CLEAN WATER ACT SECTION 404(B) (1) EVALUATION

For

MAJOR REHABILITATION OF THE JETTY SYSTEM AT THE MOUTH OF THE COLUMBIA RIVER IN PACIFIC COUNTY, WASHINGTON AND CLATSOP COUNTY, OREGON

I. Introduction and Project Description

This 404(b) (1) evaluation describes unavoidable impacts to wetlands and other waters of the U.S. that could occur as a result of proposed actions related to the Major Rehabilitation of the Jetty System at the Mouth of the Columbia River. This action involves repair and rehabilitation at all three jetties in the system, North Jetty, Jetty A, and South Jetty. It also involves lagoon and wetland fill, as well as shoreline foredune stabilization, dredging, and rock placement activities. Further details are described in the proposed action.

Section 404 of the Clean Water Act (CWA) of 1977, as amended, requires that all projects involving the discharge of dredged or fill material into waters of the United States be evaluated for water quality and other effects prior to making the discharge. All dredge and fill materials associated with the major rehabilitation activities at the Mouth of the Columbia River (MCR) jetty system are activities undertaken by or at the direction of the Corps of Engineers. Federal regulations, at 33 CFR 336.1, provide that a Section 404 permit will not be issued for such fill material by the Corps to itself; however, the Corps shall apply the Section 404(b) (1) guidelines to the project. This evaluation assesses the effects of dredge and fill actions described below utilizing guidelines established by the U.S. Environmental Protection Agency (USEPA) in conjunction with the Secretary of the Army under the authority of Section 404(b)(1) of the Act. Guidelines for conducting a 404(b) (1) evaluation are described at 40 CFR 230.1-12.

II. Description of Proposed Action

a. Location

The North Jetty and Jetty A are located in Pacific County, Washington, near Ilwaco and Long Beach on the Long Beach Peninsula. The 2.3-mile long North Jetty was completed in 1917. Three repairs to the North Jetty have been made with the last one completed in 2005. To date, jetty rock placement totals approximately 3.4 million tons. Since initial construction, about 0.4 miles of the North Jetty head has eroded and is no longer functional. Jetty A, positioned on the south side of the North Jetty, was constructed in 1939 to a length of 1.1 miles and is located upstream of the North Jetty. Jetty A was constructed to direct river and tidal currents away from the North Jetty foundation.

The South Jetty is located in Clatsop County, Oregon near Warrenton/Hammond and Astoria. The South Jetty is about 6.6 miles long. The initial 4.5-mile section of the South Jetty was completed in 1896, with a 2.4-mile extension completed in 1914. Currently, approximately 3 miles of jetty extends seaward of the shoreline. To stabilize the jetty foundation, six groins

perpendicular to the South Jetty were constructed with lengths from about 100 to 1,000 feet. Over 6,100 feet of head loss has occurred at the South Jetty. Nine repairs to the South Jetty have been completed with the latest one in 2007. To date, jetty rock placement at the South Jetty totals approximately 8.8 million tons.

b. Project Description

The Proposed Action is generally composed of four categories applicable to each jetty: **(1)** engineered designs elements and features of the physical structures; **(2)** construction measures and implementation activities; **(3)** proposed ESA Section 7(a)(1) habitat improvement measures and wetland mitigation actions to improve habitat for the benefit of listed species and to offset unavoidable wetland fill, and **(4)** proposed establishment of and coordination with an Adaptive Management Team (AMT) composed of representatives from the Corps and appropriate federal and state agencies. More detailed descriptions of the proposed action, base line conditions, effects, and discussions can be found in the 2011 Final Environmental Assessment as well as the associated Biological Assessments and Biological Opinions from the resource agencies.

The duration of the construction schedules is 20 years with a 50-year operational lifetime for the MCR jetty system. Therefore, an inherent level of uncertainty exists regarding dynamic environmental conditions and actual conditions of and at each of the jetties. For this reason, in all cases where areas, weights, and volumes (tons, acres, cubic yards, etc.) or other metrics are indicated, these are best professional estimates and may vary by greater or lesser amounts within a 20% range when final designs are completed. These amounts represent Corps' best professional judgment of what the range of variability could entail as the design is further developed and as on-the-ground conditions evolve over the 20-year construction schedule. The Corps maintains an active jetty monitoring and surveying program that will further inform the timing and design of the proposed action in order to facilitate efficient completion of the project and whenever possible to avoid emergency repair scenarios.

(1.) Design elements and structural features specific to each jetty include the following:

• North Jetty – Scheduled repairs addressing the loss of existing cross section and the addition of engineering features designed to minimize future cross section instability are planned. The cross-section repairs are primarily above MLLW, with a majority of stone placement not likely to extend beyond -5 feet below MLLW. To address the structural instability of the jetty cross-section, four spur groins will be added and the jetty head (western-most section) will be capped with large stone. Groins will be constructed primarily on existing relic stone and the head capping will be placed on relic and jetty stone that is above MLLW. The shore-side improvements that have been identified are culvert replacement and lagoon fill. These actions are designed to stop the current ongoing erosion of the jetty root.

The cross-section design from stations 20+00 to 99+00 will have a crest width of approximately 30 feet and will lie essentially within the existing jetty footprint based on the configuration of the original cross section, previous repair cross sections, and redistribution of jetty rock by wave action. About 460,000 tons (~287,500 cy) of new rock will be placed on relic armor stone, with the majority of stone placement above MLLW. About four repair events were predicted over the

next 20 years. Each repair action is expected to cover a length range of up to 1,700 feet and include stone volumes in the range of 45,000 to 100,000 tons (~28,125-62,500 cy) per season.

Three submergent spur groins will be placed on the channel side (NJ1C, NJ2C, and NJ4C) and one emergent spur groin on the ocean side (NJ3O) of the North Jetty to stabilize the foundation. The crest width will be 20-ft, with a bottom width ranging from 80-115-ft wide, and a length of between 60 and 170-ft. About 53,000 tons of stone will be placed over 1.55 acres to construct the new groins.

An armor stone cap or concrete armor units will be placed on the head of the North Jetty to stop its deterioration. Approximately 38,000 tons (~23,750 cy) of stone or equivalent concrete armor units will be placed on the relic stone to cap the jetty head. Future physical modeling will refine head capping features.

Approximately 109,000 tons (~68,125 cy) of gravel and sand will be added to the jetty's beach side as lagoon fill to eliminate the tidal flow through the jetty that is destabilizing the foundation. A recent berm repair action now precludes lagoon inundation by tidal waters coming from the shoreline. Scouring has taken place on the north side of the North Jetty resulting in formation of a backwater area (lagoon) that was previously inundated both by tidal waters that come through the jetty and from the shoreline, and by freshwater that drains from the O'Neil Lake-McKenzie Head lagoon and wetland complex area through the accreted land to the north of the jetty and North Jetty Road. This area drains through a culvert under the road and provides some of the freshwater flow to the lagoon. The surrounding lagoon resembles a scoured-out tidal channel and is a non-vegetated (and non-wetland) area of bare sand comprising approximately 8.02 acres. These wetlands and waters will be filled to protect and stabilize the foundation of the North Jetty and to serve as a location for rock stockpiles and construction staging activities.

The aging culvert draining south from the wetland complex north of the roadway will be replaced, as it provides required drainage under the roadway. The design of the inlet, elevation, and culvert size will be determined so that hydrologic function in the adjacent wetland system is not negatively impacted. The outlet channel downstream of the culvert will not be filled. This area may provide an opportunity for minor stream and bank enhancement which will be evaluated when the culvert design is finalized, but this is uncertain until possible benefits can be further assessed. Under the proposed action, the existing channel will outlet to an engineered sump area comprised of newly placed lagoon fill material. In addition to infiltration through the jetty structure, this small portion of the creek currently connects the wetland to the lagoon and likely also receives some backwater flow from jetty infiltration.

- South Jetty – Scheduled repairs addressing the existing loss of cross section and the addition of engineering features designed to minimize future cross-section instability are planned. The cross-section repairs are primarily above MLLW, with a majority of stone placement not likely to extend beyond -5 feet below MLLW. To address the structural instability of the jetty cross-section, five spur groins will be added and the jetty head (western-most section) will be capped with large stone. Groins will be constructed primarily on existing relic stone and the head capping will be placed on relic and jetty stone that is above MLLW. Augmentation of the foredune at the western shoreline extending south from the jetty root has been included in the

base condition, but is describe in detail under the selected plan. This action is intended to prevent the degradation of the jetty root and prevent the potential breaching of the fore dune.

The cross-section design from stations 155+00 to 311+00 will have a crest width of approximately 30 feet and will lie essentially within the existing jetty footprint based on the configuration of the original cross section, previous repair cross sections, and redistribution of jetty rock by wave action. The majority of the stone placement will be conducted above the MLLW. Each repair action is expected to cover a length up to 2,100 feet and include stone volumes in the range of 30,000 to 118,000 tons per season (18,750 to 73,750 cy).

Three emergent and two submergent spur groins will be constructed to stabilize the jetty's foundation. The crest width will be 20-ft, with a bottom width ranging from 80-125-ft wide, and a length of between 60 and 190-ft. About 25,000 tons of stone will be placed over 1.10 acres to construct the new groins.

An armor stone cap with approximately 40,000 to 74,000 tons (~25,000 to 46,250 cy) of stone or concrete armor units will be placed on the head of the South Jetty to stop its deterioration.

About 40,000 to 70,000 cy of cobble is proposed at the South Jetty root in order to fortify the toe of the foredune and to improve the foreshore fronting to resist wave-induced erosion/recession (Figure 24). Maximum crest width of the template is estimated to extend 70 feet seaward from the seaward base of the present foredune. Construction of the foredune augmentation would require 2 to 6 weeks. To adequately protect the foredune during storm conditions, this requires that the top of the stone berm (crest) extend vertically to approximately 25 feet NAVD and have an alongshore application length of approximately 1,100 feet, extending southward from the South Jetty root. This is equivalent to about 3 acres. The constructed template crest would be 10 to 15 feet above the current beach grade and have a 1 vertical to 10 horizontal slope aspects from crest to existing grade. Cobble is not expected to extend below MHHW. A layer of sand may be placed over this berm or natural accretion may facilitate sand recruitment after construction of the adjacent spur groin.

Cobble material would be procured from upland sources and placed using haul trucks and dozers. The material would be transported on existing surface roads and through Fort Stevens State Park to a beach access point at the project site. There is an existing relic access road along the jetty root that will be refurbished and used to transport stone to the dune augmentation area.

The dune augmentation may require maintenance every 4 to 10 years (assume 40% replacement volume). Consideration will be given to development of revegetation plans which incorporate native dune grasses to supplement foredune stabilization in the augmentation area. This bioengineering component could help restore vegetated dune habitat and take advantage of natural plant rooting functions that provide greater protection from erosive forces.

• Jetty A – Immediate rehabilitation with small cross section and the addition of engineering features designed to minimize future cross-section instability are proposed. The cross-section repairs are primarily above MLLW, with a majority of stone placement not likely to extend beyond -5 feet below MLLW. In order to address the structural instability of the jetty

cross section, two spur groins will be added and the jetty head (southern most section) will be capped with large stone. The groins will be constructed primarily on existing relic stone and the head capping will be placed on relic and jetty stone that is above MLLW.

