals.

b. Reporting. The applicant will report all monitoring items including amount of material removed and suspended sediment and water quality analyses to NMFS within 60 days of the end of the in-water work window. Any exceedance of take covered by this Opinion must be reported by the applicant to NMFS immediately. The report will include a discussion of implementation of the terms and conditions in 1, above.

c. Submit monitoring reports to:

National Marine Fisheries Service
Oregon State Habitat Office
Attn: 2011/01748
1201 NE Lloyd Boulevard, Suite 1100
Portland, OR 97232-2778

d. NOTICE: If a sick, injured or dead specimen of a threatened or endangered species is found in the project area, the finder must notify NMFS through the contact person identified in the transmittal letter for this Opinion, or through the NMFS Office of Law Enforcement at 1-800-853-1964, and follow any instructions. If the proposed action may worsen the fish's condition before NMFS can be contacted, the finder should attempt to move the fish to a suitable location near the capture site while keeping the fish in the water and reducing its stress as much as possible. Do not disturb the fish after it has been moved. If the fish is dead, or dies while being captured or moved, report the following information: (1) NMFS consultation number; (2) the date, time, and location of discovery; (3) a brief description of circumstances and any information that may show the cause of death; and (4) photographs of the fish and where it was found. The NMFS also suggests that the finder coordinate with local biologists to recover any tags or other relevant research information. If the specimen is not needed by local biologists for tag recovery or by NMFS for analysis, the specimen should be returned to the water in which it was found, or otherwise discarded.

**UNITED STATES DEPARTMENT OF COMMERCE**
**National Oceanic and Atmospheric Administration**
NATIONAL MARINE FISHERIES SERVICE
Northwest Region
7600 Sand Point Way N.E., Bldg. 1
Seattle, WA 98115

**Refer to NMFS No.:**
**2011/01748**

September 30, 2011

Kevin Moynahan
U.S. Army Corps of Engineers
Regulatory Branch, CENWP-CO-GP
P.O. Box 2946
Portland, Oregon 97208-2946

Re: Reinitiation of Endangered Species Act Section 7 Formal and Conference Consultation for the Port of Portland's Marine Terminal 6 Berth Maintenance Dredging along the Columbia River (HUC 170900120501), Multnomah County, Oregon (Corps No.: NWP-2006-635)

Dear Mr. Moynahan:

On July 22, 2011, the National Marine Fisheries Service (NMFS) received a request from the U.S. Army Corps of Engineers (Corps) for reinitiation of formal consultation pursuant to section 7(a)(2) of the Endangered Species Act (ESA) on the effects of a proposal by the Portland District of the U.S. Army Corps of Engineers to authorize maintenance dredging of three berths under the authority of section 10 of the Rivers and Harbors Act.

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The above-referenced documents describe in detail the proposed action, as well as the analytical methods and analyses, the environmental baseline, and the potential effects on Snake River (SR) fall-run Chinook salmon, SR spring/summer run Chinook salmon, SR sockeye salmon, Snake River Basin (SRB) steelhead, Lower Columbia River (LCR) Chinook salmon, Upper Columbia River (UCR) spring-run Chinook salmon, Upper Willamette River (UWR) spring-run Chinook

salmon, Columbia River chum salmon, Middle Columbia River steelhead, LCR steelhead, UWR steelhead, UCR steelhead, and LCR coho salmon as well as any critical habitat proposed or designated for these species. This document addresses the potential effects to eulachon and its proposed critical habitat and the potential effects to Steller sea lions and provides an incidental take statement for use if a take prohibition goes into effect for eulachon (Enclosure 1).

Steller sea lions are known to occur in the Columbia River. However, their presence in the river is relatively low and their distribution is patchy. There is the potential for Steller sea lions to be present in the action area during dredging activities. If present, Steller sea lions could be exposed to temporary and localized increases in turbidity and noise associated with the dredging operation. The noise is expected to be similar to noises typically generated in a busy shipping channel. Steller sea lions can swim at the surface and would likely avoid project operations. Such avoidance would constitute the only likely behavioral change for Steller sea lions. The proposed action may indirectly affect prey availability (*i.e.*, salmonid prey of Steller sea lions) by changes to water quality and physical injury. Anticipated localized take of salmonids and other species associated with the proposed action would result in an insignificant reduction in adult equivalent prey resources for Steller sea lions.

NMFS finds that these likely effects to the ESA-listed Steller sea lions are discountable or insignificant and therefore concurs with Corps' determination of "may affect, not likely to adversely affect" Steller sea lions. Critical habitat for this listed species is not designated for the Columbia River.

On March 18, 2010, NMFS listed the southern distinct population segment (DPS) of eulachon as a threatened species (75 FR 13012). The southern DPS extends from the Skeena River in British Columbia, south to the Mad River in Northern California (inclusive), and thus all eulachon found within the action area are considered to be part of the threatened southern DPS of eulachon. Take prohibitions via section 4(d) of the ESA have not yet been promulgated, nor has critical habitat yet been designated for the southern DPS, although critical habitat was proposed on January 5, 2011 (76 FR 515).

Eulachon are endemic to the northeastern Pacific Ocean, ranging from northern California to southwest and south-central Alaska and into the southeastern Bering Sea (Wilson *et al.* 2006; Gustafson *et al.* 2010). In the portion of the species' range that lies south of the U.S./Canada border, most eulachon production originates in the Columbia River Basin (Gustafson *et al.* 2010). Within the Columbia River basin, the major and most consistent spawning runs return to the mainstem of the Columbia River and the Cowlitz River. Spawning also occurs in the Grays, Elochoman, Kalama, Lewis, and Sandy rivers.

Eulachon typically enter the Columbia River system from December to May, with peak entry and spawning during February and March (Gustafson *et al.* 2010). Eulachon eggs, averaging 1 mm in size (Hay and McCarter 2000), are broadcast over and attach to a variety of substrates from sand (Langer *et al.* 1977) to pea-sized gravel (Smith and Saalfeld 1955). Newly-hatched young, transparent and 4 to 7 mm in length, are carried to the sea with the current. After the yolk sac is depleted, eulachon feed on pelagic plankton. After three to five years at sea, they return as adults to spawn.

There are few direct estimates of eulachon abundance. However, the combination of catch records and anecdotal information indicate that eulachon were present in large annual runs in the past and that significant declines in abundance have occurred (Gustafson *et al.* 2010). Eulachon numbers are at, or near, historically low levels throughout the range of the southern DPS. The Columbia River and its tributaries support the largest known eulachon run.

Climate change impacts on ocean habitat are the most serious threat to persistence of the southern DPS of eulachon (Gustafson *et al.* 2010). Other threats to the species include bycatch in shrimp trawl fisheries, climate change impacts on freshwater habitat, and habitat alteration and degradation from a variety of activities. Hydroelectric dams block access to historical eulachon spawning grounds and affect the quality of spawning substrates through flow management, altered delivery of coarse sediments, and siltation. Dredging activities in the Cowlitz and Columbia rivers during the eulachon spawning run may entrain and kill fish, or otherwise result in decreased spawning success. The Columbia River mainstem provides spawning and incubation sites, and a large migratory corridor for eulachon.

If eulachon are present during the maintenance dredging at Terminal 6, they will likely be exposed to short-term reductions in water quality from suspended sediments and contaminants during dredging, brief interactions with dredging equipment for fish migrating though or spawning in the action area and modifications to potential spawning substrates. These effects would likely cause death or injury to some individuals of the species, although due to the limited scale, location and timing of the proposed action, it is very unlikely that large numbers of eulachon would be harmed. These adverse effects will last for up to one in-water work window for each maintenance dredging event. Therefore, the proposed action is likely to adversely affect eulachon.

The project would result in localized, short-term reductions in water quality (*i.e.* turbidity, resuspension of sediment contaminants) within the immediate vicinity of the berthing areas. Sediment contaminants have been documented at Terminal 6 berths 603-605 over the past ten years (Hart Crowser 2000, 2011b; Parametrix 2005). Sediment sampling has identified the presence of low concentrations of total DDT, BBP (butyl benzyl phthalate), and TBT. However, recent sediment sampling (2011) for proposed maintenance dredging at berths 603-605 found only one sample that exceeded SEF Screening Level (SL) guidelines (90 µg/kg TBT at Berth 604) (Hart Crowser 2011b). Chemical concentrations were found to be lower in the new surface material (NSM) than within the dredge prism. Eulachon are sensitive to pollution in freshwater and could be exposed to water column contaminants through their tissues or gills during their migration runs even though they remain there only a few weeks (Rogers *et al.* 1990; WDFW and ODFW 2001).

The effects of suspended sediment and contaminants to eulachon are likely to be similar to the effects discussed in the December 22, 2006 biological opinion for this action, although adult eulachon are not known to feed while spawning (Scott and Crossman 1973) so effects to the prey base should not be an issue. A close-lipped bucket will be used for all dredging and this will help minimize the suspension of sediment and contaminants. Please refer to the December 22, 2006 biological opinion for further discussion of the effects of suspended sediment and contaminants in the action area.

If present during dredging, adult eulachon may be forced to migrate around the in-water work area. Eulachon avoiding the in-water work area means that the area would be temporarily unavailable for spawning. Those eulachon that pass through the work area may be subject to a slight increased risk for sublethal or lethal effects. Due to project timing, larvae are not expected to be present within the action area during dredging activities. Clamshell dredging (the proposed method) is not expected to entrain eulachon because pressure waves created by the bucket descending through the water column alert fish and allow them time to avoid the bucket. Also, adult eulachon migrating past the action area during the proposed action can utilize the entire water column and width of the river and have sufficient swimming ability to avoid entrainment.

Any localized substrate disturbing activities or turbidity increases (*e.g.*, from dredging) in the Lower Columbia River have the potential to adversely impact eulachon spawning or egg incubation. However, the project will briefly affect only a very small amount of the potential eulachon spawning habitat in the area and so is unlikely to affect many individuals of the species.

Maintenance dredging at Terminal 6 would result in some temporary, localized effects to a few of the physical and biological features identified as essential to the conservation of eulachon (76 FR 515) as part of their proposed critical habitat. The project could affect the water quality and substrate components of the freshwater spawning and incubation essential features as well as migration corridor and water quality components of the freshwater and estuarine migration corridor essential features. The proposed project would have no measurable effect on river flows, temperature, or food resources. Terminal 6 maintenance dredging would result in localized, short-term reductions in water quality (*i.e.* turbidity, resuspension of sediment contaminants) within the immediate vicinity of the berthing areas. Portions of berths 604 and 605 contain substrate that could provide spawning habitat for eulachon (Hart Crowser 2011a). If present during dredging, adult eulachon may be forced to migrate around the in-water work area. Those that pass through the work area may be subject to a slight increased risk for sublethal or lethal effects.

The NMFS assumes that future private and state actions will continue near the action area, increasing as population density rises. As the human population near the action area continues to grow, the demand for agricultural, commercial, and residential development is also likely to grow and increase in intensity. However, the NMFS is not aware of any specific future non-Federal activities within the action areas that would cause greater impacts to listed species than presently occur.

After reviewing the current status of the listed species, the environmental baseline within the action area, the effects of the proposed action, and cumulative effects, it is NMFS' biological opinion that the proposed action is not likely to jeopardize the continued existence of eulachon or to destroy or adversely modify its proposed critical habitat. In addition, NMFS concludes that the proposed action is not likely to adversely affect Steller sea lions.

Please direct questions regarding this opinion to Genevieve Angle in the Willamette Basin/Lower Columbia Branch of the Oregon State Habitat Office, at 503.231.2223.

Sincerely,

William W. Stelle, Jr.
Regional Administrator

Enclosure. Incidental Take Statement for Use if a Take Prohibition Goes Into Effect for Eulachon (to be used in addition to the Incidental Take Statement already in effect for this project for salmonids)

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**Incidental Take Statement for the Reinitiation of Endangered Species Act Section 7 Formal Consultation for the Port of Portland's Marine Terminal 6 Berth Maintenance Dredging along the Columbia River (HUC 170900120501), Multnomah County, Oregon.**

## Incidental Take Statement

Section 9 of the ESA and Federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without a special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by regulation to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. For purposes of this consultation, we interpret "harass" to mean an intentional or negligent action that has the potential to injure an animal or disrupt its normal behaviors to a point where such behaviors are abandoned or significantly altered.[1] section 7(b)(4) and section 7(o)(2) provide that taking that is incidental to an otherwise lawful agency action is not considered to be prohibited taking under the ESA, if that action is performed in compliance with the terms and conditions of this incidental take statement.

## Amount or Extent of Take

Activities necessary to complete the proposed dredging activities at Terminal 6 will take place within the active channel of the Columbia River when individuals of eulachon considered in this Opinion are likely to be present. Adverse effects of the proposed action will include an increase in turbidity, sediment, and other pollutants such as DDT, TBT, BBP and PAHs, modification of potential spawning substrate, and potential interaction of eulachon with dredging equipment. The habitat that will be adversely affected by the proposed action is of poor quality and not limited at the site-specific or watershed scale. Nonetheless, these effects are reasonably likely to result in incidental take, harassment and/or injury of adults and juveniles within an area extending 1,000 feet upstream and 1,000 feet downstream from the three berths.

The distribution and abundance of fish that occur within an action area are affected by habitat quality, competition, predation, and the interaction of processes that influence genetic, population, and environmental characteristics. These biotic and environmental processes interact in ways that may be random or directional, and may operate across far broader temporal and spatial scales than are affected by the proposed action. Thus, the distribution and abundance of fish within the action area cannot be attributed entirely to habitat conditions, nor can NMFS

[1] NMFS has not adopted a regulatory definition of harassment under the ESA. The World English Dictionary defines harass as "to trouble, torment, or confuse by continual persistent attacks, questions, *etc.*" The U.S. Fish and Wildlife Service defines "harass" in its regulations as "an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering," 50 CFR 17.3. The interpretation we adopt in this consultation is consistent with our understanding of the dictionary definition of harass and is consistent with the U.S. Fish and Wildlife interpretation of the term.

precisely predict the number of fish that are reasonably certain to be injured or killed if their habitat is modified or degraded by the proposed action.

Here, the best available indicators for the extent of take will be described as the predicted modification of water quality, and modification of benthic substrate:

1. Removal of approximately of 9,500 cubic yards of sediment from berths 603, 604 and 605 in 2011-2012 and 10,500 cubic yards of sediment from the same berths in 2014-2015, with a maximum depth in Berth 603 of -42 feet CRD, and berths 604 and 605 of -48 CRD.
2. Increased suspended sediment from dredging activities with suspended sediment plumes 100 feet from the boundary of dredging activities at 10% over the background level.
3. The concentration of DDT (as a surrogate for contaminants) in the water column 100 feet downstream from the edge of dredging activities of 0.001 µg/L (if, however, background concentrations of DDT are greater than 0.001 µg/L, as measured within seven days of the initiation of in-water work, then the extent of take is no more than a 10% increase above background DDT concentration.).
4. No loss of shallow-water habitat in the area upstream from Berth 605.

NMFS determined that this level of incidental take is not likely to result in jeopardy to the species. The amount of sediment removed, turbidity concentrations, the concentration of DDT, and change in availability of shallow-water habitat are thresholds for reinitiating consultation. Exceeding any of these indicators for extent of take may trigger reinitiation of this consultation.

**Reasonable and Prudent Measures**

"Reasonable and prudent measures" are nondiscretionary measures to minimize the amount or extent of incidental take (50 CFR 402.02). "Terms and conditions" implement the reasonable and prudent measures (50 CFR 402.14). These must be carried out for the exemption in section 7(o)(2) to apply.

The following measures are necessary and appropriate to minimize the impact of incidental take of listed species from the proposed action:

The Corps shall:

1. Minimize incidental take from dredging-related activities by applying permit conditions to the proposed action that avoid or minimize adverse effects to water quality and the ecology of aquatic systems.
2. Ensure completion of a monitoring and reporting program to confirm this incidental take statement is meeting its objective of minimizing incidental take from permitted activities.

**Terms and Conditions**

The measures described below are non-discretionary, and must be undertaken by the Corps or, if an applicant is involved, must become binding conditions of any permit or grant issued to the applicant, for the exemption in section 7(o)(2) to apply. The Corps has a continuing duty to regulate the activity covered by this incidental take statement. If the Corps (1) fails to assume and implement the terms and conditions or (2) fails to require an applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. To monitor the impact of incidental take, the Corps or applicant must report the progress of the action and its impact on the species to the NMFS as specified in the incidental take statement.

1. To implement reasonable and prudent measure #1, the Corps shall ensure that:

   a. DDT. The applicant shall conduct DDT monitoring at the dredge site during dredging to ensure that extent of take indicator #3 (above) is not exceeded. Samples shall be taken from the water column.
   b. Suspended Sediment. The applicant shall conduct suspended sediment monitoring to ensure that extent of take indicator # 2 (above) is not exceeded. A representative background point must be used and monitoring take place 100 feet from the boundary of dredging activities.
   c. Dredging. A clamshell dredge with a close-lipped bucket will be used for all dredging. All digging passes of the bucket shall be completed without any material being returned to the wetted area. No dumping of partial or full buckets of material back into the project area will be allowed. No dredging of holes or sumps below the maximum depth and subsequent redistribution of sediment by dredging, dragging or other means will be allowed. All large anthropogenic debris shall be removed from dredged sediments prior to flow-lane disposal and transported to an appropriate disposal site.
   d. Upland Disposal Sites. The upland disposal sites shall be large enough to accommodate the quantity of material and water to be placed there to allow adequate settling. Best management practices shall be employed to reduce turbidity levels from the upland disposal locations to the maximum extent practicable. Filter bags, sediment fences, silt curtains, leave strips or berms, or other measures shall be inspected and maintained daily to ensure their proper function.
   e. The applicant will deploy an absorptive boom during all dredging activities to capture PAHs and other contaminants that may be floating on the water surface as a consequence of dredge activities.
   f. The applicant will implement a Pollution Control Plan to prevent pollution caused by dredging and disposal operations from entering the river.
   g. The applicant will conduct post-dredge bathymetry survey to ensure that only the specified material was removed.
   h. The applicant will confine dredging impacts to the minimum area necessary to complete the project.

i. If oil or other unknown substances appear on the water surface or in dredged material while dredges are being operated, the contractor shall cease operations to immediately identify the source of the contaminant.

2. To implement reasonable and prudent measure #2, the Corps shall ensure that:

a. Monitoring. The applicant will complete (and submit to NMFS) bathymetry surveys in June of each year. The bathymetry surveys will focus on the shallow-water habitat area from the upstream end of Berth 605 and extending 500 feet upstream, and from the ordinary high water level out to 150 feet from the shoreline. The surveys must show a minimum of one-foot contour intervals.

b. Reporting. The applicant will report all monitoring items including amount of material removed and suspended sediment and water quality analyses to NMFS within 60 days of the end of the in-water work window. Any exceedance of take covered by this Opinion must be reported by the applicant to NMFS immediately. The report will include a discussion of implementation of the terms and conditions in 1, above.

c. Submit monitoring reports to:

National Marine Fisheries Service
Oregon State Habitat Office
Attn: 2011/01748
1201 NE Lloyd Boulevard, Suite 1100
Portland, OR 97232-2778

d. NOTICE: If a sick, injured or dead specimen of a threatened or endangered species is found in the project area, the finder must notify NMFS through the contact person identified in the transmittal letter for this Opinion, or through the NMFS Office of Law Enforcement at 1-800-853-1964, and follow any instructions. If the proposed action may worsen the fish's condition before NMFS can be contacted, the finder should attempt to move the fish to a suitable location near the capture site while keeping the fish in the water and reducing its stress as much as possible. Do not disturb the fish after it has been moved. If the fish is dead, or dies while being captured or moved, report the following information: (1) NMFS consultation number; (2) the date, time, and location of discovery; (3) a brief description of circumstances and any information that may show the cause of death; and (4) photographs of the fish and where it was found. The NMFS also suggests that the finder coordinate with local biologists to recover any tags or other relevant research information. If the specimen is not needed by local biologists for tag recovery or by NMFS for analysis, the specimen should be returned to the water in which it was found, or otherwise discarded.

**UNITED STATES DEPARTMENT OF COMMERCE**
**National Oceanic and Atmospheric Administration**
NATIONAL MARINE FISHERIES SERVICE
Northwest Region
7600 Sand Point Way N.E., Bldg. 1
Seattle, WA 98115

Refer to NMFS No:
2008/01071

September 2, 2009

Eric S. Petersen
Chief, Regulatory Branch
U.S. Army Corps of Engineers
*Attn: Mr. Tom Taylor*
Regulatory Branch, CENWP-CO-GP
P.O. Box 2946
Portland, Oregon 97208-2946

Re: Endangered Species Act Section 7 Biological and Conference Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for the Port of Portland Terminal 6 Berth Maintenance Dredging Project, Columbia River (HUC: 170900120501), (RM 101-103), Multnomah County, Oregon (Corps No.: NWP-2008-028)

Dear Mr. Petersen:

The enclosed document contains a biological and conference opinion (Opinion) prepared by the National Marine Fisheries Service (NMFS) pursuant to section 7(a)(2) of the Endangered Species Act (ESA) on the effects of the proposed issuance of a 5-year permit by the U.S. Army Corps of Engineers (Corps) under their authority found in section 10 of the Rivers and Harbors Act and section 404 of the Clean Water Act to the Port of Portland for maintenance dredging of berths 601 and 607 at Terminals 6 in the Columbia River, Oregon.

In this Opinion, NMFS concludes that the proposed action is not likely to adversely affect southern green sturgeon (*Acipenser medirostris*) or Snake River (SR) sockeye salmon (*O. nerka*), or jeopardize the continued existence of 15 species of ESA-listed or proposed fishes: Lower Columbia River (LCR) Chinook salmon (*Oncorhynchus tshawytscha*), Upper Willamette River (UWR) Chinook salmon, Upper Columbia River (UCR) spring-run Chinook salmon, SR spring/summer run Chinook salmon, SR fall-run Chinook salmon, Columbia River (CR) chum salmon (*O. keta*), LCR coho salmon (*O. kisutch*), LCR steelhead (*O. mykiss*), UWR steelhead, Middle Columbia River (MCR) steelhead, UCR steelhead, Snake River Basin (SRB) steelhead, or southern Pacific eulachon (*Thaleichthys pacificus*). Moreover, NMFS concludes that the proposed action is not likely to result in the destruction or adverse modification of critical habitat designated or proposed for each of those species, with the exception of LCR coho salmon and southern Pacific eulachon, for which critical habitats have not yet been proposed.

As required by section 7 of the ESA, NMFS is providing an incidental take statement with the Opinion. The incidental take statement describes reasonable and prudent measures with terms and conditions that are necessary to minimize the impact of incidental take associated with this action. However, southern green sturgeon are not protected by take prohibitions of the ESA until protective regulations become effective. Therefore, this incidental take statement does not apply to southern green sturgeon until those regulations are in place. Moreover, southern Pacific eulachon are not protected by take prohibitions of the ESA until listed and, if designated as threatened, protective regulations become effective. Therefore, the incidental take statement does not apply to that species until it is listed, protective regulations are in place, and this conference opinion is confirmed by NMFS as a biological opinion.

This document also includes the results of our analysis of the proposed action's likely effects on essential fish habitat (EFH) pursuant to section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA), and includes two conservation recommendations to avoid, minimize, or otherwise offset potential adverse effects on EFH. These conservation recommendations are a subset of the ESA take statement's terms and conditions. Section 305(b)(4)(B) of the MSA requires Federal agencies to provide a detailed written response to NMFS within 30 days after receiving these recommendations.

If the response is inconsistent with the EFH conservation recommendations, the Corps must explain why the recommendations will not be followed, including the justification for any disagreements over the effects of the action and the recommendations. In response to increased oversight of overall EFH program effectiveness by the Office of Management and Budget, NMFS established a quarterly reporting requirement to determine how many conservation recommendations are provided as part of each EFH consultation and how many are adopted by the action agency. Therefore, we request that in your statutory reply to the EFH portion of this consultation, you clearly identify the number of conservation recommendations accepted.

If you have questions regarding this consultation, please contact Dan Gambetta, fisheries biologist in the Lower Columbia River/Oregon Coast Habitat Branch of the Oregon State Habitat Office at 503.231.2243.

Sincerely,

for Barry A. Thom
Acting Regional Administrator

cc: Michelle Hollis, Port of Portland
Alex Liverman, ODEQ

# Endangered Species Act Section 7 Biological and Conference Opinion and

# Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation

Port of Portland Terminal 6 Berth Maintenance Dredging Project
Columbia River (HUC: 170900120501)
Multnomah County, Oregon
(Corps No.: NWP-2008-028)

| | |
|---|---|
| Lead Action Agency: | U.S. Army Corps of Engineers, Portland District |
| Consultation Conducted By: | National Marine Fisheries Service Northwest Region |
| Date Issued: | September 2, 2009 |
| Issued by: | Barry A. Thom<br>Acting Regional Administrator |
| **NMFS No.:** | **2008/01071** |

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## INTRODUCTION

This document contains a biological opinion (Opinion), informal review, and incidental take statement prepared in accordance with section 7(b) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531, *et seq.*), and implementing regulations at 50 CFR 402. The National Marine Fisheries Service (NMFS) also completed an essential fish habitat (EFH) consultation, prepared in accordance with section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. 1801, *et seq.*) and implementing regulations at 50 CFR 600.

The docket for this consultation is on file at the Oregon State Habitat Office in Portland, Oregon.

### Background and Consultation History

On March 5, 2008, NMFS received a letter and a biological assessment (BA) from the Corps, which requested initiation of formal ESA section 7 consultation and EFH consultation for the Corp's proposed issuance of a permit under section 10 of the Rivers and Harbors Act and section 404 of the Clean Water Act to the Port of Portland (Port) for 5-year maintenance dredging activities at berth's 601 and 607 of Terminal 6.

In their letter requesting consultation and the BA, the Corps concluded that the proposed action is "likely to adversely affect" the following species: Lower Columbia River (LCR) Chinook salmon (*Oncorhynchus tshawytscha*), Upper Willamette River (UWR) Chinook salmon, Upper Columbia River (UCR) spring-run Chinook salmon, Snake River (SR) spring/summer run Chinook salmon, SR fall-run Chinook salmon, Columbia River (CR) chum salmon (*O. keta*), LCR coho salmon (*O. kisutch*), SR sockeye salmon (*O. nerka*). LCR steelhead (*O. mykiss*), UWR steelhead, Middle Columbia River (MCR) steelhead, UCR steelhead, and Snake River Basin (SRB) steelhead (hereafter collectively referred to as "ESA-listed salmonids") and their designated critical habitats, except for LCR coho salmon, for which critical habitat has not been proposed or designated. The Corps also concluded that the proposed project "will affect" EFH for Chinook salmon, and coho salmon.

Although neither the Corps letter requesting consultation nor the BA addressed green sturgeon (*Acipenser medirostris*) or southern Pacific eulachon (*Thaleichthys pacificus*), NMFS considered the effects of the proposed action on these species and critical habitat proposed for southern green sturgeon in this Opinion.

In January 2008, the Port submitted a sediment analysis plan (SAP) to the Project Review Group (PRG) with site history data and proposed sampling locations to adequately characterize the dredging project area. Previous testing results in adjacent areas have detected cadmium, zinc, tributyltin (TBT), dichlorodiphenyltrichloroethane (DDT), polychlorinated biphenyls (PCBs), and phthalates in sediments above screening levels (SLs) listed in the 2006 Interim Sediment Evaluation Framework (SEF) for benthic toxicity. The PRG approved the Port's proposed sampling plan with the recommendation to increase the number of the newly exposed surface material (NSM) samples.

In August 2008, the Corps provided NMFS with an addendum to the BA. The BA addendum summarized results from chemical analysis of sediment samples that were collected from Berths 601 and 607 in March 2008. While the sediment from berth 601 came up clean with no exceedences from freshwater screening levels published in the SEF for benthic toxicity, sediment from berth 607 had several exceedences for zinc and TBT in the deeper sediments that would be the NSM. The Port suggested that the hit of TBT to be from a paint chip and proposed biological testing to provide more empirical evidence regarding the potential for contamination of sediment and adverse effects to benthic organisms. The PRG reviewed and approved their proposed plan.

In May 2009, the Port submitted the results of the biological testing to the PRG group. Biological testing was performed on one NSM sample obtained along the berthing face of Berth 607. Biological testing results show that the NSM sediment passed the bioassay tests with no adverse mortality or growth results for midge or chironomid larvae.

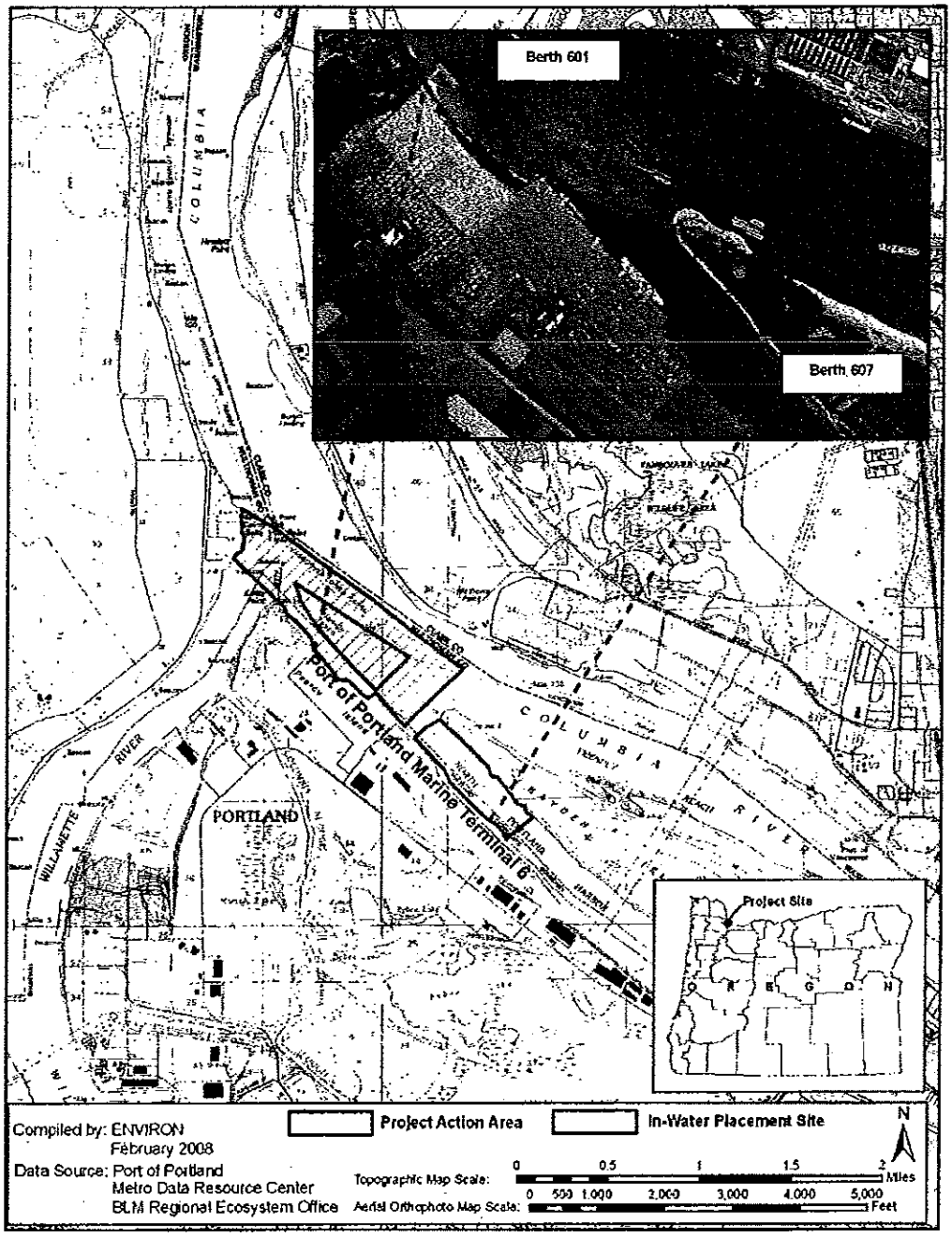
The objective of this Opinion is to determine whether the Corps's authorization of the proposed action under section 10 of the Rivers and Harbors Act and section 404 of the Clean Water Act is likely to jeopardize the continued existence of ESA-listed species or result in the destruction or adverse modification of critical habitat. This Opinion is based on information presented in the BA, and other information provided to NMFS by the Corps and the applicant.

