Environmental Assessment

Pier and Support Facilities for Transit Protection System at U.S. Coast Guard Air Station/Sector Field Office Port Angeles, Washington

Volume 2: Appendices

Department of the Navy

August 2016

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Appendix A
Mitigation Action Plan

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MITIGATION ACTION PLAN

Pier and Support Facilities for Transit Protection System at
U.S. Coast Guard Air Station/Sector Field Office

Port Angeles, Washington

Naval Facilities Engineering Command Northwest

Silverdale, WA

August 2016

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1.0 Introduction

This Appendix presents the U.S. Department of the Navy's (Navy's) Mitigation Action Plan for the proposed construction of a pier and upland support facilities at U.S. Coast Guard (USCG) Air Station/Sector Field Office (AIRSTA/SFO) Port Angeles located in the City of Port Angeles, Washington. The purpose of the pier and support facilities is to provide a staging location for Transit Protection System (TPS) vessels and crews that escort Navy submarines to and from their dive/surface points in the Strait of Juan de Fuca and Naval Base Kitsap Bangor.

Pursuant to the U.S. Army Corps of Engineers (USACE)/U.S. Environmental Protection Agency (EPA) Final Rule on Loss of Aquatic Resources (USACE and EPA 2008), compensatory mitigation will be conducted to offset potential adverse impacts to aquatic resources from the addition of shade along the nearshore and displacement of benthic habitat from installed piles necessary to construct the proposed pier (see Attachment A to this Mitigation Action Plan: *Compensatory Mitigation Plan*).

In accordance with DoD Instructions and Navy policy, the Navy will mitigate impacts to protected tribal resources that would result from the TPS Project. Port Angeles Harbor is within the Usual and Accustomed (U&A) fishing grounds and stations of the Lower Elwha Klallam, Port Gamble S'Klallam, and Jamestown S'Klallam Tribes. As a result of Government-to-Government consultation with the Port Gamble S'Klallam, Jamestown S'Klallam, and Lower Elwha Klallam Tribes, the parties have agreed to the removal of an imported-fill laydown area located in aquatic tidelands owned by DNR and associated upland structures to restore intertidal, beach, and nearshore habitat for fish and invertebrates. The parties have also agreed to examine the feasibility of salvaging eelgrass from the planned TPS pier footprint and transplanting it on shallow subtidal restoration sites along Ediz Hook. If the parties agree that the project is feasible, the Navy will enter into a Cooperative Agreement under the Sikes Act with the Lower Elwha Klallam Tribe for the Tribe to perform the work and the Navy to provide funding.

Table 1 details specific mitigation measures, parties responsible for implementing each measure, schedule for implementation, effectiveness criteria, monitoring and tracking mechanisms, and timing methods as well as estimated completion dates.

Table 1. Summary of Mitigation Measures for the Pier and Support Facilities for the Transit Protection System Project

Compensatory and Treaty Mitigation						
Mitigation Measure (MM)	**Origin of Measure**	**Anticipated Benefit**	**Criteria for Evaluating Effectiveness**	**Responsible Party**	**Timing and Methods**	**Estimated Completion Date**
Impact: Disturbance and loss of marine/aquatic vegetation, including eelgrass from resulting overwater shade from new pier. **MM 1:** Compensatory aquatic mitigation will be implemented to offset the loss of aquatic vegetation, primarily eelgrass, through removal of equal size or larger in-water/overwater structure.	USACE Final Rule (33 CFR parts 325 and 332) (*Appendix F: Compensatory Mitigation Plan*)	Create nearshore, unshaded marine habitat suitable for eelgrass colonization and that is adjacent to existing eelgrass beds.	Monitoring will be conducted to ensure mitigation project is implemented per Appendix F.	The Navy will be responsible for implementing the compensatory aquatic mitigation project.	Mitigation will be implemented within the scheduled project construction period.	October 2018.
Impact: Potential impacts to harvestable marine resources through reduction and degradation of marine habitat. **MM 2:** Treaty mitigation will be implemented through the removal of an in-water/ overwater structure for purposes of creating new unshaded, nearshore, marine habitat for fish, aquatic vegetation, and invertebrates.	Treaty mitigation will be performed in accordance with the MOA executed by the Navy and Port Gamble S'Klallam, Jamestown S'Klallam, and Lower Elwha Klallam tribes.	Restoration of intertidal, beach, and nearshore habitat.	Monitoring will be conducted to ensure mitigation project is implemented per the MOA.	The Navy.	Mitigation will be implemented within the scheduled project construction period,	October 2018.
Impact: Potential impacts to harvestable marine resources through reduction and degradation of marine habitat. **MM 3:** Treaty mitigation will be implemented if feasible by salvaging eelgrass from the planned TPS pier footprint and transplanting on shallow subtidal restoration sites along Ediz Hook.	Treaty mitigation will be performed in accordance with the MOA executed by the Navy and Port Gamble S'Klallam, Jamestown S'Klallam, and Lower Elwha Klallam tribes.	Restoration of intertidal, beach, and nearshore habitat.	Prior to initiation of TPS in-water construction, the Lower Elwha Klallam Tribe and the Navy will examine the feasibility of the eelgrass salvaging and transplanting activity.	If the parties agree the project is feasible, the Navy and Lower Elwha Klallam Tribe will enter into a Cooperative Agreement under the Sikes Act for the Tribe to perform the work and the Navy to provide funding.	Mitigation will be completed in a manner that does not delay the start of in-water construction.	October 2018.

Appendix B

Biological Assessment and Essential Fish Habitat Assessment

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Final

Biological Assessment and Essential Fish Habitat Assessment for Pier and Support Facilities for Transit Protection System at U.S. Coast Guard Air Station/Sector Field Office Port Angeles, Washington

September 2015

1101 Tautog Circle
Silverdale, WA 98315

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Table of Contents

1 Introduction 1
1.1 Project Location 1
1.2 Consultation History 2

2 Project Description 5
2.1 Project Overview 5
2.2 Construction 5
2.2.1 Upland 5
2.2.2 In-Water Work 6
2.2.3 Construction Access and Staging 11
2.2.4 Project Sequencing and Timeline 11
2.2.5 Compensatory Mitigation 11
2.3 Operations and Maintenance 12
2.4 Impact Avoidance and Minimization Measures 13
2.5 Action Area 16

3 Status/Presence of ESA-Listed Species and Designated Critical Habitats 19
3.1 Federally Listed Species within the Project Action Area 20
3.1.1 Puget Sound Chinook Salmon ESU 20
3.1.2 Hood Canal Summer-Run Chum ESU 23
3.1.3 Puget Sound Steelhead DPS 24
3.1.4 Pacific Eulachon Southern DPS 26
3.1.5 North American Green Sturgeon Southern DPS 27
3.1.6 Southern Resident Killer Whale DPS 28
3.1.7 Humpback Whale 30
3.1.8 Coastal-Puget Sound Bull Trout DPS 31
3.1.9 Marbled Murrelet 33

4 Environmental Setting 37
4.1 Marine Habitat Conditions 37
4.1.1 Ambient Sound 37
4.1.2 Physical Barriers and Overwater Shade 38
4.1.3 Water Circulation and Bathymetry 38
4.1.4 Water Quality 39
4.1.5 Sediment Quality 39
4.1.6 Marine Vegetation 40
4.1.7 Underwater Structures and Benthic Community 43

4.1.8 Forage Fish ... 44

5 Effects of the Action ... 47

5.1 Direct Effects ... 47
5.1.1 Underwater Noise ... 48
5.1.2 Physical Barriers and Overwater Shade ... 65
5.1.3 Water Circulation and Bathymetry ... 66
5.1.4 Water Quality ... 66
5.1.5 Sediment Quality ... 67
5.1.6 Marine Vegetation ... 67
5.1.7 Underwater Structures and Benthic Community ... 68
5.1.8 Forage Fish ... 68

5.2 Indirect Effects ... 69

5.3 Effects from Interrelated and Interdependent Activities ... 70

5.4 Cumulative Effects ... 70

6 Conclusions and Effects Determinations ... 71

6.1 Puget Sound Chinook Salmon ESU ... 71
6.1.1 Puget Sound Chinook Salmon ESU Critical Habitat ... 72

6.2 Hood Canal Summer-Run Chum Salmon ESU ... 73

6.3 Puget Sound Steelhead DPS ... 74

6.4 Pacific Eulachon Southern DPS ... 76

6.5 North American Green Sturgeon Southern DPS ... 76
6.5.1 Southern Green Sturgeon DPS Critical Habitat ... 77

6.6 Southern Resident Killer Whale DPS ... 78
6.6.1 Southern Resident Killer Whale DPS Critical Habitat ... 78

6.7 Humpback Whale ... 79

6.8 Coastal Puget Sound Bull Trout DPS ... 79
6.8.1 Coastal Puget Sound Bull Trout DPS Critical Habitat ... 81

6.9 Marbled Murrelet ... 81

7 Magnuson-Stevens Fishery Conservation and Management Act ... 85

7.1 Project Description ... 85

7.2 EFH Designations ... 85
7.2.1 Pacific Coast Groundfish ... 86
7.2.2 Coastal Pelagic Species ... 87
7.2.3 Pacific Coast Salmon ... 88

7.3 Habitat Areas of Particular Concern ... 88

7.3.1 Pacific Coast Groundfish 88
7.3.2 Coastal Pelagic Species 89
7.3.3 Pacific Coast Salmon 89

7.4 Description of Habitats 89

7.5 Assessment of Impacts 89
7.5.1 Construction Impacts 89
7.5.2 Potential Adverse Effects on Pacific Coast Groundfish EFH 92
7.5.3 Potential Adverse Effects on Coastal Pelagic EFH 92
7.5.4 Potential Adverse Effects on Pacific Coast Salmonid EFH 93

7.6 EFH Conservation Measures 94

7.7 Conclusions 94

8 References 95

List of Figures

Figure 1-1. Vicinity Map 3
Figure 1-2. Project Area and Existing Facilities 4
Figure 2-1. Overview of Proposed Pier and Support Facilities 7
Figure 2-2. Side-view Drawing (looking west) of Proposed Pier and Trestle 8
Figure 2-3. Action Area 18
Figure 3-1. Designated Critical Habitat within the Action Area 22
Figure 4-1. Eelgrass Locations within the Vicinity of the Project Area 42
Figure 4-2. Sand Lance Spawning Area within the Action Area 46
Figure 5-1. Representative View of Affected Areas for Fish Due to Underwater Noise from Impact and Vibratory Pile Driving 24-inch Diameter Steel Piles 51
Figure 5-2. Representative View of Affected Areas for Fish Due to Underwater Noise from Impact and Vibratory Pile Driving 30-inch Diameter Steel Piles 52
Figure 5-3. Representative View of Affected Areas for Marine Mammals Due to Underwater Noise from Impact and Vibratory Pile Driving 24-inch Diameter Steel Piles 58
Figure 5-4. Representative View of Affected Areas for Marine Mammals Due to Underwater Noise from Impact and Vibratory Pile Driving 30-inch Diameter Steel Piles 59
Figure 5-5. Representative View of Affected Areas for Marbled Murrelet from Underwater and Airborne (Masking) Noise Due to Impact Pile Driving 24-inch Diameter Steel Piles 63
Figure 5-6. Representative View of Affected Areas for Marbled Murrelets from Underwater and Airborne (Masking) Noise Due to Impact Pile Driving 30- and 36-inch Diameter Steel Piles 64

List of Tables

Table ES-1. Effects Determinations for ESA-Listed Species and Critical Habitat ES-2
Table ES-2. Effects Determinations for EFH ES-2
Table 2-1. Summary of the Number of Permanent Steel Piles for Proposed TPS Pier, Trestle, and Floats 10
Table 3-1. ESA-Listed Species and Designated Critical Habitat within the Action Area 19
Table 4-1. Summary of Macroalgae Species Observed within the Project Area 43
Table 5-1. Pile Driving Noise Injury Thresholds and Behavioral Guideline for Fish 49
Table 5-2. Representative Underwater Source Levels for 24- and 30-inch Diameter Steel Pipe Piles 50
Table 5-3. Maximum Range to Fish Sound Criteria Thresholds from Pile Driving 50
Table 5-4. Calculated Distances to Underwater Marine Mammal Noise Thresholds during Pile Driving 57
Table 5-5. Maximum Range to Marbled Murrelet Underwater Injury and Airborne Masking Sound Threshold During Impact Pile Driving 62
Table 6-1. Effects Determinations for ESA-Listed Species and Critical Habitat 83
Table 7-1. Summary of Potential Impacts on EFH by Impact Type 94
Table 7-2. EFH Effects Determinations 94

List of Appendices

Appendix A – Eelgrass survey

Appendix B – Fish species with designated essential fish habitat within the project vicinity

ABBREVIATIONS AND ACRONYMS

AFF	Alert Force Facility
AIRSTA/SFO	Air Station/Sector Field Office
BA	Biological Assessment
BMP	best management practice
BV	Blocking Vessel
°C	degrees Celsius
CFR	Code of Federal Regulations
CNRNW	Commander Navy Region Northwest
COC	contaminant of concern
CPO	Chief Petty Officer
CSL	Cleanup Screening Levels
dB	decibel(s)
dBA	A-weighted decibel(s)
dB RMS	decibel root-mean-square
DFM	diesel fuel, marine
DPS	Distinct Population Segment
Ecology	Washington Department of Ecology
EFH	Essential Fish Habitat
ESA	Endangered Species Act
ESU	Evolutionarily Significant Unit
°F	degrees Fahrenheit
FAA	Federal Aviation Administration
FHWG	Fisheries Hydroacoustic Working Group
FMP	Fishery Management Plan
ft	foot/feet
ft^2	square foot/feet
HAPC	Habitat Areas of Particular Concern
HC	Hood Canal
HCCC	Hood Canal Coordinating Council
Hz	hertz
IHA	Incidental Harassment Authorization
km	kilometer(s)
LEED	Leadership in Energy and Environmental Design
m	meter(s)
m^2	square meter(s)
MFPU	Marine Force Protection Unit
MHHW	mean higher high water
MLLW	mean lower low water
MMPA	Marine Mammal Protection Act
MSA	Magnuson-Stevens Fishery Conservation and Management Act
Navy	U.S. Department of the Navy
NMFS	National Marine Fisheries Service

NOAA	National Oceanic and Atmospheric Administration
PCB	polychlorinated biphenyls
PCE	Primary Constituent Element
PFMC	Pacific Fisheries Management Council
PS	Puget Sound
psf	pounds per square foot
PSTRT	Puget Sound Technical Recovery Team
RMS	Root-mean-square
RSA	Ready Service Armory
RV	Reaction Vessel
SEL	sound exposure level
SMS	Sediment Management Standards
SPCC	Spill Prevention, Control, and Countermeasure
SPL	sound pressure level
SPL Peak	peak sound pressure level
SQS	Sediment Quality Standards
SRKW	Southern Resident Killer Whale
SV	Screening Vessel
SWPPP	Stormwater Pollution Prevention Plan
TMDL	total maximum daily load
TPS	Transit Protection System
µPa	microPascal
U.S.	United States
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USC	U.S. Code
USCG	U.S. Coast Guard
USFWS	U.S. Fish and Wildlife Service
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WSDOT	Washington State Department of Transportation

Executive Summary

The U.S. Department of the Navy (Navy) proposes to construct a pier and support facilities at U.S. Coast Guard (USCG) Air Station/Sector Field Office Port Angeles located in Clallam County, Washington. The new pier and facilities will support USCG Transit Protection System (TPS) operations by providing a pier for berthing of up to seven TPS vessels and support facilities for the Marine Force Protection Unit (MFPU). The MFPU's mission is to provide security escort to the Navy's Fleet Ballistic Missile Submarines along their transit route from the homeport at Naval Base Kitsap, Bangor to the dive/surface sites in the Strait of Juan de Fuca. The new pier and support facilities will ensure that MFPU personnel can consistently comply with established policy and safety requirements for underway hours limitations and rest between missions.

The project will include construction of upland facilities and site improvements. In-water pile driving will involve installation of 144 permanent 18-inch diameter to 36-inch diameter steel pipe piles to accommodate a vehicle and approach trestle, fixed pier, and floats. The pier, trestle, and other in-water structures will result in 25,465 square feet (2,365 square meters) of overwater coverage.

Measures have been incorporated into the project to minimize effects to the aquatic environment and protected species and habitats. These include: use of a timing restriction to avoid exposure to outmigrating salmon, use of a timing restriction to avoid exposure of foraging marbled murrelets to impact pile driving noise during the nesting season, use of a noise attenuation device when impact pile driving, and visual monitoring for marine mammals during pile driving.

The project is scheduled to begin October 2016 and conclude October 2017. To minimize impacts to juvenile salmonids and bull trout, in-water work will occur within the work window for Tidal Reference Area 10 (July 16 through February 15) (U.S. Army Corps of Engineers [USACE] 2012). A total of 75 impact pile driving days are anticipated to occur over 18-weeks and be conducted within two in-water work windows.

This document provides a Biological Assessment that assesses whether the project affect species and designated critical habitat listed under the Endangered Species Act (ESA) under the jurisdiction of the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS). During construction, the project will create noise with the potential of harassment or injury to listed-species and their prey and the project will disturb sediments, benthos, and aquatic vegetation. After a review of the potential presence of ESA-listed species and designated critical habitat in the Action Area, and analysis of potential project effects to species and designated critical habitat, the Navy has determined that the project ***may affect, is not likely to adversely affect*** Pacific eulachon southern distinct population segment (DPS), North American green sturgeon southern DPS, southern resident killer whale DPS, and humpback whale DPSs (Western North Pacific and Central America). The project ***may affect, is likely to adversely affect*** Puget Sound Chinook salmon evolutionarily significant unit (ESU) and designated critical habitat, Hood Canal summer-run chum salmon ESU, Puget Sound steelhead DPS, coastal-Puget Sound bull trout DPS and designated critical habitat, and marbled murrelet. Table ES-1 provides a list of species and critical habitat assessed and the effects determination for each species and critical habitat.

The document also provides an Essential Fish Habitat (EFH) Assessment. After a review of the presence of EFH in the Action Area, the Navy has determined that the project ***may adversely affect*** EFH for Pacific coast groundfish, coastal pelagics, and Pacific coast salmon (Table ES-2). However, BMPs and minimization measures that will be implemented will minimize adverse effects to the extent practicable and all effects other than permanent shade will cease upon completion of the TPS project.

Table ES-1. Effects Determinations for ESA-Listed Species and Critical Habitat

Species **Common name** **(*Scientific name*)**	**ESA Status**	**Critical Habitat Status**	**Effects Determination for Species**	**Effects Determination for Critical Habitat**
NMFS-Regulated Species				
Puget Sound Chinook Salmon ESU (*Oncorhynchus tshawytscha*)	T	Designated within Action Area	*likely to adversely affect*	*likely to adversely affect*
Hood Canal Summer-run Chum ESU (O. keta)	T	Not designated within Action Area	*likely to adversely affect*	*NA*
Puget Sound Steelhead DPS (*O. mykiss*)	T	Proposed, but not within Action Area	*likely to adversely affect*	*NA*
Pacific Eulachon Southern DPS (*Thaleichthys pacificus*)	T	Not designated within Action Area	*not likely to adversely affect*	*NA*
North American Green Sturgeon Southern DPS (*Acipenser medirostris*)	T	Designated within Action Area	*not likely to adversely affect*	*not likely to adversely affect*
Southern Resident Killer Whale DPS (*Orcinus orca*)	E	Designated within Action Area	*not likely to adversely affect*	*not likely to adversely affect*
Humpback Whale (rangewide) Western North Pacific DPS Central America DPS (*Megaptera novaeangliae*)	E PT PT	Not designated	*not likely to adversely affect*	*NA*
USFWS-Regulated Species				
Coastal-Puget Sound Bull Trout DPS (*Salvelinus confluentus*)	T	Designated within Action Area	*likely to adversely affect*	*likely to adversely affect*
Marbled Murrelet (*Brachyramphus marmoratus*)	T	Not designated within Action Area	*likely to adversely affect*	*NA*

Notes: DPS = Distinct Population Segment; E = endangered; NA = Not Applicable; PT = proposed threatened; T = threatened.

Table ES-2. Effects Determinations for EFH

EFH	**Effects Determination**
Pacific Coast Groundfish	*May adversely effect*
Coastal Pelagics	*May adversely effect*
Pacific Coast Salmon	*May adversely effect*

1 Introduction

The United States (U.S.) Department of the Navy (Navy) proposes to construct a pier and support facilities at U.S. Coast Guard (USCG) Air Station/Sector Field Office (AIRSTA/SFO) Port Angeles located in Clallam County, Washington. The proposed pier and facilities will support USCG Transit Protection System (TPS) operations by providing a pier for berthing of up to seven TPS vessels and support facilities for the Marine Force Protection Unit (MFPU). The MFPU's mission is to provide security escort to the Navy's Fleet Ballistic Missile Submarines along their transit route from the homeport at Naval Base Kitsap, Bangor to the dive/surface sites in the Strait of Juan de Fuca. The proposed pier and support facilities will ensure that MFPU personnel can consistently comply with the established policy and safety requirements for underway hours limitations and rest between missions.

Section 7(a)(2) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S. Code [USC] 1531 et seq.), requires federal agencies to consult with the National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS) to ensure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of such species. This Biological Assessment (BA) evaluates the potential effects of in-water pier construction, upland support facility construction, and TPS Pier operations.