The cross-section design from stations 40+00 to 91+00 will have a crest width of approximately 40 feet and will lie mostly within the existing jetty footprint based on the configuration of the original cross section, previous repair cross sections, and redistribution of jetty rock by wave action. About 55,000 tons (~34,375 cy) of new rock will be placed on the existing jetty cross section and relic armor stone on the estuary/channel side of the jetty and 75,000 tons (~46,875 cy) of new rock on the ocean side of the jetty. Although most of the work will occur above MLLW, there will also be some stone placement below this elevation. The small cross-section also has a higher likelihood of expanding beyond the relic base compared to repair actions.

One submergent spur groin will be placed on the downstream (JA1C) side and one submergent spur will be placed on upstream (JA2O) side to stabilize the jetty's foundation. The crest width will be 20-ft, with a bottom width ranging from 100-105-ft wide, and a length of between 125 and 135-ft. About 25,000 tons of stone will be placed over about 0.61 acres to construct the new groins.

(2.) Construction measures and implementation activities for all three jetties include the following:

- Storage and staging areas for rock stockpiles and all associated construction and placement activities such as: roadways, parking areas, turn-outs, haul roads, weigh stations, yard area for sorting and staging actions, etc.
- Stone delivery from identified quarries either by barge or by truck. Possible transit routes have been identified. This also includes the construction and use of permanent barge offloading facilities and causeways with installation and removal of associated piles and dolphins.
- Stone placement either from land or water, which includes the construction, repair, and maintenance of a haul road on the jetty itself, crane set-up pads, and turnouts on jetty road. Placement by water could occur via the use of a jack-up barge on South Jetty, but will not occur by other means or on North Jetty to avoid impacts to crab and juvenile salmon migration.
- Regular dredging and disposal of infill at offloading facilities with frequency dependent on a combination of the evolving conditions at the site and expected construction scheduling and delivery. Disposal will occur at existing designated and evaluated approved in-water sites.

(3.) In addition, a suite of potential projects to provide ESA Section 7(a) (1) habitat improvement have been identified. Through one or a combination of these projects, the Corps will affirm its intent to provide habitat that is as beneficial to ESA-listed species. Depending on further development of alternatives within this habitat improvement and list, a specific project or combination of projects will be selected and constructed concurrently to provide environmental benefits as portions of the proposed action are completed over time. Generally, possible and

habitat improvement measures could include an individual project or a combination of projects and actions such as:

- Excavation and creation of tidal channels and wetlands to restore and improve hydrologic functions including water quality, flood storage, and salmonid refugia.
- Culvert and tide gate replacements or retrofits to restore or improve fish passage and access to significant spawning, rearing, and resting habitat.
- Dike breaches to restore estuarine brackish intertidal shallow-water habitat for fish benefits.
- Beneficial uses of dredged material from MCR hopper dredge to replenish littoral cells.
- Invasive species removal and control and revegetation of native plants to restore ecological and food web functions that benefit fisheries.

A separate CWA 404 (b) (1) evaluation and NEPA analysis will be completed, as appropriate, for the 7 (a) (1) actions when they are further developed.

Wetland mitigation will also help meet compliance obligations under the Clean Water Act. Wetland mitigation will be commensurate with impacts from construction activities. More specifics regarding wetland mitigation are described in that section.

(4.) Due to the long duration of the MCR Jetty Rehabilitation schedule, the Corps proposes formation of a modified Adaptive Management Team (AMT). The Corps suggests annual meetings to discuss relevant design and construction challenges and modifications, technical data, new species listings or critical habitat designations, evolving environmental conditions, and adaptive management practices as needed. The primary purpose of the proposed AMT and its implementation is to ensure construction, operation, and maintenance actions have no greater impacts than those described in the Biological Assessments and Environmental Assessment, and that Corps obligations and terms and conditions are being met. This will also allow confirmation that any necessary construction or design refinements remain within the range and scope of effects described during Consultations. This forum will provide and opportunity for periodic evaluation as to whether or not the proposed actions, ESA listings, or environmental conditions result in any re-initiation triggers. It will also facilitate continued coordination and updating and allow the Corps to inform agency partners when unforeseen changes arise. Results regarding marine mammal and fish monitoring, wetland mitigation and habitat improvement monitoring, as well as water quality monitoring will also be made available to the AMT in order to fulfill reporting requirements and to address any unexpected field observations. Results of jetty monitoring surveys will also inform the AMT of the repair schedule and design refinements that may become necessary as the system evolves over time. This venue will provide greater transparency and allow opportunities for additional agency input. Final selection and design of the habitat improvement and wetland mitigation proposal will be vetted through this forum to facilitate obtaining final environmental clearance documents for this component of the MCR proposed action. Potential principal partners include federal (National Marine Fisheries Service, U.S. Fish and Wildlife Service) and State (Washington and Oregon) resource management agencies.

c. Authority, Purpose, and Need

For the authorization for the actual construction of the MCR jetties, the present navigation channel and configuration of the inlet at the mouth of the Columbia River are the result of continuous improvement and maintenance efforts have been undertaken by the Corps Portland District since 1885. Congress has authorized the improvement of the MCR for navigation through the following legislation: Senate Executive Document 13, 47th Congress, 2nd Session (5 July 1884) authorized the Corps to construct the South Jetty (first 4.5 miles) for the purpose of attaining a 30-foot channel across the bar at the MCR; House Document 94, 56th Congress, 1st Session (3 March 1905) authorized the Corps to extend the South Jetty (to 6.62 miles) and construct a North Jetty (2.35 miles long) for the purpose of attaining a 40-foot channel (0.5 mile wide) across the bar at the MCR; House Document 249, 83rd Congress, 2nd Session (3 September 1954) authorized a bar channel of 48 feet in depth and a spur jetty ("B") on the north shore of the inlet. Funds for Jetty "B" construction were not appropriated. Public Law 98-63 (30 July 1983) authorized the deepening of the northern most 2,000 feet of the MCR channel to a depth of 55 feet below mean lower low water (MLLW). The MCR federal navigation project was originally authorized (in 1884) before formulation of local sponsor cost sharing agreements; therefore, all navigation maintenance and improvements at MCR are borne by the Federal Government.

The authority for maintenance of the MCR jetties comes from the original authority for construction of the project and then with Corps' policies for the operations, maintenance, and management of a Corps' project (Chapter 11 of EP 1165-2-1). For navigation, completed projects like the MCR have established that operations and maintenance (O&M) is solely a federal responsibility to be accomplished at federal cost.

When maintaining a Corps' project, there is regular O&M, major maintenance, and major rehabilitation. Major rehabilitation consists of either one or both of two mutually exclusive categories, reliability or efficiency improvements.

- Reliability. Rehabilitation of a major project feature that consists of structural work on a Corps operated and maintained facility to improve reliability of an existing structure, the result of which will be a deferral of capital expenditures to replace the structure. Rehabilitation will be considered as an alternative when it can significantly extend the physical life of the feature (such as a jetty) and can be economically justified by a benefit/cost relationship. Each year the budget EC delineates the dollar limits and construction seasons (usually two construction seasons).
- Efficiency Improvements. This category will enhance operational efficiency of major project components. Operational efficiency will increase outputs beyond the original project design.

Thus, the authority for maintenance of the MCR jetties comes from the authorization documents for the project and/or the authority to operate and maintain the structures.

The purpose of the proposed action is to perform modifications and repairs to the North and South jetties and Jetty A at the MCR that would strengthen the jetty structures, extend their functional life, and maintain deep-draft navigation.

Structural degradation of the +100-year old MCR jetty system has accelerated in recent years because of increased storm activity and loss of sand shoal material upon which the jetties are

constructed. In addition, beaches on the ocean sides of the North and South jetties, which formed as a result of jetty construction, have been receding gradually over the years, exposing previously protected sections of the jetties at the beach line to storm waves. Taking no action to protect and to extend the functional life of the jetties will result in further deterioration of the jetties and the sand shoals upon which they rest, increasing the likelihood of a jetty breach. Recent jetty repairs have addressed immediate critical needs. Additional modifications and repairs to the jetties are necessary to address critical near- and long-term needs and to reduce the potential for emergency repairs, emergency dredging, and impacts to navigation.

d. General Description of Fill and Dredged Material

The repair and rehabilitation project would require placement of clean armor and fill stone. This would also be required for construction of barge offloading facilities. The material would come from an approved quarry. The Corps intends to use operating quarries rather than opening any new quarries. The Contractor and quarry owner/operator will be responsible for ensuring that quarries selected for use are appropriately permitted and in environmental compliance with all state and federal laws. Armor and fill stone was discussed above in the description of the proposed action and is summarized below.

Jetty Preferred Plan Design Metrics Summary
FEASIBILITY PHASE

North Jetty Scheduled Repair with Engineering Features

Jetty Crest Elevation	Estimated Stone Density	Total Repair Length	Jetty Crest Width	Jetty Sideslope		Jetty Head Station	Head Length	Spur Groin Sta.	Spur Groin Tons
				Channel	Ocean				
25' above MLLW	167 #/ft3	8,100'	30'	1v:1.5h	1v:1.5h	99+00 to 101+00	200'	Sta 50-C Sta 70-C Sta 80-O Sta 90-C	3,895 12,870 2,340 33,960

South Jetty Scheduled Repair with Engineering Features

Jetty Crest Elevation	Estimated Stone Density	Total Repair Length	Jetty Crest Width	Jetty Sideslope		Jetty Head Station	Head Length	Spur Groin Sta.	Spur Groin Tons
				Channel	Ocean				
25' above MLLW	167 #/ft3	15,800'	30'	1v:1.5h	1v:2h	311+00 to 313+00	200'	Sta 165-O Sta 210-C Sta 230-C Sta 265-C Sta 305-O	1,496 2,095 2,095 2,841 16,747

Jetty A Rehab with Engineering Features

Jetty Crest Elevation	Estimated Stone Density	Total Repair Length	Jetty Crest Width	Jetty Sideslope		Jetty Head Station	Head Length	Spur Groin Sta.	Spur Groin Tons
				Estuary	Ocean				
20' above MLLW	167 #/ft3	5,300'	40'	1v:2h	1v:2h	91+00 to 93+00	200'	Sta 84-O Sta 90-E	12,272 12,272

Depending on site-specific circumstances, barge offloading facilities may be converted to spur groins, may be partially removed and rebuilt, may be permanently removed, or may remain as permanent facilities upon project completion. Facility removal will depend on access needs and evolving hydraulic, wave, and jetty cross-section conditions at each offloading locations.

Offloading facilities will range from approximately 200- to 500-feet long and 20- to 50-feet wide, which ranges from about 0.48 to 2.41 acres in total area. For initial construction of all four facilities combined, approximately up to 96 Z- or H-piles that are 12-16-inches in diameter could be installed as dolphins, and up to 373 sections of Z- or H-piles installed to retain rock fill. They will be located within 200-ft of the jetty structure. Facilities will have a 15-foot NGVD crest elevation and will be installed at channel depths between -20 and -30 feet NGVD. Because the sediments in the region are soft (sand), a vibratory hammer will be used for pile installation and only untreated wood or steel piles installed to a depth of approximately 15 to 25 feet below grade. Removal and replacement of the facilities could occur within the duration of the construction schedule. Volume and acreage of fill for these facilities are shown in below.

