

**ADDENDUM**  
**FOR**  
**BIOLOGICAL ASSESSMENT, COLUMBIA RIVER CHANNEL IMPROVEMENTS**  
**PROJECT**

**Introduction:** This addendum provides clarifications to the Biological Assessment, Columbia River Channel Improvements Project, dated December 28, 2001. Specific reference is made to the page, section and particular text that is to be clarified, updated or deleted, including the Executive Summary.

The clarification text for specific tables is provided below; changes in text are underlined.

**Page 1-3, Section 1.1.1.1 43-foot Channel Improvements Project.**

?? Three of the existing five turning basins on the Columbia River (located at RM 15, 73.5, and 101.5, 105.5 respectively) would be deepened to -43 feet CRD.

**Page 3-3, Add Section 3.1.1.3 Sediment Testing. Add new section and new table (Table 3.0):**

The Corps utilizes the 1998 regional DMEF protocols governing testing and evaluation of sediment to be dredged. The DMEF establishes minimum guidelines for testing and evaluation. Within this framework the guidelines require the use of available information to make a preliminary determination concerning the need for testing of material proposed for dredging. Where new information suggests there is a reason to believe additional testing is required, sediments will be collected and analyzed prior to dredging and disposal.

The Corps' analysis of existing information indicates there are no sediments with contaminant concentrations that exceed the regional DMEF guidelines or NMFS guidelines that are protective listed salmon and trout. The Corps will test channel sediments in accordance with the DMEF guidelines, at a minimum of every 10 years in the main channel for sandy areas, every 7 years for fine grained areas with no history of contamination at all, or where there is reason to believe contaminants may be present (See table below) . As noted in Table 7-3, MA 5, all information will be reported to the adaptive management team

**Table 3.0 Sediment Testing Locations and Frequency Minimums**

<b>Dredging Location</b>	<b>Frequency of Sampling (Yrs)</b>
Main Channel RM 3-106.5	10
<b>Turning Basins</b>	
CRM 13 Astoria Turning Basin	7
CRM 73.5 Kalama Turning Basin	10
CRM 105.5 Vancouver Turning Basin	
<b>Berths</b>	
United Harvest at Port of Vancouver (RM 104.2)	10
Port of Kalama grain elevator operated by United Harvest at Port of Kalama (RM 77.1)	10
Kalama Export grain elevator at Port of Kalama – (RM 73.4)	10
Terminal 6 at Port of Portland, three container berths: 603 (RM 102.3), 604 (RM 102.6) and 605 (RM 103)	7
U.S. Gypsum downstream of Rainier, Oregon (RM 65.3) <i>Added since FEIS.</i>	10

**Table 3-1: Dredging Timing**

<b>Construction Features</b>	<b>Type of Dredging</b>	<b>Timing</b>
Navigation channel, including overdepth and over width dredging at depths greater than 20 feet	Hopper Pipeline Mechanical excavation	No timing windows No timing windows No timing windows
Turning basins at depths greater than 20 feet	Hopper Pipeline	No timing windows No timing windows
Rock removal with blasting	Mechanical excavation	November 1 to February 28
Rock removal at depths greater than 20 feet	Mechanical excavation	No timing windows
Berths	Mechanical excavation	November 1 to February 28
<b>Ecosystem Restoration Features</b>		
Lois Island Embayment Habitat Restoration	Mechanical excavation Pipeline Hopper	No timing windows
Purple Loosestrife Control Program		July 1 – October 31 (no dredging required; represents application timeframe)
Miller/Pillar Habitat Restoration	Pipeline	No timing windows
Tenasillahe Island Interim Restoration <sup>1</sup> (Tidegate/Inlet Improvements)	Mechanical excavation	July 1 – September 15
Tidegate Retrofits for Salmonid Passage	Mechanical excavation	July 1 – September 15
Walker/Lord and Hump/Fisher Islands Improved Embayment Circulation	Mechanical excavation	July 1 – September 15
Cottonwood/Howard Island Proposal <sup>2</sup> Columbia White-Tailed Deer Introduction	Not Applicable	No timing window (no dredging required)
Tenasillahe Island Long-Term Restorations <sup>3</sup> (Dike Breach)	Mechanical excavation	July 1 – September 15
Bachelor Slough Restoration <sup>4</sup>	Pipeline	July 1 – September 15
Shillapoo Lake Restoration <sup>5</sup>	Mechanical excavation	July 1 – September 15 (inwater work only); balance of work behind flood control levees and thus no timing window
<b>Mitigation Action</b>		
Martin Island Embayment	Pipeline	No timing window

**Table 3-3: Best Management Practices for Disposal**

Measure	Justification	Duration	Management Decision
<b>Flowlane Disposal</b>			
Dispose of material in a manner that prevents mounding of the disposal material.	Spreading the material out will reduce the depth of the material on the bottom, which will reduce the impacts to fish and invertebrate populations.	Life of contract or action.	Maintain until new information becomes available that would warrant change.
Maintain discharge pipe of pipeline dredge at or below 20 feet of water depth during disposal.	This measure reduces the impact of disposal and increased suspended sediment and turbidity on migration juvenile salmonids, since they are believed to migrate principally in the upper 20 feet of the water column.	Continuous during dredging operations.	Maintain until new information becomes available that would warrant change.
<b>Upland Disposal</b>			
Berm upland disposal sites to maximize the settling of fines in the runoff water.	This action reduces the potential for increasing suspended sediments and turbidity in the runoff water.	Continuous during disposal operations.	Maintain until new information becomes available that would warrant change.
Maintain 300-foot habitat buffer.	This action maintains important habitat functions.	Life of contract or action.	Maintain until new information becomes available that would warrant a change.
<b>Shoreline Disposal</b>			
<u>Disposal of material in shoreline areas will be done concurrently with the dredging operation. Timing restrictions will be based on the dredging operation not the shoreline disposal operation.</u>	<u>Shoreline disposal sites are highly erosive and do not provide much if any juvenile salmon habitat. Consequently it is not necessary to limit disposal to the inwater work period even though it is a shallow water area.</u>	Continuous during dredging and disposal operations.	Maintain until new information becomes available that would warrant change.
Grade disposal site to a slope of 10 to 15 percent, with no swales, to reduce the possibility of stranding of juvenile salmonids.	Ungraded slopes can provide conditions on the beach that will create small pools or flat slopes that can strand juveniles washed up by wave action.	Continuous during dredging and disposal operations.	Maintain until new information becomes available that would warrant change.
<b>Ocean Disposal</b>			
Disposal of material in accordance with the site management and monitoring plan, which calls for a point dump placement of any construction material. The plan is to place any construction material in the southwest corner of the deep water site.	This action minimizes conflicts with users and impacts to ocean resources.	Continuous during dredging operations.	Maintain until new information becomes available that would warrant change.
<b>General Provisions for All Disposal</b>			
Disposal of hazardous waste.	The contractor, where possible, will use or propose for use materials that may be considered environmentally friendly in that waste from such materials is not regulated as a hazardous waste or is not considered harmful to the environment. If hazardous wastes are generated, disposal of this material shall be done in accordance with 40 CFR parts 260-272 and 49 CFR parts 100-177.	Life of contract or action.	If material is released, it shall be immediately removed and the area restored to a condition approximating the adjacent undisturbed area. Contaminated ground shall be excavated and removed and the area restored as directed. Any in-water discharge shall be immediately reported to the nearest U.S. Coast Guard Unit for appropriate response.

**Page 3-9, Section 3.2.4 Berth Deepening at Lower Columbia River Ports; Modify first sentence and add new table (Table 3.2.4):**

Three-grain facilities, one gypsum plant and one container terminal on the Columbia River are identified in Table 3.2.4 as having berths that may require deepening in conjunction with that for the navigation channel.