**Description of the Proposed Action**

The Port proposes to perform maintenance dredging for five years at Berths 601 and 607 of Terminal 6 (Figure 1). Terminal 6 consists of five berths. Berths 603, 604, and 605 handle containerized cargo and steel slabs. Hyundai and Honda automobiles are loaded and unloaded onto and from deep-draft vessels at Berths 601 and 607. Berth 601 is just upstream from the confluence of the Willamette River and the Columbia River. Berth 607 is on the south side of Hayden Island adjacent to the channel that is referred to as the Oregon Slough. The Port has determined based on bathymetric surveys that in order to continue loading and unloading vehicles at Berths 601 and 607, sediments that have accumulated since the berths were constructed need be dredged.

To maintain suitable navigational clearances for deep-draft vessels, Berths 601 and 607 need to be maintained to -36 feet Columbia River Datum (CRD) plus up to 2 feet of overdredge allowance as advanced maintenance of expected sediment infill. The Berths will need to be dredged only once during the 5-year permit period.

**Figure 1.** Port of Portland Terminal 5, Berths 601 and 607, on the Columbia River, between RM 102 and 104.



All in-water dredging and in-water placement activities would be performed during the Oregon Department of Fish and Wildlife (ODFW) specified in-water work window (November 1 – February 28) for the Lower Columbia River (ODFW 2008). The Port estimates that the dredging of the berths will last for 15 to 20 days. If an upland disposal facility, such as Suttle Road or West Hayden Island, is utilized, then dredged sediments would be fully contained and no surface water would be released back to the Columbia River or North Portland Harbor. Water quality monitoring would be conducted during active dredging and in-water placement activities, as specified by the appropriate federal and state permit requirements.

**Berth Maintenance Dredging.** The Port proposes to remove up to a total of 10,000 cubic yards (cy) of dredge material from Berths 601 and 607 at Terminal 6 impacting approximately 7.9 acres of river bottom.

None of the dredged area will be in shallow water (≤ 20 feet CRD) as recent Port surveys indicate that current depths range from -27 to -51 feet CRD at Berth 601, and from -30 to -46 feet CRD at Berth 607. The final depth of the berths will likely average -37 feet CRD.

A clamshell dredge equipped with an enclosed "environmental" bucket and operated either from shore or from a floating crane will be used to remove the sediments. An environmental bucket is specifically designed to reduce sediment resuspension into the overlying water column by forming a seal when the bucket is in the closed position and retrieved to the surface which reduces the amount of resuspended sediments.

The sediments will be placed in either a flat-deck barge with watertight sideboards or a bin-barge with one or multiple cells. Once full of dredged material, the barge would be transported by tugboat to an approved upland or in-water placement site depending on the nature of dredged materials.

When the contractor estimates that all designated sediments have been removed from the berthing area, a post-dredge survey will be performed to verify that the authorized depths have been achieved. If the post-dredge survey shows that areas were missed, the contractor will remove those sediments. The final post-dredge survey will be used to calculate the actual sediment quantities that were removed.

**Dredged Material Disposal**. If the Port decides to place the dredge material at an upland facility, the dredge material barge will be moored to a floating crane barge adjacent to the facility. The barge would be off-loaded with a submersible pump that pumps the sediments with additional "make-up" water, as necessary, through a 10-inch pipeline directly into the primary storage cell at the upland facility. The Suttle Road and West Hayden Island facilities consist of separated bermed cells, which are connected by adjustable weirs. Each site contains one or more settling basins to contain excess water. This water may be recycled and used as "make-up" water to accommodate the pumping of sediments back into the placement facility. If necessary, "make-up" water may also be obtained from residual water on the barge or the Columbia River. If water is pumped from the river, intake screens will be installed per NMFS (1997) and ODFW screening criteria (2008). The dewatered dredged material will be stockpiled until a beneficial use is determined or until a permanent placement site is identified.

Depending on determination of suitability for in-water placement through the Sediment Evaluation Framework Protocols, the Port may elect to discharge the material to the Oregon Slough In-Water Placement Site, which encompasses approximately 75 acres. Recent Port survey data (September 2006) show that current depths at this site range between 50 feet and 70 feet CRD.

In-water placement will occur via controlled discharge from a split hull or multi-celled barge or flat barge with tremie chutes. The tremie chute trunk discharge end will be a minimum of 10 feet below the surface of the water. If the Port uses a multi-cell material placement barge, only one cell will be opened at a time. If the Port uses a split-hull barge, the barge will have a controllable opening so that material is only dispersed within the site boundaries. Discharging of dredge material will be performed while maintaining proper navigation and vessel speed within the placement site boundaries.

**Conservation Measures.**

1. Timing of Dredging Activities. Berth maintenance and in-water placement activities will be conducted during the approved ODFW in-water work window for the Columbia River of November 1 to February 28.
2. Dredging
   a. Dredging will be performed using an enclosed "environmental" bucket to minimize turbidity and contaminant releases to the water column. Other best management practices that will be used to control turbidity may include: regulating the bucket speed, ensuring that the bucket is sealed before ascent, maintaining the bucket flaps, filling the bucket to capacity to minimize water in the bucket, not overfilling the bucket, and modifying the bucket size and/or type.
   b. Dredging and global positioning system (GPS) software will be used to model the entire dredge prism and track previously dredged areas to ensure that dredging efficiency is maximized.
   c. As an incentive to the Port's contractor to dredge only the authorized amount and to authorized depths, the Port will not compensate the contractor for the dredging or placement of any material removed from below the dredge prism.
   d. The Port will conduct post-dredge bathymetry surveys to ensure that only the material identified to be dredged was removed to the proper, authorized depth.
   e. If at any time, distressed fish are observed or a fish kill occurs, operations will cease and NMFS will be notified.
3. Barging
   a. Depending on availability, barges used for dredge material handling may include: multiple cell; split-hull; flat deck with tall, watertight sideboards; or bin barges in good condition. These barges will enclose all dredged material, including dredged sediment and water. No material shall be allowed to leak from the bins or overtop the walls.
   b. The barge will be loaded so that enough of the freeboard remains to allow for safe movement of the barge and its material on its planned route to the approved placement facility.

4. Upland and In-Water Placement
   a. The Port will handle all dredge material in a manner consistent with PRG recommendations, either to an approved upland or in-water facility.
   b. For upland placement, dredge material and residual water will be deposited at the upland facility and held in containment ponds. The ponds will be sufficiently large to contain all the dredge material. There will be no release of return water to the Columbia River or North Portland Harbor.
   c. For in-water placement, the discharge operation will proceed slowly in an upstream direction within the designated placement site to help prevent mounding.
   d. The contractor will use GPS technology to record the specific locations where the dredge material is placed.
   e. If a multi-cell material placement barge is used, only one cell will be opened at a time.
   f. If a split cell barge is used, the opening of the split hull will be controlled so that material is only dispersed within the site boundaries.
   g. If tremie chutes are used, the discharge end of the chute will be a minimum of 10 feet below the surface of the water.
5. Spill Prevention and Control
   a. The Port has developed a spill prevention, control, and containment plan for their marine operations that will be implemented during berth maintenance.
   b. All equipment used will be clean and inspected daily prior to use to ensure that the equipment has no fluid leaks. Should a leak develop during use, the leaking equipment will be removed from the project site immediately and not used again until it has been adequately repaired. At no time will fuels or oils be allowed to enter any waterbody.
   c. Construction equipment will be serviced, stored, and fueled at least 100 feet away from the shoreline, as practicable. Location of vehicles, equipment and fuel storage areas, and fuel containment measures, will be approved and monitored by a designated Port Environmental Inspector.
   d. Floating spill containment booms and absorbent booms will be maintained on site during all phases of construction to facilitate the cleanup of hazardous material spills. Containment booms and/or absorbent booms will be installed in instances where there is a potential for release of petroleum or other toxic substances.
6. Monitoring
   a. An annual compliance monitoring report will be submitted following the completion of maintenance dredging operations.
   b. Water quality monitoring will be conducted during active dredging and in-water placement activities, as specified by the Oregon Department of Environmental Quality (DEQ) 401 water quality certification.
   c. Monitoring will only be performed during daylight hours and is contingent on suitable weather conditions. If the monitoring crew determines that weather conditions (*e.g.*, heavy fog, ice/snow, excessive winds, rough water) compromise the ability for the crew to navigate to the sampling site, then monitoring shall be postponed until conditions are deemed safe.

The NMFS relied on the foregoing description of the proposed action, including all stated minimization measures, to complete this consultation. To ensure that this consultation remains valid, NMFS requests that the action agency or applicant keep NMFS informed of any changes to the proposed action.

### Action Area

For this consultation, the action area includes the south shore of the Lower Columbia River at Terminal 6, an area that extends approximately 0.25 mile upstream from Berth 607 and 0.5 mile downstream from the Oregon Slough in-water placement site (Figure 1). The action area extends from river mile (RM) 101 to RM 103 in the Lower Columbia River.

The ESA-listed species described in Table 1 use the project area for adult migration, and juvenile rearing and migration. The action area within the Columbia River is designated critical habitat; the primary constituent elements (PCEs) of critical habitat that are considered in this opinion are summarized in Tables 2 and 3 for salmon and steelhead, and in Table 4, for green sturgeon. The action area is designated EFH for Chinook salmon and coho salmon (PFMC 1999), and environmental effects of the proposed project may adversely affect EFH for those species. The effects to EFH are analyzed in the MSA portion of the document.

## ENDANGERED SPECIES ACT

Section 7(a)(2) of the ESA requires Federal agencies to consult with NMFS to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species, or adversely modify or destroy their designated critical habitat. The biological opinion (Opinion) that follows records the results of the interagency consultation for this proposed action. An incidental take statement (ITS) is provided after the Opinion that specifies the impact of any taking of threatened or endangered species that will be incidental to the proposed action, reasonable and prudent measures that NMFS considers necessary and appropriate to minimize such impact, and nondiscretionary terms and conditions (including, but not limited to, reporting requirements) that must be complied with by the Federal agency, applicant (if any), or both, to carry out the reasonable and prudent measures.

### Biological Opinion

To complete the jeopardy analysis presented in this Opinion, NMFS reviewed the status of each ESA-listed species considered in this consultation, the environmental baseline in the action area, the effects of the action, and cumulative effects (50 CFR 402.14(g)). From this analysis, NMFS determined whether effects of the action were likely, in view of existing risks, to appreciably reduce the likelihood of both the survival and recovery of the affected listed species.

For the critical habitat adverse modification analysis, NMFS considered the status of the entire designated area of the critical habitat considered in this consultation, the environmental baseline in the action area, the likely effects of the action on the function and conservation role of the affected critical habitat, and cumulative effects. NMFS used this assessment to determine

whether, with implementation of the proposed action, critical habitat would remain functional, or retain the current ability for the PCEs to become functionally established, to serve the intended conservation role for the species (Hogarth 2005).

**Table 1.** Federal Register notices for final rules that list threatened and endangered species, designate critical habitats, or apply protective regulations to listed species considered in this consultation. Listing status: 'T' means listed as threatened under the ESA; 'E' means listed as endangered.

| Species | Listing Status | Critical Habitat | Protective Regulations |
|---|---|---|---|
| **Chinook salmon (*Oncorhynchus tshawytscha*)** | | | |
| Lower Columbia River | T 6/28/05; 70 FR 37160 | 9/02/05; 70 FR 52630 | 6/28/05; 70 FR 37160 |
| Upper Columbia River spring-run | E 6/28/05; 70 FR 37160 | 9/02/05; 70 FR 52630 | ESA section 9 applies |
| Snake River spring/summer run | T 6/28/05; 70 FR 37160 | 10/25/99; 64 FR 57399 | 6/28/05; 70 FR 37160 |
| Snake River fall-run | T 6/28/05; 70 FR 37160 | 12/28/93; 58 FR 68543 | 6/28/05; 70 FR 37160 |
| Upper Willamette River spring-run | T 6/28/05; 70 FR 37160 | 9/02/05; 70 FR 52630 | 6/28/05; 70 FR 37160 |
| **Chum salmon (*O. keta*)** | | | |
| Columbia River | T 6/28/05; 70 FR 37160 | 9/02/05; 70 FR 52630 | 6/28/05; 70 FR 37160 |
| **Coho salmon (*O. kisutch*)** | | | |
| Lower Columbia River | T 6/28/05; 70 FR 37160 | Not applicable | 6/28/05; 70 FR 37160 |
| **Sockeye salmon (*O. nerka*)** | | | |
| Snake River | E 6/28/05; 70 FR 37160 | 12/28/93; 58 FR 68543 | ESA section 9 applies |
| **Steelhead (*O. mykiss*)** | | | |
| Lower Columbia River | T 1/05/06; 71 FR 834 | 9/02/05; 70 FR 52630 | 6/28/05; 70 FR 37160 |
| Middle Columbia River | T 1/05/06; 71 FR 834 | 9/02/05; 70 FR 52630 | 6/28/05; 70 FR 37160 |
| Upper Columbia River | E 1/05/06; 71 FR 834 | 9/02/05; 70 FR 52630 | 6/28/05; 70 FR 37160 |
| Snake River Basin | T 1/05/06; 71 FR 834 | 9/02/05; 70 FR 52630 | 6/28/05; 70 FR 37160 |
| Upper Willamette River | T 1/05/06; 71 FR 834 | 9/02/05; 70 FR 52630 | 6/28/05; 70 FR 37160 |
| **Green sturgeon (*Acipenser medirostris*)** | | | |
| Southern Distinct Population | T 4/7/06; 71 FR 17757 | Proposed 9/08/08; 50 CFR 227 | 4/7/06; 71 FR 17757 |
| **Pacific Eulachon (*Thaleichthys pacificus*)** | | | |
| Southern Distinct Population | C 3/12/08; 73 FR 13185 | Not applicable | Not applicable |

**Table 2.** PCEs of critical habitats designated for Pacific salmon and steelhead species considered in the Opinion (except SR spring/summer run Chinook salmon, SR fall-run Chinook salmon, and SR sockeye salmon), and corresponding species life history events.

| Primary Constituent Elements | | Species Life History Event |
|---|---|---|
| **Site Type** | **Site Attribute** | |
| Freshwater rearing | Floodplain connectivity<br>Forage<br>Natural cover<br>Water quality<br>Water quantity | Fry emergence<br>Fry/parr growth and development |
| Freshwater migration | Free of artificial obstructions<br>Natural cover<br>Water quality<br>Water quantity | Adult sexual maturation<br>Adult upstream migration, holding<br>Kelt (steelhead) seaward migration<br>Fry/parr seaward migration |
| Estuarine areas | Forage<br>Free of obstruction<br>Natural cover<br>Salinity<br>Water quality<br>Water quantity | Adult sexual maturation<br>Adult "reverse smoltification"<br>Adult upstream migration, holding<br>Kelt (steelhead) seaward migration<br>Fry/parr seaward migration<br>Fry/parr smoltification<br>Smolt growth and development<br>Smolt seaward migration |

**Table 3.** PCEs of critical habitats designated for SR spring/summer run Chinook salmon, SR fall-run Chinook salmon, and SR sockeye salmon, and corresponding species life history events.

| Primary Constituent Elements | | Species Life History Event |
|---|---|---|
| **Site** | **Site Attribute** | |
| Juvenile rearing areas | Access (sockeye)<br>Cover/shelter<br>Food (juvenile rearing)<br>Riparian vegetation<br>Space (Chinook)<br>Water quality<br>Water temperature (sockeye)<br>Water quantity | Fry/parr growth and development<br>Fry/parr smoltification<br>Smolt growth and development |
| Juvenile migration corridors | Cover/shelter<br>Food<br>Riparian vegetation<br>Safe passage<br>Space<br>Substrate<br>Water quality<br>Water quantity<br>Water temperature<br>Water velocity | Fry/parr seaward migration<br>Smolt growth and development<br>Smolt seaward migration |
| Adult migration corridors | Cover/shelter<br>Riparian vegetation<br>Safe passage<br>Space<br>Substrate<br>Water quality<br>Water quantity<br>Water temperature<br>Water velocity | Adult sexual maturation<br>Adult "reverse smoltification"<br>Adult upstream migration<br>Kelt (steelhead) seaward migration |

**Table 4.** PCEs of critical habitat proposed for southern green sturgeon and corresponding species life history events.

| PCEs | | | Life History Event |
|---|---|---|---|
| **Site Type** | **Site Attribute** | | |
| Freshwater riverine system | Food resources<br>Substrate type or size<br>Water flow<br>Water quality | Migratory corridor<br>Water Depth<br>Sediment quality | Adult spawning<br>Embryo incubation<br>Alevin development<br>Juvenile growth/development<br>Juvenile/subadult seaward migration<br>Adult upstream migration<br>Adult post-spawning seaward migration |
| Estuarine areas | Food resources<br>Water flow<br>Water quality | Migratory corridor<br>Water depth<br>Sediment quality | Juvenile/subadult growth/development<br>Juvenile/subadult seaward migration<br>Adult growth/development<br>Adult upstream migration<br>Adult post-spawning seaward migration |
| Coastal marine areas | Migratory corridor<br>Water quality<br>Food resources | | Subadult migration between marine/estuarine areas<br>Subadult/adult migration within marine areas<br>Subadult/adult growth and development<br>Adult sexual maturation |

### Status of the Species and Critical Habitat

This section defines the status and biological requirements of each listed species affected by the proposed action, and the status of each designated critical habitat relative to those requirements. Any ESA-listed species facing high risk of extinction and critical habitats with degraded conservation value are more vulnerable to the aggregation of effects considered under the environmental baseline, the effects of the proposed action, and cumulative effects.

**Status of the Species.** The NMFS reviews the condition of the listed species affected by the proposed action using criteria that describe a 'viable salmonid population' (VSP) (McElhany *et al.* 2000). Attributes associated with a VSP include abundance, productivity, spatial structure, and genetic diversity that enhance its capacity to adapt to various environmental conditions and allow it to sustain itself in the natural environment. These attributes are influenced by survival, behavior, and experiences throughout the entire life cycle, characteristics that are influenced in turn by habitat and other environmental conditions.

***LCR Chinook salmon.*** The range of this species includes all naturally-spawned populations of Chinook salmon from the Columbia River and its tributaries from its mouth at the Pacific Ocean upstream to a transitional point between Washington and Oregon, east of the Hood River and the White Salmon River, and includes the Willamette River to Willamette Falls, Oregon, exclusive of spring-run Chinook salmon in the Clackamas River. Historical records of Chinook salmon abundance are sparse, but cannery records suggest a peak run of 4.6 million fish in 1883. Although fall-run Chinook salmon are still present throughout much of their historical range, they are still subject to large-scale hatchery production, relatively high harvest, and extensive habitat degradation. The spring-run populations are largely extirpated as the result of

dams, which block access to their higher elevation habitat. Abundances largely declined during 1998-2000, and trend indicators for most populations are negative, especially if hatchery fish are assumed to have a reproductive success equivalent to that of natural-origin fish. However, 2001 and 2002 abundance estimates increased for most LCR Chinook salmon populations over the previous few years (Rawding 2003, as cited in Good *et al.* 2005). In 2003, 2,873 fall-run Chinook salmon spawned in the main channel of the Columbia River between RM 113 and RM 143. Based on the results of the VSP criteria analysis conducted by McElhany et al. (2007), the overall risk of extinction for Oregon populations of LCR Chinook salmon is high.

The NMFS (2007a) identified degraded estuarine and nearshore habitat, floodplain connectivity and function, channel structure and complexity, riparian areas and large woody debris recruitment, stream substrate, stream flow, fish passage, and harvest and hatchery impacts as the major factors limiting the recovery of this species.

The predominant life history type for this species is the fall-run, which consists of an early component that returns to the Columbia River in mid-August and spawns within a few weeks (Kostow 1995). Spring-run Chinook salmon enter freshwater in March and April and spawn in late summer. Adults from this species pass through the action area from February through November, with peak passage occurring from mid-March through May, and from October through early November (Friesen 2005). The majority of juveniles in this species leave as sub-yearlings, with downstream movement observed as early as December, and most migrating downstream during summer and fall.

During electrofishing in shallow-water habitat in the Lower Columbia River near Portland during 1997 though 1999, juvenile Chinook salmon were the most abundant anadromous salmonid species present (EES and URS 1998; EES 2000, as cited in Environ 2008a). Peak numbers of juvenile LCR Chinook salmon outmigrate through the action area from March to July, and rear in the action area from February through September (ODFW 2003). Peak numbers of adult LCR Chinook migrate upstream through the action area from mid-March through May, and from October through mid-November (ODFW 2003).

***UCR spring-run Chinook salmon.*** This species includes spring-run Chinook salmon populations found in Columbia River tributaries between Rock Island (RM 453 of Columbia River) and Chief Joseph Dams (RM 545 of Columbia River), notably the Wenatchee, Entiat, and Methow river basins. Historically, spring-run Chinook salmon may have also used portions of the Okanogan River.

Grand Coulee Dam (RM 596 of the Columbia River), completed in 1941, and Chief Joseph Dam are both impassable barriers for upstream migration of anadromous fish. No specific estimates are available of historical production of spring-run Chinook salmon from mainstem tributaries above Grand Coulee Dam. However, habitat typical of that used by spring-run Chinook salmon is found in the middle/upper reaches of mainstem tributaries above Grand Coulee Dam. Thus, it is possible that the historical range of the UCR spring-run Chinook included these areas. Alternatively, fish from the upper reaches of the Columbia River might have been considered a separate species.

All three of the existing UCR spring-run Chinook salmon populations have exhibited similar trends and patterns in abundance over the past 40 years. The 1998 Chinook salmon status review (Myers *et al.* 1998) reported that long-term trends in abundance for UCR spring-run Chinook salmon populations were generally negative, ranging from -5% to +1%. Analyses of the data series, updated to include 1996 to 2001 returns, indicated that those trends have continued with escapements in 1994 to 1996 being the lowest in the last 60 years. The Wenatchee River spawning escapements have declined an average of 5.6% per year, the Entiat River population an average of 4.8%, and the Methow River population an average rate of 6.3% since 1958 (Good *et al.* 2005). At least six former populations are now extinct, and nearly all extant populations have fewer than 100 wild spawners. With these trends, extinction risks are high. The risk of extinction within 100 years for UCR spring-run Chinook salmon is 50% for the Methow, 98% for the Wenatchee, and 99% for the Entiat spawning populations (Cooney 2002).

Some UCR spring-run Chinook salmon are killed as they pass through the four lower-river Federal hydroelectric projects and a varying number of Mid-Columbia River Public Utility District projects. The Wenatchee River enters the Columbia River above seven mainstem dams, the Entiat above eight dams, and the Methow River and Okanogan Rivers above nine dams. In addition to the challenges put forth by dams, habitat degradation from increasing urbanization on the lower reaches, irrigation/flow diversions in up-river sections of the major drainage, and livestock grazing impact on middle reaches all pose concerns for this species (Good *et al.* 2005). The major factors limiting the recovery for UCR spring-run Chinook salmon are degradation of estuarine and nearshore marine habitat, floodplain connectivity and function, channel structure and complexity, riparian areas and large woody debris recruitment, stream substrate and flow, hydropower system mortality, and hatchery impacts (NMFS 2007a).

The majority of adult UCR spring-run Chinook salmon migrate upstream through the Lower Columbia River in March through May (ODFW 2003). Peak numbers of juvenile UCR Chinook salmon outmigrate through the action area from mid-March through May (ODFW 2003).

***UWR spring-run Chinook salmon.*** The UWR spring-run Chinook salmon includes seven populations of native spring-run populations above Willamette Falls and in the Clackamas River. All the populations are in a single stratum since they share a similar life history pattern (spring run) and a single ecoregion (McElhany *et al.* 2003, Myers *et al.* 2006).

The numbers of spring Chinook salmon in the Willamette River basin are extremely depressed (McElhany *et al.* 2007). Historically, the spring run of Chinook may have exceeded 300,000 fish (Myers *et al.* 2003). The current abundance of wild fish is less than 10,000 fish, and only two populations (McKenzie and Clackamas) have significant natural production. The UWR Chinook salmon have been adversely affected by the degradation and loss of spawning and rearing habitat (loss of 30 to 40%) associated with hydropower development, and interaction with a large number of natural spawning hatchery fish. In 2007, NMFS identified degraded floodplain connectivity and function, channel structure and complexity, riparian areas and large wood recruitment, water quality, fish passage, and hatchery impacts as the major factors limiting recovery of this species (NMFS 2007a).

McElhany *et al.* (2007) analyzed the VSP population criteria (diversity, spatial structure, abundance, and productivity) for UWR Chinook salmon and found that the risk of extinction is high. The Clackamas population exhibited the lowest extinction risk. However, five of the seven populations were clearly in the high risk category, and thus UWR Chinook salmon can be characterized as having a high risk of extinction.

Juvenile Chinook salmon that have emerged from spawning sites in the Upper Willamette River watershed use the lower mainstem Willamette River and Columbia Slough in Portland for temporary rearing as they migrate to the ocean. Peak numbers of adult and juvenile UWR spring Chinook migrate upstream through the Lower Willamette River from March through May (ODFW 2003). Although unlikely, it is possible that small numbers of juvenile UWR Chinook salmon would migrate a short distance upstream from the confluence of the Willamette and Columbia Rivers and rear in the vicinity of Terminal 6, Berth 601 during their downstream migration.

***SR spring/summer run Chinook salmon.*** At least 1.5 million spring/summer run Chinook salmon returned to the Snake River in the late 1800s. This was approximately 50 to 60% of all spring/summer run Chinook in the Columbia River basin. Historically, Shoshone Falls (RM 615) was the uppermost limit to spring/summer run Chinook salmon migration, and spawning occurred in virtually all suitable and accessible habitat in the Snake River basin (Fulton 1970, Matthews & Waples 1991).

Actual counts of wild adults at Ice Harbor Dam (RM 9.7 of Snake River) averaged 59,000 each year from 1962 to 1970. The estimated number of wild adult spring and summer Chinook salmon passing over Lower Granite Dam (RM 107 of Snake River) was 9,674 fish per year between 1980 and 1990 (Matthews & Waples 1991). From 1992 to 1996, the average number of naturally-produced spawners was 3,820 fish per year (Myers *et al.* 1998). The 1999 to 2001 average return of natural-origin Chinook salmon exceeded 3,700 fish per year. In 2001, there was a large run of spring Chinook salmon to Lower Granite Dam that exceeded 17,000 fish. However, 88% of the return was hatchery-origin fish. The summer Chinook run returning to the dam has increased as well from an average of 3,076 (1986 to 1996) to 6,000 fish per year (1997 to 2001) (Good *et al.* 2005).

SR spring/summer run Chinook salmon must migrate past a series of mainstem Snake and Columbia river hydroelectric dams on their migration to and from the ocean. The Tucannon River population must migrate through six dams; all other Snake River drainages supporting spring/summer run Chinook salmon production are above eight dams. Status reviews have concluded that mainstem Columbia and Snake river hydroelectric projects have disrupted migration and negatively affected flow regimes and estuarine habitat (Good *et al.* 2005).

In 2007, NMFS identified the major factors limiting recovery of SR spring/summer run Chinook salmon as degradation of floodplain connectivity and function, channel structure and complexity, riparian areas and large woody debris recruitment, stream substrate and flow, water quality, and impacts related to the mainstem Columbia River hydropower system (NMFS 2007a).

The peak run of adult SR spring Chinook migrating through the action area occurs from early April to mid-May. The peak run of SR summer Chinook occurs in the action area from late June to early July. Juveniles travel through the action area from mid-June to late September, with peak numbers present from mid-July to mid-August.

***SR fall-run Chinook salmon.*** No reliable estimates of historical abundance are available, but because of their dependence on mainstem habitat for spawning, fall-run Chinook have probably been affected to a greater extent by irrigation and hydroelectric projects than any other species of salmon in the Snake River basin. The mean number of adult SR fall-run Chinook salmon declined from 72,000 in the 1930s and 1940s, to 29,000 during the 1950s. In spite of this, the Snake River remained the most important natural production area for fall-run Chinook in the Columbia River basin through the 1950s. The number of adults counted at the uppermost Snake River mainstem dams averaged 12,720 total spawners per year from 1964 to 1968; 3,416 spawners from 1969 to 1974; and 610 spawners from 1975 to 1980 (Waples *et al.* 1991). In the late 1990s, the mean number of natural-origin adults returning per year over Lower Granite Dam (RM 107 of Snake River) was 871 fish. In 2001, over 2,600 natural-origin fall-run Chinook returned.

Historically, the primary fall-run Chinook salmon spawning areas were on the upper mainstem of the Snake River. However, approximately 80% of this historical habitat has been lost due to the construction of a suite of dams, so natural spawning is limited to the area from the upper end of Lower Granite Reservoir to Hells Canyon Dam (RM 247 of Snake River), the lower reaches of the Imnaha, Grande Ronde, Clearwater, and Tucannon rivers, and small mainstem sections in the tailraces of the Lower Snake hydroelectric dams (Good *et al.* 2005). The loss of spawning habitat, restricting the extant species to a single naturally spawning population, increased the species' vulnerability to environmental variability and catastrophic events. The diversity associated with populations that once resided above the Snake River dams has been lost, and the impact of out-of-species fish straying to the spawning grounds has the potential to further compromise the genetic diversity of the species.

In 2007, NMFS identified the major factors limiting recovery of SR fall-run Chinook salmon as degradation of floodplain connectivity and function, channel structure and complexity, impacts related to harvest, and impacts related to mainstem Columbia River hydropower (NMFS 2007a).

Adult SR fall-run Chinook are in the Lower Columbia River in August through early October, with the peak moving through in early September. The juveniles emigrate through the action area from late June to late September.