Rock Volume and Area of Barge Offloading Facilities and Causeways

Location	Approximate Length (ft)	Approximate Rock Volume (cy) Below 0 MLLW	Total Approximate Rock Volume (cy)	Approximate Square Feet	Acres
North Jetty	200	7,778	29,640 cy	21,000	0.48
Jetty A near head	200	7,778	29,640 cy	21,000	0.48
Jetty A mid-section causeway	5000	38,888	38,888	105,000	2.41
South Jetty Parking Area D	450	17,417	33,688 cy	47,250	1.08
South Jetty along jetty turn-out	200		18,640 cy	21,000	0.48

Dredging activities will entail the following. Transport of rock would most likely be done by ocean-going barges that require deeper draft (20-22 feet) and bottom clearance when fully loaded than river-going barges. Therefore, dredging will be required to develop each of the barge offloading facilities. Under-keel clearance should be no less than 2 feet. The elevation at barge offloading sites should have access to navigable waters and a dredge prism with a finish depth no higher than -25 feet MLLW, with advance maintenance and disturbance zone depths not to extend below -32 feet MLLW. These facilities should also provide for a maneuvering footprint of approximately 400 feet x 400 feet. The depth along the unloading sites would be maintained during the active period for which the rock barges will be unloaded. The volume of material to be dredged is shown; these estimates are based on current bed morphology and may change. Also, maintenance dredging to a finish depth of -25 feet MLLW will be needed before offloading during each year of construction. Dredging is likely to occur on a nearly annual basis for the duration of the project construction period, but this will be intermittent per jetty, depending on which one is scheduled for construction in a particular year.

Estimated Dredging Volumes for Barge Offloading Facilities

Location*	Estimated Dredging Volume (cy)		Approximate Acres
	Initial	Est. Maintenance**	
North Jetty	30,000	30,000	3.73
Jetty A	60,000	80,000	3.73
South Jetty	20,000	20,000	4.19
South Jetty - Parking Area D	20,000	20,000	4.19

* Some of the locations will not be used on an annual basis; it depends on the construction schedule for each jetty.
**All dredging will be based on surveys that indicate depths shallower than -25 feet MLLW.

Approximately 109,000 tons (~68,125 cy) of gravel and sand will be added to the North Jetty's beach side as lagoon fill to eliminate the tidal flow through the jetty that is destabilizing the foundation. This fill could be derived from dredge material, upland excavation, as well as quarry stone. The aging culvert draining south from the wetland complex north of the North Jetty Access roadway will also be replaced. At the South Jetty there will be culverts installed in the marsh wetland to maintain hydraulic connectivity while allowing access up to the jetty and to areas identified for construction staging and stock piling. At the area identified for dune augmentation adjacent to and south of the root, cobble material would be procured from upland sources and placed using haul trucks and dozers. About 40,000 to 70,000 cy of cobble in the shape of angular or rounded graded stone is proposed, and could require periodic supplementation.

In order to place stones, a haul road will be constructed on the 30-foot crest width of each jetty to allow crane and construction vehicle access. Roads will consist of an additional 3 feet of top fill material, which could also entail an additional 2 feet of width spill-over. These roads will remain in place for the duration of construction. Due to ocean conditions and the wave environment, these roads will likely need yearly repair and replacement. They will not be removed upon completion. Ramps from the beach up to the jetty road will also be constructed to provide access at each jetty.

At approximately 1,000-foot intervals, turnouts to allow equipment access and passage will be constructed on the North and South jetties. These will consist of 50-foot long sections that are an additional 20-feet wide. Some of this stone for these facilities may encroach below MLLW. On the North Jetty, there will be approximately two turnouts. South Jetty will have approximately eight turnouts with two additional larger-sized turnouts. These larger turnouts will be in the range of 300-feet long with an additional 20-foot width. One of these larger turnouts will function as an offloading facility on South Jetty. At Jetty A, the causeway will function as the turnout facility.

Towards the head of each jetty, additional crane set up pads will be constructed at approximately 40-ft increment to allow crane operation during the placement of the larger capping stones. Set-up pads will roughly entail the addition of 8 feet on each side of the crest for a length of about 50 feet. Some of this stone for these facilities may encroach below MLLW. Approximately five set-up pads will be required to construct each jetty head.

e. Description of the Proposed Discharge Site

A dredged material disposal site called the North Jetty site is entirely within inland waters. It is located about 400 feet south of the North Jetty, occupies an area of 1,000 feet by 5,000 feet, and has an average water depth of 35-55 feet. This site was evaluated and established in 1999 under Section 404 of Clean Water Act to allow the placement of dredged material along the toe of the North Jetty to protect it from excessive waves and current scour. Use of the site is limited to disposal of MCR dredged material. From 1999-2008, about 4.4 million cubic yards (mcy) of dredged material was placed in the North Jetty site.

An ocean disposal site called the Shallow Water Site (SWS) lies within 2 miles offshore from the MCR and was evaluated and designated in 2005 by the U.S. Environmental Protection Agency (USEPA) under Section 102 of the Marine Protection, Research and Sanctuaries Act. The SWS occupies a trapezoidal area of 3,100- to 5,600 feet in width by 11,500 feet in length and lies within a water depth of 45-75 feet. The SWS is used for disposal of material dredged from either the MCR or the lower Columbia River. The SWS is dispersive, which means that material placed there is transported away from the site by waves and currents. Active monitoring and evaluation determined that 80% to 95% of the dredged sand annually placed at the SWS moves northward onto Peacock Spit. From 1997-2008, approximately 29 mcy of dredged sand has been placed in the SWS. The SWS is of strategic importance to the region; its continual use has supplemented Peacock Spit with sand, sustained the littoral sediment budget north of the MCR, protected the North Jetty from scour and wave attack, and stabilized the MCR inlet.

There is also an active deep water disposal site 7 miles off shoreline in Pacific Ocean, west of the Columbia R., as well as an active disposal site in the estuary at RM 7 called the Chinook Channel Area D, the latter of which receives materials from the Columbia and Lower Willamette reaches. There may also be a potential future proposed dredge material disposal site near the South Jetty.

Two dredged material disposal sites, the Shallow Water Site and the North Jetty site, are the most likely sites to be used for disposal of dredged material. Modeling has showed that the potential changes to the two disposal sites from the proposed action would not inhibit their use as disposal sites. Spur groin construction at the North Jetty would avoid the North Jetty disposal site. The northern-most cells of this site immediately adjacent to the jetty will be avoided to reduce the possibility of vessel impact with the spur groins. These sites have been previously vetted through the appropriate regulatory agencies, were evaluated for their effects, and were subsequently designated or approved after such review. The current proposed action and use of these disposals sites will maintain compliance with approved use.

These disposal sites would be used seasonally, likely between May and October, in order to maintain barge offloading facilities at the required depths. Depending on in-fill rates, dredging and disposal could occur one or more times per season. Any rock placement or road maintenance would also likely occur on a daily basis but be limited seasonally to the spring and summer months, as weather conditions at the jetties preclude safe working conditions in the winter and fall months. Localized turbidity in the immediate vicinity of the work or placement sites is also expected to occur on a seasonally limited daily basis during daylight hours. However, due to the nature of the materials and the conditions at the jetties, this is not expected to exceed background levels in any significant manner. Conditions of the State Water Quality Certifications will also likely include limited exceedence durations to protect aquatic life, with which the Corps and its contractor will comply. Lagoon fill, wetland fill, and foredune augmentation will all occur in a single season and will occur during a limited amount of time during daylight hours.

f. Description of the Disposal Method

Placement of armor stone and jetty rock on the MCR jetties would be accomplished by land or limited water-based equipment. Only clean stone will be used for rock placement, where

appropriate and feasible. Where appropriate, there may also be some re-working and reuse of the existing relic and jetty prism stone. Fill for the jetty haul roads will not be cleaned prior to installation. Dropping armor stone from a height greater than 2 feet will be prohibited. During placement there is a very small chance of stone slippage down the slope of the jetty. However, this is unlikely to occur due to the size and cost of materials and placement.

Another approach to water-based rock placement would be via a jack-up barge. This would only be applicable at the South Jetty. For armor stone and rock placement at the head, a jack-up barge with crane could be used to serve as a stable work platform (Figure 36). Once into place, the jack-up barge would be jacked up on six legs so that the deck is at the same elevation as the jetty. The legs are designed to use high-pressure water spray from the end of the legs to agitate the sand and sink the legs under their own weight. The jacking process does not use any lubricants that contain oils, grease, and/or other hydrocarbons. The stone and rock will be barged to the jack-up barge and offloaded onto the jetty head. The jack-up barge will keep moving around the head of the jetty to complete the work. A jack-up barge would not be used on the North Jetty or Jetty A to avoid interference with navigation of fishing boats and crab and fish migrations.

For land-based rock placement, a crane or a large track-hoe excavator could be situated on top of the jetty. The placement operation would require construction of a haul road along the jetty crest within the proposed work area limits. The crane or excavator would use the haul road to move along the top of jetty. Rock would be supplied to the land-based placement operation by land and/or marine-based rock delivery. For marine-based rock, the land-based crane or excavator would pick up rock directly from the barge or from a site on the jetty where rock was previously offloaded and stockpiled, and then place the rock within the work area. For land-based rock, the crane or excavator would supply rock via a truck that transports rock from the stockpile area. The crane or excavator would advance along the top of the jetty via the haul road as the work is completed.

A clamshell dredge would likely be used for all dredging, although there is a small chance that a pipeline dredge could be used. The material to be dredged is medium to fine-grained sand, typical of MCR marine sands. Disposal of material would occur in-water at an existing previously evaluated and designated approved disposal site. Clamshell dredging is done using a bucket operated from a crane or derrick that is mounted on a barge or operated from shore. Sediment removed from the bucket is generally placed on a barge before disposal. This type of dredge is typically used in shallow-water areas.

The following overall impact minimization practices and best management practices (BMPs) will be used for all maintenance dredging for offloading facilities.

1. To reduce the potential for entrainment of juvenile salmon or green sturgeon, the cutter-heads on pipeline dredges will remain on the bottom to the greatest extent possible and only be raised 3 feet off the bottom when necessary for dredge operations.

2. To reduce turbidity, if a clamshell bucket is used, all digging passes shall be completed without any material, once in the bucket, being returned to the wetted area. Not dumping of partial or half-full buckets of material back into the project area will be allowed. No dredging of

holes or sumps below minimum depth and subsequent redistribution of sediment by dredging dragging or other means will be allowed. All turbidity monitoring will comply with State 401 Water Quality Certification Conditions.

3. If the Captain or crew operating the dredges observes any kind of sheen or other indication of contaminants, he/she will immediately stop dredging and notify the Corps' environmental staff to determine appropriate action.

4. If routine or other sediment sampling determines that dredged material is not acceptable for unconfined, in-water placement, then a suitable alternative disposal plan will be developed in cooperation with the NMFS, EPA, Oregon Department of Environmental Quality (ODEQ), Washington Department of Ecology (WDOE), and other agencies.

A vibratory hammer will be used to install pilings for offloading facilities. At the South Jetty, cobble material would be procured from upland sources and placed using haul trucks and dozers. At the North Jetty, lagoon fill will also be placed using haul trucks and dozers or pump ashore.

III. Alternatives

The discharge of dredge and fill materials to wetlands and other waters of the U.S. will occur via the following project activities: stone placement for the jetty structures and associated engineering features; lagoon fill for jetty root stabilization and construction staging and access; stone placement and pile installation for barge offloading facilities; fill of wetlands for construction staging, rock stockpiles, and sorting; and discharge during inwater construction activities and dredge disposal actions. The Corps has evaluated and taken advantage of all practicable alternatives as well as minimization measures to avoid significant adverse environmental consequences. Some of these actions are water dependent or require proximity to special aquatic sites. These circumstances are described for each of the actions.