**Add Table 3.2.4 at end of Section 3.2.4**

<b>Berthing Areas as Described in FEIS<sup>1</sup>,</b>	<b>Berthing Areas as described in Biological Assessment (BA)<sup>2</sup></b>	<b>Reconciliation with River Miles</b>
The FEIS (pp. 4-57, Table 4-17) shows the following berths proposed for deepening excluding Astoria and Willamette River berths. On pp. 6-50, center of the page, the estimated quantities of material to be removed are shown. They are added here for clarification.	The BA refers to three-grain facilities and one container berth (pp. 3-9 and pp. 3-10). It adds the U.S. Gypsum berth. It shows the following berths being deepened:	This is the correct, current facility name, port and RM location consistent with the BA.
United Grain in Vancouver (RM 104.2) (250,000 cyds)	United Harvest in Vancouver (RM 104.2)	United Harvest at Port of Vancouver (RM 104.2)
Port of Kalama grain elevator owned by United Harvest (formerly Harvest States) (RM 77.1) (250,000 cyds)	Port of Kalama grain elevator operated by United Harvest (formerly Harvest States) (RM 77.1)	Port of Kalama grain elevator operated by United Harvest at Port of Kalama (RM 77.1)
Peavey Oval in Kalama (RM 73.4)	Kalama Export grain elevator at Kalama – (formerly Peavey Oval) (RM 73.4)	Kalama Export grain elevator at Port of Kalama – (RM 73.4)
Terminal 6 in Portland - Container – Three berths: 603 (RM 102.3), 604 (RM 102.6) and 605 (RM 103) (600,000 cyds)	Terminal 6, - Container – Three berths totaling 2,800 linear feet on the Columbia at the confluence of the Columbia and Willamette Rivers: 603 (RM 102.3), 604 (RM 102.6) and 605 (RM 103) (600,000 cyds)	Terminal 6 at Port of Portland, three container berths: 603 (RM 102.3), 604 (RM 102.6) and 605 (RM 103)
	U.S. Gypsum (RM 65.3) <i>Added since FEIS.</i>	U.S. Gypsum downstream of Rainier, Oregon (RM 65.3) <i>Added since FEIS.</i>

**Page 3-11, Description of Activity, first paragraph, modify the third sentence**

Material could also be loaded onto barges with mechanical dredges and then off-loaded at a temporary dock near the disposal site; however, there is no known area where a temporary dock would be required to construct the project.

**Page 6-68, Add New Section with Subsections, Text and Table to Biological Assessment (as below)**

## **Section 6.3.4 Disposal Sites, Mitigation Sites and Ecosystem Restoration Features: Effects on Listed Species and Their Critical Habitat**

### **6.3.4.1 Dredged Material Disposal Sites**

Dredged material disposal sites (Table 6-3) will occur within the Critical Habitat zone along the Columbia River. Disposal siting was primarily on existing dredged material disposal sites or occurred at locations behind flood control dikes. Typically, these disposal sites provided negligible inputs (e.g., detrital and insect faunal export, large woody debris export) to the Columbia River, and thus are of negligible value to ESA salmonids. Salmonid access to former and new upland disposal sites is typically absent given their elevated nature or location behind flood control levees. Table 6-3 contains site-specific information on each disposal location, including an assessment of impacts by site to ESA listed salmonids and their Critical Habitat. Collectively, the determination for upland disposal sites was may affect, not likely to adversely affect, listed salmonids or their Critical Habitat. An exception was the Lonestar Gravel Pit where the determination was no effect.

### **6.3.4.2 Mitigation Sites**

Habitat development, principally riparian and wetland habitats, is the principal management objective for mitigation actions. Mitigation actions at Webb and Woodland Bottoms locations would occur behind flood control levees under the current prescription. Salmonid access is essentially precluded under the present condition and future mitigation condition. Insect, detrital and large woody debris export from these locations under their present conditions is negligible. An increase in insect faunal export under the mitigation prescription to the mainstem Columbia River or side channels is forecast with the mitigation feature in place and operational (Table 6-3). This would be attributable to the development of riparian forest at these locations. Insect faunal export from these mitigation locations would not be as substantial as for locations directly connected to the Columbia River.

Development of intertidal marsh habitat (32 ac) at Martin Island would occur in an embayment excavated for Interstate Highway 5 fill. Dredged material would be placed in the embayment to attain the proper depths for development of an emergent marsh plant community. Riparian forest habitat development at Martin Island would occur on lands directly connected to the Columbia River. The direct effect of these actions at Martin Island would be more beneficial to listed ESA salmonids and their Critical Habitat than the other two mitigation sites. Insect and detrital export from riparian and emergent marsh habitat, along with large woody debris export would be expected from Martin Island mitigation actions.

### **6.3.4.3 Ecosystem Restoration Features**

Ecosystem restoration features proposed at in-water sites (Miller-Pillar, Lois Island Embayment, and Bachelor Slough) would result in initial, temporary adverse direct effects, to ESA salmonids or their Critical Habitat, but over the long-term would produce beneficial direct effects substantially greater than baseline condition. Ecosystem restoration features at Tenasillahe Island (Interim and Long-Term) and for tidegate improvements have an insignificant potential for effects to ESA salmonids and their Critical Habitat associated with the construction phase. Long-term, the direct

effects of these actions is a substantial improvement in salmonid access to a larger habitat base and improved export of vegetative detritus, insect fauna and large woody debris to the Columbia River estuary. The introduction of white-tailed deer at Cottonwood-Howard Island will have no effect on listed salmonids or their Critical Habitat. Nor does the implementation of the purple loosestrife control feature have an effect on these salmonids or their Critical Habitat, except in the long-term where maintenance of the existing intertidal marsh habitat plant communities would have a beneficial impact in maintaining the baseline habitat condition. The proposed restoration feature at Shillapoo Lake occurs behind flood control levees and thus there is negligible input from the area presently or under the future restoration condition to the Columbia River for ESA salmonids. The restoration feature to improve embayment circulation at Lord-Walker and Fisher-Hump Islands would result in negligible effects to ESA salmonids or their Critical Habitat during implementation, but over the long-term would produce beneficial direct effects greater than baseline condition.

### **Section 6.3.5 Conclusion**

None of the identified potential effects are anticipated to measurably affect salmonids; however, there is uncertainty associated with ecosystem processes that warrant implementing specific impact minimization, monitoring, and research actions (see Section 7.3, Monitoring Actions; Section 7.4, Compliance Actions; and Section 8.3, Ecosystem Research Actions).

### **6.3.4.4 Conclusion**

Table 6-3 contains site-specific information on each disposal site, ecosystem restoration feature and mitigation location, including a determination of impacts by site to ESA listed salmonids and their Critical Habitat. Collectively, the determination for upland disposal sites was may affect, not likely to adversely affect, listed salmonids or their Critical Habitat. An exception was the Lonestar Gravel Pit where the determination was no effect.

Determinations for ESA salmonids and their Critical Habitat for ecosystem restoration features were primarily may affect, not likely to adversely affect (Table 6-3). Exceptions were Lois Island embayment, Miller-Pillar and Bachelor Slough where our determination was may affect, is likely to adversely effect. This determination for these three locations was made even though the overall effect of the proposed action is beneficial to the listed species or their Critical Habitat because there may be some adverse effect to individuals of the listed species or segments of their Critical Habitat during implementation. Introduction of white-tailed deer to Cottonwood-Howard Island was determined to have no effect on listed salmonids or their Critical Habitat.

Table 6-3. Disposal sites, ecosystem restoration features and mitigation sites - evaluation for impacts to ESA salmonids and their Critical Habitat.

<b>SITES CONSIDERED<sup>1</sup>/</b>	<b>ESA Salmonid Critical Habitat Evaluation</b>	<b>Columbia River ESA Listed Salmonids and Critical Habitat Determination</b>
Hayden Island O-105.0 Upland Used 1, 2, 3	Negligible detrital/insect faunal export. No large woody debris export. No salmonid access. Bulk of area recent disposal material. One small (<1 ac inclusion of riparian trees). Site elevated from previous deposition activities.	May affect, not likely to adversely affect
Gateway 3 W-101.0 Upland New	Negligible detrital/insect faunal export. No large woody debris export. No salmonid access except during 100+ year flood events. Site behind flood control levees. Land used for agricultural purposes - row crops, small grains or pasture. Site would incorporate 300' setback from ordinary high water line of Columbia River.	May affect, not likely to adversely affect
Fazio Sand & Gravel W-97.1 Upland Used 2, 3	Negligible detrital/insect faunal export. No large woody debris export. No salmonid access except during 100+ year flood events. Site used for commercial sand and gravel operation - stockpiles, infrastructure facilities and equipment.	May affect, not likely to adversely affect
Adjacent Fazio W-96.9 Upland New	Minimal detrital/insect faunal export. No large woody debris export. No salmonid access. Small riparian inclusions (<1 acre near Columbia River shoreline) to be avoided to extent practicable. Site used for cattle stockyard on sand fill and cattle pasture. Site would incorporate 300' setback from ordinary high water line of Columbia River.	May affect, not likely to adversely affect
Lonestar O-91.5 Gravel Pit New	Gravel pit formed in upland location. Mining actions currently in progress. Site bermed. Negligible detrital/insect faunal export. No large woody debris export. No salmonid access.	No effect
RR Corridor O-87.8 Upland Used 3	Negligible detrital/insect faunal export. No large woody debris export. No salmonid access. Site old dredged material disposal location. Ground cover of moderate amount comprised of weeds and grasses.	May affect, not likely to adversely affect
Austin Point W-86.5 Upland Used 3	Negligible detrital/insect faunal export. Minor potential for large woody debris export during floods from small riparian forest inclusion (~1 ac). No salmonid access except during flood events. Site former dredged material disposal site. Site used for heavy equipment operator training school thus area constantly disturbed by grading and excavation.	May affect, not likely to adversely affect
Sand Island O-86.2 Beach Nourish Used 2, 3	Negligible detrital/insect faunal export. No large woody debris export. Site is erosive beach actively used for dredged material disposal. Salmonid access depending on river levels and tide. Site is heavily used recreational beach.	May affect, not likely to adversely affect
Reichold O-82.6 Upland Used 3	Minimal detrital/insect faunal export. No large woody debris export. No salmonid access. Site is former dredged material disposal area. Site covered moderately by grasses, Scots broom, horsetail and various forbs.	May affect, not likely to adversely affect
Martin Bar W-82.0 Upland Used 3	Negligible detrital/insect faunal export. No large woody debris export. No salmonid access. Site former dredged material disposal site. Upstream portion used for cattle grazing/stockyard.	May affect, not likely to adversely affect
Martin Is Mitigation W-80.0 In-water New	Salmonid access. Juvenile off-channel rearing area formed by borrow activities to provide fill for Interstate 5. Site formerly used for log raft moorage. Proposed action is to develop intertidal marsh and shallow subtidal habitat at location to improve primary productivity and detrital export.	May affect, not likely to adversely affect
Lower Deer Island. O-77.0 Upland Used 3	Negligible detrital/insect faunal export. No large woody debris export. No salmonid access except during flood events. Site former dredged material disposal location. Ground vegetation sparse - grasses and forbs.	May affect, not likely to adversely affect