***CR chum salmon.*** Chum salmon in the Columbia River once numbered in the hundreds of thousands of adults, and were reported in almost every river in the Lower Columbia River basin, but by the 1950s most runs had disappeared (Rich 1942, Marr 1943, Fulton 1970). The total number of chum salmon returning to the Columbia River in the last 50 years has averaged a few thousand per year, and they return to only a very restricted subset of their historical range. Significant spawning occurs in only two of the 16 historical populations, meaning that 88% of the historical populations are extirpated, or nearly so. The two remaining populations are the Grays River and the Lower Gorge (Good *et al.* 2005).

In the first half of this century, CR chum salmon supported a large commercial fishery; more than 500,000 fish per year were landed as recently as 1942. Commercial catches declined beginning in the mid-1950s, and in later years rarely exceeded 2,000 per year.

During the 1980s and 1990s, the combined abundance of natural spawners for the Lower Gorge, Washougal, and Grays River populations was below 4,000 adults. In 2002, the abundance of natural spawners exhibited a substantial increase to approximately 20,000 adults at several locations. The cause of this dramatic increase in abundance is unknown. Long- and short-term productivity trends for populations are at or below replacement. The loss of off-channel habitat and the extirpation of approximately 17 historical populations increase this species' vulnerability to environmental variability and catastrophic events. Based on the VSP criteria, the Oregon populations of CR chum salmon are at very high risk of extinction (McElhany *et al.* 2007).

In 2007, NMFS identified the major factors limiting recovery of CR chum salmon as degradation of estuarine and nearshore marine habitat, floodplain connectivity and function, channel structure and complexity, riparian areas and large woody debris recruitment, stream substrate and flow, and fish passage (NMFS 2007a).

Chum salmon spawn in the main channel of the Columbia River between RM 113 and 114, near RM 123, between RM 136 and 139, and near Ives Island (RM 143). Adults may occur in the vicinity of the action area from late September through December. Based on spawning timing, it is likely that fry emerge from late January through April in the Columbia River tributaries. Therefore, juvenile chum salmon would likely pass through the action area between February and May. Shoreline areas within the action area may provide short-term foraging and rearing habitat for juvenile chum.

***LCR coho salmon.*** This species includes 25 populations that historically existed in the Columbia River basin from the Hood River downstream (McElhany *et al.* 2007). Willamette Falls is a natural barrier to fall-migrating salmonids, including LCR coho. Of the 25 historical populations, only the Clackamas and Sandy populations show direct evidence that coho production if not reproductively dependent of the spawning of stray hatchery fish (McElhany *et al.* 2007). In the last 5 years, there has been an increase in the abundance of wild coho in the Clackamas and Sandy Rivers, plus the reappearance of moderate numbers of wild coho in the Scapoose and Clatskanie Rivers after a 10-year period in the 1990s when they were largely absent (McElhany *et al.* 2007). Based on the VSP criteria, the Oregon populations of LCR coho are at a high risk of extinction (McElhany *et al.* 2007).

In 2007, NMFS identified the major factors limiting recovery of LCR coho salmon as degradation of floodplain connectivity and function, channel structure and complexity, riparian areas and large woody debris recruitment, stream substrate and flow, water quality, and impacts related to hatcheries and harvesting (NMFS 2007a).

Adults generally migrate through the action area from September to March. After spending approximately 1 year in freshwater, juveniles migrate through the action area to the ocean between April and June.

***SR sockeye salmon.*** Before the turn of the 19th century (c. 1880), about 150,000 sockeye salmon ascended the Wallowa, Payette, and Salmon river basins to spawn in natural lakes (Evermann 1896). Sockeye populations in the Payette basin lakes were eliminated after a diversion dam near Horseshoe Bend was constructed in 1914, and Black Canyon Dam was completed in 1924. In 1916, a dam at Wallowa Lake was increased in height, resulting in the extinction of indigenous sockeye in the lake.

Sockeye salmon in the Salmon River occurred historically in at least four lakes within Idaho's Stanley basin: Alturas, Redfish, Pettit, and Stanley Lakes. Sunbeam Dam, 20 miles downstream from Redfish Lake, severely limited sockeye and other anadromous salmonid production in the upper Salmon River between 1910 and 1934 (Waples *et al.* 1991). In the 1950s and 1960s, more than 4,000 adults returned annually to Redfish Lake. Between 1985 and 1987, an average of 13 sockeye were counted at the Redfish Lake weir. Between 1988 and 1998, only 18 sockeye returned to Redfish Lake. Starting in 1999, all adults returning to the weir were progeny of the captive broodstock program; seven returned in 1999, 257 in 2000, 26 in 2001, and 22 in 2002 (Good *et al.* 2005).

In 2007, NMFS identified the major factors limiting recovery of SR sockeye salmon as impacts related to mainstem Columbia River hydropower (NMFS 2007a).

Adults SR sockeye salmon would pass through the action area starting in late May and continuing through early August, with the peak migrating during June and early July. Sockeye smolts would be in the action area from late April to early July, with the peak in late May.

***LCR steelhead.*** This species includes all naturally-spawning populations of steelhead in streams and tributaries of the Columbia River between, and including, the Cowlitz and Wind rivers in Washington, along with, and including, the Willamette River and Hood River in Oregon. Excluded are steelhead in the Upper Willamette River basin above Willamette Falls and steelhead from the Little and Big White Salmon rivers in Washington.

Five populations of winter steelhead and one population of summer steelhead exist in Oregon's portion of the species (McElhany *et al.* 2007). The population likely present in the action area is the Clackamas River population, which is part of the Cascade winter stratum.

In general, wild steelhead numbers are depressed from historical levels but all populations are thought to exist in most of their historical range, and all historical populations are believed to be extant. However, until recent years, the presence of naturally spawning hatchery fish in most populations has been high (McElhany *et al.* 2007).

The Clackamas population is at low risk for abundance and productivity, although the future impacts of human population growth and climate change add a degree of uncertainty (McElhany *et al.* 2007). Loss of accessibility is limited to larger streams, primarily due to watershed development in the lower basin. The upper Clackamas basin contains most of the historically-productive habitat, and most of that habitat is still of high quality today. For the species, the overall risk classification for Oregon LCR steelhead is moderate, with the Clackamas population at the lowest relative risk (McElhany *et al.* 2007).

The NMFS (2007a) identified degraded floodplain connectivity and function, channel structure and complexity, riparian areas and large wood recruitment, stream substrate, streamflow, water quality, and fish passage and predation/competition as the major factors limiting recovery of this species.

Fish sampling conducted for the Port of Portland in the Columbia River during the spring of 1998 found that abundance of steelhead smolts migrating downstream peaked in early May and declined through late June. Based on these efforts and other earlier sampling in the action area, it is likely that juvenile steelhead travel in deeper, open water habitat rather than along the shoreline of the action area.

***UWR steelhead.*** This species consists of four populations: Molalla, North Santiam, South Santiam, and Calapooia. Habitat loss, hatchery steelhead introgression, and harvest are the major contributors to the decline of this species. Willamette Falls (RM 26.5) is a known migration barrier. Winter-run steelhead and spring-run Chinook salmon historically occurred above the falls, whereas summer-run steelhead, fall-run Chinook, and coho salmon did not. Detroit and Big Cliff dams cut off access to 335 miles of spawning and rearing habitat in the North Santiam River. In general, habitat available to this species has become substantially simplified since the 1800s by removal of large wood to increase the river's navigability. Based on recent analyses of the population criteria, McElhany *et al.* (2007) concluded that the species risk of extinction is moderate, with the highest risk category being species diversity.

The NMFS (2007a) identified degraded floodplain connectivity and function, channel structure and complexity, riparian areas and large wood recruitment, streamflow, fish passage, and predation/competition and disease as the major factors limiting recovery of this species.

Adult late-run UWR winter steelhead migrate through the Lower Willamette River in mid-February and March. The run migrates upstream of Willamette Falls from March through mid-May, with the peak occurring from March through late May. Outmigration of UWR steelhead smolts through the Lower Willamette River begins in March, peaks in May, and is essentially complete by mid-July. Although unlikely, it is possible that small numbers of juvenile UWR steelhead would migrate a short distance upstream from the confluence of the Willamette and Columbia Rivers and rear in the vicinity of Terminal 6, Berth 601 during their downstream migration.

***MCR steelhead.*** This species includes all naturally spawning populations of steelhead in Oregon and Washington drainages upstream from the Hood and Wind river systems to, and including, the Yakima River. The Snake River is not included in this species. Major subbasins are the Deschutes, John Day, Umatilla, Walla-Walla, Yakima, and Klickitat rivers. The John Day River probably represents the largest native, naturally-spawning stock of steelhead in the region. Summer steelhead are widespread; winter steelhead occur in Mosier, Chenowith, Mill, and Fifteenmile creeks in Oregon, and in the Klickitat and White Salmon rivers in Washington.

Estimates of historical (pre-1960s) abundance specific to this species are available for the Yakima River, which has an estimated run size of 100,000 (WDF *et al.* 1993). Assuming comparable run sizes for other drainage areas, the total historical run size may have exceeded

300,000 steelhead. Current population sizes are substantially smaller than historical levels, especially in the rivers with the largest steelhead runs: the John Day, Deschutes, and Yakima rivers. At least two rivers have had extinctions of native steelhead runs: the Crooked and Metolius rivers, both in the Deschutes River basin. In 2002, the count of Bonneville Dam steelhead totaled 481,203, and exceeded all counts recorded at Bonneville Dam since 1938, except the 2001 total which was 633,464. In 2003, total steelhead numbers declined to 361,412. For each of these years, the percentage of the return that has been considered wild steelhead has remained fairly constant. In 2001, 24% of the return was wild; in 2002, 30% of the return was wild; and in 2003, that percentage increased slightly to 31% (Fish Passage Center (FPC) 2004).

Hatchery facilities are in a number of subbasins, although there are also subbasins with little or no direct hatchery influence. The Umatilla and the Deschutes rivers have ongoing hatchery production programs based on locally-derived broodstocks. Moreover, straying from out-of-basin production programs into the Deschutes River has been identified as a chronic occurrence (Good *et al.* 2005).

Blockages have prevented access to sizable steelhead production areas in the Deschutes River and the White Salmon River. In the Deschutes River, Pelton Dam blocks access to upstream habitat historically used by steelhead. Conduit Dam, constructed in 1913, blocked access to all but 2 to 3 miles of habitat suitable for steelhead production in the Big White Salmon River (Rawding 2001, as cited in Good *et al.* 2005).

The NMFS identified degraded floodplain connectivity and function, riparian areas and large wood recruitment, stream substrate and flow, water quality, fish passage, and predation, competition, and disease; and impacts related to mainstem Columbia River hydropower as the major factors limiting recovery of this species (NMFS 2007a).

Adult MCR steelhead are present in the action area from April through January, with the majority of the species migrating through the action area from April through October. Juvenile MCR steelhead migrate downstream through the action area from late March through June, with peak abundance occurring from late April through mid-May.

***UCR steelhead.*** This inland steelhead species occupies the Columbia River basin upstream from the Yakima River to the U.S./Canada border. Rivers in the area primarily drain the east slope of the northern Cascade Mountains and include the Wenatchee, Entiat, Methow, and Okanogan river basins. Estimates of historical (pre-1960s) abundance of UCR steelhead are available from fish counts at dams. Counts at Rock Island Dam (RM 453 of Columbia River) from 1933 to 1959 averaged 2,600 to 3,700 fish, suggesting a pre-fishery run size exceeding 5,000 adults for tributaries above Rock Island Dam (Chapman *et al.* 1994, Busby *et al.* 1996). Lower Columbia River harvests had already depressed fish stocks during the period in which these counts were taken, thus the pre-fishery estimate should be viewed with caution. The average (natural-origin + hatchery-origin fish) returning through Priest Rapids Dam (RM 397 of Columbia River) for 1992 through 1996 was 7,800 fish. For 1997 through 2001, the average annual return was 12,900. In 2002, 15,286 steelhead were counted at Rock Island Dam (RM 453 of Columbia River), compared with the 2001 count of 28,602, and the 10-year average return of

9,165. Of the total steelhead counted at Rock Island Dam in 2002, 10,353 were wild steelhead (FPC 2003).

Steelhead returning to the Upper Columbia River continue to be predominately hatchery-origin fish. The Wenatchee, Methow, and Okanogan are planted with hatchery smolts each year while the Entiat basin has been designated as natural production 'reference' drainage basin, *i.e.,* no hatchery outplantings (Good *et al.* 2005).

The natural-origin percentage of the run over Priest Rapids Dam, which is below the UCR steelhead production areas, increased to over 25% in the 1980s, then dropped to less than 10% by the mid-1990s. From 1992 to 1996, the average natural component of the annual steelhead run over the dam was 1,040, and increased to 2,200 from 1997 to 2001, for a median percentage of 17% natural-origin fish per year (Good *et al.* 2005).

Overall, habitat degradation, and juvenile and adult mortality in the hydropower system, have contributed to the decline of this species, and represent risk factors for the future. The construction of Grand Coulee Dam in 1939 blocked access to over 50% of the river miles formerly available to UCR steelhead (NRC 1996). Harvest in lower river fisheries, thus death from by-catch, and genetic homogenization from composite broodstock collection are other factors that may contribute significant risk to the UCR steelhead. In 2007, NMFS identified degraded floodplain connectivity and function; channel structure and complexity; stream substrate and flow; fish passage; impacts related to hatcheries; impacts related to predation, competition, and disease; and impacts related to mainstem Columbia River hydropower as the major factors limiting recovery of this species (NMFS 2007a).

UCR steelhead typically spend from 1 to 2 years in the ocean before returning to spawn. Adults move through the action area from late June through early November, with the peak occurring in late August to mid-September. Smolts do not spend substantial time rearing in the Lower Columbia River, and probably pass through the action area from mid-May through mid-June.

***SRB steelhead.*** Although direct historical estimates of production from the Snake River basin are not available, the basin probably supported more than half of the total steelhead production from the Columbia River basin (NMFS 2000). Some historical estimates of returns are available for portions of the drainage. Counts of steelhead passing through the adult fish ladder at the Lewiston dam on the lower Clearwater, which began operation in 1927, averaged approximately 40,000 per year between 1949 and 1971.

Extrapolations from tag/recapture data indicate that the natural steelhead return to the Tucannon River (a small tributary to the Snake River below Lewiston, Idaho) may have exceeded 3,000 adults in the mid-1950s (WDF 1991, as cited in Good *et al.* 2005). In the early 1960s, returns to the Grande Ronde River and Imnaha River may have exceeded 15,000 and 4,000 steelhead per year, respectively (ODFW 1991, as cited in Good *et al.* 2005). By the mid-1980s, natural stocks were beginning to show sharp declines in returns. In the 1990s, the average escapement for 1990 to 1994 above Lower Granite Dam was approximately 71,000. However, the wild component of this run was only 9,400 adults (7,000 A-run and 2,400 B-run) (Busby *et al.* 1996). The 2001 return (262,568 total steelhead) over Lower Granite Dam was substantially higher than the low

levels seen in the 1990s, and the recent 5-year mean abundance (14,768 natural returns) was approximately 28% of the interim recovery target level (NMFS 2006a).

Recent review of this species highlighted continued concern for its viability. Historically, SRB steelhead spawned in virtually all accessible habitat in the Snake River up to Shoshone Falls (RM 615). The availability of this habitat has been significantly reduced due to the development of irrigation and hydropower projects on the mainstem Snake River. The species remains spatially well-distributed in each of the six major geographic areas in the Snake River basin. However, the SRB steelhead 'B-run' was particularly depressed. High straying rates, thus, replacement of naturally-produced fish by hatchery fish, are of concern because of the possible homogenization of population structure and diversity (NMFS 2006a).

In 2007, NMFS identified degraded floodplain connectivity and function; channel structure and complexity; riparian areas and large woody debris recruitment; stream substrate and flow; water quality; fish passage; impacts related to predation, competition, and disease; and impacts related to mainstem Columbia River hydropower as the major factors limiting recovery of this species (NMFS 2007a).
Adults migrate through the action area from June to October, with the peak occurring in late June and early July. The downstream migration of juveniles occurs from April through June.

***Green sturgeon.*** Green sturgeon is a widely-distributed, anadromous species found in nearshore waters from Baja California to Canada. Spawning occurs in the spring, in deep pools or turbulent mainstem areas of the Sacramento, Klamath, and Rogue rivers. Specific characteristics of spawning habitat for this species are unknown, as is the estuarine/marine distribution and the timing of estuarine use.

The NMFS defined two distinct population segments (DPS) of green sturgeon: a northern DPS (NDPS) with spawning populations in the Klamath and Rogue rivers and a southern DPS (SDPS) that spawns in the Sacramento River. The SDPS was listed as threatened in 2006 (71 FR 17757) and includes all spawning populations south of the Eel River in California. The NDPS remains a species of concern.

McLain (2006) noted that SDPS green sturgeon were first documented in Oregon and Washington waters in the late 1950s when green sturgeon tagged in San Pablo Bay were recovered in the Columbia River estuary. Preliminary work by Israel and May (2006) determined that 80% or more of the green sturgeon found in the Columbia River estuary during late summer and early fall are part of the SDPS. It is likely that green sturgeon inhabit estuarine waters to feed and optimize growth (Moser and Lindley 2007). Commercial catches of green sturgeon in the Columbia River estuary peak in October, and records from other estuarine fisheries (*i.e.*, Willapa Bay and Grays Harbor, Washington) support the idea that sturgeon are present in these estuaries only from June until October (Moser and Lindley 2007). Harvest information from 1981-2004 indicates that the majority of green sturgeon caught in the Columbia River are caught in the lower reaches (29,132 from RMs 1-20 and 8,086 from RMs 20-52) (USACE 2007). A few green sturgeon may be found as far upriver as Bonneville Dam, but there are no known spawning populations in the Columbia River and its tributaries (USACE 2007).

The principal factor in the decline of the SDPS is the reduction of their spawning habitat to a limited section of the Sacramento River (NMFS 2006b). The potential for catastrophic events to affect such a limited spawning area increases the risk of the green sturgeon's extirpation. Insufficient freshwater flow rates in spawning areas, contaminants (*e.g.*, pesticides), bycatch of green sturgeon in fisheries, potential poaching (*e.g.*, for caviar), entrainment of juveniles by water projects, influence of exotic species, small population size, impassable migration barriers, and elevated water temperatures in the spawning and rearing habitat likely also pose threats to this species (NMFS 2006b).

Because the presence of green sturgeon within the action area during the proposed dredging is extremely remote, NMFS has determined that any impacts of the proposed action on green sturgeon would be insignificant or discountable, and that the proposed action is "not likely to adversely affect" green sturgeon. The effects of the proposed action on green sturgeon are not considered further in this Opinion. However; effects of the proposed action on proposed critical habitat for the species are evaluated below.

***Southern Pacific eulachon.*** The southern Pacific eulachon includes populations spawning in rivers south of the Nass River in British Columbia, Canada, to, and including, the Mad River in California. Eulachon leave saltwater to spawn in their natal streams late winter through early summer, and typically spawn at night in the lower reaches of larger rivers fed by snowmelt. After hatching, larvae are carried downstream and widely dispersed by estuarine and ocean currents. Eulachon movements in the ocean are poorly known although the amount of eulachon bycatch in the pink shrimp fishery seems to indicate that the distribution of these organisms overlap in the ocean (73 FR 13185).

The most significant factor responsible for the decline of southern Pacific eulachon is the effect of climate change on ocean conditions. Other factors include many adverse effects related to dams and water diversions, artificial fish passage barriers, increased water temperatures, insufficient streamflow, altered sediment balances, water pollution, over-harvest, and predation. The viability of this species is under assessment although abrupt and continuing declines in abundance throughout its range and the added vulnerability that a small population size presents for this type of highly fecund, broadcast spawning species are of particular concern. Southern Pacific eulachon occur in four recovery domains: Puget Sound, the Willamette and Lower Columbia, Oregon Coast, and Southern Oregon/Northern California Coasts (73 FR 13185).

**Status of Critical Habitat.** The NMFS reviews the status of critical habitat affected by the proposed action by examining the condition and trends of PCEs throughout the designated area. The PCEs consist of the physical and biological elements identified as essential to the conservation of the species in the documents identifying critical habitat (Tables 2 - 4).

The action area is within designated critical habitat for UWR Chinook salmon, LCR Chinook salmon, UCR spring-run Chinook salmon, SR spring/summer run Chinook salmon, SR fall-run Chinook salmon, UWR steelhead, LCR steelhead, UCR steelhead, MCR steelhead, SRB steelhead, CR chum salmon, LCR coho salmon, and SR sockeye salmon. The PCEs potentially found at the action area are those associated with freshwater rearing and freshwater migration.

In the Lower Columbia River, major factors affecting PCEs for salmon and steelhead species are altered channel morphology and stability, lost or degraded floodplain connectivity with rivers, loss of habitat diversity, excessive sediment, degraded water quality, increased water temperatures, reduced stream flows, and reduced access to spawning and rearing areas (Myers *et al.* 2006).

Salmon and steelhead critical habitat in the action area was rated by NMFS' Critical Habitat Analytical Review Team (CHART) (NMFS 2005b) as having 'high' conservation value, although present conditions in the action area are degraded. The condition of PCEs within designated areas and the human activities that have affected PCE trends are further described in the environmental baseline.

The action area is also within proposed critical habitat for the southern distinct population segment of North American green sturgeon (NMFS 2008a). Relevant PCEs under the proposed critical habitat are those for freshwater riverine system. Proposed critical habitat in the action area was rated as having a 'high' conservation value by NMFS' Critical Habitat Review Team (NMFS 2008b). The condition of PCEs within designated areas and the human activities that have affected PCE trends are further described in the environmental baseline.

**Environmental Baseline for the Action Area**

The action area is within the Lower Columbia River from RM 101 upstream to RM 103. Flow in the Lower Columbia River, which includes the action area, is regulated by a series of mainstem and tributary dams. The action area has changed dramatically in the past 100 years. In the 1920s, the Corps installed a series of rock-filled pile dikes along the south side of Hayden Island. The pile dikes were intended to narrow and deepen Portland Harbor. The disposal of dredged material increased the size of Hayden Island and filled in many historical channels and waterways that connected to the Columbia River, reducing the amount of shallow-water habitat in the action area. Natural high flows, which historically contributed large quantities of sand and silt to the area, have been dampened by the dams.

Within the action area, habitat modification and control of the hydrologic regime by upstream dams has limited salmon and steelhead access to productive feeding habitats. Along the southern shore of the Columbia River in the project reach, segments have been diked and realigned to prevent flooding and to provide suitable conditions for industrial development beside the river. Mature riparian trees (black cottonwoods and willows) are present within the action area, but they were greatly reduced in number to accommodate the industrial development.

Nautical maps from the late 1800s show islands that no longer exist in the Lower Columbia River, including Pearcy Island that was where Terminal 6 now stands. Adjacent high-quality habitat areas such as Smith, Bybee and Ramsey lakes were much larger in size, and provided off-channel habitat for juvenile salmon and steelhead, as did surface channels and backwater areas on west Hayden Island. Diking and upstream dams have reduced the frequency and intensity of flooding, thereby limiting connectivity of the floodplain within the action area. Large wood is rare within the system.

No suitable spawning substrate occurs in the action area. The closest known spawning area occurs in the Lower Columbia River east of the Interstate 205 Bridge, on the Washington side of the river. This area is used by chum salmon. It is unlikely that the action area provides spawning substrate for chum salmon because the area is dominated by sand. However, the substrate within the North Portland Harbor is suitable habitat for the prey of juvenile salmon and steelhead. The fine-grained substrate provides habitat for benthic macroinvertebrates.

Shallow-water habitats comprise less than 5% of the action area between RMs 102 and 106. This habitat is mostly confined to the near-shore areas along the harbor. Upstream of Berth 601, there is a small area of shallow-water habitat (<20 feet deep), which extends upstream to Berth 603. Shoreline habitat is important for juvenile salmon and steelhead because it provides suitable substrate conditions to support benthic algae and prey species, and a reduction in current that significantly reduces their energy requirements. Because juveniles are small and have relatively weak swimming abilities, feeding is most effective in areas where current velocities are slow. Velocities of 12 inches/second or less are best for optimal foraging (Bottom *et al.* 2001). This type of habitat is greatly limited in the action area. Dredging has resulted in a bottom profile that deepens faster, moving away from the shoreline, than prior to development of the berth.

Flows in the Columbia River are typical of a snowmelt-dominated system with peak flows in May and June, which coincides with the peak outmigration of juvenile salmonids and steelhead. During the spring and early summer months, upstream storage dams hold back water for flood control and hydropower generation, which interrupts seasonal river flow patterns. As a result, river flows are significantly reduced, resulting in delays in both juvenile and adult migration. Also, low flows contribute to juvenile salmon and steelhead mortality, as more fish are directed toward turbines, rather than over dam spillways. To increase juvenile survival, NMFS has established flow targets for several dams.

The Lower Columbia River from RMs 98 to 142 is classified as water-quality limited under section 303(d) of the Federal Clean Water Act by the DEQ, for dichloro-diphenyl-trichloroethane (DDT), dichloro-diphenyl-dichloroethylene (DDE), polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), arsenic, pH (spring), and temperature (year-round) (DEQ 2006). The EPA has approved total maximum daily loads for the Columbia River for 2,3,7,8 TCDD (dioxin) and total dissolved gas. Concentrations of PCBs, DDE, and DDT found in carp, peamouth, and sucker exceed human heath criteria, and the Oregon Department of Human Services has issued recommendations regarding fish consumption (ODHS 2008).

Water temperatures in the action area exceed the DEQ water quality criteria during the summer for both spawning and juvenile rearing. The peak period of juvenile salmon and steelhead abundance in the action area is from April through June. During this time, water temperatures typically range from 45° to 64°F (meeting the standard).

Average turbidity in the Columbia River tends to be greatest in winter and early spring due to stormwater runoff and high flows. Salmon and steelhead are using the action area at this time, and turbidity ranges from 7 to 25 NTUs. These levels are low to moderate.

Arsenic concentrations at RM 102 in the Columbia River exceed the EPA ambient water quality criteria for the protection of human health and EPA human-health advisories for drinking water (Fuhrer *et al.* 1996). Approximately 102 municipal and industrial sites discharge into the Lower Columbia River and the first 16 river miles of its tributaries. More than half are sewage-treatment plants, chemical manufacture facilities, or wood product facilities.

Berth 607 has been used exclusively for auto loading and unloading and is not known to have contaminated sediments. In March 2008, sediment samples were collected at Berths 601 and 607. The sediment samples were analyzed for metals, tributyltin (TBT), PAHs, semivolatile organic compounds (SVOCs); organochlorine pesticides; and PCBs. Based on the sediment characterization report prepared by Hart Crowser (2008), none of the analytical parameters detected at Berth 601 exceeded the Sediment Evaluation Framework screening levels. However, at Berth 607, zinc and TBT were detected at concentrations greater than the Sediment Evaluation Framework screening levels for benthic toxicity (Hart Crowser 2008) at the newly exposed surface materials (NSM). To empirically determine the potential for benthic toxicity, biological testing was then conducted on the NSM sediments that had exceedences. The Port conducted biological testing on the NSM at Berth 607 and reference samples taken from Berth 601 using a 28-day Amphipod (Hyalella azteca) survival and growth test and a 20-day Midge (Chironomus dilutus) survival and growth test. There was no significant difference from growth or mortality from either of the two bioassay tests affirming no benthic toxicity.

**Effects of the Action**

The proposed action consists of dredging (underwater excavation) that produces spoils (excess material) and in-water disposal which will cause the following effects: (1) Sediment resuspension; (2) release of contaminants from bedded and suspended sediments; and (3) altered physical habitat and prey-base. Each of these effects will be discussed more fully below.

**Dredging.** Dredging will result in the immediate resuspension of sediment that will be redeposited at the dredging site or transported to other locations in the Lower Columbia River. Resuspension rates have been reported to range up to 5% of the total volume dredged depending on the methodology of the dredging operation and the nature of sediments dredged (Anchor Environmental 2003, Hayes and Wu 2001).

During dredging operations, a close-lipped "environmental" bucket will form a seal when the bucket is in the closed position and retrieved to the surface. This will lower resuspension rates by localizing sediment releases near the river bottom. Data from comprehensive studies show that resuspension rates for bucket dredges are at 1% (Hayes and Wu 2001), less than most other methodologies. This would result in approximately 100 cy of sediment being resuspended from dredging operations resulting in adverse effects to water quality though increases in turbidity and potential contaminants. This increase in turbidity will be localized and short-term, and will be dissipated within a few hours following cessation of the activity due to methodology and the nature of the sediments. The Port predicts dredging will be required once during the 5-year permit period and that the dredging of both berths will take approximately 15 to 20 days. Therefore, turbidity will likely remain elevated and localized throughout area during the 15 to 20 days of dredging.

*Contaminants.* Analytical results on samples from Berth 601 showed that both dredge prism and NSM sediments are below SEF SLs for benthic toxicity. Sediment data for Berth 607 indicated two contaminants of concern exceeding SEF SLs for benthic toxicity: zinc in one NSM sample, and TBT in the dredge prism and one NSM sample. Contamination is often stratified in the sediment bed. Therefore sampling can only affirm the presence of contaminants while the variability of concentrations will remain unknown. The release of these contaminants into the water column can occur through the transfer from sediment pore water and sediment particles during resuspension during dredging operations and in-water disposal. Contaminants that have partitioned into to the water column will be transported downstream in dissolved form along with dissolved contaminants in the released pore water depending on the tidal cycle.

*Prey Base Effects (Dredging Site).* The areas proposed for dredging at Terminal 6 are deep-water habitat. Dredging will maintain the existing habitat as deep-water habitat despite being in a depositional area that has a potential to develop into shallow-water habitat, a rare habitat-type in the lower action area. In deep-water habitat, the primary mode of feeding for juvenile salmonids is planktonic or pelagic (*e.g., Daphnia, Corophium* spp.; Vile *et al.* 2004) rather than benthic. Increased turbidity during dredging will disrupt planktonic feeding in these berths, and this effect will last for up to 24 hours following the dredging. It is unlikely that changes in the pelagic community will be measurable during or following dredging because of the flow-induced movements of these animals, and their transient presence in the action area. Thus, pelagic feeding in the deep-water berths within the action area will be disrupted for a maximum of several weeks during the one-time dredging event.

Although not as likely, the benthic mode of feeding may also be used by juvenile salmon within the action area. The temporal extent of disruptions to benthic feeding compared to planktonic feeding from the proposed action will be longer. The benthic invertebrate populations will be disturbed over the long term (weeks to months) within the dredge prism until the new exposed substrate layer is recolonized. Because Berths 601 and 607 are already actively accessed by deep draft vessels, and subject to prop wash and deposition, it is unlikely that a healthy benthic community is currently present in the berths.

**Disposal.** The Port is likely to dispose of the sediments in-water at the Oregon Slough In-water Placement site located at RM 102.2. Turbidity increases would either result when the barge is releasing sediments to the bottom of the river or discharging sediments to the river through tremie chutes. The disposal operations will occur faster (< 1 day), than during dredging activities (several weeks), therefore the increases in turbidity and associated suspended sediments will be short-term and of limited duration. However, the sediments have been predominately characterized as silty claylike materials which will have a relatively lower settling rate than other materials such as course grained sand. The disposal area is deep water (50- to 70-foot depths) and is outside of the primary juvenile salmonid rearing and migration areas (near shore shallow-water habitat <20 feet deep), although the upper 20 feet may be used for migration of adult ESA-listed salmonids.