The Magnuson-Stevens Fishery Conservation and Management Act (MSA), as amended by the Sustainable Fisheries Act of 1996 (16 USC 1801 et seq.), requires federal agencies to consult with the NMFS on activities that may adversely affect Essential Fish Habitat (EFH) designated by the Pacific Fisheries Management Council (PFMC). EFH is designated at the project site for the following federally managed fisheries: Pacific Coast groundfish, coastal pelagic, and Pacific Coast salmon species. Chapter 7 of this document addresses potential project impacts to EFH for these fisheries.

The Navy is concurrently requesting an Incidental Harassment Authorization (IHA) under Section 101 (a)(5)(D) of the Marine Mammal Protection Act (MMPA) of 1972, as amended in 1994, for marine mammals that may be behaviorally harassed incidental to the project's construction activities. No ESA-listed marine mammals are included in the IHA application.

1.1 Project Location

USCG AIRSTA/SFO Port Angeles is located at the eastern end of Ediz Hook peninsula in Port Angeles, Washington approximately 60 miles (96 kilometers [km]) northwest of downtown Seattle (Figure 2-1).

The project area includes the terrestrial/upland portion of Ediz Hook from approximately the western end of the runway to the existing USCG T-Pier and nearshore marine areas extending south into the Port Angeles Harbor to a depth of -65 feet (ft) (- 20 meters [m]) mean lower low water (MLLW). The upland area of the USCG AIRSTA/SFO Port Angeles on Ediz Hook consists of a complex of support buildings including a two-story group support building, warehouse, station maintenance building, base exchange, medical/dental clinic, and officer's mess. There is also a 4,500 x 150-foot (ft) (1,372 x

46 m) asphalt runway and 100 x 100 ft (30 x 30 m) asphalt helipad with hangar and aircraft support facilities to support three full-time MH-65C dolphin helicopters. The marine neashore operational areas contain an existing T-Pier that is used for berthing USCG vessels.

1.2 Consultation History

The Navy corresponded with NMFS regarding whether or not consultation will be needed to address ESA-listed bocaccio, canary, and yelloweye rockfish Distinct Population Segments (DPS) since the Action Area is not within the DPS boundary. NMFS concurred that any yelloweye rockfish, canary rockfish, and bococcio rockfish occurring within the project area are not considered listed under the ESA (S. Rainsberry, pers. comm. 2014).

Figure 2-1. Vicinity Map

Figure 2-2. Project Area and Existing Facilities

2 Project Description

2.1 Project Overview

The Navy proposes to construct a pier, an Alert Force Facility (AFF) (single-story sleeping and administration building); a Ready Service Armory (RSA) (an ammunition and small arms storage facility); diesel fuel, marine (DFM) storage tank and distribution system; and site improvements including utilities, parking, security improvements, lighting, and landscaping at the USCG AIRSTA/SFO Port Angeles to support the MFPU mission.

2.2 Construction

The following provides details on the proposed upland and in-water facilities and associated construction and development activities (Figure 2-1).

2.2.1 Upland

2.2.1.1 AFF Construction

A single-story AFF building will be approximately 8,200 square feet (ft^2) (762 square meters [m^2]) and will be constructed with reinforced concrete masonry unit blocks supported by steel columns and beams, and will be approximately 21 ft (6.4 m) high. Roofing will consist of metal panels over a gypsum cover board. The area around the AFF will be lighted, and the AFF will be surrounded by security fencing with access through a 4-foot (1.2-m) wide gate for pedestrians and a 16-ft (4.9-m) double swing gate for vehicles. The facility will be designed to meet Leadership in Energy and Environmental Design (LEED) Silver requirements and will provide security features in accordance with AT/FP regulations.

The AFF will include a 25 x 15 ft (8 x 5 m) parking area west of the building. The facility will displace existing parking spaces for the Chief Petty Officer (CPO) Mess, which will require pavement to be excavated and removed to make way for the AFF. Removed parking will be replaced with a new 40 x 170 ft (12 x 52 m) parking area east of the AFF and CPO Mess. New parking areas will be constructed of pervious pavement.

2.2.1.2 Ready Service Armory

The RSA will be a 10 ft by 20 ft (3 x 6 m) pre-made structure and will be affixed to a poured concrete pad approximately 160 ft (49 m) east of an existing jetty. A 7-ft (2-m) high security fence will be installed around the RSA with a 16-ft (5-m) wide manual vehicle gate and a 4-ft (1.2-m) wide personnel gate.

2.2.1.3 DFM Storage and Distribution System

A fuel storage and distribution system will consist of an above-ground 10,000-gallon (37,854-liter) DFM storage tank that will include a system of piping and appurtenances to enable the storage tank to be filled by tanker trucks, secondary containment structures, a piping distribution network, and hose reels on the pier for vessel fueling. The tank will be double-walled and placed on a concrete pad of approximately 8 x 27 ft (2.4 x 8 m). The pad will have curbing to contain any spills. A 100 x 20 ft (30 x 8 m) fuel truck parking area will be constructed adjacent to the storage tank on the east side. This

parking area will be impervious and equipped with an oil/water separator to treat stormwater runoff.

2.2.1.1 Site Improvements

Site improvements include sewer and water utility connections/installation, stormwater facilities (including an outfall), electrical, lighting, fire protection systems, alarms, pedestrian walkways, roadways, signage, and landscaping. Just to the north of the access road (Ediz Hook Road) from the proposed pier will be the approximate location of a buried 13,000-gallon (49,210-liter) sewer tank for temporary storage of sanitary sewage coming from the proposed new pier (see Section 2.2.2 for pier construction details). A stormwater detention/infiltration pond will be west of the pier near the parking area.

Landscaping will consist of a vegetated strip planted between the road and the new pedestrian walkway, and any areas disturbed during construction will be restored. No irrigation system is proposed.

Road surfaces will be paved with pervious asphalt where possible. Other road surfaces will use impervious asphalt or concrete. There will be approximately 10,700 ft^2 (994 m^2) of new impervious surface created (paving for the parking areas and road improvements and the roof of the AFF facility) and approximately 5,200 ft^2 (483 m^2) of existing impervious surface removed. The net increase in impervious surface is approximately 5,500 ft^2 (511 m^2).

2.2.2 In-Water Work

2.2.2.1 In-Water Structures (Trestle, Fixed Pier, and Floats)

The proposed pier will be located approximately 950 ft (290 m) west of the existing USCG T-Pier. It will consist of a pile-supported trestle that extends offshore to a pile-supported fixed pier (Figures 2-1 and 2-2).

The trestle will be approximately 355 ft (108 m) long by 24 ft (7 m) wide and constructed of precast concrete. It will be designed to support a 50 pounds per square foot (psf) live load or a utility trailer with a total load of 3,000 pounds (1,361 kilograms). The trestle will be supported by thirty-six size 18-inch to 36-inch diameter steel piles and will be constructed between 7 ft and -45 ft (2.1 m and -13.7 m) MLLW. The trestle will connect to three upland piles and approximately 60 upland sheet piles.

The fixed pier will be installed at the end of the trestle and will be constructed of precast concrete measuring approximately 160 ft (48 m) long by 42 ft (12 m) wide. The fixed pier will have two mooring dolphins that connect to the pier via a catwalk. The fixed pier will be supported by eighty-seven 24-inch to 36-inch diameter piles and will be constructed between -45 ft and -63 ft (-13.7 m and -19.2 m) MLLW. Attached to the fixed pier will be several floats for the smaller TPS vessels that will be supported by twenty-one 24-inch to 36-inch diameter piles. There will be two floats on the west side of the pier that will each be approximately 80 ft (24 m) long and 17 ft (5 m) wide (Figures 2-1 and 2-2). The floats will be connected to each other and the fixed pier by a walkway and transfer span. On the east side of the fixed pier will be a 120 ft (37 m) long by 12 ft (4 m) wide floating dock.

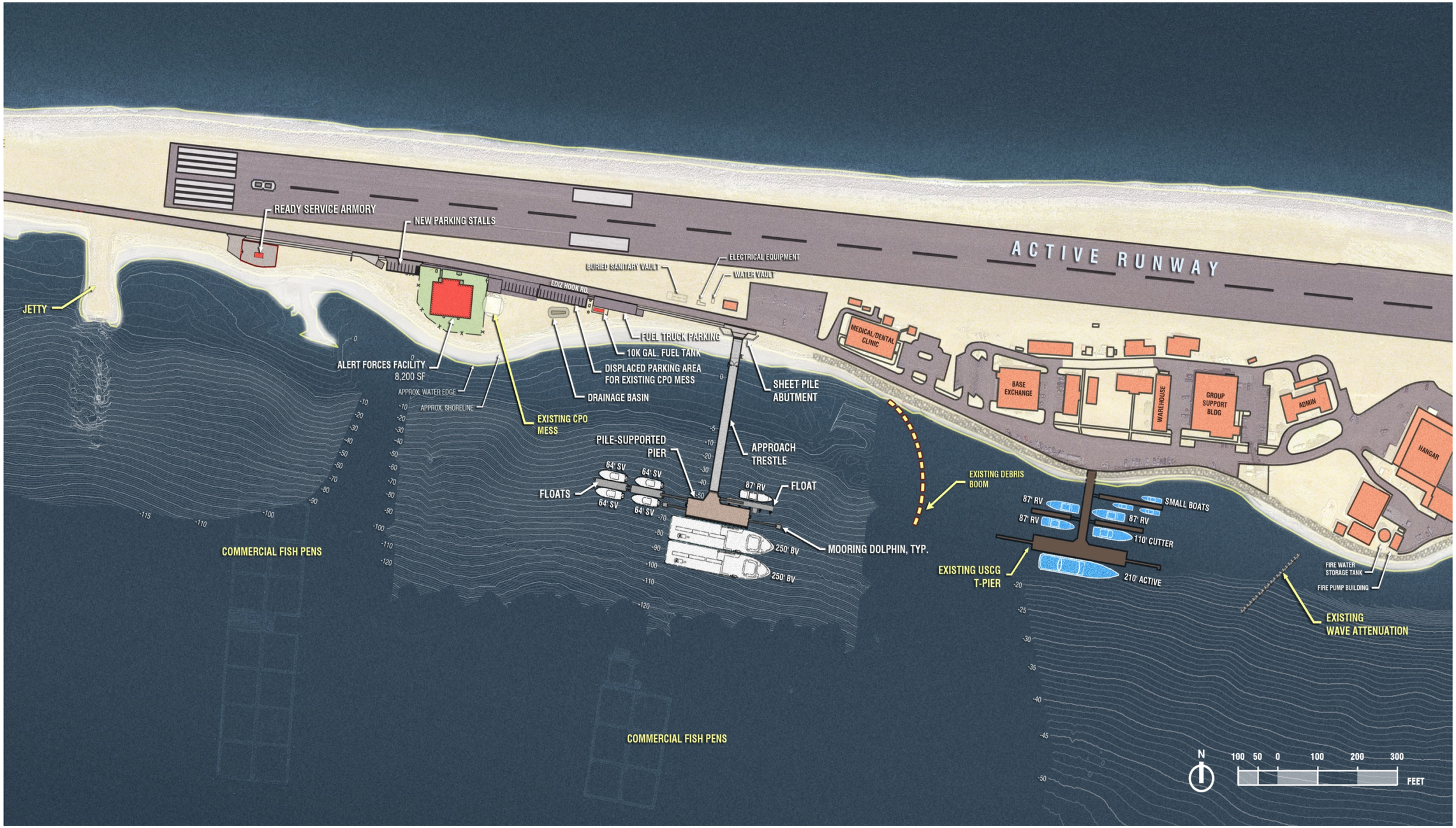

Figure 2-1. Overview of Proposed Pier and Support Facilities

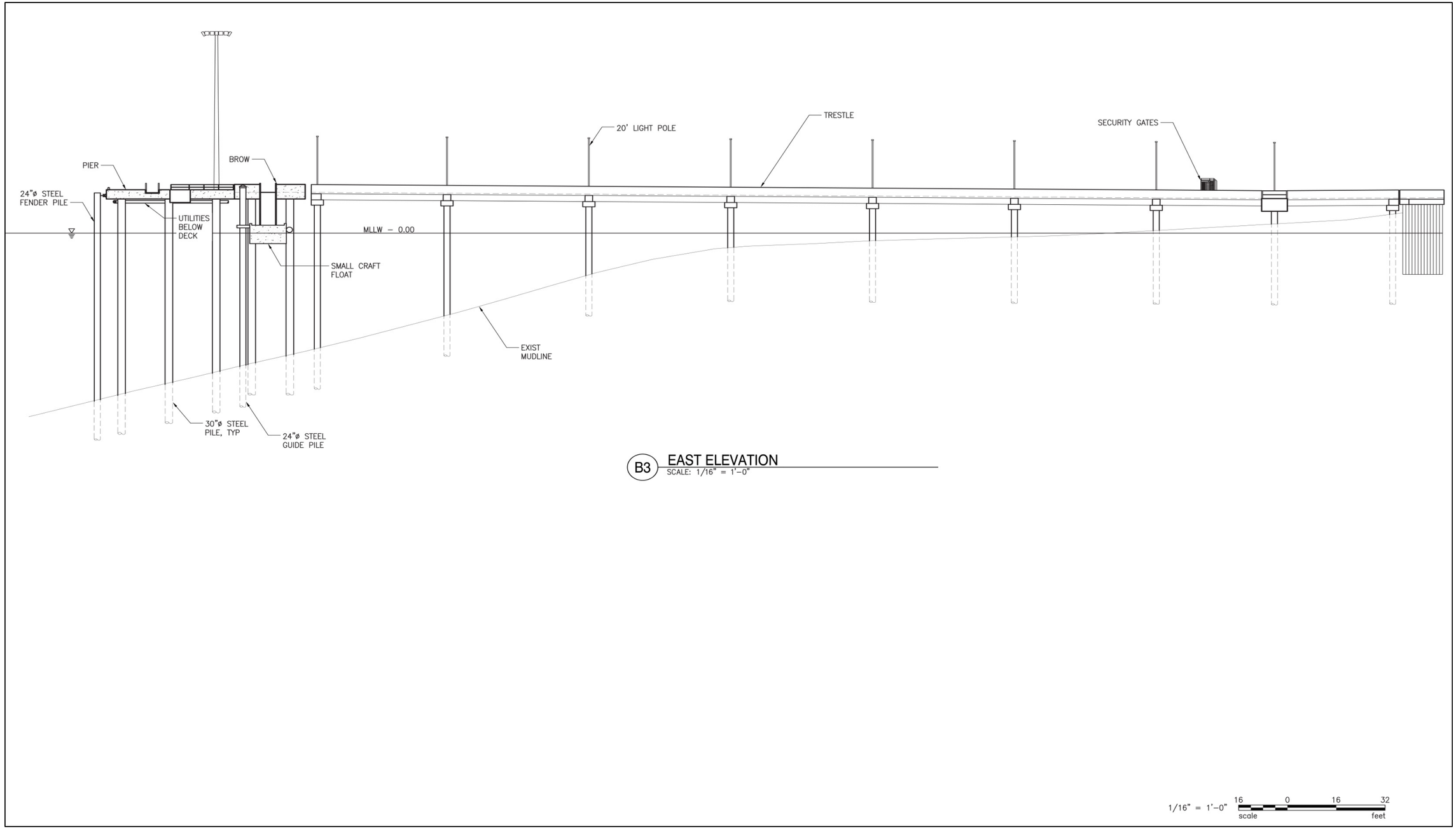

Figure 2-2. Side-view Drawing (looking west) of Proposed Pier and Trestle

The pier will have full hotel services at each of the six berths including power, potable water, fire protection, sewage connections, ship overboard drainage collection, fueling connections, and telephone and Local Area Network (LAN) service. The pier will also be equipped with lighting, mooring, fendering, brows (gangways), corrosion protection systems, access control, and stormwater protection systems. Anticipated vessel mooring will accommodate up to seven TPS vessels: two Blocking Vessels (BVs), one Reaction Vessel (RV), and up to four Screening Vessels (SV-64s) (Figure 2-1).

Due to the size of the impervious area of the trestle and pier, all stormwater from these structures will be captured and treated prior to being released into the harbor. For this reason, grating is not proposed for the fixed trestle and pier. Water quality basin will be located on the pier and trestle. Stormwater will be collected through an oil/water separator device and then passed through a filter cartridge. Following treatment, stormwater will be discharged directly to the surface water below each water quality basin.

2.2.2.2 Pile Installation

Pile driving will be necessary for installation of the trestle, fixed pier, and floats. All of the piles will be installed using vibratory and impact pile driving methods. Vibratory pile driving involves hydraulic-powered weights to vibrate a pile until the surrounding sediment liquefies, enabling the weight of the pile plus the pile driver to push the pile into the ground. Once a pile hits "refusal," which is where hard dense substrate (i.e., gravel, boulders) prevents further pile movement by vibratory methods, impact pile driving is used to drive the pile to depth. Impact hammer pile driving uses a rising and falling piston to repeatedly strike a pile and drive it into the substrate. The number of strikes will vary, depending on the substrate at each pile location and the pile size. A maximum number of pile strikes are considered for each pile size to be installed. The following bullets and Table 2-1 below provides further details on pile installation for each structure associated with the pier structure.

- Trestle – permanent installation of 16, 18-inch diameter; 12, 24-inch diameter; and 8, 36-inch diameter steel pipe piles approximately 100 ft (30.5 m) long will be driven to a depth of 75-80 ft (23-24 m).
- Fixed Pier – permanent installation of 28, 24-inch diameter; 49, 30-inch diameter; and 10, 36-inch diameter steel pipe piles approximately 100 ft (30.5 m) long will be driven to a depth of 100 ft (30.5 m).
- Floats – permanent installation of 3, 24-inch diameter; 6, 30-inch diameter; and 12, 36-inch diameter steel pipe piles approximately 100 ft (30.5 m) long will be driven to a depth of 100 ft (30.5 m).
- Falsework/Indicator Piles – temporary installation of 80, 24-inch diameter steel pipe piles approximately 100 ft (30.5 m) piles driven to a depth of 50 ft (15 m).

Table 2-1. Summary of the Number of Permanent Steel Piles for Proposed TPS Pier, Trestle, and Floats

	Structure			
Pile Size	**Trestle**	**Fixed Pier**	**Floats**	**Total**
18 inches	16	0	0	**16**
24 inches	12	28	3	**43**
30 inches	0	49	6	**55**
36 inches	8	10	12	**30**
Total	**36**	**87**	**21**	**144**

Permanent Piles

It is anticipated that eight piles could be installed per day with only one pile driver operating at one time. Each pile size is anticipated to take 60-90 minutes to vibrate into place. Following vibratory pile driving, a single impact hammer will then be used to proof(1) all eight piles. Proofing is anticipated to occur at a rate of eight piles per day for a total of 75 days. Proofing will take a maximum of 200 strikes per pile or a total of 1,600 pile strikes per day. Each pile is expected to take up to 10 minutes to proof.

In the event that hard subsurface conditions (i.e., cobble/boulder zones) are encountered during the early vibratory pile driving phase, it may be necessary to drive a pile or piles to required depth with an impact hammer pile driver. Under these circumstances, it is expected that a maximum of 875 pile strikes per pile (7,000 pile strikes per day, inclusive of proofing) will occur over 75 days.

Temporary Piles

It is anticipated that 80, 24-inch diameter indicator (temporary) piles will be driven. The indicator piles are required to assess whether required bearing capacities will be achieved with the permanent piles and to assess whether the correct vibratory and impact hammers are being used. The indicator piles will be installed using a vibratory pile driver to within 5 ft (1.5 m) of the embedment depth (installed to a depth of 50 ft [15 m]) required for the trestle and fixed pier piles. The piles will then rest for 1 day and will then be impact driven the final 5 ft (1.5 m). If the indicator piles cannot be successfully vibrated in, then a larger impact hammer will be used for the production piles. The impact driving will also provide an indication of bearing capacity via proofing.

Each pile is anticipated to take up to 30 minutes to vibrate in place with eight piles installed per day. Proofing will take up to a maximum of 200 strikes per day and will occur on successive days (total of 5 days). Each pile will then be vibratory extracted, 40 minutes per pile, in 10 days. A total of 25 days for pile driving/vibratory extraction will be required for the indicator piles.

(1) "Proofing" is driving the pile the last few feet into the substrate to determine the capacity of the pile. The capacity during proofing is established by measuring the resistance of the pile to a hammer that has a piston with a known weight and stroke (distance the hammer rises and falls) so that the energy on top of the pile can be calculated. The blow count in "blows per inch" is measured to verify resistance, and pile compression capacities are calculated using a known formula.

A total of 75 days of pile driving will be required, as described above, and will occur within the in-water work window for Tidal Reference Area 10[2] (July 16 through February 15) (U.S. Army Corps of Engineers [USACE] 2012).

2.2.2.3 Resulting Overwater Coverage and Seafloor Displacement at Project Completion

Upon completion, the trestle, fixed pier, and associated floats will result in a permanent increase in overwater coverage of approximately 25,465 ft^2 (2,365 m^2). Of this area, approximately 8,650 ft^2 (804 m^2) will be over water depths shallower than -30 ft (-9m) MLLW. In addition, approximately 745 ft^2 (69 m^2) of benthic seafloor will be displaced from the installation of permanent piles. Approximately 76 ft^2 (7.1 m^2) will be within depths shallower than -30 ft MLLW.

