CORNET BAY MARINA
MODEL TOXICS CONTROL ACT (MTCA) CLEANUP

BIOLOGICAL EVALUATION

PREPARED BY:

GRETTE ASSOCIATES[LLC]
2102 NORTH 30TH STREET, SUITE A
TACOMA, WASHINGTON 98403
(253) 573-9300

MAY 2013

Grette Associates[LLC]
ENVIRONMENTAL CONSULTANTS

TABLE OF CONTENTS

1 INTRODUCTION 6

2 DESCRIPTION OF PROJECT 8
2.1 Background 8
2.2 Purpose of Project 8
2.3 Project Description 8
2.4 Construction Methods 11
2.4.1 In Water Work 11
2.4.2 Upland Work 11
2.5 Construction Timing 12

3 DESCRIPTION OF PROJECT AREA AND ACTION AREA 13
3.1 Project Area 13
3.2 Action Area 13
3.3 Baseline Conditions 14
3.3.1 Upland Zone 14
3.3.2 Marine Zone 15
3.3.3 Eelgrass and Macroalgae 15
3.3.4 Salmonid Use of Action Area 15
3.3.5 Forage Fish Species 16

4 DESCRIPTION OF THE SPECIES AND CRITICAL HABITAT 17
4.1 Listed Species 17
4.1.1 Puget Sound Chinook Salmon 17
4.1.2 Puget Sound Steelhead Trout 17
4.1.3 Coastal-Puget Sound Bull Trout 18
4.1.4 Bocaccio 18
4.1.5 Canary Rockfish 19
4.1.6 Yelloweye Rockfish 20
4.1.7 Southern Resident Killer Whale 20
4.1.8 Humpback Whale 21
4.1.9 Steller Sea Lion 22
4.1.10 Marbled Murrelet 22
4.1.11 Leatherback Sea Turtle 23
4.2 Designated Critical Habitats 23
4.2.1 Puget Sound Chinook Salmon Critical Habitat 23
4.2.2 Coastal-Puget Sound Bull Trout Critical Habitat 24
4.2.3 Southern Resident Killer Whale Critical Habitat 24

5 EFFECTS OF THE PROJECT 25
5.1 Potential Impact Mechanisms 25
5.1.1 Water Quality Effects 25
5.1.2 Elevated Sound during Sheet Pile Work 25
5.1.3 Habitat Disturbance 26
5.1.3.1 Upland Project Area 26

5.1.3.2 Aquatic Project Area 26
5.2 Direct Effects 27
5.2.1 Direct Effects on Salmonids 27
5.2.2 Direct Effects on Listed Rockfish 28
5.2.3 Direct Effects on Marine Mammals 28
5.2.4 Direct Effects on Marbled Murrelet 29
5.2.5 Direct Effects on Leatherback Sea Turtle 30
5.3 Indirect Effects 30
5.3.1 Listed Salmonids 30
5.3.2 Listed Rockfish 30
5.3.3 Listed Marine Mammals 31
5.3.4 Marbled Murrelet 31
5.3.5 Leatherback Sea Turtle 31
5.4 Interdependent and interrelated Actions 31
5.5 Cumulative Effects 31

6 CRITICAL HABITAT EVALUATION 32
6.1 Puget Sound Chinook Salmon Critical Habitat 32
6.1.1 Primary Constituent Element # 5: Nearshore Areas 32
6.1.1.1 Obstruction and Predation 32
6.1.1.2 Water Quality and Quantity 32
6.1.1.3 Forage 33
6.1.1.4 Natural Cover 33
6.2 Effects on Coastal-Puget Sound Bull Trout Critical Habitat 33
6.2.1 Primary Constituent Element #2: Migratory Corridors 34
6.2.2 Primary Constituent Element #3: An Abundant Food Base 34
6.2.3 Primary Constituent Element #4: Complex Shoreline Environment 34
6.2.4 Primary Constituent Element #5: Water Temperature 35
6.2.5 Primary Constituent Element #8: Permanent Water of Sufficient Quantity and Quality 35
6.3 Effects on Southern Resident Killer Whale Critical Habitat 35
6.3.1 Primary Constituent Element #1: Water Quality 36
6.3.2 Primary Constituent Element #2: Prey Quantity, Quality, and Availability 36
6.3.3 Primary Constituent Element #3: Passage Conditions 36

7 REGULATORY CONSIDERATION AND MINIMIZATION MEASURES 37
7.1 Regulatory Considerations 37
7.2 General Measures during All Activities 37
7.3 Measures during Sheet Pile Driving 38
7.4 Measures during Upland Excavation 38

8 CONCLUSIONS AND DETERMINATIONS 40
8.1 Listed Species 40
8.1.1 Puget Sound Chinook Salmon, Coastal-Puget Sound Bull Trout and Puget Sound Steelhead Trout 40
8.1.2 Bocaccio, Canary Rockfish, Yelloweye Rockfish 40

8.1.3 Southern Resident Killer Whale 40
8.1.4 Humpback Whale 40
8.1.5 Steller Sea Lion 40
8.1.6 Marbled Murrelet 40
8.1.7 Leatherback Sea Turtle 40
8.2 Designated Critical Habitats 41
8.2.1 Puget Sound Chinook Salmon Critical Habitat 41
8.2.2 Coastal-Puget Sound Bull Trout Critical Habitat 41
8.2.3 Southern Resident Killer Whale Critical Habitat 41

REFERENCES 42

LIST OF TABLES

Table 1. Summary of ESA species and critical habitats (CH) with corresponding effect determinations. 7
Table 2. SRKW sighting days (1990-2008) in the quadrate comprising the Action Area 21
Table 3. Sound impact threshold and distance to threshold summary by species. 26

LIST OF FIGURES

Figure 1. Action Area 12
Figure 2. Area of potential behavioral effects from vibratory pile driving 27

LIST OF SHEETS

Sheet 1. Vicinity Map
Sheet 2. Project Site Plan
Sheet 3. Cleanup Site Plan
Sheet 4. Demolition/Temporary Shoring Plan View
Sheet 5. Bulkhead Section Views
Sheet 6. Temporary Dock Access and Demolition Plan

LIST OF APPENDICES

Appendix A. Essential Fish Habitat Assessment

1 INTRODUCTION

The Washington State Department of Ecology (Ecology) proposes to conduct a cleanup action of upland soils and groundwater at the Cornet Bay Marina. This work is being performed pursuant to a Consent Decree between Cornet Bay Marina and Ecology. It is anticipated that the proposed cleanup would take place in two primary phases to allow for uninterrupted access to the marina. Initially, a sheet-pile bulkhead would be constructed approximately 2 to 3 feet outside the existing wooden bulkhead. Following completion of the bulkhead, removal of upland soils impacted with petroleum hydrocarbons would be performed. The Project would include ancillary tasks such as relocation/replacement of marina utilities and buildings to facilitate cleanup and prevent further contamination of upland soils or adjacent marine habitats. The property is located on Cornet Bay within Deception Pass at 200 Cornet Bay Rd., Oak Harbor, Island County, Washington.

Ecology is submitting an application for a U.S. Army Corps of Engineers (Corps) authorization under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act for the Cornet Bay Marina remedial cleanup action. The Endangered Species Act (ESA) requires federal agencies to ensure that they do not authorize, fund, or carry out actions that are likely to jeopardize the continued existence of endangered or threatened species or result in the destruction or adverse modification of critical habitat for such species. This Biological Evaluation (BE) addresses the potential effects of the proposed Project on the listed species and designated critical habitats summarized in Table 1 (USFWS 2012, NOAA 2012a), and has been prepared to assist the Corps in its review of the permit application. In addition, an evaluation of the effects of the proposed Project on Essential Fish Habitat (EFH) has been prepared pursuant to the Magnuson-Stevens Fishery Conservation and Management Act and the 1996 Sustainable Fisheries Act. The effects of the proposed Project on EFH are addressed in Appendix A.

Table 1. Summary of ESA species and critical habitats (CH) with corresponding effect determinations.

Listed Species	Federal Status	Designated CH in Action Area	Species Effects Determinations	CH Effects Determinations
Puget Sound Chinook Salmon (*Oncorhynchus tshawytscha*)	threatened	yes	NLAA[1]	NLAA[1]
Coastal-Puget Sound Bull Trout (*Salvelinus confluentus*)	threatened	yes	NLAA[1]	NLAA[1]
Puget Sound Steelhead Trout (*Oncorhynchus mykiss*)	threatened	no	NLAA[1]	N/A
Bocaccio rockfish (*Sebastes paucispinis*)	endangered	N/A	NLAA[1]	N/A
Canary rockfish (*Sebastes pinniger*)	threatened	N/A	NLAA[1]	N/A
Yelloweye rockfish (*Sebastes ruberrimus*)	threatened	N/A	NLAA[1]	N/A
Steller Sea Lion (*Eumetopias jubatus*)	threatened	no	NLAA[1]	N/A
Southern Resident Killer Whale (*Orcinus orca*)	endangered	yes	NLAA[1]	NLAA[1]
Humpback Whale (*Megaptera novaeangliae*)	endangered	no	NLAA[1]	N/A
Leatherback Sea Turtle (*Dermochelys coriacea*)	endangered	no	No effect	N/A
Marbled Murrelet (*Brachyramphus marmoratus*)	threatened	no	NLAA[1]	N/A

[1] May Affect, Not Likely to Adversely Affect

2 DESCRIPTION OF PROJECT

2.1 BACKGROUND

The Cornet Bay Marina serves as a public boat mooring, launching, retrieval, and refueling facility. The marina, originally constructed in 1960, includes an existing general store/office, storage shed, parking lot, boat launch ramp, two moorage docks, and a linear timber bulkhead which separates the upland facilities (general store and parking areas) from the marina and aquatic areas. In 1989, a release of petroleum products occurred from underground fuel lines beneath the property and behind the bulkhead. In 1992, Ecology entered into a Consent Decree with the property owner for cleanup of the property. From 1995 through 2005, Ecology performed site investigations to characterize the distribution of soil and groundwater contamination on the property. Ecology has prepared a Remedial Investigation/Feasibility Study (RI/FS) that, along with prior investigations, delineates the nature and extent of contamination at the site. This BE addresses proposed remedial and cleanup activities on the Cornet Bay Marina property to restore the site to pre-release conditions.

2.2 PURPOSE OF PROJECT

Ecology proposes to conduct a clean up at Cornet Bay Marina to satisfy terms of the Ecology issued Consent Decree (1992) to remove hydrocarbon-containing soils and groundwater from the site, and to improve habitat conditions of the shoreline. Ancillary site upgrades will facilitate the cleanup, prevent contamination of adjacent marine habitats, support continued function of the marina, and minimize the need for future site improvements.

2.3 PROJECT DESCRIPTION

The Project includes complete demolition of the existing timber bulkhead, installation of a new steel sheet pile bulkhead, temporary relocation of the existing store building and associated utilities, upland area cleanup actions, treatment of groundwater, and filling and grading to restore the site for long term marina-associated upland uses.

The project will be constructed in phases so that access to marina docks can be maintained during the cleanup activities. The first phase will consist of installation of the sheet-pile bulkhead, and the second phase will consist of excavation of upland areas of the site. During excavations, the different areas of the site may be partitioned by a wall of stacked Ecology blocks placed below grade to maintain slope stability.

The only in-water work required for this project is the initial construction of the 340 linear feet AZ steel bulkhead. All remaining work described will occur in upland areas or isolated behind the new sheet pile bulkhead, except for above-water work as needed to temporarily remove sections of decking and place a temporary access float during construction.

Bulkhead Replacement and Demolition

A 340 linear foot steel sheet AZ pile bulkhead will be constructed as close as possible to the existing timber bulkhead, approximately 2 to 3 feet waterward of the existing timber bulkhead. The new sheet pile bulkhead will serve as a permanent replacement for the existing

timber bulkhead and will also provide containment of upland soils during site cleanup excavations. Installation of the sheet pile will be from the land side using a vibratory hammer. The base of the new bulkhead will be located at approximately +1 ft MLLW. The new bulkhead will tie into the existing shoreline above the waterline and will therefore completely isolate the area behind it from the aquatic environment.

Before the sheet pile is installed a floating debris boom and silt curtain will be deployed from above the MHHW mark on the north end of the project to above the MHHW mark on the south end of the project, completely isolating the work area from the adjacent waters of Cornet Bay. The top end of the boom contains oil absorbance materials to deter any sheens from leaving the work area. The toe of the silt fence will be weighted and maintain complete contact with the substrate to disallow turbidity from flowing underneath. Once the steel sheet pile is in place, the existing 340 foot timber bulkhead consisting of 12" wood pile and lagging will be demolished. Demolition will be completely isolated from the aquatic environment. The timber pile will be demolished after each upland cell has been excavated by cutting it off at the bottom of the excavation sites [approximately 8 to 14 feet BGS (below ground surface)]; it will then be removed for disposal at an approved upland facility. The timber dock portions shoreward of the first pile bent will be removed temporarily during construction to allow access for equipment used to install the new sheet pile bulkhead. In-water work will comply with permit conditions and work windows to limit impacts to salmonid species present in Cornet Bay and listed as threatened or endangered species under the federal Endangered Species Act. The contractor will be required to prepare a spill prevention and control plan and a stormwater pollution prevention plan; both plans will be used for the duration of the project.

Demolish or move existing building and utilities and any paved surfaces as necessary

The following work will occur in upland areas of the site and/or isolated from the aquatic environment behind the sheet pile wall.

Site excavation and cleanup will require the demolition or relocation of existing utilities and fuel lines at the site. The existing store building will be relocated temporarily during site cleanup activities. Water, propane, telephone/cable, and electrical lines will all be relocated as necessary, and service within the marina will be intermittently disrupted. The existing septic tank will be demolished. Existing fuel lines will be disconnected, drained, and contained within a temporary pipe casing containment during the new bulkhead installation.

During excavation of shoreline areas, there will be temporary disruptions to access to some marina docks and floats. Temporary access to the marina docks will be provided by installing a temporary float connecting the main dock with the western dock. The float (~50 ft long) will be installed approximately 40 ft waterward of MHHW in water depths of approximately -10 ft MLLW. The float will be fastened to existing structures, will not require additional pile, and will not ground out during low tide events. Temporarily changing the over water coverage in the proposed float area will not cause shading of aquatic vegetation because this area does not support eelgrass or macroalgae communities.

Construct temporary site improvements to support cleanup actions

The following work will occur in upland areas of the site and/or isolated from the aquatic environment behind the sheet pile wall.

Two temporary stabilized construction access ramps will be constructed (one at each end of the site along Cornet Bay Road) to provide for trucks entering and exiting the project site. The truck access will be temporary in nature, constructed from gravel and quarry spalls. The contractor will install erosion/sediment control barriers at the perimeter of the site, including silt filter fences along the upland property perimeter and a floating oil and debris absorbent boom along the shoreline.

Construction dewatering may be necessary during deeper excavations to facilitate excavations and reduce the water content of excavated soils. Construction water or groundwater will be collected and discharged to a series of holding tanks for solids settling, filtration, and treatment. Following filtration and treatment, groundwater will be discharged into on site stormwater conveyance features or directly to Cornet Bay.

Upland area cleanup

The following work will occur in upland areas of the site and/or isolated from the aquatic environment behind the sheet pile wall.

The proposed site cleanup includes excavating and removing up to ~15,100 cubic yards (cy) of soil from the upland area, including approximately 8,400 cy of contaminated soil and 6,700 cy of clean soils that will be reused for backfill on site. It is anticipated that the excavation will be in phases to accommodate the temporary relocation of the office/store building within the site during cleanup excavations. There will be multiple excavation cells ranging in depth from 8 to 14 ft BGS. Excavated contaminated soil will be transported off site for disposal at a permitted facility, in accordance with applicable regulations and disposal facility requirements. Soil determined to be both below site-specific soil cleanup levels and suitable for reuse on the site will be stockpiled separately for use on site as backfill.