*Prey Base Effects (in-water disposal site).* In-water placement of dredge material will likely disrupt the benthic community in the in-water disposal area through smothering any

established benthic community. However, the Oregon Slough In-Water Placement site is in water 50 to 70 feet deep, which is not feeding habitat for juvenile salmonids.

**Effects on Species.** The presence/absence information for ESA-listed species in the action area during the Columbia River winter in-water work window of November 1 through February 28 is provided in Table 5. Scheduling work during this time will reduce potential impacts to ESA-listed species through the avoidance of peak migration periods for adult and juvenile Chinook, chum, and sockeye salmon, steelhead, and juvenile coho salmon. Of the five types of salmon and steelhead considered in this Opinion, four are likely to be present in the action area during the winter in-water work window as adults, two are likely to be present as juveniles, and one, sockeye, is not likely to be present in significant numbers at any life stage (Table 5).

For Eulachon, in the Columbia River and its tributaries, spawning usually begins in January or February (Beacham *et al.* 2005) with migrations documented to start at the mouth of the Lower Columbia River in December (WDFW 2008, ODFW 2008). However, the action area is over 100 miles away and assuming that Eulachon travel approximately 4 miles per day, Eulachon off-peak migration will reach the action area in January.

**Table 5.** The presence/absence of ESA-listed salmonids in the action area (Columbia River) during the Columbia River winter in-water work window (November 1 to February 28). 'Y' indicates the species is present, 'Y-' indicates that while the life stage may be present, peak migration is not at this time', 'N' indicates that the species is not likely to be present.

| Species | Winter In-water Work Window | |
|---|---|---|
| | Adults | Juveniles |
| Chinook salmon | Y- | Y- |
| Chum salmon | Y- | N |
| Coho salmon | Y | Y- |
| Sockeye | N | N |
| Steelhead | Y- | N |
| Green Sturgeon | N | N |
| Eulachon | Y- | |

Effects to sockeye salmon are not likely because the winter in-water work period avoids the juvenile and adult migration periods for this species, and juvenile sockeye salmon do not rear in the project vicinity.

Effects to green sturgeon are also not likely because the best available information show that adult and subadult green sturgeon only occur in the Columbia River between June and October (Moser and Lindley 2007) and also will not be present during the winter in-water work window.

A known spawning site for chum salmon is a few miles upriver of the project site (RM113 to RM143); spawning of chum is not known to occur in the action area. The project timing overlaps with off-peak juvenile rearing and migration as well as off-peak adult migration;

therefore, both life stages of chum salmon may be present in low numbers during the in-water work period.

While the winter in-water work window avoids peak smolt out-migration and peak adult migration for both Chinook salmon and steelhead, some adult migration occurs for both species during this time period, and some juvenile Chinook are known to outmigrate during this time. Juvenile steelhead are not likely to migrate through the action area during the in-water work window. The work period also overlaps with adult migration for coho salmon, and off-peak migration for Eulachon and off-peak migration and rearing of juvenile coho.

***Water Quality Effects.*** Fish will be exposed to increased turbidity downstream from project activities. The effects of suspended sediment and turbidity on fish, as reported in the literature, range from beneficial to detrimental. Elevated total suspended solids (TSS) conditions have been hypothesized to enhance cover conditions, reduce predation on salmonids, and improve survival. Elevated TSS conditions have also been reported to cause physiological stress, reduce growth, and adversely affect survival. Of key importance in considering the detrimental effects of TSS on fish are the frequency and the duration of the exposure, not just the TSS concentration. At concentrations of 53 to 92 parts per million (ppm) (24 hours) macroinvertebrate populations were reduced (Gammon 1970). Concentrations of 250 ppm (1 hour) caused a 95% reduction in feeding rates in juvenile coho salmon (Noggle 1978). Concentrations of 1200 ppm (96 hours) killed juvenile coho salmon (Noggle 1978). Concentrations of 53.5 ppm (12 hours) caused physiological stress and changes in behavior in coho salmon (Berg 1985). The proposed dredging maintenance program will increase turbidity in the Columbia River for the duration of the dredging action. The increases in turbidity and suspended solids will be short-term and dissipate within several hours, and will be localized, and will likely trigger similar adverse effects to those described above (stress and behavioral changes) for a few ESA-listed salmonids in the action area.

As was described in the Effects of the Action section, recent chemistry data from Berths 601 and 607 indicate that sediments in these berths are contaminated at levels that exceed SEF screening thresholds with TBT and zinc. TBT has been widely introduced into aquatic environments as the bioactive component of antifouling paints. These paints are used on boats and ships to keep them free of plant and animal growths. TBT compounds are highly to very highly toxic to many species of aquatic organisms. TBT exposure to non-target aquatic organisms such as mussels, clams, and oysters, at low levels, may cause structural changes, growth retardation, and death (Huggett *et al.* 1992). Juvenile Chinook salmon accumulate TBT immediately upon exposure to low TBT concentrations. TBT and its metabolite, DBT, have been found in salmon muscle tissue (Short and Thrower 1986). Because of the low water solubility of TBT and other properties, it will bind strongly to suspended material such as organic material or inorganic sediments and precipitate to the bottom sediment (Short and Thrower 1986). However, TBT bioaccumulation factors for benthic organisms are generally high compared to other compounds (Meador 2000), and the primary pathway of exposure for salmonids is likely through their diet.

During studies of zinc toxicity to salmonids, effects ranging from mortality to decreased growth have been observed (Farag *et al.* 1994; Bowen *et al.* 2006). The magnitude of the effect of zinc exposure to salmonids has been shown to increase with longer exposure times and higher zinc

concentrations (Farag *et al.* 1994). However, concentrations of zinc are not likely to be high enough to cause mortality because zinc will likely be sequestered onto organic materials within the sediment and will dissipate rapidly in the dissolved phase.

ESA-listed species will experience direct exposure to these contaminants through contact with suspended sediment particles and contaminants desorbed from those particles into a dissolved phase. Since the proposed action will cause short-term increases in contaminants, and the bioavailability of these contaminants will be tempered by sequestration unto organic materials and rapid dilution of dissolved contaminants, exposure will not kill fish, but is likely to result in behavioral changes (*e.g.*, avoidance, altered feeding, delayed migration), physiological stress, and reduced fitness of juvenile ESA-listed salmonids that are present in the area during the in-water work window.

Within the Lower Columbia River, if ESA-listed species are present while dredging is on-going, migration may be delayed because of increased turbidity. Adults will easily be able to avoid the work area, but juvenile salmon, steelhead, and Eulachon are less able to swim around the disturbance and their movements may be delayed. However, the affected area is relatively small when compared to the width of the Lower Columbia River corridor which provides ample space and opportunity to swim around any sediment plume. If they are delayed in areas with suitable cover and forage opportunities, then the delay will likely be energetically neutral. However, if cover and forage are not available, then the delay can mean greater risk of predation, increased exposure to contaminants, energetic costs associated with poor food availability and swimming in current. Juveniles are commonly found along the edge of the rivers where the majority of project activities will occur.

Therefore, some juvenile salmonids and Eulachon will likely be injured by the increased turbidity and contamination within the action area. The effects will likely be increased physiological stress, reduced feeding, change in behavior, and delayed migration because the duration of the in-water portion of the proposed action is expected to be short-term, the spatial extent is small, few ESA-listed fish will be present in the action area during the in-water work window, and the Eulachon run will be off-peak while the work is occurring, the effect of increased turbidity and contaminants at the population level or at the species scale is not likely to be measurable.

The pelagic food web could also be affected by a short-term increase (hours) in contaminant concentrations and increased turbidity during and following dredging activities. There is a risk of effects to pelagic invertebrates through increased exposure to contaminants. It is unlikely that changes in the pelagic community will be measurable because of flow-induced movements of these animals, and their transient presence in the action area. Because the reduction in pelagic invertebrates would be very short-term and small in magnitude, it is not likely that this reduction in food source will result in death or injury of ESA-listed salmonids.

**Effects on Critical Habitat.** Designated critical habitat within the action area for the ESA-listed salmonids and green sturgeon considered in this Opinion consists of freshwater rearing sites and freshwater migration corridors and their essential physical and biological features as listed below. The effects of the proposed action on these features are summarized as

a subset of the habitat-related effects of the action that were discussed more fully above. The water quality effects and forage effects described below will be short-term (weeks) during in-water dredging.

Salmon and steelhead freshwater rearing sites
*Floodplain connectivity* – No effect.

*Forage* – Short-term effects to pelagic and benthic prey items are likely. Impacts to pelagic prey are expected to last for hours and the impacts to benthic prey are expected to last for several days to weeks after the dredging is completed unless sloughing of shallow-water habitat upstream of Berth 601 occurs, then reduction of benthic habitat will likely last several months. The effects to the forage PCE will be most significant in shallow-water habitat upstream of Berth 601.

*Natural cover* – No effect.

*Water quality* – Turbidity and contaminant concentrations will increase during the several weeks that dredging will take place. Over the long term, water quality will be maintained.

*Water quantity* – No effect.

Salmon and steelhead freshwater migration corridors
*Free passage* – Increased suspended sediment and contaminants from the dredging will likely briefly delay migration in the LCR.

*Water quantity* – No effect.

*Water quality* – Short-term increases in turbidity and contaminants during dredging operations will likely slightly impair or briefly delay the movement of juvenile salmon through the project reach.

*Natural cover* – No effect.

Green sturgeon freshwater riverine system
*Food resources* – Short-term effects to pelagic and benthic prey items are likely. Impaets to pelagic prey are expected to last for hours and the impacts to benthic prey are expected to last for several days to weeks after the dredging is completed unless sloughing of shallow-water habitat upstream of Berth 601 occurs, then reduction of benthic habitat will likely last several months but will likely be fully functioning by the time Green Sturgeon returns.

*Migratory corridor* – No effect.

*Sediment quality* – No effect.

*Water quality* – Turbidity and contaminant concentrations will increase during the several weeks that dredging will take place but in the time frame when green sturgeon are not present. Over the long term, water quality will be maintained.

Information presented in the status and baseline sections, above, show that poor conditions for rearing and migration are significant factors for the affected species. The effects of this action will lower the value of those PCEs in the action area over the short term (weeks), but will not affect the conservation value of the action area over the long term as long as there will be no loss of shallow-water habitat in the action area. The conservation value of the watershed for the species is already very low and has low potential for improvement, either naturally or through active restoration, because of the highly industrialized nature of this portion of the watershed.

**Cumulative Effects**

Additional projects within the watershed are anticipated as population growth continues in the region. Between 2000 and 2006, the population of Multnomah County increased by 3.2%.[1] Associated road and commercial development, as well as maintenance and upgrading of the existing infrastructure, are therefore likely to occur in the foreseeable future. Within the project action area, deep-draft cargo vessels will continue to call at these berths. These berthing areas are subject to disturbance by deep draft vessels that transport automobiles, which likely reduces the substrate suitability for benthic colonization. Propwash from these deep draft vessels can cause the resuspension of sediment as ships dock at the Port's marine facilities. These impacts may occur at Berths 601 and 607 when auto carrying vessels dock at berthing facilities. However, turbidity increases from propwash are expected to quickly dissipate out of the water column and not cause death or injury to ESA-listed species.

**Conclusion**

In developing our conclusion, NMFS reviewed the status of:

- The 15 ESA-listed species considered in this Opinion and their designated and proposed critical habitats,
- eulachon (currently proposed for listing),
- the environmental baseline for the action area,
- the effects of the proposed action, and
- the cumulative effects.

Based on this review, NMFS concludes that the proposed action is not likely to jeopardize the continued existence of the listed species, and will not result in the destruction or adverse modification of designated critical habitat.

The NMFS has also determined that the effects to green sturgeon and SR sockeye salmon will be discountable because the best available information indicates that both species will not be present in the action area during the proposed dredging and disposal operations. Impacts to Eulachon will also be discountable because their fish run will be off-peak during the time of dredging disposal and few fish are likely to be present in the action area during the in-water work window.

[1] U.S. Census Bureau, State and County Quickfacts, Multnomah County, http://quickfacts.census.gov/qfd/states/41/41051.html

The proposed action will degrade water quality for a period lasting up to 3 weeks in the action area, by slightly increasing concentrations of suspended sediment, and concentrations of suspended sediment contaminated with zinc and TBT, in the immediate vicinity of the dredging. ESA-listed species will experience direct exposure to these contaminants through contact with suspended sediment particles and contaminants desorbed from those particles into a dissolved phase. Since the proposed action will cause short-term increases in contaminants, and the bioavailability of these contaminants will be tempered by sequestration unto organic materials and rapid dilution of dissolved contaminants, exposure will not kill fish, but is likely to result in behavioral changes (*e.g.*, avoidance, altered feeding, delayed migration), physiological stress, and reduced fitness of juvenile ESA-listed salmonids that are present in the area during the in-water work window.

In addition, the migration of some adult and juvenile salmon are likely to be disrupted in the action area, temporarily increasing stress and slightly increasing energetic costs of migration. These probable effects will affect only a small proportion of each of the affected species that migrate through the area during a single year. Therefore, the likelihood of survival and recovery for these species will not be appreciably reduced by the proposed action. The degradation of water quality and the contamination of forage organisms will slightly reduce the conservation value of designated critical habitat in the action area for a period lasting up to a few months, but the effects will be limited to the action area, and therefore will not cause the destruction or adverse modification of critical habitat at the scale of the designation. Over the long term, the conservation value of these PCEs will be maintained.

### Reinitiation of Consultation

Reinitiation of formal consultation is required and shall be requested by the Federal agency or by NMFS where discretionary Federal involvement or control over the action has been retained or is authorized by law and: (a) If the amount or extent of taking specified in the incidental take statement is exceeded; (b) if new information reveals effects of the action that may affect listed species or designated critical habitat in a manner or to an extent not previously considered; (c) if the identified action is subsequently modified in a manner that has an effect to the listed species or designated critical habitat that was not considered in the biological opinion; or (d) if a new species is listed or critical habitat is designated that may be affected by the identified action (50 CFR 402.16).

To reinitiate consultation, contact the Oregon State Habitat Office of NMFS, and refer to the NMFS Number assigned to this consultation (2008/01071).

## Incidental Take Statement

Section 9 of the ESA and Federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without a special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by NMFS to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is

defined by Fish and Wildlife Service as an intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA, provided that such taking is in compliance with the terms and conditions of this incidental take statement.

Take prohibitions of the ESA do not apply to a species until it is listed and, if listed as threatened, protective regulations are in effect. Therefore, this incidental take statement does not apply to southern green sturgeon until protective regulations are in place. Moreover, this incidental take statement does not apply to southern Pacific eulachon until after the listing process is complete, protective regulations are in effect, and this conference opinion is confirmed by NMFS as a biological opinion issued through formal consultation.

**Amount or Extent of Take**

Activities necessary to complete the proposed maintenance dredging at Terminal 6 will take place within the active channel of the Lower Columbia River when individuals of LCR Chinook salmon, UWR Chinook salmon, UCR spring-run Chinook salmon, SR spring/summer run Chinook salmon, SR fall-run Chinook salmon, CR chum salmon, LCR coho salmon, LCR steelhead, UWR steelhead, MCR steelhead, UCR steelhead, SRB steelhead, and southern Pacific eulachon are likely to be present. Adverse effects of the proposed action will include the temporary loss of prey items for rearing juveniles, and an increase in turbidity and exposure to pollutants, including elevated levels of zinc and TBT. The habitat that will be adversely affected by the proposed action is of moderate to poor quality. These effects are reasonable likely to result in incidental take—harassment of adults and juveniles, and harm of juveniles (avoidance behaviors, impaired feeding, reduced growth)— within an area extending from 0.25 mile upstream to 0.5 mile downstream from the terminal.

The distribution and abundance of fish that occur within an action area are affected by habitat quality, competition, predation, and the interaction of processes that influence genetic, population, and environmental characteristics. These biotic and environmental processes interact in ways that may be random or directional, and may operate across far broader temporal and spatial scales than are affected by the proposed action. Thus, the distribution and abundance of fish within the action area cannot be attributed entirely to habitat conditions, nor can NMFS precisely predict the number of fish that are reasonably certain to be injured or killed if their habitat is modified or degraded by the proposed action.

Here, the best available indicator for the extent of take will be described as the modification of water quality, which is directly related to suspended sediment from dredging activities with suspended sediment plumes measured 300 feet downcurrent from dredging activities that are no more than 10% greater than the background level. Monitoring intervals shall be every two hours during both dredging and in-water placement and will not exceed 10% above background levels more than once every 8 hours.

In the accompanying Opinion, NMFS determined that this level of incidental take is not likely to result in jeopardy to the species. The measured amount of suspended sediment is a threshold for reinitiating consultation. Exceeding these indicators for extent of take will trigger the reinitiation provisions of this Opinion.

**Reasonable and Prudent Measures**

The following measures are necessary and appropriate to minimize the impact of incidental take of listed species from the proposed action:

The Corps shall:

1. Minimize incidental take from project-related activities by applying permit conditions to the proposed action that reduce the exposure of ESA-listed salmonids to increased turbidity and contaminants (water quality).

2. Ensure completion of a monitoring and reporting program to confirm that the take exemption for the proposed action is not exceeded, and that the terms and conditions in this incidental take statement are effective in minimizing incidental take.

**Terms and Conditions**

The measures described below are non-discretionary, and must become binding conditions of any permit or grant issued to the applicant, for the exemption in section 7(o)(2) to apply. The Corps has a continuing duty to regulate the activity covered by this incidental take statement. If the Corps (1) fails to assume and implement the terms and conditions or (2) fails to require an applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. To monitor the impact of incidental take, the Corps or applicant must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement.

1. To implement reasonable and prudent measure #1 (reduce water quality impacts), the Corps shall ensure that:

    a. Work Window. To minimize effects to juvenile salmonids, dredging shall be limited to the in-water work window (November 1 through February 28).
    b. Notice to Contractors. Before beginning work, all contractors working on site shall be provided with a complete list of Corps permit special conditions, reasonable and prudent measures, and terms and conditions intended to minimize the amount and extent of take resulting from general dredging activities and in-water work.
    c. Minimize Impact Area. The applicant will confine dredging impacts to the minimum area necessary to complete the project. If a floating crane is used, it shall not rest on or disturb bottom sediment (this does not apply to spuds that may be used to stabilize the materials barge).

d. No Redistribution. Dumping of partial or full buckets of dredged material back into the project area is not allowed. Dredging of holes or sumps below the maximum depth, and redistribution of sediment by dredging, dragging or other means is not allowed.

e. Debris. All large anthropogenic debris shall be removed from dredged sediments and transported to an appropriate disposal site.

f. Cycling Time. Clamshell cycling time shall be slowed, as necessary, to reduce turbidity and reduce sediment drift to adjacent areas.

g. Pollution Control Plan. The applicant will prepare and implement a plan to prevent pollution caused by dredging and disposal operations from entering the river.

h. Transport. The sediments shall be covered during transport on the barge to prevent the blowing of sediment back into the river if winds are predicted to be greater than 20 miles per hour during transport.

i. Staging Area. The dredge material barge shall be staged in water deeper than 20 feet.

j. Upland Disposal. The upland disposal sites shall be large enough to accommodate the quantity of material and water to be placed there to allow adequate settling. Best management practices such as filter bags, sediment fences, silt curtains, leave strips or berms shall be employed and maintenances daily to reduce turbidity levels form the upland disposal location to the maximum extent practicable.

2. To implement reasonable and prudent measure #2 (monitoring and reporting), the Corps shall ensure that:

a. Dredge Prism Monitoring. The size of the dredge prism shall be monitored (depth, areal extent, and total quantity of material removed). The applicant will conduct post-dredge bathymetry survey to ensure that only the specified material was removed.

b. Turbidity Monitoring. Quantitative turbidity monitoring shall be conducted and recorded as described below. Monitoring shall occur each day during daylight hours when in-water work is being conducted, which includes dredging and in-water disposal activities. A properly and regularly calibrated turbidimeter is required.

   i. Representative background point. A sample shall be taken every 2 hours at an undisturbed area upcurrent from the area being dredged or the in-water disposal area to establish background turbidity levels for each monitoring cycle. Background turbidity, location, time, and tidal stage must be recorded prior to monitoring.

   ii. Compliance point. Monitoring shall occur every 2 hours approximately 300 feet downcurrent from the area being dredged or the in-water disposal area and be compared against the background measurement. The turbidity, location, time, and tidal stage must be recorded for each sample.

   iii. Compliance. Results from the compliance points shall be compared to the background levels taken during that same monitoring interval. Turbidity

shall not exceed an increase of 10% above background more than once in an 8-hour period.

iv. Reporting. Copies of daily logs for turbidity monitoring shall be available to NMFS upon request.

c. Reporting. The applicant will report all monitoring items including turbidity, bathymetry, and extent of the dredge prism to NMFS within 60 days of project completion, or within 60 days of the end of the in-water work window that work occurred during. Any exceedance of take covered by this Opinion must be reported by the applicant to NMFS immediately.

d. Submit monitoring reports to:

National Marine Fisheries Service
Oregon State Habitat Office
Attn: 2008/01071
1201 NE Lloyd Boulevard, Suite 1100
Portland, OR 97232-2778

e. NOTICE: If a sick, injured or dead specimen of a threatened or endangered species is found in the project area, the finder must notify NMFS through the contact person identified in the transmittal letter for this Opinion, or through the NMFS Office of Law Enforcement at 1-800-853-1964, and follow any instructions. If the proposed action may worsen the fish's condition before NMFS can be contacted, the finder should attempt to move the fish to a suitable location near the capture site while keeping the fish in the water and reducing its stress as much as possible. Do not disturb the fish after it has been moved. If the fish is dead, or dies while being captured or moved, report the following information: (1) NMFS consultation number; (2) the date, time, and location of discovery; (3) a brief description of circumstances and any information that may show the cause of death; and (4) photographs of the fish and where it was found. The NMFS also suggests that the finder coordinate with local biologists to recover any tags or other relevant research information. If the specimen is not needed by local biologists for tag recovery or by NMFS for analysis, the specimen should be returned to the water in which it was found, or otherwise discarded.

## MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT

The consultation requirement of section 305(b) of the MSA directs Federal agencies to consult with NMFS on all actions, or proposed actions that may adversely affect EFH. Adverse effects include the direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality or quantity of EFH. Adverse effects to EFH may result from actions occurring within EFH or outside EFH, and may include site-specific or EFH-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810). Section 305(b) also requires NMFS to recommend measures that may be taken by the action agency to conserve EFH.

The Pacific Fishery Management Council (PFMC) designated EFH for groundfish (PFMC 2006), coastal pelagic species (PFMC 1998), and Chinook salmon, coho salmon, and Puget Sound pink salmon (PFMC 1999). The proposed action and action area for this consultation are described in the Introduction to this document. The action area includes areas designated as EFH for various life-history stages of coho and Chinook salmon (PFMC 1999).

Based on information provided in the BA and the analysis of effects presented in the ESA portion of this document, NMFS concludes that proposed action will have the following adverse effects on EFH designated for Pacific Coast salmon: Short-term (weeks) degradation of water quality (turbidity and contaminants).

**EFH Conservation Recommendations**

The following two conservation measures are necessary to avoid, mitigate, or offset the impact of the proposed action on EFH. These conservation recommendations are a subset of the ESA terms and conditions.

1. Reduce water quality impacts: Follow terms and conditions 1a – 1j as presented in the ESA portion of this document.

2. Monitoring: Follow terms and conditions 2a - 2e as presented in the ESA portion of this document.

**Statutory Response Requirement**

Federal agencies are required to provide a detailed written response to NMFS' EFH conservation recommendations within 30 days of receipt of these recommendations [50 CFR 600.920(j) (1)]. The response must include a description of measures proposed to avoid, mitigate, or offset the adverse affects of the activity on EFH. If the response is inconsistent with the EFH conservation recommendations, the response must explain the reasons for not following the recommendations. The reasons must include the scientific justification for any disagreements over the anticipated effects of the proposed action and the measures needed to avoid, minimize, mitigate, or offset such effects.

In response to increased oversight of overall EFH program effectiveness by the Office of Management and Budget, NMFS established a quarterly reporting requirement to determine how many conservation recommendations are provided as part of each EFH consultation and how many are adopted by the action agency. Therefore, we ask that in your statutory reply to the EFH portion of this consultation, you clearly identify the number of conservation recommendations accepted.

**Supplemental Consultation**

The Corps must reinitiate EFH consultation with NMFS if the proposed action is substantially revised in a way that may adversely affect EFH, or if new information becomes available that affects the basis for NMFS' EFH conservation recommendations [50 CFR 600.920(k)].

## DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW

Section 515 of the Treasury and General Government Appropriations Act of 2001 (Public Law 106-554) (Data Quality Act) specifies three components contributing to the quality of a document. They are utility, integrity, and objectivity. This section of the Opinion addresses these Data Quality Act (DQA) components, documents compliance with the DQA, and certifies that this Opinion has undergone pre-dissemination review.

**Utility:** Utility principally refers to ensuring that the information contained in this consultation is helpful, serviceable, and beneficial to the intended users.

This ESA consultation concludes that the proposed berth maintenance project will not jeopardize the affected listed species. Therefore, the Corps can authorize this action in accordance with its authority under section 10 of the Rivers and Harbors Act and section 404 of the Clean Water Act. The intended users are the Corps and the Port of Portland.

Individual copies were provided to the above-listed entities. This consultation will be posted on the NMFS Northwest Region website (http://www.nwr.noaa.gov). The format and naming adheres to conventional standards for style.

**Integrity:** This consultation was completed on a computer system managed by NMFS in accordance with relevant information technology security policies and standards set out in Appendix III, 'Security of Automated Information Resources,' Office of Management and Budget Circular A-130; the Computer Security Act; and the Government Information Security Reform Act.

**Objectivity:**

***Information Product Category:*** Natural Resource Plan.

***Standards:*** This consultation and supporting documents are clear, concise, complete, and unbiased; and were developed using commonly accepted scientific research methods. They adhere to published standards including the NMFS ESA Consultation Handbook, ESA regulations, 50 CFR 402.01, *et seq.*, and the MSA implementing regulations regarding EFH, 50 CFR 600.920(j).

***Best Available Information:*** This consultation and supporting documents use the best available information, as referenced in the Literature Cited section. The analyses in this Opinion/EFH consultation contain more background on information sources and quality.

***Referencing:*** All supporting materials, information, data and analyses are properly referenced, consistent with standard scientific referencing style.

***Review Process:*** This consultation was drafted by NMFS staff with training in ESA and MSA implementation, and reviewed in accordance with Northwest Region ESA quality control and assurance processes.

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CENWP-EC-HR

February 24, 2011

**Memorandum for:** Portland District Operations Division, Regulatory Branch (Taylor)

**Subject:** Project Review Group Technical Memorandum for the Port of Portland's January 14, 2011 Recency Evaluation of Sediment Characterization Data, Terminal 6, Berths 601 and 607 (Recency Letter) (Columbia River).

**Reviewers:** The following summary reflects the final consensus determination of the Portland District Project Review Group (PRG) agencies (U.S. Army Corps of Engineers, Environmental Protection Agency, National Marine Fisheries Service, Washington Department of Ecology, and Oregon Department of Environmental Quality) re: the recency of the Port of Portland's sediment quality data and bioassay testing per the 2009 *Sediment Evaluation Framework for the Pacific Northwest* (SEF). Reviewers included: James McMillan (Corps), Jim Turner (NMFS), Peter Anderson (DEQ), Jonathan Freedman (EPA), Laura Inouye (Washington Department of Ecology). U.S. Fish and Wildlife Service did not review the document.

**Prepared by:** James M. McMillan (CENWP-EC-HR)

**Applicable Authorities Governing the Project:** Section 10 of the Rivers and Harbors Act, Section 404/401 of the Clean Water Act, Section 7 of the Endangered Species Act; Section 305 of the Magnuson-Stevens Act; et al.

**Project Description:** Terminal 6 is located at 7201 N. Marine Drive in Portland, Oregon, along the south bank of the Columbia River on the Oregon Slough. The terminal spans approximately 1.5 miles beginning at river mile (RM) 102 on the Columbia River and ending upstream at RM1 on the Oregon Slough.

Berths 601 and 607 are used for the unloading of Hyundai and Honda automobiles, respectively. Maintenance dredging is needed due to the gradual deposition of river sediment in the berthing areas that compromises the authorized navigational depth clearances required for ships.

- Berth 601. The permitted design depth is -36 feet CRD plus up to 2 feet of overdredge allowance for in-fill and dredging tolerance. The leave surface would likely average -37 feet CRD. The estimated volume of sediment to be dredged ranges from approximately 7,500 to 9,000 cubic yards (cy).
- Berth 607. The permitted design depth is -36 feet CRD plus up to 2 feet of overdredge allowance for in-fill and dredging tolerance. The leave surface would likely average -37 feet CRD. The estimated volume of sediment to be dredged ranges from approximately 1,500 to 2,200 cy.

Dredging Method: A clamshell dredge will remove sediments using a close-lipped bucket operated either from the dock or from a floating crane. The depth and position of the bucket and dredge would be monitored by visual and positioning computer systems, including a global positioning system.

Dredged Material Transport and Placement: The dredge material will be placed in a barge for transport and placement at either an approved in-water placement site, upland placement facility (West Hayden Island or Suttle Road Placement Facilities), or another approved beneficial use site. Placement of this dredged material at any of the listed upland placement sites will not generate return water to the Columbia River.

**Prior Sampling, Sediment Testing, and Bioassays:**
Berth 601: Based on the sediment quality data collected using the 2006 SEF, dredge prism material and new surface material (NSM) were determined suitable for aquatic exposure; freshwater benthic toxicity screening levels (SL1s) were not exceeded in the dredge prism or NSM samples from Berth 601.

Berth 607: Based on sediment quality data collected using the 2006 SEF, dredge prism material and portions of the new surface material (NSM) were determined unsuitable for aquatic placement/ exposure without additional biological testing. Tributyltin (TBT) concentrations in the dredge prism sample exceeded the SL1. The zinc concentrations were exceeded in one NSM sample, and TBT concentrations were exceeded in another NSM sample.

The Port ran bioassays [28-day amphipod (*Hyalella azteca*); 20-day midge (*Chironomus dilutus*)] on NSM sample material only, because the NSM material contaminant concentrations were similar to the dredge prism TBT concentrations. Berth 601 material was used as the reference material for bioassays. Bioassays passed the SEF success criteria, and the dredge prism material was determined suitable for unconfined, aquatic placement; NSM material was also determined suitable for unconfined, aquatic exposure.

**Changed Conditions:** Based on Section 2.2 of the Port of Portland's January 14, 2011 Recency Letter (prepared by Hart Crowser, Inc.), site conditions have not changed, and the PRG recency determination (below) is valid.

**Management Area Ranking/ Recency:** Based on one round of sediment testing and the project area landuse (marine industrial), a moderate management area ranking is appropriate for Berths 601 and 607. Dredged material and NSM suitability determinations issued for Berths 601 and 607 by the PRG are valid through October 2013, unless site conditions change. An additional round of testing in Berth 601 may confirm a lower management area ranking in the future.