2.2.3 Construction Access and Staging

In-water pile driving will be conducted from a barge. The barge will be anchored to avoid impacting existing aquatic vegetation as much as practical. All upland construction activities will use previously developed areas for equipment and materials staging. The site has very little undeveloped areas aside from grass and minimal pre-existing landscaped areas. Construction vehicles will use existing roads and parking areas only.

All appropriate best management practices (BMPs) and minimization measures will be implemented during in-water pile driving and upland construction activities (see Section 2.4).

2.2.4 Project Sequencing and Timeline

To minimize impacts to salmon and bull trout, in-water work will occur within the work window for Tidal Reference Area 10 (July 16 through February 15) (U.S. Army Corps of Engineers [USACE] 2012). The in-water work is scheduled to begin October 2016 and conclude October 2017. A total of 75 impact pile driving days are anticipated to occur over 18-weeks and be conducted within two in-water work windows.

Although all in-water construction will occur during daylight hours, the construction equipment barge will likely be lit with industrial lighting during non-daylight hours for safety.

2.2.5 Compensatory Mitigation

The objective of compensatory mitigation is to restore, establish, enhance, or preserve aquatic resources for the purpose of offsetting unavoidable losses to aquatic resources resulting from activities authorized by USACE permits. The USEPA and USACE issued a final rule under 33 CFR Parts 325 and 332 governing compensatory mitigation for authorized impacts to wetlands, streams, and other waters of the U.S. under section 404 of the CWA and other USACE permits. The amount of compensatory mitigation required

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(2) Tidal reference areas are delineated segments of the state's marine shorelines that are used to identify authorized in-water work times.

for a proposed project depends on the size of the project footprint, the quality of habitat at the project site, and the type of compensatory mitigation proposed.

The proposed project will result in a permanent increase in overwater coverage of approximately 25,465 ft^2 (2,365 m^2). Of this area, approximately 8,650 ft^2 (804 m^2) will occur in water depths shallower than -30 ft (-9 m) MLLW and could impact approximately 4,595 ft^2 (426 m^2) of eelgrass growing in this area. Existing eelgrass beds could potentially be impacted both during construction and through the loss of available habitat due to shading. Approximately 745 ft^2 (69 m^2) of eelgrass could be impacted due to placement of piles within the beds.

The Navy is currently working with the USACE to identify and develop compensatory mitigation for the loss of aquatic resource, as required by USACE/U.S. EPA Rule on Loss of Aquatic Resources. The Navy is also working with the Lower Elwha Klallam Tribe (LEKT) to identify and develop tribal mitigation for impacts to tribal treaty resources. The anticipated mitigation projects include the following:

(1) Inner Ediz Hook Jetty Restoration (Compensatory Mitigation) – This restoration would involve the removal of 16,800 ft^2 (1,561 m^2) of fill located in aquatic tidelands off the south shoreline of inner Ediz Hook east of the USCG AIRSTA/SFO Port Angeles entrance gate and Puget Sound Pilots Station pier. The fill extends approximately 215 feet (65 m) south from the shoreline and is protected by a timber bulkhead capped by a concrete slab. The timber piles comprising the bulkhead would be cut off and capped below the mudline.

(2) Icicle Seafoods Laydown Area Restoration (Tribal Mitigation) – This restoration would involve the removal of 18,980 ft^2 (1,764 m^2; 0.44 acre) of fill in aquatic tidelands off the south shoreline of inner Ediz Hook adjacent to and west of the Ediz Hook Boat Launch.

The proposed mitigation projects would provide a combined total of approximately 35,780 ft^2 (0.83 acres) of new nearshore habitat. Removal of the structures and fill would create unshaded habitat suitable for eelgrass and other marine vegetation. It is anticipated that eelgrass beds adjacent to the mitigation sites would increase and occupy the new habitat over time. The locations of over/in-water structures proposed for removal are shown in Figures 2-3 and 4-1.

2.3 Operations and Maintenance

Post-construction operations associated with the proposed pier will be similar to the activities at the USCG AIRSTA/SFO Port Angeles and other marine facilities within Port Angeles Harbor. The facility will have an operational Spill Prevention, Control, and Countermeasure (SPCC) Plan and spill response equipment to minimize the impact from potential fuel releases or spills.

Maintenance of the trestle and fixed pier infrastructure will include routine inspections, repair, and replacement of facility components as required. Any extensive maintenance will incorporate the measures listed in Section 2.4 below. The installed piles are designed to not require replacement during the design life of the structure. A protective coating and additional steel thickness will be added to all piles prior to install to verify the integrity of the structure. Maintenance will be performed on the protection system to

ensure it continues to operate as designed. Maintenance will include, as necessary, repairing any damage to the coatings. Other actions will involve repairing the pile coating as it becomes worn.

2.4 Impact Avoidance and Minimization Measures

Integrated into the project are design features and measures to avoid environmental impacts. Where avoidance is not possible, the design has been modified to minimize those impacts. Implementation of the proposed project will include incorporation of the following design measures, current practices, and construction BMPs to avoid or minimize potential environmental impacts.

Design Measures

- The trestle and fixed pier have been designed to minimize the amount of disturbance to the seabed and amount of overwater shading as much as practical.
- Pervious pavement over crushed stone infiltration beds will be implemented as much as possible to reduce stormwater runoff and allow natural infiltration. This includes new parking areas and pedestrian walkways.
- Runoff from the roof of the AFF will be infiltrated.
- The AFF is being designed to LEED Silver standards, which require that the building be constructed in an environmentally responsible way for sustainability. This includes the use of recycled material and facilities that save water and energy, quality control of stormwater runoff, and measures to manage waste.

Current Practices, Operations, and Maintenance

- Spills will be handled according to applicable laws and regulations.
- To reduce the likelihood of any petroleum products, chemicals, or other toxic or deleterious materials from entering the water, fuel hoses, oil or fuel transfer valves, and fittings will be checked regularly for drips or leaks, and be maintained and stored properly to prevent spills.
- A Hazardous Materials Management Plan will be developed and implemented to ensure proper handling, storage, and disposal of hazardous materials.
- Maintenance of the trestle and fixed pier infrastructure will include routine inspections, repair, and replacement of facility components. Any extensive maintenance will incorporate the measures listed below under Construction BMPs and will be evaluated to determine if re-initiation under ESA is required.
- The installed piles will be designed to not require replacement during the design life of the structure. A protective coating and additional steel thickness will be installed on all piles to ensure that they will not need replacement. Piles will be inspected annually to verify the integrity of the structure. Maintenance will be performed on the protection system to ensure it continues to operate as designed. Maintenance will include repairing any damage to the coatings. Other actions will involve repairing the pile coating as it becomes worn. Fouling organisms will be routinely removed from the piles.

Construction BMPs

- In-water construction will observe the Tidal Reference Area 10 (Port Townsend) in-water work window (July 16 through February 15).
- Measures will be implemented to avoid anchor dragging and line dragging during construction.
- Construction vessels will be excluded from shallow areas (less than 30 ft [9 m] in depth) outside the immediate construction site (within 150 ft [45 m] of the trestle or pier).
- Within the immediate construction site:
  - Vessel operators will be instructed to avoid using excess engine thrust in waters less than 30 ft [9 m].
  - Vessel operators will be instructed to avoid bottoming out (running aground) in shallow areas.
  - Work barges will not be allowed to ground out or rest on the substrate, or be over or within 25 ft [7.6 m] of vegetated shallows (except where such vegetation is limited to state-designated noxious weeds).
  - Barges will not be anchored over vegetated shallows for more than 96 hours (4 days).
- All equipment (except for clamshell buckets, spuds, etc. required to remove piles) will be kept out of the water, above the waterline, to minimize and prevent contaminant releases.
- To the maximum extent practicable, a vibratory hammer will be used for the pile driving actions; however, it may be necessary to use an impact hammer complete pile driving if refusal is met where the pile cannot reach the required depth. An impact pile driver will also be used to proof piles.
- Temporary barriers, such as silt curtains, may be installed to control the spread of silt from pile driving, although their efficacy will be strongly influenced by wind, current, and wave conditions at the site.
- The use of bubble curtains or other attenuation device to minimize the noise from pile driving will be implemented.
- A Debris Management Plan and Spill Response Plan to retrieve and clean up any accidental spill and construction debris will be developed and implemented. Personnel will be trained in hazardous materials handling and spill response, and be equipped with all necessary response tools, including absorbent oil booms. In the event of a spill, spill cleanup and containment efforts will begin immediately and take precedence over normal work.
- During in-water and overwater work, containment booms and absorbent booms (or other oil-absorbent fabric) will be placed around the perimeter of the work area to capture wood debris, oil, and other materials if released into marine waters. All accumulated debris will be collected and disposed of at an approved

upland site. Following completion of in-water construction activities, an underwater survey will be conducted to remove any lost construction materials.

- Fuel hoses and oil or fuel transfer valves and fittings on equipment will be inspected regularly for drips or leaks to prevent spills into the surface water. Spill containment booms and absorbent materials will be kept readily available at all times during in-water and over-water work.
- Water quality monitoring for turbidity and other water quality parameters will be completed to ensure that construction activities comply with Washington State Surface Water Quality Standards (173-201A Washington Administrative Code [WAC]), or other conditions as specified in the standards and project permits.
- A Stormwater Pollution Prevention Plan (SWPPP) will be implemented for construction and operation and include measures for avoiding or minimizing erosion and sedimentation.
- All chemicals, liquid products, petroleum products, and other wastes at the construction site will be covered, contained, and protected.
- Soil areas disturbed by grading will be re-vegetated by hydroseeding.
- All construction activities will occur during daylight hours.

Minimization Measures

- To reduce impacts to juvenile salmonids, pile driving activities will occur up to 5 days per week within the in-water work window (July 16 through February 15).
- To protect foraging marbled murrelets, impact pile driving will occur between 2 hours after sunrise and 2 hours before sunset (July 16 through September 23).
- Prior to construction, the contractor shall conduct an advanced eelgrass survey per the Washington Department of Fish and Wildlife (WDFW) Eelgrass/Macroalgae Habitat Interim Survey Guidelines (WDFW 2008). The following restrictions will be enforced within the project area to avoid impacts to eelgrass:
    - No derrick spudding or anchoring will occur.
    - No scouring of sediments or significant sediment contamination will occur within eelgrass beds.
- In order to comply with the ESA and MMPA, monitoring for marine mammals will occur within pre-determined shutdown zones for purposes of avoiding injurious effects. The duration of monitoring will take place from 15 minutes prior to initiation through 15 minutes after completion of pile driving activities to ensure marine mammals are absent from the area. Should a marine mammal enter the shutdown zone, pile driving will be immediately halted until the marine mammal has left the area.

  The monitoring zones will be as follows:

    - During impact pile driving, visual monitoring of Southern Resident killer whale and humpback whale will be conducted for the 180 decibels root mean

square (dB RMS) shutdown zone of 95 ft (29 m) and 160 dB RMS behavioral disturbance zone of 2,070 ft (631 m).

- During vibratory pile driving, visual monitoring of Southern Resident killer whale and humpback whale will be conducted of the 120 dB RMS behavioral disturbance zone of 8.5 miles (13.6 km). Pile driving will cease should a Southern resident killer whale or humpback approach the behavioral disturbance zone.
- A bubble curtain will be used during impact pile driving and pile driving will not exceed 75 days.

2.5 Action Area

The Action Area is defined as: "all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action" (50 Code of Federal Regulations (CFR) 402.2). The Action Area addresses the three dimensional extent of all physical, biological, and chemical effects of the action on the environment. The Action Area includes, but is not limited to, all project components, including equipment staging, roads used by the project, water bodies and uplands affected by the project, and mitigation sites. Effects from each project component and action are overlain on the landscape to determine which action has the greatest geographical effect above baseline conditions. The furthest reaching impact of all project activities was determined to be the temporary extent of airborne and underwater noise from pile driving at the USCG AIRSTA/SFO Port Angeles site. Therefore, the Action Area for the project is then defined as the combination of the extent of airborne and underwater noise associated with proposed pile driving (Figure 2-3). In addition, the *project area* is defined as the area within the immediate vicinity of proposed in-water and upland activities on Ediz Hook associated with the Proposed Action.

For proposed construction activities, airborne noise levels from impact pile driving will extend the farthest. The average ambient daytime sound pressure level at Ediz Hook is 52.1 A-weighted decibels (dBA) (Sargeant 2013). Sound will attenuate faster over land. Using the ambient daytime sound pressure level of 52.1 dBA at 50 ft (15 m) and the spherical spreading model for point source sound[(3)], noise from impact pile driving was calculated to attenuate to background levels by approximately 50,000 ft (15,240 m). However, the airborne portion of the Action Area is likely smaller as ambient noise levels measured across the Harbor near the town of Port Angeles and at the Port of Port Angeles are likely higher than 52.1 dBA.

Underwater noise is also a result of both vibratory and impact hammer pile driving. Due to the absence of ambient underwater noise level measurements for the project area and

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(3) D = Do * 10((Construction Noise - Ambient Sound Level in dBA)/α), where D = the distance from noise source, Do = reference measurement (50 ft [15 m]); α = 20 for hard site conditions (water), 25 for soft site conditions (forested/vegetated areas); impact pile driving noise = 112 dB Lmax, and background levels = 52 dBA. D = 50 * 10((112-52)/20) = 50,000 ft (15,240 m) for hard site areas (over water extent and hard land surface of Ediz Hook). Ediz Hook is not considered a soft surface area and thus overland extent would be the same as overwater.

Port Angeles Harbor in general, the Navy assumed background sound levels at Port Angeles Harbor will be within the same range as those at the Seattle ferry terminal (124 dB root-mean-square [dB RMS) (Laughlin 2012; Washington State Department of Transportation [WSDOT] 2015). The largest pile size that will be installed for the proposed project is a 36-inch diameter steel pile with a source level of 167 dB RMS (Navy 2014). Using a Practical Spreading Loss model for estimating transmission loss (15 log*R), underwater sound from vibratory pile driving was determined to have the furthest geographical distribution, extending 27.8 miles (approximately 44.7 km). However, this distance is intersected by land to the west and south in Port Angeles Harbor and extends east into the Strait of Juan de Fuca before intersecting land for a total area encompassing 11.5 square miles (mi^2) (29.9 square kilometers [km^2]) (Figure 2-3). This area is within the airborne Action Area as defined above. Therefore, elevated underwater noise levels as well as all other effects of the action, including temporary increases in turbidity levels from pile installation and potential effects to forage species, are encompassed within the extent of the airborne noise Action Area. No other direct or indirect project effects were identified that would increase the size of the Action Area.

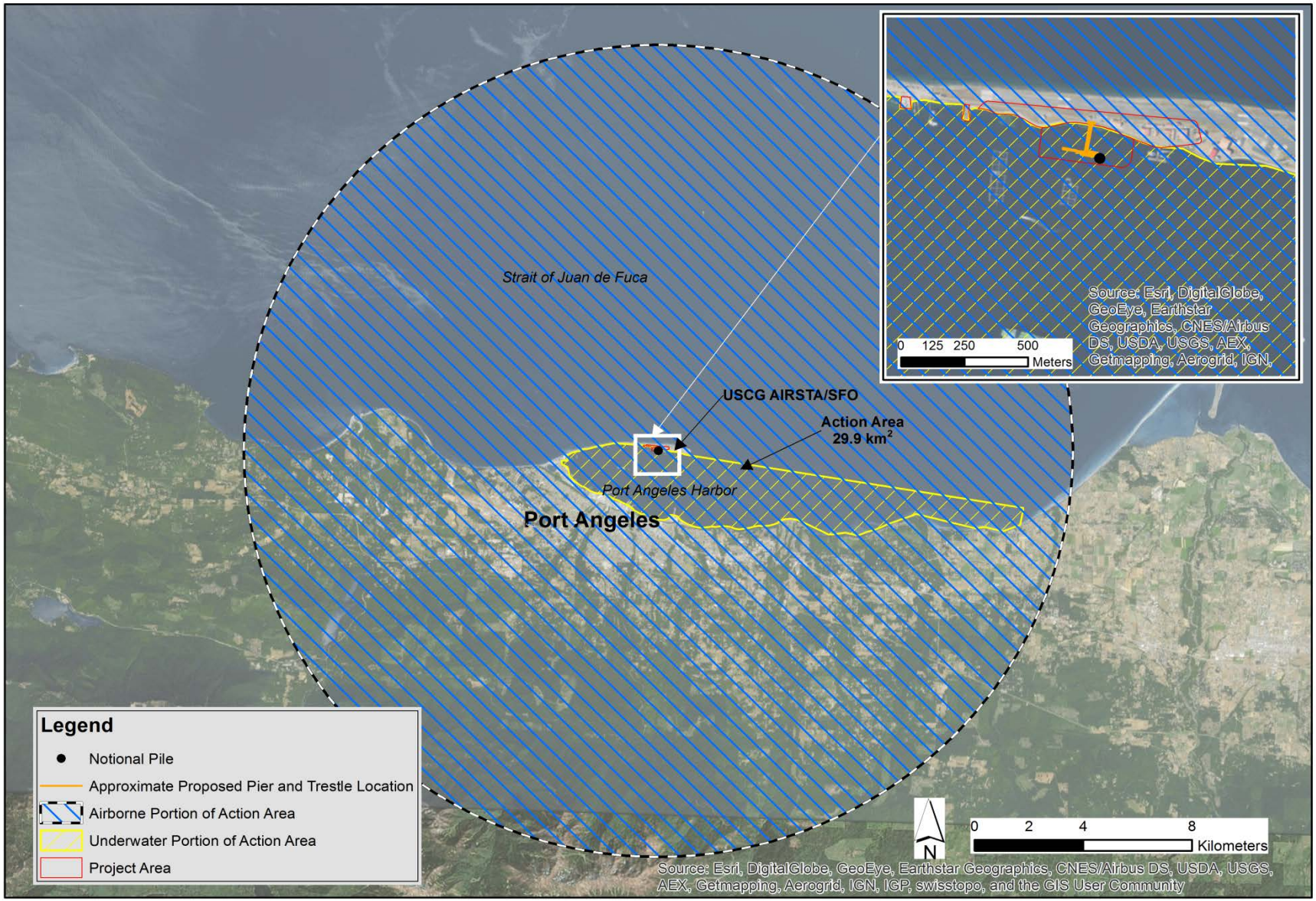

Figure 2-3. Action Area

3 Status/Presence of ESA-Listed Species and Designated Critical Habitats

The lists of endangered and threatened species that may be affected by the proposed project were obtained from the NMFS and USFWS endangered species web sites. Additional information was gathered from review of available literature. Nine ESA-listed species either occur or have the potential to occur within the Action Area. These species include two Evolutionary Significant Units (ESUs) and four Distinct Population Segments (DPSs) for six fish species, two marine mammal species (including one DPS), and one bird species. The species ESA listing status and presence of critical habitat (if designated) in the Action Area are provided in Table 3-1. Additional information regarding the distribution and presence of these species within the Action Area is provided in the following sections.

Table 3-1. ESA-Listed Species and Designated Critical Habitat within the Action Area

Common name (*Scientific name*)	ESA Status	Designated Critical Habitat within Action Area
NMFS-Regulated Species		
Puget Sound Chinook Salmon ESU (*Oncorhynchus tshawytscha*)	T	Yes, along the shoreline from a line of extreme high tide out to a depth of 98 ft (30 m).
Hood Canal Summer-run Chum Salmon ESU (*O. keta*)	T	No.
Puget Sound Steelhead DPS (*O. mykiss*)	T	No.
Pacific Eulachon Southern DPS (*Thaleichthys pacificus*)	T	No.
North American Green Sturgeon Southern DPS (*Acipenser medirostris*)	T	Yes, within Port Angeles harbor and in Strait of Juan de Fuca out to 360 ft (110 m) or within 100 miles (161 km) from shore.
Southern Resident Killer Whale DPS (*Orcinus orca*)	E	Yes, within Port Angeles Harbor and along the Strait of Juan de Fuca in waters deeper than 20 ft (6 m).
Humpback Whale (rangewide) Western North Pacific DPS Central America DPS (*Megaptera novaeangliae*)	E PT PT	Not Designated
USFWS-Regulated Species		
Coastal-Puget Sound Bull Trout Bull Trout (*Salvelinus confluentus*)	T	Yes, within Port Angeles Harbor and nearshore marine areas of the Strait of Juan de Fuca out to a depth of 33 ft (10 m).
Marbled Murrelet (*Brachyramphus marmoratus*)	T	No.

Notes: DPS = Distinct Population Segment, E = endangered, ESU = Evolutionarily Significant Unit, PT = proposed threatened, T = threatened.
Sources: USFWS 1970, 1992, 1999, 2010a; NMFS 2005a, 2005b, 2005c, 2006a, 2006b, 2007, 2008a, 2009, 2010a, 2015.

3.1 Federally Listed Species within the Project Action Area

3.1.1 Puget Sound Chinook Salmon ESU

3.1.1.1 Status

The Puget Sound Chinook salmon ESU (hereafter PS Chinook ESU) was listed as threatened under the ESA in June 2005 (NMFS 2005a). The listing includes all naturally spawned populations of Chinook salmon from rivers and streams flowing into Puget Sound including the Strait of Juan de Fuca from the Elwha River, eastward, including rivers and streams flowing into Hood Canal, South Sound, North Sound, and the Strait of Georgia in Washington, as well as 26 artificial propagation programs.