Site restoration, relocate or replace utilities

The following work will occur in upland areas of the site and/or isolated from the aquatic environment behind the sheet pile wall.

Upland ground surfaces will be restored/finished with clean imported fill, recycled clean fill from site excavations, crushed rock surfacing, and concrete walkways and pavement where appropriate. A new concrete foundation for the moved building will be constructed and concrete walkways will be replaced. The store building then will be placed on the new foundation in the identical location.

Existing utilities will be restored and/or replaced in conformance with current County code requirements. Existing utilities, including diesel, gasoline, water, electrical, telephone/cable, and power, will be routed around the excavation areas to maintain utility service to the extent

practicable during construction. A new septic tank and effluent pumps will be installed as required to restore sanitary waste treatment.

Fuel lines will be replaced, and a fuel valve vault will be installed. Fuel lines and connections to the marina fuel dock will be permanently replaced within a new underground closed containment system. A new underground fuel valve vault will be installed adjacent to the existing tank vault.

Install sheet pile cap and shoreline public access improvements

The following work will occur in upland areas of the site and/or isolated from the aquatic environment behind the sheet pile wall.

A geotextile reinforced soil wall and drainage rock layer will be placed behind the new sheet pile bulkhead. The top of the sheet pile bulkhead will be finished with a 6'-10" wide concrete cap which will provide structural support and also serve as a shoreline esplanade along the length of the new bulkhead. A sidewalk and guide rail will be installed directly adjacent to the shoreline. Dock access will be restored by replacing the dock access platforms connecting the shore to the two marina docks.

2.4 CONSTRUCTION METHODS

2.4.1 In Water Work

To make room for installation of the new steel sheet pile wall, the landward sections of the two mooring docks (main and west docks) will be removed using a land-based excavator. A temporary float will be installed between the two mooring docks (approximately 40 ft waterward of MHHW) to allow full dock access during construction. The floating debris boom and silt curtain will be deployed to isolate the work area. Installation of steel sheet pile will occur using a land-based crane with a vibratory hammer attachment. Installation of the sheet pile wall will take place prior to demolition of the timber bulkhead in order to isolate the work area along the existing shoreline and to prohibit an influx of debris into Cornet Bay. Sheet pile installation is expected to occur over 21 days with the vibratory hammer operating 8 hours per day. After the steel sheet pile bulkhead is in place, excavation behind the timber bulkhead will commence, and the timber bulkhead will be cut off at the bottom of the excavation. The timber bulkhead will be disposed of at an approved upland facility.

2.4.2 Upland Work

Upland demolition, structure/utility relocation, and excavation will be accomplished with land-based excavators, bulldozers, and crane. Petroleum-impacted soils and clean soils will be separated and stockpiled upland. Clean soils will be used as backfill, while contaminated soil will be transported from the site via dump trucks to an approved upland disposal facility. Other fill materials including clean gravel/quarry spalls, ecology blocks, crushed rock, and cement will be used for temporary truck construction entrances, temporary barrier wall between excavation cells, permanent parking surface, and permanent building foundation, walkway, bulkhead cap, and patio, respectively.

Construction dewatering in excavation sites will be accomplished using generator-powered pumps, with water being captured in holding tanks for settling, testing and treatment. After treatment, water will be pumped into on site stormwater conveyance features to allow for controlled outflow into Cornet Bay (see Section 2.4.1).

2.5 CONSTRUCTION TIMING

Ecology proposes to conduct this work as soon as permits are received. Based on permits received for similar projects around Cornet Bay, the anticipated work window would likely be July 16 through February 15. However, starting at October 15th, forage fish surveys will be required to ensure no spawning has occurred in the vicinity, allowing work to continue to February 15th. In-water construction is anticipated to require up to one month to complete, while upland construction may be conducted year-round until the site is restored.

3 DESCRIPTION OF PROJECT AREA AND ACTION AREA

3.1 PROJECT AREA

The Project Area includes all upland and nearshore areas of the Cornet Bay Marina where construction activities will occur. The proposed Project Area is located on Cornet Bay within Deception Pass in Oak Harbor, WA. The Project Area includes approximately 340 ft of shoreline, the entire upland of the Cornet Bay Marina property (approximately 56,000 sf), and the shoreward ~40 ft of the two mooring docks. In-water and over-water work would occur within approximately 40 ft waterward of MHHW. Substrate disturbance (sheet pile installation) will occur between approximately +1 and +3 ft MLLW at the toe of the new sheetpile wall.

3.2 ACTION AREA

The effects of the project are described within a broader setting to provide context for evaluating the impacts of the Project. This broader area, termed the "Action Area," encompasses the Project Area as well as all areas that may be directly or indirectly affected by proposed Project activities. The Action Area for the Project was defined by considering the potential spatial extent of mechanisms that may lead to impacts on listed species. In this case, the geographic extent of the Action Area is primarily based on the predicted maximum extent of noise associated with vibratory driving of sheet pile (Figure 1).[1]

It is standard practice to use the Practical Spreading Loss model to determine the distance at which sound associated with project activities attenuates to ambient conditions. For marine mammal consultations, NOAA Fisheries requires either a detailed site-specific assessment of background and ambient underwater sound or that the applicant uses the lowest applicable effect threshold to determine the area of potential sound effects (http://www.nwr.noaa.gov/Marine-Mammals/MM-sound-areas.cfm), queried March 27, 2013). Because there is a continuous sound (vibratory driver operation), the potential effect threshold used in lieu of background is 120 decibels $(dB^1)_{RMS}$.
The model was used with the following assumptions:

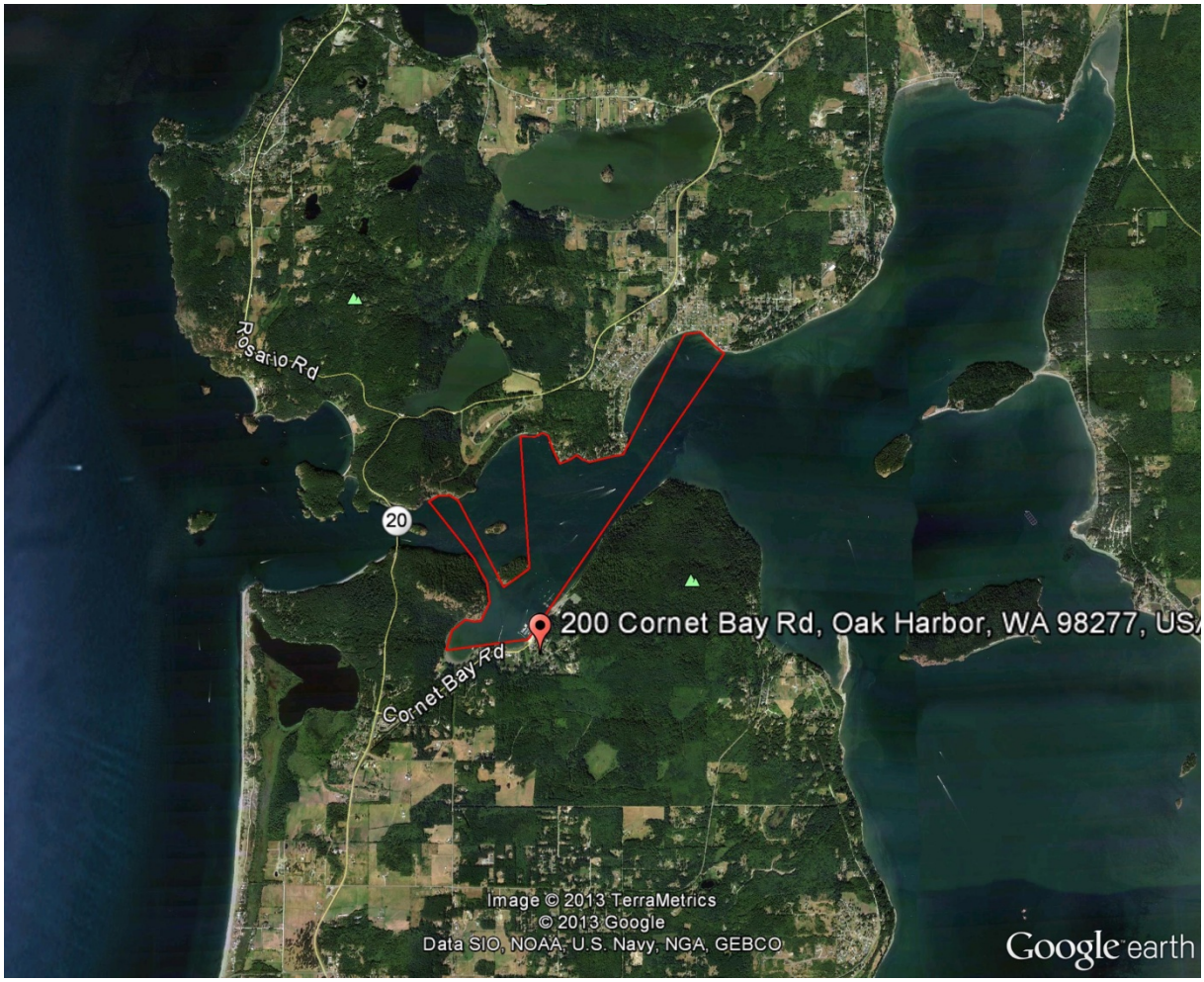
- The loudest sound is anticipated to be generated by vibratory driving steel sheet pile. Vibratory driving sheet pile will generate underwater sound pressure levels (SPLs) of 163 dB_{RMS} at 10 meters (ICF Jones & Stokes 2009).
- Sound pressure travels in a linear direction (concentrically) away from the source.
- Sound does not reflect off of or travel through landmasses.

The Practical Spreading Loss model was used to calculate the distance necessary for sound to attenuate from 163 dB_{RMS} to 120 dB_{RMS} (ambient noise level). The model returned a distance

[1] Sound pressure in water is referenced at 1 micropascal (1 µPa). In this document, all Peak (dB_{peak}) and Root Mean Squared (dB_{RMS}) pressures are referenced at 1 µPa (e.g., 195 dB_{RMS} (re. 1 µPa). Sound Exposure Levels (SEL) are referenced at 1 µPa*sec (e.g., 187 dB_{SEL} (re. 1 µPa*sec). For readability purposes, the pressure references are not repeated throughout the text.

of 4.57 miles. Because sound is constrained by land mass, the greatest distance that sound would travel from the source (vibratory hammer) is estimated to be approximately 2 miles through eastern Deception Pass to southern Fidalgo Island (Figure 1).

Figure 1: Action Area based on elevated sound pressure levels during vibratory pile driving (less than 2 miles based on landmass).



3.3 BASELINE CONDITIONS

3.3.1 Upland Zone

The upland within the Project Area is comprised of a gravel parking lot, general store/office, and storage shed. The upland and aquatic shoreline meet at a vertical timber bulkhead (+3 MLLW at toe of the bulkhead). Below-ground structures on the upland include a concrete fuel containment basin, fuel lines, septic system, and utility lines. The upland within the Action Area is highly modified for marina use and is sparsely vegetated along the shoreline.

3.3.2 Marine Zone

The marine portion of the Project Area consists of the Cornet Bay Marina shoreline (340 ft) to approximately 40 ft waterward of MHHW. The shoreline has been highly modified since 1960, when the vertical timber bulkhead and marina mooring docks were originally constructed. The aquatic habitat waterward of the vertical timber bulkhead is comprised of fine sediments.

The marine habitat within the greater Action Area consists of Cornet Bay and eastern Deception Pass, including Quiet Cove and the southern shoreline of Ben Ure Island. These areas contain patchy and continuous fringing eelgrass, patchy fringing kelp (~1,600 ft west of Project Area), patchy fringing salt marsh and low marsh (~225 ft southwest), and a tidal aquatic bed (~875 ft west) (https://fortress.wa.gov/ecy/coastalatlas/tools/Map.aspx queried April 4, 2013).

3.3.3 Eelgrass and Macroalgae

There is no eelgrass or significant macroalgae coverage within the footprint of the proposed replacement sheet pile bulkhead (+1 ft MLLW to MHHW for 340 ft of shoreline). The Project Area does not support eelgrass or macroalgae communities due to its long-term, highly modified nature. Eelgrass is present in the shoreline area to the northeast and southwest of the Project Area. In addition, patchy fringing salt/low marsh and a tidal emergent wetland can be found in the shoreline area to the southwest of the Project Area.

As described in Section 3.3.2, the Action Area contains patchy/continuous fringing eelgrass, patchy fringing kelp, patchy fringing salt marsh and low marsh, and a tidal aquatic bed within Cornet Bay and along the southern shoreline of Ben Ure Island and Fidalgo Island in eastern Deception Pass.

3.3.4 Salmonid Use of Action Area

Juvenile salmonids utilize nearshore habitats primarily for migration, foraging, and as nursery areas for residence and refuge. The Project Area is likely used primarily for migration; little rearing or foraging likely occurs in the Project Area. However, other areas of Cornet Bay and Deception Pass within the Action Area may be used by juvenile salmonids for foraging and rearing. The peak of juvenile salmonid migration through the Project Area primarily occurs in late spring and early summer, coinciding with the warming of the nearshore waters and accompanying plankton blooms.

Several salmonid species spawn in the Skagit, Samish, Stillaguamish, Nooksack, and Snohomish Rivers which are approximately 8, 14, 15, 27, and 32 miles from the Project Area, respectively. Salmonids that spawn in these river systems are listed below; all of these salmonid species may be present in the vicinity of the Project Area.

- Chinook salmon (*Oncorhynchus tshawytscha*)
- Coho salmon (*O. kisutch*)
- Chum salmon (*O. keta*)

- Pink salmon (*O. gorbuscha*)
- Sockeye salmon (*O. nerka*)
- Cutthroat trout (*O. clarki*)
- Steelhead trout (*O. mykiss*)
- Bull trout (*Salvelinus confluentus*)

All in-water project activities will occur between approximately –10 ft MLLW and MHHW. Therefore, the Project Area is likely to be utilized by nearshore-dependent juvenile salmonids during outmigration. Adherence to approved in-water work periods will minimize the likelihood of juvenile salmonids being present during and immediately following in-water work, especially installation of replacement steel sheet pile bulkhead.

3.3.5 Forage Fish Species

Pacific herring spawning is not mapped in Cornet Bay. Herring spawn in Skagit and Similk Bay (east of Cornet Bay) from early-February to mid-April, with peak spawning occurring in late-February and early-March (WDFW 2009). The closest area of documented herring spawning is approximately 1.5 miles from the Project Area (WDFW 2009). Herring presence is possible within the Project Area, though heavy use is not expected in the immediate vicinity of in-water work (sheet pile driving). More suitable eelgrass and macroalgae communities exist to the southwest in Cornet Bay and to the north and east along southern Fidalgo Island and Ben Ure Island.

Surf smelt spawning occurs year round along the shoreline of Skagit and Similk Bay and requires high intertidal beaches (uppermost third of the tidal range; approximately +7 MLLW to MHHW) with gravel 1 to 7 mm in size with moderate wave action (Penttila 2007). No documented spawning habitat is present in the immediate vicinity of the Project Area. The WDFW SalmonScape online mapper indicates that surf smelt spawning has been documented and is mapped as occurring on the shoreline of Cornet Bay, approximately 0.2 miles (~1056 ft) northeast of the Project Area (WDFW 2013). The WDFW SalmonScape mapper also shows potential spawning beaches along much of the shoreline of eastern Cornet Bay, including the northeast section of the Cornet Bay Marina shoreline. However, the entire shoreline within the Project Area is modified by a vertical timber bulkhead (+3 MLLW at toe of the bulkhead), and high intertidal beaches are completely absent. Therefore, the Project Area is not suitable for surf smelt spawning.

