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

Refer to NMFS Tracking No.: 2012/9334

July 31, 2013

R.F. Krochalis
Regional Administrator
Federal Transit Administration
915 Second Ave., Suite 3142
Seattle, WA 98174-1002

Re: Endangered Species Act Section 7 Formal Consultation and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for Mukilteo Multimodal Project, Snohomish County, Washington. 171100190202 (Powder Mill Gulch-Frontal Possession Sound).

Dear Mr. Krochalis:

The enclosed document contains a biological opinion (Opinion) prepared by the National Marine Fisheries Service (NMFS) pursuant to section 7(a)(2) of the Endangered Species Act (ESA) on the effects of the project referenced above. In this opinion, NMFS concludes that the proposed action is not likely to jeopardize the continued existence of Puget Sound (PS) Chinook salmon, PS steelhead, southern resident killer whales (SRKW), humpback whales, and Steller sea lions and is not likely to destroy or adversely modify PS Chinook salmon critical habitat and SRKW critical habitat.

NMFS is not including an incidental take authorization for marine mammals at this time because the incidental take of marine mammals has not been authorized under section 101(a)(5) of the Marine Mammal Protection Act (MMPA) and/or its 1994 Amendments. Following the issuance of such regulations or authorizations for marine mammals, NMFS may amend this document to include an incidental take statement for marine mammals.

The document also contains the results of the Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat (EFH) consultation. The Federal Transit Administration (FTA) determined that the project will adversely affect EFH. NMFS concurs with this determination and therefore, is providing conservation recommendations pursuant to the MSA (section 305(b)(4)(A)). The FTA must respond to these recommendations within 30 days (MSA section 305(b)(4)(B)).

If you have questions regarding this consultation, please contact Michael Grady of the Washington State Habitat Office at (206) 526-4645, or by email at Michael.Grady@noaa.gov.

Sincerely,

for William W. Stelle, Jr.
Regional Administrator

Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion, Section 7(a)(2) "Not Likely to Adversely Affect" Determination, Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat (EFH) Consultation

Mukilteo Multimodal Project
NMFS Consultation Number: 2012/9344

Action Agency: Federal Transit Administration
Affected Species and Determinations:

ESA-Listed Species	Status	Is Action Likely to Adversely Affect Species or Critical Habitat?	Is Action Likely To Jeopardize the Species?	Is Action Likely To Destroy or Adversely Modify Critical Habitat?
Southern Resident killer whales (*Orcinus orca*).	Endangered	Yes	No	No
Eastern Steller Sea Lion (*Eumetopias jubatus*)	Threatened	Yes	No	No
Humpback Whale (*Megaptera novaeangliae*)	Endangered	Yes	No	N/A
Puget Sound steelhead (*Oncorhynchus* mykiss)	Threatened	Yes	No	N/A
Puget Sound Chinook salmon (*O.* tshawytscha)	Threatened	Yes	No	No
yelloweye rockfish (*Sebastes ruberrimus*)	Threatened	No	No	N/A
canary rockfish (*S. pinniger*)	Threatened	No	No	N/A
bocaccio (*S. paucispinis*)	Endangered	No	No	N/A

Fishery Management Plan That Describes EFH in the Project Area	Does Action Have an Adverse Effect on EFH?	Are EFH Conservation Recommendations Provided?
Pacific Coast Salmon	Yes	Yes
Pacific Coast Groundfish	Yes	Yes
Coastal Pelagic Species	Yes	Yes

Consultation Conducted By: National Marine Fisheries Service, Northwest Region

Issued By:

William W. Stelle, Jr.
Regional Administrator

Date: July 31, 2013

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1. INTRODUCTION

This Introduction section provides information relevant to the other sections of this document and is incorporated by reference into Sections 2 and 3 below.

1.1 Background

The National Marine Fisheries Service (NMFS) prepared the biological opinion (Opinion) and incidental take statement portions of this document in accordance with section 7(b) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531, et seq.), and implementing regulations at 50 CFR 402. NMFS also completed an Essential Fish Habitat (EFH) consultation in accordance with section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. 1801, et seq.) and implementing regulations at 50 CFR 600. The opinion and EFH conservation recommendations both comply with the Data Quality Act (44 U.S.C. 3504(d)(1) et seq.), and they underwent pre-dissemination review.

1.2 Consultation History

On November 2, 2012, the Federal Transit Administration (FTA), submitted a biological assessment (BA) to NMFS for the Mukilteo Multimodal Project and requested consultations under both the ESA and MSA according to their effects determinations presented in Table 1, below. The Washington State Ferries (WSF) Division of the Washington State Department of Transportation (WSDOT) will carry out the project. The FTA is the lead Federal agency and will fund the project, in part. The US Army Corps of Engineers (USACE) will issue a permit under section 404 of the Clean Water Act (CWA), and NMFS may issue a letter of authorization (LOA) under the Marine Mammal Protection Act (MMPA).

NMFS received additional project information during meetings and via email exchanges between November 2, 2012 and April 23, 2013. Upon receiving the additional information, NMFS initiated consultation on April 23, 2013. The bases for NMFS's concurrence with "not likely" determinations are presented in section 2.11 of this document.

Table 1. FTA ESA Determinations[1]

Species	Federal Status	Species Determination	Critical Habitat Determination	Listing/ Designation Date
Puget Sound steelhead (*Oncorhynchus mykiss*)	Threatened	LAA[3]	N/A	6/28/05 (70 FR 37160)
Puget Sound Chinook salmon (*O. tshawytscha*)	Threatened	LAA	LAA	6/28/05 (70 FR 37160)/ 9/2/05 (70 FR 52630)
Puget Sound/Georgia Basin yelloweye rockfish (*Sebastes ruberrimus*)	Threatened	NLAA[2]	N/A	4/28/10 (75 FR 22276)
Puget Sound/Georgia Basin canary rockfish (*S. pinniger*)	Threatened	NLAA	N/A	4/28/10 (75 FR 22276)
Puget Sound/Georgia Basin bocaccio (*S. paucispinis*)	Endangered	NLAA	N/A	4/28/10 (75 FR 22276)
Southern Pacific Eulachon (*Thaleichthys pacificus*)	Threatened	NLAA	No Effect[4]	3/18/10 (75 FR 13012)/ 10/20/11 (50 FR 65324)
Southern Green Sturgeon (*Acipenser medirostris*)	Threatened	NLAA	No Effect[4]	6/6/06 (71 FR 177570)/ 10/9/2009 (50 FR 52300)
Southern Resident killer whales (*Orcinus orca*).	Endangered	LAA	LAA	11/18/05 (70 FR 69903)/ 11/29/06 (71 FR 69054)
Eastern Steller Sea Lions (*Eumetopias jubatus*)	Threatened	LAA	No Effect[4]	6/4/97 (62 CFR 24345)/ 8/27/93 (58 CFR 45269)
Humpback Whales (*Megaptera novaeangliae*)	Endangered	LAA	N/A	12/2/70 (35 FR 18319)

[1] NMFS agreed with these determinations and initiated consultation accordingly
[2] NLAA = not likely to adversely affect
[3] LAA = likely to adversely affect
[4] The action area is not within designated critical habitat for these species.

1.3 Proposed Action

"Action" means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies. Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration.

The FTA and the WSF propose to replace the Mukilteo Ferry Terminal with a new terminal (Figure 1). The project will move the ferry terminal east of its existing location in downtown Mukilteo to the former U.S. Department of Defense Fuel Supply Point facility (the Tank Farm property) which includes a large pier extending into Possession Sound (the Tank Farm pier). A new roadway will connect State Route (SR) 525 east to the Mukilteo Commuter Rail station and continue on to the ferry terminal.

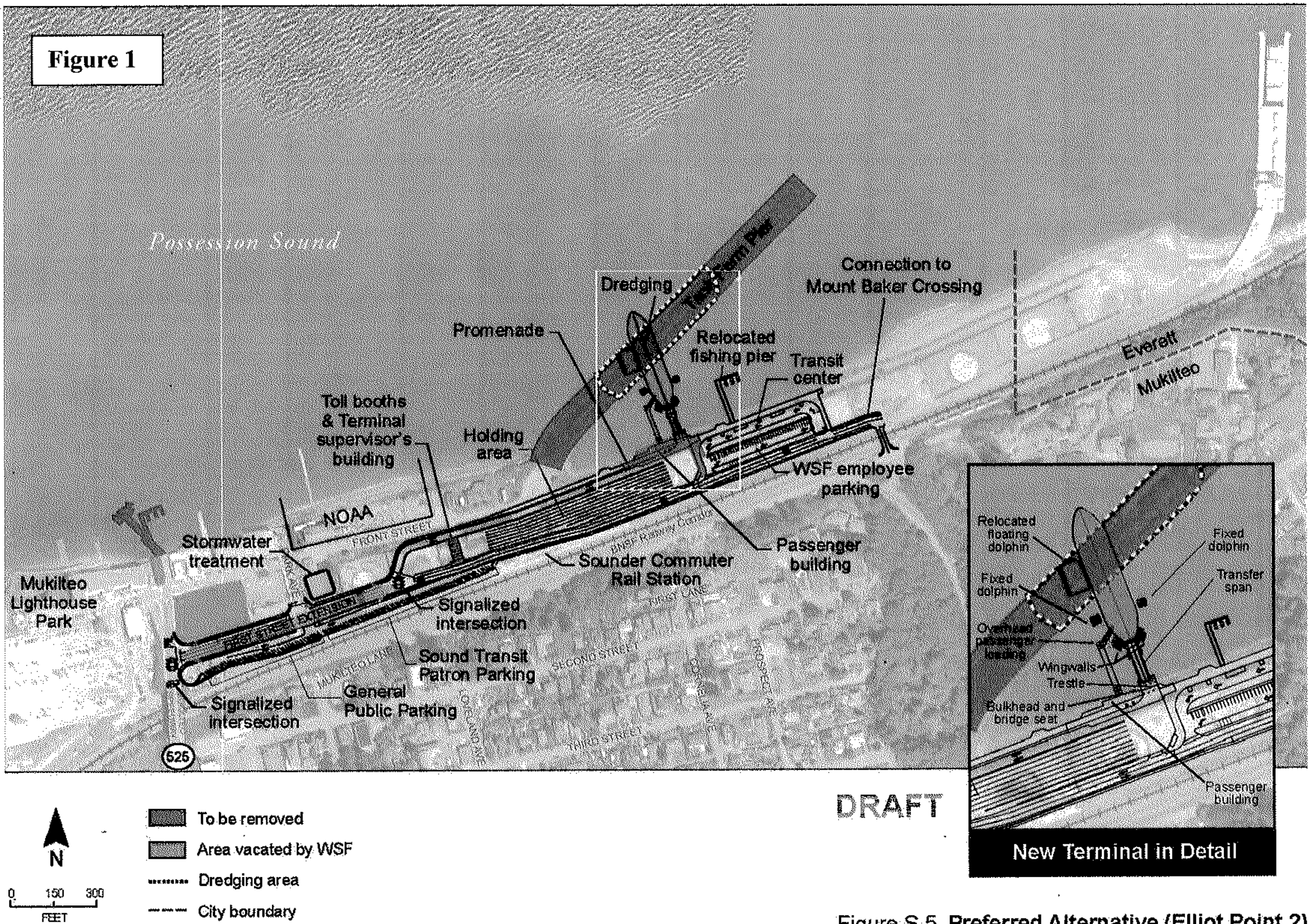


Figure S-5. **Preferred Alternative (Elliot Point 2)**

1.3.1 Marine Components

Project construction will begin in 2015. The WSF will conduct all in-water work between July 15 and February 15, starting as soon as July 15, 2014 and ending by February 15, 2018.The WSF will conduct the following activities in marine waters:

- remove the Tank Farm pier;
- dredge a 500-foot wide navigation channel;
- construct stone columns in the substrate below the new terminal;
- construct a new concrete trestle and bulkhead;
- construct a transfer span;
- construct a pedestrian overhead loading structure;
- construct wingwalls on either side of the trestle and fixed dolphins on either side of the slip;
- relocate a floating dolphin from the old terminal to the new;
- remove the existing terminal and the Port of Everett's existing fishing pier;
- construct a new fishing pier and day moorage just to east of the new terminal; and
- conduct subsurface sampling

Tank Farm Pier Removal

The Tank Farm pier covers 3.17 acres over water and contains approximately 3,900 creosote-treated piles and 7,300 tons of creosote-treated timber. Demolition will take approximately ten months over two in-water work windows. Some elements of the demolition, such as removing the existing piping from the top of the deck, will take place year round. The WSF will remove the 655-foot section of pier over the future navigation channel first, so that the dredging and construction of the new terminal can proceed. The WSF will work from land and from barges.

The WSF will remove the piles with a vibratory hammer to the extent possible. If piles are so deteriorated they cannot be removed using vibratory methods, the WSF will use a clamshell bucket to pull the piles from below the mud line. The WSF will attempt to completely remove each pile in its entirety. In cases where piles break during removal or their condition has deteriorated to the point where removing an intact pile is not possible, the WSF will implement the following procedures:

1. A chain will be used, if practical, to entirely remove the broken pile.

2. If the entire pile cannot be removed, the pile will be cut at or below the mud line using a pneumatic underwater chainsaw.

3. If sediments are contaminated and the mud line is subtidal, piling will be cut- off at the mud line to minimize disturbance of the sediment.

4. Piling will be cut- off at least one foot below the mud line in intertidal areas where the work can be accomplished in the dry and in subtidal areas where the sediments are not contaminated.