Threats and Trends

The Puget Sound Technical Recovery Team (PSTRT) identified 22 independent populations within the PS Chinook ESU (Ruckelshaus et al. 2006). The NMFS Biological Review Team identified the following risks and threats to the PS Chinook ESU in the form of the four "Hs": (1) harvest; (2) hydropower; (3) habitat degradation; and (4) hatchery production (Good et al. 2005; Ford 2011). A status review conducted in 2005 determined an overall improvement to natural spawning escapement trends with some populations doing marginally better and others did worse since the status review conducted in 1997 (Good et al. 2005). The 2011 status review for Puget Sound Chinook salmon determined that all ESUs are well below the planning range for recovery escapement levels and most populations continue to be below the spawner-recruitment levels identified by the Technical Review Team for recovery (Ford 2011).

The Strait of Juan de Fuca contains 2 of the 22 independent populations that the PSTRT identified within the PS Chinook ESU (Ruckelshaus et al. 2006). The independent populations within the Strait of Juan de Fuca are the Dungeness River population and the Elwha River population. Both of these populations are considered essential to the recovery of the ESU (WDFW 2007).

The Northwest Fisheries Science Center reviewed average escapements for 5-year intervals and estimates of trends over the intervals for all natural spawners (natural-origin and hatchery-origin) and natural-origin only spawners. Data on escapement for the Strait of Juan de Fuca population (combining Dungeness and Elwha) dated back to 1971 and abundance for the population was relatively high in the 1970s. Population abundance was found to be lowest for the mid period (1985-1999) and then high again for the most recent 10 years. The overall trend in spawning abundance for the Strait of Juan de Fuca population has been generally stable for all natural spawners. The population's natural-origin only spawners showed a significant positive trend (Ford 2011).

In the most recent 5-Year Review, NMFS found that for the ESU overall, while natural origin recruit escapements have remained fairly constant from1985–2009, total natural origin recruit abundance and productivity have continued to decline. This is likely due to several risk factors that are still present such as widespread loss and degradation of habitat and high fractions of hatchery fish. Therefore, all Puget Sound Chinook salmon populations are considered well below escapement abundance levels identified for recovery in the recovery plan (NMFS 2011a). However, NMFS concluded in the 5-year

review (Ford 2011) that the updated information on abundance, productivity, spatial structure and diversity since the previous review does not indicate a change in this ESU's biological risk category.

Notable successes towards recovery of the PS Chinook ESU, in general, include numerous high priority habitat restoration projects that have been accomplished across every watershed in Puget Sound (Judge 2011). Specific to the Strait of Juan de Fuca population, Chinook salmon have been observed utilizing the upper Elwha River since dam removal was completed in 2014. Chinook had not had access to the upper Elwha River in over 100 years (Peninsula Daily News 2014).

3.1.1.2 Occurrence in the Action Area

The Elwha Chinook population is believed to be comprised of two subpopulations: an early and a late returning run. Chinook return to the Elwha River from late spring through late-September and spawn from late-August through mid-October (Puget Sound Indian Tribes and WDFW 2004). Schools of Chinook fry congregate in nearshore areas prior to their offshore migration to feed in open water (Nightingale and Simenstad 2001). Smaller outmigrants tend to migrate along nearshore areas and will use river deltas and pocket estuaries as rearing areas (Beamer et al. 2003). Larger outmigrants are not as associated with the nearshore.

The Dungeness Chinook population is comprised of a single population of native origin fish with spring/summer run timing. Chinook return to the Dungeness River in the late spring to mid-summer, with spawning occurring early August through early October. Fry emerge in the early spring with a majority of them emigrating to rear in the estuary during their first year of life, while remaining fry will rear in the river for a year and emigrate out as yearlings. Fish spend the first year of their life within estuarine nearshore habitat (Puget Sound Indian Tribes and WDFW 2004).

Both the Elwha and Dungeness populations likely occur in the project area. During nearshore surveys conducted from 2006 through 2014, juvenile Chinook salmon were recorded from April to September. Out of approximately 40 different species collected during these surveys, Chinook were among the most abundant species collected (Fresh 2015).

3.1.1.3 Designated Critical Habitat within the Action Area

Critical habitat was designated for the PS Chinook ESU in September 2005 (NMFS 2005b). Critical habitat consists of water, substrate, and the adjacent riparian zone of accessible estuarine and riverine reaches. In marine areas, critical habitat includes all nearshore marine areas (including areas adjacent to islands) of the Strait of Georgia (south of the Canada-United States border), Puget Sound, Hood Canal, and the Strait of Juan de Fuca (to the western end of the Elwha River delta) from the line of extreme high tide out to a depth of 98 ft (30 m). Critical habitat for PS Chinook ESU occurs within Port Angeles Harbor, along Ediz Hook and extending north, south, and east to -98 ft (-30 m) MLLW (Figure 3-1)

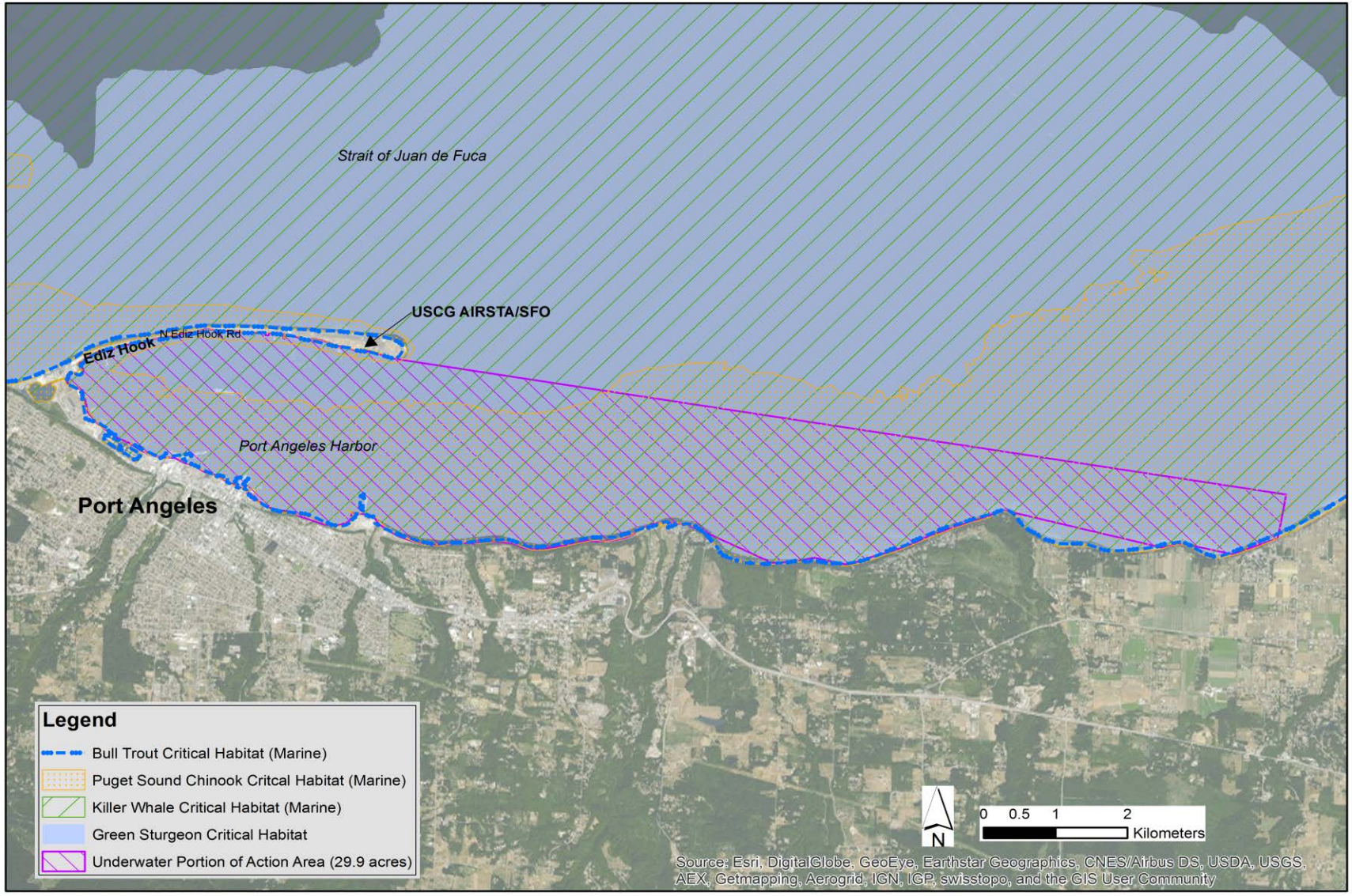

Figure 3-1. Designated Critical Habitat within the Action Area

(Sources: NMFS 2005b, 2006b, 2009; USFWS 2010a)

Six Primary Constituent Elements (PCEs) were identified in the designation (NMFS 2005b). These PCEs include:

(1) Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation, and larval development;

(2) Freshwater rearing sites with (i) water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility; (ii) water quality and forage supporting juvenile development; and (iii) natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks;

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

(4) Estuarine areas free of obstruction and excessive predation with: (i) water quality and quantity, and salinity conditions supporting juvenile and adult physiological transitions between fresh- and saltwater; (ii) natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders side channels; and (iii) juvenile and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation;

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

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

Only PCEs 5 and 6 occur in the Action Area.

3.1.2 Hood Canal Summer-Run Chum ESU

3.1.2.1 Status

The Hood Canal summer-run chum salmon ESU (hereafter HC chum ESU) was listed as threatened in June 2005 (NMFS 2005a). The listing includes all naturally spawned populations of summer-run chum salmon in Hood Canal and its tributaries as well as populations in Olympic Peninsula rivers between Hood Canal and Dungeness Bay. Eight artificial propagation programs are also considered to be part of this ESU.

Threats and Trends

The PSTRT designated two independent populations for the HC chum ESU, one that includes spawning aggregations within Hood Canal and one that includes the spawning aggregations from rivers and creeks draining into the Strait of Juan de Fuca (Ford 2011). The Strait of Juan de Fuca summer chum population is composed of five spawning

aggregations (Dungeness River, Jimmycomelately Creek, Salmon Creeks, Snow Creek, and Chimacum Creek).

In 1992, state and tribal biologists identified the following three primary factors that have contributed to the decline of the summer chum salmon in Hood Canal and eastern Strait of Juan de Fuca streams: habitat loss, fishery exploitation, and climate-related changes in stream flow patterns. In 2002, the Hood Canal Coordinating Council (HCCC) lead the development of the Hood Canal and Eastern Strait of Juan de Fuca Summer Chum Salmon Recovery Plan which is also part of Washington State's regional recovery planning effort for all ESA-listed salmon. The HCCC is the regional recovery organization for the HC chum ESU. Recovery goals include habitat restoration, harvest management regimes designed to reduce incidental harvest of summer chum, and programs in place to monitor and reduce potential negative impacts of hatcheries (i.e., reducing diversity between wild stocks) (HCCC 2005).

The PSTRT had not yet finalized population designations and viability criteria for the HC chum ESU at the time of the previous status review (Good et al. 2005). A majority of the stocks were showing positive growth rates and increased spawning abundance at the time of the listing. Spawning abundance was relatively high in the 1970s and lowest during 1985 – 1999. The most recent 10 years have shown an increase in abundance. The overall trend in spawning abundance for the Strait of Juan de Fuca populations is generally stable for all spawners (both natural spawners and natural-origin spawners) (Ford 2011).

3.1.2.2 Occurrence in the Action Area

Summer chum enter the Dungeness River in late August through late October and spawn in the main channel through September. Some spawn in the tributaries of the river within low gradient, low mainstem reaches where low flows are encountered in late summer and early fall. Eggs incubate in redds for 5-6 months with fry emerging between January and May. After hatching, fry migrate rapidly downstream and out to the estuary and nearshore areas (National Oceanic and Atmospheric Administration [NOAA] Fisheries 2005).

During nearshore surveys conducted from 2006 through 2014, juvenile chum salmon were recorded from April through September, with higher abundances during the spring months (April-June) (Fresh 2015). The HC chum ESU likely occurs in the Action Area.

3.1.2.3 Designated Critical Habitat within the Action Area

Critical habitat is designated for the HC chum ESU (NMFS 2005b), but it does not overlap or fall within the Action Area.

3.1.3 Puget Sound Steelhead DPS

3.1.3.1 Status

The Puget Sound steelhead DPS (hereafter PS steelhead DPS) was listed as threatened under the ESA in 2007 (NMFS 2007). The PS steelhead DPS includes all naturally spawned anadromous steelhead originating below natural and manmade impassable barriers from rivers flowing into Puget Sound from the Elwha River (inclusive) eastward,

including rivers in Hood Canal, South Sound, North Sound and the Strait of Georgia. Steelhead from six artificial propagation programs are also included.

Threats and Trends

The PS steelhead DPS exhibits two distinct life history strategies: summer- and winter-run migrations. Winter-run steelhead are ocean-maturing steelhead, returning to freshwater to spawn during the winter and early spring-months and relatively soon after entering freshwater. Summer-run steelhead are stream-maturing steelhead that return to freshwater during the late spring at an immature state where they remain in freshwater to continue maturing and spawn the following winter or spring. Winter-run steelhead are the predominant life history type that occurs in Puget Sound (Puget Sound Steelhead Technical Recovery Team [PSSTRT] 2013).

The PSSTRT reviewed information and identified 3 major population groups that contain a total of 32 steelhead demographically independent populations within the PS steelhead DPS. One of the three major populations groups is the combined Hood Canal and Strait of Juan de Fuca major populations group that historically contained eight demographically independent populations (one summer/winter run and seven winter run with two of these winter runs possibly including summer-run components) (PSSTRT 2013).

Since 1985, Puget Sound winter-run steelhead abundance has shown a widespread declining trend over a majority of the DPS with the exception of 4 of the 16 populations evaluated that showed a long-term population growth. These four populations included Hood Canal, west Hood Canal, Samish River, and Port Angeles (within Strait of Juan de Fuca Independent tributaries population) (Ford 2011). Over the years 2005 – 2009, Puget Sound winter-run steelhead abundance was found to be very low over much of the DPS (geometric mean of less than 250 fish annually for 8 populations evaluated). The Elwha River population was one of three that had very low mean abundance during the evaluation years (2005-2009) resulting in less than 15 fish. Review of all data collected indicated relatively low abundance, declining trends in natural escapement of winter-run steelhead throughout Puget Sound (Ford 2011).

The status of the listed PS steelhead DPS has not changed substantially since the ESA listing in 2007 and a majority of the populations within the DPS continue to show downward trends (3 to 10% annually) in estimated abundance. However, these trends did not suggest a change in biological risk category at the time of the review.

3.1.3.2 Occurrence in the Action Area

Of the 32 independent populations of PS steelhead DPS, 3 may occur in the vicinity of the Action Area. These include the Dungeness River summer/winter-run steelhead, Strait of Juan de Fuca Independent Tributaries winter-run steelhead, and the Elwha River winter-run steelhead (PSSTRT 2013).

The Dungeness River summer/winter-run population spawns in the mainstem of the Dungeness and Grey Wolf rivers. Given historical records indicate presence of summer-run steelhead in the 1940s, further monitoring is needed to determine if they are still present within the basin. Within the Dungeness River, spawning occurs from mid-March

to early June. Genetically, the Dungeness River steelhead most closely cluster with other collections from the Strait of Juan de Fuca and Elwha River populations (PSSTRT 2013).

The Strait of Juan de Fuca independent tributaries winter-run steelhead population consists of steelhead spawning in small independent tributaries of the Strait of Juan de Fuca between the Dungeness and Elwha rivers, including: Ennis, White, Morse, Siebert, and McDonald creeks (PSSTRT 2013).

The Elwha River winter-run steelhead population consists of a native late-winter run and one early-winter hatchery-origin run. Natural spawning occurs within the mainstem and tributaries in mid-March for early returning steelhead and from April to June for late returning steelhead (PSSTRT 2013).

Although Shaffer and Galuska (2009) recorded presence of steelhead during the summer, occurrence was identified as rare as only one fish was identified. Fresh (2015) did not record any presence of steelhead during spring and summer months of 2006 through 2014; sampling data is not available for the other months.

3.1.3.3 Designated Critical Habitat within the Action Area

Critical habitat for the PS steelhead DPS was proposed in January 2013 (NMFS 2013a) but does not overlap with the Action Area.

3.1.4 Pacific Eulachon Southern DPS

3.1.4.1 Status

The Pacific Eulachon Southern DPS (hereafter southern eulachon DPS) was listed as threatened under the ESA in March 2010 (NMFS 2010a). This DPS includes all eulachon originating from the Skeena River in British Columbia south to and including the Mad River in northern California.

Threats and Trends

Threats to the southern eulachon DPS include habitat loss, blocked access to historical spawning grounds from hydroelectric dams, and dredging that can cause either entrainment of adults or smothering of eggs. The Fraser and Columbia rivers experienced rapid declines in the mid-1990s, increases in 2001 and 2003, and more recently are declining again (Gustafson et al. 2010).

3.1.4.2 Occurrence in the Action Area

Eulachon inhabit nearshore waters to a depth of 1,000 ft (300 m). They spend 3-5 years in saltwater before returning to freshwater to spawn. Eulachon spawn in lower reaches of larger snowmelt-fed rivers in water temperatures between 39 and 50 degrees Fahrenheit (°F) (4 and 10 degrees Celsius [°C]). Spawning occurs over sand or coarse gravel substrates and most adults die after spawning. Eggs are fertilized in the water column and sink following fertilization where they then adhere to the river bottom. Eggs hatch in 20-40 days, and larvae are then carried downstream and disperse into estuarine and ocean currents. Juvenile eulachon move from shallow nearshore areas to mid-depth areas and both juveniles and adults commonly forage within depths ranging from 66 to 292 ft (20 to 150 m) (NMFS 2014).

Prior to dam removal, eulachon had been rare in the Elwha River system for the past 60 years and only occasional spawning had been reported (Gustafson et al. 2010). Removal of the dam has restored eulachon habitat that was altered by the dam. In January 2015, seining surveys in the lower Elwha River estuary collected hundreds of egg-bearing and spent eulachon, indicating that local spawning was occurring (Coastal Watershed Institute 2015).

Larvae and young juveniles become widely distributed in coastal waters once they enter the ocean. Larvae, measuring 1-1.1 inches (25-30 millimeters), have been caught via incidental plankton net catch in the Strait of Juan de Fuca (Fisheries and Oceans Canada 2014).

3.1.4.3 Designated Critical Habitat within the Action Area

Critical habitat has been designated for the southern eulachon DPS (NMFS 2011b) but does not overlap with the Action Area.

3.1.5 North American Green Sturgeon Southern DPS

3.1.5.1 Status

The North American green sturgeon southern DPS (hereafter southern green sturgeon DPS) was listed under the ESA as threatened in April 2006 (NMFS 2006a). This DPS includes all green sturgeon originating from the Sacramento River basin and from coastal rivers south of the Eel River in northern California.

Threats and Trends

The main factor for decline of the southern green sturgeon DPS has been from the reduction of spawning grounds. The Sacramento River in California contains the only known green sturgeon spawning population in this DPS. Habitat blockages (via dams) have removed access to historical spawning grounds that occurred in the Feather River, California. Dredging is a potential threat that could entrain juvenile or adults as well as smothering of eggs. Incidental catch is also a threat. Due to the trophy status of large white sturgeon, green sturgeon have been caught incidentally in white sturgeon fisheries (NMFS 2006a). Protection has been established for this DPS in the form of ESA section 4(d) Rule where regulating the take of this species would be applied wherever the southern green sturgeon DPS occurs, unless otherwise specified. Areas include but are not limited to bays and estuaries along Washington coasts (including Puget Sound) and coastal waters within 360-ft (110- m) depth (including Strait of Juan de Fuca) (NMFS 2010b).

3.1.5.2 Occurrence in the Action Area

Green sturgeon are the most wide ranging and most marine-oriented species of the sturgeon family and are believed to spend a majority of their lives in nearshore oceanic waters, bays, and estuaries. They typically migrate into freshwater beginning in late February and spawning occurs from March through July in the mainstem of the Sacramento River, California. Juveniles rear in the Sacramento River and the Delta and bays for 1-4 years before migrating out to sea as subadults. While at sea, green sturgeon inhabit coastal bays and estuaries and coastal marine waters from the Bering Sea to southern California, primarily occurring within 360-ft (110-m) depth (NMFS 2010b).

Subadult and adult green sturgeon make annual migrations along the coast in the spring and fall, spending winters in the marine waters north of Vancouver Island and south of southeast Alaska, and summers in coastal waters, bays and estuaries of Washington, Oregon and California. Sturgeon have been observed on a southward migration within the Strait of Juan de Fuca waters during summer time. It is assumed that most green sturgeon migrating between Canadian and United States waters cross the Strait of Juan de Fuca over deep water to the west of the Strait of Juan de Fuca line (Lindley et al. 2008). There have been no sightings of green sturgeon within the Port Angeles Harbor (Longenbaugh 2015).

3.1.5.3 Designated Critical Habitat within the Action Area

Critical habitat for the southern green sturgeon DPS was designated in October 2009 and includes the marine waters within the 360-ft (110-m) depth isobaths from Monterey Bay to the United States-Canada border, including Port Angeles Harbor (NMFS 2009) (Figure 3-1). Three PCEs were identified that are essential for conserving the southern green sturgeon DPS in coastal marine areas (NMFS 2009). These include:

(1) Migratory Corridor – a safe and timely migratory pathway within marine and between estuarine and marine habitats. Safe and timely passage is defined as human-induced impediments (physical, chemical, or biological) do not alter migratory behavior of the fish.