Sandy Island O-75.8 Upland Used 2, 3	Negligible detrital/insect faunal export. No large woody debris export. No salmonid access. Site currently diked for disposal operations and used in recent years.	May affect, not likely to adversely affect
Northport W-71.9 Upland Used 2, 3	Negligible detrital/insect faunal export. No large woody debris export. No salmonid access. Previously used dredged material disposal location with very sparse grass/forb ground cover.	May affect, not likely to adversely affect
Cottonwood Island. W-70.1 Upland Used 2, 3	Minimal detrital/insect faunal export. No large woody debris export. No salmonid access. Former Mt. St. Helens disposal site with grass/forb groundcover and low overstory of Scots broom and scattered seedling cottonwood . Disposal site set back 300' from river shoreline to extent practicable.	May affect, not likely to adversely affect
Howard Island. W-68.7 Upland Used 2, 3	Minimal detrital/insect faunal export. No large woody debris export. No salmonid access. Former Mt. St. Helens disposal site with grass/forb groundcover and low overstory of Scots broom and scattered seedling cottonwood . Disposal site set back 300' from river shoreline to extent practicable.	May affect, not likely to adversely affect
International W-67.5 Upland Used 1, 2	Minimal detrital/insect faunal export. No large woody debris export. No salmonid access. Site behind flood control dike. Former industrial and dredged material disposal location.	May affect, not likely to adversely affect
Rainier Beach O-67.0 Upland Used 3	Minimal detrital/insect faunal export. No large woody debris export. No salmonid access. Former Mt. St. Helens disposal site with grass/forb groundcover and low overstory of Scots broom and scattered seedling cottonwood . Private development of site - clearing and bank protection - has been implemented.	May affect, not likely to adversely affect
Rainier Industrial. O-64.8 Upland Used 1, 2, 3	Minor detrital/insect faunal export from riparian forest inclusions. Potential for minor large woody debris export. No salmonid access except during flood events. Currently used disposal location with rehandle operation in place.	May affect, not likely to adversely affect
Lord Is. Upstream O-63.5 Upland Used 1, 2, 3	Minimal detrital/insect faunal export. No large woody debris export. No salmonid access. Site currently diked for disposal operations and used in recent years.	May affect, not likely to adversely affect
Reynolds Alum. W-63.5 Upland Used 1, 2, 3	Minimal detrital/insect faunal export. No large woody debris export. No salmonid access. Site behind flood control dike. Currently used disposal location with rehandle operation in place.	May affect, not likely to adversely affect
Mt. Solo W-62.0 Upland New	Minimal detrital/insect faunal export. No large woody debris export. No salmonid access. Site behind flood control dike. Site used for pastureland. Site would incorporate 300' setback from ordinary high water line of Columbia River.	May affect, not likely to adversely affect
Hump Island W-59.7 Upland Used 1, 2, 3	Minimal detrital/insect faunal export. No large woody debris export. No salmonid access. Site old disposal site with disposal operations planned for 2002. Ground cover of grasses, horsetail and forbs with scattered Scots broom. Scattered cottonwood seedlings and small riparian inclusions present.	May affect, not likely to adversely affect
Crims Island O-57.0 Upland Used 1, 2, 3	Minimal detrital/insect faunal export. No large woody debris export. No salmonid access. Site currently diked for disposal operations and has been used in recent years.	May affect, not likely to adversely affect
Port Westward O-54.0 Upland Used 3	Minimal detrital/insect faunal export. No large woody debris export. No salmonid access. Site behind flood control dike. Site is historic disposal site and munitions terminal with rail road tracks and railyard present. Ground cover of grasses, moss, horsetail and forbs.	May affect, not likely to adversely affect
Brown Island. W-46.0/46.3 Upland Used 1, 2, 3	Minimal detrital/insect faunal export. No large woody debris export. No salmonid access. Site former disposal location and currently is diked for disposal operations and has received dredged material in recent years. Ground cover is minimal although seeding operations are planned for Spring 2002 to provide forage for Columbian white-tailed deer.	May affect, not likely to adversely affect

Puget Island. (Vik) W-44.0 Upland New	Minimal detrital/insect faunal export. No large woody debris export. No salmonid access. Site behind flood control dike. Land used for agricultural purposes currently, principally pasture and forage production. Site would incorporate 300' setback from ordinary high water line of Columbia River.	May affect, not likely to adversely affect
James River O-42.9 Upland Used 1, 2, 3	Minimal detrital/insect faunal export. No large woody debris export. No salmonid access. Site currently diked for disposal operations and has been used in recent years. Ground cover of grasses.	May affect, not likely to adversely affect
Tenasillahe Island. O-38.3 Upland Used 1, 2, 3	Minimal detrital/insect faunal export. No large woody debris export. No salmonid access except during flood events. Ground cover sparse, primarily grasses, forbs and horsetail. Site designed to avoid riparian inclusions. Site is old dredged material disposal location.	May affect, not likely to adversely affect
Welch Island O-34.0 Upland Used 2, 3	Minimal detrital/insect faunal export. No large woody debris export. No salmonid access except during flood events. Ground cover sparse, primarily grasses, forbs and horsetail. Site is old dredged material disposal location.	May affect, not likely to adversely affect
W-33.4 Beach Nourishment Used 2, 3	Minimal detrital/insect faunal export. No large woody debris export. Site is erosive beach periodically replenished with dredge material. Salmonid access depending on river levels and tide. Site is used for rehandle/sale of dredged material and also County Park.	May affect, not likely to adversely affect
Pillar Rock Island. O-27.2 Upland Used 1, 2, 3	Minimal detrital/insect faunal export. No large woody debris export. No salmonid access except during flood events. Site is frequently used disposal location. Moderate ground cover of grasses, forbs, horsetail, and Scots broom. Riparian inclusion to be avoided in future disposal operations. Riparian development at tideline on embayment side to be avoided by disposal operations.	May affect, not likely to adversely affect
Miller Sands O-23.5 Beach Nourish Used 1,2,3	Minimal detrital/insect faunal export. No large woody debris export. Site is erosive beach/upland combination. Salmonid access depending on river levels and tide. Upland portions of site with sparse vegetative cover. Riparian development at tideline on embayment side to be avoided by disposal operations.	May affect, not likely to adversely affect
Rice Island W-21.0 Upland Used 1, 2, 3	Minimal detrital/insect faunal export. No large woody debris export. No salmonid access. Site currently diked for disposal operations and frequently used for disposal purposes. Vegetation absent or very sparse across the majority of the acreage except upstream and downstream tips which have moderate ground cover of grasses, forbs and horsetail with scattered seedling cottonwoods and willows.	May affect, not likely to adversely affect
Harrington Point Sump Open Water	In-water sump location used for frequent disposal by hopper dredges. Sump has ~1.2 million cubic yard capacity. When full, pipeline dredged is used to excavate dredged material and place on Rice Island disposal site. Site depth when empty approximately 40-45 feet.	May affect, not likely to adversely affect
<b>Ecosystem Restoration Features</b>		
Lois Island Embayment CRM 19-20 Dredged material placement to establish intertidal marsh and flat habitat with some shallow subtidal channels.	Site is former mooring basin for WWII era mothballed ships. The basin was formed by dredging intertidal marsh/flat and shallow subtidal habitat. Basin currently approximately 18' in depth. Site lacks diversity of structure. Fringing marsh present around dredged material islands formed on basin perimeter. Proposed action is to restore location to approximately historic depths and habitat complexity thereby improving productivity for juvenile salmonids. Beneficial action in long term.	May affect, likely to adversely affect
Miller-Pillar CRM 25-26 Dredged material placement to establish shallow subtidal habitat.	Site is erosive area between Miller Sands and Pillar Rock Islands and lies south of the navigation channel. Historically, site was shallow subtidal habitat (~-6'). Erosion is creating deep subtidal habitat (~-25-30'). Shallow subtidal habitat is more productive for benthic invertebrates and fish, including ESA salmonids. Proposed action is to restore to approximately historic subtidal depth thereby improving productivity for juvenile salmonids. Beneficial action in long term.	May affect, likely to adversely affect