Pacific sand lance spawning occurs from November to February within fine substrate beaches (majority 0.2- to 0.4-mm) in mid- to upper intertidal areas (Penntila 2007). Spawning generally occurs between +5 MLLW to MHHW. Sand lance spawning habitat often resembles surf smelt spawning habitat to the extent that distinguishing geographical stock boundaries is impractical. The WDFW SalmonScape mapper indicates documented sand lance spawning habitat approximately .95 miles (~5000 ft) northeast of the Project Area along outer Cornet Bay (WDFW 2013). Potential spawning habitat for sand lance within the vicinity of the Project Area is the same as that for surf smelt and is described in Section 3.3.5.2 (WDFW 2013). Like surf smelt, Pacific sand lance require high intertidal, fine substrate beaches for spawning. The shoreline modification (vertical timber bulkhead) makes the Project Area unsuitable for Pacific sand lance spawning.

4 DESCRIPTION OF THE SPECIES AND CRITICAL HABITAT

The ESA-listed species associated with the Action Area are Puget Sound Chinook salmon, Coastal-Puget Sound bull trout, Puget Sound steelhead trout, bocaccio, canary rockfish, yelloweye rockfish, Steller sea lion, Southern Resident killer whale, humpback whale, leatherback sea turtle, and marbled murrelet. Designated critical habitat associated with the Action Area includes that for Puget Sound Chinook salmon, Coastal-Puget Sound bull trout and Southern Resident killer whale. The geographic distribution and boundaries of critical habitat areas as well as the extent of the Action Area within these critical habitats is discussed below.

4.1 LISTED SPECIES

4.1.1 Puget Sound Chinook Salmon

On March 24, 1999, the NOAA Fisheries formalized listing of Puget Sound Chinook salmon as threatened under the ESA (NOAA 1999). This species occurs throughout Puget Sound and according to the WDFW, its presence has been documented within Sullivan Slough, the North and South Fork of the Skagit River, Hall Slough, Browns Slough, Stillaguamish River, and Snohomish River, 7, 8, 13, 10, 11, 15, and 32 miles to the southeast of the Action Area, respectively (WDFW 2013). Additionally, Chinook presence has been documented within the Samish River, Colony Creek, Padden Creek, Whatcom Creek, Squalicum Creek, and Nooksack River, 13, 17, 23, 25, 26, and 27 miles northeast, respectively (WDFW 2013). Although no Chinook spawning has been documented on Whidbey Island, juvenile Chinook outmigrating from the Skagit, Snohomish, and Whatcom County basins likely migrate and rear along the nearshore environment of Deception Pass and Cornet Bay, including the Action Area (NMFS 2007). Three years of seine net surveys (2009-2011) conducted by Northwest Straits and Island County Beach Watchers demonstrated juvenile Chinook presence in Cornet Bay, including the Project Area, from February through June (Schmidt 2012). Sub-adult and adult Chinook may be present in the Action Area any time of the year, but are not dependent on shallow water areas.

General life history and stock information on Chinook in the vicinity of the Action Area can be found in the following references: Congleton et al. 1982; Duker et al. 1989; Healey 1991; NMFS 1998.

4.1.2 Puget Sound Steelhead Trout

Puget Sound steelhead trout were listed as threatened by NOAA Fisheries on May 11, 2007 (NOAA 2007). A number of runs comprise the mainland Skagit, Snohomish, and Whatcom County population of Puget Sound steelhead. Native wild steelhead are present in the North and South Fork of the Skagit River, Stillaguamish River, Snohomish River, Samish River, Chuckanut Creek, Squalicum Creek, and Nooksack River 8, 14, 16, and 32 miles southeast and 14, 22, 26, and 27 miles northeast of Project Area respectively (WDFW 2013).

Summer steelhead runs occur in the Skagit, Stillaguamish, Snohomish, and Nooksack Rivers, which are very productive steelhead streams. According to WDFW's SalmonScape (WDFW 2013), summer steelhead spawning occurs in the upper reaches of these river systems and in

small tributaries such as the Cascade and Sauk Rivers (Skagit basin), Deer Creek (Stillaguamish basin), Peoples Creek (Snohomish basin), and Black Slough (Nooksack basin).

Winter steelhead are also present in the Skagit, Stillaguamish, Snohomish, and Nooksack Rivers, as well as the Samish River. According to WDFW's SalmonScape (WDFW 2013), in the Skagit, Stillaguamish, Snohomish, Nooksack, and Samish Rivers, winter steelhead spawning occurs throughout much of the mainstem as well as several smaller tributaries.

Any juvenile steelhead present in Cornet Bay would likely overlap temporally with Chinook and other ocean-type salmon, but are much less likely to rely on shallow water rearing due to their larger size. It is unlikely that juvenile rearing occurs in shallow waters of the Action Area; occasional opportunistic foraging in the Action Area is more likely, but still would not comprise regular use by steelhead. Sub-adult and adult steelhead may use the deeper, offshore waters of the Action Area for migration and foraging, but are not expected to be present in significant numbers at any time.

General life history information for Puget Sound steelhead trout has been reviewed in the Final Listing Determination (NOAA 2007) and the Status Review Update for Puget Sound Steelhead (NMFS 2005). Critical habitat listing for Puget Sound steelhead has been proposed, but it does not include nearshore marine areas (http://www.nwr.noaa.gov/habitat/critical_habitat_in_the_nw/critical_habitat_in_the_nw.html).

4.1.3 Coastal-Puget Sound Bull Trout

The USFWS announced the listing of Coastal-Puget Sound bull trout as threatened on November 1, 1999 (USFWS 1999). Anadromous bull trout are known to be present in the Skagit, Stillaguamish, Snohomish, Samish, and Nooksack Rivers approximately 8, 14, 32, 14, and 27 miles, respectively, from the Project Area (WDFW 2013). Because anadromous bull trout may range in salt water as much as 30 or 40 kilometers (approximately 18 to 25 miles) from the mouth of their natal stream (Kraemer 1994), it is assumed that they are present in Cornet Bay and may be present in the Action Area. Sub-adult and adult bull trout may be in the area year round. Juvenile bull trout would most likely be present at the same time as other juvenile salmonids, although like steelhead these juveniles are larger at outmigration and are less nearshore dependent than juvenile Chinook salmon. No bull trout were caught during beach seining efforts within Cornet Bay, including the Project Area, during February-June of 2009, 2010, and 2011 (Schmidt 2012).

Life history and stock information on Coastal-Puget Sound bull trout potentially occurring in the Action Area can be found in the following references: Buchanan and Gregory (1997); Lee et al. (1997); Rieman and McIntyre (1993; 1995); USACE (2000); USFWS (1999).

4.1.4 Bocaccio

Bocaccio were listed as endangered under the ESA on April 28, 2010 (NOAA 2010).

Bocaccio rockfish are a large rockfish, often reaching up to 3 ft in length. Bocaccio rockfish, like other rockfish species, give birth to live larval young that are pelagic for several months.

Juvenile bocaccio rockfish then settle into nearshore habitat, often including aquatic vegetation such as macroalgae-covered rocks or sand/eelgrass habitat (Love et al. 2002). Juveniles typically inhabit shallower water than adults, though still are most commonly found in relatively deep waters (100-400 ft [COSEWIC 2002]). Bocaccio rockfish and most rockfish species migrate to deeper water as they mature (Love et al. 1991), and adult bocaccio rockfish are usually found at depths of between 165 ft and 825 ft (Love et al. 2002). Adults often congregate around rocky bottom and outcrop habitat, though occasionally wander into mudflats (NMFS 2008). Adults are typically found well off the bottom (Love et al. 2002). Juvenile bocaccio rockfish are planktivorous, feeding on larval krill, diatoms, and dinoflagellates. Adults are piscivorous, primarily feeding on other rockfishes, hake sablefish, anchovies, lanternfish, and also squid (NMFS 2008). Bocaccio rockfish are prey of chinook salmon, terns, and harbor seals (NMFS 2008).

Bocaccio have not been documented in Puget Sound since 2001, although it is assumed an extant population exists (NMFS 2008). Historically, bocaccio were more frequently observed as bycatch or in the recreational fisheries in the southern portion of Puget Sound, including the area around Point Defiance and the Tacoma Narrows (NOAA 2009, NMFS 2008, and Palsson et al. 2009).

Based on available information, bocaccio are likely uncommon in the Action Area. The aquatic habitat within the Action Area is shallower than typical bocaccio habitat. Eelgrass and macroalgae are present along the shoreline of the Action Area, which may be utilized by juveniles for rearing. Adults almost certainly do not use the Action Area due to the shallow water. Based on the available information, it is unlikely that bocaccio would be present in the Action Area.

4.1.5 Canary Rockfish

Canary rockfish were listed as threatened under the ESA on April 28, 2010 (NOAA 2010).

Like other rockfish, canary rockfish give birth to live larval young that occupy the upper 330 ft (100 m) of the water column for 3-4 months after parturition (COSEWIC 2007). Juveniles then settle in tide pools, rocky reefs, kelp beds, low rock and cobble areas (NMFS 2008). Juveniles often occur at the interface between sand and rock outcrops at approximately 50-60 ft water depth (Love et al. 2002). Adults migrate to deeper water as they increase in size and age, and adult canary rockfish are typically found at depths of between approximately 260 ft and 650 ft (Love et al. 2002). Adult canary rockfish were observed in association with reefs at depths between approximately 650 and 820 ft in the Olympic Marine Sanctuary off the Washington Coast during coral surveys (Brancato et al. 2007). Adults often congregate around rocky shelves and pinnacles (Love et al. 2002). Juvenile canary rockfish are planktivorous, feeding on crustacean larvae, barnacle cyprids, and euphasiid eggs and larvae. Adults are planktivorous/carnivorous, primarily feeding on euphasiids and other crustaceans and small fish (NMFS 2008). Canary rockfish are prey of yellow rockfish, lingcod, salmon, sharks, dolphins, and seals (NMFS 2008).

Canary rockfish have been documented throughout Puget Sound (Miller and Borton 1980), although absolute numbers are relatively low compared to other rockfish species (Palsson et

al. 2009; NMFS 2008). WDFW includes canary rock fish on its PHS list, and documents them as present in Island County (WDFW 2012b). However, the aquatic habitat within the Project Area is not typical canary rockfish habitat, as the site is shallower than their preferred habitat. Eelgrass present along the shoreline of the Action Area may be utilized by juvenile canary rockfish prior to settling in deeper waters, but adults typically inhabit much deeper waters and are associated with rocky habitat. Based on available information, it is unlikely that canary rockfish would be present in the Action Area.

4.1.6 Yelloweye Rockfish

Yelloweye rockfish were listed as threatened under the ESA on April 28, 2010 (NOAA 2010).

Yelloweye rockfish, one of the larger rockfish, are generally considered rare in Puget Sound (Love et al. in NMFS 2008). Like other rockfish, yelloweye rockfish give birth to live larval young that are pelagic for several months. Juvenile yelloweye rockfish generally settle in shallow, high relief zones, crevices and sponge gardens (Love et al. in NMFS 2008). Juveniles move from shallow rocky reefs to deeper pinnacles and rocky habitats as they mature (NMFS 2008). Adults generally inhabit water between approximately 40 and 1,560 ft deep, but are most common between 300 and 600 ft (Love et al. 2001). Adult yelloweye rockfish are generally attached to a specific site and do not move much from that site (NMFS 2008). Adult yelloweye rockfish were observed in association with coral reefs at depths between approximately 650 and 820 ft in the Olympic Marine Sanctuary off the Washington Coast during coral surveys (Brancato et al. 2007). Juvenile yelloweye rockfish are planktivorous. Adults, due to their large size, prey on a wider range of prey items than bocaccio rockfish or canary rockfish, including smaller rockfish, sand lance, gadids, flatfishes, shrimp, crab, and gastropods (Love et al. 2002 and Yamanaka et al. 2006 in NMFS 2008). Yelloweye rockfish are preyed on less frequently than most rockfish due to their size, though they are occasionally preyed upon by killer whales.

As with bocaccio rockfish and canary rockfish, the Project Area is not typical yelloweye rockfish habitat due to the lack of very deep water and/or rocky reefs or outcrops. WDFW includes yelloweye rock fish on its PHS list and shows that they are present within Island County (WDFW 2012b), however the Action Area is generally shallower than that inhabited by yelloweye rockfish. Based on the available information, it is unlikely that yelloweye would be present in the Action Area.

4.1.7 Southern Resident Killer Whale

The NMFS announced the listing of the North Pacific Southern Resident killer whale as an endangered species on November 18, 2005, effective February 6, 2006 (NOAA 2005a). The listing is specific to the three resident whale pods (J, K, and L pods) with spring through fall ranges in Puget Sound and the Straits of Georgia and Juan de Fuca. A number of factors have been identified by NOAA Fisheries as having resulted in the listing of these whales as endangered. Sound and disturbance from vessel traffic, toxic chemicals which accumulate in top predators, and uncertain prey availability (primarily salmon) all have been identified as concerns for the continued survival of this population.

The Whale Museum, based on San Juan Island, maintains a sighting record upon which NOAA Fisheries relies to determine killer whale presence within a project's Action Area. The sighting record is available on the NOAA Fisheries website (http://www.nwr.noaa.gov/Marine-Mammals/MM-occurrence.cfm) and was queried for this Project on March 22, 2013. The Action Area, including Cornet Bay and eastern Deception Pass, is contained within quadrate 366. Individual sighting days are summarized in Table 2. Based on the available information, Southern Resident killer whale sightings in Cornet Bay and eastern Deception Pass are extremely rare; only one (1) killer whale sighting was recorded between 1990 and 2008 within quadrate 366. Southern Resident killer whales are therefore not expected to be present in the Action Area at any time.

Life history information on Southern Resident killer whales potentially found in the Action Area can be found in the following references: Barrett-Lennard and Ellis (2001); Braham and Dahlheim (1982); Dahlheim and Heyning (1999); Ford et al. (2000); NOAA (2006); Reeves and Leatherwood (1994).

Table 2. SRKW sighting days (1990-2008) in the quadrate comprising the Action Area.

Quadrate/ Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total*
366	1	0	0	0	0	0	0	0	0	0	0	0	1
Total*	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**

* Totals represented days with sightings within each quadrate, therefore totals may be overestimates reflecting multiple sightings of the same whale(s) on the same day.

4.1.8 Humpback Whale

The humpback whale was listed as endangered when the Endangered Species Act was enacted in 1970. Humpback whales inhabit coastal waters with high plankton and forage fish productivity, and are typically found within about 50 nautical miles of shore (Evans 1987, Calambokidis and Steiger 1995). They are dependent on abundant food resources because of their size and metabolic needs for reproduction, nursing, and sustenance during times of the year (i.e., winter) when food resources are less abundant (Evans 1987).

Humpback whales typically inhabit coastal areas because of the productivity of these habitats. They rarely enter the inland waters of the Straits of Juan de Fuca and Georgia, or Puget Sound. Prior to 2003, only three individual whales had been observed in these inland waters, and although reported sightings have increased in recent years with 13 different individuals during 2003 and 2004, most of these whales were in the Straits and not in Puget Sound (Falcone et al. 2005). Based on OrcaNetwork sightings, humpbacks do occasionally appear in Rosario Strait, Strait of Juan de Fuca, and Saratoga Passage, 5 miles northwest, 5 miles west, and 20 miles southeast of the Project Area, respectively. Given the lack of suitable habitat for feeding and breeding and the absence of recorded sightings within Cornet Bay and eastern Deception Pass, humpback whales are not expected to occur in the Action Area at any time.

Life history information on humpback whales potentially found in the Action Area can be found in the following references: Braham 1991; Calambokidis et al. 1997, 1998, 2001;

Calambokidis and Quan 1997; Calambokidis and Steiger 1995; Evans 1987; Scheffer and Slipp 1948.