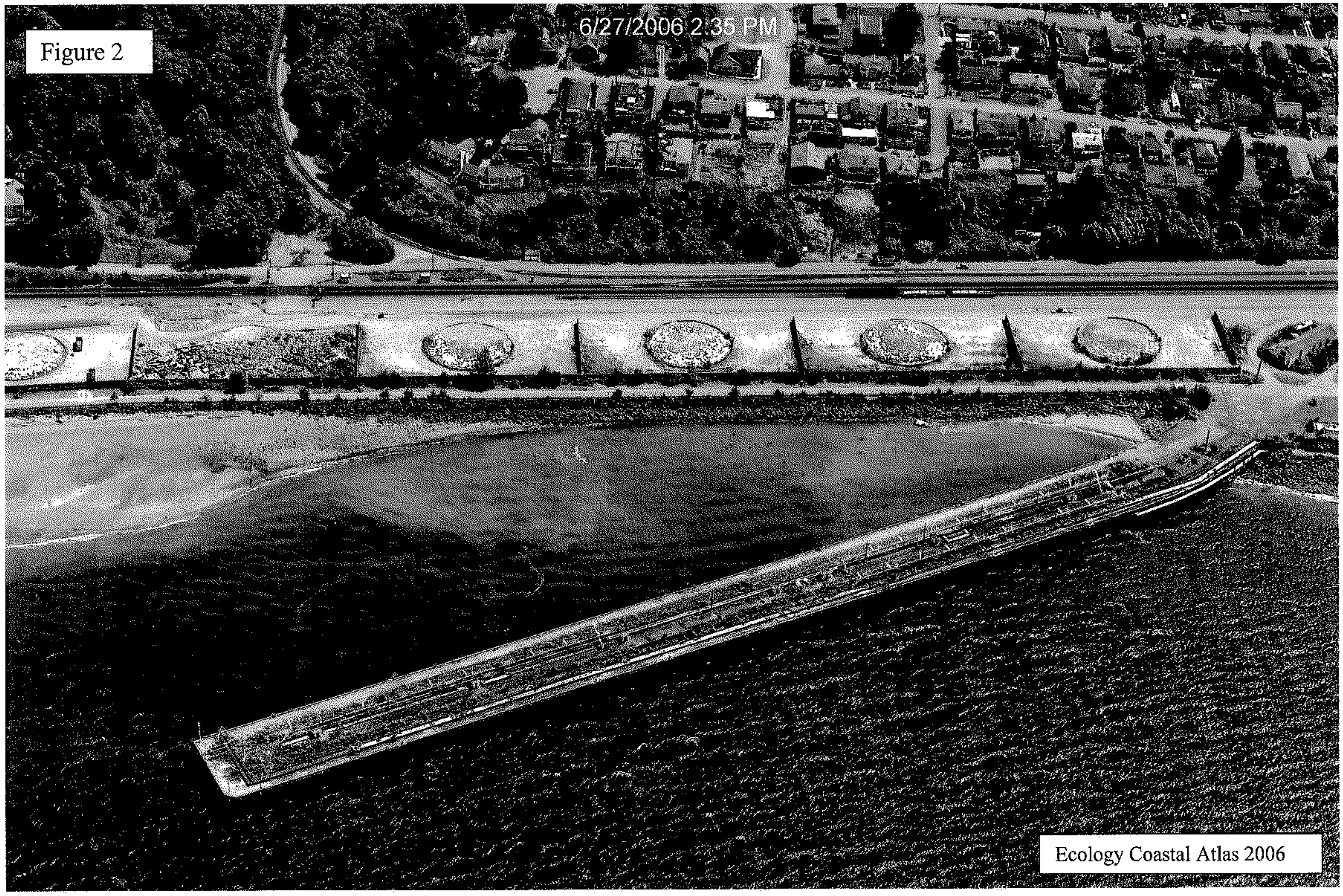


Figure 2

5. Piles will be cut- off at the lowest practical tide condition and at slack water.

6. For piles in deep subtidal waters that break off one foot or more below the mud line, the WSF will leave them in place.

7. For broken piles in intertidal and shallow subtidal areas, the WSF will cut- the piles off at least two feet below the mud line.

8. Any piles within the dredge channel will be removed completely.

In order to minimize turbidity and contaminant release during pile removal, the WSF will:

1. Remove piles slowly to minimize turbidity and sediment disturbance;

2. "Wake- up" the pile to break the bond with surrounding sediment by vibrating the pile slightly prior to removal. Waking- up the pile avoids pulling out large blocks of sediment;

3. Keep extraction equipment out of the water;

4. Not repeatedly attempt to remove a pile using a clamshell bucket in contaminated sediments or below the water line;

5. Not intentionally break off piles by twisting, bending, or other deformation;

6. Construct a containment basin for the work surface on the barge deck or pier for piles and any sediment removed during pulling. The basin will be composed of durable plastic sheeting with sidewalls supported by hay bales or a support structure to contain all sediment;

7. Properly dispose of sediment or other residues along with the piles;

8. Fill any holes left when removing piles with clean sand or gravel;

9. Place containment booms and absorbent booms (or other oil-absorbent fabric) around the perimeter of the work area to capture wood debris, oil, and other materials;

10. Monitor water quality every four hours during pile removal;

11. Contain treated wood during and after removal to preclude sediments and contaminated materials from entering the aquatic environment;

12. Not use hydraulic water jets to remove piles;

13. Not allow barges to ground out or rest on the substrate or be over or within 25 feet of vegetated shallows (except where such vegetation is limited to state-designated noxious weeds); and

14. Not anchor barges over vegetated shallows for more than 96 hours.

Dredging

The WSF will dredge approximately 23,500 cubic yards from an area 500 feet long and 100 feet wide to a depth of up to -30 mean lower low water (MLLW) to provide a navigation channel through the sediment mound underneath the Tank Farm pier (Figure 1). The landward edge of the dredge prism is approximately 230 feet offshore and extends northeast to about 410 feet offshore. Dredging will take less than a month between December 1, 2015 and January 31, 2016.

The WSF will only dispose of dredged material at open water disposal sites if the sediment meets the Dredge Material Management Program (DMMP) standards. Initial testing of sediments indicates levels of contamination above DMMP standards. The WSF will conduct additional sampling prior to construction to more accurately characterize the level and extent of contamination. The WSF will remove and dispose of dredged material that exceeds DMMP criteria at existing upland commercial facilities permitted to accept contaminated waste. The WSF will determine whether to cap the post-dredge surface. If the samples indicate that the post-dredge surface is contaminated, the area will be over-dredged by two feet to accommodate the placement of a cap of clean material. In order to minimize turbidity and contaminant release during pile dredging, the WSF will:

1. Fully extract creosote-treated piles from the dredge prism prior to dredging;

2. Prevent over-penetration of the dredge bucket;

3. Deploy aprons to catch spillage and a rinse tank to clean the bucket each cycle;

4. Prevent overflow from barges during dredging or transport;

5. Have oil booms readily available for containment;

6. Prevent multiple bites while the bucket is on the bottom; and

7. Keep spill containment booms and absorbent materials on the dredge barge at all times.

Stone Columns

The WSF will construct stone columns within 25,000 square feet of substrate prior to constructing the trestle, transfer span, and overhead loading structure. Stone columns are a ground improvement technique consisting of gravel-filled columns. Compressed air or water pushes the gravel through a feeder tube and into the subsurface. The gravel creates a stiff column that reinforces the treatment zone and increases the density of the surrounding soils. The WSF will construct approximately 200 three-foot diameter columns in a grid pattern over a eight-week period between July 15 and September 30. Columns will extend 60 feet below the ground surface.

Trestle and Bulkhead

The WSF will construct a new 1,600-square foot concrete trestle (Figure 1). Fourteen 24-inch diameter octagonal concrete piles will support the new trestle. The WSF will drive the piles with an impact hammer over the course of five days between July 15 and February 15. Each pile will take up to two hours to drive. During construction, the WSF will anchor a floating barge, measuring 50 feet by 150 feet (7,500 square feet) adjacent to the new terminal for one in-water work season to support cranes, the pile driver, and other construction equipment. They will move the barge periodically to access different work areas.

Transfer Span

The new transfer span will measure approximately 2,600 square feet. Two 60-inch diameter drilled shafts will support the transfer span. The WSF will install steel casings for the drilled shafts using a vibratory hammer. After the casing is installed, the WSF will excavate the interior of the casing, install a rebar cage, and pour in concrete. Each casing will take approximately one hour to drive over two days. Construction of the drilled shafts will take about two weeks between July 15 and February 15.

Overhead Loading Structure

The WSF will construct an overhead loading structure measuring 2,600 square feet on the west side of the trestle. Two drilled shafts, one 131 inches in diameter and one 96 inches in diameter, will support the structure. The WSF will construct this drilled shaft in the same manner as the transfer span drilled shafts. The casing will take approximately one hour each to drive. Construction of this drilled shaft will take about two weeks between July 15 and February 15.

Wingwalls and Fixed Dolphins

The WSF will construct two wingwalls, measuring 900 square feet each, on either side of the water ward end of the transfer span. Seven 36-inch and two 18-inch steel piles will support each of the two wingwalls for a total of 18 piles. The WSF will also construct fixed dolphins just beyond the wingwalls using 18 30-inch steel piles. The WSF will use a vibratory hammer to drive all 36 of these steel piles. Because the dolphins and wingwalls are not load-bearing structures they will not need to be proofed with an impact hammer. Each pile will take approximately 30 minutes to drive. Construction of the drilled shaft will take about six days between July 15 and February 15.

Floating Dolphin

The WSF will tow a floating dolphin measuring 4,600 square feet from the existing terminal and anchor it at the new terminal site.

Existing Terminal Removal

The WSF will remove the existing terminal after completing the new terminal. The existing terminal covers 8,120 square feet of marine water and contains 248 creosote piles. Demolition of the terminal will remove approximately 406 tons of creosote-treated timber from the aquatic environment. Demolition will take approximately two weeks between July 15 and October 15 and will occur from land and from a barge containing the necessary equipment. The WSF will follow the same pile removal procedures as the Tank Farm pier.

New Terminal Building

The WSF will construct the new terminal building along the shoreline west of the trestle. The building will extend slightly over the water, creating 2,464 square feet of overwater cover. Eight 24-inch concrete piles will support the over water portion of the building. The WSF will drive the piles with an impact hammer over the course of three days between July 15 and February 15. Each pile will take up to two hours to drive.

Fishing Pier Relocation

The Port of Everett public fishing pier/seasonal day moorage, just east of the existing terminal, shares part of its foundation with the existing terminal. The pier measures over 2,000 square feet and contains 42 12-inch diameter creosote-treated timber piles. The WSF will remove the pier during demolition of the existing terminal. Demolition of the fishing pier will remove approximately 69 tons of creosote-treated timber from the aquatic environment. The WSF will use land and barge-based equipment to remove the existing terminal and fishing pier.

The new fishing pier will be just east of the new terminal and cover 3,455 square feet. Twelve 24-inch diameter concrete piles will support the new pier, and 37 12-inch diameter steel piles will support associated fenders and guide piles. The WSF will install the concrete piles using an impact hammer and the steel piles using a vibratory hammer.

Subsurface Sampling

The WSF will collect marine sediment samples at the site of the new terminal at six locations under the Tank Farm pier within the area to be dredged in order to determine if the sediment meets the DMMP requirements for open water disposal. The WSF will also collect geotechnical data at four locations where the new trestle will be.

1.3.2 Land Components

The WSF will conduct the following activities:

- Realign and extend First Street from a new intersection with SR 525 to the new ferry terminal and a new bus transit facility and add sidewalks and bike lanes;

- Construct a new public parking lot between the railroad and First Street;
- Construct a new vehicle holding area and a toll building;
- Construct a new two-story passenger and maintenance building;
- Remove the upland components of the existing ferry terminal;
- Place one to seven feet of fill (depending on the location) over the site to avoid contaminated soils and archaeological resources; and
- Remove any contaminated soils encountered during construction and dispose of them at existing upland facilities.

In order to minimize contaminant release from upland areas, the WSF will:

1. Test soils in areas of excavation prior to ground-disturbing activities;

2. Dispose of contaminated soils at permitted locations;

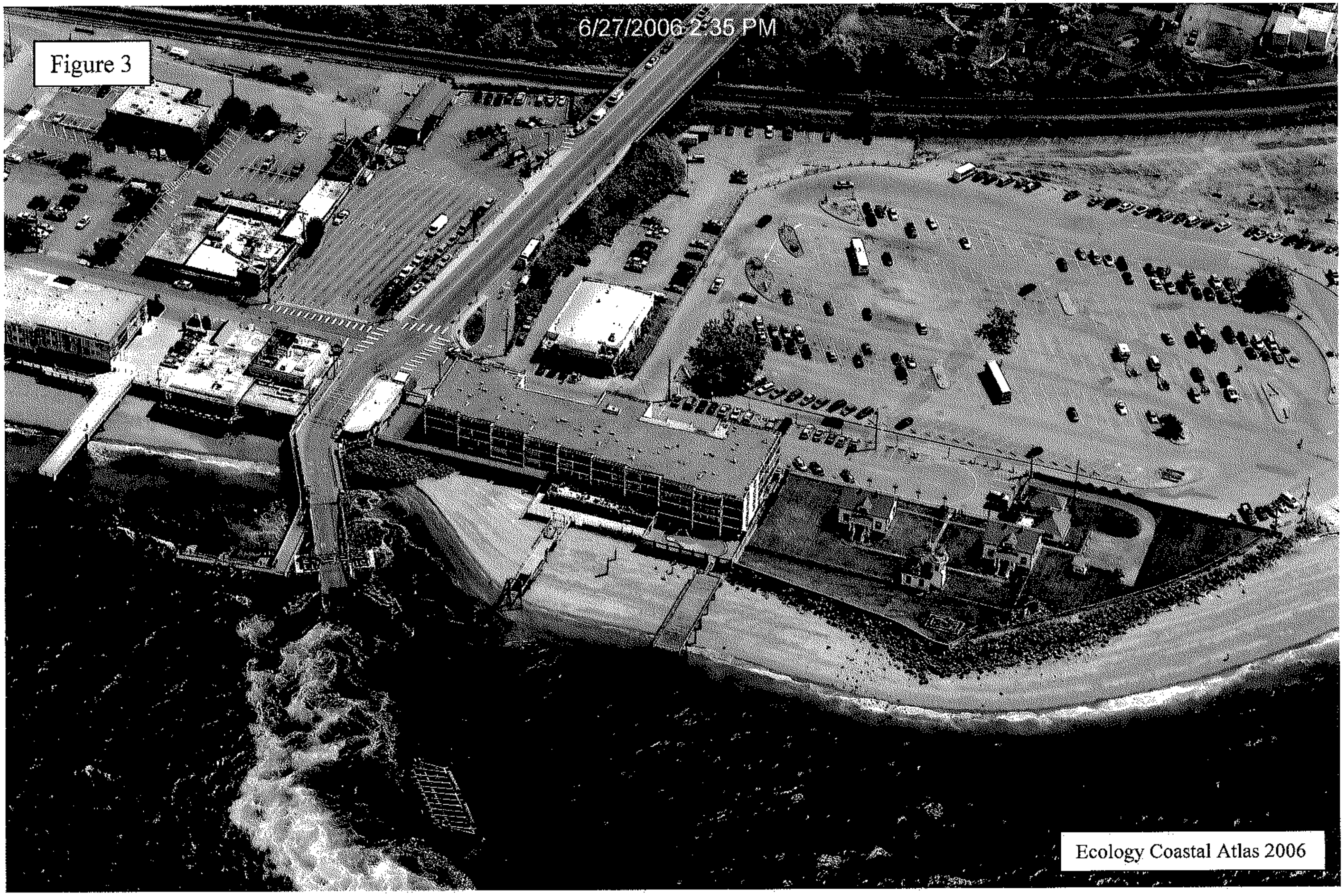
3. Test groundwater in excavation and infiltration areas prior to the start of construction;

4. Prevent stormwater from contacting contaminated soils or groundwater; and

5. Dispose of contaminated groundwater at an offsite facility.

1.3.3 Stormwater Treatment

Existing impervious surface in the project area totals 41.26 acres, only 2.43 acres of which is pollution-generating. The project will create an additional 10.20 acres (12.63 acres total), of pollution-generating impervious surface (PGIS), mostly by converting the impervious surface of the Tank Farm property to roadway, parking, and holding areas. The WSF will use enhanced treatment, Filterra cartridges or natural bio-retention systems, for all stormwater runoff from the proposed project. Stormwater from the new terminal will discharge to Possession Sound via three outfalls: an existing outfall west of Brewery Creek, an existing 30-inch diameter outfall, and a new outfall on the eastern edge of the site. The WSF will also sweep the new terminal quarterly.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1.4 Action Area

"Action area" means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02). The action area includes 42.7 square miles of the Possession Sound, the aquatic area within line of sight of the existing and new Mukilteo Ferry Terminal, framed by the extent of underwater noise from pile driving. Possession Sound is part of Puget Sound between Whidbey Island and the coastline of Snohomish County between the cities of Everett and Mukilteo. Possession Sound connects the main Puget Sound basin to the south with Saratoga Passage and Port Susan to the north. The Snohomish River flows into Possession Sound at Port Gardner Bay. Gedney Island, also called Hat Island, is located in Possession Sound. All of the species in Table 1 are reasonably certain to be within the action area during in-water work. The action area also contains critical habitat for Puget Sound Chinook salmon and southern resident killer whale (SRKW).