(2) Water Quality – Coastal marine waters with adequate dissolved oxygen levels and acceptably low levels of contaminants.

(3) Food Resources – abundant prey items for subadults and adults, which may include benthic invertebrates and fish.

Of the three PCEs described above, PCEs 2 and 3 occur in the Action Area.

3.1.6 Southern Resident Killer Whale DPS

3.1.6.1 Status

The Southern Resident Killer Whale DPS (hereafter SRKW DPS) was listed under the ESA as endangered in November 2005 (NMFS 2005c). This population is comprised of three pods, designated as J, K, and L pods. The SRKW DPS is one of three forms or ecotypes (Resident, Transient, and Offshore) occurring in the Eastern North Pacific region (NMFS 2005c).

Threats and Trends

Prior to the 1960s, the SRKW DPS population was estimated to be approximately 140 whales. Approximately 50 whales were removed during the live-captures fishery in the 1960s before it ended in the mid-1970s when there was an estimated total wild population of 71 whales. By 1995, the population peaked at 98 animals and then dropped by 20% between 1996 and 2001 (NOAA Fisheries 2014). This drop in population is what ultimately resulted in the endangered listing status under ESA in 2005.

As of the summer of 2014, the population was estimated at 79 individuals (Center for Whale Research 2014). In December 2014, the carcass of a 19-year old pregnant female member of J pod was found along a shoreline in British Columbia (Balcomb 2014).

After reviewing sighting summaries that include the addition of one calf in 2014 and three calves in 2015, the current population is estimated at approximately 81 whales as of July 2015 (Seattle Times 2015).

The major threats to the survival of this population include prey availability, pollution and contaminants (pre-existing [i.e., legacy contaminants in sediments] and potential [i.e., oil spills], and effects from vessels and sound. The main prey source for the SRKW DPS is Chinook salmon, primarily during the summer months. In Puget Sound, chum salmon are the preferred prey. Many of the ESUs for Chinook and chum are also currently listed under the ESA. Pollutants such as polychlorinated biphenyls (PCBs) and dichloro-diphenyl-trichloroethane or known as DDT (pesticides) have been found in whale blubber. These pollutants are a long standing issue within the urban/industrial setting of Puget Sound where the SRKW DPS and their prey spend a majority of their time. The Strait of Juan de Fuca where whales commonly pass through, is near the state's major refineries and is considered a location most at risk of major spills. Lastly, underwater noise can impact communication between individuals of the SRKW DPS (NMFS 2008b).

A recovery plan finalized in 2008 (NMFS 2008b) outlines recovery measures needed to conserve and rebuild the depleted SRKW DPS. These measures include but are not limited to management measures to support salmon as well as other prey species restoration efforts in the region; clean up contaminated sites and sediments; and monitor vessel activity around whales (NMFS 2008b). Multiple habitat restoration projects have either been completed or are currently underway or planned for the near future to rebuild the depleted salmon populations in Puget Sound (Puget Sound Partnership 2015). NOAA Fisheries worked closely with partners to develop a killer whale-specific oil spill response plan which was completed in 2010. In 2011, a regulation was made prohibiting vessels from approaching any killer whale closer than 200 yards, and intercepting or parking in the path of whales. An assessment determined this regulation would reduce risk of vessel strikes and behavioral and acoustic disturbance. Continued education, enforcement, and monitoring activities through a funded grant issued in 2013 are being conducted by WDFW (NOAA Fisheries 2014).

3.1.6.2 Occurrence in the Action Area

The SRKW DPS is found during the spring, summer, and fall months in the Salish Sea, which includes the inland waters of Puget Sound, the Northwest Straits, and the southern Georgia Strait. Between 1976 and 2014, SRKW DPS were observed within the areas of the Strait of Juan de Fuca, passing by Ediz Hook during the summer months of June through September with peak occurrence in spring (March). SRKW DPS have not been sighted during the month of February and are generally less common during the winter months (The Whale Museum 2015). Their coastal distribution during the winter is not completely confirmed, but the population has been observed south in Monterey Bay, California and north in Chatham Strait in southeast Alaska (NOAA Fisheries 2014).

3.1.6.3 Designated Critical Habitat within the Action Area

Critical habitat was designated for the SRKW DPS in November 2006 (NMFS 2006b). This designation includes 2,560 mi^2 (6,630 km^2) of marine waters deeper than 20 ft (6 m) within three areas: (1) Summer Core Area in Haro Strait and waters around the San Juan Islands; (2) Puget Sound; and (3) the Strait of Juan de Fuca, including Port Angeles

Harbor (Figure 3-1). Three PCEs were identified that are essential for conserving SRKW DPS (NMFS 2006b). These include:

(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; and

(3) Passage conditions to allow for migration, resting, and foraging.

All three PCEs described above occur in the Action Area.

3.1.7 Humpback Whale

3.1.7.1 Status

Humpback whales were listed in 1970 as endangered under the Endangered Species Conservation Act of 1969 (USFWS 1970), the predecessor to the ESA. When the ESA was passed in 1973, the humpback whale was listed as endangered throughout its range. In April 2015, NMFS proposed to divide the globally listed endangered humpback whale species into 14 DPSs, remove the current species-level listing, and in its place list 2 DPSs as endangered and 2 DPSs as threatened. The remaining 10 DPSs are not proposed for listing based on their current statuses (NMFS 2015). Based on the fidelity of humpback whales fidelity to feeding grounds, two of the DPS' proposed for threatened status (Western North Pacific and Central America) are known to use the Eastern North Pacific waters of Alaska, British Columbia, and Washington for feeding. Two additional DPSs that are not proposed for listing (Hawaii and Mexico) are also known to use Eastern North Pacific waters for feeding (NMFS 2015).

Threats and Trends

The primary threats to humpback whales are entanglement in fishing gear, ship strikes, whale watch harassment, harvest, and habitat impacts. Entanglement in gear from several fisheries can occur along their long migration from Hawaii to Alaska. Longline gear, crab pots, and other non-fishery related lines have impacted the species. The population was estimated at 1,400 whales in 1966. Shipping traffic, or low- and mid-frequency active sonar have had a potential impact on humpback whale habitat. Studies have not been conducted on humpback whales, but data collected on blue whales (*Balaenoptera musculus*) showed signs of disturbance by way of increasing swimming speed, moving away from source, and cessation of feeding (Carretta et al. 2014).

3.1.7.2 Occurrence in the Action Area

Between January 2003 and July 2012 there were over 60 sightings of humpback whales reported within inland waters of Washington (Orca Network 2012). Of these 60 sightings, a majority were within the main basin of Puget Sound. The number of humpback whales potentially present within the action area are expected to be very low in any month and even lower from August through March. The closest and most recent sightings of humpback whales to the action area have been within the deep waters of the Strait of Juan de Fuca, approximately 20 miles (32 km) north of the Ediz Hook during the month of May (Orca Network 2015).

3.1.7.3 Designated Critical Habitat within the Action Area

Critical habitat has not been designated for the humpback whale.

3.1.8 Coastal-Puget Sound Bull Trout DPS

3.1.8.1 Status

The Coastal-Puget Sound bull trout DPS (hereafter CPS bull trout DPS) was listed under the ESA as threatened in 1999 (USFWS 1999). This DPS encompasses all Pacific coast drainages within Washington, including Puget Sound.

Threats and Trends

In May 2004, the USFWS released the Draft Recovery Plan for the CPS bull trout DPS, in two volumes (Puget Sound and Olympic Peninsula Management units) (USFWS 2004). Each volume describes a management unit that together comprise the CPS bull trout DPS. The Olympic Peninsula Management Unit includes all watersheds within the Olympic Peninsula and the nearshore marine waters of the Pacific Ocean, Strait of Juan de Fuca, and Hood Canal (USFWS 2010a). The Dungeness River and Elwha River core areas occur within the vicinity of the Action Area. The Dungeness River core area is expected to support as many as 500 but fewer than 1,000 adult bull trout. In the Elwha River core area, moderately low numbers of bull trout have been observed. Snorkel surveys in 2003 documented 31 bull trout. There is no information on trends in abundance of the Elwha River bull trout, and the status of this core area is unknown (USFWS 2008a).

A 5-year status review conducted in 2008 concluded that listing the species as threatened remained warranted range-wide in the coterminous United States and it was reported that bull trout were generally stable overall range-wide, with some core area populations decreasing, some stable, and some increasing. Based on this review, historic habitat loss and fragmentation, interaction with nonnative species, and fish passage issues are considered the most significant threat factors affecting bull trout (USFWS 2008b). The draft recovery plan (2004) was never finalized but identified recovery actions across the range. A revised draft recovery plan is currently out for review (USFWS 2014a) and takes into consideration strategies to recover bull trout in the areas continuing to affect the species as determined in the status review conducted in 2008. Recovery actions include (1) protect, restore, and maintain suitable habitat conditions for bull trout that promote diverse life history strategies and conserve genetic diversity, (2) prevent and reduce negative effects of non-native fishes and other non-native taxa on bull trout, and (3) work with partners to conduct research and monitoring to implement and evaluate bull trout recovery activities, consistent with an adaptive management approach using feedback from implemented, site-specific recovery tasks (USFWS 2014a).

Since the 1999 listing of bull trout, many conservation measures have been implemented to aid in recovery of the species. These include suppressing non-native species within several bull trout core areas, habitat improvements, and removal of migration barriers (USFWS 2014a). Specifically, approximately 27 bull trout were identified in the upper Elwha River after dam removal in 2014 (Peninsula Daily News 2014).

3.1.8.2 Occurrence in the Action Area

Bull trout exhibit both resident and migratory life-history patterns. Resident forms complete their entire life cycle in the tributary or nearby stream. Migratory forms spawn in tributary streams, where juvenile fish rear for 1-4 years before migrating to either a lake (adfluvial), river (fluvial), or coastal areas to saltwater (anadromous). Bull trout typically spawn from August to November during periods of decreasing water temperatures. Migratory bull trout may begin spawning in April, and move upstream as far as 155 miles (250 km) into spawning grounds in some areas of their range. Temperatures during spawning are typically from 39 to 50°F (4 to 10°C) (USFWS 1999).

The Dungeness River and Elwha River core areas' spawning populations are the only core areas connected to the Strait of Juan de Fuca. Bull trout distribution is patchy, and hence precise population estimate information is unavailable. Spawning does occur in the mainstem Dungeness River (USFWS 2008b). The Strait of Juan de Fuca and associated independent tributaries are used for foraging, migration, and overwintering. Bull trout have been documented in the Strait of Juan de Fuca drainages of Bell, Siebert, Morse, and Ennis creeks. However, current and historical habitat conditions of these creeks are not believed to support spawning populations of bull trout (USFWS 2004).

The Elwha River and Dungeness bull trout populations represent 4 of the 11 local populations of the Olympic Peninsula region of the Coastal Recovery Unit identified in the recent revised recovery plan (USFWS 2014a). These populations exhibit fluvial and adfluvial life history strategies and may be anadromous, as a bull trout was captured at the mouth of the river in 2010 (Crain and Brenkman 2010). Spawning in the Elwha River system occurs in October.

Surveys conducted by Shaffer and Galuska (2009) and Fresh (2015) did not record any presence of bull trout during spring and summer months of 2006 through 2014; sampling data are not available for the other months. WDFW (2015a) documents bull trout occurrence within Ennis Creek and they may be present and foraging occasionally within the harbor during migration to and from the Strait of Juan de Fuca. However, bull trout may occasionally use the Port Angeles Harbor as a foraging area during migration through to the Strait of Juan de Fuca.

3.1.8.3 Designated Critical Habitat within the Action Area

Critical habitat was originally designated for the CPS bull trout DPS in September 2005 (USFWS 2005), with a revision to the designation published in October 2010 (USFWS 2010a). The Olympic Peninsula critical habitat unit is bordered by Hood Canal to the east, Strait of Juan de Fuca to the north, the Pacific Ocean to the west, and the lower Columbia River basins and Puget Sound to the south. In the marine nearshore areas of the Action Area, the inshore extent of critical habitat is the mean higher high water (MHHW) line, including the uppermost reach of the saltwater wedge within tidally influenced, freshwater heads of estuaries. Critical habitat extends offshore to the depth of 33 ft (10 m) relative to the MLLW line (USFWS 2010a) (Figure 3-1) (USFWS 2010a).

Nine PCEs were identified that are essential for conserving bull trout (USFWS 2010a). These include:

(1) Springs, seeps, groundwater sources, and subsurface water connectivity (hyporheic flows) to contribute to water quality and quantity and provide thermal refugia;

(2) Migratory 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 with features such as large wood, side channels, pools, undercut banks and substrates, to provide a variety of depths, gradients, velocities, and structure;

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

(6) Substrates of sufficient amount, size, and composition to ensure success of egg and embryo overwinter survival, fry emergence, and young-of-the-year and juvenile survival. A minimal amount (e.g., less than 12 percent) of fine substrate less than 0.85 mm (0.03 in.) in diameter and minimal embeddedness of these fines in larger substrates are characteristic of these conditions;

(7) A natural hydrograph, including peak, high, low, and base flows within historic and seasonal ranges or, if flows are controlled, they minimize departures from a natural hydrograph;

(8) Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited; and

(9) Few or no nonnative predatory (e.g., lake trout, walleye, northern pike, smallmouth bass); inbreeding (e.g., brook trout); or competitive (e.g., brown trout) species present.

Only PCEs 2 and 3 occur in the Action Area.

3.1.9 Marbled Murrelet

3.1.9.1 Status

The Washington, Oregon, and California DPS of marbled murrelet was federally listed as threatened under the ESA in October 1992 (USFWS 1992). The listed range for this species extends from the Canadian border south to central California.

Threats and Trends

The breeding population within Washington State was determined to be approximately 5,000 birds in 1992. Loss or modification of nesting habitat by way of commercial

timber harvests, human induced fires, land use changes, and mortality associated with net fisheries and oil spills have been the primary cause of decline. The geographical area of suitable marbled murrelet nesting habitat (old-growth and mature forests) was drastically reduced during the 1800s and 1900s due to timber harvest. The establishment of Olympic National Park was significant to preserving old-growth forest on the Olympic Peninsula that may have otherwise been heavily harvested (USFWS 1997).

The 1997 recovery plan for the marbled murrelet focuses on: (1) establishing conservation zones; (2) identifying and protecting terrestrial and marine habitat areas within each marbled murrelet conservation zone; (3) monitoring nesting and breeding habitat; (4) implementing short-term actions to stabilize the populations; (5) implementing long-term actions to stop decline and increase populations; (6) initiating research on survey and monitoring protocols; and (7) establishing a Regional West Coast Data Center (USFWS 1997). A 5-year review (USFWS 2009) determined that the recovery objectives and delisting criteria have not been met. However, the recovery actions, with the exception of establishing Regional Coordination body, have been implemented. Specifically, six marbled murrelet conservation zones identified within the recovery plan were established and at-sea marbled murrelet monitoring surveys were developed and have been implemented.

In addition to meeting the requirements of the ESA, long-term marbled murrelet monitoring was designed to evaluate the effectiveness of the Northwest Forest Plan. Management objectives of the Northwest Forest Plan focus on protecting and enhancing habitat for mature and old-growth forests and related species, including the marbled murrelet. Five of the six established conservation zones fall within the scope of the Northwest Forest Plan. Annual monitoring has been conducted within these zones since 2000 as part of the Northwest Forest Plan Interagency Monitoring Program. The density of marbled murrelets for all conservation zones combined was 22,200 birds in 2001 and 19,600 in 2013 (Pearson et al. 2014). For the combined five-conservation zone area for the monitoring years of 2001-2013, a weak trend of 1.2% decline per year occurred (Falxa et al. 2014).

3.1.9.2 Occurrence within the Action Area

Marbled murrelets are not known to nest within the Action Area. However, they use the marine environment of the Strait of Juan de Fuca for courtship, loafing, and foraging and may occur in the offshore areas of the Action Area for courtship, loafing, and foraging. In the Strait of Juan de Fuca and Puget Sound, their nesting season is between April 1 and September 23 (USFWS 2012). During the breeding season, murrelets tend to forage in well-defined areas along the shoreline in relatively shallow marine waters (usually within 1.2 miles [2 km] from shore and in water less than 164-328 ft [50-100 m] deep) (USFWS 1997). Throughout their range, marbled murrelets are opportunistic feeders and utilize prey of diverse sizes and species but feed primarily on small fish such as Pacific sand lance and smelt species as well as feed on various invertebrates in coastal and nearshore marine waters. Murrelets forage at all times of the day and in some cases at night (Strachan et al. 1995; USFWS 2010b). Murrelets typically forage in pairs during the summer, with singles and flocks of three or more birds occurring less often (Strachan et al. 1995; Merizon et al. 1997). During the pre-basic (post-breeding season) molt, murrelets are essentially flightless and must select foraging sites that provide adequate

prey resources within swimming distance (Carter 1984; Carter and Stein 1995). During the non-breeding season, murrelets typically disperse and are found farther from shore (Strachan et al. 1995).

The Strait of Juan de Fuca, Puget Sound, Hood Canal, and the San Juan Islands encompass Conservation Zone 1, which overlaps the Action Area. Surveys conducted May-July, 2013 estimated a population of 4,395 birds (Pearson et al. 2014). Surveys conducted during the same sampling window and zone in 2014 showed a decline of 35 percent from the previous year with 2,822 birds estimated for Zone 1 (Lance and Pearson 2015).

3.1.9.3 Designated Critical Habitat within the Action Area

Critical habitat for nesting marbled murrelets was designated in May 1996 (USFWS 1996) and revised in Oregon and California in 2011 (USFWS 2011). Designated critical habitat in Washington remained unchanged from the 1996 ruling and does not overlap with the Action Area.

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4 Environmental Setting

The proposed project will occur on, just off-shore of, and on the south side of Ediz Hook within Port Angeles Harbor. Ediz Hook is a narrow spit of land, with widths ranging from 90 to 750 ft (27 to 228 m), and juts 3.5 miles (5.6 km) into the Strait of Juan de Fuca, forming the northern boundary of Port Angeles Harbor.

The Ediz Hook spit is lined with public beaches, picnic spots, and parking areas, and a multi-use recreational trail begins just outside the USCG AIRSTA/SFO Port Angeles entrance gate and follows the shoreline around the harbor to the downtown Port Angeles waterfront. There is a public boat launch west of the Puget Sound Pilots Station and numerous public access points for hand-launched watercraft, fishing, swimming, and scuba diving along the length of Ediz Hook.

Most of Ediz Hook outside of the USCG AIRSTA/SFO Port Angeles upland operational area is owned by the federal government and leased long-term to the City of Port Angeles. The Puget Sound Pilots Association has a pier with training and sleeping facilities on the south shore of Ediz Hook just outside (west) of the main entrance to the USCG station. They provide dispatch and other support services for pilots as well as direct vessels into and out of the harbor and the Strait of Juan de Fuca and provide quick response to vessels in emergency situations.

The USCG AIRSTA/SFO Port Angeles is primarily composed of paved roads and parking lots, buildings, and a runway along the eastern half of Ediz Hook. The upland habitat is composed of terrestrial salt-tolerant grasses and shrubs and shore pines planted near the USCG buildings. Beaches occur along Ediz Hook, containing small pea gravel, rip rap, and drift wood. Because ESA-listed species evaluated in this document inhabit the marine environment, existing marine habitat conditions are described below and evaluated in detail in Section 5.

4.1 Marine Habitat Conditions

Marine habitat conditions within the Port Angeles Harbor are described below for physical barriers, water circulation and bathymetry, water quality, sediment quality, marine vegetation, underwater structures and benthic community, forage fish, and ambient sound. Where data is available, marine habitat conditions are described at the project scale.

4.1.1 Ambient Sound

4.1.1.1 Ambient Underwater Sound

Underwater ambient sound is comprised of sounds produced by a number of natural and anthropogenic sources and varies both geographically and temporally. Natural sound sources include wind, waves, precipitation, and biological sources such as shrimp, fish, and cetaceans. These sources produce sound in a wide variety of frequency ranges (Urick 1983; Richardson et al. 1995) and can vary over both long (days to years) and short (seconds to hours) time scales. In shallow waters, precipitation may contribute up to 35 dB to the existing sound level, and an increase in wind speed of 5-10 knots can cause a 5 dB increase in ambient ocean sound between 20 and 100,000 hertz (Hz) (Urick 1983).

Human-generated noise contributes to the ambient acoustic environment within Port Angeles Harbor. Activities within the area include transiting of large USCG ships and support boats, recreational boats, and general maintenance activities at both the USCG AIRSTA/SFO, adjacent Puget Sound Pilots Station, as well as commercial and recreational boat activity associated with the Port of Port Angeles. Ambient underwater noise has not been recorded for the area but is likely similar to a range measured at the Seattle Ferry Terminal (124-128 dB RMS re 1 µPa) (Laughlin 2012; WSDOT 2015).