Stone placement for the jetty structures and associated engineering features: Various jetty rehabilitation and repair design alternatives have been considered. These are described further in the associated Final Environmental Assessment for the Major Rehabilitation of the MCR Jetty System, which is incorporated herein. Alternatives considered for jetty design included variations in the timing, sequencing, and extent of cross-section repairs and rehabilitation actions at each of the jetties, as well as variations with type and size of stone, slope, spur groin size and locations, etc.

The "no action" alternative was considered in the alternatives analysis and was determined to be unacceptable due to the risk of jeopardizing the long-term functional integrity of the jetty system, possible effects to navigation, and possible loss of interdependent landforms. To allow the jetties to continue to deteriorate could eventually lead to breaching and sediment transport into the estuary and navigation channel, which could increase offshore shoaling outside of the channel entrance and result in loss of beach areas and accreted habitat. As the jetties continues to deteriorate, waves are predicted to move further into the inner harbor adding to the difficulty of maintaining a reliable, year-round navigation channel, particularly one that accommodates larger, ocean-going vessels. There could also be a resulting increase boating hazards and

necessary dredging actions. Repair and rehabilitation of the jetty system will facilitate maintenance of the current river entrance location and navigational function, as well as the accreted landforms, habitats, and recreational uses that have developed along the shoreline.

Should the condition of the jetty worsen to the point an emergency is declared (which becomes much more likely under a "no action" scenario), repairs and dredging would commence as soon as possible. Environmental documentation would follow, if was not completed prior to emergency construction.

However, this emergency situation is unlikely as the final selected plan addresses these functional issues and minimizes the amount of fill material because it has the smallest, or in the case of Jetty A, minimal footprint practicable. Additionally, this fill is unavoidable because this is a project to maintain the jetty system at its current location at the river's mouth, which also preserves accessibility for navigation at the MCR. Therefore these actions are by nature water-dependent. The purpose of the project could not be achieved without the level of stone fill to meet the repair and rehabilitation goals and needs.

The method of stone placement does reduce the amount of fill to some degree, as placement by land reduces the need for additional pilings and mooring facilities. When placement by water does occur, it will happen via a jack-up barge, which provides a stable platform without the addition of other facilities.

Lagoon fill for jetty root stabilization and construction staging and access: Lagoon fill will occur at both the North and South Jetty. At the North Jetty, this fill is required to arrest the scour that is undermining the jetty root at the lagoon, which could contribute to its structural deterioration. As a structural component in each of the repair and rehabilitation alternatives, it is a water-dependent feature that is identified as a critical component in any of the alternatives carried forward to maintain the North Jetty.

Partial fill of the lagoon is necessary at the South Jetty because it allows access to the jetty itself for the necessary construction activities. Some logistical staging and preparation activities require proximity to the jetty access road. Additionally, an access road is necessary to ramp up to the jetty itself, and this best occurs in the proximity of the lagoon and marsh inlet area. The farther out on the jetty on the seaward side that the access road can be constructed prior to ramping-up to the jetty, the more resilient and lower its cost. A longer road on the jetty (which would be the case if ramping-up nearer inland) is less feasible, more costly because of the additional fill material needed, and requires more maintenance and repairs because of exposure to wave action. To minimize impacts to waters, the road will be constructed immediately adjacent to the jetty to avoid any marsh channels or wetlands as much as possible. Additionally, a culvert or series of culverts will be installed in the access road as necessary to maintain hydrologic connectivity into the marsh wetland system.

Stone placement and pile installation for barge offloading facilities: Barge offloading facilities will likely be necessary for the transport and delivery of large stones, particularly those used for jetty head-capping. Logistically and feasibly, the size of stone that could be used may in some cases preclude efficient or safe transport of stone by land. Offloading facilities also

benefit from being in proximity to the jetties, because this reduces the redundancy of re-handling and moving the stones prior to placement. Besides increasing efficiency, this reduces the likelihood of stone breakage, which can be very costly.

Though private offloading facilities exist locally, there is no guarantee that these facilities will be available during the timing and in the duration that would be required to efficiently complete the entire project. Areas selected for facilities were chosen because of their proximity to the jetties, their likelihood for safer sea conditions, and their proximity to deeper waters to reduce maintenance dredging. Additionally, in the case of Jetty A, the transportation network to the jetty itself may preclude safe passage of vehicles sized to carry the specified tonnage of rock necessary to complete the project. At the North Jetty, the facility was placed in an area that is presumed to have feasible sea conditions and deeper bathymetry to allow safe offloading. This is the same for the facility located along the South Jetty. At the South Jetty, Parking Area D was selected over the Social Security Beach area also under consideration because it provides some additional shelter from ocean conditions while reducing the footprint and impacts to shallow water.

Finally, in order to maintain appropriate side-slopes, to reduce the in-water footprint of the facilities, and to provide a location for barges to tie-up, the installation of sheet pile and dolphins will be required in conjunction with these facilities. In summary, these facilities ensure availability to feasible offloading sites that allow efficient delivery alternatives, which in the case of large stones may be the only existing technological option to delivery very large stones.

Fill in wetlands for construction staging, rock stockpiles, and sorting: Variations regarding locations for construction staging and rock stockpiling were considered in order to avoid and minimize potential impacts from wetland fill. The current proposed plan reduces these impacts to the maximum extent practicable.

In order to efficiently sequence work, purchase and sort stones, and efficiently place rock each season, it was determined that a maximum two-year supply of stones would be required at each site. This amount was then translated into an acreage that included a minimum area needed to meet basic construction staging needs for things like scales, parking, equipment preparation and storage, etc. Proximity of these activities to the jetty structures is required for feasibility of project execution so that stone is near the placement site for the purposes of proper sorting, stone sizing and selection, minimization of stone breakage, minimization of re-handling stone, and efficient work flows.

Official wetland delineations were completed at all jetties to determine wetland locations that could be avoided. At Jetty A, there is little available space to access the jetty itself, so adequate desired staging and stockpiling is already unavailable. The location of the wetlands in the middle of the site, the isolation and steep topography of the site, the somewhat limited large-vehicle access, and the use of the site by the Coast Guard further preclude availability of staging and storage areas as practicable alternatives to avoid these wetlands.

At North Jetty, the structural lagoon fill is also likely to affect adjacent wetlands, as will also occur to a smaller degree with the culvert replacement. In order to concentrate effects and

reduce impacts to additional higher-value wetlands in the complex north of the North Jetty Access Road, this fill area south of the road was selected to serve the dual purpose of structural fill as well as staging and stockpiling. Most of the wetlands were avoided north of the road, and areas were selected that preserved adequate conserved wetland and shoreline buffers while also providing adequate space necessary for efficient and feasible construction activities.

At the South Jetty, staging and stockpile areas were required to be in proximity to the jetty and the second barge offloading site near Parking Area D. This allows efficient offloading, sizing, and sorting that is necessary prior to placement at the jetty. Parts of a relic access road were included to minimize any new impacts, and several of these areas have been used during previous repairs. Stone sizes are very large, and are easily broken. To reduce re-handling, to minimize interference with construction traffic flows, and to avoid interactions between construction vehicles and park visitors, staging areas closer to the work site are required. The amount and size of the stone and the need for several available sizes during placement precludes the feasibility of staging areas located off-site from the jetties and offloading structures.

However, adequate areas available for stockpiling and staging were constrained to the north by the recent development of the Oregon Parks and Recreation Snowy Plover Habitat Conservation Plan. The project area abuts and overlaps with the southern boundary of this area, but manages to avoid a majority of the designated HCP area. Wetlands and mudflats on the Trestle Bay side, the need to maintain an adequate shoreline dune buffer on the western side, and park recreation activities are also constraints for locating construction staging and stockpiles.

In the current configuration, the marsh wetland will be crossed, but culverts will maintain hydrologic connectivity between the wetland complexes. By allowing this crossing, there is a chance that portions of the park may be able to remain open to the public while certain stages of construction are occurring. Otherwise, additional closures may be necessary which could be more disruptive to park visitors. The selected configuration also allows a safer and more efficient flow of construction traffic that reduces interactions between construction and visitor traffic while somewhat reducing travel time for stone delivery between the jetty, stockpiles, and offloading sites.

The areas around the neck of the Spit and to the south would have provided less available space and would have resulted in a larger park closure. Environmental and wetland impacts for this area were not assessed. Staging and stockpiling any further away from the jetty structure would not be feasible.

Overall, wetland impacts were avoided and minimized to the maximum extent practicable, including providing adequate buffers for conserved wetlands. However, some wetland fill was unavoidable to achieve an adequate and contiguous construction area that allowed access and proximity to implement the project. For the reasons described in the discussion above, no other practicable alternatives allowed full avoidance of wetland impacts.

Wetland mitigation has been identified at both the North Jetty and in proximity to the South Jetty in Trestle Bay to offset these impacts. This is discussed further under the section: *Aquatic Ecosystems and Organism Determination*.

Dredging of barge offloading facilities: Maintaining the functionality of the offloading facilities may require regular dredging when they are seasonally in use. Barges delivering jetty stones are likely to be larger, ocean-going vessels that require under-keel clearances in excess of depths that are likely currently available and self-maintainable at the offloading sites. Dredging and in-water disposal will be required to maintain adequate depths that avoid bottom collisions and allow safe offloading in sometimes rough and unforeseen channel, ocean, wind, and wave conditions. This dredged material will be placed at a pre-approved designated Ocean Dredge Material Disposal Site for which the Corps through its Annual Use Plan will seek permission for use from the EPA prior to any dredge or disposal activities.

Discharge during inwater construction activities: During stone placement, pile installation, and dredging activities, there is likely to be some level of discharge and associated turbidity levels. However, this is unavoidable and will likely be minimal. The size of the stones and the sandy substrate ensure that any suspended sediments are likely to be negligible and to settle out quickly. Additionally, BMPs have been described that will further avoid and minimize any runoff, spill, or discharge potential. Turbidity monitoring and Conditions of the State Water Quality Certification will also be protective of species and will limit the duration of any such discharge. Conserved wetlands will be adequately buffered to avoid and unintended discharge.

IV. Factual Determinations (40 CFR § 230.11)

a. Physical Substrate Determinations

Rock placement will occur on an annual basis starting in the late spring through the late to early fall seasons. Fill will be comprised mostly of mostly clean, large armor stones. Placement may occur at more than one jetty per season and will occur regularly throughout the duration of the construction schedule. Some permanent habitat conversion and modification will occur as a result of stone placement for repair and rehabilitation of jetty features. Along specific portions of North and South jetties and along the entire length of Jetty A, substrate will be converted to rocky sub and intertidal habitat, and associated benthic communities will be covered. In addition, crane set-up pads and turnouts will require placement of rock that could extend slightly off the current centerline of the jetty trunk. However, this total area is a relatively small percentage of the existing jetty structures, and conversion is mostly limited to the spur groin locations. Some crushed roadway fill will be placed to form a road on the jetty. This will be mostly above the MHHW mark to avoid deterioration of the roadway.