2. ENDANGERED SPECIES ACT: BIOLOGICAL OPINION AND INCIDENTAL TAKE STATEMENT

The ESA establishes a national program for conserving threatened and endangered species of fish, wildlife, plants, and the habitat on which they depend. Section 7(a)(2) of the ESA requires Federal agencies to consult with the United States Fish and Wildlife Service, NMFS, or both, to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species or adversely modify or destroy their designated critical habitat. Section 7(b)(3) requires that at the conclusion of consultation, the Service provide an opinion stating how the agencies' actions will affect listed species or their critical habitat. If incidental take is expected, Section 7(b)(4) requires the provision of an incidental take statement (ITS) specifying the impact of any incidental taking, and including reasonable and prudent measures to minimize such impacts.

2.1 Analytical Approach of the Biological Opinion

Section 7(a)(2) of the ESA requires Federal agencies, in consultation with NMFS, to insure that their actions are not likely to jeopardize the continued existence of endangered or threatened species, or adversely modify or destroy their designated critical habitat. The jeopardy analysis considers both survival and recovery of the species. The adverse modification analysis considers the impacts to the conservation value of the designated critical habitat.

"To jeopardize the continued existence of a listed species" means to engage in an action that would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR 402.02). This biological opinion does not rely on the regulatory definition of 'destruction or adverse modification' of critical habitat at 50 C.F.R. 402.02. Instead, we have relied upon the statutory provisions of the ESA to complete the following analysis with respect to critical habitat.[1]

[1] Memorandum from William T. Hogarth to Regional Administrators, Office of Protected Resources, NMFS

We will use the following approach to determine whether the proposed action described in Section 1.3 is likely to jeopardize listed species or destroy or adversely modify critical habitat:

- Identify the range wide status of the species and critical habitat likely to be adversely affected by the proposed action;
- Describe the environmental baseline in the action area;
- Analyze the effects of the proposed action on both species and their habitat;
- Describe any cumulative effects in the action area;
- Integrate and synthesize the above factors to assess the risk that the proposed action poses to species and critical habitat; and
- Reach conclusions regarding jeopardy and adverse modification.

2.2 Range-wide Status of the Species and Critical Habitat

Climate change affects listed marine mammals and listed fish species and their habitat throughout Washington. Several studies have revealed that climate change is affecting and will continue to affect salmonid habitat in nearly all tributaries throughout the state (Battin et al. 2007; ISAB 2007). While the intensity of effects will vary by region (ISAB 2007), climate change will generally alter aquatic habitat (water yield, peak flows, and stream temperature). As climate change alters the structure and distribution of rainfall, snowpack, and glaciers. These changes will alter riverine hydrographs. Climate and hydrology models project significant reductions in both total snow pack and low-elevation snow pack in the Pacific Northwest over the next 50 years (Mote and Salathe 2009). These changes will shrink the extent of the snowmelt-dominated habitat available to salmon. Such changes may restrict our ability to conserve diverse salmon life histories, especially spring-run Chinook salmon.

In Washington State, most models project warmer air temperatures, increases in winter precipitation, and decreases in summer precipitation. Average temperatures in Washington State are likely to increase 0.1-0.6°C per decade (Mote and Salathe 2009). Warmer air temperatures will lead to more precipitation falling as rain rather than snow. As the snow pack diminishes, seasonal hydrology will shift to more frequent and severe early large storms, changing stream flow timing and increasing peak river flows, which may limit salmon survival (Mantua et al. 2009). The largest driver of climate-induced decline in salmon populations is projected to be the impact of increased winter peak flows, which scour the streambed and destroy salmon eggs (Battin et al. 2007).

Higher water temperatures and lower spawning flows, together with increased magnitude of winter peak flows are all likely to increase salmon mortality. Higher ambient air temperatures will likely cause water temperatures to rise (ISAB 2007). Salmon and steelhead require cold water for spawning and incubation. As climate change progresses and stream temperatures warm, thermal refugia will be essential to persistence of many salmonid populations. Thermal refugia are important for providing salmon and steelhead with patches of suitable habitat while

(Application of the "Destruction or Adverse Modification" Standard Under Section 7(a)(2) of the Endangered Species Act) (November 7, 2005).

allowing them to undertake migrations through or to make foraging forays into areas with greater than optimal temperatures. To avoid waters above summer maximum temperatures, juvenile rearing may be increasingly found only in the confluence of colder tributaries or other areas of cold-water refugia (Mantua et al. 2009).

Climate change will make recovery targets for these salmon populations more difficult to achieve. Habitat action can address the adverse impacts of climate change on salmon. Examples include restoring connections to historical floodplains and freshwater and estuarine habitats to provide fish refugia and areas to store excess floodwaters, protecting and restoring riparian vegetation to ameliorate stream temperature increases, and purchasing or applying easements to lands that provide important cold water or refuge habitat (Battin et al. 2007; ISAB 2007).

Climate change will also affect listed marine mammals. Effects from climate change include increased ocean temperature, increased stratification of the water column, and changes in intensity and timing of coastal upwelling. These continuing changes will alter primary and secondary productivity, the structure of marine communities, and in turn, the growth, productivity, survival, and migrations of salmonids. A mismatch between earlier smolt migrations (due to earlier peak spring freshwater flows and decreased incubation period) and altered upwelling may reduce marine survival rates. Increased concentration of carbon dioxide reduces the availability of carbonate for shell-forming invertebrates, including some that are prey items for juvenile salmonids. In all of these cases, the specific effects on salmon and steelhead abundance, productivity, spatial distribution and diversity are poorly understood, but as a primary prey source for SRKW, the effect on salmonids from climate change has potential to affect prey abundance as a PCE of SRKW critical habitat. Humpbacks primarily eat zooplankton and forage fish, while Steller sea lions are generalist predators, but they do eat some salmon. To the degree that salmonids are prey of Steller sea lions and humpback whales, climate change is expected to negatively affect salmon as prey for these species as well. Similarly, climate change could also indirectly affect humpback whales and Steller sea lions via trophic dynamics and available non-salmonid prey.

2.2.1 Status of the Species

Puget Sound Chinook Salmon

Generally, PS Chinook salmon adults spawn in freshwater rivers and large streams at elevations above the floodplain. The eggs are deposited in gravel that has well oxygenated water percolating through it (Healey 1991). The eggs over-winter and hatch in the gravel to become juveniles with a yolk sac. At about the time the yolk sac is absorbed, the juveniles emerge from the gravel and begin to forage on their own. The juveniles forage and move downstream into estuaries where they continue to forage before moving into the north Pacific Ocean where they reside for one to six years (Healey 1991).

Abundance and Productivity. Using peak recorded harvest landings in Puget Sound in 1908, Bledsoe et al. (1989) estimated that the historical run size of the ESU was 670,000. During a recent five-year period, the geometric mean of natural spawners in populations of PS Chinook salmon ranged from 222 to just over 9,489 fish. Most populations had natural spawners numbering in the hundreds (median recent natural escapement is 766), and, of the six populations with greater than 1,000 natural spawners, only two have a low fraction of hatchery fish. Estimates of the historical equilibrium abundance, based on pre-European settlement habitat conditions, range from 1,700 to 51,000 potential PS Chinook salmon spawners per population (Ford et al. 2011).

Long-term trends in abundance and median population growth rates for naturally spawning populations of PS Chinook salmon indicate that approximately half of the populations are declining and the other half are increasing in abundance. Eight of the 22 populations are declining over the short term, and 11 or 12 populations are experiencing long-term declines (Ford et al. 2011). Factors contributing to the downward trends are widespread blockages of streams, degraded freshwater and marine habitat, poor forest practices in upper river tributaries, and urbanization and agriculture in lower tributaries and main stem rivers. Hatchery production and release of PS Chinook salmon are widespread, and more than half of the recent total escapement returned to hatcheries.

All Puget Sound Chinook populations are well below recovery escapement levels (Ford et al. 2011). Most populations are also consistently below recovery spawner-recruit levels identified. Across the ESU, most populations have declined in abundance since the last status review in 2005, and trends since 1995 are mostly flat (Ford et al. 2011).

Spatial Structure and Diversity. The PS Chinook salmon ESU encompasses all runs of Chinook salmon from the Elwha River in the Strait of Juan de Fuca eastward, including rivers and streams flowing into Hood Canal, Puget Sound, and the Strait of Georgia in Washington. Of an estimated 31 original populations, there are 22 extant geographically distinct populations (Ford et al. 2011).

There are two typical life history strategies known as stream type and ocean type (Healey 1991; Myers et al. 1998). Timing of adult returns is dependent on the life history type. Stream type individuals are commonly called spring-run Chinook salmon since adults with this life history migrate into near shore waters and return to natal streams in spring to early summer. The ocean type life history is commonly called the fall-run PS Chinook salmon since most of the adults move to their natal streams in late summer and early fall. Fall-run PS Chinook salmon spawn in late September through October (Healey 1991). Most PS Chinook salmon are ocean type.

The artificial propagation of fall-run PS Chinook salmon is widespread throughout the ESU. Transfers between watersheds within and outside the ESU have been commonplace throughout the last century. Nearly two billion Chinook salmon have been released into Puget Sound tributaries since the 1950s. The vast majority of these were from local returning fall-run adults. Returns to hatcheries have accounted for 57 percent of the total spawning escapement, although the hatchery contribution to spawner escapement is probably much higher in some populations due to hatchery derived strays on the spawning grounds. The electrophoretic similarity between Green and Duwamish River fall-run PS Chinook salmon and several other fall-run stocks in Puget Sound suggests that there may have been a significant and lasting effect from Green River hatchery transplants (Ford et al. 2011).

Puget Sound Steelhead

Steelhead are the anadromous form of *O. mykiss*. PS steelhead typically spend two to three years in freshwater before migrating downstream into marine waters. Once the juveniles emigrate, they move rapidly through Puget Sound into the North Pacific Ocean where they reside for several years before returning to spawn in their natal streams. Unlike other species of Oncorhynchus, O. mykiss are capable of repeat spawning. Averaged across all West Coast steelhead populations, eight percent of spawning adults have spawned previously. Coastal populations have a higher incidence of repeat spawning than inland populations (Busby et al. 1996).

Abundance and Productivity. Since 1992 there has been a general downward trend in steelhead populations in this DPS. Busby et al. (1996) reviewed the 21 populations in the Puget Sound DPS and found that 17 had declining trends and four had increasing trends. Marked declines in natural run size are evident in all areas of the DPS. Even sharper declines are observed in southern Puget Sound and in Hood Canal. Throughout the DPS, natural steelhead production has shown a weak response to reduced harvest since the mid-1990s. Median population growth rates were estimated for several populations in the DPS, using the 4-year running sums method (Holmes 2001; Holmes and Fagan 2002). They estimated that the growth rate was less than 1 for most populations in the DPS, meaning the populations are declining.

No abundance estimates exist for most of the summer-run populations; all appear to be small, most averaging less than 200 spawners annually. Summer-run populations are concentrated in northern Puget Sound and Hood Canal; only the Elwha River and Canyon Creek support summer-run steelhead in the rest of the DPS. Steelhead are most abundant in northern Puget Sound, with winter-run steelhead in the Skagit and Snohomish rivers supporting the two largest populations (approximately 3,000 and 5,000 respectively). From 2005-2009, geometric means of natural spawners indicate relatively low abundance (4 of 15 populations with fewer than 500 spawners annually) and declining trends (6 of 16 populations) in natural escapement of winter-run steelhead throughout Puget Sound, particularly in southern Puget Sound and on the Olympic Peninsula (Ford et al. 2011). Widespread declines in abundance and productivity in most natural populations have been caused by the following factors:

Spatial Structure and Diversity. Puget Sound steelhead are found in all accessible large tributaries to Puget Sound and the eastern Strait of Juan de Fuca (WDFG 1932). Nehlsen et al. (1991) identified nine PS steelhead stocks at some degree of risk or concern.

The WDF et al. (1993) identified 53 stocks within the DPS, of which 31 were considered to be of native origin and predominantly natural production. Of the 31 stocks, they rated 11 as healthy, three as depressed, one as critical, and 16 as unknown.

There are two types of steelhead, winter steelhead and summer steelhead. Winter steelhead become sexually mature during their ocean phase and spawn soon after arriving at their spawning grounds. Adult summer steelhead enter their natal streams and spend several months holding and maturing in freshwater before spawning. The PS steelhead DPS is composed primarily of winter-run populations.

(1) Steelhead habitat has been dramatically affected by a number of large dams in the Puget Sound Basin that eliminated access to habitat or degraded habitat by changing river hydrology, temperature profiles, downstream gravel recruitment, and movement of large woody debris.

(2) In the lower reaches of rivers and their tributaries, urban development has converted natural areas (e.g. forests, wetlands, and riparian habitat) into impervious surfaces (buildings, roads, parking lots, etc.). This has changed the hydrology of urban streams causing increases in flood frequency, peak flow, and stormwater pollutants. The hydrologic changes have resulted in gravel scour, bank erosion, sediment deposition during storm events, and reduced summer flows (Moscrip and Montgomery 1997; Booth et al. 2002; May et al. 2003).

(3) Agricultural development has reduced river braiding, sinuosity, and side channels through the construction of dikes and the hardening of banks with riprap. Constriction of rivers, especially during high flow events, increases gravel scour and the dislocation of rearing juveniles. Much of the habitat that existed before European immigration has been lost due to these land use changes (Beechie et al. 2001; Collins and Montgomery 2002; Pess et al. 2002).

(4) In the mid-1990s, Washington Department of Fish and Wildlife (WDFW) banned commercial harvest of wild steelhead. Previous harvest management practices contributed to the decline of PS steelhead (Busby et al. 1996). Predation by marine mammals (principally seals and sea lions) and birds may be of concern in some local areas experiencing dwindling steelhead run sizes (Kerwin 2001).

(5) Ocean and climate conditions can have profound impacts on steelhead populations. Changing weather patterns affect their natal streams. As snow pack decreases, in-stream flow is expected to decline during summer and early fall (Battin et al. 2007).

