Appendix C

Biological Opinions, Commitments, and Authorizations

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.

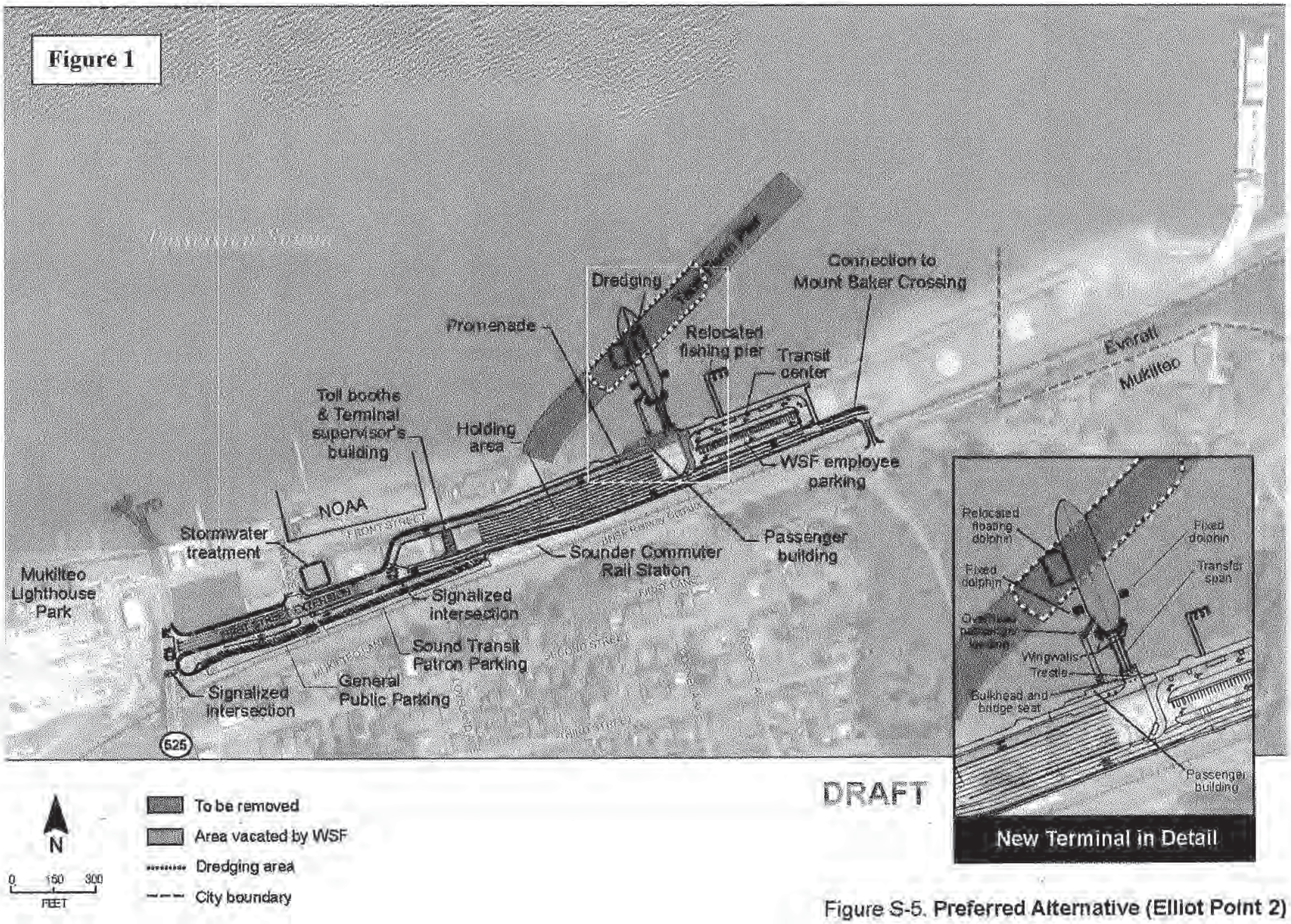

Figure S-5. **Preferred Alternative (Elliot Point 2)**

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.