Purple Loosestrife Control CRM 16-52 Intertidal Marsh - Control of exotic weed.	Control of invasive exotic purple loosestrife in intertidal marsh habitat from Tongue Point to Eureka Bar using integrated pest management (biological agents, herbicide, mechanical). Effort directed at maintaining natural marsh plant communities and their primary production (baseline condition), an important estuarine element for juvenile ESA salmonids. Implement July-October. Beneficial action.	May affect, not likely to adversely affect
Tidegate Retrofits (Project area) Tributary streams - improvement of fish passage conditions	Retrofit tidegates with new, lightweight gates and/or fish slides to improve anadromous salmonid access/egress. Implement feature during inwater work period. Beneficial action.	May affect, not likely to adversely affect
Lord-Walker and Fisher-Hump Island Embayments Improved flow and water circulation in backwater habitat.	Excavate channels through dredged material deposition areas to improve embayment circulation. Feature should improve juvenile salmonid access and improve benthic invertebrate productivity of embayments through improved water circulation and temperatures. Beneficial action.	May affect, not likely to adversely affect
Tenasillahe Island Interim Feature Improvement of fish passage conditions and access to backwater channel habitat.	Retrofit tidegates with new, lightweight gates and/or fish slides to improve anadromous salmonid access/egress. Provide increased inflow and throughflow. Implement feature during inwater work period. Feature would result in ESA salmonid access to historic habitat for rearing and refuge. Restoration area currently has negligible detrital/insect faunal export. No large woody debris export. No salmonid access. Beneficial action.	May affect, not likely to adversely affect
Tenasillahe Island Long-term Feature Reestablish Columbia River direct connection to intertidal marsh habitat with some shallow subtidal channels.	Breach flood control dikes; reconnect backwater channels to Columbia River. Feature would restore full ESA juvenile salmonid access to historic intertidal marsh and subtidal channel habitat and reconnect Columbia River to its floodplain, thereby enhancing detrital and large woody debris export. Restoration area currently has negligible detrital/insect faunal export. No large woody debris export. No salmonid access. Beneficial action in long term.	May affect, not likely to adversely affect
Cottonwood-Howard Island Feature Translocate Columbian white-tailed deer.	Introduce Columbian white-tailed deer to upland habitat. Action would have no effect on Critical Habitat for ESA salmonids.	No effect
Bachelor Slough Dredge accumulated sediments to restore flow.	Remove accumulated sediments in Bachelor Slough thereby improving water throughflow and temperature, particularly during summer low flow periods. Also implemented would be riparian forest restoration on Bachelor Slough shoreline and 1-3 areas on Bachelor Island. Riparian restoration would improve detrital and insect faunal export to Columbia River. Action would improve Critical Habitat conditions for ESA salmonids. ESA salmonids currently have access to site via Lake River and Columbia River. Beneficial action in long term.	May affect, not likely to adversely affect
Shillapoo Lake Construct water control features to develop managed wetlands.	Develop managed wetlands on former agricultural lands located behind main flood control levees. Restoration area currently has negligible detrital/insect faunal export. No large woody debris export. No salmonid access.	May affect, not likely to adversely affect
<b>Wildlife Mitigation Actions</b>		
Woodland Bottoms Develop riparian forest, wetland and grassland habitat.	Develop managed wetlands, riparian forest and grassland (goose pasture) on former agricultural lands located behind main flood control levees. Mitigation area currently has negligible detrital/insect faunal export. No large woody debris export. No salmonid access with possible exception of fish entering Burris Creek through tidegate at pump station.	May affect, not likely to adversely affect
Martin Island Develop riparian forest and wetland habitat.	Develop wetland and riparian forest habitat on former agricultural pasturelands located on Martin Island. Mitigation area currently has moderate detrital, insect faunal, and large woody debris export. Salmonid access to excavated embayment that will be filled for intertidal marsh habitat development and to varying portions of island during spring freshets; access depends upon river level.	May affect, likely to adversely affect

Webb Develop riparian forest and wetland habitat.	Develop managed wetlands and riparian forest habitat on former agricultural pasturelands located behind main flood control levees. Mitigation area currently has negligible detrital/insect faunal export. No large woody debris export. No salmonid access.	May affect, not likely to adversely affect
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**Table Legend:**

"W"/"O" refer to the Washington or Oregon shoreline;  
the number refers to approximate river mile on the navigation channel

**2/ Disposal history based on 1995 information:**

- 1 - Site has been used within the last 2 years
- 2 - Site has been used within the last 10 years
- 3 - Site was used over 10 years ago

**Renumber Section 6.3.4 to 6.3.5, i.e.**

**Table 7-3: ESA Sec. 7(a)(2) Monitoring Actions Associated with Dredging and Disposal**

Monitoring Action Number	Indicator	Monitoring Task	Justification	Uncertainty And Risk <sup>1</sup>	Duration
MA-1	Salinity, velocity, water surface, habitat complexity, connectivity, and conveyance, and habitat opportunity.	The Corps will maintain three hydraulic monitoring stations, one downstream of Astoria, one in Grays Bay, and one in Cathlamet Bay. Parameters measured would include salinity, water surface, and water temperature.	Physical changes related to channel deepening are expected to be small and concentrated near the navigation channel.	Salinity L,L+; velocity L,L; bathymetry L,M-; habitat complexity, connectivity, and conveyance L+, M;	7 years: 2 years before, 2 years during, and 3 years after construction
MA-2	Dredging volume, bedload.	Annual dredging volumes, construction and O&M.	To ensure scale of the project does not change.	Bedload M, L	Life of the project.
MA-3	Accretion/erosion, bathymetry (main channel).	Main channel bathymetric surveys throughout project area.	Side-slope adjustments are expected to occur intermittently adjacent to the navigation channel.	Accretion/erosion M, L; bathymetry L, M-	7 years: 2 years before, 2 years during, and 3 years after construction
MA-4	Tidal marsh, swamp, flats, refugia, habitat complexity, connectivity and conveyance, suspension and deposit feeders, insects, macrodetritus and habitat specific food availability, juvenile salmonids in peripheral habitats and habitat opportunity.	Repeat estuary habitat surveys being conducted by NMFS (Bottom and Gore, 2001 proposal).	Identify if there is a change to habitat due to deepening.	Tidal marsh and swamp habitat M, L+; flats habitat M, M-L+; suspension/deposit feeders M, M; deposit feeders M, M; suspension feeders M, M; insects H, M; macrodetritus H, L+; habitat-specific food availability M, M; feeding habitat opportunity L, L+	One time survey conducted 3 years after completion of the deepening.
MA-5	Contaminants	<del>NMFS will review the SEDQUAL database to determine if there are areas that would require additional sampling. Review existing contaminants database using NMFS guidelines or trigger values that are more protective of salmonids and trout. Provide notification during construction dredging to monitor for presence of fine-grained material — i.e.,</del>	Ensure that channel construction <u>and</u> maintenance does not disturb undetected deposits of fine-grained material, potentially causing redistribution of contaminants that could pose a risk to salmonids and trout.	Contaminants M, M.	<del>NMFS will review SEDQUAL data prior to construction; if additional samples are required they would be obtained prior to construction. On-board observations would be conducted. 2 years before, 2</del>

Monitoring Action Number	Indicator	Monitoring Task	Justification	Uncertainty And Risk <sup>1</sup>	Duration
		<p>oily sheens. If found, dredging will cease in that location and additional testing will be conducted.</p> <p>The Corps, Fish and Wildlife and NMFS will annually review any new sediment chemistry from the Lower Columbia River and estuary from sources such as SEDQUAL database and, known permit applicants and determine if there are any changes in the "Management Area Ranking" as defined in the DMEF manual</p>			<p>years during construction, and annually during maintenance.</p>