(6) The extensive propagation of the Chambers Creek winter steelhead and the Skamania Hatchery summer steelhead stocks have contributed to the observed decline in abundance of native PS steelhead populations (Hard et al. 2007). Approximately 95 percent of the hatchery production in the PS DPS originates from these two stocks. The Chambers Creek stock has undergone extensive breeding to provide an earlier and more uniform spawn timing. This has resulted in a large degree of reproductive divergence between hatchery and wild winter-run fish. The Skamania Hatchery stock is derived from summer steelhead in the Washougal and Klickitat rivers and is genetically distinct from the Puget Sound populations of steelhead. For these reasons, Hard et al. (2007) concluded that all hatchery summer- and winter-run steelhead populations in Puget Sound derived from the Chambers Creek and Skamania Hatchery stocks should be excluded from the DPS. NMFS included two hatchery populations that were derived from native steelhead, the Green River winter-run and the Hamma Hamma winter-run, as part of the DPS (72 FR 26722).

Southern Resident Killer Whales

NMFS listed the SRKW Distinct Population Segment (DPS) as endangered under the ESA on November 18, 2005 (70 FR 69903) and designated them as depleted and strategic under the

Marine Mammal Protection Act (68 FR 31980; May 29, 2003). NMFS issued the final recovery plan for SRKW in January 2008 (NMFS 2008a). This section summarizes status information from the recovery plan, the five-year status review (NMFS 2011a), and other data.

The SRKWs are a long-lived species, with have a late onset of sexual maturity (NMFS 2008a). Mothers and offspring maintain highly stable social bonds throughout their lives, which is the basis for the matrilineal social structure in the SRKW population (NMFS 2008a). Groups of related matrilines form pods. Three pods – J, K, and L – make up the SRKW DPS. Vocal communication is advanced in SRKW and is important to their social structure, navigation, and foraging (NMFS 2008a). They consume a variety of fish and one species of squid, but salmon, and Chinook salmon in particular, are their primary prey (Ford and Ellis 2006; Hanson et al. 2010).

Spatial Distribution and Diversity. The SRKW DPS is a single population that ranges as far south as central California and as far north as Southeast Alaska. They spend considerable time in the Salish Sea, mostly around the San Juan Islands, from late spring to early autumn and then move south into Puget Sound. Although the entire DPS can occur along the outer coast at any time of the year, occurrence along the outer coast is more likely from late autumn to early spring.

The estimated effective size of the population (based on the number of breeding individuals under ideal genetic conditions) is very small, less than 30 whales or about one third of the current population size (Ford et al. 2011). The small effective population size, the absence of gene flow from other populations, and documented breeding within pods may elevate the risk from inbreeding (Ford et al. 2011). In addition, the small effective population size may contribute to the lower growth rate of the SRKW population in contrast to the Northern Resident population (Ford et al. 2011; Ward et al. 2009).

Abundance and Productivity. As of July 1, 2012, there were 25 whales in the J pod, 20 whales in K pod and 40 whales in L pod, for a total of 85 whales. The historical abundance of SRKW was between 140 and 400 whales (Krahn et al. 2004; Olesiuk et al. 1990). Between 1983 and 2010, population growth was variable, with an average annual population growth rate of 0.3 percent (The Center for Whale Research unpubl. data).

One of the delisting criterion in the SRKW recovery plan is an average growth rate of 2.3 percent for 28 years (NMFS 2008a). This criterion has not been met (NMFS 2011a), and the recent low population growth rate of 0.3 percent is not sufficient to achieve recovery. Other factors limiting the growth rate of the population include the small number of breeding males, particularly in J and K pods, reduced fecundity, decreased sub-adult survivorship in L pod, and the total number of individuals in the population (NMFS 2008a).

Limiting Factors. Several factors may be limiting SRKW recovery including the quantity and quality of prey, exposure to bioaccumulating toxic chemicals, and disturbance from sound and vessels. Oil spills are also a risk factor. Multiple threats are likely acting in concert to impact SRKWs. Although it is not clear which threat or threats are most significant to the survival and recovery of the SRKW DPS, all of these threats are potential limiting factors in the population (NMFS 2008a).

Steller Sea Lion

NMFS listed Steller sea lions as threatened under the ESA on November 26, 1990 (55 FR 49204) across their entire range. After continued declines in the western portion of the population, NMFS listed the western stock as endangered on May 5, 1997 (62 FR 24345). The eastern stock remained listed as threatened. Under the Marine Mammal Protection Act, NMFS classified all Steller sea lions as strategic stocks and depleted. NMFS issued a revised recovery plan in March 2008 (NMFS 2008b). On April 18, 2012, NMFS issued a proposed rule to remove the eastern DPS of Steller sea lions from the List of Endangered and Threatened Wildlife (77 FR 23209). This section summarizes information taken from the recovery plan and most recent stock assessment report (NMFS 2008b; Allen and Angliss 2012).

Steller sea lions are a long-lived species and reach sexual maturity at age 10 (NMFS 2008b). Breeding occurs at rookeries where males compete for females by defending territories. Females bear at most a single pup each year from late May through early July. Steller sea lions are generalist predators and are able to respond to changes in prey abundance. Their prey includes a variety of fishes and cephalopods (NMFS 2008b). Pacific hake is their primary prey across the range of eastern Steller sea lion DPS (NMFS 2008b). Other prey items include Pacific cod, walleye Pollock, salmon, and herring.

Spatial Distribution and Diversity. The eastern DPS of Steller sea lions are a single population that ranges from southeast Alaska to southern California, including inland waters of Washington State and British Columbia. Occurrence in inland waters of Washington is limited to male and sub-adult Steller sea lions in fall, winter, and spring. They breed on rookeries in southeast Alaska, British Columbia, Oregon, and California. No rookeries occur in Washington. Haul-outs are located throughout their range (NMFS 2008b).

Steller sea lions disperse from rookeries after the breeding season. Adult males and juveniles range further from their rookeries than adult females (Allen and Angliss 2012). Exchange between rookeries is low (Allen and Angliss 2012). The breeding distribution of the eastern DPS has shifted north, with range contraction in southern California and new rookeries in southeast Alaska (Pitcher et al. 2007).

Abundance and Productivity. The total population size is between 58,334 and 72,223 (Allen and Angliss 2012). NMFS cannot estimate the historical abundance of the DPS because of poor data quality prior to 1970 (NMFS 2008b). The population increased 3.1 percent per year from the 1970s until 2002 (Pitcher et al. 2007). Rookeries in southeast Alaska and British Columbia had the largest population increases and account for 82 percent of the pup production in the DPS. Pup production in California has remained low (Allen and Angliss 2012).

Limiting Factors. The recovery plan did not identify any threats to the continued recovery of the eastern DPS (NMFS 2008b). However, factors which can affect population dynamics of the eastern DPS include predation from killer whales and sharks, fish harvests, killing by humans, entanglement in debris, disease, toxic substances, climate change, reduced prey quality, and disturbance (NMFS 2008b).

Humpback Whale

NMFS listed humpback whales as endangered under the Endangered Species Conservation Act (ESCA) in June 1970 (35 FR 18319). The ESA replaced the ESCA in 1973 and continued to list humpback whales as endangered. NMFS issued the final recovery plan for humpback whales in November 1991 (NMFS 1991).

Spatial Structure and Diversity. Humpback whales occur in all major oceans of the world. In the North Pacific, humpback whales feed in coastal waters from California to Russia, including in the Bering Sea. There are four stocks in the North Pacific, the Central North Pacific stock, the Western North Pacific stock, the California/Oregon/Washington stock, and the American Samoa stock (Carretta et al. 2012). The California/Oregon/Washington stock winters in coastal waters of Mexico and Central America and migrates to feeding areas from California to southern British Columbia in summer and fall (Carretta et al. 2012). Humpback whales forage on a variety of crustaceans, other invertebrates, and fish (NMFS 1991). Humpback whales occupy shallow coastal waters in the summer and deeper offshore waters during their winter migrations.

Abundance and Productivity. Based on the available data, humpback whales appear to be increasing in abundance (Carretta et al. 2012). Calambokidis et al. (2008) estimated that the current population of humpback whales in the North Pacific is approximately 18,000 to 20,000 whales. More recently, Barlow et al. (2011) estimated the abundance to be over 21,000. The estimated growth rate for this stock is between seven and eight percent per year (Calambokidis et al. 2009).

Calambokidis et al. (2009) estimated the abundance of the California/Oregon/Washington stock to be 2,043. Within this stock, regional abundance estimates vary among the feeding areas. Average abundance estimates ranged from 200 to 400 individuals for southern British Columbia/northern Washington and 1,400 to 2,000 for California/Oregon (Calambokidis et al. 2008; Barlow et al. 2011).

Factors which may be limiting humpback whale recovery include entanglement in fishing gear, collisions with ships, whale watch harassment, subsistence hunting, and anthropogenic sound (NMFS 1991).

2.2.2 Status of Critical Habitat

Puget Sound Chinook Salmon

NMFS designated critical habitat for the PS Chinook salmon and HCSR chum salmon ESUs on September 2, 2005. While the geographic extent of each ESU's critical habitat is different, the primary constituent elements (PCEs) are the same. The following are the PCEs NMFS identified for PS Chinook and HCSR chum salmon critical habitat:

> PCE 1--Freshwater spawning sites with water quantity and quality conditions and substrate that support spawning, incubation, and larval development;

PCE 2--Freshwater rearing sites with (1) water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility, (2) water quality and forage that support juvenile development, and (3) natural cover such as shade, submerged and overhanging large wood, logjams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks;

PCE 3--Freshwater migration corridors free of obstruction and excessive predation with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks that support juvenile and adult mobility and survival;

PCE 4--Estuarine areas free of obstruction and excessive predation with (1) water quality, water quantity, and salinity conditions that support juvenile and adult physiological transitions between fresh water and salt water, (2) natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels, and (3) juvenile and adult foraging opportunities, including aquatic invertebrates and prey fish, supporting growth and maturation;

PCE 5--Nearshore marine areas free of obstruction and excessive predation with (1) water quality and quantity conditions and foraging opportunities, including aquatic invertebrates and fishes, supporting growth and maturation, and (2) natural cover including submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels;

PCE 6--Offshore marine areas with water quality conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation.

Critical habitat throughout the Puget Sound basin has been degraded by numerous activities, including hydropower development, loss of mature riparian forests, increased sediment inputs, removal of large woody debris, intense urbanization, agriculture, alteration of floodplain and stream morphology, riparian vegetation disturbance, wetland draining and conversion, dredging, armoring of shorelines, marina and port development, road and railroad construction and maintenance, timber harvest, and mining. Changes in habitat quantity, availability, diversity, stream flow, temperature, sediment load, and channel instability are common limiting factors of critical habitat.

Southern Resident Killer Whale Critical Habitat

NMFS designated critical habitat for the SRKW DPS on November 29, 2006 (71 FR 69054). Critical habitat consists of three areas, the Summer Core Area in Haro Strait and waters around the San Juan Islands, Puget Sound, and the Strait of Juan de Fuca. NMFS identified the following physical and biological features essential to conservation, water quality to support growth and development, prey species of sufficient quantity, quality, and availability to support individual growth, reproduction, and development and population growth, and passage conditions to allow for migration, resting, and foraging.

Water Quality. Water quality in Puget Sound is degraded (Puget Sound Partnership 2006; 2008). For example, toxic chemicals in Puget Sound persist and build- up in marine organisms including SRKWs and their prey despite bans in the 1970s of some harmful substances and cleanup efforts. The primary concern for direct effects on whales from water quality is oil spills.

Prey Quantity, Quality, and Availability. Most wild salmon stocks throughout the Northwest are at fractions of their historical levels. Since 1994, NMFS has listed 28 ESUs and DPSs of salmon and steelhead in Washington, Oregon, Idaho, and California as threatened or endangered under the ESA. Overfishing, habitat loss, and hatchery practices are major causes of decline. Poor ocean conditions over the past two decades have also reduced wild populations. While wild salmon stocks have declined, hatchery production has been generally strong. Total Chinook salmon abundances increased significantly from the mid-1990s to the early 2000s, but have declined in the last several years (PFMC 2008).

Contaminants and pollution also affect the quality of SRKW prey in Puget Sound. Contaminants enter marine waters and sediment from numerous sources, but are typically concentrated near areas of high human population and industrialization. Once in the environment, these substances accumulate up the food chain and reach high levels in long-lived apex predators like SRKWs. The size of Chinook salmon is also an important aspect of prey quality. In addition, vessels and sound may reduce the effective zone of echolocation and reduce availability of fish for SRKWs in their critical habitat (Holt 2008).

Passage. The SRKWs are highly mobile and use a variety of areas for foraging and migration. Human activities can interfere with movements of the whales and impact their passage. In particular, vessels and acoustic disturbance may present obstacles to whale passage, causing the whales to swim further and change direction more often. This increases energy expenditure and impacts foraging behavior (NMFS 2011b).

2.3 Environmental Baseline

The "environmental baseline" includes the past and present impacts of all Federal, state, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of state or private actions which are contemporaneous with the consultation in process (50 CFR 402.02).

Possession Sound

Possession Sound is within the Whidbey Basin of Puget Sound. Human activities have degraded habitat in the basin through excessive sedimentation, failing septic systems, bulkheads, water quality degradation, and interruption of shoreline sediment sources and long shore transport processes. Approximately 22.5 percent of the Whidbey Basin shoreline is armored, particularly in the cities of Mukilteo and Everett and along the three miles of BNSF railroad between the two cities. The Whidbey Basin also has areas of low dissolved oxygen. Possession Sound is one of eight locations Ecology considers of highest concern for eutrophication. Human activities have degraded sediment quality. Nine percent of the Whidbey Basin marine area exceeds the state's sediment quality standards and the cleanup screening levels for one or more contaminants (PSP 2008).

Possession Sound has significant vessel traffic. In addition to the multiple daily runs of WSF vessels, Possession Sound also has large vessels using the Port of Everett and the Naval Station Everett, commercial fishing boats, and numerous smaller recreational boats. Background noise levels due to vessel traffic at the terminal exceed the 120 dBrms behavioral disturbance threshold for marine mammals. Laughlin (2011) reported background noise levels at the Mukilteo Ferry Terminal within the functional hearing range for SRKWs (122 dB_{rms}), Steller sea lions (122 dB_{rms}), and for humpback whales at (124 dB_{rms}).

Juvenile Chinook salmon use the area as they migrate out of their natal streams and rivers. In 1986 and 1987, a beach seine station within the action area near Mukilteo was sampled weekly from April through July. Juvenile Puget Sound Chinook salmon were more abundant than other salmonid species. Chinook salmon entered the area in low numbers beginning in late April, peaked in mid-May to early June and continued in moderate to high numbers through mid-July.