**Contact:** This memorandum was prepared by James McMillan (CENWP-EC-HR). If the Regulatory Project Manger or permit applicant (or agent) has any questions regarding this memorandum, please call James McMillan at (503) 808-4376 or e-mail to: james.m.mcmillan@usace.army.mil.

James M. McMillan
Project Review Group Lead

**UNITED STATES DEPARTMENT OF COMMERCE**
**National Oceanic and Atmospheric Administration**
NATIONAL MARINE FISHERIES SERVICE
Northwest Region
7600 Sand Point Way N.E., Bldg. 1
Seattle, WA 98115

**Refer to NMFS No:**
**2008/01071**

September 2, 2009

Eric S. Petersen
Chief, Regulatory Branch
U.S. Army Corps of Engineers
*Attn: Mr. Tom Taylor*
Regulatory Branch, CENWP-CO-GP
P.O. Box 2946
Portland, Oregon 97208-2946

Re: Endangered Species Act Section 7 Biological and Conference Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for the Port of Portland Terminal 6 Berth Maintenance Dredging Project, Columbia River (HUC: 170900120501), (RM 101-103), Multnomah County, Oregon (Corps No.: NWP-2008-028)

Dear Mr. Petersen:

The enclosed document contains a biological and conference opinion (Opinion) prepared by the National Marine Fisheries Service (NMFS) pursuant to section 7(a)(2) of the Endangered Species Act (ESA) on the effects of the proposed issuance of a 5-year permit by the U.S. Army Corps of Engineers (Corps) under their authority found in section 10 of the Rivers and Harbors Act and section 404 of the Clean Water Act to the Port of Portland for maintenance dredging of berths 601 and 607 at Terminals 6 in the Columbia River, Oregon.

In this Opinion, NMFS concludes that the proposed action is not likely to adversely affect southern green sturgeon (*Acipenser medirostris*) or Snake River (SR) sockeye salmon (*O. nerka*), or jeopardize the continued existence of 15 species of ESA-listed or proposed fishes: Lower Columbia River (LCR) Chinook salmon (*Oncorhynchus tshawytscha*), Upper Willamette River (UWR) Chinook salmon, Upper Columbia River (UCR) spring-run Chinook salmon, SR spring/summer run Chinook salmon, SR fall-run Chinook salmon, Columbia River (CR) chum salmon (*O. keta*), LCR coho salmon (*O. kisutch*), LCR steelhead (*O. mykiss*), UWR steelhead, Middle Columbia River (MCR) steelhead, UCR steelhead, Snake River Basin (SRB) steelhead, or southern Pacific eulachon (*Thaleichthys pacificus*). Moreover, NMFS concludes that the proposed action is not likely to result in the destruction or adverse modification of critical habitat designated or proposed for each of those species, with the exception of LCR coho salmon and southern Pacific eulachon, for which critical habitats have not yet been proposed.

As required by section 7 of the ESA, NMFS is providing an incidental take statement with the Opinion. The incidental take statement describes reasonable and prudent measures with terms and conditions that are necessary to minimize the impact of incidental take associated with this action. However, southern green sturgeon are not protected by take prohibitions of the ESA until protective regulations become effective. Therefore, this incidental take statement does not apply to southern green sturgeon until those regulations are in place. Moreover, southern Pacific eulachon are not protected by take prohibitions of the ESA until listed and, if designated as threatened, protective regulations become effective. Therefore, the incidental take statement does not apply to that species until it is listed, protective regulations are in place, and this conference opinion is confirmed by NMFS as a biological opinion.

This document also includes the results of our analysis of the proposed action's likely effects on essential fish habitat (EFH) pursuant to section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA), and includes two conservation recommendations to avoid, minimize, or otherwise offset potential adverse effects on EFH. These conservation recommendations are a subset of the ESA take statement's terms and conditions. Section 305(b)(4)(B) of the MSA requires Federal agencies to provide a detailed written response to NMFS within 30 days after receiving these recommendations.

If the response is inconsistent with the EFH conservation recommendations, the Corps must explain why the recommendations will not be followed, including the justification for any disagreements over the effects of the action and the recommendations. In response to increased oversight of overall EFH program effectiveness by the Office of Management and Budget, NMFS established a quarterly reporting requirement to determine how many conservation recommendations are provided as part of each EFH consultation and how many are adopted by the action agency. Therefore, we request that in your statutory reply to the EFH portion of this consultation, you clearly identify the number of conservation recommendations accepted.

If you have questions regarding this consultation, please contact Dan Gambetta, fisheries biologist in the Lower Columbia River/Oregon Coast Habitat Branch of the Oregon State Habitat Office at 503.231.2243.

Sincerely,

for Barry A. Thom
Acting Regional Administrator

cc: Michelle Hollis, Port of Portland
Alex Liverman, ODEQ

# Endangered Species Act Section 7 Biological and Conference Opinion and

# Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation

Port of Portland Terminal 6 Berth Maintenance Dredging Project
Columbia River (HUC: 170900120501)
Multnomah County, Oregon
(Corps No.: NWP-2008-028)

| | |
|---|---|
| Lead Action Agency: | U.S. Army Corps of Engineers, Portland District |
| Consultation Conducted By: | National Marine Fisheries Service Northwest Region |
| Date Issued: | September 2, 2009 |
| Issued by: | Barry A. Thom<br>Acting Regional Administrator |
| **NMFS No.:** | **2008/01071** |

## TABLE OF CONTENTS

## INTRODUCTION

This document contains a biological opinion (Opinion), informal review, and incidental take statement prepared in accordance with section 7(b) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531, *et seq.*), and implementing regulations at 50 CFR 402. The National Marine Fisheries Service (NMFS) also completed an essential fish habitat (EFH) consultation, prepared in accordance with section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. 1801, *et seq.*) and implementing regulations at 50 CFR 600.

The docket for this consultation is on file at the Oregon State Habitat Office in Portland, Oregon.

### Background and Consultation History

On March 5, 2008, NMFS received a letter and a biological assessment (BA) from the Corps, which requested initiation of formal ESA section 7 consultation and EFH consultation for the Corp's proposed issuance of a permit under section 10 of the Rivers and Harbors Act and section 404 of the Clean Water Act to the Port of Portland (Port) for 5- year maintenance dredging activities at berth's 601 and 607 of Terminal 6.

In their letter requesting consultation and the BA, the Corps concluded that the proposed action is "likely to adversely affect" the following species: Lower Columbia River (LCR) Chinook salmon (*Oncorhynchus tshawytscha*), Upper Willamette River (UWR) Chinook salmon, Upper Columbia River (UCR) spring-run Chinook salmon, Snake River (SR) spring/summer run Chinook salmon, SR fall-run Chinook salmon, Columbia River (CR) chum salmon (*O. keta*), LCR coho salmon (*O. kisutch*), SR sockeye salmon (*O. nerka*). LCR steelhead (*O. mykiss*), UWR steelhead, Middle Columbia River (MCR) steelhead, UCR steelhead, and Snake River Basin (SRB) steelhead (hereafter collectively referred to as "ESA-listed salmonids") and their designated critical habitats, except for LCR coho salmon, for which critical habitat has not been proposed or designated. The Corps also concluded that the proposed project "will affect" EFH for Chinook salmon, and coho salmon.

Although neither the Corps letter requesting consultation nor the BA addressed green sturgeon (*Acipenser medirostris*) or southern Pacific eulachon (*Thaleichthys pacificus*), NMFS considered the effects of the proposed action on these species and critical habitat proposed for southern green sturgeon in this Opinion.

In January 2008, the Port submitted a sediment analysis plan (SAP) to the Project Review Group (PRG) with site history data and proposed sampling locations to adequately characterize the dredging project area. Previous testing results in adjacent areas have detected cadmium, zinc, tributyltin (TBT), dichlorodiphenyltrichloroethane (DDT), polychlorinated biphenyls (PCBs), and phthalates in sediments above screening levels (SLs) listed in the 2006 Interim Sediment Evaluation Framework (SEF) for benthic toxicity. The PRG approved the Port's proposed sampling plan with the recommendation to increase the number of the newly exposed surface material (NSM) samples.

In August 2008, the Corps provided NMFS with an addendum to the BA. The BA addendum summarized results from chemical analysis of sediment samples that were collected from Berths 601 and 607 in March 2008. While the sediment from berth 601 came up clean with no exceedences from freshwater screening levels published in the SEF for benthic toxicity, sediment from berth 607 had several exceedences for zinc and TBT in the deeper sediments that would be the NSM. The Port suggested that the hit of TBT to be from a paint chip and proposed biological testing to provide more empirical evidence regarding the potential for contamination of sediment and adverse effects to benthic organisms. The PRG reviewed and approved their proposed plan.

In May 2009, the Port submitted the results of the biological testing to the PRG group. Biological testing was performed on one NSM sample obtained along the berthing face of Berth 607. Biological testing results show that the NSM sediment passed the bioassay tests with no adverse mortality or growth results for midge or chironomid larvae.

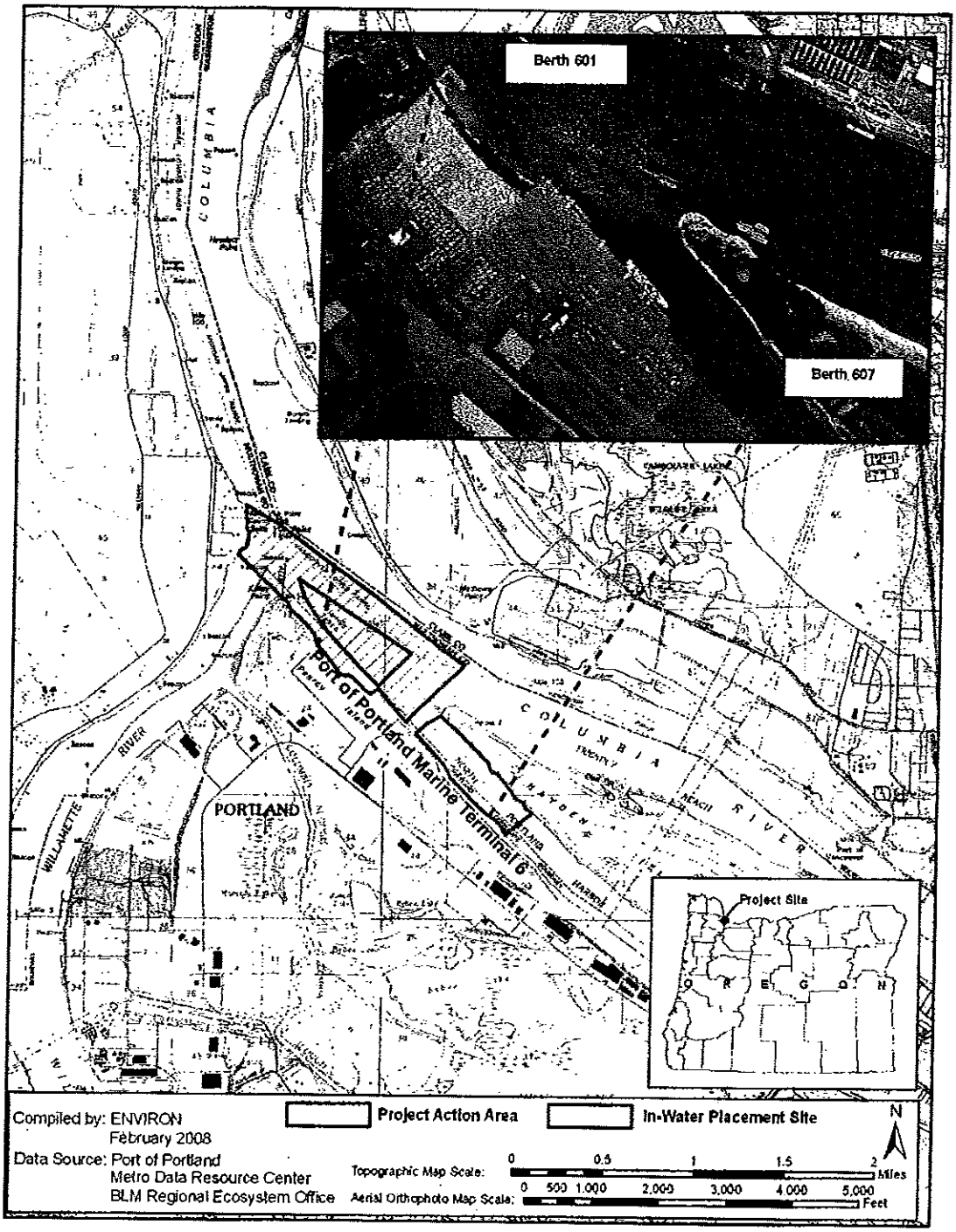
The objective of this Opinion is to determine whether the Corps's authorization of the proposed action under section 10 of the Rivers and Harbors Act and section 404 of the Clean Water Act is likely to jeopardize the continued existence of ESA-listed species or result in the destruction or adverse modification of critical habitat. This Opinion is based on information presented in the BA, and other information provided to NMFS by the Corps and the applicant.

**Description of the Proposed Action**

The Port proposes to perform maintenance dredging for five years at Berths 601 and 607 of Terminal 6 (Figure 1). Terminal 6 consists of five berths. Berths 603, 604, and 605 handle containerized cargo and steel slabs. Hyundai and Honda automobiles are loaded and unloaded onto and from deep-draft vessels at Berths 601 and 607. Berth 601 is just upstream from the confluence of the Willamette River and the Columbia River. Berth 607 is on the south side of Hayden Island adjacent to the channel that is referred to as the Oregon Slough. The Port has determined based on bathymetric surveys that in order to continue loading and unloading vehicles at Berths 601 and 607, sediments that have accumulated since the berths were constructed need be dredged.

To maintain suitable navigational clearances for deep-draft vessels, Berths 601 and 607 need to be maintained to -36 feet Columbia River Datum (CRD) plus up to 2 feet of overdredge allowance as advanced maintenance of expected sediment infill. The Berths will need to be dredged only once during the 5-year permit period.

**Figure 1.** Port of Portland Terminal 5, Berths 601 and 607, on the Columbia River, between RM 102 and 104.



All in-water dredging and in-water placement activities would be performed during the Oregon Department of Fish and Wildlife (ODFW) specified in-water work window (November 1 – February 28) for the Lower Columbia River (ODFW 2008). The Port estimates that the dredging of the berths will last for 15 to 20 days. If an upland disposal facility, such as Suttle Road or West Hayden Island, is utilized, then dredged sediments would be fully contained and no surface water would be released back to the Columbia River or North Portland Harbor. Water quality monitoring would be conducted during active dredging and in-water placement activities, as specified by the appropriate federal and state permit requirements.

**Berth Maintenance Dredging.** The Port proposes to remove up to a total of 10,000 cubic yards (cy) of dredge material from Berths 601 and 607 at Terminal 6 impacting approximately 7.9 acres of river bottom.

None of the dredged area will be in shallow water (≤ 20 feet CRD) as recent Port surveys indicate that current depths range from -27 to -51 feet CRD at Berth 601, and from -30 to -46 feet CRD at Berth 607. The final depth of the berths will likely average -37 feet CRD.

A clamshell dredge equipped with an enclosed "environmental" bucket and operated either from shore or from a floating crane will be used to remove the sediments. An environmental bucket is specifically designed to reduce sediment resuspension into the overlying water column by forming a seal when the bucket is in the closed position and retrieved to the surface which reduces the amount of resuspended sediments.

The sediments will be placed in either a flat-deck barge with watertight sideboards or a bin-barge with one or multiple cells. Once full of dredged material, the barge would be transported by tugboat to an approved upland or in-water placement site depending on the nature of dredged materials.

When the contractor estimates that all designated sediments have been removed from the berthing area, a post-dredge survey will be performed to verify that the authorized depths have been achieved. If the post-dredge survey shows that areas were missed, the contractor will remove those sediments. The final post-dredge survey will be used to calculate the actual sediment quantities that were removed.

**Dredged Material Disposal**. If the Port decides to place the dredge material at an upland facility, the dredge material barge will be moored to a floating crane barge adjacent to the facility. The barge would be off-loaded with a submersible pump that pumps the sediments with additional "make-up" water, as necessary, through a 10-inch pipeline directly into the primary storage cell at the upland facility. The Suttle Road and West Hayden Island facilities consist of separated bermed cells, which are connected by adjustable weirs. Each site contains one or more settling basins to contain excess water. This water may be recycled and used as "make-up" water to accommodate the pumping of sediments back into the placement facility. If necessary, "make-up" water may also be obtained from residual water on the barge or the Columbia River. If water is pumped from the river, intake screens will be installed per NMFS (1997) and ODFW screening criteria (2008). The dewatered dredged material will be stockpiled until a beneficial use is determined or until a permanent placement site is identified.

Depending on determination of suitability for in-water placement through the Sediment Evaluation Framework Protocols, the Port may elect to discharge the material to the Oregon Slough In-Water Placement Site, which encompasses approximately 75 acres. Recent Port survey data (September 2006) show that current depths at this site range between 50 feet and 70 feet CRD.

In-water placement will occur via controlled discharge from a split hull or multi-celled barge or flat barge with tremie chutes. The tremie chute trunk discharge end will be a minimum of 10 feet below the surface of the water. If the Port uses a multi-cell material placement barge, only one cell will be opened at a time. If the Port uses a split-hull barge, the barge will have a controllable opening so that material is only dispersed within the site boundaries. Discharging of dredge material will be performed while maintaining proper navigation and vessel speed within the placement site boundaries.

**Conservation Measures.**

1. Timing of Dredging Activities. Berth maintenance and in-water placement activities will be conducted during the approved ODFW in-water work window for the Columbia River of November 1 to February 28.
2. Dredging
   a. Dredging will be performed using an enclosed "environmental" bucket to minimize turbidity and contaminant releases to the water column. Other best management practices that will be used to control turbidity may include: regulating the bucket speed, ensuring that the bucket is sealed before ascent, maintaining the bucket flaps, filling the bucket to capacity to minimize water in the bucket, not overfilling the bucket, and modifying the bucket size and/or type.
   b. Dredging and global positioning system (GPS) software will be used to model the entire dredge prism and track previously dredged areas to ensure that dredging efficiency is maximized.
   c. As an incentive to the Port's contractor to dredge only the authorized amount and to authorized depths, the Port will not compensate the contractor for the dredging or placement of any material removed from below the dredge prism.
   d. The Port will conduct post-dredge bathymetry surveys to ensure that only the material identified to be dredged was removed to the proper, authorized depth.
   e. If at any time, distressed fish are observed or a fish kill occurs, operations will cease and NMFS will be notified.
3. Barging
   a. Depending on availability, barges used for dredge material handling may include: multiple cell; split-hull; flat deck with tall, watertight sideboards; or bin barges in good condition. These barges will enclose all dredged material, including dredged sediment and water. No material shall be allowed to leak from the bins or overtop the walls.
   b. The barge will be loaded so that enough of the freeboard remains to allow for safe movement of the barge and its material on its planned route to the approved placement facility.

4. Upland and In-Water Placement
   a. The Port will handle all dredge material in a manner consistent with PRG recommendations, either to an approved upland or in-water facility.
   b. For upland placement, dredge material and residual water will be deposited at the upland facility and held in containment ponds. The ponds will be sufficiently large to contain all the dredge material. There will be no release of return water to the Columbia River or North Portland Harbor.
   c. For in-water placement, the discharge operation will proceed slowly in an upstream direction within the designated placement site to help prevent mounding.
   d. The contractor will use GPS technology to record the specific locations where the dredge material is placed.
   e. If a multi-cell material placement barge is used, only one cell will be opened at a time.
   f. If a split cell barge is used, the opening of the split hull will be controlled so that material is only dispersed within the site boundaries.
   g. If tremie chutes are used, the discharge end of the chute will be a minimum of 10 feet below the surface of the water.
5. Spill Prevention and Control
   a. The Port has developed a spill prevention, control, and containment plan for their marine operations that will be implemented during berth maintenance.
   b. All equipment used will be clean and inspected daily prior to use to ensure that the equipment has no fluid leaks. Should a leak develop during use, the leaking equipment will be removed from the project site immediately and not used again until it has been adequately repaired. At no time will fuels or oils be allowed to enter any waterbody.
   c. Construction equipment will be serviced, stored, and fueled at least 100 feet away from the shoreline, as practicable. Location of vehicles, equipment and fuel storage areas, and fuel containment measures, will be approved and monitored by a designated Port Environmental Inspector.
   d. Floating spill containment booms and absorbent booms will be maintained on site during all phases of construction to facilitate the cleanup of hazardous material spills. Containment booms and/or absorbent booms will be installed in instances where there is a potential for release of petroleum or other toxic substances.
6. Monitoring
   a. An annual compliance monitoring report will be submitted following the completion of maintenance dredging operations.
   b. Water quality monitoring will be conducted during active dredging and in-water placement activities, as specified by the Oregon Department of Environmental Quality (DEQ) 401 water quality certification.
   c. Monitoring will only be performed during daylight hours and is contingent on suitable weather conditions. If the monitoring crew determines that weather conditions (*e.g.*, heavy fog, ice/snow, excessive winds, rough water) compromise the ability for the crew to navigate to the sampling site, then monitoring shall be postponed until conditions are deemed safe.

The NMFS relied on the foregoing description of the proposed action, including all stated minimization measures, to complete this consultation. To ensure that this consultation remains valid, NMFS requests that the action agency or applicant keep NMFS informed of any changes to the proposed action.

### Action Area

For this consultation, the action area includes the south shore of the Lower Columbia River at Terminal 6, an area that extends approximately 0.25 mile upstream from Berth 607 and 0.5 mile downstream from the Oregon Slough in-water placement site (Figure 1). The action area extends from river mile (RM) 101 to RM 103 in the Lower Columbia River.

The ESA-listed species described in Table 1 use the project area for adult migration, and juvenile rearing and migration. The action area within the Columbia River is designated critical habitat; the primary constituent elements (PCEs) of critical habitat that are considered in this opinion are summarized in Tables 2 and 3 for salmon and steelhead, and in Table 4, for green sturgeon. The action area is designated EFH for Chinook salmon and coho salmon (PFMC 1999), and environmental effects of the proposed project may adversely affect EFH for those species. The effects to EFH are analyzed in the MSA portion of the document.

## ENDANGERED SPECIES ACT

Section 7(a)(2) of the ESA requires Federal agencies to consult with NMFS to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species, or adversely modify or destroy their designated critical habitat. The biological opinion (Opinion) that follows records the results of the interagency consultation for this proposed action. An incidental take statement (ITS) is provided after the Opinion that specifies the impact of any taking of threatened or endangered species that will be incidental to the proposed action, reasonable and prudent measures that NMFS considers necessary and appropriate to minimize such impact, and nondiscretionary terms and conditions (including, but not limited to, reporting requirements) that must be complied with by the Federal agency, applicant (if any), or both, to carry out the reasonable and prudent measures.

### Biological Opinion

To complete the jeopardy analysis presented in this Opinion, NMFS reviewed the status of each ESA-listed species considered in this consultation, the environmental baseline in the action area, the effects of the action, and cumulative effects (50 CFR 402.14(g)). From this analysis, NMFS determined whether effects of the action were likely, in view of existing risks, to appreciably reduce the likelihood of both the survival and recovery of the affected listed species.

For the critical habitat adverse modification analysis, NMFS considered the status of the entire designated area of the critical habitat considered in this consultation, the environmental baseline in the action area, the likely effects of the action on the function and conservation role of the affected critical habitat, and cumulative effects. NMFS used this assessment to determine

whether, with implementation of the proposed action, critical habitat would remain functional, or retain the current ability for the PCEs to become functionally established, to serve the intended conservation role for the species (Hogarth 2005).

**Table 1.** Federal Register notices for final rules that list threatened and endangered species, designate critical habitats, or apply protective regulations to listed species considered in this consultation. Listing status: 'T' means listed as threatened under the ESA; 'E' means listed as endangered.

| Species | Listing Status | Critical Habitat | Protective Regulations |
|---|---|---|---|
| **Chinook salmon (*Oncorhynchus tshawytscha*)** | | | |
| Lower Columbia River | T 6/28/05; 70 FR 37160 | 9/02/05; 70 FR 52630 | 6/28/05; 70 FR 37160 |
| Upper Columbia River spring-run | E 6/28/05; 70 FR 37160 | 9/02/05; 70 FR 52630 | ESA section 9 applies |
| Snake River spring/summer run | T 6/28/05; 70 FR 37160 | 10/25/99; 64 FR 57399 | 6/28/05; 70 FR 37160 |
| Snake River fall-run | T 6/28/05; 70 FR 37160 | 12/28/93; 58 FR 68543 | 6/28/05; 70 FR 37160 |
| Upper Willamette River spring-run | T 6/28/05; 70 FR 37160 | 9/02/05; 70 FR 52630 | 6/28/05; 70 FR 37160 |
| **Chum salmon (*O. keta*)** | | | |
| Columbia River | T 6/28/05; 70 FR 37160 | 9/02/05; 70 FR 52630 | 6/28/05; 70 FR 37160 |
| **Coho salmon (*O. kisutch*)** | | | |
| Lower Columbia River | T 6/28/05; 70 FR 37160 | Not applicable | 6/28/05; 70 FR 37160 |
| **Sockeye salmon (*O. nerka*)** | | | |
| Snake River | E 6/28/05; 70 FR 37160 | 12/28/93; 58 FR 68543 | ESA section 9 applies |
| **Steelhead (*O. mykiss*)** | | | |
| Lower Columbia River | T 1/05/06; 71 FR 834 | 9/02/05; 70 FR 52630 | 6/28/05; 70 FR 37160 |
| Middle Columbia River | T 1/05/06; 71 FR 834 | 9/02/05; 70 FR 52630 | 6/28/05; 70 FR 37160 |
| Upper Columbia River | E 1/05/06; 71 FR 834 | 9/02/05; 70 FR 52630 | 6/28/05; 70 FR 37160 |
| Snake River Basin | T 1/05/06; 71 FR 834 | 9/02/05; 70 FR 52630 | 6/28/05; 70 FR 37160 |
| Upper Willamette River | T 1/05/06; 71 FR 834 | 9/02/05; 70 FR 52630 | 6/28/05; 70 FR 37160 |
| **Green sturgeon (*Acipenser medirostris*)** | | | |
| Southern Distinct Population | T 4/7/06; 71 FR 17757 | Proposed 9/08/08; 50 CFR 227 | 4/7/06; 71 FR 17757 |
| **Pacific Eulachon (*Thaleichthys pacificus*)** | | | |
| Southern Distinct Population | C 3/12/08; 73 FR 13185 | Not applicable | Not applicable |

**Table 2.** PCEs of critical habitats designated for Pacific salmon and steelhead species considered in the Opinion (except SR spring/summer run Chinook salmon, SR fall-run Chinook salmon, and SR sockeye salmon), and corresponding species life history events.

| Primary Constituent Elements | | Species Life History Event |
|---|---|---|
| **Site Type** | **Site Attribute** | |
| Freshwater rearing | Floodplain connectivity<br>Forage<br>Natural cover<br>Water quality<br>Water quantity | Fry emergence<br>Fry/parr growth and development |
| Freshwater migration | Free of artificial obstructions<br>Natural cover<br>Water quality<br>Water quantity | Adult sexual maturation<br>Adult upstream migration, holding<br>Kelt (steelhead) seaward migration<br>Fry/parr seaward migration |
| Estuarine areas | Forage<br>Free of obstruction<br>Natural cover<br>Salinity<br>Water quality<br>Water quantity | Adult sexual maturation<br>Adult "reverse smoltification"<br>Adult upstream migration, holding<br>Kelt (steelhead) seaward migration<br>Fry/parr seaward migration<br>Fry/parr smoltification<br>Smolt growth and development<br>Smolt seaward migration |

**Table 3.** PCEs of critical habitats designated for SR spring/summer run Chinook salmon, SR fall-run Chinook salmon, and SR sockeye salmon, and corresponding species life history events.

| Primary Constituent Elements | | Species Life History Event |
|---|---|---|
| **Site** | **Site Attribute** | |
| Juvenile rearing areas | Access (sockeye)<br>Cover/shelter<br>Food (juvenile rearing)<br>Riparian vegetation<br>Space (Chinook)<br>Water quality<br>Water temperature (sockeye)<br>Water quantity | Fry/parr growth and development<br>Fry/parr smoltification<br>Smolt growth and development |
| Juvenile migration corridors | Cover/shelter<br>Food<br>Riparian vegetation<br>Safe passage<br>Space<br>Substrate<br>Water quality<br>Water quantity<br>Water temperature<br>Water velocity | Fry/parr seaward migration<br>Smolt growth and development<br>Smolt seaward migration |
| Adult migration corridors | Cover/shelter<br>Riparian vegetation<br>Safe passage<br>Space<br>Substrate<br>Water quality<br>Water quantity<br>Water temperature<br>Water velocity | Adult sexual maturation<br>Adult "reverse smoltification"<br>Adult upstream migration<br>Kelt (steelhead) seaward migration |

**Table 4.** PCEs of critical habitat proposed for southern green sturgeon and corresponding species life history events.

| PCEs | | | Life History Event |
|---|---|---|---|
| **Site Type** | **Site Attribute** | | |
| Freshwater riverine system | Food resources<br>Substrate type or size<br>Water flow<br>Water quality | Migratory corridor<br>Water Depth<br>Sediment quality | Adult spawning<br>Embryo incubation<br>Alevin development<br>Juvenile growth/development<br>Juvenile/subadult seaward migration<br>Adult upstream migration<br>Adult post-spawning seaward migration |
| Estuarine areas | Food resources<br>Water flow<br>Water quality | Migratory corridor<br>Water depth<br>Sediment quality | Juvenile/subadult growth/development<br>Juvenile/subadult seaward migration<br>Adult growth/development<br>Adult upstream migration<br>Adult post-spawning seaward migration |
| Coastal marine areas | Migratory corridor<br>Water quality<br>Food resources | | Subadult migration between marine/estuarine areas<br>Subadult/adult migration within marine areas<br>Subadult/adult growth and development<br>Adult sexual maturation |

### Status of the Species and Critical Habitat

This section defines the status and biological requirements of each listed species affected by the proposed action, and the status of each designated critical habitat relative to those requirements. Any ESA-listed species facing high risk of extinction and critical habitats with degraded conservation value are more vulnerable to the aggregation of effects considered under the environmental baseline, the effects of the proposed action, and cumulative effects.

**Status of the Species.** The NMFS reviews the condition of the listed species affected by the proposed action using criteria that describe a 'viable salmonid population' (VSP) (McElhany *et al.* 2000). Attributes associated with a VSP include abundance, productivity, spatial structure, and genetic diversity that enhance its capacity to adapt to various environmental conditions and allow it to sustain itself in the natural environment. These attributes are influenced by survival, behavior, and experiences throughout the entire life cycle, characteristics that are influenced in turn by habitat and other environmental conditions.