4.1.9 Steller Sea Lion

The eastern Distinct Population Segment (DPS) of the Steller sea lion was listed as threatened on December 4, 1990 (USFWS 1990). The center of Steller sea lion abundance in Washington is along the coast from Cape Flattery to the Columbia River (Jones & Stokes Associates, Inc. and Natural Resources Consultants, Inc. 2000), although they are occasionally found in Puget Sound. Following the large El Niño event of 1985-1986, several hundred animals were reported to have appeared in South Puget Sound (Jones & Stokes Associates, Inc. and Natural Resources Consultants, Inc. 2000).

There are no documented areas of regular use by Steller sea lions in Cornet Bay or in any of the Eastern Bays (Region 9) described in the WDFW atlas of sea lion haulouts (Jeffries et al. 2000). The closest Steller sea lion haul-outs are Bird Rocks and Whale Rock, which are approximately 9 and 15 miles to the northwest and west, respectively (http://www.nwr.noaa.gov/maps_data/marine_mammal_maps.html). Steller sea lions are unlikely to be present within the Action Area at any given time.

On April 18, 2012 NOAA Fisheries published a proposal to delist the eastern DPS of Steller sea lions based on the finding that it has recovered and no longer meets the definitely of a threatened species under the ESA (NOAA 2012b); final determination is pending. Should NOAA Fisheries delist the eastern DPS of this population it will no longer require consultation under the ESA.

Life history information on Steller sea lions potentially found in the Action Area can be found in the following references: Fiscus and Baines (1966); Jeffries et al. (2000); Jones (1981); Jones & Stokes Associates, Inc. and Natural Resources Consultants, Inc. (2000); NMFS (1992); Osborne (1988); Otesiuk et al. (1990); Spalding (1964); Treacy (1985).

4.1.10 Marbled Murrelet

The marbled murrelet was listed as threatened on October 1, 1992 (USFWS 1992). Marbled murrelets feed in marine waters but nest in old-growth coniferous forests. While murrelet at-sea foraging behavior is not well understood, murrelets are typically observed foraging in marine waters between 20 and 80 meters (65 and 262 feet) deep, though they have been observed foraging in water as shallow as 1 meter (3 feet) and as deep as 100 meters (328 feet) (Ralph et al. 1995). Marbled murrelets reportedly feed on a wide variety of prey, including sand lance, Pacific herring, and other marine taxa such as crustaceans. Murrelets nest in old growth or mature forest composed of conifers, including Douglas fir, western red cedar, Sitka spruce, and western hemlock. Designated critical habitat for the marbled murrelet applies only to nesting habitat, and does not occur in the Action Area (USFWS 2011). Murrelets have been reported in vicinity of the Action Area and may occasionally forage within it.

Life history and population information on marbled murrelets potentially found in the Action Area can be found in the following references: Carter 1984; Parametrix, Inc. 1996; Ralph et al. 1995; USFWS 1995, 1996, 1997.

4.1.11 Leatherback Sea Turtle

The leatherback sea turtle was listed as endangered on June 2, 1970. Leatherback sea turtles are found in the Pacific, Atlantic, and Indian Oceans (Groombridge 1982). In the Pacific Ocean, this species has been recorded along the coast of South America and as far north as Alaska; however, they are uncommon in Washington waters and found off the coast only during the summer and early fall when sea surface temperatures are highest (Mager 1985). They have not been documented in Puget Sound (Salzer pers. comm. 2012)

Bowlby et al. (1994) observed 16 leatherback sea turtles off the Oregon and Washington coasts in 1989 and 1990, and three more in 1992. During the study, no other sea turtles were observed. The majority of these turtle sightings occurred off the Washington coast with a mean offshore distance of 33 nautical miles and a range of 4.5 to 80 nautical miles. Critical habitat is associated with breeding areas and does not occur in Washington.

Because the leatherback sea turtle typically occurs in offshore locations and there are no documented sightings within Puget Sound, there is no expectation that this species uses the Action Area.

Life history information on leatherback sea turtles can be found in the following references: Bowlby et al. 1994; CEE 1983; Groombridge 1982; Mager 1985.

4.2 DESIGNATED CRITICAL HABITATS

4.2.1 Puget Sound Chinook Salmon Critical Habitat

On September 2, 2005, the NMFS designated critical habitat for 12 Evolutionary Significant Units (ESU) of Pacific salmon and steelhead, including critical habitat for the Puget Sound Chinook ESU (NOAA 2005b). Critical habitat for this ESU includes 15 associated subbasins within Puget Sound and the Nearshore Marine Areas (Unit 16). Nearshore Marine Areas include the entirety of the nearshore zones of Puget Sound (including areas adjacent to islands), Hood Canal, and the Strait of Juan de Fuca (to the mouth of the Elwha River) (NOAA 2005c). The Nearshore Marine Areas are further divided into subunits based on the boundaries separating the 19 Water Resource Inventory Areas (WRIAs) that discharge into Puget Sound. The Project Action Area is located within Nearshore Marine Area 3, Lower Samish/Skagit Subbasin (corresponding to WRIA 3) and Nearshore Marine Area 6, Stillaguamish Subbasin (corresponding to WRIA 6) (NOAA 2005b).

Designated critical habitat within the Nearshore Marine Areas includes elevations from Extreme High Water (EHW; +10.2 feet MLLW) to -30 m (-98 feet) MLLW. The focus within the Nearshore Marine Areas has been identified as photic zone habitat based on the presence of macrophytes (eelgrass and macroalgae) that are vital to rearing, migrating, and maturing Chinook salmon and their prey (NOAA 2005b). Based on this designation, and the shallow nature of Cornet Bay and its vicinity, all aquatic areas in the Action Area below +10.2 feet MLLW (the uppermost extent of EHW in Cornet Bay) are designated as critical habitat for Chinook salmon.

4.2.2 Coastal-Puget Sound Bull Trout Critical Habitat

On September 26, 2005, the U.S. Fish and Wildlife Service (USFWS) designated 22 Critical Habitat Units (CHUs) for Coastal-Puget Sound bull trout (USFWS 2005). The aquatic habitat within the Project Action Area is classified as nearshore marine habitat and lies within the Puget Sound CHU (Unit 28), which includes approximately 1,526 miles of streams, 44,222 acres of lakes, and 566 miles of marine shoreline (USFWS 2005). Unit 28 is further divided into core areas, or Critical Habitat Subunits (CHSU). The Action Area is located within the Puget Sound Marine (South Portion) CHSU (subunit xiii). This area includes the entire eastern shoreline of Puget Sound, including associated bays and estuaries (USFWS 2005).

The extent of critical habitat for nearshore marine areas is from MHHW to -10 m (-33 ft) MLLW (USFWS 2005). This offshore boundary is based on the average extent of the photic zone, which is the topmost layer of water in which there is sufficient light for net primary production. Based on this designation, and the shallow nature of Cornet Bay and its vicinity, most aquatic areas (those at or above -33 ft MLLW) in the Action Area waterward of MHHW (+10.9 ft MLLW) are designated as critical habitat for bull trout.

4.2.3 Southern Resident Killer Whale Critical Habitat

NOAA designated critical habitat for Southern Resident killer whale on November 29, 2006, effective December 29, 2006 (NOAA 2006). Three areas have been designated as critical habitat: Area 1: the Core Summer Area in Haro Strait and waters around the San Juan Islands; Area 2: Puget Sound excluding Hood Canal; and Area 3: the Strait of Juan de Fuca. The Action Area is located within Area 2: Puget Sound. Designated critical habitat for Southern Residents includes only waters in Puget Sound deeper than -20 ft relative to Extreme High Water (EHW, +10.9 feet MLLW), or -9.1 feet MLLW. This includes portions of the Project Area where decking will be temporarily removed and the temporary float will be placed and most of the Action Area.

5 EFFECTS OF THE PROJECT

This section presents the direct effects, indirect effects, and effects of interrelated/interdependent actions related to the proposed Project on the species of concern within the Action Area.

5.1 POTENTIAL IMPACT MECHANISMS

5.1.1 Water Quality Effects

The project would result in temporary and short-term elevated levels of turbidity within the Action Area as a result of sheet pile driving. Potential effects of increased turbidity and suspended sediment load on salmonids have been investigated by a number of studies (Mortensen et al. 1976; Noggle 1978; Berg and Northcote 1985; Servizi and Martens 1987, 1992; Redding et al. 1987; Emmett et al. 1988; Simenstad 1988). The potential resulting effects on salmonids include direct mortality, sublethal effects (e.g., stress, gill damage, and increased susceptibility to disease), and behavioral responses (disruptions to feeding or migration). Increased suspended sediment loads associated with sheet pile driving would be minimal and expected to be well below levels associated with direct mortality and sublethal effects. Such turbidity would be contained within the silt curtain and temporary during the Project.

Accidental spills of chemicals could occur in conjunction with machinery operation. As part of the Project MMs/BMPs, the construction contractor will be responsible for the preparation of spill response and hazardous material control plans to be used for the duration of the construction period. The plans will outline measures to be taken to prevent the release or spread of hazardous materials, including (but not limited to) gasoline, oils, chemicals, and contaminated soils. Additionally, the contractor will install erosion/sediment barriers at the perimeter of the site to prevent inadvertent releases of hazardous materials. This will include silt filter fences along the upland property perimeter and a floating oil and debris boom along the shoreline.

There is also potential for construction material or debris to enter the water during construction. This risk will be managed through adherence to standard above-water and in-water construction BMPs (Section 7).

5.1.2 Elevated Sound during Sheet Pile Work

All sheet pile driving will be conducted at +1 MLLW using a vibratory hammer staged upland. Therefore, the analysis below addresses elevated underwater sound associated with vibratory sheet pile driving only.

The Services are concerned about potential effects of elevated underwater sound for a number of species, and have standard thresholds against which potential effects (behavior or injury) are evaluated. These thresholds are typically applied dependent upon the nature of the sound: impulsive (impact pile driving) or continuous (vibratory pile driving).

In this case, only continuous sound from vibratory sheet pile driving will occur, and therefore only the disturbance threshold for marine mammals during continuous sound applies: 120 dB_{RMS}. Determining the potential extent of sound above threshold levels is the same analysis as was completed to determine the Action Area (Section 3.2), resulting in a 4.57 mile distance for sound to attenuate to 120 dB_{RMS} (Table 4), which is actually an area not more than 2 miles from the marina based on landmass (Figure 1).

Table 3. Sound impact threshold and distance to threshold summary by species.

Species	Effect type	Threshold	Distance to Effect Threshold
Vibratory Hammer Operation (installation)			
Southern Resident killer whale, humpback whale and Steller sea lion	Behavioral disruption, continuous sound, drive 340 linear feet of steel sheet pile	120 dB_{RMS}	4.57 mi (7.36 km)

5.1.3 Habitat Disturbance

5.1.3.1 Upland Project Area

Upland construction activities include: (1) installing temporary construction ramps, (2) relocating upland buildings and utilities, (3) excavating contaminated soils, (4) backfilling excavation sites, (5) installing replacement building foundation, septic system, and fuel line/containment system, (6) restoring site utilities, and (7) installing concrete bulkhead cap, pedestrian walkway, and guide rail.

The construction activities listed above will temporarily alter the entire upland work area, approximately 56,000 sf. After contaminated soils are excavated and removed from the site, the upland will be restored to its pre-construction condition.

Upland activities will not affect the aquatic habitat within the Project Area. The replacement steel sheet pile bulkhead will prevent all upland contaminated soils from coming into contact with the aquatic habitat in Cornet Bay. The steel sheet pile bulkhead will be driven at least 20 ft below mudline, which is deeper than the depth of upland contaminated sediments (8-14 ft below ground surface).

Because of the limited potential for impacts due to upland construction activities as well as the lack of listed terrestrial species within the Project Area, the remainder of the effect analysis will focus on the effects of aquatic construction activities, specifically vibratory sheet pile driving, on listed aquatic species.

5.1.3.2 Aquatic Project Area

In-water and over-water construction activities include: (1) demolition and replacement of shoreward dock sections, (2) installation of temporary floating bridge connecting the two mooring docks, and (3) installation of 340 ft of AZ steel sheet pile bulkhead.

Of the aforementioned construction activities, installation of the steel sheet pile bulkhead has the greatest potential for habitat disturbance. The replacement steel sheet pile bulkhead will be installed 2 to 3 feet waterward of the existing timber bulkhead (340 ft), isolating approximately 680-1020 sf of existing intertidal habitat (+1 to +3 feet MLLW) from the aquatic environment. The intertidal habitat within the bulkhead footprint consists of fine/silty sediments and does not offer high quality refuge, foraging, or rearing habitat for listed marine species.

Overwater cover will be temporarily reconfigured through removal of decking sections and the use of a temporary access float. This reconfiguration will be in effect for approximately 21 days. Based on the relatively small areas affected, the short duration (~21 days), and the typically unvegetated nature of the marina, any resulting habitat effects would be neglibible within the Action Area.

Other potential effects from in-water and over-water work were discussed in Section 5.1.1 and include the effects of construction debris and inadvertent chemical releases in the aquatic habitat. These potential effects will be minimized by adhering to Project CM/BMPs (Section 7).

Installation of the steel sheet pile bulkhead will isolate upland contaminated soil from the aquatic habitat in Cornet Bay. This is considered a necessary and beneficial measure for the Cornet Bay Marina cleanup. Without the installation of a replacement bulkhead, the Project Area shoreline would be at risk of collapse during excavation, which could result in a large release of upland contaminated and uncontaminated soils/groundwater into Cornet Bay.

5.2 DIRECT EFFECTS

5.2.1 Direct Effects on Salmonids

Direct effects of the Project would entail those occurring during construction, primarily the effects on water quality (turbidity) and habitat disturbance as described in Section 5.1.1 and 5.1.3.

Turbidity generated by sheet pile driving activities would be temporary and localized (contained within the silt curtain), and well below levels expected to result in disturbance or injury to listed salmonids. Sheet pile driving is expected to occur over approximately 21 days, with the vibratory hammer operating 8 hours per day.

Installation of the sheet pile wall will isolate approximately 680-1020 sf of nearshore intertidal habitat (+1 MLLW to +3 MLLW). Although nearshore areas are utilized by juvenile salmonids for foraging and rearing, the Project bulkhead footprint does not include high quality aquatic habitat. The Cornet Bay Marina shoreline is characterized by low complexity substrates and a vertical timber bulkhead. Based on project timing during approved in-water work windows and lack of suitable foraging or rearing habitat, it is very unlikely that juvenile or adult salmonids would present within this area of Cornet Bay during construction.

Further, potential for spills of hazardous material during Project construction would be minimized by adherence to BMPs. Therefore, the possibility of chemical contaminants posing a risk to salmonids is negligible.

There is the potential for construction waste and/or hazardous materials from construction machinery to be released into the aquatic environment. As mentioned in Section 5.1.1, CM/BMPs would be implemented to minimize this risk.

All in-water work would occur during the established in-water work season approved by WDFW, the Corps, NOAA Fisheries, and USFWS to ensure that in-water work does not occur during the period when juvenile salmonids are abundant in the Action Area. It is also unlikely that adult and sub-adult salmonids would be present in the Action Area during Project construction due to noise and in-water activity. Limitations on in-water work are not typically extended to sub-adult and adult salmonids because fish in these life stages are highly mobile. Thus, the risk of adverse direct effects on salmonids is negligible.

5.2.2 Direct Effects on Listed Rockfish

Direct effects of the Project to listed rockfish would be the same as the direct effects on listed salmonids (Section 5.2.1). The primary effects on listed rockfish include effects of water quality and habitat disturbance as described in Section 5.1.1 and 5.1.3. Based on their extremely limited populations, distribution relative to the Action Area, and lack of suitable habitat within Cornet Bay, it is discountable that listed rockfish would experience direct effects of the project. Further, based on the minimal, localized, and temporary nature of water quality effects, effects on rockfish should they be present would be discountable. Rockfish do not use intertidal habitat that would be isolated during construction, and effects of that isolation would therefore also be insignificant for listed rockfish.