4.1.1.2 Ambient Airborne Sound

Ambient airborne sound generated within the project area is produced by common industrial and maintenance equipment and vehicles such as trucks, cranes, compressors, and generators. Noise from helicopter operations (take-offs, landings, and overflights) at the USCG AIRSTA/SFO Port Angeles likely generate the highest airborne noise levels within the Action Area. The average ambient daytime sound pressure level in Port Angeles Harbor, along Ediz Hook, was measured as low as 52.1 dBA re 20 µPa and as high as 88.9 dBA when a USCG Dolphin helicopter flew over during sound level measurements (Sargeant 2013).

4.1.2 Physical Barriers and Overwater Shade

The existing structures that likely serve as physical barriers along Ediz Hook (from east to west from the tip of the Hook) include the existing T-Pier at the USCG AIRSTA/SFO Port Angeles, a rock groin/jetty approximately 0.5 miles (0.77 km) west of the T-Pier, the Puget Sound Pilots Station pier and dock, the public boat launch (composed of two ramps) and the Icicle Creek laydown area on the west side of the public boat launch. Most of the nearshore barriers in the Action Area are approximately 1.5 miles (2.5 km) south of Ediz Hook at the Port of Port Angeles. The Port has approximately 10 terminals with various pier and dock configurations that create physical barriers (Port of Port Angeles 2015).

Overwater shade is also created by the existing T-pier, Pilots Station pier and dock, and the Port or Port Angeles piers and docks.

4.1.3 Water Circulation and Bathymetry

The currents within the Port Angeles Harbor are driven by the tidal flow in the Strait of Juan de Fuca (Federal Water Pollution Control Administration 1967; Ebbesmeyer et al. 1979). During flood-tide, a large eddy is established between the Dungeness Spit and Ediz Hook that extends a short way into the harbor and circulates water in a clockwise direction (Ebbesmeyer et al. 1979; Yang et al. 2003). The direction of the eddy is driven by water moving along the northern edge of the harbor during flood tides and along the southern edge of the harbor during ebb tides. The eddy circulates at a slower rate than the flows outside the harbor and is constrained by the size of the harbor itself. Surface currents within the harbor are generally slow (less than 0.8 ft/second [0.2 m/second]) with long periods of slack water, especially in the northern and western portions of the Harbor (along the southern shore of Ediz Hook) (Federal Water Pollution Control Administration 1967).

The Port Angeles Harbor is over 1,400 acres (566 ha) and over 1.3 miles (2.4 km) across. Bathymetry within the project area is from -5 ft (1.5 m) (at the tip of the jetty) to – 60 ft (18.2m) MLLW.

4.1.4 Water Quality

Circulation patterns have a variety of influences on local water quality. The higher velocities reduce residence times, increase the re-suspension and transport of sediment and more rapidly disperse pollutants. Lower velocities result in more deposition, less mixing, longer residence times, and lower transport rates.

The U.S. Environmental Protection Agency (USEPA) approved the marine Water Quality Assessment 305(b) report and 303(d) list (Washington Department of Ecology [Ecology] 2012a). Ecology's Toxics Cleanup Program provides information on state-wide sediment contamination and the relationship it has with water quality and potential impairment of waterbodies in the state. Ecology's Water Quality Program uses this information in the listing of impaired water bodies for Section 303d list as Sediment Management Standards (SMS) were approved by the USEPA's Water Quality Program as Water Quality Standards (see section 4.2.4 for further discussion on SMS and existing sediment contaminants within Port Angeles Harbor).

Assessed water bodies were placed into one of five categories based on methods outlined in the Integrated Report. Port Angeles Harbor has Category 1, 2, and 5 waterbody impairments. Category 1 is waters that meet tested standards for clean waters. Category 2 is waters of concern where there is some evidence of water quality impairment but not enough to require immediate action. Category 5 indicates polluted waters that require a total maximum daily load (TMDL) but one is not currently in place and implemented for the water quality standard that has been violated for one or more pollutants. The western portion of Port Angeles Harbor has a Category 5 rating for presence of mercury in sediment and a Category 2 for cadmium and zinc presence in sediment. The southern portion of the Harbor has a Category 5 rating for sediment due to the presence of over 30 contaminants. The east end of the hook, adjacent to the USCG station, is a Category 5 for 5 contaminants detected in tissue (mussel [*Mytilus* sp.]) and a Category 1 for approximately 20 contaminants detected in tissue (Ecology 2012a).

4.1.5 Sediment Quality

Ecology identifies Port Angeles Harbor as a priority bay under Ecology's Puget Sound Initiative. It is one of seven areas identified as a priority site because of legacy sediment contamination above the Washington State SMS. Ecology has identified two sites in the Port Angeles Harbor that require remedial action: the Western Port Angeles Harbor area and the Rayonier Mill site in the southern portion of the harbor (Ecology 2014).

Surface sediments within the Action Area consist of sand and silt with increasing amounts of gravel closer to the Ediz Hook shoreline. Surface sediments are generally characterized as the top 3.9 inches (10 centimeters) of sediment on the seafloor. Surface and subsurface sediment in Port Angeles Harbor has been affected by historical industrial activities near the western portion of Port Angeles Harbor and the activities at the Rayonier Mill site, south of Ediz Hook, which operated from 1930 to 1997. The sediment quality within the Harbor is above the Washington State SMS cleanup levels based on

benthic toxicity (Ecology 2012b). A sediment investigation that focused on several areas within Port Angeles Harbor identified several contaminants of concern (Ecology 2012c):

- Dioxins and furans;
- PCBs;
- Semi-volatile organic compounds (SVOCs);
- Ammonia and sulfides;
- Metals (arsenic, mercury, cadmium, lead, and zinc); and
- Petroleum hydrocarbons.

The sediments within the project area have not been analyzed. Three of the closest surface sediment samples collected within 1,000 ft (305 m) of the project site were not detected above the Sediment Quality Standards (SQS) and Cleanup Screening Levels (CSL) screening levels. Surface sediment results may not be a good indicator of the potential of underlying subsurface contamination (Ecology 2012b). However, subsurface sediment samples indicate that sediments are less impacted farther from the source areas. Tidally driven currents, wave action, and vessel scour may also have an impact on sediment contamination dispersion and transport.

4.1.6 Marine Vegetation

Aquatic vegetation includes intertidal and subtidal species as well as floating and attached species. Macroalgae species such as *Laminaria*, a genus of brown algae commonly referred to as "kelp," are common in the area. Kelp are large brown seaweeds that attach to bedrock or cobbles in high wave energy areas within shallow waters; they are typically found at depths less than 66 ft (20 m) (Mumford 2007).

Eelgrass (*Zostera* spp.) creates high quality aquatic habitat and is most abundant in low-wave energy areas. It occurs in the lower intertidal and shallow subtidal photic zone, where organic matter and nutrients are abundant (Johnson and O'Neil 2001). Eelgrass is found in sediments ranging from mud to clean sand with its upper limit distribution within the intertidal zone and its lower limit distribution controlled by light limitation in the shallow subtidal zone. The depth of eelgrass presence is typically less than 32 ft (10 m) (Mumford 2007).

Eelgrass and macroalgae surveys were conducted along the south side of Ediz Hook in 1993, 2003, 2012, and 2015 (Shreffler 1993; MCS Environmental 2003; Grette Associates 2012; SEE LLC 2015) (Figure 4-1). The most recent survey conducted in July 2015 can be found in Appendix A.

Video and diver surveys were conducted along the south side of Ediz Hook within the Action Area in July 2015. The surveys documented eelgrass presence on the west side of the jetty/rock groin but occurring in relatively small and discontinuous patches. On the east side of the jetty is one dense, contiguous bed of eelgrass between approximately -1 ft and -20 ft MLLW. The shallowest eelgrass observed in this location was to -0.5 ft MLLW, and deeper than -20 ft MLLW where occasional solitary plants down to as deep as -30 ft MLLW were observed. Turion counts along the upper intertidal limit of the eelgrass beds were between 13 to 19 per 0.25 m^2 to the west of the jetty, and from 14 to

52 turions on the eastern side of the jetty. On the east side of the project area, eelgrass is between approximately -0.2 to as deep as -29 ft MLLW, but primarily between 0 and -20 ft MLLW. The total eelgrass within the surveyed transects of the jetty is 49,693 ft^2 (4,616 m^2) (SEE LLC 2015).

Eelgrass occurs in a continuous bed beginning at the east side of the jetty/rock groin and primarily occurs between 0 and -20 ft MLLW. Individual plants were observed in a video survey down to as deep as -35 ft MLLW, but were found at a lower limit of -20 ft MLLW during a diver survey. Turion counts along the upper intertidal limit of the eelgrass beds were 23-40 per 0.25 m^2. The average eelgrass density of the area was 18 turion counts per 0.25 m^2. The total eelgrass within the footprint of the project area is 98,873 ft^2 (9,185 m^2) (SEE LLC 2015).

Eelgrass occurs in a relatively narrow bed at the east end of Ediz Hook between approximately -1.5 to -19 ft MLLW but becoming limited to approximately -3 to -19 ft MLLW at the easternmost surveyed location where the shore becomes steep and dominated by large cobble. Turion counts averaged 30 per 0.25 m^2 quadrat. Total eelgrass at the eastern end of Ediz Hook is 47,909 ft^2 (4,450 m^2) (SEE LLC 2015).

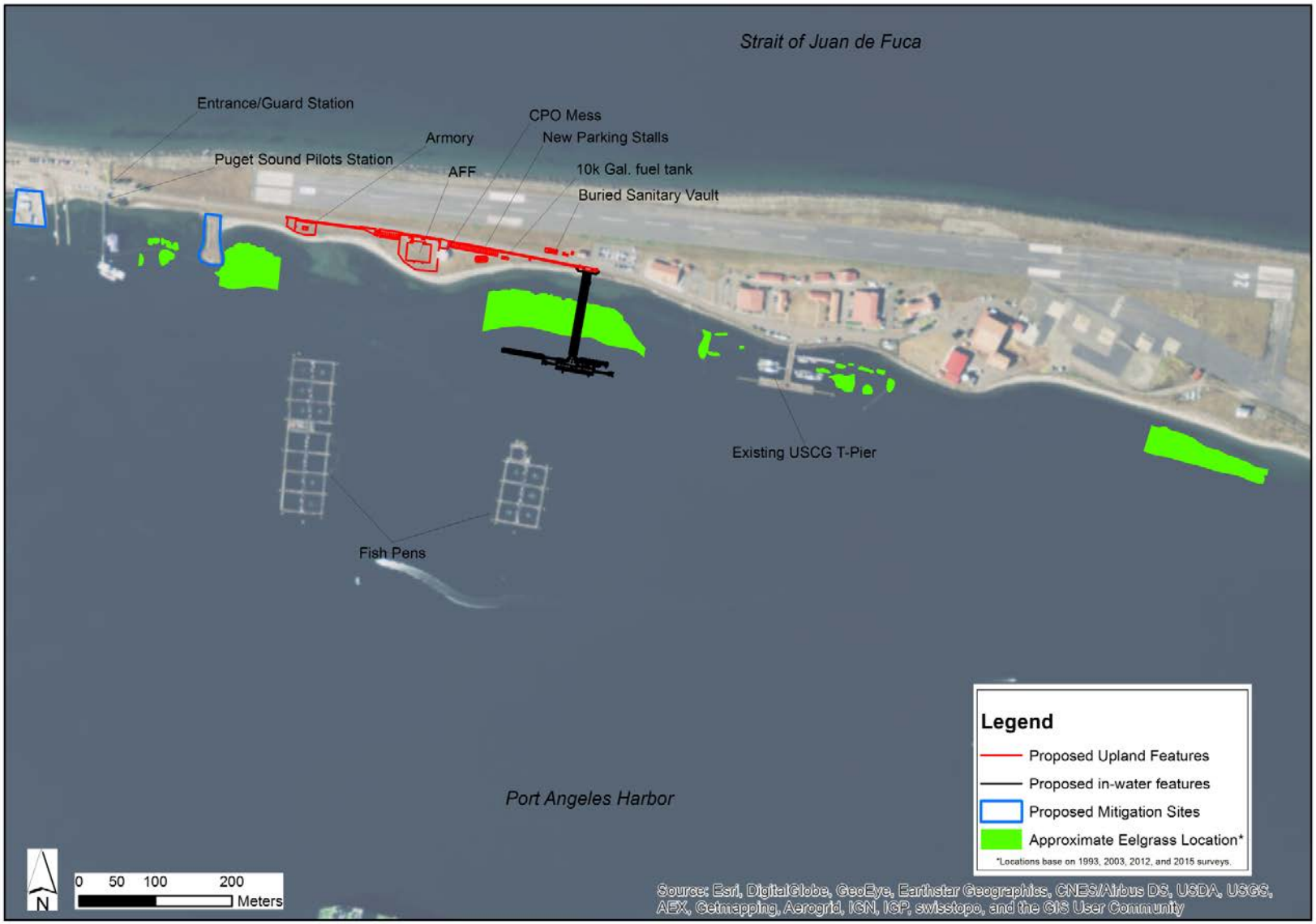

Figure 4-1. Eelgrass Locations within the Vicinity of the Project Area

(*Sources*: Shreffler 1993; MCS Environmental 2003; Grette Associates 2012; SEE LLC 2015)

Macroalgae coverage near the existing jetty and eastern end of Ediz Hook was 55% and 19%, respectively (Grette Associates 2012). Macroalgae was observed in a dense layer throughout both the east and west sides of the existing T-Pier. Algae recorded was predominantly sea lettuce (*Ulva lactuca*) and kelp (*Laminaria* spp.) accounting for 71% and 20%, respectively, of bottom algae covered. Some red algae (2%) was also present (MCS Environment 2003).

During the 2015 survey, macroalgae coverage within the area of the jetty and west primarily consisted of *Ulva, Laminaria*, and *Sarcodiotheca* spp. Macroalgae occurring east of the jetty and extending toward the T-pier consisted mainly of *Ulva* and *Laminaria* as well as *Sargassum* spp. At the eastern end of Ediz Hook, the main macrolgae species observed were *Laminaria, Nereocystis, Ulva*, and *Sarcodiotheca* spp (SEE 2015). A summary of macroalgae species observed within the project area is provided in Table 4-1.

Table 4-1. Summary of Macroalgae Species Observed within the Project Area

Common Name	Scientific Name
Bleachweed	*Prionitis lanceolata*
Brown algae	*Leathesia difformis*
Bull Kelp	*Nereocystis spp.*
Callophyllis	*Callophyllis* spp.
Coralline algae	*Corallinaceae* spp.
Gracilaria	*Gracilaria* spp.
Kelp	*Laminaria* spp.
Palmaria	*Palmaria spp.*
Plocamium	*Plocamium spp.*
Red Iridescent algae	*Iridea codata*
Sarcodiotheca	*Sarcodiotheca spp.*
Sargassum	*Sargassum spp.*
Seagrass laver	*Smithora naiadum*
Sea lettuce	*Ulva lactuca*
Seersucker kelp	*Costaria costata*
Splendid iridescent seaweed	*Mazzaella splendens*
Sugar kelp	*Saccharina latissima*

Source: Grette Associates 2012; SEE LLC 2015

4.1.7 Underwater Structures and Benthic Community

A manmade underwater rock structure was inadvertently formed during construction activities that occurred in the area years ago. It is located a distance of approximately 50 ft (15 m) immediately offshore from the tip of the jetty and approximately 1,600 ft (488 m) west of the project area. The structure is composed of three individual rock piles, two main north-south rock piles with an approximately 50-ft (15 m) gap between them, and an east-west pile to the north. The combined rock pile structure measures approximately 80 ft (24 m) wide and extends from -20 to -75 ft (-6 to – 22 m) MLLW within the Action Area. Rock habitats are generally categorized as nearshore or offshore in reference to the proximity of the habitat to the coastline. Rock habitat may be composed of bedrock, boulders, or smaller rocks, such as cobble and gravel and are among the most important

habitats for groundfish species. Rock habitats provide the appropriate substratum for colonization of diverse algal and invertebrates assemblages, creating a complex physical and biogenic habitat that provides important shelter and foraging opportunities for many species of groundfish (PFMC 2014a).

Bottom substrate in the project area is highly varied. Silty sand is predominant, and patches of sand, silt, clay, a sticky sand-clay mixture, shells, gravel, and wood debris are also found (MCS Environmental 2003; Berger Abam 2014). Pandalid shrimp (*Pandalus* spp.), Dungeness crab (*Cancer magister*), and hard shell clam (*Mercenaria mercenaria)* occur south of Ediz Hook, further into Port Angeles Harbor (WDFW 2015).

Surveys in 2003 recorded an abundance of Sitka periwinkle turban snail (*Littorina sitkana*) occurring on *Laminaria* and eelgrass at the existing USCG T-Pier site. Other species observed included leopard dorid nudibranch (*Diaulula sandiegensis*), Monterey sea lemon nudibranch (*Archidoris montereyensis*), slender tube worms (*Phyllochaetopterus prolifica*), slender kelp crab (*Pugettia gracilis*), helmet crab (*Telmessus cheiragonus*), plumrose anemone (*Metridium senile*), painted anemone (*Urticina crassicornis*), leafy hornmouth snail (*Ceratastoma foliatum*), and smooth pink scallop (*Chlamys rubida*) (MSC Environmental 2003).

Dive surveys in 2014 along Ediz Hook recorded the presence of crabs and starfish as well as an abundance of coral attached to existing piles (Berger Abam 2014). Additional surveys within the project area observed approximately 20 different species of invertebrates including red rock crab (*Cancer productus*), northern kelp crab (*Pugettia producta*), Dungeness crab, spiny pink sea star (*Pisaster brevispinus*), leather sea star (*Dermasterias imbricata*), sunflower sea star (*Pycnopodia helianthoides*); and various species of anemones, shrimp, and jellyfish (Reef.org 2015).

4.1.8 Forage Fish

Forage fish are an important and abundant group of species that occur in the marine waters of Washington. As the name implies, forage fish are important as prey for a large variety of other marine organisms, including birds, fish, marine mammals, and Pacific salmonids. The most common forage fish in Puget Sound include Pacific herring (*Clupea harengus pallasi*), surf smelt (*Hypomesus pretiosus*), and Pacific sand lance (*Ammodytes hexapterus*). All three forage fish species occur within the Action Area (Shaffer and Galuska 2009; Fresh 2015).

The majority of spawning by herring in Washington State waters occurs annually from late January through early April (Bargmann 1998). Herring deposit their transparent eggs on intertidal and shallow subtidal eelgrass and marine algae. Although no herring spawning locations have been documented in the Action Area (WDFW 2015b), juvenile herring have been caught during seining just off Ediz Hook (Shaffer and Galuska 2009).

Surf smelt are most abundant within the Action Area in late spring through summer. Surf smelt are believed to spawn throughout the year with the heaviest spawn occurring from mid-October through December. Although no surf smelt spawning locations have been documented in the Action Area (WDFW 2015b), adult, juvenile, and larval surf smelt may be present year round.

As with other forage fish, the Pacific sand lance is an important part of the trophic link between zooplankton and larger predators in local marine food webs. Sand lance spawning activity occurs annually from early November through mid-February. They deposit eggs on a range of nearshore substrates, from soft, pure, fine sand beaches to beaches armored with gravel (Bargmann 1998). Bargmann (1998) indicates that 35% of all juvenile salmon diets and 60% of the juvenile Chinook diet, in particular, are sand lance. Other regionally important species (such as Pacific cod, Pacific hake, and dogfish) feed heavily on juvenile and adult sand lance. The closest documented sand lance spawning area is a 1,000-ft (305-m) long area on the south side of Ediz Hook approximately 0.6 mile (1 km) west of the USCG AIRSTA/SFO Port Angeles (WDFW 2015b) (Figure 4-2). Adult, juvenile, and larval sand lance are expected to be present within the Action Area throughout the year.

Between 2006 and 2014, Fresh (2015) conducted monthly surveys from April to September within the nearshore of the project area and recorded a higher abundance of adult and juvenile life stage surf smelt and sand lance as compared to other marine species collected over the 8-year sampling period (Fresh 2015).

Figure 4-2. Sand Lance Spawning Area within the Action Area

(*Source* WDFW 2015b)

5 Effects of the Action

This section analyzes direct and indirect effects of the action on listed species, their habitats, and critical habitats. The analysis includes activities that are interrelated or interdependent with the action and considers the environmental baseline (50 CFR 402.2). To conduct the analysis, the Navy first identified individual program activities that may result in environmental stressors that have the potential to directly or indirectly affect ESA-listed species, their habitats, and designated critical habitats. For each listed species, the potential for an individual to be exposed to a stressor was evaluated in conjunction with the severity of the stressor and the status of existing baseline conditions. For designated critical habitat, the effect of the stressor to each PCE present in the Action Area was evaluated.

Because much of the discussion of each stressor is the same for each species or species group, a general discussion of effects to the environment for each stressor is presented below and then more detailed discussion follows within each species, species group, or designated critical habitat as appropriate. The effects of the action that are reasonably likely to affect listed species are temporary elevated sound levels, temporary impaired water quality from temporary increases in suspended sediment and turbidity levels, contaminants, impacts from lighting and overwater coverage, impacts to marine vegetation and benthos, and potential effects to forage fish species.