Eight years of beach seine data in Skagit Bay indicates that wild juvenile Chinook are most abundant along the shoreline between May and July, then decrease in August. Wild sub-yearling Chinook were captured infrequently in Skagit Bay during beach seining efforts in September and October. A nearly identical pattern was observed in Bellingham Bay where monthly sampling continued through December (Rice 2004). The Bellingham Bay research captured two juvenile Chinook in 14 sets in September, and no juvenile Chinook were captured between October and December. Similarly, tow-net sampling in deeper portions of the nearshore reveal a consistent downward trend in Chinook abundance in Skagit Bay between June and October (Rice et al. 2001). Tow-net sampling in Bellingham Bay also documented a summer peak and few juvenile Chinook captured in October (Beamer et al. 2003). No tow-net sampling was conducted in Bellingham Bay during September. In comparison to the beach seine results, juvenile Chinook presence in the Skagit Bay tow-net samples persisted later in the year (Rice et al. 2001). Tow-net sampling by Rice et al. (2011) showed that juvenile Chinook salmon presence in deeper nearshore areas of the Whidbey Basin peaks from July to September and that the majority of these fish are unmarked (and presumably wild).

There are no natal streams in the area of the Mukilteo Ferry Terminal that support Puget Sound steelhead. However, major river systems that support winter and summer steelhead include the Snohomish River (approximately 7 miles north), Stillaguamish River (approximately 15 shoreline miles north), Skagit River (approximately 20 shoreline miles north), and the Duwamish/Green River (approximately 30 shoreline miles south). In addition, numerous small streams in the Sinclair/Dyes Inlets and southern Puget Sound rivers and streams support winter steelhead.

Tow-net sampling (deeper nearshore) and beach seine sampling (shallow nearshore) around Puget Sound have found few steelhead. In tow-net sampling in north and south Puget Sound, NMFS captured a total of 18 steelhead (Rice, unpublished data). Although the total sampling data was not available, the mean steelhead catch ranged from 0 to 0.2 per net in north Puget Sound and 0.1 to 0.8 per net in south Puget Sound.

During 2001 and 2002, beach seining conducted in central Puget Sound by King County Department of Natural Resources captured only nine steelhead out of a total of approximately 34,000 juvenile salmonids (Brennan et al. 2004). Beach seine sampling in Bellingham Bay (north Puget Sound) also captured few steelhead (Lummi Nation, unpublished data). The Bellingham Bay research reported the capture of two juvenile steelhead salmon in 336 sets between February 14 and December 1, 2003. The steelhead were captured in the eastern portion of Bellingham Bay near the Taylor Avenue Dock on June 12 and June 25, 2003.

Southern resident killer whales, Steller sea lions, and humpback whales are likely to be present within the action area in Possession Sound. The Whale Museum manages a long-term database of SRKW sightings and geospatial locations in inland waters of Washington. While these data are predominately opportunistic sightings from a variety of sources (public reports, commercial whale watching, Soundwatch, Lime Kiln State Park land-based observations, and independent research reports), SRKW are highly visible in inland waters and widely followed by the interested public and research community. The dataset does not account for level of observation effort by season or location. However, it is the most comprehensive long-term dataset available to evaluate broad scale habitat use by SRKWs in inland waters. For these reasons, NMFS relies on the number of past sightings to assess the likelihood of SRKW presence in a project area and during work windows. A review of this dataset from the years 1990 to 2008 indicates that SRKW have used the project vicinity during the months that in-water construction activities are proposed (Table 2).

Table 2. Total killer whale sightings per month in the project action area between 1990 and 2008. Months corresponding to the in-water work window are highlighted in green.

Month	**Number of sightings**
July	0
August	3
September	5
October	20
November	20
December	22
January	18
February	7
March	15
April	7
May	14
June	0

NMFS has limited information about humpback whale foraging habits and space use in inside waters of Washington, and do not have specific fine-scale information for the project area. In recent years, humpback whales are sighted with increasing frequency in the inside waters of Washington, including Puget Sound, primarily during the fall and spring. However, occurrence is uncommon.

Steller sea lions can occur in Washington waters throughout the year. There are no breeding rookeries in Washington. Occurrence in inland waters of Washington is limited to male and sub-adult Steller sea lions in fall, winter, and spring months. Steller sea lions use haul-out locations in coastal and inland waters of Washington. The number of haul-out sites has increased in recent years. The closest documented haul out sites to the Mukilteo Ferry Terminal are the Rich Passage buoys near Manchester, approximately 19 miles southwest of the terminal (haul out #361/362) and Craven Rock, east of Marrowstone Island, approximately 23 miles northwest of the terminal (haul out #232). Generally, the Craven Rock haul out is occupied from October to May. From June to September, most Steller sea lions are at the Oregon or British Columbia rookeries or on the Washington coast haul out site.

There are also observer accounts of one to two Steller sea lions hauled out in Port Gardner near Everett, which is approximately 7 miles northeast of the terminal. Vessel-based sightings of Steller sea lions swimming in the passage between the Kingston and Edmonds Ferry Terminals (approximately 12 miles south of the Mukilteo Ferry Terminal) and in Useless Bay (approximately 11 miles west of the terminal) were recorded in the mid-1980s (NMML, unpublished data).

Existing Terminal

Substrates in the vicinity of the ferry terminal consist of coarse grained sand, gravel, and cobble. The beach is gently sloped. The shoreline has little vegetation and steep retaining walls and riprap. The WSF conducted an eelgrass survey in 2011 and found only one small eelgrass patch (less than one square foot) just east of the existing terminal. Possession Sound is classified as extraordinary for aquatic life use per WAC 173-201A-612. No parameters of concern have been identified in Washington State Department of Ecology's (Ecology) 2008 303(d) list.

The existing terminal covers 8,120 square feet of marine water and contains 248 creosote piles. The existing fishing pier covers 2,000 square feet of marine water and contains 42 creosote piles. The creosote piles degrade water quality in the action area by releasing polycyclic aromatic hydrocarbons (PAHs) into the marine environment. Water quality is a component of both SRKW and PS Chinook salmon (PCE 5) critical habitat. In addition to water quality effects, the pier is also a barrier to juvenile Chinook salmon migration which further degrades PCE 5 of PS Chinook salmon critical habitat.

New Terminal Location

The proposed terminal site is on the Tank Farm property which consists of approximately 20 acres of upland and 13 acres of adjacent offshore property. The upland portion of the property is

12 feet above mean sea level and is graded and flat. A protective riprap wall, approximately ten feet high, separates the property from Possession Sound. Vegetation on the property is almost entirely non-native and consists of small trees, shrubs, and herbaceous plants, although there are some small native black cottonwoods and red alders.

The Tank Farm property is contaminated as a result of past industrial uses, particularly when the site served as a fuel storage and loading facility. Testing in the 1970s and 1980s found petroleum hydrocarbons, volatile organic compounds, polychlorinated biphenyls, and heavy metals in the soil, groundwater, surface water, and sediments. The Air Force conducted a cleanup of the site in the 1990s and early 2000s. They installed a groundwater remediation treatment system of fuel product recovery, vapor extraction, and air sparge subsystems. This system operated on at least a portion of the site from 1997 until 2002, when performance monitoring of groundwater and surface water indicated that contaminants were at concentrations below the site-specific cleanup levels. In 2006, Ecology concluded that the monitoring was complete and, in 2008, removed the property from the Ecology Hazardous Sites List.

The WSF discovered soil contamination on the site during archaeological investigations for the proposed action. The WSF commissioned a study of soil and groundwater contamination on the Tank Farm property in 2006. Investigations revealed elevated levels of petroleum hydrocarbons and benzene, toluene, ethylbenzene, and xylenes.

Aquatic substrates in the vicinity of the proposed terminal are primarily sand and silt. Riprap extends from the high intertidal area and extends approximately 20 feet from the shore. Substrates underneath the Tank Farm pier also contain large chunks of concrete that have fallen off the pier, as well as shell hash from shellfish that cover the pilings. The WSF did not find any eelgrass during a 2011 survey of the footprint of the proposed terminal. The nearest eelgrass beds are on either side of the Mount Baker Terminal, more than 2,000 feet east of the proposed terminal location. The dominant macroalgae species at the proposed location are sea lettuce, northern bladder chain, and kelp.

The beach is steeply sloped at this location, dropping to 30 feet below MLLW within 75 feet of the shoreline. The military dredged a birth for ships along the east side of the Tank Farm pier in the late 1940s which created elevations east of the pier approximately 38 feet below MLLW. Water depth is shallower under the Tank Farm pier, 14 feet below MLLW due to a sediment mound. The mound may have been formed by sediments that drop out of seawater as wave energy is attenuated by the dense placement of pilings underneath the pier, it may have been created deliberately to provide support for the pier, or it may have resulted from placement of dredge material from the dredge channel.

Sediment sampling in 2003 along the Tank Farm property shoreline did not detect contaminants of concern above reporting limits or above Ecology Sediment Quality Standards. However, in 2009 composite tissue samples for mussels exceeded National Toxics Rule criteria for PCBs and PAHs (Ecology 2010). Sediment sampling underneath and adjacent to the Tank Farm pier in March and April of 2012 revealed levels of contaminants above DMMP screening level criteria. Upper levels of sediment, from the surface to eight feet deep) contained chlordane, an organochlorine pesticide, and lower levels, between eight and 12 feet deep, contained PAHs.

The sediment samples were from three to five feet from the creosote piles and did not capture higher levels of PAHs that are likely to be in sediments immediately adjacent to the piles.

The Tank Farm pier substantially degrades the baseline of the action area. It is supported by 3,900 creosote-treated piles and covers 3.17 acres of Possession Sound. The pier significantly degrades water quality in the action area. Water quality is a component of both SRKW and PS Chinook salmon (PCE 5) critical habitat. Ecology estimated that there are 100,000 creosote-treated piles in the marine waters of Puget Sound (Ecology 2012). The 3,900 piles from the Tank Farm pier and the 290 piles from the existing terminal and fishing pier represent approximately four percent of all of the creosote-treated pile in Puget Sound. Ecology used data from Valle et al. (2007) to estimate the annual release of PAHs into Puget Sound. Valle et al. (2007) estimated the annual release of 0.482 kilograms (1.063 pounds) per pile. Using these numbers, NMFS estimates that these two structures release approximately 2,000 kilograms (4,400 pounds) of PAHs into Possession Sound each year.

In addition to water quality effects, the overwater shading of the Tank Farm pier further degrades PCE 5 of PS Chinook salmon critical habitat in the action area. The sharp underwater light contrasts from overwater structures cause delays in migration from disorientation, fish school dispersal (resulting in a loss of refugia), and altered migration routes around the structures (Simenstad 1999). The characteristics of an overwater structure, including height and width, orientation, and piling type and number, can affect the severity of the shade-related impacts (Southard et al. 2006). The characteristics of the Tank Farm pier, particularly its width and large number of closely space creosote piles, make it a major migration barrier to juvenile Chinook salmon.

The Tank Farm pier also impairs benthic habitat from both the area of habitat the piles occupy and the area shaded by the pier. This reduces the production of benthic and epibenthic macroinvertebrates in the action area that juvenile Chinook prey upon.

2.4 Effects of the Action

"Effects of the action" means the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline (50 CFR 402.02). Indirect effects are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur. During consultation, neither NMFS nor the action agency identified any interrelated or interdependent actions.

The ESA prohibits the unauthorized take of threatened or endangered species, and regulations define the term "take" to include harassment. Some ESA-listed marine mammals will be harassed as they respond to sound associated with the proposed action. The ESA does not define harassment and NMFS has no regulation defining harassment. The U.S. Fish & Wildlife Service has promulgated a regulation that defines harassment as "an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering" (50 CFR § 17.3). Under the Marine Mammal Protection Act, there is a definition of what is referred to as Level B harassment: "any act of pursuit, torment, or annoyance which . . . has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering but which does not have the potential to injure a marine mammal or marine mammal stock in the wild" (16 U.S.C. 1362(18)(A)(ii)). This opinion considers all potential take associated with the proposed action, including the take under the more inclusive, MMPA definition of harassment.

2.4.1 Effects of the Action on Listed Species

Pile Driving and Vessel Traffic

Puget Sound Chinook Salmon and Steelhead. Pile driving can cause high levels of underwater sound. High enough levels of underwater sound can injure or kill fish and alter behavior (Turnpenny et al. 1994; Turnpenny and Nedwell 1994; Popper 2003; Hastings and Popper 2005). Death from barotrauma can be instantaneous or delayed up to several days after exposure. Even when not enough to kill fish, high sound levels can cause sublethal injuries. Fish suffering damage to hearing organs may suffer equilibrium problems, and may have a reduced ability to detect predators and prey (Turnpenny et al. 1994; Hastings et al. 1996). Hastings (2007) determined that a cumulative Sound Exposure Level (cSEL) as low as 183 dB (re: 1 μPa2-sec) was sufficient to injure the non-auditory tissues of juvenile spot and pinfish with an estimated mass of 0.5 grams.

Adverse effects on survival and fitness can occur even in the absence of overt injury. Exposure to elevated noise levels can cause a temporary shift in hearing sensitivity (referred to as a temporary threshold shift), decreasing sensory capability for periods lasting from hours to days (Turnpenny et al. 1994; Hastings et al. 1996). Popper et al. (2005) found temporary threshold shifts in hearing sensitivity after exposure to cSELs as low as 184 dB. Temporary threshold shifts reduce the survival, growth, and reproduction of the affected fish by increasing the risk of predation and reducing foraging or spawning success.

Cumulative SEL is a measure of the sound energy integrated across all of the pile strikes. The Equal Energy Hypothesis, described by NMFS (2007), is used as a basis for calculating cumulative SEL. The number of pile strikes is estimated per continuous work period. This approach defines a work period as all the pile driving between 12-hour breaks. NMFS uses the practical spreading model to calculate transmission loss. NMFS, USFWS, and WSDOT agreed to interim criteria to minimize potential impacts to fishes (FHWG 2008). The interim criteria identify the following thresholds for the onset of physical injury using peak sound pressure level (SPL) and cSEL:

- Peak SPL: levels at or above 206 dB from any hammer strike; and
- cSEL: levels at or above 187 dB for fish sizes of 2 grams or greater, or 183 dB for fish smaller than 2 grams.

The WSF will drive all steel piles using a vibratory hammer. Vibratory pile driving does not injure fish. As described above, the WSF will impact drive a total of 34, 24-inch concrete piles for the new terminal and fishing pier between July 15 and February 15. All PS Chinook salmon and PS steelhead will be greater than 2 grams during this window, so the cumulative SEL injury threshold for this project is 187 dB. The WSF will take two hours to drive each pile. For the new terminal, impact pile driving will be completed over five days, and for the fishing pier, impact pile driving will be completed over four days.

NMFS cannot estimate the number of individuals that will experience adverse effects from underwater sound. Impact pile driving will occur episodically throughout the in-water work seasons. NMFS cannot predict the number of individual fish that will be exposed. Furthermore, not all exposed individuals will experience adverse effects. Therefore, NMFS will use the physical and temporal extent of injurious levels of underwater sound to analyze the effects to PS Chinook salmon and PS steelhead.