5.2.3 Direct Effects on Marine Mammals

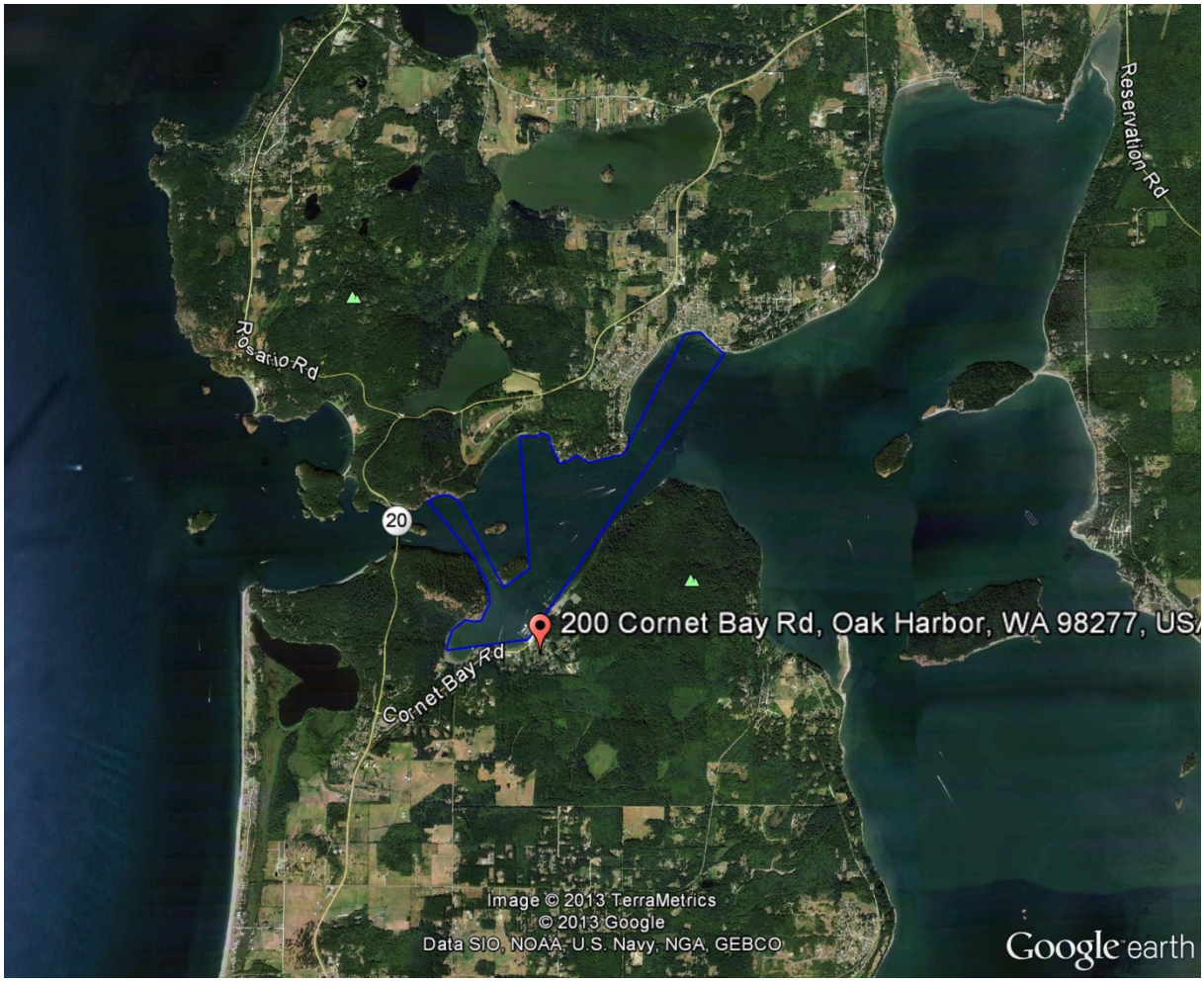
Direct effects of the Project to listed marine mammals would entail those occurring from construction activities, primarily the effects of water quality impacts (turbidity) and noise from vibratory sheet pile driving.

Increased turbidity could occur during sheet pile driving. A 150-ft mixing zone is typically allowed under the Ecology 401 Water Quality Certification; however a silt curtain deployed to isolate the work from adjacent waters will contain turbidity to a much smaller zone. Potential turbidity effects are limited to waters within or immediately adjacent to existing Cornet Bay Marina bulkhead; this area is not suitable foraging or breeding habitat for listed marine mammals. Therefore, potential turbidity effects on listed marine mammals are discountable.

Vibratory pile work may occur on approximately 21 days of project construction. NOAA Fisheries considers continuous sound associated with vibratory pile work that is above 120 dB_{RMS} to be potentially disturbing (Level B) for all marine mammals. There is no potentially injurious (Level A) threshold associated with continuous sound. The extent of sound above 120 dB_{RMS} during vibratory activities is analyzed in Section 5.1.2.

During vibratory installation of steel sheet pile, potentially disturbing sound could extend up to 4.57 miles from the sheet pile (Section 5.1.2). However, since sound does not travel through land masses, potentially disturbing sound from vibratory sheet pile driving would occur no more than 2 miles from the Project Area (Figure 2). The area of potential sound impacts encompasses all of Cornet Bay and portions of eastern Deception Pass, including Quiet Cove and the southern shoreline of Ben Ure Island (Figure 2). As described in Sections 4.1.7, 4.1.8, and 4.1.9, listed marine mammals – Southern Resident killer whale, humpback whale, and Steller sea lion – do not use the Project or Action Area with any regularity. Given the rarity of listed marine mammal presence in Cornet Bay and Deception Pass and unsuitable habitat for foraging or breeding, it is extremely unlikely that listed marine mammals would be present during construction.

Figure 2: Area of potential behavioral effects during vibratory pile driving (4.57 mi; < 2 mi based on landmasses).



5.2.4 Direct Effects on Marbled Murrelet

Marbled murrelets may occasionally forage within the Action Area; however temporary turbidity associated with pile driving is expected to be contianed by a silt curtain. Other direct effects would be similarly discountable and/or insignificant for murrelets based on their

location within the marina and their limited, temporary, and minimal nature. Continuous sound from vibratory hammering is not considered to be potentially injurious or disturbing to foraging murrelets. Overall, should marbled murrelets temporarily avoid the immediate Project Area due to noise or activities associated with construction, this would not result in diminished foraging opportunity or elicit a significant disruption of behavioral patterns.

5.2.5 Direct Effects on Leatherback Sea Turtle

Leatherback sea turtles are not known to use Puget Sound and are not expected in the Action Area at any time.

5.3 INDIRECT EFFECTS

The upland Project Area has been developed for public marina use since 1960. Native vegetation and quality habitat for terrestrial species is absent. Removing approximately 8,400 cy of contaminated soils from the upland is recognized as a benefit of the Project and will result in long-term improvements of the aquatic and terrestrial habitat condition.

The removal of 340 linear feet of creosote-treated timber bulkhead from the aquatic Project Area is recognized as a benefit of the Project. In addition, replacement of the outdated fuel lines and containment system will prevent future releases of fuels into the soil or aquatic habitat. These measures may improve long-term water quality conditions within the Action Area and Cornet Bay.

5.3.1 Listed Salmonids

Potential indirect effects of the Project include the permanent loss of approximately 680-1020 sf of nearshore intertidal habitat. This area may support epibenthic prey utilized by juvenile Chinook as well as other salmonid prey species including Pacific herring, sand lance, and surf smelt utilize nearshore and intertidal areas for spawning and juvenile rearing. Sand lance and surf smelt spawning have been documented within Cornet Bay, while Pacific herring spawning has been documented in Similk Bay. As discussed in Sections 3.3.5.1, 3.3.5.2, and 3.3.5.3, suitable spawning habitat for surf smelt and sand lance are absent within the Project Area, and Pacific herring spawning in the Project Area is extremely unlikely due to the absence of significant eelgrass or macroalgae. Juvenile rearing is also not likely to occur regularly in the aquatic Project Area due to low complexity substrates. Overall, the permanent loss of 680-1020 sf of unvegetated, modified intertidal area is expected to be insignificant for listed salmonids within the Action Area.

The project will benefit the aquatic environment through the permanent removal of 340 linear feet of creosote-treated timber bulkhead as well as the upland clean up actions described in Sections 2.3, 2.4.2, and 5.1.3.1.

5.3.2 Listed Rockfish

This Project will not result in any indirect effects to listed rockfish species.

5.3.3 Listed Marine Mammals

This Project will not result in any indirect effects to Southern Resident killer whale, humpback whale, or Steller sea lion.

5.3.4 Marbled Murrelet

Indirect effects on marbled murrelet would include those related to habitat disturbance on marbled murrelet prey species.

Marbled murrelets feed on a wide variety of prey including sand lance, Pacific herring, and crustaceans. Pacific herring and sand lance spawning habitat have been documented 1.5 mi and .95 mi from the Project Area, respectively. The Project Area may be used by juvenile sand lance and/or Pacific herring for foraging and rearing, but not spawning. Installation of replacement steel sheet pile would eliminate approximately 680-1020 sf of nearshore intertidal habitat. However, the nearshore Project Area is highly modified and does not provide high quality rearing/foraging habitat or spawning habitat for these fish. Any indirect effects habitat loss from sheet pile installation on Pacific herring and sandlance are expected to be negligible, and therefore insignificant to marbled murrelet foraging opportunity in the Action Area.

5.3.5 Leatherback Sea Turtle

This Project will not result in any indirect effects to leatherback sea turtles.

5.4 INTERDEPENDENT AND INTERRELATED ACTIONS

This project will maintain the current use of an existing facility. There are no interdependent or interrelated actions to affect the species of concern.

5.5 CUMULATIVE EFFECTS

Cumulative effects from an ESA perspective, considers future non-Federal actions (i.e., non-Federal projects and projects that do not require Federal permits) that may affect habitat within the Action Area. No such actions have been identified in the Action Area.

6 CRITICAL HABITAT EVALUATION

6.1 PUGET SOUND CHINOOK SALMON CRITICAL HABITAT

The NOAA identified six Primary Constituent Elements (PCEs) (i.e., physical and biological features) essential to the conservation of Chinook salmon critical habitat (NOAA 2005b). For the purposes of this assessment, the Project Area is considered to be in a nearshore marine area. Thus, of the six PCEs listed below, only number five (below) applies to the Action Area.

5. **Nearshore marine areas free of obstruction and excessive predation with water quality and quantity conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation; and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels.**

Based on the designations provided for nearshore marine areas, all of the Action Area below EHW (+10.2 feet MLLW) is considered Chinook designated critical habitat. Effects of the Project on the components of PCE #5 are presented below.

6.1.1 Primary Constituent Element # 5: Nearshore Areas

6.1.1.1 Obstruction and Predation

The effects of aquatic construction activities on salmonid behavior are addressed in Section 5.2.1 and 5.3.1. There is no potentially disturbing sound associated with vibratory pile driving. Installation of steel sheet pile 2-3 ft waterward of the existing bulkhead would eliminate approximately 680-1020 sf of nearshore intertidal marine habitat. However, this area does not provide high quality habitat for rearing or foraging. Additionally, construction would be timed during avoid peak juvenile salmon outmigration periods. The minor permanent alterations (removal of 680-1020 sf of nearshore marine habitat) will in no way alter passage or predation risk for salmonids.

The project would not adversely affect this element of PCE #5 through increased risk of obstruction or predation.

6.1.1.2 Water Quality and Quantity

The effects of the Project on water quality are addressed in Sections 5.1.1, 5.2.1, and 5.3.1 of this document. Sheet pile work may result in elevated levels of turbidity and suspended sediment, but these would be contained within a silt curtain and below levels potentially harmful to salmonids. There is also potential for unanticipated discharges of fuel, oil or other materials during construction, but these would be minimized and managed through standard practices for work in aquatic areas (Section 7). Construction would be timed to avoid peak juvenile salmon outmigration periods. Any increases would be temporary, minimal, and highly localized.

The removal of 340 ft of creosote-treated timber bulkhead, cleanup of 8,400 cy of contaminated upland soils, and replacement of outdated fuel lines and containment system would result in long-term water quality improvements within the Action Area.

The project would not adversely affect this element of PCE #5 through negative effects on water quality.

6.1.1.3 Forage

Sheet pile installation and other potential effects on forage conditions for Chinook salmon are addressed in Sections 5.1.3.2, 5.2.1, and 5.3.1. The elimination of 680-1020 sf of nearshore intertidal habitat would occur in an already modified shoreline area with low substrate complexity and habitat value. The effects of this on salmonid forage would be insignificant. In the long term, the loss of 680-1020 sf of low quality intertidal habitat would represent an insignificant change to salmonid foraging in Cornet Bay.

The project would not adversely affect this element of PCE #5 through negative effects on forage condition and opportunity.

6.1.1.4 Natural Cover

Natural cover in the vicinity of the Project Area is limited to eelgrass and macroalgae. Within the Project Area and specifically the steel sheet pile bulkhead footprint, there is no eelgrass or significant macroalgae. The substrate within the replacement bulkhead footprint is comprised solely of low complexity, silty/sandy sediment.

The project would not adversely affect this element of PCE #5 through negative effects on natural cover.

6.2 EFFECTS ON COASTAL-PUGET SOUND BULL TROUT CRITICAL HABITAT

The USFWS (2005) identified nine PCEs (i.e., physical and biological features) essential to the conservation of bull trout using the best scientific and commercial data available. Because the Project will take place in marine water, only PCEs 2, 3, 4, 5, and 8 apply to this Action Area:

2. **Migration habitats with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and freshwater and marine foraging habitats, including but not limited to permanent, partial, intermittent, or seasonal barriers.**

3. **An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.**

4. **Complex river, stream, lake, reservoir, and marine shoreline aquatic environments, and processes that establish and maintain these aquatic environments, with features such as large wood, side channels, pools,**

undercut banks and unembedded substrates, to provide a variety of depths, gradients, velocities, and structure.

5. **Water temperatures ranging from 2 to 15 degrees Celsius (°C) (36 to 59 degrees Fahrenheit (°F)), with adequate thermal refugia available for temperatures that exceed the upper end of this range. Specific temperatures within this range will depend on bull trout life-history stage and form; geography; elevation; diurnal and seasonal variation; shading, such as that provided by riparian habitat; streamflow; and local groundwater influence.**

8. **Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited.**

Based on the designations provided for nearshore marine areas, all portions of the Project and Action Areas above approximately -33 feet MLLW are considered critical habitat. All of the Project Area and portions of the Action Area fall into that category.

6.2.1 Primary Constituent Element #2: Migratory Corridors

The effects of aquatic construction activities on salmonid behavior are addressed in Section 5.2.1 and 5.3.1. There is no potentially disturbing sound associated with vibratory pile driving. Installation of steel sheet pile 2-3 ft waterward of the existing bulkhead would eliminate approximately 680-1020 sf of nearshore intertidal marine habitat. However, this would not constitute an obstruction to migration. Additionally, construction would be timed during avoid peak juvenile salmon outmigration periods. The minor permanent alterations (removal of 680-1020 sf of nearshore marine habitat) will in no way alter migratory corridors for bull trout.

The project would not adversely affect PCE #2.