5.1 Direct Effects

Direct effects are defined as the direct or immediate effects of the project on the species or its habitat. In-water construction will impact marine habitats used by fish through water column effects (underwater noise, water quality effects, presence of physical barriers, and artificial lighting), and substrate effects (shading, physical disruption caused by pile-driving and anchoring), which will affect both unvegetated and vegetated substrates. The greatest impact during construction will occur during impact pile driving. Pile driving will exceed the NMFS and USFWS underwater noise threshold for fish injury and guideline for fish behavior, resulting in the greatest potential for adverse impacts to fish (see Section 5.1.1.1 and Table 5-1). Pile driving will require approximately 75 days to complete and will require two in-water work seasons. Impact hammers normally have a repetition rate of about 1 to 1.5 seconds per strike (Illingworth and Rodkin 2013). Based on these rates and a maximum of 7,000 impact strikes per day for 18-, 24-, 30-, and 36-inch diameter steel piles the estimated duration of impact pile driving will range from 60 to 90 minutes per pile and installing up to 8 piles per day.

The vast majority of pile driving will be completed using the much quieter vibratory pile driver as opposed to the impact pile driver. Underwater noise levels associated with vibratory pile drivers are less than impact drivers, and do not exceed the NMFS and USFWS injurious noise level threshold for fish (WSDOT 2015). Additional over-water work (attaching the pre-fabricated trestle to the fixed pier, installing floats, and floating mooring dock) will require approximately 15 months to complete. Positioning and anchoring the construction barges and pile driving units will increase turbidity within the project area, disturb benthic habitats and forage fish, and shade marine vegetation in the immediate project vicinity. Underwater noise impacts on juvenile salmonids from pile driving will be minimized by adhering to the in-water work period designated for Tidal

Reference Area 10 (July 16 through February 15) (USACE 2012), when juvenile salmonids and bull trout are least likely to be present.

5.1.1 Underwater Noise

Construction activity associated with the project will result in increased underwater noise levels. Noise will be generated from support vessels, small boat traffic, and barge-mounted equipment, such as generators, and pile installation. Noise levels from all activities except pile driving will typically not exceed underwater sound levels resulting from existing routine waterfront operations in Port Angeles Harbor. The most significant underwater noise potentially affecting listed species will be from impact pile driving 144 steel piles ranging from 18 to 36 inches in diameter. To reduce potential impacts to ESA-listed species, the piles will first be driven using a vibratory pile driver until either the pile hits refusal, necessitating an impact hammer to reach required depth, or depth is achieved with only impact proofing necessary to verify the structural capacity of the piles. Since vibratory pile drivers typically generate noise lower than impact pile driving and do not produce waveforms with sharp rise times like impact pile driving, impacts on fish are typically not observed in association with vibratory pile driving (WSDOT 2015). With the use of a vibratory driver as the primary means of installation, estimates of impact driving durations will range from several minutes to proof piles up to approximately 90 minutes per pile to fully drive a pile. In the unlikely event that difficult subsurface conditions are encountered (i.e., cobble/boulder zones) requiring increased need for using impact hammer pile driving methods, the maximum time for impact pile driving will not exceed 75 days, during which intermittent impact pile driving will occur over the 75-day duration.

The intensity of pile driving sound is greatly influenced by factors such as the type of piles, drivers, and the physical environment in which the activity takes place. The intensity of the sound (acoustic pressure wave) decreases as it propagates out from a source. This loss in acoustic intensity as the sound propagates is known as transmission loss. Transmission loss parameters vary with frequency, temperature, sea conditions, current, source and receiver depth, water depth, water chemistry, and bottom composition and topography.

Three metrics are commonly used to evaluate underwater sound (Caltrans 2009):

- Peak Sound Pressure level (SPL Peak) – Peak sound pressure level based on the largest absolute value of the instantaneous sound pressure over the frequency range from 20 to 20,000 Hz.[4]
- Root Mean Square (RMS) – RMS level is the square root of the energy divided by a defined time period.
- Sound Exposure Level (SEL) – Constant level over 1 second that has the same amount of acoustic energy, as indicated by the square of the sound pressure, as the original sound.

[4] Peak and RMS values for underwater sound are referenced to 1 microPascal (1 μPa) throughout this document. SEL is referenced to 1 $\mu Pa^2 \cdot sec$.

5.1.1.1 Potential Effects of Pile Driving Noise Exposure to Fish

Thresholds for Analysis of Hydroacoustic Effects to Fish from Pile Driving

The USFWS and NMFS have adopted thresholds or guidance for evaluating the effects of sound exposure on fish exposed to underwater sound levels. Table 5-1 lists the current injury thresholds and behavioral guidance currently used by NMFS and USFWS for fish.(5) The criteria use a duel threshold for injury using both peak SPLs and cumulative SEL. The underwater noise threshold criterion for fish injury from a single impact hammer pile strike is at an SPL of 206 dB PEAK (Fisheries Hydroacoustic Working Group [FHWG 2008]). Cumulative SEL is a measure of the risk of injury from exposure to multiple pile strikes. The number of pile strikes is estimated per continuous work period which is considered 1 day. The cumulative SEL criterion for injury to fish is 187 dB SEL for fish greater than or equal to 2 grams in weight, and 183 dB SEL for fish less than 2 grams in weight (FHWG 2008). As reference points of total fish length at 2 grams weight in Puget Sound, including some variability due to fish health and food availability, juvenile chum salmon are approximately 2.7-2.8 inches (68-70 mm) (Tynan 2013, personal communication) and juvenile English sole are 2.4-2.8 inches (60-70 mm) (Hunt 2005).

Table 5-1. Pile Driving Noise Injury Thresholds and Behavioral Guideline for Fish

Fish Size	Impact Pile Driving		Vibratory Pile Driving	
	Injury Threshold	Behavioral Guideline	Injury Threshold	Behavioral Guideline
≥ 2 grams	187 dB cumulative SEL	150 dB RMS	n/a	150 dB RMS
< 2 grams	183 dB cumulative SEL			
All sizes	206 dB PEAK			

Source: FHWG 2008.

The method used to calculate distances to the cumulative SEL thresholds involves limiting the maximum affected distance to a point ("effective quiet") at which the acoustic energy from a single strike attenuates to 150 dB SEL (WSDOT 2015). No physical injury is expected beyond this distance.

In addition to the injury thresholds, Hastings (2002) recommended an underwater noise guideline for behavioral impacts on fish, including startle response, at a level of 150 dB RMS. The effect of behavior alterations, whether or not an alteration results in injury, is dependent on project specific factors. Project specific factors could be a behavioral change that results in a migration delay or disturbance to juvenile rearing. This behavioral guideline applies to both impact hammer and vibratory pile driving.

(5) The Fisheries Hydroacoustic Working Group (FHWG) is a multi-agency group that includes members from Caltrans, Oregon Department of Transportation, WSDOT, Federal Highway Administration, NMFS, USFWS, California Department of Fish and Game, and USACE. This technical working group is responsible for generating underwater noise effects criteria for fish exposed to pile driving activities.

Estimation of Extent of Elevated Underwater Noise Levels Above Thresholds

To determine how far project noise will exceed these thresholds, noise levels anticipated from installation of 24- and 30-inch diameter steel piles were estimated. The Practical Spreading Loss model was used to calculate the expected noise propagation from both impact and vibratory pile driving using representative sound levels for installing 24- and 30-inch diameter steel piles estimated from past acoustic studies as these source levels were higher than that of 18- and 36-inch diameter piles (Navy 2014). Because a bubble curtain or other attenuation device will be used to minimize the level of underwater noise generated into the water column by driving steel pipe piles, an expected attenuation of 8 dB was first subtracted from the source levels (Navy 2014). To calculate cumulative SEL, the number of pile strikes were estimated from past project information and engineering staff (Table 5-2). Approximately 200 strikes for each pile proofed and up to 7,000 strikes for a pile fully impact driven were estimated. Because piles are not anticipated to be impact driven other than the last few feet, the number of strikes per day used in the analysis was 7,000 to be conservative.

Table 5-2. Representative Underwater Source Levels for 24- and 30-inch Diameter Steel Pipe Piles

Pile Driving Method	Pile Size	Average RMS dB re 1 µPa	Average Peak dB re 1 µPa	Average SEL
Impact	24 inches	185	202	173
	30 inches	187	208	178
Vibratory	24 inches	162	NA	NA
	30 inches	167	NA	NA

Source: Navy 2014
Notes: Sound pressure levels include a reduction of 8 dB with use of a bubble curtain during impact pile driving. SPLs were measured at 10 m.

Calculated distances using the Practical Spreading Loss Model to fish noise thresholds and adjusted maximum areas are provided in Table 5-3. The areas only include the area encompassed to the extent of the shoreline. The area above the threshold values decreases the closer to shore pile driving occurs and where shallow water and land block noise transmission. Figure 5-1 and Figure 5-2 illustrate the calculated extent and area of noise propagation that exceeds the thresholds or behavioral guidance.

Table 5-3. Maximum Range to Fish Sound Criteria Thresholds from Pile Driving

Method and Pile Size	Criteria Threshold (distance/area)			
	206 dB PEAK (injury)	187 dB Cumulative SEL for fish >2 g (injury)	183 dB Cumulative SEL for fish <2 g (injury)	150 dB RMS (behavioral)
Impact Pile Driving				
24 inches	5 m/<0.01 km^2	341 m/0.2 km^2	341 m/0.3 km^2	2.5 km/9.8 km^2
30 inches	14 m/<0.01 km^2)	736 m/1.0 km^2	736 m/1.0 km^2	2.9 km/11.8 km^2
Vibratory Pile Driving				
24 inches	NA	NA	NA	63 m/0.01 km^2
30 inches	NA	NA	NA	136 m/0.06 km^2

Notes: NA = not applicable. Practical spreading loss model (15 log R, or 4.5 dB per doubling of distance) used for calculations. Assumes 8 dB attenuation with use of a bubble curtain. Cumulative SEL calculated as Single Strike SEL + 10 * log (# of pile strikes), assumes 8 piles installed/day at 7,000 pile strikes/day.

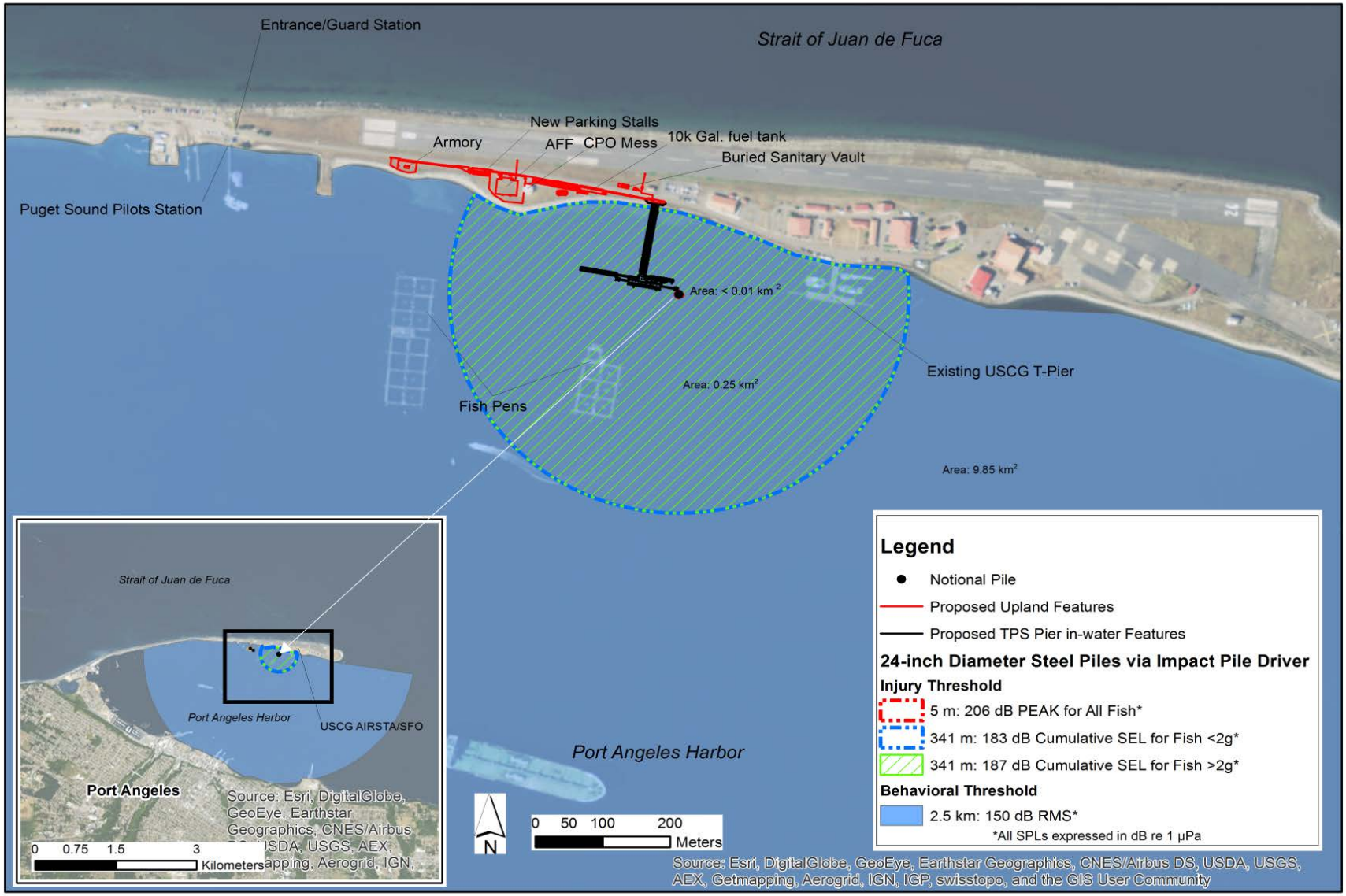

Figure 5-1. Representative View of Affected Areas for Fish Due to Underwater Noise from Impact and Vibratory Pile Driving 24-inch Diameter Steel Piles

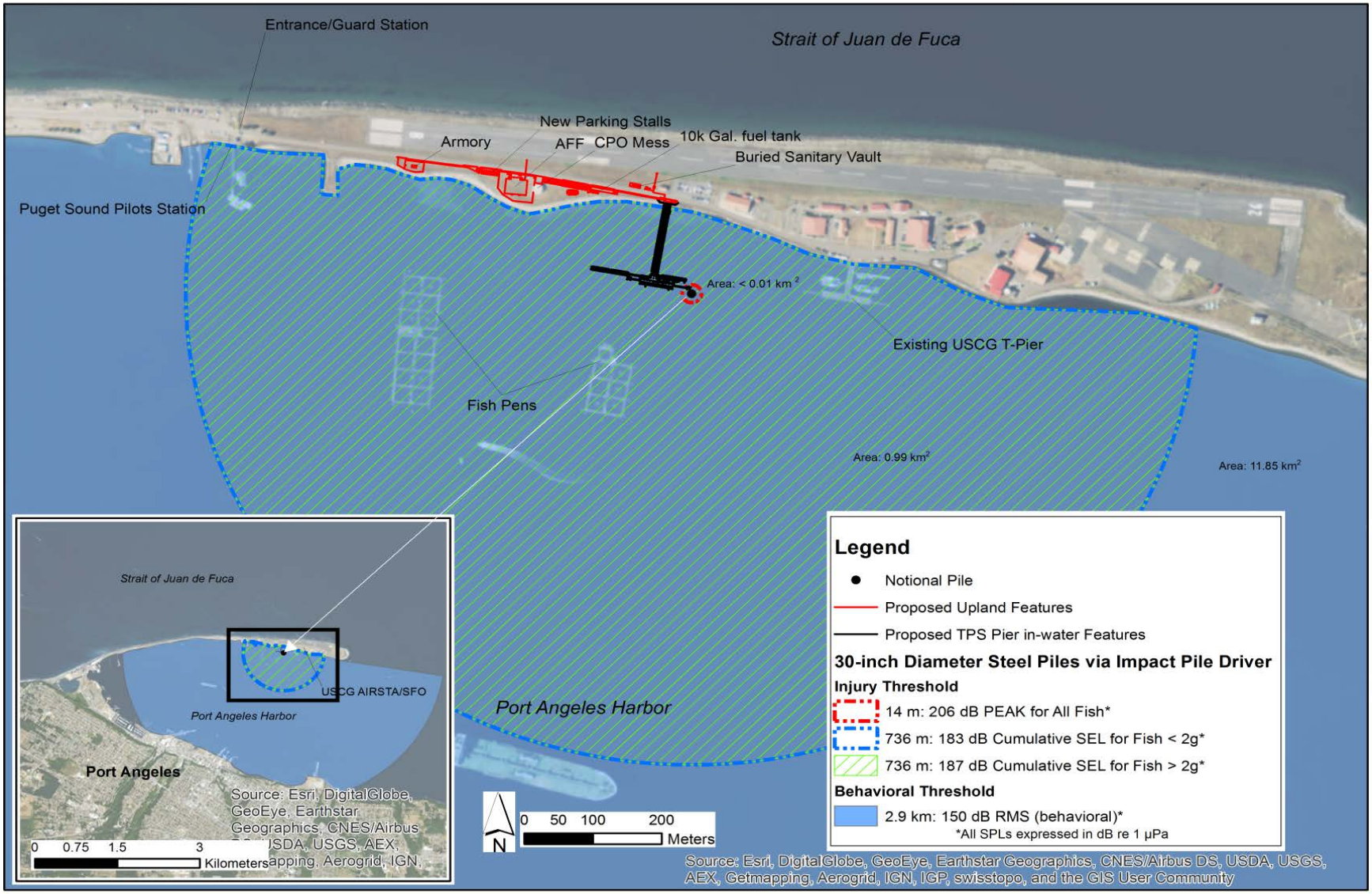

Figure 5-2. Representative View of Affected Areas for Fish Due to Underwater Noise from Impact and Vibratory Pile Driving 30-inch Diameter Steel Piles

5.1.1.2 Potential Effects Exceeding the Injury Threshold and Behavioral Guidance

The degree to which an individual fish exposed to underwater sound will be affected depends on a number of variables, including species, size, and physical condition of the fish; presence of a swim bladder; maximum sustained sound pressure and frequency; shape of the sound wave (rise time); depth of the water; depth of the fish in the water column; amount of air in the water; size and number of waves on the water surface; bottom substrate composition and texture; effectiveness of bubble curtain sound/pressure attenuation technology (if used); currents; and presence of predators. Depending on these factors, effects on fish can range from changes in behavior to immediate mortality. Fish injury and mortality from impact pile driving steel piles has been documented (Caltrans 2009). Therefore, the discussion below on the physiological responses of fish is focused on impact driving of steel piles.

Physiological Responses

All fish fall into two hearing categories: "hearing generalists" such as salmon and trout and "hearing specialists" such as herring and eulachon (Hastings and Popper 2005). The majority of fish on the Pacific coast are hearing generalists and do not have specialized hearing capabilities apart from their swim bladder, inner ear, and lateral line. They sense sound directly through the inner ear, and some use the inner ear coupled with the swim bladder to sense additional energy. Hearing specialists (i.e., eulachon) have particular adaptations that enhance their hearing bandwidth and sensitivity versus hearing generalists (Hastings and Popper 2005). The hearing category for sturgeon is still undetermined. Popper (2005) found that sturgeon can detect an extremely wide range of sounds, and several studies have found that some sturgeon produce sounds that may be used to facilitate breeding. Further studies are necessary to determine how sturgeon vocalize, what sound levels are produced in the natural environment, and how their vocalizations are used in their behavior.

The effects to fish at different intensities of underwater sound are unclear. Many of the previous studies cited for the physical effects, including injury and mortality, of underwater sound on fish were based on seismic air gun and underwater explosives studies. These physical effects can include swim bladder, otolith, and other organ damage; hearing loss; and mortality (Hastings and Popper 2005).

Fish with swim bladders, including salmonids and larval rockfish, are more susceptible to barotraumas from impulsive sounds (sounds of very short duration with a rapid rise in pressure like steel impact pile driving) because of swim bladder resonance (vibration at a frequency determined by the physical parameters of the vibrating object). When a sound pressure wave strikes a gas-filled space, such as the swim bladder, it causes that space to vibrate (expand and contract) at its resonant frequency. When the amplitude of this vibration is sufficiently high, the pulsing swim bladder can press against, and strain, adjacent organs, such as the liver and kidney. This pneumatic compression causes demonstrable injury, in the form of ruptured capillaries, internal bleeding, and maceration of highly vascular organs (Caltrans 2009).

Hastings and Popper (2005) also noted that sound waves can cause different types of tissue to vibrate at different frequencies, and that this differential vibration can cause

tearing of mesenteries and other sensitive connective tissues. Exposure to high noise levels can also lead to injury through "rectified diffusion," the formation and growth of bubbles in tissues. These bubbles can cause inflammation, cellular damage, and blockage or rupture of capillaries, arteries, and veins (Crum and Mao 1996; Vlahakis and Hubmayr 2000; Stroetz et al. 2001). These effects can lead to overt injury or even mortality. Death from barotrauma and rectified diffusion injuries can be instantaneous, or delayed for minutes, hours or even days after exposure.

Even in the absence of mortality, elevated noise levels can cause sublethal injuries affecting survival, and fitness. Fish suffering damage to hearing organs may suffer equilibrium problems, and may have a reduced ability to detect predators and prey (Turnpenny et al. 1994; Hastings et al. 1996). Other types of sublethal injuries can place the fish at increased risk of predation and disease.