***LCR Chinook salmon.*** The range of this species includes all naturally-spawned populations of Chinook salmon from the Columbia River and its tributaries from its mouth at the Pacific Ocean upstream to a transitional point between Washington and Oregon, east of the Hood River and the White Salmon River, and includes the Willamette River to Willamette Falls, Oregon, exclusive of spring-run Chinook salmon in the Clackamas River. Historical records of Chinook salmon abundance are sparse, but cannery records suggest a peak run of 4.6 million fish in 1883. Although fall-run Chinook salmon are still present throughout much of their historical range, they are still subject to large-scale hatchery production, relatively high harvest, and extensive habitat degradation. The spring-run populations are largely extirpated as the result of

dams, which block access to their higher elevation habitat. Abundances largely declined during 1998-2000, and trend indicators for most populations are negative, especially if hatchery fish are assumed to have a reproductive success equivalent to that of natural-origin fish. However, 2001 and 2002 abundance estimates increased for most LCR Chinook salmon populations over the previous few years (Rawding 2003, as cited in Good *et al.* 2005). In 2003, 2,873 fall-run Chinook salmon spawned in the main channel of the Columbia River between RM 113 and RM 143. Based on the results of the VSP criteria analysis conducted by McElhany et al. (2007), the overall risk of extinction for Oregon populations of LCR Chinook salmon is high.

The NMFS (2007a) identified degraded estuarine and nearshore habitat, floodplain connectivity and function, channel structure and complexity, riparian areas and large woody debris recruitment, stream substrate, stream flow, fish passage, and harvest and hatchery impacts as the major factors limiting the recovery of this species.

The predominant life history type for this species is the fall-run, which consists of an early component that returns to the Columbia River in mid-August and spawns within a few weeks (Kostow 1995). Spring-run Chinook salmon enter freshwater in March and April and spawn in late summer. Adults from this species pass through the action area from February through November, with peak passage occurring from mid-March through May, and from October through early November (Friesen 2005). The majority of juveniles in this species leave as sub-yearlings, with downstream movement observed as early as December, and most migrating downstream during summer and fall.

During electrofishing in shallow-water habitat in the Lower Columbia River near Portland during 1997 though 1999, juvenile Chinook salmon were the most abundant anadromous salmonid species present (EES and URS 1998; EES 2000, as cited in Environ 2008a). Peak numbers of juvenile LCR Chinook salmon outmigrate through the action area from March to July, and rear in the action area from February through September (ODFW 2003). Peak numbers of adult LCR Chinook migrate upstream through the action area from mid-March through May, and from October through mid-November (ODFW 2003).

***UCR spring-run Chinook salmon.*** This species includes spring-run Chinook salmon populations found in Columbia River tributaries between Rock Island (RM 453 of Columbia River) and Chief Joseph Dams (RM 545 of Columbia River), notably the Wenatchee, Entiat, and Methow river basins. Historically, spring-run Chinook salmon may have also used portions of the Okanogan River.

Grand Coulee Dam (RM 596 of the Columbia River), completed in 1941, and Chief Joseph Dam are both impassable barriers for upstream migration of anadromous fish. No specific estimates are available of historical production of spring-run Chinook salmon from mainstem tributaries above Grand Coulee Dam. However, habitat typical of that used by spring-run Chinook salmon is found in the middle/upper reaches of mainstem tributaries above Grand Coulee Dam. Thus, it is possible that the historical range of the UCR spring-run Chinook included these areas. Alternatively, fish from the upper reaches of the Columbia River might have been considered a separate species.

All three of the existing UCR spring-run Chinook salmon populations have exhibited similar trends and patterns in abundance over the past 40 years. The 1998 Chinook salmon status review (Myers *et al.* 1998) reported that long-term trends in abundance for UCR spring-run Chinook salmon populations were generally negative, ranging from -5% to +1%. Analyses of the data series, updated to include 1996 to 2001 returns, indicated that those trends have continued with escapements in 1994 to 1996 being the lowest in the last 60 years. The Wenatchee River spawning escapements have declined an average of 5.6% per year, the Entiat River population an average of 4.8%, and the Methow River population an average rate of 6.3% since 1958 (Good *et al.* 2005). At least six former populations are now extinct, and nearly all extant populations have fewer than 100 wild spawners. With these trends, extinction risks are high. The risk of extinction within 100 years for UCR spring-run Chinook salmon is 50% for the Methow, 98% for the Wenatchee, and 99% for the Entiat spawning populations (Cooney 2002).

Some UCR spring-run Chinook salmon are killed as they pass through the four lower-river Federal hydroelectric projects and a varying number of Mid-Columbia River Public Utility District projects. The Wenatchee River enters the Columbia River above seven mainstem dams, the Entiat above eight dams, and the Methow River and Okanogan Rivers above nine dams. In addition to the challenges put forth by dams, habitat degradation from increasing urbanization on the lower reaches, irrigation/flow diversions in up-river sections of the major drainage, and livestock grazing impact on middle reaches all pose concerns for this species (Good *et al.* 2005). The major factors limiting the recovery for UCR spring-run Chinook salmon are degradation of estuarine and nearshore marine habitat, floodplain connectivity and function, channel structure and complexity, riparian areas and large woody debris recruitment, stream substrate and flow, hydropower system mortality, and hatchery impacts (NMFS 2007a).

The majority of adult UCR spring-run Chinook salmon migrate upstream through the Lower Columbia River in March through May (ODFW 2003). Peak numbers of juvenile UCR Chinook salmon outmigrate through the action area from mid-March through May (ODFW 2003).

***UWR spring-run Chinook salmon.*** The UWR spring-run Chinook salmon includes seven populations of native spring-run populations above Willamette Falls and in the Clackamas River. All the populations are in a single stratum since they share a similar life history pattern (spring run) and a single ecoregion (McElhany *et al.* 2003, Myers *et al.* 2006).

The numbers of spring Chinook salmon in the Willamette River basin are extremely depressed (McElhany *et al.* 2007). Historically, the spring run of Chinook may have exceeded 300,000 fish (Myers *et al.* 2003). The current abundance of wild fish is less than 10,000 fish, and only two populations (McKenzie and Clackamas) have significant natural production. The UWR Chinook salmon have been adversely affected by the degradation and loss of spawning and rearing habitat (loss of 30 to 40%) associated with hydropower development, and interaction with a large number of natural spawning hatchery fish. In 2007, NMFS identified degraded floodplain connectivity and function, channel structure and complexity, riparian areas and large wood recruitment, water quality, fish passage, and hatchery impacts as the major factors limiting recovery of this species (NMFS 2007a).

McElhany *et al.* (2007) analyzed the VSP population criteria (diversity, spatial structure, abundance, and productivity) for UWR Chinook salmon and found that the risk of extinction is high. The Clackamas population exhibited the lowest extinction risk. However, five of the seven populations were clearly in the high risk category, and thus UWR Chinook salmon can be characterized as having a high risk of extinction.

Juvenile Chinook salmon that have emerged from spawning sites in the Upper Willamette River watershed use the lower mainstem Willamette River and Columbia Slough in Portland for temporary rearing as they migrate to the ocean. Peak numbers of adult and juvenile UWR spring Chinook migrate upstream through the Lower Willamette River from March through May (ODFW 2003). Although unlikely, it is possible that small numbers of juvenile UWR Chinook salmon would migrate a short distance upstream from the confluence of the Willamette and Columbia Rivers and rear in the vicinity of Terminal 6, Berth 601 during their downstream migration.

***SR spring/summer run Chinook salmon.*** At least 1.5 million spring/summer run Chinook salmon returned to the Snake River in the late 1800s. This was approximately 50 to 60% of all spring/summer run Chinook in the Columbia River basin. Historically, Shoshone Falls (RM 615) was the uppermost limit to spring/summer run Chinook salmon migration, and spawning occurred in virtually all suitable and accessible habitat in the Snake River basin (Fulton 1970, Matthews & Waples 1991).

Actual counts of wild adults at Ice Harbor Dam (RM 9.7 of Snake River) averaged 59,000 each year from 1962 to 1970. The estimated number of wild adult spring and summer Chinook salmon passing over Lower Granite Dam (RM 107 of Snake River) was 9,674 fish per year between 1980 and 1990 (Matthews & Waples 1991). From 1992 to 1996, the average number of naturally-produced spawners was 3,820 fish per year (Myers *et al.* 1998). The 1999 to 2001 average return of natural-origin Chinook salmon exceeded 3,700 fish per year. In 2001, there was a large run of spring Chinook salmon to Lower Granite Dam that exceeded 17,000 fish. However, 88% of the return was hatchery-origin fish. The summer Chinook run returning to the dam has increased as well from an average of 3,076 (1986 to 1996) to 6,000 fish per year (1997 to 2001) (Good *et al.* 2005).

SR spring/summer run Chinook salmon must migrate past a series of mainstem Snake and Columbia river hydroelectric dams on their migration to and from the ocean. The Tucannon River population must migrate through six dams; all other Snake River drainages supporting spring/summer run Chinook salmon production are above eight dams. Status reviews have concluded that mainstem Columbia and Snake river hydroelectric projects have disrupted migration and negatively affected flow regimes and estuarine habitat (Good *et al.* 2005).

In 2007, NMFS identified the major factors limiting recovery of SR spring/summer run Chinook salmon as degradation of floodplain connectivity and function, channel structure and complexity, riparian areas and large woody debris recruitment, stream substrate and flow, water quality, and impacts related to the mainstem Columbia River hydropower system (NMFS 2007a).

The peak run of adult SR spring Chinook migrating through the action area occurs from early April to mid-May. The peak run of SR summer Chinook occurs in the action area from late June to early July. Juveniles travel through the action area from mid-June to late September, with peak numbers present from mid-July to mid-August.

***SR fall-run Chinook salmon.*** No reliable estimates of historical abundance are available, but because of their dependence on mainstem habitat for spawning, fall-run Chinook have probably been affected to a greater extent by irrigation and hydroelectric projects than any other species of salmon in the Snake River basin. The mean number of adult SR fall-run Chinook salmon declined from 72,000 in the 1930s and 1940s, to 29,000 during the 1950s. In spite of this, the Snake River remained the most important natural production area for fall-run Chinook in the Columbia River basin through the 1950s. The number of adults counted at the uppermost Snake River mainstem dams averaged 12,720 total spawners per year from 1964 to 1968; 3,416 spawners from 1969 to 1974; and 610 spawners from 1975 to 1980 (Waples *et al.* 1991). In the late 1990s, the mean number of natural-origin adults returning per year over Lower Granite Dam (RM 107 of Snake River) was 871 fish. In 2001, over 2,600 natural-origin fall-run Chinook returned.

Historically, the primary fall-run Chinook salmon spawning areas were on the upper mainstem of the Snake River. However, approximately 80% of this historical habitat has been lost due to the construction of a suite of dams, so natural spawning is limited to the area from the upper end of Lower Granite Reservoir to Hells Canyon Dam (RM 247 of Snake River), the lower reaches of the Imnaha, Grande Ronde, Clearwater, and Tucannon rivers, and small mainstem sections in the tailraces of the Lower Snake hydroelectric dams (Good *et al.* 2005). The loss of spawning habitat, restricting the extant species to a single naturally spawning population, increased the species' vulnerability to environmental variability and catastrophic events. The diversity associated with populations that once resided above the Snake River dams has been lost, and the impact of out-of-species fish straying to the spawning grounds has the potential to further compromise the genetic diversity of the species.

In 2007, NMFS identified the major factors limiting recovery of SR fall-run Chinook salmon as degradation of floodplain connectivity and function, channel structure and complexity, impacts related to harvest, and impacts related to mainstem Columbia River hydropower (NMFS 2007a).

Adult SR fall-run Chinook are in the Lower Columbia River in August through early October, with the peak moving through in early September. The juveniles emigrate through the action area from late June to late September.

***CR chum salmon.*** Chum salmon in the Columbia River once numbered in the hundreds of thousands of adults, and were reported in almost every river in the Lower Columbia River basin, but by the 1950s most runs had disappeared (Rich 1942, Marr 1943, Fulton 1970). The total number of chum salmon returning to the Columbia River in the last 50 years has averaged a few thousand per year, and they return to only a very restricted subset of their historical range. Significant spawning occurs in only two of the 16 historical populations, meaning that 88% of the historical populations are extirpated, or nearly so. The two remaining populations are the Grays River and the Lower Gorge (Good *et al.* 2005).

In the first half of this century, CR chum salmon supported a large commercial fishery; more than 500,000 fish per year were landed as recently as 1942. Commercial catches declined beginning in the mid-1950s, and in later years rarely exceeded 2,000 per year.

During the 1980s and 1990s, the combined abundance of natural spawners for the Lower Gorge, Washougal, and Grays River populations was below 4,000 adults. In 2002, the abundance of natural spawners exhibited a substantial increase to approximately 20,000 adults at several locations. The cause of this dramatic increase in abundance is unknown. Long- and short-term productivity trends for populations are at or below replacement. The loss of off-channel habitat and the extirpation of approximately 17 historical populations increase this species' vulnerability to environmental variability and catastrophic events. Based on the VSP criteria, the Oregon populations of CR chum salmon are at very high risk of extinction (McElhany *et al.* 2007).

In 2007, NMFS identified the major factors limiting recovery of CR chum salmon as degradation of estuarine and nearshore marine habitat, floodplain connectivity and function, channel structure and complexity, riparian areas and large woody debris recruitment, stream substrate and flow, and fish passage (NMFS 2007a).

Chum salmon spawn in the main channel of the Columbia River between RM 113 and 114, near RM 123, between RM 136 and 139, and near Ives Island (RM 143). Adults may occur in the vicinity of the action area from late September through December. Based on spawning timing, it is likely that fry emerge from late January through April in the Columbia River tributaries. Therefore, juvenile chum salmon would likely pass through the action area between February and May. Shoreline areas within the action area may provide short-term foraging and rearing habitat for juvenile chum.

***LCR coho salmon.*** This species includes 25 populations that historically existed in the Columbia River basin from the Hood River downstream (McElhany *et al.* 2007). Willamette Falls is a natural barrier to fall-migrating salmonids, including LCR coho. Of the 25 historical populations, only the Clackamas and Sandy populations show direct evidence that coho production if not reproductively dependent of the spawning of stray hatchery fish (McElhany *et al.* 2007). In the last 5 years, there has been an increase in the abundance of wild coho in the Clackamas and Sandy Rivers, plus the reappearance of moderate numbers of wild coho in the Scapoose and Clatskanie Rivers after a 10-year period in the 1990s when they were largely absent (McElhany *et al.* 2007). Based on the VSP criteria, the Oregon populations of LCR coho are at a high risk of extinction (McElhany *et al.* 2007).

In 2007, NMFS identified the major factors limiting recovery of LCR coho salmon as degradation of floodplain connectivity and function, channel structure and complexity, riparian areas and large woody debris recruitment, stream substrate and flow, water quality, and impacts related to hatcheries and harvesting (NMFS 2007a).

Adults generally migrate through the action area from September to March. After spending approximately 1 year in freshwater, juveniles migrate through the action area to the ocean between April and June.

***SR sockeye salmon.*** Before the turn of the 19th century (c. 1880), about 150,000 sockeye salmon ascended the Wallowa, Payette, and Salmon river basins to spawn in natural lakes (Evermann 1896). Sockeye populations in the Payette basin lakes were eliminated after a diversion dam near Horseshoe Bend was constructed in 1914, and Black Canyon Dam was completed in 1924. In 1916, a dam at Wallowa Lake was increased in height, resulting in the extinction of indigenous sockeye in the lake.

Sockeye salmon in the Salmon River occurred historically in at least four lakes within Idaho's Stanley basin: Alturas, Redfish, Pettit, and Stanley Lakes. Sunbeam Dam, 20 miles downstream from Redfish Lake, severely limited sockeye and other anadromous salmonid production in the upper Salmon River between 1910 and 1934 (Waples *et al.* 1991). In the 1950s and 1960s, more than 4,000 adults returned annually to Redfish Lake. Between 1985 and 1987, an average of 13 sockeye were counted at the Redfish Lake weir. Between 1988 and 1998, only 18 sockeye returned to Redfish Lake. Starting in 1999, all adults returning to the weir were progeny of the captive broodstock program; seven returned in 1999, 257 in 2000, 26 in 2001, and 22 in 2002 (Good *et al.* 2005).

In 2007, NMFS identified the major factors limiting recovery of SR sockeye salmon as impacts related to mainstem Columbia River hydropower (NMFS 2007a).

Adults SR sockeye salmon would pass through the action area starting in late May and continuing through early August, with the peak migrating during June and early July. Sockeye smolts would be in the action area from late April to early July, with the peak in late May.

***LCR steelhead.*** This species includes all naturally-spawning populations of steelhead in streams and tributaries of the Columbia River between, and including, the Cowlitz and Wind rivers in Washington, along with, and including, the Willamette River and Hood River in Oregon. Excluded are steelhead in the Upper Willamette River basin above Willamette Falls and steelhead from the Little and Big White Salmon rivers in Washington.

Five populations of winter steelhead and one population of summer steelhead exist in Oregon's portion of the species (McElhany *et al.* 2007). The population likely present in the action area is the Clackamas River population, which is part of the Cascade winter stratum.

In general, wild steelhead numbers are depressed from historical levels but all populations are thought to exist in most of their historical range, and all historical populations are believed to be extant. However, until recent years, the presence of naturally spawning hatchery fish in most populations has been high (McElhany *et al.* 2007).

The Clackamas population is at low risk for abundance and productivity, although the future impacts of human population growth and climate change add a degree of uncertainty (McElhany *et al.* 2007). Loss of accessibility is limited to larger streams, primarily due to watershed development in the lower basin. The upper Clackamas basin contains most of the historically-productive habitat, and most of that habitat is still of high quality today. For the species, the overall risk classification for Oregon LCR steelhead is moderate, with the Clackamas population at the lowest relative risk (McElhany *et al.* 2007).

The NMFS (2007a) identified degraded floodplain connectivity and function, channel structure and complexity, riparian areas and large wood recruitment, stream substrate, streamflow, water quality, and fish passage and predation/competition as the major factors limiting recovery of this species.

Fish sampling conducted for the Port of Portland in the Columbia River during the spring of 1998 found that abundance of steelhead smolts migrating downstream peaked in early May and declined through late June. Based on these efforts and other earlier sampling in the action area, it is likely that juvenile steelhead travel in deeper, open water habitat rather than along the shoreline of the action area.

***UWR steelhead.*** This species consists of four populations: Molalla, North Santiam, South Santiam, and Calapooia. Habitat loss, hatchery steelhead introgression, and harvest are the major contributors to the decline of this species. Willamette Falls (RM 26.5) is a known migration barrier. Winter-run steelhead and spring-run Chinook salmon historically occurred above the falls, whereas summer-run steelhead, fall-run Chinook, and coho salmon did not. Detroit and Big Cliff dams cut off access to 335 miles of spawning and rearing habitat in the North Santiam River. In general, habitat available to this species has become substantially simplified since the 1800s by removal of large wood to increase the river's navigability. Based on recent analyses of the population criteria, McElhany *et al.* (2007) concluded that the species risk of extinction is moderate, with the highest risk category being species diversity.

The NMFS (2007a) identified degraded floodplain connectivity and function, channel structure and complexity, riparian areas and large wood recruitment, streamflow, fish passage, and predation/competition and disease as the major factors limiting recovery of this species.

Adult late-run UWR winter steelhead migrate through the Lower Willamette River in mid-February and March. The run migrates upstream of Willamette Falls from March through mid-May, with the peak occurring from March through late May. Outmigration of UWR steelhead smolts through the Lower Willamette River begins in March, peaks in May, and is essentially complete by mid-July. Although unlikely, it is possible that small numbers of juvenile UWR steelhead would migrate a short distance upstream from the confluence of the Willamette and Columbia Rivers and rear in the vicinity of Terminal 6, Berth 601 during their downstream migration.

***MCR steelhead.*** This species includes all naturally spawning populations of steelhead in Oregon and Washington drainages upstream from the Hood and Wind river systems to, and including, the Yakima River. The Snake River is not included in this species. Major subbasins are the Deschutes, John Day, Umatilla, Walla-Walla, Yakima, and Klickitat rivers. The John Day River probably represents the largest native, naturally-spawning stock of steelhead in the region. Summer steelhead are widespread; winter steelhead occur in Mosier, Chenowith, Mill, and Fifteenmile creeks in Oregon, and in the Klickitat and White Salmon rivers in Washington.

Estimates of historical (pre-1960s) abundance specific to this species are available for the Yakima River, which has an estimated run size of 100,000 (WDF *et al.* 1993). Assuming comparable run sizes for other drainage areas, the total historical run size may have exceeded

300,000 steelhead. Current population sizes are substantially smaller than historical levels, especially in the rivers with the largest steelhead runs: the John Day, Deschutes, and Yakima rivers. At least two rivers have had extinctions of native steelhead runs: the Crooked and Metolius rivers, both in the Deschutes River basin. In 2002, the count of Bonneville Dam steelhead totaled 481,203, and exceeded all counts recorded at Bonneville Dam since 1938, except the 2001 total which was 633,464. In 2003, total steelhead numbers declined to 361,412. For each of these years, the percentage of the return that has been considered wild steelhead has remained fairly constant. In 2001, 24% of the return was wild; in 2002, 30% of the return was wild; and in 2003, that percentage increased slightly to 31% (Fish Passage Center (FPC) 2004).

Hatchery facilities are in a number of subbasins, although there are also subbasins with little or no direct hatchery influence. The Umatilla and the Deschutes rivers have ongoing hatchery production programs based on locally-derived broodstocks. Moreover, straying from out-of-basin production programs into the Deschutes River has been identified as a chronic occurrence (Good *et al.* 2005).

Blockages have prevented access to sizable steelhead production areas in the Deschutes River and the White Salmon River. In the Deschutes River, Pelton Dam blocks access to upstream habitat historically used by steelhead. Conduit Dam, constructed in 1913, blocked access to all but 2 to 3 miles of habitat suitable for steelhead production in the Big White Salmon River (Rawding 2001, as cited in Good *et al.* 2005).

The NMFS identified degraded floodplain connectivity and function, riparian areas and large wood recruitment, stream substrate and flow, water quality, fish passage, and predation, competition, and disease; and impacts related to mainstem Columbia River hydropower as the major factors limiting recovery of this species (NMFS 2007a).

Adult MCR steelhead are present in the action area from April through January, with the majority of the species migrating through the action area from April through October. Juvenile MCR steelhead migrate downstream through the action area from late March through June, with peak abundance occurring from late April through mid-May.

***UCR steelhead.*** This inland steelhead species occupies the Columbia River basin upstream from the Yakima River to the U.S./Canada border. Rivers in the area primarily drain the east slope of the northern Cascade Mountains and include the Wenatchee, Entiat, Methow, and Okanogan river basins. Estimates of historical (pre-1960s) abundance of UCR steelhead are available from fish counts at dams. Counts at Rock Island Dam (RM 453 of Columbia River) from 1933 to 1959 averaged 2,600 to 3,700 fish, suggesting a pre-fishery run size exceeding 5,000 adults for tributaries above Rock Island Dam (Chapman *et al.* 1994, Busby *et al.* 1996). Lower Columbia River harvests had already depressed fish stocks during the period in which these counts were taken, thus the pre-fishery estimate should be viewed with caution. The average (natural-origin + hatchery-origin fish) returning through Priest Rapids Dam (RM 397 of Columbia River) for 1992 through 1996 was 7,800 fish. For 1997 through 2001, the average annual return was 12,900. In 2002, 15,286 steelhead were counted at Rock Island Dam (RM 453 of Columbia River), compared with the 2001 count of 28,602, and the 10-year average return of

9,165. Of the total steelhead counted at Rock Island Dam in 2002, 10,353 were wild steelhead (FPC 2003).

Steelhead returning to the Upper Columbia River continue to be predominately hatchery-origin fish. The Wenatchee, Methow, and Okanogan are planted with hatchery smolts each year while the Entiat basin has been designated as natural production 'reference' drainage basin, *i.e.,* no hatchery outplantings (Good *et al.* 2005).

The natural-origin percentage of the run over Priest Rapids Dam, which is below the UCR steelhead production areas, increased to over 25% in the 1980s, then dropped to less than 10% by the mid-1990s. From 1992 to 1996, the average natural component of the annual steelhead run over the dam was 1,040, and increased to 2,200 from 1997 to 2001, for a median percentage of 17% natural-origin fish per year (Good *et al.* 2005).

Overall, habitat degradation, and juvenile and adult mortality in the hydropower system, have contributed to the decline of this species, and represent risk factors for the future. The construction of Grand Coulee Dam in 1939 blocked access to over 50% of the river miles formerly available to UCR steelhead (NRC 1996). Harvest in lower river fisheries, thus death from by-catch, and genetic homogenization from composite broodstock collection are other factors that may contribute significant risk to the UCR steelhead. In 2007, NMFS identified degraded floodplain connectivity and function; channel structure and complexity; stream substrate and flow; fish passage; impacts related to hatcheries; impacts related to predation, competition, and disease; and impacts related to mainstem Columbia River hydropower as the major factors limiting recovery of this species (NMFS 2007a).

UCR steelhead typically spend from 1 to 2 years in the ocean before returning to spawn. Adults move through the action area from late June through early November, with the peak occurring in late August to mid-September. Smolts do not spend substantial time rearing in the Lower Columbia River, and probably pass through the action area from mid-May through mid-June.

***SRB steelhead.*** Although direct historical estimates of production from the Snake River basin are not available, the basin probably supported more than half of the total steelhead production from the Columbia River basin (NMFS 2000). Some historical estimates of returns are available for portions of the drainage. Counts of steelhead passing through the adult fish ladder at the Lewiston dam on the lower Clearwater, which began operation in 1927, averaged approximately 40,000 per year between 1949 and 1971.

Extrapolations from tag/recapture data indicate that the natural steelhead return to the Tucannon River (a small tributary to the Snake River below Lewiston, Idaho) may have exceeded 3,000 adults in the mid-1950s (WDF 1991, as cited in Good *et al.* 2005). In the early 1960s, returns to the Grande Ronde River and Imnaha River may have exceeded 15,000 and 4,000 steelhead per year, respectively (ODFW 1991, as cited in Good *et al.* 2005). By the mid-1980s, natural stocks were beginning to show sharp declines in returns. In the 1990s, the average escapement for 1990 to 1994 above Lower Granite Dam was approximately 71,000. However, the wild component of this run was only 9,400 adults (7,000 A-run and 2,400 B-run) (Busby *et al.* 1996). The 2001 return (262,568 total steelhead) over Lower Granite Dam was substantially higher than the low

levels seen in the 1990s, and the recent 5-year mean abundance (14,768 natural returns) was approximately 28% of the interim recovery target level (NMFS 2006a).

Recent review of this species highlighted continued concern for its viability. Historically, SRB steelhead spawned in virtually all accessible habitat in the Snake River up to Shoshone Falls (RM 615). The availability of this habitat has been significantly reduced due to the development of irrigation and hydropower projects on the mainstem Snake River. The species remains spatially well-distributed in each of the six major geographic areas in the Snake River basin. However, the SRB steelhead 'B-run' was particularly depressed. High straying rates, thus, replacement of naturally-produced fish by hatchery fish, are of concern because of the possible homogenization of population structure and diversity (NMFS 2006a).

In 2007, NMFS identified degraded floodplain connectivity and function; channel structure and complexity; riparian areas and large woody debris recruitment; stream substrate and flow; water quality; fish passage; impacts related to predation, competition, and disease; and impacts related to mainstem Columbia River hydropower as the major factors limiting recovery of this species (NMFS 2007a).
Adults migrate through the action area from June to October, with the peak occurring in late June and early July. The downstream migration of juveniles occurs from April through June.

***Green sturgeon.*** Green sturgeon is a widely-distributed, anadromous species found in nearshore waters from Baja California to Canada. Spawning occurs in the spring, in deep pools or turbulent mainstem areas of the Sacramento, Klamath, and Rogue rivers. Specific characteristics of spawning habitat for this species are unknown, as is the estuarine/marine distribution and the timing of estuarine use.

The NMFS defined two distinct population segments (DPS) of green sturgeon: a northern DPS (NDPS) with spawning populations in the Klamath and Rogue rivers and a southern DPS (SDPS) that spawns in the Sacramento River. The SDPS was listed as threatened in 2006 (71 FR 17757) and includes all spawning populations south of the Eel River in California. The NDPS remains a species of concern.

McLain (2006) noted that SDPS green sturgeon were first documented in Oregon and Washington waters in the late 1950s when green sturgeon tagged in San Pablo Bay were recovered in the Columbia River estuary. Preliminary work by Israel and May (2006) determined that 80% or more of the green sturgeon found in the Columbia River estuary during late summer and early fall are part of the SDPS. It is likely that green sturgeon inhabit estuarine waters to feed and optimize growth (Moser and Lindley 2007). Commercial catches of green sturgeon in the Columbia River estuary peak in October, and records from other estuarine fisheries (*i.e.*, Willapa Bay and Grays Harbor, Washington) support the idea that sturgeon are present in these estuaries only from June until October (Moser and Lindley 2007). Harvest information from 1981-2004 indicates that the majority of green sturgeon caught in the Columbia River are caught in the lower reaches (29,132 from RMs 1-20 and 8,086 from RMs 20-52) (USACE 2007). A few green sturgeon may be found as far upriver as Bonneville Dam, but there are no known spawning populations in the Columbia River and its tributaries (USACE 2007).

The principal factor in the decline of the SDPS is the reduction of their spawning habitat to a limited section of the Sacramento River (NMFS 2006b). The potential for catastrophic events to affect such a limited spawning area increases the risk of the green sturgeon's extirpation. Insufficient freshwater flow rates in spawning areas, contaminants (*e.g.*, pesticides), bycatch of green sturgeon in fisheries, potential poaching (*e.g.*, for caviar), entrainment of juveniles by water projects, influence of exotic species, small population size, impassable migration barriers, and elevated water temperatures in the spawning and rearing habitat likely also pose threats to this species (NMFS 2006b).

Because the presence of green sturgeon within the action area during the proposed dredging is extremely remote, NMFS has determined that any impacts of the proposed action on green sturgeon would be insignificant or discountable, and that the proposed action is "not likely to adversely affect" green sturgeon. The effects of the proposed action on green sturgeon are not considered further in this Opinion. However; effects of the proposed action on proposed critical habitat for the species are evaluated below.

***Southern Pacific eulachon.*** The southern Pacific eulachon includes populations spawning in rivers south of the Nass River in British Columbia, Canada, to, and including, the Mad River in California. Eulachon leave saltwater to spawn in their natal streams late winter through early summer, and typically spawn at night in the lower reaches of larger rivers fed by snowmelt. After hatching, larvae are carried downstream and widely dispersed by estuarine and ocean currents. Eulachon movements in the ocean are poorly known although the amount of eulachon bycatch in the pink shrimp fishery seems to indicate that the distribution of these organisms overlap in the ocean (73 FR 13185).

The most significant factor responsible for the decline of southern Pacific eulachon is the effect of climate change on ocean conditions. Other factors include many adverse effects related to dams and water diversions, artificial fish passage barriers, increased water temperatures, insufficient streamflow, altered sediment balances, water pollution, over-harvest, and predation. The viability of this species is under assessment although abrupt and continuing declines in abundance throughout its range and the added vulnerability that a small population size presents for this type of highly fecund, broadcast spawning species are of particular concern. Southern Pacific eulachon occur in four recovery domains: Puget Sound, the Willamette and Lower Columbia, Oregon Coast, and Southern Oregon/Northern California Coasts (73 FR 13185).