6.2.2 Primary Constituent Element #3: An Abundant Food Base

Sub-adult and adult migratory bull trout are opportunistic feeders and generally consume large quantities of small fish in marine and freshwater environments (USFWS 2005). Overall, the Project would have negligible effects on bull trout food base. Any impacts would be very minor and temporary. Turbidity and nearshore habitat removal associated with sheet pile installation could temporarily affect prey items close to the Project Area, but these effects would be minimal. Abundant foraging opportunities exist in the immediate vicinity such that any temporary impacts to bull trout food base in the Action Area would have a negligible effect on bull trout critical habitat.

The project would not adversely affect PCE #3.

6.2.3 Primary Constituent Element #4: Complex Shoreline Environment

The Project Area shoreline has been modified by a vertical timber bulkhead since 1960. The replacement sheet pile bulkhead would be installed 2-3 ft waterward of the existing bulkhead

but would not otherwise alter the current shoreline configuration. There are no elements of natural shoreline complexity in the Project Area.

The project would not adversely affect PCE #4.

6.2.4 Primary Constituent Element #5: Water Temperature

The Project is located within the tidally influenced Cornet Bay. Water temperature at the site is influenced both by the saline Puget Sound and freshwater input from nearby tributaries. Neither construction activities nor the as-built condition of the Project will change the input of water to the Action Area or in other ways alter water temperature in the short or long-term.

This project would have no effect on PCE #5.

6.2.5 Primary Constituent Element #8: Permanent Water of Sufficient Quantity and Quality

The effects of the Project on water quality are addressed in Sections 5.1.1, 5.2.1, 5.3.1, and 6.1.1.2. Sheet pile installation may result in elevated levels of turbidity and suspended sediment, but this would be contained within the silt curtain. There is also potential for unanticipated discharges of fuel, oil or other materials during construction, but these would be contained within the debris boom and silt curtain (Section 7). Additionally, construction would be timed to minimize impacts to bull trout. Any increases would be temporary, minimal, and highly localized. In the long term, the project would not affect water quality.

Removal of existing creosote-treated timber bulkhead and upland contaminated soils may improve water quality long-term within the Project Area and is considered a benefit of the Project.

The project would not adversely affect PCE #8.

6.3 Effects on Southern Resident Killer Whale Critical Habitat

NOAA has identified three primary constituent elements (PCEs; i.e. physical and biological features) essential to the conservation of Southern Resident killer whale critical habitat (NOAA 2006).

1. **Water quality to support growth and development;**
2. **Prey species of sufficient quantity, quality, and availability to support individual growth, reproduction, and development, as well as overall population growth;**
3. **Passage conditions to allow for migration, resting and foraging;**

Southern Resident killer whale critical habitat begins at -20 feet relative to EHW (approximately -9.1 feet MLLW). Thus, most of the Action Area is within Southern Resident killer whale critical habitat. The effects of the Project on the three PCEs are presented in detail below.

6.3.1 Primary Constituent Element #1: Water Quality

Potential effects of the project on water quality and resulting effects on Southern Resident killer whales are addressed in Section 5.1.1, 5.2.3, and 5.2.3.1. Sheet pile installation may result in temporarily elevated levels of turbidity and suspended sediment, but this would be contained adjacent to the sheet pile. There is also potential for unanticipated discharges of fuel, oil or other materials during construction, but these would be minimized and managed through standard practices for work in aquatic areas (Section 7). Any effects would be temporary, minimal, and highly localized, and insignificant to Southern Resident killer whales. Further, although effects could occur within critical habitat, is it extremely unlikely that any Southern Resident killer whales would be present so close to active construction to experience them. In the long term, the project would not affect water quality.

The project would not adversely affect PCE #1.

6.3.2 Primary Constituent Element #2: Prey Quantity, Quality, and Availability

Southern Resident killer whales prey mainly on salmonids, and may prefer Chinook and chum salmon runs within Puget Sound (NOAA 2006). Consumption of a considerable biomass of fish is vital to growth and sexual maturity in Southern Residents and enables population growth of the pods.

Effects of the Project on salmonids were discussed in Section 5.2.1 and 5.3.1, and effects of the Project on Chinook salmon and bull trout critical habitat were discussed in Sections 6.1 and 6.2, respectively. Overall, the project would have insignificant and/or discountable effects. Any salmonid avoidance of the Project Area during construction would be so temporary as to be insignificant to Southern Resident killer whales, which are unlikely to be present in the area. In the long term, the project would not affect prey quantity, quality, or availability.

The project would not adversely affect PCE #2.

6.3.3 Primary Constituent Element #3: Passage Conditions

Elevated underwater sound during vibratory sheet pile driving is the mechanism by which passage conditions could be affected. Vibratory driving would result in an area of potentially disruptive sound within approximately 2 miles (by landmass) from the site, including designated critical habitat. However, Southern Resident whales are considered extremely unlikely to be present in this area (Section 4.1.7).

In the long term, the project will not affect passage for Southern Resident killer whales.

7 REGULATORY CONSIDERATION AND MINIMIZATION MEASURES

Federal, state, and local permits contain conditions that are intended to reduce the potential for short-term effects from in-water Project activities and long-term effects from habitat impacts. These provisions comprise an extensive list of considerations and measures that are applied to projects in or near estuarine and marine waters.

7.1 REGULATORY CONSIDERATIONS

- Timing restrictions specifying that construction must occur when juvenile salmonids are absent or present in very low numbers in the adjacent waterbody would be strictly observed. All timing restrictions that may be established by WDFW, the USACE, NOAA Fisheries, or USFWS would be strictly observed (USACE permit and HPA).
- Water quality standards and procedures that limit the impact of turbidity to a defined mixing zone would be observed (401 Water Quality Certification).
- Project construction will be completed in compliance with WAC 173-201A (401 Water Quality Certification).
- Any discharge of oil, fuel or chemicals into state waters is prohibited (401 Water Quality Certification).
- Fuel hoses, oil drums, oil or fuel transfer valves and fittings, etc., shall be checked regularly for drips or leaks, and shall be maintained and stored properly to prevent spills into state waters. Proper security shall also be maintained to prevent vandalism (401 Water Quality Certification).
- Corrective actions will be taken in the event of any discharge of oil, fuel, or chemicals into the water (401 Water Quality Certification), including:
    - In the event of a spill, containment and cleanup efforts will begin immediately and be completed as soon as possible, taking precedence over normal work. Cleanup will include proper disposal of any spilled material and used cleanup material.
    - The cause of the spill shall be assessed and appropriate action will be taken to prevent further incidents or environmental damage.
- Spills and/or conditions resulting in distressed or dying fish shall be reported immediately to DOE's Northwest Regional Spill Response Office at (425) 649-7000 (a 24-hour phone number) (401 Water Quality Certification). Spills of oil or hazardous materials also shall be reported immediately to the National Response Center at 1 (800) 424-8802 and the Washington Emergency Management Division at 1 (800) 258-5990 or 1 (800) OILS-911.

7.2 GENERAL MEASURES DURING ALL ACTIVITIES

- The contractor will comply with permit conditions.
- The contractor will comply with all water quality restrictions imposed by Ecology and implement corrective measures if temporary water quality standards are exceeded.

- Operations will be stopped temporarily if listed species are observed as injured, sick, or dead in the project area, to evaluate whether additional listed species are present and to assess whether operations may continue without further impact. NOAA Fisheries law enforcement will be notified, and fish will be handled with care to ensure effective treatment or analysis of cause of death or injury.
- The contractor will have a spill containment kit, including oil-absorbent materials, on site to be used in the event of a spill or if any oil product is observed in the water.
- The contractor is responsible for the preparation of a Spill Prevention, Control, and Countermeasures (SPCC) plan to be used for the duration of the Project.
    - The SPCC plan will: 1) identify construction planning elements and recognize potential spill sources in the Action Area,
    - 2) outline the response actions in the event of a spill or release and identify notification and reporting procedures,
    - 3) outline contractor management elements such as personal responsibilities, site security and inspections, and training, and
    - 4) outline what measures shall be taken by the contractor to prevent the release or spread of hazardous materials, either found on-site and encountered during construction but not identified in contract documents, or any hazardous materials that the contractor stores, uses, or generates on the construction site during construction activities. Hazardous materials include but are not limited to gasoline, oils, and chemicals, and are further defined in RCW 70.105.010.

7.3 MEASURES DURING SHEET PILE DRIVING

- A debris boom/silt curtain will be deployed to isolate the work from adjacent marine waters.
- A vibratory hammer will be used for all sheet pile driving activities.
- All in-water and over-water work will be conducted using equipment staged upland.

7.4 MEASURES DURING UPLAND EXCAVATION

- The contractor will install erosion/sediment barriers at the perimeter of the site to prevent inadvertent releases of hazardous materials. This will include silt filter fences along the upland property perimeter and a floating oil and debris boom along the shoreline.
- Water from excavation sites will be treated and filtered through holding tanks until it is in compliance with Ecology's Water Quality Standards. After treatment, water will be discharged according to the approved plan.
- An Ecology block wall will be installed between Cell 1 and Cell 2 during excavation.

- Two temporary gravel and quarry spall construction ramps will be installed to facilitate clean entry/exit of construction trucks to/from Project site.

8 CONCLUSIONS AND DETERMINATIONS

8.1 LISTED SPECIES

8.1.1 Puget Sound Chinook Salmon, Coastal-Puget Sound Bull Trout and Puget Sound Steelhead Trout

Direct and indirect effects of the Project on listed salmonids are addressed in Sections 5.2.1 and 5.3.1. Based on the analysis in this BE, the Project ***may affect, but is not likely to adversely affect*** Puget Sound Chinook salmon, Coastal-Puget Sound bull trout, and Puget Sound steelhead trout.

8.1.2 Bocaccio, Canary Rockfish, Yelloweye Rockfish

Direct and indirect effects of the Project on listed rockfish are addressed in Sections 5.2.2 and 5.3.2. Based on the analysis in this BE, the Project ***may affect, but is not likely to adversely affect*** Bocaccio, canary rockfish, and yelloweye rockfish.

8.1.3 Southern Resident Killer Whale

Direct and indirect effects of the Project on Southern Resident killer whale are addressed in Sections 5.2.3, 5.2.3.1 and 5.3.3. Based on the analysis in this BE, the Project ***may affect, but is not likely to adversely affect*** Southern Resident killer whale.

8.1.4 Humpback Whale

Direct and indirect effects of the Project on humpback whales are addressed in Sections 5.2.3, 5.2.3.2, and 5.3.3. Based on the analysis in this document, the Project ***may affect, but is not likely to adversely affect*** humpback whales.

8.1.5 Steller Sea Lion

Direct and indirect effects of the Project on Steller sea lion are addressed in Sections 5.2.3, 5.2.3.3, and 5.3.3. Based on the analysis in this document, the Project ***may affect, but is not likely to adversely affect*** Steller sea lion.

8.1.6 Marbled Murrelet

Direct and indirect effects of the Project on marbled murrelets are addressed in Sections 5.2.4 and 5.3.4. Based on the analysis in this document, the Project ***may affect, but is not likely to adversely affect*** marbled murrelets.

8.1.7 Leatherback Sea Turtle

Direct and indirect effects of the Project on leatherback sea turtles are addressed in Sections 5.2.5 and 5.3.5. Leatherback sea turtles are not expected to be in or near the Action Area at any time. Based on the analysis in this document, the Project would have ***no effect*** on leatherback sea turtles.

8.2 DESIGNATED CRITICAL HABITATS

8.2.1 Puget Sound Chinook Salmon Critical Habitat

An analysis of the Project's effects on Puget Sound Chinook salmon critical habitat was presented in Section 6.1. Based on that analysis, the Project ***may affect, but would not likely adversely affect*** Chinook salmon critical habitat.

8.2.2 Coastal-Puget Sound Bull Trout Critical Habitat

An analysis of the Project's effects on Coastal/Puget Sound bull trout critical habitat was presented in Section 6.2. Based on that analysis, the Project ***may affect, but would not likely adversely affect*** Coastal/Puget Sound bull trout critical habitat.

8.2.3 Southern Resident Killer Whale Critical Habitat

An analysis of the Project's effects on Southern Resident killer whale critical habitat was presented in Section 6.3. Based on that analysis, the Project ***may affect, but would not likely adversely affect*** Southern Resident killer whale critical habitat.

REFERENCES

Barrett-Lennard, L.G. and G.M. Ellis. 2001. Population structure and genetic variability in northeastern Pacific killer whales: towards an assessment of population viability. Research Document 2001/065, Department of Fisheries and Oceans, Nanaimo, British Columbia.

Bowlby, C.E., G.A. Green, and M.L. Bonnell. 1994. Observations of leatherback sea turtles offshore of Washington and Oregon. Northwest Naturalist. 75:33-35.

Berg, L. and T.G. Northcote. 1985. Changes in territorial, gill flaring and feeding behavior in juvenile coho salmon (*Oncorhynchus kisutch*) following short-term pulses of suspended sediment. Can. J. Fish. Aquat. Sci. 42:1410-1417.

Braham, H.W. and M.E. Dahlheim. 1982. Killer whales in Alaska documented in the Platforms of Opportunity Program. Report of the International Whaling Commission 32:643-646.

Braham, H.W. 1991. Endangered whales: Status update. A report on the 5-year status of stocks review under the 1978 amendments to the U.S. Endangered Species Act. National Marine Fisheries Service Unpublished Report.

Brancato, M.S., C.E. Bowlby, J. Hyland, S.S. Intelmann, and K. Brenkman. 2007. Observations of Deep Coral and Sponge Assemblages in Olympic Coast National Marine Sanctuary, Washington. Cruise Report: NOAA Ship McArthur II Cruise AR06-06/07. Marine Sanctuaries Conservation Series NMSP-07-03. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Sanctuary Program, Silver Spring, MD. 48 pp.

Buchanan, D.V. and S.V. Gregory. 1997. Development of water temperature standards to protect and restore habitat for bull trout and other cold water species in Oregon. Pages 119-126 in Mackay, W.C., M.K. Brewin, and M. Monita, editors. Friends of the bull trout conference proceedings. Bull Trout Task Force (Alberta), c/o Trout Unlimited Canada. Calgary, Alberta, Canada.

Calambokidis, J., and G.H. Steiger. 1995. Population estimates of humpback and blue whales made through photo-identification from 1993 surveys off California. Report to Southwest Fisheries Science Center, National Marine Fisheries Service. La Jolla, California.

Calambokidis, J., G.H. Steiger, J.M. Straley, T.J. Quinn II, L.M. Herman, S. Cerchio, D.R. Salden, M. Yamaguchi, F. Sato, J. Urban, J. Jacobsen, O. vonZeigesar, K.C. Balcomb, C.M. Gagbriele, M.E. Dahlheim, M. Higashi, S. Uchida, J.K.B. Ford, Y. Miyamura, P. Ladron de Guevara, S.A. Mizroch, L. Schlender, and K. Rasmussen. 1997. Abundance and population structure of humpback whales in the north Pacific basin. Report to Southwest Fisheries Science Center, National Marine Fisheries Service, La Jolla, California.

Calambokidis, J., T. Chandler, K. Rasmussen, and G.H. Steiger. 1998. Humpback whales and other marine mammals off Costa Rica, 1996-98. Cascadia Research, Olympia, Washington.

Calambokidis, J., T. Chandler, L. Schlender, K. Rasmussen, and G. Steiger. 2001. Research on Humpback and Blue Whales off California, Oregon, and Washington in 2000. Cascadia Research. Olympia, Washington. June 2001.

Calambokidis, J., and J. Quan. 1997. Gray whales in Washington State: Report on research in 1996. Final report to National Marine Mammal Laboratory, Seattle, Washington.

Carter, H.R. 1984. At-sea biology of the marbled murrelet (*Brachyramphus marmoratus*) in Barkley Sound, British Columbia. M.S. thesis. University of Manitoba, Winnipeg, Manitoba.

CEE. 1983. Manual of sea turtle research and conservation techniques. Prepared for the Western Atlantic turtle symposium, San Juan, Costa Rica. 126pp.