Generally, effects to in-water habitat could include the following: sub-tidal and intertidal habitat conversion from sandy to rocky substrate and potential unforeseen indirect far-field effects from hydraulic influence (slight, localized changes to accretion, currents, velocities, etc). However, relatively little habitat conversion and footprint expansion will occur because a majority of the stone placement for construction of the jetty head, trunk, and root features will occur on existing relic jetty stone and within the existing structural prism. Moreover, aquatic species would experience limited exposure since stone placement for cross-section repair and rehabilitation actions occurs mostly above the MHHW elevation.

Indirect disturbance effects due to placement activities will be localized and occur mostly during daylight hours in the summer months. Disturbance effects are expected to be of limited duration and minimal, since a majority of the placement is above MHHW and on existing relic stone. There may be temporary disturbance to species using the jetty structure in the vicinity of placement activities. However, the Corps does not expect long-term negative effects from these actions. Finally, the selected plans include cross-sections that avoid and minimize additional habitat conversion that would have resulted from a larger selected cross section.

Dredging will be needed for construction and maintenance of barge offloading facilities and is likely during early summer prior to rock delivery; it may not occur at all facilities annually. If all facilities were dredged, this would total about 16 acres near the jetties. However, it is likely only one or two facilities would be used seasonally for short durations and would be dredged on a periodic basis as needed. The effects of dredging on physical habitat features include modification of bottom topography, which in the vicinity of the jetties is extremely dynamic. Dredging may convert intertidal habitats to subtidal, or shallow subtidal habitats to deeper subtidal. Such conversions may affect plant and animal assemblages uniquely adapted to the particular site conditions these habitats offer. However, the dredge prisms would be very small as a relative percentage of the ~19,575 acres of shallow-water habitat available within a 3-mile proximity to the MCR. The proposed dredging of offloading facilities would affect bottom topography, but is unlikely to cause large-scale or long-term effects to habitat features. Dredging activities will also have some contribution to increased acoustic disturbance that could occur for a limited duration while dredging is underway. These effects are expected to attenuate rapidly such that they return to background levels within a short distance from the source.

Disposal is likely to occur on an annual basis originating from one or more of the offloading facilities. The duration of disposal will be limited and will likely occur earlier in the construction season prior to use of offloading facilities. All disposal of dredged material will be placed in previously evaluated and USEPA-approved ODMDS or Clean Water Act disposal sites. No new or different impacts to species or habitats than those previously evaluated by USEPA or other resource agencies for disposal approval are expected from these actions. Per USEPA guidelines, the ODMDS have a Site Management and Monitoring Plan that is aimed at assuring that disposal activities will not unreasonably degrade or endanger the marine environment. This involves regulating the time, quantity, and physical/chemical characteristics of dredged material that is placed in the site; establishing disposal controls; and monitoring the site environs to verify that unanticipated or significant adverse effects are not occurring from past or continued use of the site and that permit terms are met. The relative quantities, characteristics, and effects of the proposed action would not be expected to have different or significant negative impacts to these sites.

The effects of disposal on physical habitat features include modification of bottom topography. In some cases, disposal may result in the mounding of sediments on the bed of the disposal site. Such conversions may affect plant and animal assemblages uniquely adapted to the particular site conditions these habitats offer. However, the area impacted by disposal would be relatively small and would occur in deeper habitat offshore, in the littoral cell, or near the North Jetty vicinity. The proposed disposal is unlikely to cause large-scale or long-term effects to habitat features.

b. Water Circulation, Fluctuation and Salinity Determinations

Water quality characteristics such as salinity, water chemistry, clarity, color, odor, taste, dissolved gas levels and nutrients are not likely to be affected. Hydraulic features such as current patterns, water circulation, velocity and salinity would remain unchanged.

The USGS and ERDC conducted numerical modeling to evaluate changes in circulation and velocity, salinity, and sediment transport at the MCR for various rehabilitation design scenarios for the MCR jetty system. A 2007 USGS model evaluation assessed the functional performance for rebuilding the jetty lengths in order to aid in the assessment of potential impacts to fish from the rebuilt lengths. Ultimately, even in the larger rebuild scenario only negligible and insignificant changes were predicted to the overall hydraulic and hydrological process at the MCR.

For the proposed action addressed in the current EA, rebuilding of the jetty lengths is not included. However, model results under the larger jetty length rebuild scenario are still relevant for comparing and evaluating potential changes to the MCR system as a whole. This earlier modeling work also remains valid because the current proposed action in this EA caps the jetties at their present lengths, which is essentially the same length as the "base condition" used in the models.

Modeling by the USGS was performed for two time periods, August-September and October-November. Existing conditions were established using actual data collected in August-September 2005. The October-November model period was established for engineering purposes as this time period represents extreme conditions at the MCR. Plots were produced to show existing and post-rehabilitation conditions for the following parameters: residual (average for all tides) velocity and current direction for bed and near surface, residual bed load transport, residual total load transport (bed load + suspended load), and mean salinity for bed and near surface.

The ERDC analyzed the impacts of the presence of spur groins at the MCR in 2007. This analysis was done independently of the USGS modeling and was conducted with the coastal modeling system (CMS) and other models that operate within the surface water modeling system (SMS). A regional circulation model (ADCIRC) provided the tidal and wind forcing for the boundaries of project-and local-scale wave, current, sediment transport, and morphology change calculated by the CMS. The half-plane version of the wave transformation model, STWAVE, was coupled with two-dimensional and three-dimensional versions of the CMS, which calculates current, sediment transport, and morphology change. These models were coupled to provide wave forcing and update calculated bathymetry used in both models at regular intervals (Connell and Rosati 2007).

In summary, the 2007 modeling work remains valid because the current proposed action caps the jetties at their present lengths, which is essentially the same length as the "base condition" used in the 2007 modeling. Modeling results showed that the changes to velocities, currents, salinity, plume dynamics, and bed morphology would be small to negligible under the larger jetty length

rebuild scenario with spur groins. Any small changes to the system would be even less unlikely under the current proposed action because it does not involve rebuilding the length of the jetties. Therefore, no significant overall changes to the hydraulics or hydrology of the MCR system are anticipated under the current proposed action. Additionally, relative to earlier plans which restored the length of the jetties and capped the heads at a significantly longer restored length, the current revised plan selection further reduces any potential impacts to

c. Suspended Particulate/Turbidity Determinations

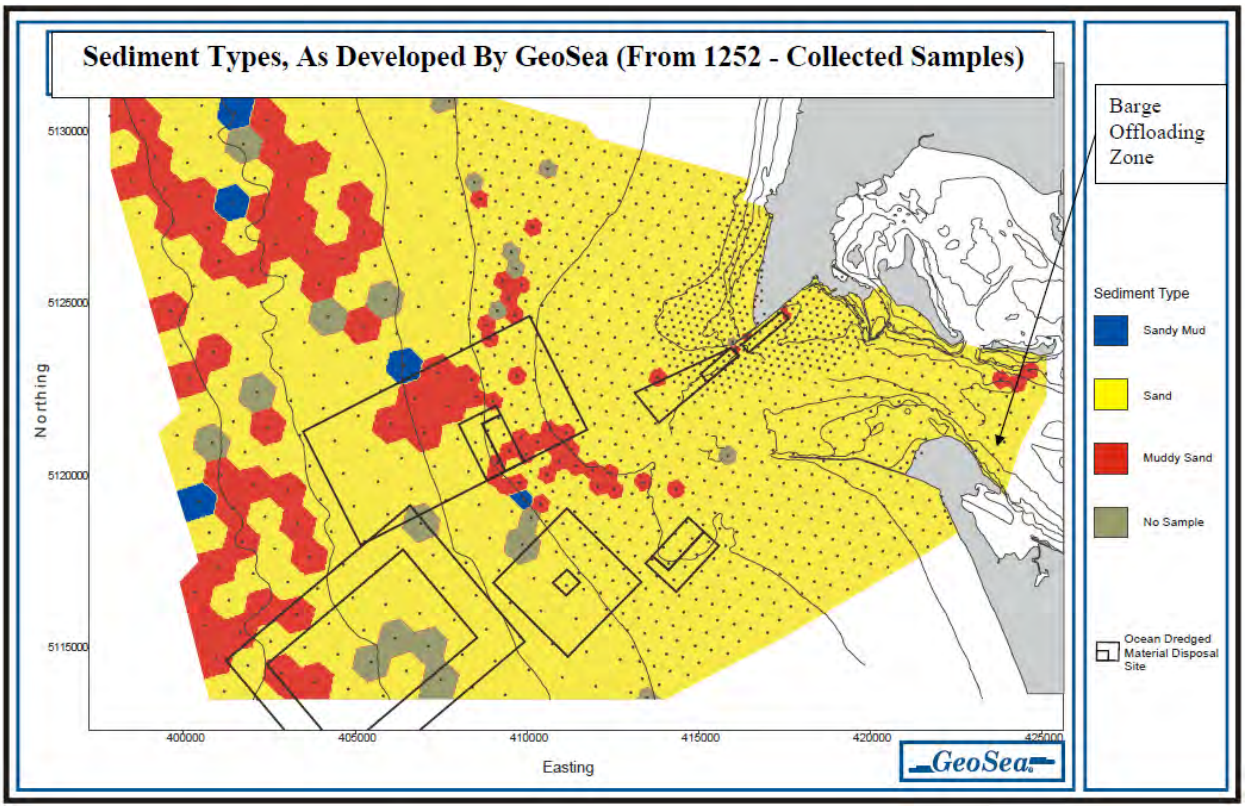
An unavoidable but minimal increase in suspended sediments in the water column is expected during the construction period; however, this impact is expected to stay within acceptable levels for fish and wildlife species of concern. Short-term turbidity is expected to occur with the placement of the temporary dolphins, offloading facilities, and dredging. Long-term adverse impacts are not anticipated.

In 2000, a sediment trend analysis was conducted in the MCR and surrounding off-shore locations by GeoSea Consulting, under contract to the Corps (McLaren and Hill 2000, Corps 2005). Over twelve hundred (1,252) samples were collected. Physical analyses of the samples surrounding the area (6 samples selected) indicated that the sediments consisted of +99% sand. Select samples from study in the MCR area were analyzed for physical and chemical contamination. Results indicated that no contaminates were detected at or near the screening levels in the *Dredge Material Evaluation Framework for the Lower Columbia River Management Area* (DMEF 1998). For a complete report on chemical results, see http://www.nwp.usace.army.mil/docs/d_sediment/Reports/Mcr/mouth00.pdf

In 2005, the Corps conducted a Tier I evaluation near the proposed the South Jetty barge offloading site following procedures set forth in the Inland Testing Manual and the Upland Testing Manual (Corps October 2005). The methodologies used were those adopted for use in the 1998 DMEF and its update, the *Northwest Regional Sediment Evaluation Framework, Interim Final* (SEF 2006). This Tier I evaluation of the proposed dredged material showed that the material was acceptable for both unconfined in-water and upland placement. No significant, adverse ecological impacts in terms of sediment toxicity were expected from disposal.

In 2008 using USEPA's *OSV Bold*, 10 sediment grab samples were collected from sites previously sampled in the 2000 sediment trend analysis (Corps 2008). In 2008, percent sand averaged 98.45% with a range of 99.3% to 97.0% and percent silt and clay averaged 1.59% (range from 3.0% to 0.7%). Per the Project Review Group approved Sediment Analysis Plan, no chemical analyses were conducted. Physical results for the 2000 and 2008 sampling events were compared. The mean percent sand for all samples in September 2000 was 98.11% and for June 2008 was 98.45%. In both data sets, sediments towards the outer portion of the mouth are finer than sediments towards the center of the mouth.