**Status of Critical Habitat.** The NMFS reviews the status of critical habitat affected by the proposed action by examining the condition and trends of PCEs throughout the designated area. The PCEs consist of the physical and biological elements identified as essential to the conservation of the species in the documents identifying critical habitat (Tables 2 - 4).

The action area is within designated critical habitat for UWR Chinook salmon, LCR Chinook salmon, UCR spring-run Chinook salmon, SR spring/summer run Chinook salmon, SR fall-run Chinook salmon, UWR steelhead, LCR steelhead, UCR steelhead, MCR steelhead, SRB steelhead, CR chum salmon, LCR coho salmon, and SR sockeye salmon. The PCEs potentially found at the action area are those associated with freshwater rearing and freshwater migration.

In the Lower Columbia River, major factors affecting PCEs for salmon and steelhead species are altered channel morphology and stability, lost or degraded floodplain connectivity with rivers, loss of habitat diversity, excessive sediment, degraded water quality, increased water temperatures, reduced stream flows, and reduced access to spawning and rearing areas (Myers *et al.* 2006).

Salmon and steelhead critical habitat in the action area was rated by NMFS' Critical Habitat Analytical Review Team (CHART) (NMFS 2005b) as having 'high' conservation value, although present conditions in the action area are degraded. The condition of PCEs within designated areas and the human activities that have affected PCE trends are further described in the environmental baseline.

The action area is also within proposed critical habitat for the southern distinct population segment of North American green sturgeon (NMFS 2008a). Relevant PCEs under the proposed critical habitat are those for freshwater riverine system. Proposed critical habitat in the action area was rated as having a 'high' conservation value by NMFS' Critical Habitat Review Team (NMFS 2008b). The condition of PCEs within designated areas and the human activities that have affected PCE trends are further described in the environmental baseline.

**Environmental Baseline for the Action Area**

The action area is within the Lower Columbia River from RM 101 upstream to RM 103. Flow in the Lower Columbia River, which includes the action area, is regulated by a series of mainstem and tributary dams. The action area has changed dramatically in the past 100 years. In the 1920s, the Corps installed a series of rock-filled pile dikes along the south side of Hayden Island. The pile dikes were intended to narrow and deepen Portland Harbor. The disposal of dredged material increased the size of Hayden Island and filled in many historical channels and waterways that connected to the Columbia River, reducing the amount of shallow-water habitat in the action area. Natural high flows, which historically contributed large quantities of sand and silt to the area, have been dampened by the dams.

Within the action area, habitat modification and control of the hydrologic regime by upstream dams has limited salmon and steelhead access to productive feeding habitats. Along the southern shore of the Columbia River in the project reach, segments have been diked and realigned to prevent flooding and to provide suitable conditions for industrial development beside the river. Mature riparian trees (black cottonwoods and willows) are present within the action area, but they were greatly reduced in number to accommodate the industrial development.

Nautical maps from the late 1800s show islands that no longer exist in the Lower Columbia River, including Pearcy Island that was where Terminal 6 now stands. Adjacent high-quality habitat areas such as Smith, Bybee and Ramsey lakes were much larger in size, and provided off-channel habitat for juvenile salmon and steelhead, as did surface channels and backwater areas on west Hayden Island. Diking and upstream dams have reduced the frequency and intensity of flooding, thereby limiting connectivity of the floodplain within the action area. Large wood is rare within the system.

No suitable spawning substrate occurs in the action area. The closest known spawning area occurs in the Lower Columbia River east of the Interstate 205 Bridge, on the Washington side of the river. This area is used by chum salmon. It is unlikely that the action area provides spawning substrate for chum salmon because the area is dominated by sand. However, the substrate within the North Portland Harbor is suitable habitat for the prey of juvenile salmon and steelhead. The fine-grained substrate provides habitat for benthic macroinvertebrates.

Shallow-water habitats comprise less than 5% of the action area between RMs 102 and 106. This habitat is mostly confined to the near-shore areas along the harbor. Upstream of Berth 601, there is a small area of shallow-water habitat (<20 feet deep), which extends upstream to Berth 603. Shoreline habitat is important for juvenile salmon and steelhead because it provides suitable substrate conditions to support benthic algae and prey species, and a reduction in current that significantly reduces their energy requirements. Because juveniles are small and have relatively weak swimming abilities, feeding is most effective in areas where current velocities are slow. Velocities of 12 inches/second or less are best for optimal foraging (Bottom *et al.* 2001). This type of habitat is greatly limited in the action area. Dredging has resulted in a bottom profile that deepens faster, moving away from the shoreline, than prior to development of the berth.

Flows in the Columbia River are typical of a snowmelt-dominated system with peak flows in May and June, which coincides with the peak outmigration of juvenile salmonids and steelhead. During the spring and early summer months, upstream storage dams hold back water for flood control and hydropower generation, which interrupts seasonal river flow patterns. As a result, river flows are significantly reduced, resulting in delays in both juvenile and adult migration. Also, low flows contribute to juvenile salmon and steelhead mortality, as more fish are directed toward turbines, rather than over dam spillways. To increase juvenile survival, NMFS has established flow targets for several dams.

The Lower Columbia River from RMs 98 to 142 is classified as water-quality limited under section 303(d) of the Federal Clean Water Act by the DEQ, for dichloro-diphenyl-trichloroethane (DDT), dichloro-diphenyl-dichloroethylene (DDE), polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), arsenic, pH (spring), and temperature (year-round) (DEQ 2006). The EPA has approved total maximum daily loads for the Columbia River for 2,3,7,8 TCDD (dioxin) and total dissolved gas. Concentrations of PCBs, DDE, and DDT found in carp, peamouth, and sucker exceed human heath criteria, and the Oregon Department of Human Services has issued recommendations regarding fish consumption (ODHS 2008).

Water temperatures in the action area exceed the DEQ water quality criteria during the summer for both spawning and juvenile rearing. The peak period of juvenile salmon and steelhead abundance in the action area is from April through June. During this time, water temperatures typically range from 45° to 64°F (meeting the standard).

Average turbidity in the Columbia River tends to be greatest in winter and early spring due to stormwater runoff and high flows. Salmon and steelhead are using the action area at this time, and turbidity ranges from 7 to 25 NTUs. These levels are low to moderate.

Arsenic concentrations at RM 102 in the Columbia River exceed the EPA ambient water quality criteria for the protection of human health and EPA human-health advisories for drinking water (Fuhrer *et al.* 1996). Approximately 102 municipal and industrial sites discharge into the Lower Columbia River and the first 16 river miles of its tributaries. More than half are sewage-treatment plants, chemical manufacture facilities, or wood product facilities.

Berth 607 has been used exclusively for auto loading and unloading and is not known to have contaminated sediments. In March 2008, sediment samples were collected at Berths 601 and 607. The sediment samples were analyzed for metals, tributyltin (TBT), PAHs, semivolatile organic compounds (SVOCs); organochlorine pesticides; and PCBs. Based on the sediment characterization report prepared by Hart Crowser (2008), none of the analytical parameters detected at Berth 601 exceeded the Sediment Evaluation Framework screening levels. However, at Berth 607, zinc and TBT were detected at concentrations greater than the Sediment Evaluation Framework screening levels for benthic toxicity (Hart Crowser 2008) at the newly exposed surface materials (NSM). To empirically determine the potential for benthic toxicity, biological testing was then conducted on the NSM sediments that had exceedences. The Port conducted biological testing on the NSM at Berth 607 and reference samples taken from Berth 601 using a 28-day Amphipod (Hyalella azteca) survival and growth test and a 20-day Midge (Chironomus dilutus) survival and growth test. There was no significant difference from growth or mortality from either of the two bioassay tests affirming no benthic toxicity.

**Effects of the Action**

The proposed action consists of dredging (underwater excavation) that produces spoils (excess material) and in-water disposal which will cause the following effects: (1) Sediment resuspension; (2) release of contaminants from bedded and suspended sediments; and (3) altered physical habitat and prey-base. Each of these effects will be discussed more fully below.

**Dredging.** Dredging will result in the immediate resuspension of sediment that will be redeposited at the dredging site or transported to other locations in the Lower Columbia River. Resuspension rates have been reported to range up to 5% of the total volume dredged depending on the methodology of the dredging operation and the nature of sediments dredged (Anchor Environmental 2003, Hayes and Wu 2001).

During dredging operations, a close-lipped "environmental" bucket will form a seal when the bucket is in the closed position and retrieved to the surface. This will lower resuspension rates by localizing sediment releases near the river bottom. Data from comprehensive studies show that resuspension rates for bucket dredges are at 1% (Hayes and Wu 2001), less than most other methodologies. This would result in approximately 100 cy of sediment being resuspended from dredging operations resulting in adverse effects to water quality though increases in turbidity and potential contaminants. This increase in turbidity will be localized and short-term, and will be dissipated within a few hours following cessation of the activity due to methodology and the nature of the sediments. The Port predicts dredging will be required once during the 5-year permit period and that the dredging of both berths will take approximately 15 to 20 days. Therefore, turbidity will likely remain elevated and localized throughout area during the 15 to 20 days of dredging.

***Contaminants.*** Analytical results on samples from Berth 601 showed that both dredge prism and NSM sediments are below SEF SLs for benthic toxicity. Sediment data for Berth 607 indicated two contaminants of concern exceeding SEF SLs for benthic toxicity: zinc in one NSM sample, and TBT in the dredge prism and one NSM sample. Contamination is often stratified in the sediment bed. Therefore sampling can only affirm the presence of contaminants while the variability of concentrations will remain unknown. The release of these contaminants into the water column can occur through the transfer from sediment pore water and sediment particles during resuspension during dredging operations and in-water disposal. Contaminants that have partitioned into to the water column will be transported downstream in dissolved form along with dissolved contaminants in the released pore water depending on the tidal cycle.

***Prey Base Effects (Dredging Site).*** The areas proposed for dredging at Terminal 6 are deep-water habitat. Dredging will maintain the existing habitat as deep-water habitat despite being in a depositional area that has a potential to develop into shallow-water habitat, a rare habitat-type in the lower action area. In deep-water habitat, the primary mode of feeding for juvenile salmonids is planktonic or pelagic (*e.g.*, *Daphnia*, *Corophium* spp.; Vile *et al.* 2004) rather than benthic. Increased turbidity during dredging will disrupt planktonic feeding in these berths, and this effect will last for up to 24 hours following the dredging. It is unlikely that changes in the pelagic community will be measurable during or following dredging because of the flow-induced movements of these animals, and their transient presence in the action area. Thus, pelagic feeding in the deep-water berths within the action area will be disrupted for a maximum of several weeks during the one-time dredging event.

Although not as likely, the benthic mode of feeding may also be used by juvenile salmon within the action area. The temporal extent of disruptions to benthic feeding compared to planktonic feeding from the proposed action will be longer. The benthic invertebrate populations will be disturbed over the long term (weeks to months) within the dredge prism until the new exposed substrate layer is recolonized. Because Berths 601 and 607 are already actively accessed by deep draft vessels, and subject to prop wash and deposition, it is unlikely that a healthy benthic community is currently present in the berths.

**Disposal.** The Port is likely to dispose of the sediments in-water at the Oregon Slough In-water Placement site located at RM 102.2. Turbidity increases would either result when the barge is releasing sediments to the bottom of the river or discharging sediments to the river through tremie chutes. The disposal operations will occur faster (< 1 day), than during dredging activities (several weeks), therefore the increases in turbidity and associated suspended sediments will be short-term and of limited duration. However, the sediments have been predominately characterized as silty claylike materials which will have a relatively lower settling rate than other materials such as course grained sand. The disposal area is deep water (50- to 70-foot depths) and is outside of the primary juvenile salmonid rearing and migration areas (near shore shallow-water habitat <20 feet deep), although the upper 20 feet may be used for migration of adult ESA-listed salmonids.

***Prey Base Effects (in-water disposal site).*** In-water placement of dredge material will likely disrupt the benthic community in the in-water disposal area through smothering any

established benthic community. However, the Oregon Slough In-Water Placement site is in water 50 to 70 feet deep, which is not feeding habitat for juvenile salmonids.

**Effects on Species.** The presence/absence information for ESA-listed species in the action area during the Columbia River winter in-water work window of November 1 through February 28 is provided in Table 5. Scheduling work during this time will reduce potential impacts to ESA-listed species through the avoidance of peak migration periods for adult and juvenile Chinook, chum, and sockeye salmon, steelhead, and juvenile coho salmon. Of the five types of salmon and steelhead considered in this Opinion, four are likely to be present in the action area during the winter in-water work window as adults, two are likely to be present as juveniles, and one, sockeye, is not likely to be present in significant numbers at any life stage (Table 5).

For Eulachon, in the Columbia River and its tributaries, spawning usually begins in January or February (Beacham *et al.* 2005) with migrations documented to start at the mouth of the Lower Columbia River in December (WDFW 2008, ODFW 2008). However, the action area is over 100 miles away and assuming that Eulachon travel approximately 4 miles per day, Eulachon off-peak migration will reach the action area in January.

**Table 5.** The presence/absence of ESA-listed salmonids in the action area (Columbia River) during the Columbia River winter in-water work window (November 1 to February 28). 'Y' indicates the species is present, 'Y-' indicates that while the life stage may be present, peak migration is not at this time', 'N' indicates that the species is not likely to be present.

| Species | Winter In-water Work Window | |
|---|---|---|
| | Adults | Juveniles |
| Chinook salmon | Y- | Y- |
| Chum salmon | Y- | N |
| Coho salmon | Y | Y- |
| Sockeye | N | N |
| Steelhead | Y- | N |
| Green Sturgeon | N | N |
| Eulachon | Y- | |

Effects to sockeye salmon are not likely because the winter in-water work period avoids the juvenile and adult migration periods for this species, and juvenile sockeye salmon do not rear in the project vicinity.

Effects to green sturgeon are also not likely because the best available information show that adult and subadult green sturgeon only occur in the Columbia River between June and October (Moser and Lindley 2007) and also will not be present during the winter in-water work window.

A known spawning site for chum salmon is a few miles upriver of the project site (RM113 to RM143); spawning of chum is not known to occur in the action area. The project timing overlaps with off-peak juvenile rearing and migration as well as off-peak adult migration;

therefore, both life stages of chum salmon may be present in low numbers during the in-water work period.

While the winter in-water work window avoids peak smolt out-migration and peak adult migration for both Chinook salmon and steelhead, some adult migration occurs for both species during this time period, and some juvenile Chinook are known to outmigrate during this time. Juvenile steelhead are not likely to migrate through the action area during the in-water work window. The work period also overlaps with adult migration for coho salmon, and off-peak migration for Eulachon and off-peak migration and rearing of juvenile coho.

***Water Quality Effects.*** Fish will be exposed to increased turbidity downstream from project activities. The effects of suspended sediment and turbidity on fish, as reported in the literature, range from beneficial to detrimental. Elevated total suspended solids (TSS) conditions have been hypothesized to enhance cover conditions, reduce predation on salmonids, and improve survival. Elevated TSS conditions have also been reported to cause physiological stress, reduce growth, and adversely affect survival. Of key importance in considering the detrimental effects of TSS on fish are the frequency and the duration of the exposure, not just the TSS concentration. At concentrations of 53 to 92 parts per million (ppm) (24 hours) macroinvertebrate populations were reduced (Gammon 1970). Concentrations of 250 ppm (1 hour) caused a 95% reduction in feeding rates in juvenile coho salmon (Noggle 1978). Concentrations of 1200 ppm (96 hours) killed juvenile coho salmon (Noggle 1978). Concentrations of 53.5 ppm (12 hours) caused physiological stress and changes in behavior in coho salmon (Berg 1985). The proposed dredging maintenance program will increase turbidity in the Columbia River for the duration of the dredging action. The increases in turbidity and suspended solids will be short-term and dissipate within several hours, and will be localized, and will likely trigger similar adverse effects to those described above (stress and behavioral changes) for a few ESA-listed salmonids in the action area.

As was described in the Effects of the Action section, recent chemistry data from Berths 601 and 607 indicate that sediments in these berths are contaminated at levels that exceed SEF screening thresholds with TBT and zinc. TBT has been widely introduced into aquatic environments as the bioactive component of antifouling paints. These paints are used on boats and ships to keep them free of plant and animal growths. TBT compounds are highly to very highly toxic to many species of aquatic organisms. TBT exposure to non-target aquatic organisms such as mussels, clams, and oysters, at low levels, may cause structural changes, growth retardation, and death (Huggett *et al.* 1992). Juvenile Chinook salmon accumulate TBT immediately upon exposure to low TBT concentrations. TBT and its metabolite, DBT, have been found in salmon muscle tissue (Short and Thrower 1986). Because of the low water solubility of TBT and other properties, it will bind strongly to suspended material such as organic material or inorganic sediments and precipitate to the bottom sediment (Short and Thrower 1986). However, TBT bioaccumulation factors for benthic organisms are generally high compared to other compounds (Meador 2000), and the primary pathway of exposure for salmonids is likely through their diet.

During studies of zinc toxicity to salmonids, effects ranging from mortality to decreased growth have been observed (Farag *et al.* 1994; Bowen *et al.* 2006). The magnitude of the effect of zinc exposure to salmonids has been shown to increase with longer exposure times and higher zinc

concentrations (Farag *et al.* 1994). However, concentrations of zinc are not likely to be high enough to cause mortality because zinc will likely be sequestered onto organic materials within the sediment and will dissipate rapidly in the dissolved phase.

ESA-listed species will experience direct exposure to these contaminants through contact with suspended sediment particles and contaminants desorbed from those particles into a dissolved phase. Since the proposed action will cause short-term increases in contaminants, and the bioavailability of these contaminants will be tempered by sequestration unto organic materials and rapid dilution of dissolved contaminants, exposure will not kill fish, but is likely to result in behavioral changes (*e.g.*, avoidance, altered feeding, delayed migration), physiological stress, and reduced fitness of juvenile ESA-listed salmonids that are present in the area during the in-water work window.

Within the Lower Columbia River, if ESA-listed species are present while dredging is on-going, migration may be delayed because of increased turbidity. Adults will easily be able to avoid the work area, but juvenile salmon, steelhead, and Eulachon are less able to swim around the disturbance and their movements may be delayed. However, the affected area is relatively small when compared to the width of the Lower Columbia River corridor which provides ample space and opportunity to swim around any sediment plume. If they are delayed in areas with suitable cover and forage opportunities, then the delay will likely be energetically neutral. However, if cover and forage are not available, then the delay can mean greater risk of predation, increased exposure to contaminants, energetic costs associated with poor food availability and swimming in current. Juveniles are commonly found along the edge of the rivers where the majority of project activities will occur.

Therefore, some juvenile salmonids and Eulachon will likely be injured by the increased turbidity and contamination within the action area. The effects will likely be increased physiological stress, reduced feeding, change in behavior, and delayed migration because the duration of the in-water portion of the proposed action is expected to be short-term, the spatial extent is small, few ESA-listed fish will be present in the action area during the in-water work window, and the Eulachon run will be off-peak while the work is occurring, the effect of increased turbidity and contaminants at the population level or at the species scale is not likely to be measurable.

The pelagic food web could also be affected by a short-term increase (hours) in contaminant concentrations and increased turbidity during and following dredging activities. There is a risk of effects to pelagic invertebrates through increased exposure to contaminants. It is unlikely that changes in the pelagic community will be measurable because of flow-induced movements of these animals, and their transient presence in the action area. Because the reduction in pelagic invertebrates would be very short-term and small in magnitude, it is not likely that this reduction in food source will result in death or injury of ESA-listed salmonids.

**Effects on Critical Habitat.** Designated critical habitat within the action area for the ESA-listed salmonids and green sturgeon considered in this Opinion consists of freshwater rearing sites and freshwater migration corridors and their essential physical and biological features as listed below. The effects of the proposed action on these features are summarized as

a subset of the habitat-related effects of the action that were discussed more fully above. The water quality effects and forage effects described below will be short-term (weeks) during in-water dredging.

Salmon and steelhead freshwater rearing sites
*Floodplain connectivity* – No effect.

*Forage* – Short-term effects to pelagic and benthic prey items are likely. Impacts to pelagic prey are expected to last for hours and the impacts to benthic prey are expected to last for several days to weeks after the dredging is completed unless sloughing of shallow-water habitat upstream of Berth 601 occurs, then reduction of benthic habitat will likely last several months. The effects to the forage PCE will be most significant in shallow-water habitat upstream of Berth 601.

*Natural cover* – No effect.

*Water quality* – Turbidity and contaminant concentrations will increase during the several weeks that dredging will take place. Over the long term, water quality will be maintained.

*Water quantity* – No effect.

Salmon and steelhead freshwater migration corridors
*Free passage* – Increased suspended sediment and contaminants from the dredging will likely briefly delay migration in the LCR.

*Water quantity* – No effect.

*Water quality* – Short-term increases in turbidity and contaminants during dredging operations will likely slightly impair or briefly delay the movement of juvenile salmon through the project reach.

*Natural cover* – No effect.

Green sturgeon freshwater riverine system
*Food resources* – Short-term effects to pelagic and benthic prey items are likely. Impacts to pelagic prey are expected to last for hours and the impacts to benthic prey are expected to last for several days to weeks after the dredging is completed unless sloughing of shallow-water habitat upstream of Berth 601 occurs, then reduction of benthic habitat will likely last several months but will likely be fully functioning by the time Green Sturgeon returns.

*Migratory corridor* – No effect.

*Sediment quality* – No effect.

*Water quality* – Turbidity and contaminant concentrations will increase during the several weeks that dredging will take place but in the time frame when green sturgeon are not present. Over the long term, water quality will be maintained.

Information presented in the status and baseline sections, above, show that poor conditions for rearing and migration are significant factors for the affected species. The effects of this action will lower the value of those PCEs in the action area over the short term (weeks), but will not affect the conservation value of the action area over the long term as long as there will be no loss of shallow-water habitat in the action area. The conservation value of the watershed for the species is already very low and has low potential for improvement, either naturally or through active restoration, because of the highly industrialized nature of this portion of the watershed.

**Cumulative Effects**

Additional projects within the watershed are anticipated as population growth continues in the region. Between 2000 and 2006, the population of Multnomah County increased by 3.2%.[1] Associated road and commercial development, as well as maintenance and upgrading of the existing infrastructure, are therefore likely to occur in the foreseeable future. Within the project action area, deep-draft cargo vessels will continue to call at these berths. These berthing areas are subject to disturbance by deep draft vessels that transport automobiles, which likely reduces the substrate suitability for benthic colonization. Propwash from these deep draft vessels can cause the resuspension of sediment as ships dock at the Port's marine facilities. These impacts may occur at Berths 601 and 607 when auto carrying vessels dock at berthing facilities. However, turbidity increases from propwash are expected to quickly dissipate out of the water column and not cause death or injury to ESA-listed species.

**Conclusion**

In developing our conclusion, NMFS reviewed the status of:

- The 15 ESA-listed species considered in this Opinion and their designated and proposed critical habitats,
- eulachon (currently proposed for listing),
- the environmental baseline for the action area,
- the effects of the proposed action, and
- the cumulative effects.

Based on this review, NMFS concludes that the proposed action is not likely to jeopardize the continued existence of the listed species, and will not result in the destruction or adverse modification of designated critical habitat.

The NMFS has also determined that the effects to green sturgeon and SR sockeye salmon will be discountable because the best available information indicates that both species will not be present in the action area during the proposed dredging and disposal operations. Impacts to Eulachon will also be discountable because their fish run will be off-peak during the time of dredging disposal and few fish are likely to be present in the action area during the in-water work window.

[1] U.S. Census Bureau, State and County Quickfacts, Multnomah County, http://quickfacts.census.gov/qfd/states/41/41051.html

The proposed action will degrade water quality for a period lasting up to 3 weeks in the action area, by slightly increasing concentrations of suspended sediment, and concentrations of suspended sediment contaminated with zinc and TBT, in the immediate vicinity of the dredging. ESA-listed species will experience direct exposure to these contaminants through contact with suspended sediment particles and contaminants desorbed from those particles into a dissolved phase. Since the proposed action will cause short-term increases in contaminants, and the bioavailability of these contaminants will be tempered by sequestration unto organic materials and rapid dilution of dissolved contaminants, exposure will not kill fish, but is likely to result in behavioral changes (*e.g.*, avoidance, altered feeding, delayed migration), physiological stress, and reduced fitness of juvenile ESA-listed salmonids that are present in the area during the in-water work window.

In addition, the migration of some adult and juvenile salmon are likely to be disrupted in the action area, temporarily increasing stress and slightly increasing energetic costs of migration. These probable effects will affect only a small proportion of each of the affected species that migrate through the area during a single year. Therefore, the likelihood of survival and recovery for these species will not be appreciably reduced by the proposed action. The degradation of water quality and the contamination of forage organisms will slightly reduce the conservation value of designated critical habitat in the action area for a period lasting up to a few months, but the effects will be limited to the action area, and therefore will not cause the destruction or adverse modification of critical habitat at the scale of the designation. Over the long term, the conservation value of these PCEs will be maintained.

### Reinitiation of Consultation

Reinitiation of formal consultation is required and shall be requested by the Federal agency or by NMFS where discretionary Federal involvement or control over the action has been retained or is authorized by law and: (a) If the amount or extent of taking specified in the incidental take statement is exceeded; (b) if new information reveals effects of the action that may affect listed species or designated critical habitat in a manner or to an extent not previously considered; (c) if the identified action is subsequently modified in a manner that has an effect to the listed species or designated critical habitat that was not considered in the biological opinion; or (d) if a new species is listed or critical habitat is designated that may be affected by the identified action (50 CFR 402.16).

To reinitiate consultation, contact the Oregon State Habitat Office of NMFS, and refer to the NMFS Number assigned to this consultation (2008/01071).

## Incidental Take Statement

Section 9 of the ESA and Federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without a special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by NMFS to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is

defined by Fish and Wildlife Service as an intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA, provided that such taking is in compliance with the terms and conditions of this incidental take statement.

Take prohibitions of the ESA do not apply to a species until it is listed and, if listed as threatened, protective regulations are in effect. Therefore, this incidental take statement does not apply to southern green sturgeon until protective regulations are in place. Moreover, this incidental take statement does not apply to southern Pacific eulachon until after the listing process is complete, protective regulations are in effect, and this conference opinion is confirmed by NMFS as a biological opinion issued through formal consultation.

**Amount or Extent of Take**

Activities necessary to complete the proposed maintenance dredging at Terminal 6 will take place within the active channel of the Lower Columbia River when individuals of LCR Chinook salmon, UWR Chinook salmon, UCR spring-run Chinook salmon, SR spring/summer run Chinook salmon, SR fall-run Chinook salmon, CR chum salmon, LCR coho salmon, LCR steelhead, UWR steelhead, MCR steelhead, UCR steelhead, SRB steelhead, and southern Pacific eulachon are likely to be present. Adverse effects of the proposed action will include the temporary loss of prey items for rearing juveniles, and an increase in turbidity and exposure to pollutants, including elevated levels of zinc and TBT. The habitat that will be adversely affected by the proposed action is of moderate to poor quality. These effects are reasonable likely to result in incidental take—harassment of adults and juveniles, and harm of juveniles (avoidance behaviors, impaired feeding, reduced growth)— within an area extending from 0.25 mile upstream to 0.5 mile downstream from the terminal.

The distribution and abundance of fish that occur within an action area are affected by habitat quality, competition, predation, and the interaction of processes that influence genetic, population, and environmental characteristics. These biotic and environmental processes interact in ways that may be random or directional, and may operate across far broader temporal and spatial scales than are affected by the proposed action. Thus, the distribution and abundance of fish within the action area cannot be attributed entirely to habitat conditions, nor can NMFS precisely predict the number of fish that are reasonably certain to be injured or killed if their habitat is modified or degraded by the proposed action.

Here, the best available indicator for the extent of take will be described as the modification of water quality, which is directly related to suspended sediment from dredging activities with suspended sediment plumes measured 300 feet downcurrent from dredging activities that are no more than 10% greater than the background level. Monitoring intervals shall be every two hours during both dredging and in-water placement and will not exceed 10% above background levels more than once every 8 hours.

In the accompanying Opinion, NMFS determined that this level of incidental take is not likely to result in jeopardy to the species. The measured amount of suspended sediment is a threshold for reinitiating consultation. Exceeding these indicators for extent of take will trigger the reinitiation provisions of this Opinion.

**Reasonable and Prudent Measures**

The following measures are necessary and appropriate to minimize the impact of incidental take of listed species from the proposed action:

The Corps shall:

1. Minimize incidental take from project-related activities by applying permit conditions to the proposed action that reduce the exposure of ESA-listed salmonids to increased turbidity and contaminants (water quality).

2. Ensure completion of a monitoring and reporting program to confirm that the take exemption for the proposed action is not exceeded, and that the terms and conditions in this incidental take statement are effective in minimizing incidental take.

**Terms and Conditions**

The measures described below are non-discretionary, and must become binding conditions of any permit or grant issued to the applicant, for the exemption in section 7(o)(2) to apply. The Corps has a continuing duty to regulate the activity covered by this incidental take statement. If the Corps (1) fails to assume and implement the terms and conditions or (2) fails to require an applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. To monitor the impact of incidental take, the Corps or applicant must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement.

1. To implement reasonable and prudent measure #1 (reduce water quality impacts), the Corps shall ensure that:

    a. Work Window. To minimize effects to juvenile salmonids, dredging shall be limited to the in-water work window (November 1 through February 28).
    b. Notice to Contractors. Before beginning work, all contractors working on site shall be provided with a complete list of Corps permit special conditions, reasonable and prudent measures, and terms and conditions intended to minimize the amount and extent of take resulting from general dredging activities and in-water work.
    c. Minimize Impact Area. The applicant will confine dredging impacts to the minimum area necessary to complete the project. If a floating crane is used, it shall not rest on or disturb bottom sediment (this does not apply to spuds that may be used to stabilize the materials barge).

d. No Redistribution. Dumping of partial or full buckets of dredged material back into the project area is not allowed. Dredging of holes or sumps below the maximum depth, and redistribution of sediment by dredging, dragging or other means is not allowed.

e. Debris. All large anthropogenic debris shall be removed from dredged sediments and transported to an appropriate disposal site.

f. Cycling Time. Clamshell cycling time shall be slowed, as necessary, to reduce turbidity and reduce sediment drift to adjacent areas.

g. Pollution Control Plan. The applicant will prepare and implement a plan to prevent pollution caused by dredging and disposal operations from entering the river.

h. Transport. The sediments shall be covered during transport on the barge to prevent the blowing of sediment back into the river if winds are predicted to be greater than 20 miles per hour during transport.

i. Staging Area. The dredge material barge shall be staged in water deeper than 20 feet.

j. Upland Disposal. The upland disposal sites shall be large enough to accommodate the quantity of material and water to be placed there to allow adequate settling. Best management practices such as filter bags, sediment fences, silt curtains, leave strips or berms shall be employed and maintenances daily to reduce turbidity levels form the upland disposal location to the maximum extent practicable.