Laughlin (2007) measured underwater sound from the impact driving of a 24-inch concrete pile at Mukilteo ferry terminal in 2006. Noise levels were 184 dB_{peak} and 170 dB_{rms} at 10 meters from the source. NMFS calculated individual strike SEL, 159 dB_{sel}, by subtracting 25 dB from the peak dB. Using these values, NMFS calculated the distance and the area that will be subjected to cumulative SELs greater than or equal to 187dB. Impact pile driving will subject the area within 59 feet of the piles (0.5 acre) to injurious levels of underwater noise. Adult and juvenile PS Chinook salmon and PS steelhead are likely to be present at different times during this window. These fish are likely to be injured but not killed.

Southern Resident Killer Whales. NMFS is currently developing comprehensive guidance on sound levels likely to disrupt normal behaviors or cause physical injury of SRKWs. Until formal guidance is available, NMFS uses conservative thresholds of sound pressure levels from broad-band sounds known to cause behavioral disturbance (160 dB_{rms} for impulse sound and 120 dB_{rms} for continuous sound)[2] and injury (180 dB_{rms} for whales and 190 dB_{rms} for pinnipeds (70 FR 1871; January 11, 2005). Laughlin (2011) reported background noise levels at the Mukilteo Ferry Terminal within the functional hearing range for SRKWs of 122 dB_{rms}. Therefore, NMFS used 122 dB_{rms} as the threshold for this analysis.

Impact pile driving of 24-inch concrete piles will generate noise levels of 170 dB_{rms}, which is below the injury thresholds of marine mammals. However, it is above the 160 dB_{rms} disturbance threshold for disturbance for impulse sound. The noise will attenuate to below the 160 dB_{rms} disturbance threshold with 152 feet. NMFS considers the chances of SRKWs to be that within that zone during the nine days of pile driving to be extremely unlikely.

There are no data on noise from stone column construction, which uses a vibratory probe to inject gravel and crushed rock into the soil. Sound from this me is likely similar to other types of vibratory construction methods, such as pile installation, that would generate noise levels of approximately 160 dB_{rms}. The WSF will install the stone columns over a eight-week period between July 15 and September 30. Data from the Whale Museum from 1990 to 2008 show that SRKWs rarely occur in the action area during these months. Therefore, NMFS considers the

[2] Throughout this document, the reference value for dB_{rms} is 1 μPa.

chances of SRKWs to be exposed to the noise from the stone column installation to be extremely unlikely.

Using the background noise level of 122 dB_{rms} in place of the disturbance threshold for continuous sound, the proposed vibratory pile driving activities will produce sound pressure levels that could disturb or injure marine mammals within a certain distance of the sound source. Vibratory removal of the approximately 4,200 creosote-treated timber piles will generate noise levels of up to 152 dB_{rms} exceeding the background levels of 122 dB_{rms} (Laughlin 2011). Using the practical spreading model, the noise will attenuate to background within one mile. The pile removal will take approximately 1,050 hours over three construction seasons.

Vibratory installation of the four drilled shaft casings and 91 steel piles (between 12 and 36 inches in diameter) will generate sound levels between 162 dB_{rms} and 174 dB_{rms} and will attenuate to background level between 2.9 and 18.2 miles. The vibratory installation of the drilled shaft casings and steel piles will take approximately 49.5 hours over 13 days during two construction seasons.

In general, SRKWs exposed to sound at or above 120 dB threshold (or above background levels) will respond in ways similar to those previously documented for mid-frequency hearing specialists exposed to non-pulse sound. Southall et al. (2007) conducted a comprehensive literature review of the effects of sound on marine mammals. Behavioral responses in mid-frequency cetaceans from exposure to non-pulse sound can include moderate changes in speed of travel, direction, or dive profile, moderate to extended cessation or modification of vocal behavior, minor or moderate avoidance of the sound source, and change in group distribution (Southall et al. 2007).

The SRKWs exposed to the sound of vibratory pile driving may be displaced from the portion of the action area during vibratory pile driving when noise levels are above the 122 dB background level, choosing to avoid the area in favor of less "noisy" water further away from sound sources caused by the proposed action. This could result in lost forage opportunity in those affected areas of the action area. If exposed, SRKWs are also likely to redirect around the sound instead of passing through the area. For the removal of the timber piles, the area of increased sound will be relatively small but will continue for an extended period of time. There are alternate foraging areas available, and SRKWs migrating through this area would have to travel less than a mile to avoid the disturbance (the one mile zone minus the distance from shore the SRKWs are when they encounter the underwater noise). In either case, the behavioral responses to increased noise from the timber pile removal will not reduce the reproductive success or increase the risk of physical injury or death for any individual SRKW.

For the vibratory installation of the drilled shaft casings and steel piles, the area of increased sound will be much larger but will also be 49.5 hours occurring intermittently over two six-month periods between July 15 and February 15. Forty-two percent of this window is during a time when SRKWs rarely occur in the action area. The SRKWs choosing to avoid this area during pile driving could lose foraging opportunities. However, there are alternate foraging areas available. Underwater noise from vibratory installation of the drilled shaft casings and steel piles will intermittently "block" access to Possession Sound from the south because the underwater noise will extend from Mukilteo on the mainland to Clinton on Whidbey Island. However, there will only be about 13 days with vibratory pile driving and an average of four hours of pile driving per day. Each pile will take between 30 and 60 minutes to drive. There will be breaks between piles when SRKWs could pass through the action area. Therefore, the noise from vibratory pile driving could delay migrating SRKWs for up to an hour. This is unlikely to cause a significant increase in an individual's energy budget and will not reduce the reproductive success or increase the risk of physical injury or death for any individual SRKW.

The WSF will use tugs and barges to construct the project. Tugs are slow moving, follow a predictable course, do not target whales (in the manner that whale watching vessels do), and should be easily detected by SRKWs. Vessel strikes are extremely unlikely and any potential encounters with SRKWs will be sporadic and transitory in nature. Most of the sound pressure produced by a tug towing a loaded barge will be below the level of peak hearing sensitivity for killer whales. When the tug is in motion, sound pressure levels will be transient and will attenuate to background levels a short distance from any one location. Therefore, the sound is unlikely to mask acoustic signals of biological significance to SRKWs.

Steller Sea Lions. Steller sea lions may be present during the in-water work window, October 1 to February 14. Based on the conservative thresholds described above for SRKWs, the impact pile driving of 24-inch concrete piles will generate noise levels of 170 dBrms, which is below the injury thresholds of marine mammals. Laughlin (2011) reported background noise levels at the Mukilteo Ferry Terminal within the functional hearing range for Steller sea lions of 122 dBrms. Therefore, NMFS used 122 dBrms as the threshold for this analysis.

Vibratory pile-driving will generate noise levels of up to 174 dB_{rms}, exceeding the background levels of 122 dB_{rms}. The nearest regularly used haul outs are 19 and 23 miles from the project. On any given day, it is unlikely that Steller sea lions would be foraging within the action area. However, there are sighting records of Steller sea lions within the action area. Given that the pile driving will take place over two six-month work windows, it is likely that a very small number of Steller sea lions will be exposed to underwater noise. As a result of sound exposure, Steller sea lions may spend less time foraging in the action area. In the event that animals are displaced from foraging areas in the action area, there are alternative foraging areas available to the affected individuals.

Humpback Whale. As described in the Status of the Species section, NMFS does not have fine-scale information about humpback whale use of the action area, but their occurrence there is uncommon. Based on this information, NMFS expects only a few individual humpback whales may forage or pass through the project vicinity when pile driving would occur. As described above, the impact pile driving of the concrete steel piles will not exceed the injury threshold. Laughlin (2011) reported background noise levels at the Mukilteo Ferry Terminal within the functional hearing range for humpback whales of 124 dB_{rms}. Therefore, NMFS used 124 dB_{rms} as the threshold for this analysis.

Vibratory pile driving will generate noise levels of up to 174 dB_{rms}, exceeding the background noise level of 124 dB_{rms}. Humpback whales exposed to sound at or above 120 dB_{rms} threshold (or, in this case, background levels) may elicit behavioral responses similar to previously documented responses by low-frequency hearing specialists to non-pulse sound. Noise from the vibratory pile driving will attenuate to the 124 dB_{rms} background level within 13.4 miles.

There are no studies that document the response of low-frequency sound specialists to pile driving. Humpback whales exposed to sound from the proposed pile driving are unlikely to detect the physical presence of pile driving machinery. For this reason, NMFS concludes that of the non-pulse sound sources that studied the documented response to playback sound, as opposed to studies that documented response to both sound and physical presence of machinery, are most applicable to the likely response under evaluation (Malme et al. 1983, 1984, and 1986). These studies documented responses that range from slight deviation in course and deflection around the sound (migrating whales) to avoidance of the area (feeding whales). Therefore, NMFS anticipates that if humpback whales are exposed to sound from the vibratory pile driving in the project vicinity, they may respond by either changing course to deflect around the sound (migrating whales) or by avoiding the area (feeding whales).

Similar to SRKWs, there are alternate foraging areas available, and the short delays to migration are unlikely to cause a significant increase in an individual's energy budget. Therefore, the effects are anticipated to be short-term and will not reduce the reproductive success or increase the risk of injury or mortality for any individual humpback whale.

The WSF will use tugs and barges to construct the project. They are slow moving, follow a predictable course, and do not target whales. Therefore, vessel strikes are extremely unlikely and any potential encounters with humpback whales are expected to be sporadic and transitory in nature.

Contaminants

Presently, creosote-treated piles contaminate the surrounding sediment up to two meters away with PAHs (Evans et al. 2009). The removal of the creosote-treated piles mobilizes these PAHs into the surrounding water and sediments (Smith et al. 2008; Parametrix 2011). The project will also release PAHs directly from creosote-treated timber during the demolition of the deck and if any of the piles break during removal (Parametrix 2011). The concentration of PAHs released into surface water rapidly dilutes. Smith et al. (2008) reported concentrations of total PAHs of 101.8 µg/l 30 seconds after creosote-pile removal and 22.7 µg/l 60 seconds after. However, PAH levels in the sediment after pile removal can remain high for six months or more (Smith et al. 2008). Romberg (2005) found a major reduction in sediment PAH levels three years after pile removal contaminated an adjacent sediment cap.

There are two pathways for PAH exposure to listed fish species in the action area, direct uptake through the gills and dietary exposure (Lee and Dobbs 1972; Neff et al. 1996; Karrow et al. 1999; Varanasi et al. 1993; Meador et al. 2006; McCain et al. 1990; Roubal et al. 1977). Fish rapidly uptake PAHs through their gills and food but also efficiently remove them from their body tissues (Lee and Dobbs 1972; Neff et al. 1996). Juvenile Chinook salmon prey, including amphipods and copepods, uptake PAHs from contaminated sediments (Landrum and Scavia 1983; Landrum et al. 1984; Neff 1982). Varanasi et al. (1993) found high levels of PAHs in the stomach contents of juvenile Chinook salmon in the Duwamish estuary.

The primary effects of PAHs on salmonids from both uptake through their gills and dietary exposure are immunosuppression and reduced growth. Karrow et al. (1999) characterized the immunotoxicity of creosote to rainbow trout (*Oncorhynchus mykiss*) and reported a lowest observable effect concentration for total PAHs of 17 μg/l. Varanasi et al. (1993) found greater immune dysfunction, reduced growth, and increased mortality compared to control fish. In order to isolate the effects of dietary exposure of PAHs on juvenile Chinook salmon, Meador et al. (2006) fed a mixture of PAHs intended to mimic those found by Varanasi et al. (1993) in the stomach contents of field-collected fish. These fish showed reduced growth compared to the control fish.

Listed fish which currently use the habitat near the three creosote-treated timber structures are likely to be exposed to PAHs. The magnitude of the exposure will greatly increase during the removal of these structures and the dredging. NMFS expects increased PAHs in the water column and sediments will remain within the area of increased suspended sediment caused by the project. Therefore, the water and substrate within 150 feet of the structure demolition (16.8 acres) and within 300 feet of the dredging (14.5 acres) will have increased levels of PAHs. Within three years after construction, the removal of the creosote-treated timber will reduce listed-fish exposure to PAHs in the long-term. Some of the listed fish exposed to PAHs from the proposed action will experience immunosuppression and reduced growth which, in some cases will increase the risk of death.

Because they are shoreline-oriented and spend a greater amount of time within the action area, juvenile Chinook salmon will have the highest probability of exposure to PAHs. However, NMFS cannot discount the probability of adult and juvenile steelhead and adult Chinook salmon exposure. NMFS cannot predict the number of Chinook salmon and steelhead that will exposed to PAHs. The numbers of each species within the action area varies year to year. NMFS also cannot estimate the proportion of fish each year that will enter the impact zones. Therefore, NMFS will use the area within 150 feet of the creosote-treated timber structure demolition and within 300 feet of the dredging as a surrogate for the number of Chinook salmon and steelhead affected.

Overwater Coverage

The project will construct three new structures with overwater coverage, the new trestle (0.35 acre), the new terminal building (0.06 acre), and the new fishing pier (0.07 acre). Overwater structures cause delays in migration for PS Chinook salmon from disorientation, fish school dispersal (resulting in a loss of refugia), and altered migration routes around the structures (Simenstad 1999). However, the project will also remove three existing structures with overwater coverage, the existing trestle (0.23 acre), the existing fishing pier (0.05 acre), and the Tank Farm pier (3.17 acres).

Overall, the project will reduce overwater coverage by 2.97 acres. This reduction will improve the ability of juvenile Chinook salmon to migrate through the action area and reduce the predation risks associated with overwater structures. The Tank Farm pier removal will also improve benthic habitat by removing the piles and shading. This will increase the production of benthic and epibenthic macroinvertebrates in the action area that juvenile Chinook prey upon.

Stormwater

As described above, the WSF will add 10.2 acres of PGIS to the existing 2.43 acres of existing PGIS. They will treat stormwater from all 12.63 acres of PGIS using Filterra systems, an enhanced stormwater BMP. Exposure to stormwater pollutants causes reduced growth, impaired migratory ability, and impaired reproduction in salmonids. The extent and severity of these effects varies depending on the extent, timing, and duration of the exposure, ambient water quality conditions, the species and life history stage exposed, pollutant toxicity, and synergistic effects with other contaminants (EPA 1980). The primary pollutants of concern in stormwater from road surfaces are total suspended solids (TSS), total zinc, dissolved zinc, total copper, and dissolved copper. Dissolved metals are particularly difficult to remove from stormwater.

The WSF used the Highway Runoff Dilution and Loading model (HI-RUN) model to predict the post-treatment annual pollutant loading, effluent concentration, and dilution zone dimensions. The HI-RUN model uses a statistical procedure called Monte Carlo simulation. Monte Carlo simulation is a method that estimates possible outcomes from a set of random variables by simulating a process a large number of times and observing the outcomes. Using Monte Carlo simulation, the HI-RUN model calculates multiple model output scenarios by repeatedly sampling values for each input variable from computer-generated probability distributions. In this way, a probability distribution can be derived for the model output that indicates which predicted values have a higher probability of occurrence. The probability of exceeding a specific threshold for detrimental effects also can be determined using this procedure. The WSF used the CORMIX dilution model for the discharges. They used a modified version of HI-RUN to calculate pollutant loadings and concentrations for the outfalls and fed that information into the CORMIX model.