Sediment Trend Analysis in the MCR Area



Placement of rock by heavy equipment, jetty access road construction, dredging, disposal, and pile installation and removal could all cause temporary and local increases in suspended sediment. This is expected to have minimal and limited effects on the environment. Previous tests have confirmed that material to be dredged will be primarily sand with little or no fines, which does not stay suspended in the water column for a significant length of time. During infrequent and limited duration dredging and disposal, suspended sediments may increase locally for a short time. However, light attenuation and water quality effects from increased suspended sediments are expected to be minimal and fleeting. Pile driving is also expected to occur in sand and therefore have similar transient and minimal effects to water quality. Jetty roads could also contribute suspended sediments that would create turbidity, but since they are above MHHW this will likely be an infrequent occurrence. Increases in turbidity from construction activities on the jetties will likely occur on a nearly daily basis but will be of limited extent and duration, as rock placement will involve clean fill. Wave and current conditions in the action area naturally contribute to higher background turbidity levels; and such conditions also preclude the effective use of isolating measures to minimize turbidity. Effects from potential stormwater runoff will be avoided by implementation of an Erosion and Sediment Control Plan or Stormwater Pollution Prevention Plan that avoids and minimizes runoff and pollutant loading associated with upland construction activities. Therefore, impact from suspended sediments should be insignificant.

Temporally, effects to water quality from suspended sediment and turbidity could occur on a daily basis, but are not expected to be continuous throughout the day. Turbidity levels and

durations will be limited to conditions required in the State Water Quality Certifications which include exceedence windows that are protective of beneficial uses such as salmonids and other aquatic life. Spills or leaks are expected to be infrequent and unlikely. Although the repetition of disturbance may be greater, it is still expected to remain within safe ranges that would not have long-term or significant effects. Furthermore, effects are expected to be geographically limited, short term, and minor.

Effects of the proposed action to water quality could occur by increasing suspended sediments, increasing the potential occurrence of spills and leaks, and increasing the potential for contamination. However, most of the discharged material will be large stone and coarser materials like sand. The Corps is also requiring a spill prevention and response plan along with additional BMPs and stormwater control measures that reduce the potential for leak or runoff exposure. Therefore, the Corps does not expect these effects to be likely or significant.

d. Contaminant Determinations

The Corps will require the contractor to provide a spill prevention and management plan that will include measures to avoid and minimize the potential for spills and leaks and to respond quickly to minimize damages should spills occur. Good construction practices, proper equipment maintenance, appropriate staging set-backs, and use of a fast fueling system would further reduce the likelihood of leak and spill potential and exposure extent and its associated effects.

Test results on dredge material described earlier further indicated that materials in the area are approved for unconfined in-water disposal and do not contain contaminants in concentrations harmful to organisms occupying the action area. The prohibition of treated wood will also avoid contamination from the migration of creosote and its components (e.g., copper and PAHs) from treated wood in the lotic environments.

e. Aquatic Ecosystems and Organism Determination

The Corps does not anticipate significant affects to the aquatic ecosystem. Some short-term loss of microhabitat will occur during the construction period but will be replaced by the completion of the proposed action. Avoidance of the area may occur throughout the construction period as a result of the increased activities and noise, but all species would be expected to return following project completion. Construction is expected to occur year-round. Some work would occur during appropriate in-water work periods determined by fishery agencies to minimize impacts to fish, wildlife and habitat; however, most of the work would occur outside these periods due to weather constraints. The Corps received a Biological Opinion from National Marine Fisheries Service (NMFS) that concluded the proposed action was not likely to adversely affect any of the listed species in the action area, with the exception of eulachon, Stellar sea lions, and humpback whales. For these species, NMFS determined that Corps actions would not result in jeopardy to the species. The U.S. Fish and Wildlife Service (USFW) also concurred with the Corps' determination that its proposed actions would have no effect or were not likely to adversely affect any of the listed species under their jurisdiction in the action area.

Impacts of fill and discharge to the structure and function of the aquatic ecosystem and organisms are expected to be minor, in that the disposal would temporarily disrupt feeding and

food sources of organisms present within the site. Aquatic ecosystem functions would essentially remain unchanged within the high-energy environments of the site. Some organisms would be buried or temporarily displaced by the fill and discharge. It is expected that benthic organisms would rapidly reestablish at the sites within a short time following disposal and rock placement.

Some wetland fill will be required in order to conduct construction staging, storage, and rock stockpiling activities. Selection of appropriate sites has greatly avoided and reduced the amount wetland fill proposed. After avoidance and minimization measures, the following impacts will be appropriately mitigated per State and Federal requirements:

Wetlands near North Jetty.
All wetlands as well as the lagoon area south of the North Jetty Access Road will be impacted and filled in order to allow construction staging and to reduce processes eroding and undermining the jetty root, to which the lagoon also contributes. Additionally, a few small wetlands north of the roadway will be impacted in order to provide the necessary space for adequate rock storage (enough for 2 years-worth of rock placement) and efficient construction, staging, and access areas. The location of these staging and stockpiling areas have been selected in order to minimize impacts to the higher quality, more extensive wetland complex north of the North Jetty Access Road. There will also be some wetland impacts during replacement of the damaged culvert crossing under the North Jetty Access Road. After avoidance and minimization measures, including implementation of an 80-ft buffer around conserved wetlands north of the roadway and a 200-ft shoreline buffer beyond the Highest High Tide, unavoidable total wetland impacts come to about 1.14 acres out of the 31 acres identified for construction actions, and impacts to other waters of the U.S. via the lagoon equals about 8.02 acres.

Of the wetlands impacted, 0.11 acres are part of a wetland mosaic complex which rated as Category IV Interdunal, Depressional wetlands. 0.65 acres are part of a wetland mosaic complex which rated as Category III Interdunal, Depressional wetlands. 0.25 acres rated as Category II Interdunal Riverine wetlands; and 0.13 acres rated as Category 1 Estuarine, Freshwater Tidal Fringe.

These wetlands all will be mitigated onsite, in an area north of the North Jetty Access Road adjacent to the conserved wetland fringe that extends further north. At a 2:1 mitigation ratio, this equals about 2.28 acres of wetland mitigation, plus the required buffer. This amount of upland area is available, and wetland creation via excavation to appropriate depths, appropriate native plantings, invasive species removal, and buffer requirements will offset impacts to wetland within the same vicinity in which they are proposed. This 2:1 ratio also aligns with mitigation requirements in WA that were developed in partnership with WA Department of Ecology, EPA, and the Corps (WADOE 2006). According to this guidance, estuarine ratios are developed on a case-by-case basis (WADOE 2006). Given the ample rainfall and close proximity to higher functioning wetlands, the likelihood of successful wetland establishment further supports the proposed amount of compensatory wetland mitigation. Though these buffers, ratios, and acreages are likely close to the final amounts, they are subject to change depending on review by WA Department of Ecology and receipt of Conditions in the WA State Clean Water Act 401

Water Quality Certification and the determination of Coastal Zone Management Act Consistency.

Wetlands near South Jetty (on Clatsop Spit).
In order to acquire the 44 acres needed for staging and rock stockpiles, 2.65 acres of unavoidable wetland impacts will occur at the South Jetty. However, by slightly revising locations, maintaining hydrologic connections at wetland crossings, and by maintaining a 50-ft wetland, shoreline, and riparian buffer for preserved areas whenever possible, these impacts have been greatly reduced and minimized relative to initial conservative impact estimates. This includes limiting the roads required to cross wetlands to a 20-ft width and requiring culverts to maintain hydrologic connectivity at crossings. In addition to wetlands, about 3.5 of the existing 5.2 acres of other waters of the US will be impacted in the form of fill in a lagoon area adjacent to and along the jetty. There will be a road and crossing over these waters, which will be culverted in order to maintain flows into and out of the marsh wetland complex; and the 40-ft wide causeway/jetty access roadway will be constructed immediately adjacent to the jetty in order to minimize interference with and impacts to the inlet of the marsh complex.

According to the Cowardin Classification system (1979), of the wetlands impacted, approximately: 0.77 acres are classified as Estuarine-Intertidal-Emergent-Persistent; 0.66 acres are classified as Palustrine-Forested-Needled-leaved-Evergreen; 0.75 are classified as Palustrine-Emergent-Non-persistent; and, 0.47 acres are classified as Palustrine-Forested-Broad-leaved-Deciduous.

Wetlands were scored for grouped service functions as define by ORWAP (2010), and the categories depressional and estuarine were identified.

Following this method in determining the types of wetland impacts, this brings the totals under the ORWAP categories to 1.15 acres of impacts to depressional wetlands at the South Jetty, which were ranked relatively as follows: low for hydrologic function and fish support group; and high for water quality, carbon sequestration, aquatic support, and terrestrial support. Alternatively, the relative scores for the grouped service values were: low for hydrologic function, terrestrial support, and public use and recognition; equal for provisioning services, and high for water quality, fish support, and aquatic support. The wetlands also ranked relatively high for ecological condition and sensitivity, and low for stressors.

In comparison to State wetland scores for grouped service functions as define by ORWAP (2010), 1.49 acres of impacts would affect estuarine wetlands at the South Jetty which are ranked relatively as follows: low for hydrologic function, aquatic support, and terrestrial support; and high for water quality, carbon sequestration, and fish support group. Alternatively, the relative scores for the grouped service values were: low for hydrologic function, aquatic support, terrestrial support, and public use and recognition; equal for provisioning services, and high for water quality and fish support. The wetlands also ranked relatively high for ecological condition, and low for stressors and sensitivity.

These wetlands will be mitigated near the impact site in an area identified in Trestle Bay near the channel entrance to Swash Lake. At a 2:1 mitigation ratio, this equals about 5.3 acres of wetland

mitigation. Anecdotally, it is thought that the uplands in this area are the result of previous historic fill from the dredging the adjacent channel, so that excavation of uplands would result in restoration of wetland that are likely to be intertidal. There is also a former ODOT mitigation site that the Corps will likely abut. This is an appropriate mitigation site because it is within the same subwatershed (HUC 7), and per the ORWAP scoring and Cowardin classification, the adjacent areas have wetland types similar to those being impacted.

In comparison to State wetland scores for grouped service functions as define by ORWAP (2010), depressional wetlands at the South Jetty mitigation area are ranked relatively as follows: low for hydrologic function, carbon sequestration, fish support group, and aquatic support; and high for terrestrial support; and equal for water quality. Alternatively, the relative scores for the grouped service values were: low for hydrologic function, aquatic support, terrestrial support, and public use and recognition; equal for provisioning services, and high for water quality and fish support. The wetlands also ranked relatively high for ecological condition and sensitivity, and low for stressors.

In comparison to State wetland scores for grouped service functions as define by ORWAP (2010), estuarine wetlands at the South Jetty mitigation area are ranked relatively as follows: low for hydrologic function and water quality; and high for carbon sequestration, fish support group, aquatic support, and terrestrial support. Alternatively, the relative scores for the grouped service values were: low for hydrologic function, aquatic support, terrestrial support, and public use and recognition; equal for provisioning services, and high for water quality and fish support. The wetlands also ranked relatively high for ecological condition and stressors, and low for sensitivity.

Proximity of the uplands to existing wetlands from both classes that had similar ORWAP scores at the mitigation site, in addition to tidal and precipitation hydrology should serve as reasonable indicators for potential success of the mitigation site. For all proposed mitigation, detailed designs, plans, and specifications will be further determined in the next stages of project development and will be constructed concurrent with wetland impacts.