City of Anacortes. 1999. Revised Final Integrated Fidalgo Bay-Wide Plan and EIS. Anacortes, Washington. March 26, 1999.

Committee of the Status of Endangered Wildlife in Canada (COSEWIC) 2002. COSEWIC assessment and status report on the Bocaccio Sebastes paucispinis in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vii + 43 pp.

Committee of the Status of Endangered Wildlife in Canada (COSEWIC). 2007. COSEWIC assessment and status report on the canary rockfish Sebastes pinniger in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vii + 71 pp. (www.sararegistry.gc.ca/status/status_e.cfm).

Congleton, J.L., S.K. Davis, and S.R. Foley. 1982. Distribution, abundance and outmigration timing of chum and Chinook salmon fry in the Skagit salt marsh. *In* Salmon and trout migratory behavior symposium. *Edited by* E.L. Brannon and E.O. Salo. University of Washington, School of Fisheries, Seattle, Washington. pp. 153-163.

Dahlheim, M.E. and J.E. Heyning. 1999. Killer whale *Orcinus orca* (Linnaeus, 1758). Pages 281-322 *in* S. Ridgway and R. Harrison, editors. Handbook of marine mammals. Academic Press, San Diego, California.

Duker, G. C. Whitmus and E.O. Salo, G. B. Grette, and W.M. Schuh. 1989. Distribution of juvenile salmonids in Commencement Bay, 1983. University of Washington, Fisheries Research Institute. Seattle, Washington.

Emmett, R.L., G.T. McCabe Jr., and W.D. Muir. 1988. Effects of the 1980 Mount St. Helens eruption on Columbia River estuarine fishes: implications for dredging in northwest estuaries. Pages 75-91 in C.A. Simenstad, ed. Effects of Dredging on Anadromous Pacific Coast Fishes. University of Washington, Seattle, Washington.

Evans, P.G.H. 1987. The natural history of whales and dolphins. Facts on File Publications. New York, New York.

Falcone, E., J. Calambokidis., G. Steiger, M. Malleson, and J. Ford. 2005. Humpback whales in the Puget Sound/Georgia Strait Region in Proceedings of the 2005 Puget Sound Georgia Basin Research Conference. http://www.engr.washington.edu/epp/psgb/2005psgb/2005proceedings/papers/A2_FALCO.pdf.

Fiscus C., and G. Baines. 1966. Food and feeding behavior of Steller and California sea lions. *Journal of Mammology* 47: l95-200.

Ford, J.K.B., G.M. Ellis, and K.C. Balcomb. 2000. Killer whales: the natural history and genealogy of *Orcinus orca* in British Columbia and Washington State. 2nd ed. UBC Press, Vancouver, British Columbia.

Groombridge, B. 1982. The IUCN Amphibia-Reptilia Red Data Book, Part I, Testudines, Crocodylia, and Rhynchocephalia. IUCN, Gland, Switzerland. 426pp.

Hay, D.E. 1985. Reproductive biology of Pacific herring (*Clupea harengus pallasi*). Can. J,. Fish. Aquat. Sci. 42 (Suppl. 1):111-126.

Healey, M.C. 1991. Life history of Chinook salmon (*Oncorhynchus tshawytscha*). *in* C. Groot and L. Margolis (eds.), Pacific Salmon Life Histories. UBC Press, Vancouver, Canada.

ICF Jones & Stokes and Illingworth and Rodkin. 2009. Final Technical Guidance for Assessment and Mitigation of the Hydroacoustic Effects of Pile Driving on Fish. Prepared for California Department of Transportation, Sacramento, California. February 2009.

Jefferies, S.J., P.J. Gearin, H.R. Huber, D.L. Saul, and D.A. Pruett. 2000. Atlas of Seal and Sea Lion Haulout Sites in Washington. Washington Department of Fish and Wildlife, Wildlife Science Division, 600 Capitol Way North, Olympia, Washington.

Jones, R.E. 1981. Food habits of smaller marine mammals from northern California. Proceedings of the California Academy of Science 42:409-433.

Jones & Stokes Associates, Inc. and Natural Resources Consultants, Inc. 2000. Programmatic biological evaluation, Puget Sound Dredged Disposal Analysis (PSDDA) non-dispersive disposal sites. Prepared for the U.S. Army Corps of Engineers, Seattle, Washington.

Kraemer, C. 1994. Some observations on the life history and behavior of the native char Dolly Varden (*Salvelinus malma*) and bull trout (*Salvelinus confluentus*) of the north Puget Sound region. Washington Department of Fisheries Baitfish Unit. Mount Vernon, Washington.

Lee, D.C., J.R. Sedell, B.E. Rieman, R.F. Thurow, J.C. Williams and others. 1997. Chapter 4: Broadscale Assessment of Aquatic Species and Habitats. *In* T.M. Quigley and S.J. Arbelbide (eds.), An Assessment of Ecosystem Components in the Interior Columbia Basin and Portions of the Klamath and Great Basins Volume III. U.S. Department of Agriculture, Forest Service, and U.S. Department of Interior, Bureau of Land Management, Gen Tech Rep PNW-GTR-405.

Lee, D.C., J.R. Sedell, B.E. Rieman, R.F. Thurow, J.C. Williams and others. 1997. Chapter 4: Broadscale Assessment of Aquatic Species and Habitats. *In* T.M. Quigley and S.J. Arbelbide (eds.), An Assessment of Ecosystem Components in the Interior Columbia Basin and Portions of the Klamath and Great Basins Volume III. U.S. Department of Agriculture, Forest Service, and U.S. Department of Interior, Bureau of Land Management, Gen Tech Rep PNW-GTR-405.

LeGore, R.S. and D.M. DesVoigne. 1973. Absence of acute effects of threespine sticklebacks (Gasterosteus aculeatus) and coho salmon (Oncorhynchus kisutch) exposed to resuspended harbor sediment concentrations. J. Fish. Res. Bd. Can. 30(8): 1240-1242.

Love, M.S., M.H. Carr, and L.J. Haldorson. 1991. The ecology of substrate-associated juveniles of the genus *Sebastes*. Environmental Biology of Fishes 30:225-243.

Love, M.S., M. Yoklavich, and L. Thorsteinson. 2002. The Rockfishes of the Northeast Pacific. University of California Press. 405

Mager, A. 1985. Five-year status review of sea turtles listed under the Endangered Species Act of 1973. National Marine Fisheries Service, St. Petersburg, Florida.

Miller, B.S. and S.F. Borton. 1980. Geographical Distribution of Puget Sound Fishes: Maps and data source sheets. University of Washington Fisheries Research Institute, 3 vols.

Mortensen, D.G., B.P. Snyder, and E.O. Salo. 1976. An analysis of the literature on the effects of dredging on juvenile salmonids. University of Washington. Fisheries Research Institute, FRI-UW-7605.

National Marine Fisheries Service (NMFS). 1992. Report to Congress on Washington State Marine Mammals, Silver Spring, Maryland.

National Marine Fisheries Service (NMFS). 1998. Proposed recommendations for Amendment 14 to the Pacific Coast salmon plan for essential fish habitat. March 26, 1998.

National Marine Fisheries Service (NMFS). 2005. Status Review Update for Puget Sound Steelhead. Prepared by NMFS Puget Sound Steelhead Biological Review Team. July 2005.

National Marine Fisheries Service (NMFS). 2007. Endangered Species Act—Section 7 Consultation Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation: Port of Anacortes Project Pier 1 Project, Lake Campbell, 171100020204, Skagit County, Washington State. Prepared by NMFS Northwest Region for U.S. Army Corps of Engineers. April 2007.

National Marine Fisheries Service (NMFS) Biological Review Team (BRT). 2008. Preliminary scientific conclusions of the review of the status of 5 species of rockfish: bocaccio (*Sebastes paucispinis*), canary rockfish (*Sebastes pinniger*), yelloweye rockfish (*Sebastes ruberrimus*), greenstriped rockfish (*Sebastes elongatus*), and redstripe rockfish (*Sebastes proriger*) in Puget Sound, Washington. NMFS Northwest Fisheries Science Center. Seattle, WA. December 2, 2008.

National Oceanic and Atmospheric Administration (NOAA). 1999. Endangered and Threatened Species: Threatened Status for Three Chinook Salmon Evolutionary Significant Units in Washington and Oregon, and Endangered Status of One Chinook Salmon ESU in Washington. Federal Register, Volume 64, Number 56: 14308-14328. March 24, 1999.

National Oceanic and Atmospheric Administration (NOAA). 2005a. Endangered and Threatened Wildlife and Plants: Endangered Status for Southern Resident Killer Whales. 50 CFR Part 224. RIN No. 0648-AS95. November 18, 2005.

National Oceanic and Atmospheric Administration (NOAA). 2005b. Endangered and Threatened Species; Designation of Critical Habitat for 12 Evolutionary Significant Units of West Coast Salmon and Steelhead in Washington, Oregon, and Idaho. 50 CFR Part 226. RIN No. 0648-AQ77. September 2, 2005.

National Oceanic and Atmospheric Administration (NOAA). 2005c. Final Assessment of NOAA Fisheries' Critical Habitat Analytical Review Teams for 12 Evolutionarily Significant Units of Pacific Salmon and Steelhead. Prepared by NOAA Fisheries Protected Resources Division. August 2005.

National Oceanic and Atmospheric Administration (NOAA). 2006. Endangered and Threatened Species; Designation of Critical Habitat for Southern Resident Killer Whale. Federal Register, Volume 71, Number 229: 69054-69070. November 29, 2006.

National Oceanic and Atmospheric Administration (NOAA). 2007. Endangered and Threatened Species: Final Listing Determination for Puget Sound Steelhead. Federal Register, Volume 72, Number 91: 26722-26735. May 11, 2007.

National Oceanic and Atmospheric Administration (NOAA). 2009. Endangered and Threatened Wildlife and Plants: Proposed Endangered, Threatened, and Not Warranted Status for Distinct Population Segments of Rockfish in Puget Sound. Federal Register, Volume 7, Number 77: 18516-18542. April 23, 2009.

National Oceanic and Atmospheric Administration (NOAA). 2010. Endangered and Threatened Wildlife and Plants: Threatened Status for the Puget Sound/Georgia Basin Distinct Population Segments of Yelloweye and Canary Rockfish and Endangered Status for the Puget Sound/Georgia Basin Distinct Population Segment of Bocaccio Rockfish. Federal Register, Volume 75, Number 81:22276-22290. April 28, 2010.

NOAA. 2012a. Northwest Regional Office Species Lists. http://www.nwr.noaa.gov/Species-Lists.cfm Queried November 29, 2012.

NOAA. 2012b. Endangered and Threatened Species; Proposed Delisting of Eastern DPS of Steller Sea Lions. April 18, 2012. Fed. Reg. 77(75): 23209-23220.

Noggle, C.C. 1978. Behavioral, physiological and lethal effects of suspended sediment on juvenile salmonids. Master's thesis. University of Washington, Seattle, Washington.

Osborne, R. 1988. Marine mammals of greater Puget Sound. The Whale Museum. Seattle, Washington.

Otesiuk, P., M. Bigg, G. Ellis, S. Crockford and R. Wigen. 1990. An assessment of the feeding habits of harbor seals (*Phoca vitulina*) in the Strait of Georgia, British Columbia, based on scat analysis. *Canadian Technical Report of Fisheries and Aquatic Sciences* No. 1730.

Palsson, W.A., T. Tsou, G.G. Bargmann, R.M. Buckley, J.E. West, M.L. Mills, Y.W. Cheng, and R.E. Pacunski. 2009. The Biology and Assessment of Rockfishes in Puget Sound. Washington Department of Fish and Wildlife. September 2009.

Parametrix, Inc. 1996. Blaine Harbor Moorage Expansion and Dredging Project. Mitigation study area surveys. Prepared for the Port of Bellingham, Bellingham, Washington.

Penttila, D. 2007. Marine Forage Fishes in Puget Sound. Puget Sound Nearshore Partnership Report No. 2007-03. Published by Seattle District, U.S. Army Corps of Engineers. Seattle, Washington.

Ralph, C.J., G.L. Hunt, Jr., and J.F. Piatt (technical editors). 1995. Ecology and conservation of the marbled murrelet. Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station. Gen. Tech. Rep. PSW-GTR-152.

Redding, M. J., C.B. Schreck, and F.H. Everest. 1987. Physiological effects on coho salmon and steelhead of exposure to suspended solids. Trans. of the Am. Fish. Soc. 116:737-744.

Reeves, R.R. and S. Leatherwood. 1994. Dolphins, porpoises, and whales: 1994-1998 action plan for the conservation of cetaceans. IUCN, Gland, Switzerland.

Rieman, B.E. and J.D. McIntyre. 1993. Demographic and Habitat Requirements for conservation of Bull Trout. Gen. Tech. Rep. INT-302. Ogden, UT: U.S. Department of Agriculture, Forest Service, and Intermountain Research Station. Boise, Idaho. 38p.

Rieman, B.E. and J.D. McIntyre. 1995. Occurrence of bull trout in naturally fragmented habitat patches of varied size. Transactions of the American Fisheries Society 124: 285-296.

Salzer, Lori. 2012. Personal communication between Melora Shelton, Grette Associates Biologist and Lori Salzer, WDFW Field Biologist regarding leatherback sea turtle sightings in Puget Sound and in the offshore areas of Washington State. September 25, 2012.

Scheffer, V.B. and J.W. Slipp. 1948. The whales and dolphins of Washington State with a key to the cetaceans of the west coast of America. Am. Midl. Natur. 39(2):257-337.

Schmidt, Sarah. 2012. Juvenile salmon and nearshore fish use in shallow intertidal habitat associated with Cornet Bay. Northwest Straits Marine Conservation Initiative. http://www.nwstraits.org/Archives/Library.aspx.

Servizi, J.A. and D.W. Martens. 1987. Some effects of suspended Fraser River sediments on sockeye salmon (*Oncorhynchus nerka*). Page 254-264 in H.D. Smith, L. Margolis, and C.C. Wood, eds. Sockeye salmon (*Oncorhynchus nerka*) population biology and future management. Can. Spec. Publ. Fish. Aquat. Sci. 96.

Servizi, J.A. and D.W. Martens. 1992. Sublethal responses of coho salmon (*Oncorhynchus kisutch*) to suspended sediments. Can. J. Fish. Aquat. Sci. 49:1389-1395.

Simenstad, C.A. 1988. Effects of Dredging on Anadromous Pacific Coast Fishes. Workshop Proceedings Sept 8-9, 1988. University of Washington, Seattle, Washington.

Spalding, D.J. 1964. Comparative feeding habits of the fur seal, sea lion, and harbour seal on the British Columbia coast. Bull. Fish. Res. Bd. Canada 146:1-52.

Treacy, S.D. 1985. Feeding habits of marine mammals from Grays Harbor, Washington to Netarts Bay, Oregon. In Marine mammals and their interactions with fisheries of the Columbia River and adjacent waters. NWAFC Proc. Report 85-04. Edited by R. Beach, A. Geiger, S. J. and B. Troutman. pp. 149-198.

U.S. Army Corps of Engineers (USACE). 2000. Programmatic Biological Evaluation, Marbled Murrelet and Bull Trout, Puget Sound Dredged Disposal Analysis (PSDDA) Non-Dispersive Disposal Sites. Seattle, Washington.

U.S. Fish and Wildlife Service (USFWS). 1990. Endangered and Threatened Wildlife and Plants: Listing of the Steller Sea Lion as a Threatened Species. Federal Register, Volume 55, Number 233: 50005-50006. December 4, 1990.

U.S. Fish and Wildlife Service (USFWS). 1992. Endangered and Threatened Wildlife and Plants: Determination of Threatened Status for the Washington, Oregon, and California Population of the Marbled Murrelet. Federal Register, Volume 57, Number 191: 45328-45337. October 1, 1992.