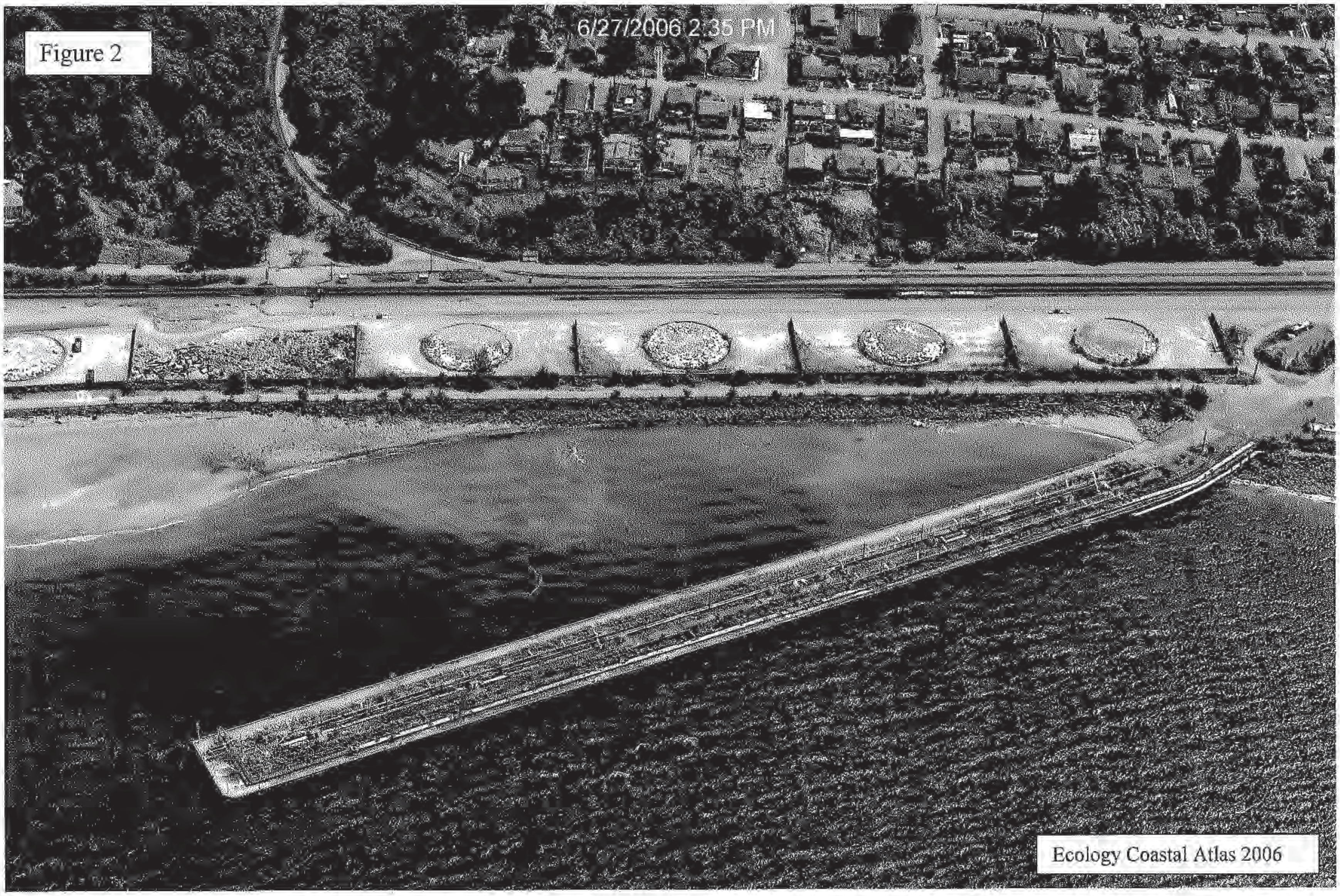
Figure 2
6/27/2006 2:35 PM
Ecology Coastal Atlas 2006

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.

Figure 3

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]

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[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

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(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