Wetlands near Jetty A.
A total of about 0.91 acres of wetland at Jetty A will also be filled due to rock storage and construction staging activities. Unfortunately, these wetlands cannot be avoided, but impacts to adjacent water of the U.S. will be minimized by implementing a 100-ft buffer beyond the Highest High Tide elevation, which is consistent with the setbacks required for lands designated by Pacific County as Conservancy. Of the wetlands impacted, 0.74 acres rated as a Category III Interdunal, Depressional wetlands with scores under 26. 0.17 acres rated as Category 1 Estuarine, Freshwater Tidal Fringe wetlands.

Because of onsite space constraints and site conditions, these wetlands will be mitigated in the same vicinity as the mitigation area identified at the North Jetty, north of the North Jetty Access Road. At a 2:1 mitigation ratio, this equals about 1.82 acres of wetland mitigation, plus the required buffer. These requirements were determined as described for the North Jetty and align with WADOE guidance (2006). Wetland creation will occur in conjunction with and in addition to the area and process described for compensatory mitigation at the North Jetty. Reduced

disturbance coupled with improved potential hydrology and adjacent functioning wetlands at North Jetty compared to at Jetty A make the success of wetland creations more likely at the location at the North Jetty compared to any creation at Jetty A. The total compensatory mitigation acreage at the North Jetty is 4.1 acres, and this area is available as described. As with the North Jetty, though these mitigation ratios and acreages are likely close to the final amounts, they are subject to change depending on review by WA Department of Ecology and receipt of Conditions in the WA State Clean Water Act 401 Water Quality Certification and the determination of Coastal Zone Management Act Consistency.

Wetland fills and culvert installations at all jetties will occur once and could happen during anytime in the construction season depending on weather. Sequentially, these actions will be required prior to several of the other features of the proposed action. Subsequent removal of construction-related culverts would be likely to occur once and could also happen during anytime in the construction season depending on weather and construction needs. Periodic culvert maintenance may be required during construction. Temporally, this limits the repetition of disturbance activities to single event and season on separate jetties.

Where possible, the construction, access, and staging areas at all jetties have been planned so that the footprint would minimize impacts to wetlands and higher value habitat features. Protections and BMPs will be implemented for the identified rare and ranked vegetative communities within the area. Strategic use of uplands and lower quality wetlands for rock storage would be undertaken to the most practical extent in order to avoid and minimize these impacts. However, permanent and temporary wetland fill would occur as a result of construction staging, storage, and rock stockpiles at all three jetties. Fill used to protect the North Jetty root would also affect wetlands. Long-term direct and indirect impacts to wetlands could include permanent wetland fill, potential fragmentation of and between existing wetlands, soil compaction, loss of vegetation, altered hydrology, conversion to upland, and loss of ecosystem functions (water quality, flood storage, nitrogen cycling, habitat, etc.). However, it is expected that effects from wetland impacts and lagoon fill would be insignificant on river functions, as the wetlands are not within the channel prism of the Columbia River. Although these wetlands are connected hydrologically to the Columbia River, wetland fill impacts would not be likely to negatively alter groundwater-stream exchange or hyporheic flow because the wetlands are on accreted land that has formed on stabilized sand shoals behind the jetties. Wetland hydrology is mostly elevation and rainfall dependent, and fill impacts would be relatively insignificant to the Columbia channel. Culverts will be installed to maintain wetland hydrology and connectivity with permanent replacement at the North Jetty and when temporary construction roadways cross wetlands. Habitat improvement action(s) ultimately selected for implementation will be evaluated in a subsequent NEPA document(s).

The current culvert under the North Jetty Access Road is perched and the regularly disconnected nature of the lagoon system does not appear to support anadromous fish use. Fish surveys were not completed for the stream inlet leading into this wetland complex and creek. An initial sampling survey will be conducted during peak juvenile salmon outmigration to determine whether or not fish salvage and fish exclusion efforts for ESA-listed species is warranted. The Corps will coordinate with NMFS if listed species are identified. Redesign of this system may provide an opportunity to accommodate improved

hydrology to newly created wetlands excavated adjacent to the existing wetland complex, and will be further investigated during the hydraulic/hydrologic design analysis.

Though there is an existing razor clam bed adjacent to the vicinity of the proposed dune augmentation, species impacts are not expected because all of the stone placement will occur above MHHW, and haul traffic will be precluded from using Parking Lot B and from driving on the beach during material delivery. Excavator and bulldozer work will be mostly confined to the dry sand areas to further avoid negative species effects.

Because vibratory hammers will be implemented in areas with velocities greater than 1.6 feet per second, the need for hydroacoustic attenuation is not an anticipated issue. Piling will be fitted with pointed caps to prevent perching by piscivorous birds to minimize opportunities for avian predation on listed species. Some of the pilings and offloading facilities will be removed at the end of the construction period.

No significant or long-term adverse affects on any listed/candidate threatened or endangered species are anticipated. More thorough effects analyses can be found in the associated Biological Assessments and the subsequent Biological Opinion from NMFS and Letter of Concurrence from USFW, herein incorporated.

f. Proposed Disposal Site Determinations

The effects of disposal on physical habitat features include modification of bottom topography. In some cases, disposal may result in the mounding of sediments on the bed of the disposal site. Such conversions may affect plant and animal assemblages uniquely adapted to the particular site conditions these habitats offer. However, the area impacted by disposal would be relatively small and would occur in deeper habitat offshore, in the littoral cell, or near the North Jetty vicinity. The proposed disposal is unlikely to cause large-scale or long-term effects to habitat features.

Disposal is likely to occur on an annual basis originating from one or more of the offloading facilities. The duration of disposal will be limited and will likely occur earlier in the construction season prior to use of offloading facilities. All disposal of dredged material will be placed in previously evaluated and USEPA-approved ODMDS or Clean Water Act disposal sites. No new or different impacts to species or habitats than those previously evaluated by USEPA or other resource agencies for disposal approval are expected from these actions. Per USEPA guidelines, the ODMDS have a Site Management and Monitoring Plan that is aimed at assuring that disposal activities will not unreasonably degrade or endanger the marine environment. This involves regulating the time, quantity, and physical/chemical characteristics of dredged material that is placed in the site; establishing disposal controls; and monitoring the site environs to verify that unanticipated or significant adverse effects are not occurring from past or continued use of the site and that permit terms are met. The relative quantities, characteristics, and effects of the proposed action would not be expected to have different or significant negative impacts to these sites.

Determination of Compliance with Applicable Water Quality Standards

Oregon and Washington have classified the lower Columbia River as water quality-limited and placed it on the Clean Water Act Section 303(d) list for the following parameters: RM 0 to 35.2 for temperature and polychlorinated biphenyls (PCBs); RM 35.2 to 98 for arsenic, dichlorodiphenyl trichloroethane (DDT), PCBs, and temperature; and RM 98 to 142 for temperature, arsenic, DDT, PCBs, and polynuclear aromatic hydrocarbons (PAHs). In Washington, the river also is on the Section 303(d) list for dichloro-diphenyl-dichloroethane, Alpha BHC (a pesticide), mercury, dissolved gas, dieldrin, chlordane, aldrin, dichloro-diphenyl-dichloroethylene, fecal coliforms, and sediment bioassay. In addition, the entire river is subject to an USEPA total maximum daily load for dioxin.

The proposed action is not anticipated to contribute to the pollutant load or degradation of any of these listed water quality parameters. Effects to turbidity have been further described elsewhere and will remain in compliance with forthcoming State 401 Water Quality Certification Conditions. Therefore, the proposed actions are expected to be in compliance with all State and Federal water quality standards.

Potential Effects on Human Use Characteristics

Municipal and Private Water Supplies: There are no municipal or private water supply intakes in the vicinity of the disposal areas.

Recreational and Commercial Fisheries: Crab fishermen generally crab in the area adjacent to the North Jetty. There will be an impact to recreational fisheries along the channel sides of the jetties as a result of barge traffic to and from the barge off-loading platforms. The recreational crab fisherman will be notified as to when the construction activities will take place and they will need to limit their crab pots in the area to accommodate barge traffic.

Water-related recreation:
The proposed action would have minor adverse impacts to recreationists at Cape Disappointment State Park and Fort Stevens State Park, those participating in water-sports and beach activities near the jetties, and those using the jetty structures for fishing and crabbing. Heavy equipment using park roads and parking lots will delay or inconvenience park visitors and water sport and beach recreationists. Park visitors and recreationists are likely to be disturbed by construction noise. A number of restrictions would be in place near the construction zones at each jetty to protect park visitors, water sport and beach recreationists, and the public. Some park roads and parking lots would likely be closed at times during construction. Access to the jetties and nearby beaches would be closed periodically at different times during construction of the individual jetties, which would impact water sport and beach recreationists and anglers. However, large portions of the parks and beaches will remain open and accessible to the public, and the bulk of the construction activities are likely to be seasonally concentrated. The long-term reduction in the levels of recreational activity could also affect the local economy of the Long Beach peninsula and the Warrenton/Hammond area, which are highly dependent on tourism. However, the recreation and local economy impacts are not expected to be significant.

Rehabilitation of the MCR jetty system is expected to have a long-term, positive effect on recreational vessel safety. Maintenance of the shoreline at Clatsop Spit and Benson Beach is also expected, which preserves these areas for recreational opportunities mentioned above. The proposed action would have no effect on utilities and public services in the area. The MCR is the gateway to the Columbia-Snake River system, accommodating commercial traffic with an approximate annual value of $16 billion dollars a year. The proposed action would have a long-term, positive effect on maintaining this vital transportation link and associated economy for the states of Oregon, Washington, Idaho, and Montana, as well as for the Nation as a whole.

Aesthetics: No impacts to aesthetics are anticipated.

Parks, etc: Impacts to both Cape Disappointment State Park and Fort Canby State Park will involve the placement of jetty stone, construction traffic, temporary beach and road closures, and temporary staging areas for construction equipment. The impact will be repaired and any placement of construction material will be removed and the site restored to its pre-construction state. The Corps will coordinate with both Parks to avoid and minimize recreational effects as much as feasible while still accommodating an efficient completion of the project actions.

g. Determination of Cumulative and Secondary Effects on the Aquatic Ecosystem

For a determination of cumulative effects, the effects of the proposed activity have to be viewed in the context of past, present and reasonably foreseeable future actions that may impact environmental resources in the vicinity of the work. The cumulative effects of basin-wide actions are addressed in detail in Chapter 6 of the *Columbia River Channel Improvement Project Final Supplemental Integrated Feasibility Report and Environmental Impact Statement* (January 2003). Cumulative effects are also discussed in the 2011 Final EA for the Major Rehabilitation of the Columbia River Jetty System.

There have been significant impacts to the Lower Columbia River and MCR from historic actions such as the Federal Columbia River Power System which has greatly modified flow patterns of the Columbia River, the jetty system at the MCR which has altered ocean currents and wave patterns in the vicinity of the proposed activity, and dredging which has prevented meandering of the channel as would be expected in a more natural, dynamic river system. Because the impacts are intermittent and in a small area relative to the overall size of the MCR and adjacent beaches, this proposed activity will have only a small temporary impact on the aquatic ecosystem in the MCR.