Dissolved copper and dissolved zinc are the constituents of greatest concern because they are prevalent in stormwater, they are biologically active at low concentrations, and they have adverse effects on salmonids (Sandahl et al. 2007; Sprague 1968). Increased copper and zinc loading presents two pathways for possible adverse effects: direct exposure to water column pollutant concentrations in excess of biological effects thresholds and indirect adverse effects resulting from the accumulation of pollutants in the environment over time, altered food web productivity, and possible dietary exposure.

Baldwin et al. (2003) found that 30 to 60 minute exposures to a dissolved copper concentration of 2.3 µg/l over background level caused olfactory inhibition in coho salmon juveniles. Sandahl et al. (2007) found that a three hour exposure to a dissolved copper concentration of 2.0 µg/l caused olfactory inhibition in coho salmon juveniles.

The toxicity of zinc is widely variable, dependent upon concurrent levels of calcium, magnesium, and sodium in the water column (De Schamphelaere and Janssen 2004). A review of zinc toxicity studies reveals effects including reduced growth, avoidance, reproduction impairment, increased respiration, decreased swimming ability, increased jaw and bronchial abnormalities, hyperactivity, hyperglycemia, and reduced survival in freshwater fish (Eisler 1993). Juveniles are more sensitive to elevated zinc concentrations than adults (EPA 1987). Sprague (1968) documented avoidance in juvenile rainbow trout exposed to dissolved zinc concentrations of 5.6 µg/l over background levels.

The results of CORMIX modeling are shown in Table 3. This table shows the distances from each outfall where the concentrations of dissolved zinc and dissolved copper will remain above the biological effects thresholds during stormwater discharge.

Table 3.

Outfall	Receiving Water body	Dilution Zone Dissolved Zinc (ft)	Dilution Zone Dissolved Copper (ft)
Brewery Creek (4-24)	Possession Sound	21.0	12.9
Japanese Gulch (5-30)	Possession Sound	46.2	19.1
Japanese Gulch (6-XX)	Possession Sound	15.5	4.71

Because they are shoreline-oriented and spend a greater amount of time within the action area, juvenile Chinook salmon will have the highest probability of exposure to stormwater pollutants from these outfalls. However, because the project will discharge stormwater in perpetuity, NMFS cannot discount the probability of adult and juvenile steelhead and adult Chinook salmon exposure.

Juvenile Chinook salmon using the dilution zones during stormwater discharges will likely experience increased physiological stress, reduced feeding, impaired ability to detect predators, and behavior alterations. Because they are likely to migrate quickly through the action area, adult and juvenile steelhead and adult Chinook salmon will experience less exposure to dissolved copper and dissolved zinc than juvenile Chinook salmon. Juvenile steelhead will likely experience increased physiological stress, reduced feeding, impaired ability to detect predators, and behavior alterations. Adult Chinook salmon and adult steelhead exposed to stormwater discharges will experience increased physiological stress and behavior alterations (e.g. altered migration routes).

NMFS cannot predict the number of Chinook salmon and steelhead that will be exposed to the stormwater discharges. Stormwater discharges will occur in perpetuity. The numbers of each species within the action area varies year to year as does the number of rain events that produce stormwater effluent. NMFS also cannot estimate the proportion of fish each year that will enter the dilution zones. Therefore, the distance from the outfalls where dissolved copper and dissolved zinc are above the biological effects thresholds serves to quantify the exent of affected Chinook salmon and steelhead.

2.4.2 Effects on Critical Habitat

Puget Sound Chinook Salmon

The action area contains the nearshore marine PCE of PS Chinook salmon critical habitat. The essential elements of this PCE include areas free of obstruction and excessive predation with (1) water quality and quantity conditions and foraging opportunities, including aquatic invertebrates and fishes, supporting growth and maturation, and (2) natural cover including submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels. The effects of the proposed action include beneficial effects on the free passage, water quality, and foraging elements of the nearshore marine PCE.

As described above, the Tank Farm pier is a significant obstruction to migrating juvenile Chinook salmon. The removal of the pier will decrease total overwater coverage in the action area by 2.97 acres of overwater cover. The removal will substantially improve passage conditions within the action area.

Removal of the creosote-treated timber structures (the Tank Farm pier, the existing terminal, and the existing fishing pier) and dredging will temporarily degrade water quality by releasing PAHs and other contaminants. It will also degrade water quality near the three outfalls in perpetuity from stormwater discharges. However, removing the 7,775 tons of creosote-treated timber from the action area will substantially improve water quality in the long-term. Water quality degradation from the removal of the creosote-treated timber structures and dredging will temporarily reduce prey quantity and quality.

The stormwater discharges from the outfall on Brewery Creek will impact sand lance spawning and reduce the quantity and quality of this prey species within the action area. However, removing the 7,775 tons of creosote-treated timber and reducing shading of the nearshore by 2.97 acres will lead to a net increase in both prey quality and quantity.

Southern Resident Killer Whale

The proposed action will affect SRKW critical habitat. As described above, the proposed action will have short-term adverse effects on Chinook salmon, the primary prey of SRKWs. These adverse effects include exposure to contaminants, some of which can bioaccumulate. This will reduce survivorship for exposed juvenile Chinook salmon increase the amount of contaminants in their tissues. The long-term effects of the project will increase the quantity and quality of Chinook salmon. However, these effects to PS Chinook are unlikely to have any measurable effect on the overall quantity and quality of SRKW prey. Only a very small percentage of the PS Chinook salmon ESU will experience these adverse effects, and these individuals will only spend a very short period of time within the action area. The PS Chinook salmon ESU comprises a small percentage of the SRKW diet. Hanson et al. (2010) found only six to 14 percent of Chinook salmon eaten by SRKWs in the summer were from Puget Sound. Therefore, NMFS concludes that both the short-term adverse effects and the long-term beneficial effects on SR killer whale prey quantity and quality will be insignificant.

The sound from vibratory pile driving will interfere with SRKW passage. For example, exposed SRKWs are likely to redirect around the sound instead of passing through the area. However, as described above, the effects of the additional distance traveled is unlikely to cause a measureable increase in an individual's energy budget, and the effects would therefore be temporary and insignificant.

2.5 Cumulative Effects

"Cumulative effects" are those effects of future state or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation (50 CFR 402.02). Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

There are no reasonably foreseeable non-Federal activities within the action area. Federal actions dominate current and future impacts in the action area because the vast majority of activities which may affect listed species in the action area will require an approval under the CWA. Future Federal actions will be subject to section 7(a)(2) consultation under the ESA. As described in section 2.3 Environmental Baseline, vessel traffic and fishing activities are the primary ongoing non-Federal activities in the action area. Specific threats from vessel traffic include the risk from strikes, behavioral disturbance, and acoustic masking. Protective regulations issued by NMFS in 2011 will minimize these threats in the action area (76 FR 20870; April 14, 2011).

2.6 Integration and Synthesis

The Integration and Synthesis section is the final step of NMFS' assessment of the risk posed to species and critical habitat as a result of implementing the proposed action. In this section, we add the effects of the action (Section 2.4) to the environmental baseline (Section 2.3) and the cumulative effects (Section 2.5) to formulate the agency's biological opinion as to whether the proposed action is likely to: (1) Result in appreciable reductions in the likelihood of both survival and recovery of the species in the wild by reducing its numbers, reproduction, or distribution; or (2) reduce the value of designated or proposed critical habitat for the conservation of the species. These assessments are made in full consideration of the status of the species and critical habitat (Section 2.2).

Puget Sound Chinook Salmon

Puget Sound Chinook salmon will be exposed to injurious levels of underwater noise from the impact pile driving of the concrete piles. The noise will extend up to 59 feet away from the impact pile driving and impact 0.5 acre of aquatic habitat. However, there will only be nine days of impact pile driving. Therefore, only a small percentage of juvenile Chinook salmon that use this 0.5-acre of aquatic habitat will be exposed and experience the sublethal adverse effects described above. These sublethal effects will not have an observable effect on the spatial structure, productivity, long-term abundance, or diversity of the PS Chinook salmon ESU.

Puget Sound Chinook salmon will be exposed to increased levels of PAHs in the water column during and immediately following the demolition of the creosote-treated timber structures and dredging. Puget Sound Chinook salmon will also be exposed to increased levels of PAHs in their prey items within the action area. Fish foraging in the area will be exposed to increased PAH levels in their prey from the start of construction to up to three years after. The exposed fish will likely experience immunosuppression and reduced growth which may lead to increased mortality. However, the area subjected to increased PAHs is a very small fraction of the total habitat available to juvenile PS Chinook salmon, and prey items from this area will make up a very small percentage of any individual fish's diet. Furthermore, juvenile Chinook salmon from multiple populations use the action area. Therefore, the effects from PAH exposure will not have an observable effect on the spatial structure, productivity, long-term abundance, or diversity on any single population or the PS Chinook salmon ESU as a whole.

Puget Sound Chinook salmon will be exposed to elevated pollutant levels from stormwater discharges. Juveniles using the dilution zones during stormwater discharges will likely experience increased physiological stress, reduced feeding, impaired ability to detect predators, and behavior alterations. However, only a subset of the juveniles in any given year will migrate within the dilution zone of the outfalls. Furthermore, migration of Chinook salmon through the action area occurs from late-spring to early-fall when rain events large enough to cause stormwater discharges are less frequent. Only individuals within the dilution zones during stormwater discharges will be affected. Given the infrequency of rain events during the Chinook salmon migration times, and the small area of the dilutions zones compared to the amount of habitat in the action area, the elevated pollutant levels from stormwater discharges will not have an observable effect on the VSP parameters of the ESU as a whole.

The removal of the Tank Farm pier and the other creosote-treated timber structures will substantially improve habitat conditions in the action area. It will remove 7,775 tons of creosote-treated timber from the marine environment and 2.97 acres of over-water cover. This will lead to a long-term increase in water quality and significantly improve the ability of juvenile Chinook salmon to forage and migrate through the area. Overall, the project will improve the VSP parameters of the ESU.

Puget Sound Steelhead

Puget Sound steelhead are larger than PS Chinook salmon when they enter the Sound. They spend very little time in nearshore areas and migrate rapidly to the ocean. While any individuals exposed to the stressors from this project will experience the same adverse effects as PS Chinook salmon, both the absolute number individuals and the percentage of the population that will be exposed to these stressors will be substantially lower. Therefore, the project will not have an observable effect on the VSP parameters of the DPS.

Southern Resident Killer Whales

Several factors identified in the recovery plan for SRKW may be limiting recovery. These are quantity and quality of prey, toxic chemicals that accumulate in top predators, and disturbance from sound and vessels. Oil spills are also a risk factor. It is likely that multiple threats are acting together. Although it is not clear which threat or threats are most significant to the survival and recovery of SRKWs, all of the threats are important to address.

The entire SRKW DPS is a single population of 85 whales. The effective population size of less than 30 whales is very small, and this, in combination with the absence of gene flow from other populations, may elevate the risk from inbreeding. A delisting criterion for the SRKW DPS is an average growth rate of 2.3 percent for 28 years (NMFS 2008a). The current average growth rate of 0.3 percent, the risk of stochastic events, and genetic issues underscore the importance for the population to grow quickly.

A small number of SRKWs will be affected by pile driving activities, and the most significant effect will be behavioral response. Behavioral responses can include changes in speed of travel, direction, or dive profile; moderate to extended cessation or modification of vocal behavior; minor or moderate avoidance of the sound source, and change in group distribution. Exposed killer whales may be displaced and precluded from foraging in the project vicinity, though there are alternate foraging areas available. Exposed individuals are also likely to alter their travel pattern around the sound instead of passing through the area. Any additional distance traveled is unlikely to cause a significant increase in an individual's energy budget, and the effects would be short-term. The likely behavioral responses, even considering potential for repeat exposures of individual whales, are not anticipated to reduce the reproductive success or increase the risk of injury or mortality for any individual SRKW.

As described above, the effects of the proposed action on prey quality or quantity will be insignificant. Additionally, vessels associated with the proposed action are extremely unlikely to affect SRKWs. Effects of the action, when added to threats that are part of the environmental baseline, and when cumulative effects are considered, will not appreciably reduce the species' ability to survive and recover.

Steller Sea Lions

The eastern DPS of Steller sea lions is a large population, which over the past 30 years has increased approximately three percent per year. Steller sea lions are generalist predators and are able to respond to changes in prey abundance. There are no substantial threats to the species, and NMFS has proposed removing the eastern DPS from the Federal List of Endangered Wildlife and Plants.

The nearest regularly used haul outs are 19 and 23 miles from the project. Any Steller sea lions in the action area will likely spend less time foraging in the immediate vicinity. However, there are alternative foraging areas available to the affected individuals. Short-term displacement is likely to cause disruptions in their normal behavioral patterns in the action area. There are no current threats to the species that are either part of the environmental baseline or cumulative effects in the action area that will affect Steller sea lion in addition to the activities of the proposed action. Effects of the action, in addition to threats that are part of the environmental baseline or cumulative effects, will not appreciably reduce the species' ability to survive and recover.

Humpback Whales

The current abundance of humpback whales in the North Pacific is approximately 18,000 to 21,000. Approximately 2,000 of those whales are part of the Washington/Oregon/California stock. Humpback whales are sighted with increasing frequency in the inside waters of Washington, primarily during the fall and spring months. However, occurrence is uncommon.

Based on the available information about foraging habits and space use of humpback whales inside waters of Washington, a few whales are likely to pass through and may forage in the project vicinity. The potential exposure of humpback whales to underwater sound may elicit behavioral responses within the range of previously documented responses by low-frequency hearing specialists to non-pulse sound. Based on a review of these documented responses, NMFS concludes that humpback whales exposed to sound from the vibratory pile driving may respond by either a deviation in their course to deflect around the sound (migrating whales) or by avoiding the area (feeding whales). Exposed humpback whales may be displaced and precluded from foraging in the project vicinity. However, there are alternate foraging areas available. Exposed humpback whales may also deflect around the sound instead of passing through the area. The likely short-term behavioral responses, even considering potential for repeat exposures of individual whales, will not reduce the reproductive success or increase the risk of injury or mortality for any individual humpback whale. Effects of the action, in addition to threats that are part of the environmental baseline or cumulative effects will not appreciably reduce the species' ability to survive and recover.

2.7 Conclusion

After reviewing the current status of the listed species, the environmental baseline within the action area, the effects of the proposed action, and cumulative effects, it is NMFS' biological opinion that the proposed action is not likely to jeopardize the continued existence of SRKWs, the eastern DPS of Steller sea lion, or humpback whales, or destroy or adversely modify SRKW critical habitat.

2.8. Incidental Take Statement

Section 9 of the ESA and Federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without a permit or exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by regulation to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Section 7(b)(4) and Section 7(o)(2) provide that taking that is incidental to an otherwise lawful agency action is not considered to be prohibited taking under the ESA, if that action is performed in compliance with the terms and conditions of this incidental take statement.