**Table 7-5: Minimization Practices and Best Management Practices for Dredging**

Monitoring Action Number	Indicator	Measure	Justification	Duration
<b>Hopper Dredging</b>				
CA-1	Entrainment (Survival) Benthic Invertebrates Deposit Feeders	Maintain dragheads in the substrate or no more than 3 feet off of the bottom with the dredge pumps running.	This restriction minimizes or eliminates entrainment of juvenile salmonids during normal dredging operations.	Continuous during dredging operations.
CA-2	Habitat Complexity Bathymetry & Turbidity Feeding Habitat Opportunity Suspension-Deposit Feeders Deposit Feeders Mobile Macroinvertebrates	Dredge in shallow water areas (less than 20 feet) only during the recommended ESA in-water work period for the Columbia River of November 1 until February 28.	Areas less than 20 feet deep are considered salmonid migratory habitat. Dredging or disposal in these areas could delay migration or reduce or eliminate food sources.	Continuous during dredging operations.
<b>Pipeline Dredging</b>				
CA-3	Entrainment (Survival) Benthic Invertebrates Deposit Feeders	Maintain cutterheads in the substrate or no more than 3 feet off of the bottom with the dredge pumps running.	This restriction minimizes or eliminates entrainment of juvenile salmonids during normal dredging operations.	Continuous during dredging operations.
CA-4	Habitat Complexity Bathymetry & Turbidity Feeding Habitat Opportunity Suspension-Deposit Feeders Deposit Feeders Mobile Macroinvertebrates	Dredge in shallow water areas (less than 20 feet) only during the recommended ESA in-water work period for the Columbia River of November 1 until February 28 <u>and July 1 – September 15 for certain ecosystem restoration measures (see Table 3-1).</u>	Areas less than 20 feet deep are considered salmonid migratory habitat. Dredging or disposal in these areas could delay migration or reduce or eliminate food sources.	Continuous during dredging operations.
<b>General Provisions For All Dredging</b>				
CA-5	Contaminants Water Column Habitat	The contractor will not release any trash, garbage, oil, grease, chemicals, or other contaminants into the waterway.	Protect water resources.	Life of contract or act
CA-6	NA	The contractor, where possible, will use or propose for use materials that may be considered environmentally friendly in that waste from such materials is not regulated as a hazardous waste or is not considered harmful to the environment. If hazardous wastes are generated, disposal of this material will be done in accordance with 40 CFR parts 260-272 and 49 CFR parts 100-177.	Dispose of hazardous waste.	Life of contract or act

**Table 7-6: Best Management Practices for Disposal**

Monitoring Action Number	Indicator	Measure	Justification	Durat
<b>Flow Lane Disposal</b>				
CA-7	Accretion/Erosion	Dispose of material in a manner that prevents mounding of the disposal material.	Spreading the material out will reduce the depth of the material on the bottom, which will reduce the impacts to fish and invertebrate populations.	Life of contract
CA-8	Bathymetry & Turbidity (Survival) Suspended Solids	Maintain discharge pipe of pipeline dredge at or below 20 feet of water depth during disposal. <u>Exceptions are Miller-Pillar and Lois Island Embayment Ecosystem Restoration Features.</u>	This measure reduces the impact of disposal and increased suspended sediment and turbidity to migration juvenile salmonids, as they are believed to migrate principally in the upper 20 feet of the water column.	Continuous du disposal opera
<b>Upland Disposal</b>				
CA-9	Suspended Solids Turbidity (Survival) Bathymetry & Turbidity	Berm upland disposal sites to maximize the settling of fines in the runoff water.	This action reduces the potential for increasing suspended sediments and turbidity in the runoff water	Continuous du disposal opera
CA-10	Habitat Complexity, Connectivity Conveyance Insects Resident Macrodetritus, Microdetritus Large Woody Debris	Maintain 300-foot habitat buffer for <u>new upland dredged material disposal sites (e.g., Gateway 3 (W-101.0), Fazio B(W-96.9; interior ½), Mt. Solo (W-62.0) and Puget Island (W-44.0)). Otherwise use existing dredged material disposal locations to avoid loss of previously non-impacted lands within the ESA salmonid Critical Habitat designated zone.</u>	Maintains important habitat functions.	Life of contract
<b>Shoreline Disposal</b>				
CA-11	Habitat Complexity Bathymetry & Turbidity Feeding Habitat Opportunity Suspension-Deposit Feeders Deposit Feeders Mobile Macroinvertebrates	<u>Disposal of material in shoreline areas will be done concurrently with the dredging operation. Timing restrictions will be based on the dredging operation not the shoreline disposal operation. Three erosive shoreline disposal areas only are proposed (Sand Island (O-86.2), Skamokawa (W-33.4) and Miller Sands Spit (O-23.5).</u>	<u>Shoreline disposal sites are highly erosive and do not provide much, if any, juvenile salmonid habitat. Consequently it is not necessary to limit disposal actions to the inwater work period even though it is a shallow water area.</u>	Continuous du disposal opera
CA-12	Stranding	Grade disposal site to a slope of 10 to 15 percent, with no swales, to reduce the possibility of stranding of juvenile salmonids.	Ungraded slopes can provide conditions on the beach that will create small pools or flat slopes that strand juvenile salmonids when washed up by wave action.	Continuous du disposal opera

Monitoring Action Number	Indicator	Measure	Justification	Durat
<b>Ocean Disposal</b>				
CA-13	N A	Dispose of in accordance with the site management and monitoring plan, which calls for a point dump placement of any material from the project during construction. The plan is to place any construction material in the southwest corner of the deep water site.	This action minimizes conflicts with users and impacts to ocean resources.	Continuous dur dredging opera
<b>General Provisions For All Disposal</b>				
CA-14	N A	Dispose of hazardous waste.	The contractor, where possible, will use or propose for use materials that may be considered environmentally friendly in that waste from such materials is not regulated as a hazardous waste or is not considered harmful to the environment. If hazardous wastes are generated, disposal of this material will be done in accordance with 40 CFR parts 260-272 and 49 CFR parts 100-177.	Life of contract

**Table 8-1: ESA Sec. 7(a)(1) Ecosystem Research Actions (ERA)**

ERA Number	Indicator	Monitoring Task	Justification	Duration	
ERA-1	Tidal Marsh and Swamp Habitat, Shallow Water and Flats Habitat, Water Column Habitat	Add one or two additional transects in different habitat types similar to those being done for the NMFS studies currently under way with AFEP	Provide additional habitat and salmonid distribution information for the estuary. Useful in establishing inventory information for future monitoring or restoration.	Begin before construction and for 3 years after completion of the project.	Record differences in juvenile cutthroat
ERA-2	Tidal Marsh and Swamp Habitat, Shallow Water and Flats Habitat, Water Column Habitat	<u>Conduct study on cutthroat trout use and distribution in the Columbia River and estuary.</u>	<u>Little is known about the species use of this habitat. Research effort is intended to provide additional information regarding cutthroat use of this habitat.</u>	<u>Conduct studies for four years: two years prior to construction and two years during construction</u>	Record differences in cutthroat
ERA-3	Bathymetry, Shallow Water and Flats Habitat	Conduct bank-to-bank hydrographic surveys of the estuary.	Has not been done in 20 years and is needed to assess available habitat and restoration actions.	Once, prior to construction.	Bathymetry for shallow estuary
ERA-4	Contaminants	In conjunction with ongoing studies of juvenile salmonids habitat utilization in the lower Columbia River collect and analyze juvenile salmonids and their prey for concentrations of chemical contaminants.	Provide additional data on contaminants in listed salmonids and their prey. Useful in establishing inventory information for future monitoring or restoration.	Begin before construction during and up to 3 years after construction, depending on the results.	Record persistence of DDTs like other salmon
ERA-5	Contaminants	In conjunction with above contaminant study, assess sublethal effects of contaminants (e.g., growth, disease resistant) on salmonids.	Provide additional data for established contaminants thresholds effect levels to ensure that guidelines are protective of salmonids; to better characterize performance of juvenile salmonids in the estuary.	Begin before construction during and up to 3 years after construction, depending on the results.	Record juvenile above
ERA-6	Salinity, turbidity, and phytoplankton	ETM Workshop	To further the knowledge of the ETM and the listed stocks.	Once	Not re

Any study done should fit into the overall research effort that is being conducted or proposed by LCREP, NMFS, BPA and the Corps. In this way it will provide results that fit into what should be an overall goal for research in the estuary.