U.S. Fish and Wildlife Service (USFWS). 1995. Draft recovery plan for the marbled murrelet (*Brachyramphus marmoratus*). U.S. Fish and Wildlife Service, Portland, Oregon.

U.S. Fish and Wildlife Service (USFWS). 1996. Endangered and Threatened Wildlife and Plants; Final Designation of Critical Habitat for the Marbled Murrelet. 50 CFR Part 17. RIN 1018–AC33. May 24, 1996.

U.S. Fish and Wildlife Service (USFWS). 1997. Recovery plan for the threatened marbled murrelet (*Brachyramphus marmoratus*) in Washington, Oregon, and California. Portland, Oregon. 203 pp.

U.S. Fish and Wildlife Service (USFWS). 1999. Endangered and threatened wildlife and plants: determination of threatened status for bull trout in the coterminous United States. Final Rule. Federal Register, Volume 64, Number 210: 58910. November 1, 1999.

U.S. Fish and Wildlife Service (USFWS). 2005. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Bull Trout. Federal Register, Volume 70, Number 185: 56212-56311. September 26, 2005.

U.S. Fish and Wildlife Service (USFWS). 2011. Endangered and Threatened Wildlife and Plants; Revised Critical Habitat for the Marbled Murrelet. Federal Register, Volume 76, Number 193: 61599-61621. October 5, 2011.

USFWS. 2012. Listed and Proposed Endangered and Threatened Species and Critical Habitat, Candidate Species, and Species of Concern in Skagit County. http://www.fws.gov/wafwo/speciesmap/SkagitCounty0312.pdf Queried November 29, 2012.

Washington Department of Fish and Wildlife (WDFW). 2009. 2008 Washington State Herring Stock Status Report. November 2009. Washington Department of Fish and Wildlife, Olympia, Washington.

Washington Department of Fish and Wildlife (WDFW). 2012. Priority Habitats and Species List by County, 2012. Available http://wdfw.wa.gov/publications/00165/2012_distribution_by_county.xls

Washington Department of Fish and Wildlife (WDFW). 2013. *SalmonScape* on-line GIS salmonid distribution mapper available http://fortress.wa.gov/dfw/gispublic/apps/salmonscape/default.htm, queried March 26, 2013.

Washington State Department of Transportation (WSDOT). 2007. Underwater Sound Levels Associated with Pile Driving during the Anacortes Ferry Terminal Dolphin Replacement Project. Prepared by Tim Sexton, WSDOT. April 2007.

CORNET BAY MARINA
MODEL TOXICS CONTROL ACT (MTCA) CLEANUP

BIOLOGICAL EVALUATION
APPENDIX A: ESSENTIAL FISH HABITAT ASSESSMENT

PREPARED BY:

GRETTE ASSOCIATES LLC
2102 NORTH 30TH, SUITE A
TACOMA, WASHINGTON 98403
(253) 573-9300

MAY 2013

Grette Associates LLC
ENVIRONMENTAL CONSULTANTS

1 Background

Pursuant to the Magnuson-Stevenson Fishery Conservation Management Act (MSFCMA) and the 1996 Sustainable Fishery Act, an evaluation of impacts of the Cornet Bay Marina MTCA Cleanup project on Essential Fish Habitat (EFH) is necessary. EFH is defined by the MSFCMA in 50 CFR 600.905-930 as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." The Pacific Fisheries Management Council (PFMC) has designated EFH for the Pacific salmon fishery, federally managed ground fishes, and coastal pelagic fishes (NOAA Fisheries 1999, PFMC 1999).

In Washington, EFH for the Pacific salmon fishery includes all those streams, lakes, ponds, wetlands and other water bodies currently or historically accessible to Chinook (*Oncorhynchus tshawytscha*), coho (*Oncorhynchus kisutch*), and pink salmon (*Oncorhynchus gorbuscha*), except above impassible barriers (PFMC 1999). In estuarine and marine areas, designated EFH for Chinook, coho and pink salmon extends from nearshore and tidal submerged environments within state territorial waters out to the full extent of the Exclusive Economic Zone (EEZ) off the Washington coast (PFMC 1999).

The EFH designation for groundfishes and coastal pelagics includes those waters and substrates necessary to ensure the production needed to support a long-term sustainable fishery. Ground fish and coastal pelagic EFH within marine waters of Washington also extends from the nearshore and tidal submerged environment out to the EEZ.

The west coast ground fish management unit includes 83 species that typically live on or near the bottom of the ocean. Species groups include skates and sharks, rockfishes, flatfishes and ground fishes. Coastal pelagics are schooling fishes that migrate in coastal waters. West coast pelagics include the pacific sardine (*Sardinops sagax*), Pacific chub (*Scomber japonicus*), northern anchoy (*Engraulis mordax*), jack mackerel (*Trachurus symmertircus*) and market squid (*Loligo opalescens*).

The objective of this EFH assessment is to determine whether or not the Cornet Bay Marina MTCA Cleanup project "may adversely affect" designated EFH for relevant commercially, federally-managed fisheries species within the proposed Action Area. It also described conservation measures proposed to avoid, minimize or otherwise offset potential adverse effects to designated EFH associated with the Action Area.

2 Essential Fish Habitat Analysis

2.1 Essential Fish Habitat within the Action Area

Salmon, groundfish, and pelagic species and life-stages with designated EFH in Puget Sound estuaries that may be present in the Action Area are listed in Table 1, below.

Table 1. Fish species and life-stages with designated essential fish habitat in Puget Sound

Guild / Common Name	Species Name	Adults	Eggs	Juveniles	Larvae
Groundfish[1]					
Big skate	*Raja binoculata*	x	x	x	
Black rockfish	*Sebastes melanops*	x		x	
Blue rockfish	*Sebastes mystinus*	x		x	x
Bocaccio	*Sebastes paucispinis*	x		x	x
Brown rockfish	*Sebastes auriculatus*	x		x	
Butter sole	*Isopsetta isolepis*	x	x	x	x
Cabezon	*Scorpaenichthys marmoratus*	x	x	x	x
China rockfish	*Sebastes nebulosus*	x		x	
Copper rockfish	*Sebastes caurinus*	x		x	
Dover sole	*Microstomus pacificus*	x	x	x	x
English sole	*Parophrys vetulus*	x	x	x	
Flathead sole	*Hippoglossoides elassodon*	x		x	
Greenstriped rockfish	*Sebastes elongatus*	x		x	x
Kelp greenling	*Hexagrammos decagrammus*	x	x	x	x
Lingcod	*Ophiodon elongatus*			x	x
Longnose skate	*Raja rhina*	x	x	x	
Pacific cod	*Gadus macrocephalus*	x			
Pacific hake	*Merluccius productus*	x		x	
Pacific sanddab	*Citharichthys sordidus*	x	x	x	x
Petrale sole	*Eopsetta jordani*	x		x	
Quillback rockfish	*Sebastes maliger*	x		x	x
Redstripe rockfish	*Sebastes proriger*	x		x	x
Rex sole	*Glyptocephalus zachirus*	x		x	
Rock sole	*Lepidopsetta bilineata*	x	x	x	x
Sablefish	*Anoplopoma fimbria*	x	x	x	x
Sand sole	*Psettichthys melanostictus*	x	x	x	x
Spiny dogfish	*Squalus acanthias*	x		x	
Splitnose rockfish	*Sebastes diploproa*	x		x	x
Spotted ratfish	*Hydrolagus colliei*	x	x	x	
Starry flounder	*Platichthys stellatus*	x	x	x	x
Tiger rockfish	*Sebastes nigrocinctus*	x		x	x
Widow rockfish	*Sebastes entomelas*	x		x	x
Yelloweye rockfish	*Sebastes ruberrimus*	x			x
Yellowtail rockfish	*Sebastes flavidus*	x		x	

Guild / Common Name	Species Name	Adults	Eggs	Juveniles	Larvae
Pacific Salmon[2]					
Chinook	*Oncorhynchus tshawytscha*	x		x	
Coho	*Oncorhynchus kisutch*	x		x	
Puget Sound pink	*Oncorhynchus gorbuscha*	x		x	
Coastal Pelagics[2]					
Northern anchovy	*Engraulis mordax*	x	x	x	x
Pacific sardine	*Sardinops sagax caerulea*	x			
Pacific mackerel	*Scomber japonicus*	x			
Market squid	*Loligo opalescens*	x			

[1] Based on information from EFH database provided by J. Stadler (NFMS) dated January 16, 2007.
[2] Based on previously published Puget Sound EFH lists from NFMS used in EFH Assessments through 2012.

All three of the Pacific salmon management unit species (chinook, coho and pink salmon) may be present within the Project Action Area (WDFW 2013). The nearest streams with salmon spawning and rearing are approximately 8 miles away (WDFW 2013), and some seasonal rearing, particularly for Chinook salmon, may occur in the Action Area. All three salmon species may use the Action Area for adult migration and juvenile out-migration.

Many of the ground fish species that occur in Puget Sound may also occur within the Action Area. West coast pelagic fishes are primarily associated with open ocean and coastal areas (PFMC 1998), and are therefore not likely to occur within the Action Area.

2.2 Description of the Proposed Action

Detailed descriptions of proposed Project activities may be found in Section 2.3 of the Biological Evaluation (BE), to which this document is attached. Although this Project is primarily an upland cleanup of contaminated soils, there are associated in-water construction activities required. There are no impacts to EFH associated with upland cleanup activities. The potential for impacts to designated EFH within the Action Area is primarily associated with minor habitat loss due to proposed sheet pile driving. Additionally, there is potential for impacts to water quality through minor turbidity and potential for spills into the water from construction activities.

2.3 Potential Effects of the Project

This assessment of whether proposed Project activities may adversely affect designated EFH within the Action Area is based on information in the documents referenced above (NMFS 1998; PFMC 1998a, 1998b, 1999).

The primary elements of the Project that could potentially impact designated EFH, and Conservation Measures that would avoid and minimize impacts, are summarized in Table 2, below. Detail about all potential Project impacts on species of concern may be found in Section 5 of the BE.

Table 2. Affected EFH by Project element and proposed conservation measures

Project Element	Affected EFH	Impact Mechanism	Conservation Measures
Sheet wall installation	Salmon, groundfish, coastal-pelagic substrate EFH	Vibratory installation of replacement steel sheet pile bulkhead would occur 2-3 ft waterward of existing timber bulkhead for the entire shoreline within the Project Area (340 ft). This would result in a net loss of 680-1020 sf of nearshore intertidal marine habitat. The elimination of 680-1020 sf of nearshore intertidal habitat would occur in an already modified shoreline area with low substrate complexity and habitat value. In the long term, the loss of 680-1020 sf of low quality intertidal habitat would represent an insignificant change to EFH in Cornet Bay.	**1, 2, 3 (for salmon EFH), 4, 5.**
Sheet wall installation	Salmon, groundfish, coastal-pelagic water column EFH	Installation of the sheet pile bulkhead will allow the complete isolation and subsequent removal of 340 lineal feet of creosote-treated vertical creosote-treated timber bulkhead from the aquatic environment. This will benefit water quality in water column EFH in the long term.	
Construction activities	Salmon, groundfish, coastal-pelagic water column EFH	Minor turbidity could result from sheet pile driving. Any turbidity generated would be localized and temporary.	**1, 2, 3 (for salmon EFH), 5 and 6.**
		Operation of construction machinery, including pile driving equipment, would have the potential for accidental releases of hazardous substances into the water.	**1, 2, 3 (for salmon EFH), 5, 6and 7.**

List of Applicable Conservation Measures

1. Compliance with the State's standards will ensure that fish and aquatic life will be protected to the extent feasible and practicable.
2. Compliance with the substantive requirements of the Hydraulic Code.
3. Timing restrictions specifying that in-water work must occur when juvenile salmon are absent or present in very low numbers.
4. Sheet pile will be installed with a vibratory hammer.
5. Sheet pile wall will completely isolate the timber bulkhead and adjacent upland areas from the aquatic environment during demolition and clean up activities.
6. Compliance with applicable State water quality standards (WAC 173-201A).
7. Care will be taken to prevent any petroleum products, chemicals, or other toxic or deleterious materials from entering the water. If a spill were to occur, work would be stopped immediately, steps would be taken to contain the material, and appropriate agency notifications would be made. Spill response and hazardous material control plans will be produced and used by project contractors.

3 Conclusions and Determination of Effects

3.1.1 Salmon EFH

The impacts of the Project on salmon EFH are shown in Table 2. During construction, bulkhead installation will isolate 680-1020 sf of low quality nearshore intertidal habitat. This is a relatively small area of low quality substrate EFH. Further, because construction will be timed to avoid juvenile salmon outmigration, the isolation of this area is unlikely to significantly affect substrate EFH function. Increased turbidity and risk of unintentional releases from construction equipment may temporarily impact water column EFH during project activities, but these impacts would be localized, minimal, and temporary in nature. All temporary effects would be further reduced by project timing, which will reduce the likelihood for juvenile salmon presence during project activities.

In the long term, the project will permanently remove the 680-1020 sf area isolated behind the sheet pile wall during construction. Although this is permanent loss of EFH, the biological significance of this loss for salmon EFH function within the Action Area is expected to be insignificant based on its relatively small area and low habitat quality. Further, the project will benefit water column EFH through the permanent removal of 340 lf of creosote-treated timber bulkhead and cleanup of adjacent areas.

Overall, the Project ***will not adversely affect salmon EFH***.

3.1.2 Groundfish EFH

The impacts of the Project on groundfish EFH are shown in Table 2. During construction, bulkhead installation will isolate 680-1020 sf of low quality nearshore intertidal habitat. This is a relatively small area of low quality substrate EFH. Increased turbidity and risk of unintentional releases from construction equipment may temporarily impact water column EFH during project activities, but these impacts would be localized, minimal, and temporary in nature.

In the long term, the project will permanently remove the 680-1020 sf area isolated behind the sheet pile wall during construction. Although this is permanent loss of EFH, the biological significance of this loss for groundfish EFH function within the Action Area is expected to be insignificant based on its relatively small area and low habitat quality. Further, the project will benefit water column EFH through the permanent removal of 340 lf of creosote-treated timber bulkhead and cleanup of adjacent areas.

Overall, the Project ***will not adversely affect groundfish EFH***.

3.1.3 Coastal Pelagic EFH

The impacts of the Project on coastal pelagic habitat are shown in Table 2. Increased turbidity and risk of unintentional releases from construction equipment may temporarily impact water column EFH during project activities, but these impacts would be localized, minimal, and temporary in nature.

In the long term, the project will benefit water column EFH through the permanent removal of 340 lf of creosote-treated timber bulkhead and cleanup of adjacent areas.

Overall, the Project ***will not adversely affect coastal pelagic EFH***.

4 References

National Marine Fisheries Service (NMFS). 1998. Essential Fish Habitat West Coast Groundfish Appendix. NMFS, Seattle, Washington.

Pacific Fishery Management Council (PFMC). 1998a. The Pacific Coast Groundfish Fishery Management Plan. Pacific Fishery Management Council, Portland, Oregon.

Pacific Fishery Management Council (PFMC). 1998b. Coastal Pelagics Fishery Management Plan. Pacific Fishery Management Council, Portland, Oregon.

Pacific Fishery Management Council (PFMC). 1999. Appendix A. Identification and Description of Essential Fish Habitat, Adverse Impacts, and Recommended Conservation Measures for Salmon. Pacific Fishery Management Council, Portland, Oregon.

Pacific International Engineering 1999. West Blair terminal project. Fairliner habitat area and Rhone-Poulenc habitat area monitoring report, 1997. Prepared for The Port of Tacoma, Washington.

Washington Department of Fish and Wildlife (WDFW). 2012. *SalmonScape* on-line GIS salmonid distribution mapper. Queried November 29, 2012.