NMFS is not including an incidental take authorization for marine mammals at this time because the incidental take of marine mammals has not been authorized under section101(a)(5) of the Marine Mammal Protection Act and/or its 1994 Amendments. Following the issuance of such regulations or authorizations for marine mammals, NMFS may append this Opinion to include an incidental take statement for marine mammals.

2.8.1 Anticipated Amount or Extent of Take

Effects of the action will coincide with the presence of PS Chinook salmon and PS steelhead such that the incidental take is reasonably certain to occur. The take described below cannot be accurately quantified as a number of fish because NMFS cannot predict, using the best available science, the number of individuals of listed fish species that will be exposed to these stressors. Furthermore, even if NMFS could estimate that number, the manner in which each exposed individual responds to that exposure cannot be predicted.

In circumstances where NMFS cannot estimate the amount of individual fish that would be injured or killed by the effects of the proposed action, NMFS assesses the extent of take as an amount of modified habitat and exempts take based only on that extent. This extent is readily observable and therefore suffices to trigger reinitiation of consultation, if exceeded and necessary (see H.R. Rep. No 97-567, 97th Cong., 2d Sess. 27 (1982).

NMFS cannot estimate the number of individuals that will experience adverse effects from underwater sound. Impact pile driving will occur episodically throughout the in-water work seasons. NMFS cannot predict the number of individual fish that will be exposed. Furthermore, not all exposed individuals will experience adverse effects. Therefore, NMFS will use the physical and temporal extent of injurious levels of underwater sound as a surrogate for the number of fish. NMFS exempts take from impact pile driving (cumulative SEL greater than 187dB) for the area within 59 feet of the new concrete piles (0.5 acre).

NMFS cannot estimate the number of individuals that will experience adverse effects from exposure to contaminants. The numbers of each species within the action area varies year to year. NMFS also cannot estimate the proportion of fish each year that will enter the impact zones. Therefore, NMFS will use the area within 150 feet of the creosote-treated timber structure demolition and within 300 feet of the dredging as a surrogate for the number of Chinook salmon and steelhead affected. NMFS exempts take from contaminant exposure for the areas within 150 of the existing terminal, existing fishing pier, and the Tank Farm pier (16.8 acres) and within 300 feet of dredging (14.5 acres).

NMFS cannot predict the number of Chinook salmon and steelhead that will be exposed to the stormwater discharges. Stormwater discharges will occur in perpetuity. The numbers of each species within the action area varies year to year as does the number of rain events that produce stormwater effluent. NMFS also cannot estimate the proportion of fish each year that will enter the dilution zones. Therefore, NMFS will use the distance from the outfalls where dissolved copper and dissolved zinc are above the biological effects thresholds described above as a surrogate for the number of Chinook salmon and steelhead affected. NMFS exempts take from stormwater discharges (dissolved zinc 5.6 µg/l over background concentrations and dissolved copper at 2.0 µg/l over background concentrations) for:

1. The area within 21.0 feet of the Brewery Creek (4-24) outfall for dissolved zinc and within 12.9 feet for dissolved copper;

2. The area within 46.2 feet of the Japanese Gulch (5-30) outfall for dissolved zinc and within 19.1 feet for dissolved copper; and

3. The area within 15.5 feet of the Japanese Gulch (6-XX) outfall for dissolved zinc and within 4.71 feet for dissolved copper.

2.8.2 Effect of the Take

The effect of take on PS Chinook salmon and PS steelhead is describe above in Section 2.4 and 2.6, and will not jeopardize either species.

2.8.3 Reasonable and Prudent Measures

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

The FTA shall minimize take of species PS Chinook salmon and PS steelhead. These reasonable and prudent measures are necessary and appropriate to minimize the take of these species. The FTA shall:

1. minimize incidental take from impact-driving of concrete piles;

2. minimize incidental take from contaminants; and

3. minimize incidental take from stormwater discharges;

2.8.4 Terms and Conditions

1. To implement RPM 1, the FTA shall:

   a) Impact drive the concrete piles during low tides to the maximum extent practicable;

   b) When impact driving concrete piles in water three or more feet deep, monitor underwater noise as described in Appendix C of the BA; and

   c) Submit the results of the underwater noise monitoring to NMFS.

2. To implement RPM 2, FTA shall:

   a) Conduct all dredging between November 1 and February 15;

   b) Use an enclosed bucket for dredging;

   c) Conduct pile removal activities and demolition of creosote-treated timber elements of the 655-foot section of the Tank Farm pier above the future navigation channel between July 15 and February 15;

   d) Conduct pile removal activities and demolition of creosote-treated timber elements of the other section of the Tank Farm pier between September 1 and February 15;

   e) Install floating booms during all demolition and pile removal activities for the Tank Farm pier, existing terminal pier, and existing fishing pier;

   f) Equip the floating booms shall with absorbent pads to contain any oil sheens;

   g) Fill any holes from the removed creosote piles from the Tank Farm pier with clean sand or gravel;

   h) Cap the area within two feet of the removed creosote piles from the Tank Farm with clean sediment;

   i) Use the stable grain size for the 25-year return period storm event as calculate by Coast and Harbor Engineering (2012) for the sediment cap;

   j) Submit the following to NMFS: (1) the DMMP Compliance Sediment Characterization Report or equivalent, (2) the results of any other future contaminant sampling of marine sediments in the project area, (3) a turbidity monitoring report by April 1 following each construction season, (4) a contaminants monitoring report which will include the BMPs implemented to control the release of contaminates into marine waters and the disposition of creosote-treated wood and contaminated sediments; and

k) Report any violations of the WDFW's Hydraulic Project Approval or Ecology's requirements to NMFS.

3. To implement RPM 3, the FTA and WSDOT shall implement the programmatic approach to monitoring detailed in "Programmatic Monitoring Approach for Highway Stormwater Runoff in Support of Endangered Species Act (ESA) Section 7 Consultations." The sites selected for this programmatic monitoring approach shall be representative of conditions within the action area, including average daily traffic and seasonal and temporal variations in stormwater runoff quantity and quality. If the programmatic monitoring shows that the analysis performed for this project has underestimated the end of pipe effluent concentrations or the size of the dilution zones then the reinitiation provisions of this opinion may be triggered.

2.9. Conservation Recommendations

Section 7(a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the threatened and endangered species. Specifically, conservation recommendations are suggestions regarding discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information (50 CFR 402.02).

NMFS has identified the following measures to further minimize or avoid adverse effects to listed species:

1. Relocate outfall # 4-24 away from sand lance spawning areas;

2. Use translucent structural glass or another light-penetrating surface for the deck of the new fishing pier; and

3. Use permeable pavement in all areas of post-project PGIS where the infiltrated stormwater would not encounter contaminated soils or ground water.

2.10 Reinitiation of Consultation

As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded, (2) new information reveals effects of the agency action on listed species or designated critical habitat in a manner or to an extent not considered in this opinion, (3) the agency action is subsequently modified in a manner that causes an effect on the listed species or critical habitat not considered in this opinion, or 4) a new species is listed or critical habitat designated that may be affected by the action.

2.11 "Not Likely to Adversely Affect" Determinations

Yelloweye Rockfish, Canary Rockfish, and Bocaccio

Rockfish fertilize their eggs internally and the young are extruded as larvae. Rockfish larvae are pelagic, often found near the surface of open waters, under floating algae, detached seagrass, and kelp. Juvenile bocaccio and canary rockfish settle onto shallow nearshore water in rocky or cobble substrate that support kelp and other macroalgae at 3 to 6 months of age, and move to progressively deeper waters as they grow (Love et al. 2002). Juvenile yelloweye rockfish do not typically occupy shallow waters (Love et al. 1991) and are very unlikely to be within the action area. Adult yelloweye rockfish, canary rockfish, and bocaccio typically occupy waters deeper than 120 feet (Love et al. 2002).

Larval yelloweye rockfish, canary rockfish or bocaccio could occur within the project and action area, though they are readily dispersed by currents after they are born, making the concentration or probability of presence of larvae in any one location extremely small (NMFS 2003). The size of the project and action area where effects could occur to larval ESA-listed rockfish, combined with the short duration of project activities, make it extremely unlikely, and therefore discountable, that a larvae will be present and exposed to project activities. Because all potential adverse effects are discountable, NMFS concurs with the determination of may affect, not likely to adversely affect for yelloweye rockfish, canary rockfish, and bocaccio.

Green Sturgeon and Eulachon.

The southern DPSs of green sturgeon and eulachon have been documented in Puget Sound, but are uncommon. Puget Sound has a long history of commercial and recreational fishing and fishery-independent monitoring of other species that use habitats similar to those these species, but very few have been observed. NMFS believes it is very unlikely that green sturgeon or eulachon will occur in the action area, and even more improbable that they will be exposed to the six hours of impact pile driving. Therefore, NMFS concludes that the effects to the southern DPS green sturgeon and southern DPS eulachon are discountable.

3. MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT

The consultation requirement of section 305(b) of the MSA directs Federal agencies to consult with NMFS on all actions or proposed actions that may adversely affect EFH. The MSA (section 3) defines EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. Adverse effects include the direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality or quantity of EFH. Adverse effects on EFH may result from actions occurring within EFH or outside EFH, and may include site-specific or EFH-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810). Section 305(b) also requires NMFS to recommend measures that can be taken by the action agency to conserve EFH.

This analysis is based, in part, on the EFH assessment provided by the Federal action agency and descriptions of EFH contained in the fishery management plan developed by the Pacific Fishery Management Council (PFMC) and approved by the Secretary of Commerce for groundfish (PFMC 1998a), coastal pelagic species (PFMC 1998b), and Pacific Coast salmon (PFMC 1999).

3.1 Essential Fish Habitat Affected by the Project

The proposed action and action area for this consultation are described in the Introduction to this document. The action area includes areas designated as EFH for groundfish, coastal pelagic species, and Pacific Coast salmon, but does not occur within a Habitat Area of Particular Concern.

3.2 Adverse Effects on Essential Fish Habitat

NMFS determined that the proposed action will have adverse effects to EFH designated for groundfish, coastal pelagic species, and Pacific Coast salmon, based on information provided in the BA and the analysis of effects presented in the ESA portion of this document. NMFS determined that the proposed action will adversely affect EFH by temporarily elevating contaminant levels and permanently discharging stormwater. EFH will also be improved by the removal of the Tank Farm pier.

The EFH within 59 feet of the new concrete piles (0.5 acre) will be affected by impact pile driving (cumulative SEL greater than 187dB).

The EFH within 150 of the existing terminal, existing fishing pier, and the Tank Farm pier (16.8 acres) and within 300 feet of dredging (14.5 acres) will be affected by increased contaminants.

The following is the amount of EFH that will be adversely affected by stormwater discharges:

1. The area within 21.0 feet of the Brewery Creek (4-24) outfall for dissolved zinc and within 12.9 feet for dissolved copper;

2. The area within 46.2 feet of the Japanese Gulch (5-30) outfall for dissolved zinc and

within 19.1 feet for dissolved copper; and

3. The area within 15.5 feet of the Japanese Gulch (6-XX) outfall for dissolved zinc and within 4.71 feet for dissolved copper.

3.3 Essential Fish Habitat Conservation Recommendations

1. NMFS expects that full implementation of these EFH conservation recommendations would protect, by avoiding or minimizing the adverse effects described in section 3.2 above, approximately 395 acres of designated EFH for Pacific coast salmon. These conservation recommendations are a subset of the ESA terms and conditions. NMFS recommends that FTA:

2. Impact drive the concrete piles during low tides to the maximum extent practicable;

3. When impact driving concrete piles in water three or more feet deep, monitor underwater noise as described in Appendix C of the BA;

4. Submit the results of the underwater noise monitoring to NMFS.

5. Conduct all dredging between November 1 and February 15;

6. Use an enclosed bucket for dredging;

7. Conduct pile removal activities and demolition of creosote-treated timber elements of the 655-foot section of the Tank Farm pier above the future navigation channel between July 15 and February 15;

8. Conduct pile removal activities and demolition of creosote-treated timber elements of the other section of the Tank Farm pier between September 1 and February 15

9. Install floating booms during all demolition and pile removal activities for the Tank Farm pier, existing terminal pier, and existing fishing pier;

10. Equip the floating booms shall with absorbent pads to contain any oil sheens;

11. Fill any holes from the removed creosote piles from the Tank Farm pier with clean sand or gravel;

12. Cap the area within two feet of the removed creosote piles from the Tank Farm with clean sediment;

13. Use the stable grain size for the 25-year return period storm event as calculate by Coast and Harbor Engineering (2012) for the sediment cap;

14. Submit the following to NMFS: (1) the DMMP Compliance Sediment Characterization

Report or equivalent, (2) the results of any other future contaminant sampling of marine sediments in the project area, (3) a turbidity monitoring report by April 1 following each construction season, (4) a contaminants monitoring report which will include the BMPs implemented to control the release of contaminates into marine waters and the disposition of creosote-treated wood and contaminated sediments.

15. Report any violations of the WDFW's Hydraulic Project Approval or Ecology's requirements to NMFS;

16. Implement the programmatic approach to monitoring detailed in "Programmatic Monitoring Approach for Highway Stormwater Runoff in Support of Endangered Species Act (ESA) Section 7 Consultations." The sites selected for this programmatic monitoring approach shall be representative of conditions within the action area, including average daily traffic and seasonal and temporal variations in stormwater runoff quantity and quality. If the programmatic monitoring shows that the analysis performed for this project has underestimated the end of pipe effluent concentrations or the size of the dilution zones then the reinitiation provisions of this opinion may be triggered;

17. Relocate outfall 4-24 away from sand lance spawning areas;

18. Use translucent structural glass or another light-penetrating surface for the deck of the new fishing pier; and

19. Use permeable pavement in all areas of post-project PGIS where the infiltrated stormwater would not encounter contaminated soils or ground water.

3.4 Statutory Response Requirement

As required by section 305(b)(4)(B) of the MSA, the Federal agency must provide a detailed response in writing to NMFS within 30 days after receiving an EFH Conservation Recommendation from NMFS. Such a response must be provided at least 10 days prior to final approval of the action if the response is inconsistent with any of NMFS' EFH Conservation Recommendations, unless NMFS and the Federal agency have agreed to use alternative time frames for the Federal agency response. The response must include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with NMFS Conservation Recommendations, the Federal agency must explain its reasons for not following the recommendations, including the scientific justification for any disagreements with NMFS over the anticipated effects of the action and the measures needed to avoid, minimize, mitigate, or offset such effects [50 CFR 600.920(k)(1)].

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

EFH portion of this consultation, you clearly identify the number of conservation recommendations accepted.

3.5 Supplemental Consultation

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

4. DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW

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

4.1 Utility--Utility principally refers to ensuring that the information contained in this consultation is helpful, serviceable, and beneficial to the intended users. These users include three agencies of the Federal government (NMFS, FTA, and USACE), the WSDOT, the residents of the City of Mukilteo, Snohomish County, the State of Washington, and the general public.

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

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

4.3 Objectivity

4.3.1 Information Product Category--Natural Resource Plan.

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

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

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

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

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