**Table 8-2: Ecosystem Restoration Features for the Project**

Feature	Area Affected by Restoration	Type, Function, and Value
Lois Island Embayment Habitat Restoration	389 acres	Type: Tidal marsh and swamp; shallow water and flats habitat Function: Provide rearing habitat for ocean-type salmonids; increase detrital export Value: High
Purple Loosestrife Control Program	<u>Columbia River mile 18-52</u>	Type: Tidal marsh and swamp Function: Maintain native Tidal marsh plant community; increase detrital export Value: High
Miller/Pillar Habitat Restoration	161 acres	Type: Shallow water and flats habitat Function: Provide rearing habitat for ocean-type salmonids; increase benthic invertebrate productivity Value: High
Tenasillahe Island Interim Restoration <sup>1</sup> (Tidegate/Inlet Improvements)	92 acres	Type: Backwater/side channel reconnection to Columbia River Function: Increase access/egress for ocean-type salmonids Value: Moderate
Tidegate Retrofits for Salmonid Passage	38 miles	Type: Tributary reconnection to Columbia River Function: Increase access/egress for ocean-type salmonids; improve access for adult salmonids to headwaters for spawning Value: High
Walker/Lord and Hump/Fisher Islands Improved Embayment Circulation	335 acres	Type: Marsh and swamp; shallow water and flats habitat Function: Provide rearing habitat for ocean-type salmonids; increase benthic invertebrate productivity Value: Moderate
Martin Island Embayment	32 acres	Type: Tidal marsh and swamp (wildlife mitigation) Function: Increase detrital export; provide rearing habitat for ocean-type salmonids Value: Moderate (salmonids); high (wildlife)
Cottonwood/Howard Island Proposal <sup>2</sup> Columbia White-Tailed Deer Introduction	1,000 acres	Type: Translocation of Columbia white-tailed deer Function: Establish secure, viable subpopulation of Columbia white-tailed deer Value: High
Tenasillahe Island Long-Term Restorations <sup>3</sup> (Dike Breach)	1,778 acres	Type: Tidal marsh and swamp; shallow water and flats habitat Function: Provide rearing habitat for ocean-type salmonids; increase detrital export Value: High
Bachelor Slough Restoration <sup>4</sup>	<u>~100 acres (instream restoration); 6 acres (Bachelor Slough shoreline riparian restoration); 27 acres (riparian restoration using Bachelor Slough sediments – old disposal location and/or 2 upland locations)</u>	Type: Shallow water and flats habitat; riparian forest Function: Provide rearing habitat for ocean-type salmonids; increase detrital export Value: Moderate (side channel); high (riparian forest)
Shillapoo Lake Restoration <sup>5</sup>	<u>470-1055 (acreage restored depends upon private land acquisition and prior restoration by others)</u>	Type: Managed wetlands Function: Increase waterfowl, shorebird, wading bird, and raptor habitat Value: High
<p>Notes: The Tidegate Retrofits for Salmonid Passage, Walker/Lord and Hump/Fisher Islands Improved Embayment Circulation, and Shillapoo Lake Restoration features were proposed in the original FEIS (Corps, 1999a). The remaining restoration features were added during the BA reconsultation process.</p> <p><sup>1</sup>This restoration is contingent on hydraulic analysis results.</p> <p><sup>2</sup>This restoration primarily benefits Columbia white-tailed deer.</p> <p><sup>3</sup>This restoration feature is contingent on the delisting of Columbia white-tailed deer.</p> <p><sup>4</sup>This restoration feature is contingent on sediment testing and approval by WDNR.</p> <p><sup>5</sup>This restoration primarily benefits waterfowl, but would create detrital input to the Columbia River.</p>		

**Page 8-3, Section 8.2.1 Lois Island Embayment Habitat Restoration (RM 19), replace last paragraph in Section 8.2.1 with following text:**

Restoration of the Lois Island Embayment would require approximately 8 mcy of material. It is estimated that approximately 6.0 mcy from construction of the deepened could be placed at Lois Mott Island embayment in the two-year construction period. This material would originate from the navigation channel between RM 3 and 30. The balance of the dredged material that is required to complete the restoration action would originate from O&M of the 43' channel. Material dredged from the navigation channel would be transported via hopper dredge to a temporary location (sump) and then a pipeline dredge would be used to transfer the material into the embayment for placement to attain the target elevations. These target elevations would be predicated on the historical bathymetry of the area. Placement of material via hopper dredges and pipeline dredging of the sump materials for emplacement in Lois Island embayment are concurrent actions because of the significant volumes associated with the restoration feature.

The sump could either be located in the Tongue Point Navigation Channel turning basin or within 600 feet of the navigation channel between Columbia River miles 18 to 20. Use of the Tongue Point Navigation Channel turning basin for a sump would require a temporary deepening of the site by 15 feet in order to provide a safe passage for hopper dredges and adequate short-term storage of dredged materials deposited by these dredges. These hopper dredges require approximately 25 feet of operating depth when loaded plus some room to open the doors for disposal. The authorized turning basin has an area of approximately 37.3 acres (Figure 1) with a maximum dimension at the upstream end of 1,050' x 1050' which then tapers to the authorized channel width of 350 feet. Authorized depth for the turning basin is 25 feet although no O&M dredging has occurred since construction. Soundings taken in March 2000 indicate that the site is still at or near the authorized depth.

To attain a 40-foot depth sump, the turning basin would have to be dredged approximately 15 feet deeper than the authorized depth generating around 900,000 cy of dredged material. Sediment samples would have to be obtained from the turning basin material to be dredged to obtain the 40 foot depth to determine if the material is suitable for inwater placement in Lois Island embayment. A composite bathymetric contour map from the Tongue Point Navigation Channel Improvement Project Detailed Project Report and Environmental Assessment (1989) indicates that only the portion of the turning basin nearest Mott Island historically reached or slightly exceeded 25 feet in depth. The turning basin sump can be restored to the authorized 25' depth post construction of the ecosystem restoration feature via placement of O&M dredged material (~900,000 cy) into the site.

The adjacent 40' Tongue Point Navigation Channel is only authorized to a width of 350' and thus is too narrow to concurrently accommodate hopper and pipeline dredges safely or efficiently.

A 40-foot depth sump would provide approximately 10 feet of disposal capacity for hopper dredges transporting material for the ecosystem restoration feature. The turning basin sump could hold 298,000 cy at a 5-foot fill or 596,000 cy at a 10-foot fill. Close coordination will be required between hopper dredges supplying fill material and the pipeline dredge concurrently excavating the sump area because of restricted operating space.

No deep draft vessels currently call at Tongue Point because industrial facilities requiring their service have not been developed at this location. Consequently, placement of dredged material in the turning basin would not compromise vessel traffic.

An alternative construction scenario for Lois Island embayment restoration would entail placement of initial channel construction materials in deep water in and adjacent to the navigation channel (within 600 feet) between Columbia River miles 18 and 20. Hopper dredges would use this location as a sump for a pipeline dredge that would then pump the materials to the embayment. Hopper dredges would charge this sump prior to the inwater work period when pipeline dredges would begin placement of materials in the embayment. Hopper and pipeline dredges would then work concurrently throughout the inwater work period to sustain material delivery to the sump and embayment. Should additional material be required during the inwater work period of construction year two, the sump would again be charged with material beforehand and the same scenario implemented.

Absent the availability of a sump, the proposed ecosystem restoration feature could not be constructed.

The following actions will be taken as part of the Lois Island Embayment Habitat Restoration effort:

- ?? Fund and implement construction effort
- ?? Monitor post-construction benthic productivity and fish species composition and density on the restoration site and an adjacent control site

**Page 8-3, Section 8.2.2, Purple Loosestrife Control Program: Add following text beginning as separate paragraph after second paragraph**

Purple loosestrife occurs in the vegetated, upper intertidal marsh zone. Typically, marsh vegetation in this zone is very dense and tall during the summer growing season and vegetative covers remains well into the fall. Incised tidal channels bisect the intertidal marsh habitat. Juvenile salmonid utilization is primarily associated with these incised tidal channels and the vegetative zone on their perimeter during high tides. Juvenile salmonid use of the densely vegetated intertidal marsh habitat is considered relatively minimal due to the dense vegetation. Presence of juvenile salmonids in intertidal marsh habitat probably coincides with the primary outmigration period, principally spring and early summer.