2. To implement reasonable and prudent measure #2 (monitoring and reporting), the Corps shall ensure that:

a. Dredge Prism Monitoring. The size of the dredge prism shall be monitored (depth, areal extent, and total quantity of material removed). The applicant will conduct post-dredge bathymetry survey to ensure that only the specified material was removed.

b. Turbidity Monitoring. Quantitative turbidity monitoring shall be conducted and recorded as described below. Monitoring shall occur each day during daylight hours when in-water work is being conducted, which includes dredging and in-water disposal activities. A properly and regularly calibrated turbidimeter is required.

   i. Representative background point. A sample shall be taken every 2 hours at an undisturbed area upcurrent from the area being dredged or the in-water disposal area to establish background turbidity levels for each monitoring cycle. Background turbidity, location, time, and tidal stage must be recorded prior to monitoring.

   ii. Compliance point. Monitoring shall occur every 2 hours approximately 300 feet downcurrent from the area being dredged or the in-water disposal area and be compared against the background measurement. The turbidity, location, time, and tidal stage must be recorded for each sample.

   iii. Compliance. Results from the compliance points shall be compared to the background levels taken during that same monitoring interval. Turbidity

shall not exceed an increase of 10% above background more than once in an 8-hour period.

iv. Reporting. Copies of daily logs for turbidity monitoring shall be available to NMFS upon request.

c. Reporting. The applicant will report all monitoring items including turbidity, bathymetry, and extent of the dredge prism to NMFS within 60 days of project completion, or within 60 days of the end of the in-water work window that work occurred during. Any exceedance of take covered by this Opinion must be reported by the applicant to NMFS immediately.

d. Submit monitoring reports to:

National Marine Fisheries Service
Oregon State Habitat Office
Attn: 2008/01071
1201 NE Lloyd Boulevard, Suite 1100
Portland, OR 97232-2778

e. NOTICE: If a sick, injured or dead specimen of a threatened or endangered species is found in the project area, the finder must notify NMFS through the contact person identified in the transmittal letter for this Opinion, or through the NMFS Office of Law Enforcement at 1-800-853-1964, and follow any instructions. If the proposed action may worsen the fish's condition before NMFS can be contacted, the finder should attempt to move the fish to a suitable location near the capture site while keeping the fish in the water and reducing its stress as much as possible. Do not disturb the fish after it has been moved. If the fish is dead, or dies while being captured or moved, report the following information: (1) NMFS consultation number; (2) the date, time, and location of discovery; (3) a brief description of circumstances and any information that may show the cause of death; and (4) photographs of the fish and where it was found. The NMFS also suggests that the finder coordinate with local biologists to recover any tags or other relevant research information. If the specimen is not needed by local biologists for tag recovery or by NMFS for analysis, the specimen should be returned to the water in which it was found, or otherwise discarded.

## MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT

The consultation requirement of section 305(b) of the MSA directs Federal agencies to consult with NMFS on all actions, or proposed actions that may adversely affect EFH. Adverse effects include the direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality or quantity of EFH. Adverse effects to EFH may result from actions occurring within EFH or outside EFH, and may include site-specific or EFH-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810). Section 305(b) also requires NMFS to recommend measures that may be taken by the action agency to conserve EFH.

The Pacific Fishery Management Council (PFMC) designated EFH for groundfish (PFMC 2006), coastal pelagic species (PFMC 1998), and Chinook salmon, coho salmon, and Puget Sound pink salmon (PFMC 1999). The proposed action and action area for this consultation are described in the Introduction to this document. The action area includes areas designated as EFH for various life-history stages of coho and Chinook salmon (PFMC 1999).

Based on information provided in the BA and the analysis of effects presented in the ESA portion of this document, NMFS concludes that proposed action will have the following adverse effects on EFH designated for Pacific Coast salmon: Short-term (weeks) degradation of water quality (turbidity and contaminants).

**EFH Conservation Recommendations**

The following two conservation measures are necessary to avoid, mitigate, or offset the impact of the proposed action on EFH. These conservation recommendations are a subset of the ESA terms and conditions.

1. Reduce water quality impacts: Follow terms and conditions 1a – 1j as presented in the ESA portion of this document.

2. Monitoring: Follow terms and conditions 2a - 2e as presented in the ESA portion of this document.

**Statutory Response Requirement**

Federal agencies are required to provide a detailed written response to NMFS' EFH conservation recommendations within 30 days of receipt of these recommendations [50 CFR 600.920(j) (1)]. The response must include a description of measures proposed to avoid, mitigate, or offset the adverse affects of the activity on EFH. If the response is inconsistent with the EFH conservation recommendations, the response must explain the reasons for not following the recommendations. The reasons must include the scientific justification for any disagreements over the anticipated effects of the proposed action and the measures needed to avoid, minimize, mitigate, or offset such effects.

In response to increased oversight of overall EFH program effectiveness by the Office of Management and Budget, NMFS established a quarterly reporting requirement to determine how many conservation recommendations are provided as part of each EFH consultation and how many are adopted by the action agency. Therefore, we ask that in your statutory reply to the EFH portion of this consultation, you clearly identify the number of conservation recommendations accepted.

**Supplemental Consultation**

The Corps must reinitiate EFH consultation with NMFS if the proposed action is substantially revised in a way that may adversely affect EFH, or if new information becomes available that affects the basis for NMFS' EFH conservation recommendations [50 CFR 600.920(k)].

## DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW

Section 515 of the Treasury and General Government Appropriations Act of 2001 (Public Law 106-554) (Data Quality Act) specifies three components contributing to the quality of a document. They are utility, integrity, and objectivity. This section of the Opinion addresses these Data Quality Act (DQA) components, documents compliance with the DQA, and certifies that this Opinion has undergone pre-dissemination review.

**Utility:** Utility principally refers to ensuring that the information contained in this consultation is helpful, serviceable, and beneficial to the intended users.

This ESA consultation concludes that the proposed berth maintenance project will not jeopardize the affected listed species. Therefore, the Corps can authorize this action in accordance with its authority under section 10 of the Rivers and Harbors Act and section 404 of the Clean Water Act. The intended users are the Corps and the Port of Portland.

Individual copies were provided to the above-listed entities. This consultation will be posted on the NMFS Northwest Region website (http://www.nwr.noaa.gov). The format and naming adheres to conventional standards for style.

**Integrity:** This consultation was completed on a computer system managed by NMFS in accordance with relevant information technology security policies and standards set out in Appendix III, 'Security of Automated Information Resources,' Office of Management and Budget Circular A-130; the Computer Security Act; and the Government Information Security Reform Act.

**Objectivity:**

***Information Product Category:*** Natural Resource Plan.

***Standards:*** This consultation and supporting documents are clear, concise, complete, and unbiased; and were developed using commonly accepted scientific research methods. They adhere to published standards including the NMFS ESA Consultation Handbook, ESA regulations, 50 CFR 402.01, *et seq.*, and the MSA implementing regulations regarding EFH, 50 CFR 600.920(j).

***Best Available Information:*** This consultation and supporting documents use the best available information, as referenced in the Literature Cited section. The analyses in this Opinion/EFH consultation contain more background on information sources and quality.

***Referencing:*** All supporting materials, information, data and analyses are properly referenced, consistent with standard scientific referencing style.

***Review Process:*** This consultation was drafted by NMFS staff with training in ESA and MSA implementation, and reviewed in accordance with Northwest Region ESA quality control and assurance processes.

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# August 2011 HiNoon Presentation Outline: T6 Dredging

I. Overview of T6 maintenance dredging
   - Need for maintenance dredging
   - Location
   - Frequency
   - Estimated volume removed

II. Overview of dredging and offloading process

III. Project schedule

IV. Overview of dredging and placement permitting process

V. Overview and summary of T6 sediment results
   - Chemicals analyzed
   - Agencies involved in review and approval
   - Human health and ecological screening criteria

VI. Highlights of BUD application
   - Opportunities for public input

July 2, 2009

Mr. Thomas Taylor
U.S. Army Corps of Engineers
ATTN: CENWP-OP-GP
P.O. Box 2946
Portland, OR 97208-2946

Dear Mr. Taylor:

The Department of Environmental Quality (DEQ) has reviewed the U.S. Army Corps of Engineers (USACE) Permit application #2008-00028. The applicant, Port of Portland (Port), proposes to conduct maintenance dredging activities at Marine Terminal 6 (T-6), Berths 601 and 607. The project is located along the Columbia River, between approximately river mile 102 and 104, Portland, Multnomah County, Oregon (Section 30, T2N/R1E and Section 24, T2N/R1W).

The Port previously received 401 Water Quality Certifications (WQCs) for: deepening and maintenance dredging (USACE # 2006-00635 which expires approximately January 4, 2012); installation of sheetpile and rock for scour protection (USACE # 2005-00161-1 which expires October 27, 2010); underwater grading (USACE # 2004-00104 which expires May 27, 2010); and berth maintenance (USACE # 2000-00950 which expired January 12, 2006); at Berths 603, 604, and 605 at the same Marine Terminal.

**Project Description:** To maintain adequate navigational depths for continued operation of the T-6 facility, which handles containerized and breakbulk cargo and automobiles, the Port proposes to remove up to approximately 10,000 cubic yards (cy) of sediment (approximately 7,300 cy from 601 and 1,300 cy from 607). Using a closed-lipped "environmental" clamshell bucket, the Port proposes to dredge to a depth of approximately -38 feet Columbia River Datum (CRD), which includes up to 2 feet of "overdredge," over an area of approximately 7.9 acres. Dredged material will be placed in a barge and transported either to the Oregon Slough In-Water Placement Site at river mile 102.2 of the Columbia River, or to an authorized upland disposal site, depending on determination of suitability for in-water placement through the Sediment Evaluation Framework protocols.

**The Columbia River is classified as water quality limited under the Federal Clean Water Act, Section 303(d), for the parameters of: Temperature; DDE (DDT metabolite); PCB; and Arsenic. An Environmental Protection Agency (EPA) approved Total Maximum Daily Load (TMDL) has been developed for the parameters of: Dioxin and Total Dissolved Gas. Other parameters listed for potential concern include: Cadmium; Copper; Iron; Lead; Mercury; Nickel; Silver; Tributyltin; Zinc; Aldrin; Alpha-BNC; Benzo(a)anthracene; Benzo(g, h, i)perylene; Bhc; Chlordane; Chrysene; Cyanide; DDD; DDT; Dieldrin; Endrin; Hexavalent Chromium; pH; Phenol; Polynuclear Aromatic Hydrocabons (PAHs); Pyrene; and Radionuclides.**

**Beneficial uses impaired by the above listed parameters in the Columbia River include: salmonid rearing; anadromous fish passage; resident fish and aquatic life; drinking water; water contact recreation; and aesthetics.**

Based on information provided by the applicant, DEQ does not anticipate any long-term violations of State Water Quality Standards, including *Oregon Administrative Rule (OAR) 340-41-004, Antidegradation Policy for Surface Waters*, provided the applicant strictly adheres to the conditions which follow.

1) **Duration of Certification:** This 401 Water Quality Certification (WQC) covering maintenance dredging activities expires five years from the date of issuance of the USACE permit. A new 401 WQC must be obtained prior to any substantial modification of the USACE permit.

2) **Fish protection/ODFW timing:** All in-water work shall occur within the Oregon Department of Fish and Wildlife's (ODFW) preferred time window as specified in Oregon Guidelines for Timing of In-Water Work to Protect Fish and Wildlife Resources, June 2008, or most current version. Exceptions to the work timing window must be reviewed and approved in writing by ODFW and National Marine Fisheries Service (NMFS).

3) **Aquatic life movements:** No activity may substantially disrupt the movement of those species of aquatic life indigenous to the water body, including those species that normally migrate through the area. Unobstructed fish passage must be provided for at all times during dredging and disposal activities.

4) **Sediment characterization** has been conducted in accordance with the *Interim Final Sediment Evaluation Framework* (SEF), 2006 [USACE, US Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), US Environmental Protection Agency (EPA), DEQ, Washington Department of Natural Resources (WDNR), Washington Department of Ecology (Ecology), and Idaho Department of Environmental Quality (IDEQ)].

   (a) Sediment at Berth 601 was determined by the Project Review Group (PRG) to be suitable for unconfined, in-water placement.

   (b) Sediment at Berth 607 exceeded screening levels for zinc and tributyl tin and was determined by the PRG to be unsuitable for unconfined, in-water disposal without further testing. Biological testing was conducted and the PRG determined that the material was suitable for unconfined, in-water pleacement.

5) **Dredging Operations:**

   (a) Dredging operations shall be conducted employing BMP's that minimize disturbance or siltation to adjacent habitat or waters. All digging passes of the bucket shall be completed without any material, once in the bucket, being returned

to the wetted area. No dumping of partial or full buckets of material back into the project area will be allowed.

(b) If the dredging operation causes a water quality problem which results in distressed or dying fish, the operator shall immediately: cease operations; take appropriate corrective measures to prevent further environmental damage; collect fish specimens and water samples; and notify DEQ, ODFW and NMFS.

(c) Dredging of holes or sumps below maximum depth and subsequent redistribution of sediment by dredging, dragging, or other means is not authorized.

6) **Dredged Material Placement:**

(a) In-water placement will occur via controlled discharge from a split hull or multi-celled barge or flat barge with tremie chute into the stream.

(b) Placement of dredged material in-water shall occur during ebb tides and at depths of greater than 20 feet.

(c) All anthropogenic debris shall be removed from dredged sediments prior to in-water placement. Such debris must be transported to an appropriate upland disposal site.

(d) Upland placement and reuse may occur at either the Port's Suttle Road Rehandle Facility or the USACE West Hayden Island Disposal Facility, provided the upland disposal site or reuse plan is approved by DEQ through a Solid Waste Letter of Authorization (SWLA) or clean fill determination.

(e) Depending on levels of contamination, disposal at an upland facility large enough to accommodate the quantity of both material and water removed, in order to allow adequate settling and appropriate chemical testing without release of water, or an appropriately permitted solid waste facility may be required.

7) **Turbidity:** All practical Best Management Practices (BMPs) on disturbed banks and within the stream must be implemented during dredging and disposal to minimize turbidity during in-water work. Any activity that causes turbidity to exceed 10% above natural stream turbidities is prohibited except as specifically provided below.

(a) **Monitoring:** Turbidity monitoring shall be conducted and recorded as described below. Monitoring shall occur each day during daylight hours when dredging or in-water placement, is being conducted. A properly and regularly calibrated turbidimeter is required taking measurements at approximately mid-depth below the surface of the water and above the channel bottom at the compliance and background distances.

i. <u>Dredging and In-Water Placement:</u> Monitoring points shall be a *representative background point* at an undisturbed area within the flowing channel approximately **100 feet upcurrent** from the disturbance or

placement area; and a *compliance point* within the flowing channel approximately **300 feet downcurrent** from the project area and within any visible plume. Monitoring intervals shall be every two hours during dredging and in-water placement.

ii. Upland Disposal Site: Although upland disposal with return water is not anticipated, monitoring shall occur if return water is discharged. Monitoring points shall be a *representative background point* at an undisturbed site within the flowing channel approximately **100 feet upcurrent** from the discharge area; and a *compliance point* within the flowing channel approximately **100 feet downcurrent** from the point of discharge and within any visible plume every two hours the first day of discharge and every four hours each day afterwards until return water discharges cease.

b) **Compliance**: Results from the compliance points should be compared to the background levels taken during that monitoring interval. Limited duration exceedances are allowed as follows:

i. An increase of **5-29 NTUs** above background over a duration of no more than eight hours for each calendar day.
ii. An increase of **30-49 NTUs** for no more than two hours during any 24-hour period.

Limited duration exceedances of the criteria are allowed for no more than 6 calendar days out of any consecutive 30-day period.

*If an exceedance occurs at: 50 NTU or more over background; 30 NTU over background for 2 hours; or 5-29 NTU over back ground for 8 hours, the activity must stop immediately for the remainder of that 24-hour period.*

(c) **Reporting:** Copies of daily logs for turbidity monitoring shall be available to DEQ, USACE, NMFS, USFWS, and ODFW upon request. The log must include: background NTUs, compliance point NTUs, comparison of the points in NTUs, and location, date, time, and tidal stage for each reading. Additionally, a narrative must be prepared discussing all exceedances with subsequent monitoring, actions taken, and the effectiveness of the actions.

7) **Spill Prevention:**

(a) Best management practices (BMPs) shall be employed in order to prevent petroleum products, chemicals, or other deleterious waste materials from entering waters of the State.

(b) Fuel hoses, oil drums, oil or fuel transfer valves and fittings, etc., must undergo frequent inspection for drips or leaks, and shall be maintained in order to prevent spills into State waters.

(c) An adequate supply of spill response materials, such as booms and absorbent materials, shall be kept at the immediate project site and deployed as necessary.

(d) The applicant must remove all foreign materials, refuse, and waste from the area and dispose of them properly.

8) **Spill & Incident Reporting**:

(a) In the event that petroleum products, chemicals, or any other deleterious materials are discharged into state waters, or onto land with a potential to enter state waters, the discharge shall be promptly reported to the Oregon Emergency Response Service (OERS, 1-800-452-0311). Containment and cleanup must begin immediately and be completed as soon as possible.

(b) If the project operations cause a water quality problem which results in distressed or dying fish, the operator shall immediately: cease operations; take appropriate corrective measures to prevent further environmental damage; collect fish specimens and water samples; and notify DEQ, ODFW, NMFS and USFWS as appropriate.

9) DEQ reserves the option to modify, amend or revoke this WQC, as necessary, in the event new information indicates that the project activities are having a significant adverse impact on State water quality or beneficial uses.

10) A copy of this WQC letter shall be kept on site and readily available for reference by the Port and its contractors, USACE, DEQ, NMFS, and other appropriate state and local government inspectors.

11) This WQC is invalid if the project is operated in a manner not consistent with the project description contained in the permit application materials.

12) DEQ is to have site access upon reasonable request.

13) If you are dissatisfied with the conditions contained in this certification, you may request a hearing before the Environmental Quality Commission. Such request must be made in writing to the Director of DEQ within 20 days of the mailing of this certification.

The DEQ hereby certifies that this project complies with the Clean Water Act and state water quality standards, if the above conditions are made a part of the Federal permit. The applicant shall notify the DEQ of any change in the ownership, scope, or construction methods of the project subsequent to certification. If you have any questions, please contact Alexandra Cyril at 503.229.6030.

Sincerely,

Sally Puent
Water Quality Manager
Northwest Region

T:AC.certtayl.08-28

cc: Applicant
Cathy Tortorici, NMFS

January 5, 2007

Dr. Janice Stuart
U.S. Army Corps of Engineers
ATTN: CENPP-OP-GP
P.O. Box 2946
Portland, OR 97208-2946

Dear Dr. Stuart:

The Department of Environmental Quality (DEQ) has reviewed the U.S. Army Corps of Engineers (USACE) Permit application 2006-00635 [Department of State Lands (DSL) permit #34105-RP]. The applicant, Port of Portland (Port), proposes to excavate up to 62,000 cubic yards (cy) of accumulated sediment to deepen and maintain Berths 603, 604, and 605 at Terminal 6 on the Columbia River. The project is located at approximately river mile 102.5 of the Columbia River, in the City of Portland, in Multnomah County, Oregon (Section 24, T2N/R1W). The Port previously received water quality certification for installation of sheetpile and rock for scour protection (USACE # 2005-00161-1 which expires October 27, 2010), underwater grading (USACE # 2004-00104 which expires May 27, 2010), and berth maintenance (USACE # 2000-00950 which expired January 12, 2006) at the same location.

**Project Description**: The Port proposes to dredge and maintain berths 603, 604, and 605 to various depths due to locations of known sediment contamination and structural concerns associated with differing dates and methods of construction of the contiguous berths. Using a closed-lipped, clamshell bucket on a floating barge, Berth 603 would be deepened to and maintained at -40 feet Columbia River Datum (CRD) plus 2-feet of overdepth; the western half of Berth 604 would be deepened to and maintained at -43-feet CRD plus 2-feet of overdepth; the eastern half of Berth 604 and all of Berth 605 would be deepened to and maintained at -45-feet CRD plus 3-feet of overdepth. Previous sediment sampling and analysis has determined that portions of Berth 603 contain Tributyltin (TBT) and DDT above screening levels outlined in the Dredged Material Evaluation Framework (DMEF, 1998). A transition zone of approximately 600-feet with a gradual 3:1 slope will be left between the known contaminated area of Berth 603 and the contiguous section of Berth 604. Additional sediment sampling and analysis covering the entire area proposed for dredging has been completed and submitted for review to the Regional Sediment Evaluation Team (RSET). If RSET determines that the dredged material is suitable for unconfined, in-water disposal, the material will be placed via controlled discharge from a split hull or multi-celled barge or flat barge with tremie chute in stream at the Oregon Slough In-Water Placement Site 1 (O 102.2) which is downstream of Terminal 6 just north of Kelley Point Park. If RSET determines the dredged material to be unsuitable for in-water disposal, the material will be dewatered and placed at an upland disposal facility at either the Suttle Road Rehandle Facility or the USACE West Hayden Island Disposal Facility, prior to reuse. Due to the large capacity of the disposal sites, return of water from the material to the Columbia River is not anticipated to occur.

**The Columbia River is classified as Water Quality Limited under Section 303(d) of the Clean Water Act for the parameters of: pH; Temperature; Total Dissolved Gas; Arsenic; PCB; Polynuclear Aromatic Hydrocarbons (PAHs); and DDT Metabolite (DDE). The US Environmental Protection Agency (EPA) has approved Total Maximum Daily Loads**

**(TMDLs) for the Columbia River for the water quality parameters of 2,3,7,8 TCDD (Dioxin) and Total Dissolved Gas.**

**The above listed parameters impair the following beneficial uses in the Columbia River: salmonid rearing; anadromous fish passage; resident fish and aquatic life; drinking water; and water contact recreation.**

Based on information provided by the applicant, DEQ does not anticipate any long-term violations of State Water Quality Standards, including *Oregon Administrative Rule (OAR) 340-41-004, Antidegradation Policy for Surface Waters*, provided the applicant strictly adheres to the conditions which follow.

## CONDITIONS

1. **Duration of Certificate:** This 401 Water Quality Certification (WQC) expires 5 years from the date of issuance of the USACE permit. A new 401 WQC must be obtained prior to expiration for any significant changes granted to the USACE permit.

2. **In-water work windows**: Dredging shall occur only within the Oregon Department of Fish and Wildlife's (ODFW) preferred time window, described in: *Oregon Guidelines for Timing of In-Water Work to Protect Fish and Wildlife Resources,* unless approved in writing by National Marine Fisheries Service (NMFS), ODFW, and DSL.

3. **Aquatic life movements:** No activity may substantially disrupt the movement of those species of aquatic life indigenous to the water body, including those species that normally migrate through the area. Unobstructed fish passage must be provided at all times during any authorized activity.

4. **Sediment Characterization**: Chemical characterization of any sediment to be dredged at Terminal 6 will be conducted and the results reviewed and approved prior to each dredging event in accordance with the regulatory guidelines in place at the time.

5. **Dredging Operations:**

    a. Dredging operations shall be conducted employing BMP's that minimize disturbance or siltation to adjacent habitat or waters. All digging passes of the bucket shall be completed without any material, once in the bucket, being returned to the wetted area. No dumping of partial or full buckets of material back into the project area will be allowed.
    b. If the dredging operation causes a water quality problem which results in distressed or dying fish, the operator shall immediately: cease operations; take appropriate corrective measures to prevent further environmental damage; collect fish specimens and water samples; and notify DEQ, ODFW and NMFS.

6. **Turbidity**: All dredging and disposal of sediments shall be conducted so as to minimize siltation and turbidity in the project area. Turbidity shall not exceed 10% above natural stream turbidities, except where allowed by OAR 340-041-0036. This rule states, in part, that limited duration activities necessary to accommodate essential dredging, and which cause the turbidity standard to be exceeded may be authorized provided all

practical turbidity control techniques have been applied and a section 401 water quality certificate has been granted.

a) **Monitoring:** Turbidity shall be monitored during active in-water work periods including dewatering.

Dredging: For this activity, the project area is considered to be the entire facility area proposed for dredging. Monitoring points shall be: 1) *representative background* : an undisturbed site within the flowing channel approximately 100 feet upcurrent from the project area; and 2) *compliance point* : within the flowing channel approximately 300 feet downcurrent from the project area and within any visible plume. A turbidimeter is required taking measurements at approximately mid-depth below the surface of the water and above the channel bottom at the compliance and background distances. Monitoring intervals shall be every two hours during dredging.

Upland Disposal Site: Although return water is not anticipated, monitoring shall occur if return water is discharged. Monitoring points shall be: 1) *representative background* : an undisturbed site within the flowing channel approximately 100 feet upcurrent from the discharge area; and 2) *compliance point* : within the flowing channel approximately 100 feet downcurrent from the point of discharge and within any visible plume every two hours the first day of discharge and every four hours each day afterwards until return water discharges cease.

b) **Compliance**: Results from the compliance points should be compared to the background levels taken during that monitoring interval. When using a turbidimeter, turbidity may exceed an increase of **5 NTUs** above background during a single period of not greater than eight hours for each calendar day allowed. During that period, turbidity increases above background may exceed **30 NTUs** for no more than two hours and must not exceed **50 NTUs** above background turbidity during any single monitoring interval. Limited duration exceedances of the criteria are allowed for no more than 6 calendar days out of any consecutive 30-day period, unless turbidity monitoring or existing relevant data demonstrate compliance with the monthly average turbidity criteria.

c) **Reporting**: Copies of daily logs for turbidity monitoring shall be made available to DEQ, USACE, NMFS, USFWS, and ODFW upon request.

7. **Erosion Control**: The applicant is referred to DEQ's Oregon Sediment and Erosion *Control Manual*, April 2005. The following erosion control measures (and others as appropriate) or comparable measures as specified in an NPDES 1200-C permit (if required) shall be implemented:

a. Filter bags, sediment traps or catch basins, vegetative strips, berms, Jersey barriers, fiber blankets, bonded fiber matrices, geotextiles, mulches, wattles, sediment fences, or other measures used in combination shall be used to prevent movement of soil from uplands into waterways or wetlands;
b. An adequate supply of materials needed to control erosion must be maintained at the project construction site;

c. To prevent stockpile erosion, use compost berms, impervious materials or other equally effective methods, during rain events or when the stockpile site is not moved or reshaped for more than 48 hours;
d. Erosion control measures shall be inspected and maintained daily, or more frequently as necessary, to ensure their continued effectiveness and shall remain in place until all exposed soil is stabilized;
    i. If monitoring or inspection shows that the erosion and sediment controls are ineffective, mobilize work crews immediately to make repairs, install replacements, or install additional controls as necessary.
    ii. Remove sediment from erosion and sediment controls once it has reached 1/3 of the exposed height of the control.
e. Unless part of the authorized permanent fill, all construction access points through, and staging areas in, riparian or wetland areas shall use removable pads or mats to prevent soil compaction.
f. Flag or fence off avoided wetlands and planted areas to protect from disturbance and/or erosion.
g. Dredged or other excavated material shall be placed on upland areas with stable slopes to prevent materials from eroding back into waterways or wetlands;
h. Sediment from disturbed areas or able to be tracked by vehicles onto pavement shall not be allowed to leave the site in amounts that would reasonably be expected to enter waters of the state and impair water quality. Placement of clean aggregate at all construction entrances, and other BMPs such as truck or wheel washes if needed, will be used when earth moving equipment will be leaving the site and traveling on paved surfaces; and,
i. Projects which disturb one acre or more require an NPDES 1200C Storm Water Discharge Permit. Contact the appropriate DEQ regional office for more information (Contact information can be found at: http://www.deq.state.or.us/wq/wqpermit/stormwaterhome.htm).

8. **Deleterious Waste Materials**: Petroleum products, chemicals, or other deleterious waste materials shall not be allowed to enter waters of the State. The applicant must remove all foreign materials, refuse, and waste from the area.

9. **Spill Prevention:** Fuel hoses, oil drums, oil or fuel transfer valves and fittings, etc., shall be checked regularly for drips or leaks, and shall be maintained in order to prevent spills into waters of the state. Fuel, operate, maintain, and store vehicles and construction materials in areas which minimize disturbance to habitat and prevent adverse effects from potential fuel spills.
    a. Complete vehicle staging, cleaning, fueling, maintenance, and fuel storage in a vehicle staging area placed 150 feet or more from any waters of the state, unless this distance is not appropriate because of any of the following site conditions:
        i. Physical constraints that make this distance not feasible (e.g., steep slopes, rock outcroppings);
        ii. Natural resource features would be degraded as a result of this setback; or,
        iii. Equal or greater spill containment and effect avoidance if staging area is less than 150 feet of any waters of the State;
    b. If staging areas are within 150 feet of any waters of the State, full containment of potential contaminants shall be provided to prevent soil and water contamination, as appropriate;

c. Inspect all vehicles operated within 150 feet of any waters of the State daily for fluid leaks before leaving the vehicle staging area. Repair any leaks detected in the vehicle staging area before the vehicle resumes operation;
d. Before operations begin and as often as necessary during operation, steam clean (or an approved equal) all equipment that will be used below bankfull elevation until all visible external oil, grease, mud, and other visible contaminates are removed;
e. Diaper all stationary power equipment (e.g., generators, cranes, stationary drilling equipment) operated within 150 feet of any waters of the state to prevent leaks, unless other suitable containment is provided to prevent potential spills from entering any waters of the state; and,
f. An adequate supply of materials (such as straw matting/bales, geotextiles, booms, diapers, and other absorbent materials) needed contain spills must be maintained at the project construction site and deployed as necessary.

10. **Spill & Incident Reporting**:

a. In the event that petroleum products, chemicals, or any other deleterious materials are discharged into state waters, or onto land with a potential to enter state waters, the discharge shall be promptly reported to the Oregon Emergency Response Service (OERS, 1-800-452-0311). Containment and cleanup must begin immediately and be completed as soon as possible.
b. If the project operations causes a water quality problem which results in distressed or dying fish, the operator shall immediately: cease operations; take appropriate corrective measures to prevent further environmental damage; collect fish specimens and water samples; and notify DEQ, ODFW, NMFS and USFWS as appropriate.

11. A copy of this WQC letter shall be kept on the job site and readily available for reference by the USACE DEQ personnel, the contractor, and other appropriate state and local government inspectors.

12. This WQC is invalid if the project is operated in a manner not consistent with the project description contained in the Public Notice for certification. Failure to comply with the conditions of this certification may subject the applicant to civil penalties or other administrative or judicial actions.

13. DEQ requires site access upon request.

If you are dissatisfied with the conditions contained in this certification, you may request a hearing before the Environmental Quality Commission. Such request must be made in writing to the Director of DEQ within 20 days of the mailing of this certification.

The DEQ hereby certifies that this project complies with the Clean Water Act and state water quality standards, if the above conditions are strictly adhered to.

The applicant shall notify the DEQ of any change in the ownership, scope, or construction methods of the project subsequent to certification. If you have any questions, please contact Alexandra Cyril at 503.229.6030.

Sincerely,

Sally Puent
Water Quality Manager
Northwest Region

T:AC.certstua.06-635

cc: Joy Freibaum, DSL