Cumulative effects are defined as, “The impact on the environment which results from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions” (Code of Federal Regulations Title 40, Section 1508.7). Cumulative impacts can result from individually minor, but collectively significant actions taking place over a period of time. The past actions that have occurred in and near the MCR jetties are identified below. Together, these actions have resulted in the existing conditions in the vicinity of the MCR jetties (see Section 2).

- European settlement and associated modifications in the vicinity of the MCR.
- Residential, commercial, and industrial development that occurred in upland areas.
- Original construction of the MCR jetty system and subsequent rehabilitation and repairs.
- Development and recreational use of Fort Stevens and Cape Disappointment state parks.
- Operation and maintenance of the Columbia River federal navigation channel.
- Designation and use of dredge material disposal sites. Several active and historic disposal sites occur in the vicinity of the MCR. A North Jetty site was established in 1999 to allow placement of dredged material along the jetty toe to protect it from excessive waves and current scour. Its use is limited to disposal of MCR dredged material. From 1999-2008, about 4.4 mcy of dredged material was placed in this site. The shallow water ocean disposal site (SWS) was designated in 2005 by USEPA and lies about 2 miles offshore from the MCR. The SWS is used for disposal of material dredged from the MCR and is of strategic importance to the region; its continual use has supplemented Peacock Spit with sand, sustained the littoral sediment budget north of the MCR, protected the North Jetty from scour and wave attack, and stabilized the MCR inlet. There is a deep water ocean disposal site further offshore from the MCR and a proposed dredge material disposal site near the South Jetty.
- Disposal of dredged material (marine sand) at Benson Beach.
- Deepening of the Columbia River federal navigation channel.

The reasonably foreseeable future actions under consideration in this analysis are identified below. The listing includes relevant foreseeable actions in and near the MCR including those by the Corps, other federal agencies, state and local agencies, and private/commercial entities.

- Wetland mitigation and habitat improvements associated with the proposed action.
- Operation and maintenance of the federal navigation channel for authorized project purposes.
- Protection and restoration of existing natural areas and potential acquisition, restoration and protection of natural areas in the vicinity of the MCR by federal, state, and local agencies.
- Operation and maintenance of existing recreational facilities in Fort Stevens and Cape Disappointment state parks.
- Continued use and development in upland areas for residential, commercial and industrial use in proportion to future increases in population throughout the area.
- Water quality improvements with implementation of more stringent non-point source pollution standards, such as total maximum daily loads (TMDLs).
- The Corps is evaluating the feasibility of a possible dredge disposal site near the South Jetty. This site could also help to alleviate some to the scour occurring at the jetty structure.

The potential cumulative effects associated with the proposed action were evaluated with respect to each of the resource evaluation categories in this Environmental Assessment. For the proposed action, water quality impacts (suspended sediment and turbidity increases) are expected to be temporary and localized, and BMPs would further reduce effects. Water quality impacts from the proposed action are not expected to be cumulatively significant. Stricter controls placed on foreseeable future projects would reduce short-term, adverse impacts and are anticipated to provide a long-term, cumulative benefit to the water quality in the vicinity of the MCR.

Future development, construction activities, and other foreseeable future projects, in combination with population growth, would produce changes in the amount of impervious surfaces and associated runoff in the vicinity of the MCR. However, all projects are required to adhere to local, state, and federal stormwater control regulations and best management practices that are designed to limit surface water inputs.

Biological resources include fish and wildlife, vegetation, wetlands, federal threatened and endangered species, other protected species, and natural resources management. While historic development in the vicinity of the MCR has caused losses of aquatic and riparian habitats, especially in the lower Columbia River and estuary with resulting adverse impacts to fish and wildlife resources, these actions occurred in a regulatory landscape that is very different from that which exists today. While future development will likely have localized impacts on these resources, under the current regulatory regime these resources are unlikely to suffer significant losses. Moreover, initiatives by federal, state, and local agencies and groups would operate to mitigate the unavoidable environmental impacts of any future development. In addition, there are a number of actions that are ongoing or planned that would provide a cumulative, long-term improvement to fish resources and habitat, especially for ESA-listed salmonid species, including the implementation of the RPAs specified in the 2008 NMFS Biological Opinion and more stringent non-point source pollution standards. Any future federal actions would require additional evaluation under the National Environmental Policy Act at the time of their development.

In the long term, wetland mitigation and habitat improvements associated with the proposed action would provide the benefits previously described, including an increase the overall square footage of wetlands and improve uplands, potentially also improving wetland-stream hydrologic functions in the Columbia River estuary.

A long-term reduction in the levels of recreational activities near the MCR jetties would occur during the proposed action and future activities. This reduction in recreation activity could also affect the local economy of the Long Beach peninsula and the Warrenton/Hammond area, which are highly dependent on tourism. These recreation and local economy impacts are not expected to be significant. The proposed action and future activities are not expected to cause a cumulative, adverse change to population or other indicators of social well being, and should not result in a disproportionately high or adverse effect on minority populations or low-income populations. No cultural and historic resources are expected to be impacted by the proposed action. Reasonably foreseeable future actions will be subject to review and approval by State Historic Preservation Officer.

The proposed action will facilitate effective maintenance of the Columbia River navigation channel, as it would improve and restore the function of the MCR jetty system. The jetty system helps reduce shoaling in the main channel and directs and concentrates currents in order to preserve sufficient depths in the main channel. While operations and maintenance dredging will continue at the MCR, the proposed action is intended to reduce the migration of littoral drift into the channel; upon completion, this may reduce the volumes and frequency of future operation and maintenance dredging at the MCR. Another benefit of reducing littoral drift into the MCR is the preservation of Benson Beach and Clatsop Spit. The dredge disposal at Benson Beach may

complement the proposed infill actions that are intended to protect the North Jetty root. Similarly, this may also be the case if a new disposal site is proposed and evaluated near the South Jetty. Shoreline preservation could be complemented by the infill activities, dredge disposal, and further stabilization and augmentation efforts at the spit.

In conclusion, this cumulative effects analysis considered the effects of implementing the proposed action in association with past, present, and reasonably foreseeable future Corps' and other parties' actions in and near the MCR. The potential cumulative effects associated with the proposed action were evaluated with respect to each resource evaluation category and no cumulatively significant, adverse effects were identified. In addition, there are a number of actions that are ongoing or planned that would provide a cumulative, long-term improvement to fish and wildlife resources and habitat.

Coordination

The proposed work has been coordinated with the following agencies:

Federal
U.S. Environmental Protection Agency
U.S. Fish and Wildlife
National Oceanic and Atmospheric Administration

State of Oregon
Oregon Department of Fish and Wildlife
Oregon Department of State Lands
Oregon Department of Environmental Quality
Oregon Parks and Recreation Department
Oregon Department of Land Conservation and Development
Washington Department of Fish and Wildlife
Washington Parks and Recreation Department
Washington Department of Ecology

V. Findings of Compliance (40 CFR § 230.12)

a. Adaptations: No significant adaptations of the guidelines were made relative to this evaluation.

b. Alternatives: The no action alternative was considered and subsequently rejected. Breaching and deterioration of the jetties would cause severe ecological and economic damage to the region.

c. Water Quality Standards [40 CFR § 230.10(b) (1)]. Water quality certification from both the States of Washington and Oregon will be requested. The Corps does not anticipate its actions will degrade any of the water quality parameters, including those listed for the Columbia.

d. Toxic Effluent Standards [40 CFR § 230.10(b) (2)]. The proposed action would not violate the toxic effluent standards of Section 307 of the Clean Water Act.

e. Endangered Species [40 CFR § 230.10(b) (3)]. The dredging of materials and placement of fill would not harm any endangered species or their habitat as discussed under the Endangered Species Act of 1973. This is further demonstrated in the associated Biological Assessments and Biological Opinion and Letter of Concurrence from the Services.

f. Marine Sanctuaries [40 CFR § 230.10(b) (4)]. No marine sanctuary designated under Title III of the Marine Protection, Research, and Sanctuaries Act of 1972 will be affected by the proposed action.

g. No Significant Degradation [40 CFR § 230.10(c)].

1) The proposed action would not result in significant adverse effects on human health or welfare, including municipal water supplies, plankton, fish, shellfish, or wildlife.

2) Significant adverse effects on life stages of aquatic life and other wildlife dependent on the aquatic ecosystem, on ecosystem diversity, productivity, or stability, or on recreational, esthetic, or economic values would not occur.

3) No significant adverse effects on aquatic ecosystem diversity, productivity and stability are expected due to avoidance, impact minimization, and implementation of best management practices, and monitoring actions, to assess project-related impacts throughout the project life.

4) No significant adverse effects of the fill material are expected on recreational, aesthetic and economic values.

h. Minimization of Impacts [40 CFR § 230.10(d)]. Appropriate actions to minimize potential adverse impacts would be specified in the construction contract.

1) Other alternatives were considered including the "no action" alternative for the project. These alternatives were dismissed for reasons detailed in Section III above.

2) The proposed action is in compliance with applicable State water quality standards.

3) The proposed action would not violate the toxic effluent standards of Section 307 of the Clean Water Act. State water quality certification has been requested for the project.

4) Information on federally listed species and designated critical habitat was presented in the EA. Biological Assessments (BAs) were also prepared for the proposed action to address federally listed species under the jurisdiction of the NMFS and USFWS. The BAs were provided to the respective agencies for review and consultation.

On March 18, 2011, The Corps received a Biological Opinion from NMFS indicating that the Corps' proposed actions were not likely to adversely affect any listed species, with the exception of eulachon, humpback whales, and Stellar sea lions (2010/06104). For these species, NMFS determined that Corps actions were not likely to jeopardize the existence of the species. NMFS also concluded that Corps actions were not likely to adversely affect any of the current or proposed critical habitats. There was a Conservation Recommendation to carry out actions to reverse threats to species survival identified in the Columbia River Estuary ESA Recovery Plan Module for Salmon and Steelhead.

On February 23, 2011 the Corps received a Letter of Concurrence from USFW regarding potential effects to species under their jurisdiction (13420-2011-I-0082). The Corps' determined its actions would have no effect on listed species, with the exception of bull trout, marbled murrelets, and snowy plover. The Corps concluded that its actions were not likely to adversely affect these species or their critical habitat. The USFW concurred with the Corps' determination. USFW also included four Conservation Recommendations to protect and improve snowy plover habitat and manage attractant waste derived from construction actions.

Under Section 7(a) (1) of the ESA, habitat improvement components have been included in the proposed action by the Corps. These actions are the Corps' affirmative commitment to fulfill responsibility to assist with conservation and recovery of ESA-listed salmonids.

5) The proposed project would not result in significant adverse effects on human health and welfare, including municipal and private water supplies, recreational and commercial fishing, plankton, fish, shellfish, and wildlife. Significant adverse effects on aquatic ecosystem diversity, productivity, and stability, and recreational, esthetic, and economic values would not occur. Any unavoidable wetland impacts will be appropriately mitigated.

6) Appropriate steps to minimize potential adverse impacts have been further detailed in the EA and will be specified in the Environmental Protection standards prepared for the project.

With the inclusion of appropriate and practical measures to minimize adverse effects to the aquatic ecosystem, the proposed action is determined to be in compliance with the requirements of the Section 404(b) (1) guidelines.

VI. Conclusions

On the basis of the factual determinations and findings made above, the proposed fill materials comply with the Guidelines at 40 CFR Part 230 and with the requirements of Executive Order 11990 (Protection of Wetlands) and based on the factual determinations and findings made above that the proposed fill material associated with this project is in the overall public interest.