Purple loosestrife control efforts with the herbicide Rodeo would primarily be targeted for application to occur from June to October. Application of Rodeo would occur during low tide periods when the plant is exposed. Rodeo would be wicked onto the plants (dispersal of herbicide through direct contact between plant and fabric impregnated with Rodeo herbicide) and spot sprayed when the plants are actively growing and undergoing photosynthesis. Translocation of the herbicide throughout the plant will occur then thus resulting in a lethal effect. Application of herbicides during the inwater work period (November 1- February 28), as has been suggested, would be ineffective, as plants are typically dormant, inactive with regard to photosynthesis and translocation of nutrients, and difficult to recognize given the loss of above ground vegetative structure. Wicking the herbicide onto purple loosestrife results in a target specific application with

minimal transfer to nontarget species and would be used when plants are sparsely distributed and occur primarily as individuals or small clusters of individuals. Spot spraying would be used for denser populations of purple loosestrife, as it is more efficient relative to time and coverage. Given the considerable acreage involved and the intertidal nature of the marsh habitats impacted, there is only a limited timeframe both seasonally and daily for implementation of herbicide and/or mechanical treatments. Complete spraying of blocks of intertidal marsh is not proposed. Spot spraying and wicking will limit the total amount of herbicide applied compared to a complete (full coverage) spraying operation. The ongoing effort to establish biocontrol agents in the Columbia River estuary for purple loosestrife control will be supported and expanded, as warranted, by implementation of this ecosystem restoration feature. Research actions concurrent with the control operation will be conducted to determine geographic spread and plant density of purple loosestrife and to evaluate efficacy of integrated pest management actions.

**Page 8-7, Section 8.2.4.1 Step 1 – Interim Restoration Features: Add following text after first paragraph on page**

Implementation of this feature would occur in the August-September timeframe. Although outside the inwater work period for the Columbia River, the proposed timeframe would allow construction when levees are dry and firm, thus minimizing sediment runoff. Further, interior waters of the Tenasillahe Island sloughs would be too warm for salmonid use at that time, thus lessening the potential for impacts to juvenile salmonids that had managed to enter the system through the current tidegates.

**Page 8-8, Section 8.2.6 Bachelor Slough Restoration: Add following text prior to paragraph one**

There are two principal actions comprising this ecosystem restoration proposal. The first action, proposed by the U.S. Fish and Wildlife Service, Ridgefield National Wildlife Refuge, entails dredging of Bachelor Slough to increase depth and through flow of Columbia River waters in order to restore and improve in-stream salmonid habitat. Increased depth and flow should also address water temperatures in Bachelor Slough, which currently exceed temperature tolerance of salmonids from approximately mid-summer until fall.

The second action relates to restoration of riparian forest habitat. There are two subcomponents of this second action: a) the restoration of riparian forest on approximately 6 acres of Bachelor Slough shoreline, primarily downstream of the bridge crossing; and b) restoration of riparian forest on the upland disposal site(s). The first sub-component is a stand-alone element and can be implemented separate of the dredging action. Absent dredging, the second sub-component would not be implemented.

**Page 8-8, Section 8.2.6 Bachelor Slough Restoration: Modify first sentence of paragraph two plus add one sentence-** Bachelor Slough submerged lands and the upland disposal site adjacent to the Columbia River are both the property of WDNR and USFWS.

Bachelor Slough submerged lands and the upland disposal site adjacent to the Columbia River are the property of WDNR. Two upland disposal sites on U.S. Fish and Wildlife refuge lands are

proposed, one adjacent to Bachelor Slough downstream of the confluence with Lake River and one adjacent to the dike near Wigeon Lake.

**Page 8-9, Section 8.2.6 Bachelor Slough Restoration: Replace first sentence of second full paragraph on this page with text below (balance of original paragraph would form a separate paragraph following replacement text)-** ~~All dredging activity would occur in water from November 1 to February 28 to minimize potential impacts to fish.~~

Dredging of Bachelor Slough would be implemented during the July 4 September 15 timeframe to comply with in-water work timeframes. Work is anticipated to be completed by a small pipeline dredge with dredged material placed in diked upland cells with return water discharge via weirs to the Columbia River, Lake River and/or Bachelor Slough. Potential areas for dredged material disposal include an upland portion of Bachelor Slough immediately downstream of the junction of Bachelor Slough and Lake River and inland of the flood protection dike. A second location is an upland site adjacent to the dike near Wigeon Lake. The third location is an old dredged material disposal location on Washington Department of Natural Resources (WDNR) land that abuts the Columbia River at approximately the center of the island. The WDNR site would be prepped with a cat prior to disposal to scarify the Scots broom from the site and bury. Low levees would be constructed from old sandy dredged material mounds that are scattered throughout the area.

Natural establishment of riparian forest trees would be relied on for stand development on the disposal locations. The presence of bare mineral soil in May through early June during seed dispersal by cottonwoods and willows will result in natural establishment of riparian forest stands. Dredged material will provide that type of substrate. Minor tillage in spring prior to seed dispersal would be sufficient to control weeds or other competitive vegetation that may develop between disposal and spring.

**Page 8-9, Section 8.2.6 Bachelor Slough Restoration: Replace text of third full paragraph -** Restoration of riparian forest along the shoreline of Bachelor Slough would be implemented via scarification and sloping of the bank line. The preferred timeframe for scarification of vegetation along the bank line of Bachelor Slough would be early May. This would provide for a bare soil environment that coincides with seed dispersal by cottonwoods and willows from mid-May into June. Scarification would be used to remove the reed canarygrass/false indigo bush dominated vegetation. Native shrubs (willows and redosier dogwood) and trees that are present would be left in place. The bank line would be sloped, with side slopes as gentle as 1V:6H. Presently, there is a sharp cut bank 4-6 feet in height at the water's edge. Where adequate width is available outward of the levee toe, scarified vegetation will be placed in an excavated trench and buried. If inadequate width for burial and/or burial would compromise the levee's integrity, the scarified vegetative material will be hauled to an upland location and buried. Excavated soil free of vegetation would be graded into the levee or bank slope as appropriate.

**Page 8-9, Section 8.2.6 Bachelor Slough Restoration: Delete text of fourth full paragraph on page.**

**Page 8-9, Section 8.2.6 Bachelor Slough Restoration: Replace fifth full paragraph on page.**

The Bachelor Slough ecosystem restoration feature is contingent on the Corps' evaluation of sediment chemistry to determine suitability for upland disposal and approval by WDNR and/or the USFWS to dispose of dredged material on their property. Backwater channels are more likely to contain fine-grained sediments (silts) with a high organic content and, therefore, a greater likelihood of contaminants (e.g., PCBs, DDT, DDE) than coarser-grained sands with low organic content found in the main navigation channel.

Sediment sampling to determine contaminant levels is planned prior to initiating dredging of the slough. Failure of sediment samples to meet the established criteria will cancel the proposed action. Similarly, the absence of an upland dredged material disposal site on Bachelor Island will cancel the proposed action.

**Page 8-10, Add new section (8.2.7) prior to 8.3:**

#### ***8.2.7 Tidegate Retrofits for Salmonid Passage Ecosystem Restoration Feature***

This proposed ecosystem restoration feature is described in Section 3 and in more detail in Chapter 4 of the FEIS (Corps, 1999a). The feature consists of improvements to existing tidegates to improve anadromous fish movement through the structures. The Corps solicited lists of potential restoration actions from the Oregon and Washington Departments of Fish and Wildlife during the feasibility phase of the study. Three Oregon tributaries to the Columbia River—Tide Creek, Grizzly Slough, and Fertile Valley Creek—were identified for ecosystem restoration actions. Two Washington streams—Burris Creek and Deep River—were also identified for retrofitting of tidegates. As the proposed retrofit is generic in nature (i.e. replace the existing tidegate and/or add a sliding door to the tidegate; replace the culvert if necessary) for tidegates throughout the lower Columbia River system, additional tributaries would be considered for retrofits if identified by the resource agencies.

The new tidegates will feature either a lighter weight, aluminum hinged door that fits over the end of a large-diameter drainage pipe that opens and closes more easily in response to changes in hydraulic pressure and/or small sliding doors. New drainage pipes may be required at some locations depending on the age and condition of the current drainage pipe. The purpose of the retrofit is to increase the amount of time that anadromous fish have access through these structures to the tributaries and/or backwater channels they drain.

Construction would typically take place in late summer to take advantage of lower water levels, dry soil conditions, and the general absence of fish. For tributaries along the lower Columbia River, Oregon in-water work dates are typically July 1 – September 15. This work period occurs prior to when adult salmonids (coho, steelhead, coastal cutthroat trout) would be entering streams (October – March) and when most juveniles have completed outmigration or are rearing in the headwaters. Tidegates and associated dikes are located generally at the mouths of these tributaries.

Construction actions would be short-term in nature (1-5 days) with replacement of tidegates typically consisting of removal of the old tidegate and replacement with a fish-friendly tidegate and/or addition of a fish slide. Excavation would be required if the culverts are old and need replaced. In that case, a small cofferdam may be temporarily placed around the culvert ends in order to work in the dry. Season of construction, minimal excavation and use of temporary cofferdams minimizes sediment export from the work site and thus reduces the potential for impact to surrounding waters.

*Page 8-10, Add new section prior to 8.3:*

### **8.2.8 Shillapoo Lake Ecosystem Feature**

The original concept for the Shillapoo Lake ecosystem feature (FEIS 1999) eight cells hydraulically separated by levees, but interconnected by water control channels and structures, has been modified. Modifications to the original proposal arose from a value engineering study, actions by other agencies, and the remaining presence of a private in holding. The proposed action would retain a controlled hydraulic connection to Lake River via a tide gate and pumping station. This connection to Lake River would not afford access or egress by juvenile salmonids to Shillapoo Lake. This situation represents the current situation at Shillapoo Lake.

The proposed ecosystem restoration feature will be modified in the following manner. Cell 8 (195 ac) will not be constructed as the Washington Department of Fish and Wildlife (WDFW) will pursue other management features in the cell to accomplish their management objectives. Cell 1 (214 ac) will be constructed separately by the Natural Resource Conservation Service (NRCS) in partnership with WDFW. The proposed ecosystem restoration feature will complement management actions in Cell 1 through an enhanced capability to provide or draw down water. Cells 3 and 4 (209 ac) will be combined as will be Cells 5 and 7 (261 ac) based upon results of the value engineering study. Their combination will reduce construction, operations and maintenance costs. A large central pump and underground pipe system rather than the original concept of a system of channels and water control structures will manage water supply and withdrawal. Lastly, Cells 2 (176 ac) and 6 (193 ac) are still privately held and would not be constructed until acquired at some future date. Drainage capability for the private in holding will be provided through the proposed ecosystem restoration feature via pumps and pipelines.

Salmonids typically cannot enter these diking districts and export to the Columbia River of vegetative detritus, insect fauna and large woody debris is typically negligible under existing conditions. These factors are true at Shillapoo Lake.

As currently designed, the Shillapoo Lake ecosystem restoration feature will not provide for juvenile salmonid access. A porous rock fill dike will be constructed as part of the ecosystem restoration feature as a means to preclude carp, and thus other fish, from the management area. Carp compromise emergent and aquatic plant management objectives through their foraging actions that can preclude sunlight penetration of the water column and their consumption of the plants.

The restoration features proposed at Shillapoo Lake are not irreversible. Should reconnection with the Columbia River be established as the primary management objective in the future, then actions

can be taken to remove the rock fill dike and earthen levees to afford inundation of the Shillapoo Lake bed by Columbia River waters and access/egress by juvenile salmonids.

**Page 8-12 and 8-13, Section 8.4.1.1, Delete text of third and fourth paragraphs.**

**Page 8-13, Lois Island Embayment Habitat Restoration: Modify text of last sentence in paragraph one** - Historically, the area included complex tidal marsh and swamp habitat with a deeper subtidal channel bisecting the area.

Historically, the area included complex tidal marsh and mudflat habitat with a deeper subtidal channel bisecting the area.

**Page 8-13, Lois Island Embayment Habitat Restoration: Modify text of second sentence in paragraph four and add one sentence-** The site will be restored using a pipeline dredge to transfer material placed by hopper dredges at the upstream end of the Tongue Point turning basin.

The site will be restored using a pipeline dredge to transfer material placed by hopper dredges either in the Tongue Point Navigation Channel turning basin or between Columbia River miles 18 to 20. The Tongue Point turning basin would require dredging of 900,000 cy of material to obtain adequate depth for hopper placement of dredged material from the Columbia River Navigation Channel.

**Page 8-13, Lois Island Embayment Habitat Restoration: Add sentence after sentence 8 in paragraph four** - No contaminant concerns are foreseen (see Section 6.1.5, Accretion/Erosion).

No contaminant concerns are foreseen (see Section 6.1.5, Accretion/Erosion). Sediment testing for contaminants will be done for material dredged from the turning basin if this alternative is implemented.

**Page 8-14, Lois Island Embayment Habitat Restoration: Revise text of last paragraph in this section** - ~~It is our determination that the proposed action may adversely affect listed salmonids during restoration of historical elevations; however, over the long term, the proposed action should beneficially affect listed salmonids~~

It is our determination that the proposed action may affect, and is likely to adversely affect listed salmonids and their Critical Habitat during restoration of the site to historical elevations. However, over the long term, the proposed action should beneficially affect listed salmonids through provision of a more productive and diverse habitat.

**Page 8-14, Purple Loosestrife Control, Replace last paragraph with following text.**

It is our determination that the purple loosestrife control feature, using the integrated pest management approach, including use of herbicides as part of this restoration feature, may affect, but is not likely to adversely affect listed salmonids or their Critical Habitat. The proposed restoration feature is likely to beneficially affect listed salmonids through maintenance of the natural intertidal marsh plant community.

**Page 8-14, Miller-Pillar Habitat Restoration, Replace last paragraph with following text.**

It is our determination that the restoration of productive shallow subtidal habitat, may affect, and is likely to adversely affect ESA listed salmonids and their Critical Habitat. The proposed restoration feature is likely to beneficially affect listed salmonids over the longterm through restoration of a more productive shallow subtidal habitat than the current deep subtidal habitat.

**Page 8-14, Tenasillahe Island, Replace last paragraph with following text.**

It is the Corps' determination that the proposed action, either the interim or longterm feature, may affect, but is not likely to adversely affect ESA listed salmonids or their Critical Habitat. Long-term beneficial effects for ESA listed salmonids are expected from project implementation for either the short-term or long-term feature through provision of additional, productive intertidal and shallow subtidal habitat.

**Page 8-15 and 8-16, Tidegate Retrofits for Salmonid Passage, Replace last three paragraphs with following text.**

The tidegate retrofit restoration feature is estimated to provide or improve anadromous fisheries access to 38 miles of tributary streams. These tributaries containspawning, stream rearing, and (near their confluence with either the Columbia River or a more major tributary) backwater channel and freshwater marsh habit for rearing and/or overwinter refuge from floods.

Access through tidegates would be improved through installation of sliding doors and/or tidegates. The sliding doors (fish slides) can be left open during outmigration and inmigration periods to allow anadromous fish the opportunity to access or egress the stream on their timeframe, rather than strictly when tidal conditions (outgoing) provide for the tidegates to open.

It is the Corps' determination that implementation of this restoration feature may affect, but is not likely to adversely affect, listed salmonid ESUs or their Critical Habitat. Longerm, the proposed restoration will be beneficial to the suite of listed fish species through provision of access to additional habitat.

**Page 8-16, Walker/Lord and Hump/Fisher Island Improved Embayment Circulation, Replace last paragraph.**

It is the Corps' determination that implementation of this restoration feature may affect, but is not likely to adversely affect, listed salmonid ESUs or their Critical Habitat. Longerm, the proposed restoration will be beneficial to the suite of listed fish species through provision of a more productive shallow water habitat than currently exists.

**Page 8-17, Martin Island Embayment, Replace last paragraph with following text.**

The proposed action may affect, and is likely to adversely affect, listed stocks of salmonids and their Critical Habitat. Long-term, the proposed restoration feature will be beneficial to listed stocks and their Critical Habitat through provision of a more productive intertidal marsh habitat than the excavated embayment currently present.

**Page 8-17, Bachelor Slough, Replace last paragraph of section with following text.-**

The proposed restoration feature may affect, and is likely to adversely affect, listed salmonids and their Critical Habitat. Long term, the proposed restoration may beneficially affect listed salmonids and their Critical Habitat through improvements in flows, water temperature, benthic productivity and export of detritus, insects and large woody debris from the restored riparian forest component of the feature.

**Page 8-17, Shillapoo Lake Ecosystem Restoration: Replace text of two paragraphs. -**

A revised description of this ecosystem restoration feature is presented in Section 8.2.8, an additional section identified earlier in the addendum text. The principal construction effort for this feature will occur interior to the existing main flood control dikes during the summer months. Additional work will occur around the tidegate and pump station that exhausts interior waters to Lake River during the July 1– September 15 inwater work period. This inwater timeframe takes advantage of seasonally low water levels and the minimal presence of juvenile salmonids in Lake River. Little of the proposed construction work will occur outside the flood protection levees. Pump installation and construction of the rock levee would result in negligible turbidity increase in the immediate area of the activity. Screens will be placed to prevent entrainment of juvenile salmonids by pumps.

This restoration feature can be modified in the future if management actions directed toward salmonids are deemed more appropriate by the resource agencies, including the Washington Department of Fish and Wildlife, the proponent and manager of the Shillapoo Wildlife Management Area.

It is the Corps' determination that the proposed action may affect, but is not likely to adversely affect, listed stocks of salmonids.

**Page 8-25, Section 8.4.2.5 Northern Sea Lion: Delete first sentence of second paragraph –**