Adverse effects on survival and fitness can occur even in the absence of overt injury. Exposure to elevated noise levels can cause a temporary shift in hearing sensitivity (referred to as a temporary threshold shift, or TTS), decreasing sensory capability for periods lasting from hours to days (Turnpenny et al. 1994; Hastings et al. 1996). The severity of effects from high noise levels produced by impact pile driving of steel piles depends on several factors, including the size and species of fish exposed. Regardless of species, smaller fish appear to be more sensitive to injury of non-auditory tissues (Yelverton et al. 1975). Approximately 100 surf perch from three different species (*Cymatogaster aggregata, Brachyistius frenatus,* and *Embiotoca lateralis*) were killed during impact pile driving of 30-inch diameter steel pilings at Bremerton, Washington, (Stadler 2002). Dissections revealed complete swim bladder destruction across all species in the smallest fish (80 mm fork length), while swim bladders in the largest fish (170 mm fork length) were nearly intact. However, swim bladder damage was typically more extensive in *C. aggregata* when compared to *B. frenatus* of similar size.

To better understand the effects of impulsive sounds from impact pile driving, Halvorsen et al. (2011, 2012) conducted a controlled study with juvenile Chinook (mean standard length 103 mm, mean weight 11.8 grams). Based on the results of the study, the authors conclude that the onset of injury to Chinook salmon occurred at a minimum cumulative SEL of 210 dB. However, due to a number of concerns with the study and to be protective of ESA-listed fish species, the FHWG has not adopted the higher threshold (Caltrans 2009).

Because of their large size, adult salmon can tolerate higher noise levels and are generally less sensitive to injury of non-auditory tissues than juveniles (Hubbs and Rechnitzer 1952). However, no information is available to determine whether or not the risk of auditory tissue damage decreases with increasing size of the fish.

Behavioral Responses

Field investigations of the behavior of Puget Sound juvenile salmon, when present near pile driving projects, found little evidence that normally nearshore migrating juvenile salmonids moved further offshore to avoid the general project area (Feist 1991; Feist et al. 1992). In fact, some studies indicate that construction site behavioral responses, including site avoidance, may be as strongly tied to visual stimuli as underwater sound (Feist 1991; Feist et al. 1992; Ruggerone et al. 2008). However, the level of sound to

which fish are exposed is not controlled in field studies (Caltrans 2009), and Halvorsen et al. (2012) noted that caged field studies (Abbot et al. 2005; Ruggerone et al. 2008; Caltrans 2010) lacked appropriate biological control groups because the experimental fishes may not have been neutrally buoyant resulting in a lower risk of injury because there swim bladder may have been deflated.

Fish in the area where the behavioral disturbance guidance is exceeded may display a startle response during initial stages of pile driving and could avoid the immediate project vicinity during construction activities, including pile driving. Similarly, if injury does not occur, noise may modify fish behavior that may make them more susceptible to predation. Although pile driving will adhere to the July16 through February 15 period for in-water work to minimize underwater noise impacts on juvenile salmon, juvenile chinook and chum have been documented within the area during a portion of this window (see sections 3.1.1 and 3.1.2). Further, adult PS Chinook ESU, HC chum ESU, PS steelhead DPS, and CPS bull trout DPS will be expected to occur in the area above the behavioral thresholds during periods of pile driving activity. The southern green sturgeon DPS and southern eulachon DPS may pass by the Action Area along the Strait of Juan de Fuca. These species are the least likely of the ESA-listed fish to be present during pile driving or in the area at all, as there are no reported sightings of them within the Port Angeles Harbor.

To minimize underwater noise impacts during pile driving, a majority of pile driving activity will be conducted using a vibratory pile driver with only impact pile driving to proof piles. Although behavioral effects could occur from vibratory pile driving, no injury threshold has been identified for this type of pile driving due to its lower amplitude and non-impulsive waveform (FHWG 2008). All pile driving will require a maximum of 75 days to complete during two in-water work seasons, with an estimated duration of impact pile driving ranging from 60 to 90 minutes per pile or a maximum of 4 hours per day for up to 75 days. In addition, a nightly reprisal from pile driving is expected to give fish an opportunity to pass through the Action Area without being subject to noise. Because of the limited duration and the intermittent nature of pile driving work, noise above the behavioral guidance is not anticipated to result in reduced predatory avoidance or susceptibility to predation for any ESA-listed fish.

5.1.1.3 Summary of Effects by Species or Species Group

All Fish Species

All steel piles will be installed initially using a vibratory hammer followed by impact pile driving (to required depth and/or proofing). Impact pile driving will be preempted with start-up of a bubble curtain. Therefore, fish are likely to leave the area next to the pile where injurious levels of sound will occur before impact pile driving commences and exposure to injurious levels above the 206 dB PEAK threshold (estimated to extend up to 46 ft [14 m]) are likely avoided. All in-water construction activities will be conducted during the in-water work window when the majority of juvenile salmon are least likely to be present (July 16 through February15). As previously stated, juvenile Chinook and chum have been documented in the Action Area during the spring and summer; therefore juvenile salmon could still potentially be exposed to the effects of underwater sound despite adherence to the work windows. Resident and returning Chinook, returning

summer-run chum, and steelhead that occur within the harbor could be present during the period of in-water construction and will be exposed to elevated underwater sound levels during pile driving. These fish will not be protected by the work windows, although the majority exposed will be larger in size, will not be nearshore dependent, and are not anticipated to remain in the work area for any extended period of time. However, these fish may still be exposed, temporarily, to injurious levels of underwater sound from impact pile driving as the injurious threshold zone extends out into deeper water. As noted above, upon encountering non-injurious levels of elevated underwater sound, these fish could display either a startle response or behavioral disturbance.

Forage fish, the prey species of listed salmonids, could occur within the behavioral or injury zones during pile driving. Effects from in-water noise will most likely occur to sand lance for which the peak spawning periods (November to mid-February) will coincide with the in-water construction period. Minimization measures listed in Section 2.4 will limit exposure of forage fish species to temporary construction impacts. Exposure to noise levels above the injury threshold will be limited to impact pile driving and/or proofing 144 piles with a maximum 4 hours per day over a maximum of 75 days. During this time, a reduction in forage fish may occur either through injury/mortality or avoidance of the area during pile driving. This could affect adult salmonids that may be foraging at the time. Therefore, a temporary reduction in forage fish could occur within the project area during impact pile driving. However, due to the temporary and localized effects and minimization measures used during impact driving, reductions to the overall population of forage fish are not expected and effects to salmon would be immeasurable.

PS Chinook ESU and Critical Habitat, HC Chum ESU, and PS Steelhead DPS

Pile installation will be conducted during the in-water work window when juvenile salmon are least likely to be present; so exposure of juvenile PS Chinook ESU, HC chum ESU, and PS steelhead DPS to all in-water work is minimized. Some larger juveniles, adult PS Chinook, HC chum, and PS steelhead could potentially be present when pile driving will occur. As described above for all fish species, these larger juvenile salmon and adult salmon and steelhead may still be exposed to injurious levels during pile driving as the zone extends out into deeper water where they may occur. Therefore, impacts from exposure to injurious noise levels may result during the 75 days of pile driving .

The nearshore marine area PCE and Offshore marine area PCE for PS Chinook ESU critical habitat occur within the Action Area. Small numbers of nearshore-dependent juvenile chinook may be present during pile driving and would be exposed to injurious sound levels and impacting the nearshore PCE. The injurious noise level threshold will also extend over deeper water and affecting the offshore PCE. Adult and larger (less nearshore dependent) PS Chinook will be exposed if present in the harbor during pile driving. As previously stated, pile driving is anticipated to occur a maximum of 75 days.

Southern Green Sturgeon DPS and Critical Habitat and Southern Eulachon DPS

Currently, underwater noise impact thresholds do not differentiate between fish species (FHWG 2008). Although green sturgeon and eulachon differ from salmonids in their life histories, all three species groups have internal air bladders to maintain buoyancy. This is important since the bladder is susceptible to rapid expansion/decompression when a peak

pressure wave from an underwater noise source is encountered. At a high enough level this exposure is fatal for all three species groups. Therefore, it is likely that noise effects on green sturgeon and eulachon will be similar to noise effects on salmon.

The southern green sturgeon and southern eulachon DPSs occurring within 1.8 miles (2.9 km) of an impact driven pile will be exposed to underwater noise levels above the behavioral disturbance guidance. Adult and subadult green sturgeon may come in to the Port Angeles Harbor during fall migrations out to the Strait of Juan de Fuca waters but are not likely to come close enough to impact pile driving activity where exposure to injurious levels could occur. Eulachon are also not expected to come within the injury zone as they are more likely to be found offshore within the Strait of Juan de Fuca either as larvae, juveniles, or adults or within the Elwha River Estuary which is outside and west of the Action Area. Therefore, exposure to behavioral and injurious noise levels will be discountable.

The coastal marine water quality and food resources PCEs for southern green sturgeon DPS critical habitat occur within the Action Area. Increased noise will temporarily degrade water quality but injurious and behavioral noise thresholds will not extend into the Strait of Juan de Fuca where green sturgeon are expected. Further, green sturgeon are not expected to come within the project area to forage and thus no impacts to their food resource PCE will occur. Therefore, impacts to the coastal marine water quality and food resources PCEs will be discountable.

SRKW DPS and Critical Habitat

SRKW DPS will be exposed to injurious effects from impact pile driving if they were to occur within 72 ft (22 m) of a 24-inch diameter pile or 95 ft (29 m) of a 30-inch pile installed using an impact pile driver (Table 5-4, Figure 5-3, and Figure 5-4). In general, SRKW are unlikely to be injured by pile driving noise at these short distances because the high level of human activity, noise from industrial areas, and large tanker ships as well as general vessel traffic will cause them to avoid the immediate construction area. Cetaceans in general are unlikely to swim this close to manmade structures during construction.

Table 5-4. Calculated Distances to Underwater Marine Mammal Noise Thresholds during Pile Driving

Method	Pile Size	Injury – Cetaceans: 180 dB RMS (distance/area)	Behavioral Disturbance (Impact) – 160 dB RMS (distance/area)	Behavioral Disturbance (Vibratory) – 120 dB RMS (distance/area)
Impact	24 inches	22 m/<0.01 km^2	464 m/ 0.4 km^2	NA
	30 inches	29 m/<0.01 km^2	631 m/ 0.7 km^2	NA
Vibratory	24 inches	NA	NA	6.3 km/29.9 km^2
	30 inches	NA	NA	13.6 km/29.9 km^2

Notes: NA = Not Applicable. Assumes 8 dB attenuation. Practical spreading loss model (15 log R, or 4.5 dB per doubling of distance) used for calculations. Area for the 120 dB RMS threshold is the same for 24- and 30-inch due to noise intersecting landmasses rather than extending out to the full distance.

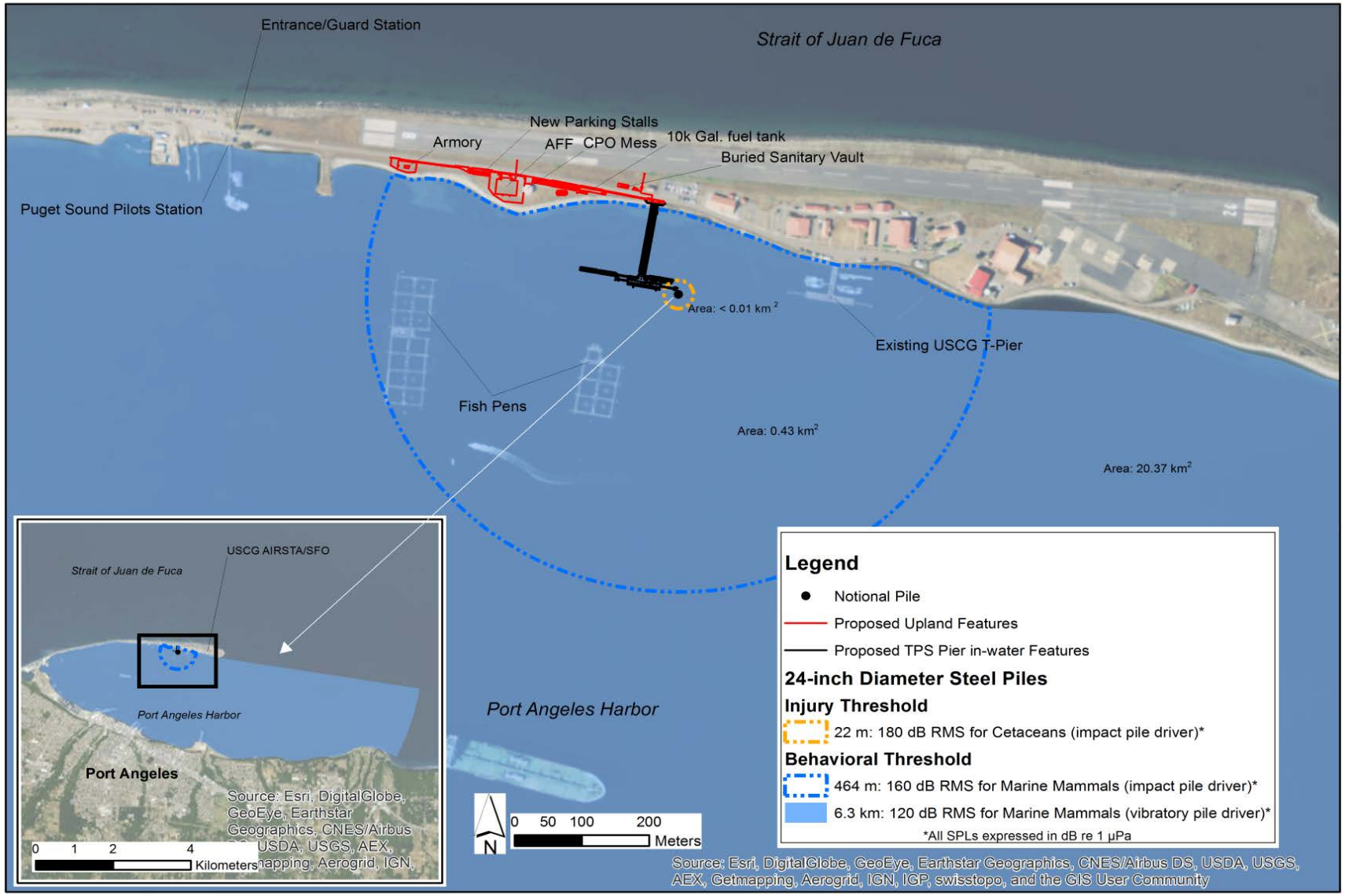

Figure 5-3. Representative View of Affected Areas for Marine Mammals Due to Underwater Noise from Impact and Vibratory Pile Driving 24-inch Diameter Steel Piles

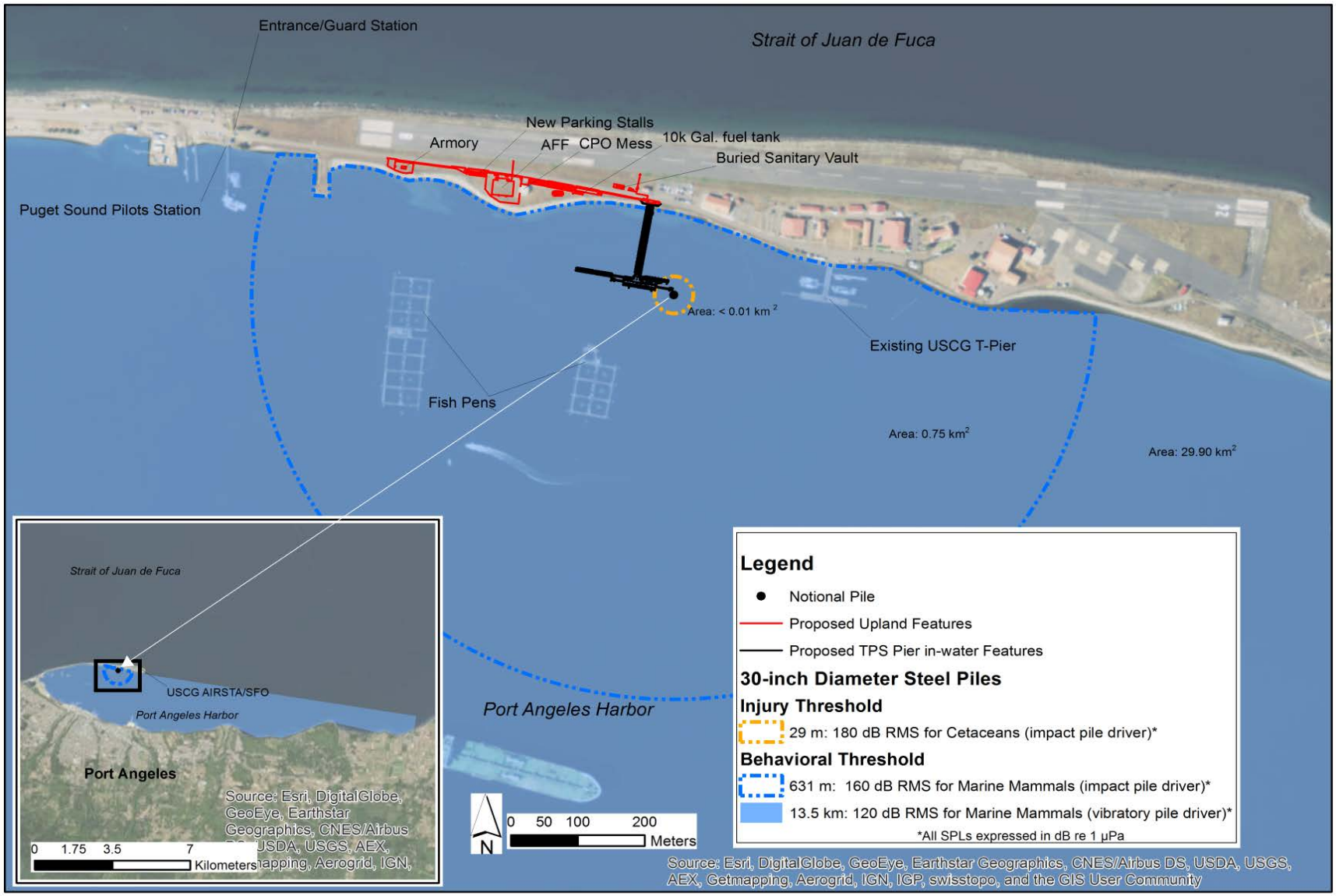

Figure 5-4. Representative View of Affected Areas for Marine Mammals Due to Underwater Noise from Impact and Vibratory Pile Driving 30-inch Diameter Steel Piles

NMFS has identified different thresholds for behavioral disturbance for vibratory pile driving versus impact pile driving. For cetaceans, the behavioral disturbance threshold for impact pile driving is 160 dB RMS and the threshold for vibratory pile driving (continuous noise) is 120 dB RMS. Because the 120 dB RMS threshold is lower and includes a geographical area of 29.9 km^2, SRKW could come within this behavioral disturbance zone (Figures 5-3 and 5-4). However, as noise from the vibratory pile driver attenuates through this range, an individual SRKW may encounter ambient conditions above 120 dB RMS from other noise sources or environmental conditions, such as wave action. Therefore, this extent of vibratory noise is a conservative estimate and it is not anticipated to be audible throughout the extent of this range.

Pile driving noise is not expected to result in injury of SRKW DPS because they are unlikely to be present in the small affected areas, and because monitoring and shutdown zones will be implemented. Further, there are no reported sightings of SRKW in Port Angeles Harbor. SRKW are commonly observed in the Strait of Juan de Fuca, passing north of Ediz Hook during the summer months of June through September and less commonly sighted during the winter months (The Whale Museum 2015). With implementation of monitoring and shutdown protocols in place, impacts to SRKW from pile driving noise will be discountable.

Water quality, prey species, and passage conditions PCEs for SRKW critical habitat occur within the Action Area. The water quality PCE will be temporarily degraded by noise, however, SRKW are not expected to occur in the harbor where the water quality PCE will encompass the injurious noise zone. Noise from impact pile driving will potentially expose prey species (individual chinook and chum) to injurious noise levels. However, impacts would occur over 75 impact pile driving days and include minimization measures to reduce impacts. Therefore the project is not expected to measurably reduce salmon populations and overall prey availability to SRKW. Salmon prey may avoid the area temporarily due to increased noise during pile driving, however SRKW are not expected to occur in the Action Area and would not be affected by the resulting localized reduction of prey. Therefore, effects to the prey PCE would be immeasurable. Behavioral disturbance zones will extend east to the furthest extent of the harbor bordering the Strait of Juan de Fuca where SRKW passage conditions PCE occurs. With implementation of monitoring and shutdown zones in place, impacts to the passage conditions PCE will be discountable.

Humpback Whale

As described above for SRKW DPS, humpbacks will also potentially be exposed to injurious effects if they were to come within 95 ft (29 m) of impact pile driving (Table 5-4; Figures 5-3 and 5-4). There are no recorded sightings of humpbacks within Port Angeles Harbor. The nearest sightings to the Action Area have been within the deep waters of the Strait of Juan de Fuca, with infrequent sightings occurring between the months of August and March. In-water work will occur during the in-water work window from mid-July through mid-February and will correspond to a time in which occurrence of humpbacks in the Strait of Juan de Fuca (outside the Action Area) are less common.

The behavioral disturbance zone of 120 dB for vibratory pile driving encompasses a larger area (29.9 km^2) and will be monitored during pile driving. Pile driving activity will cease to prevent takes should a humpback be observed entering the behavioral disturbance zone. Therefore, impacts to humpback whales from pile driving noise will be discountable.

CPS Bull Trout DPS and Critical Habitat

Pile installation will be conducted during the in-water work window when CPS bull trout DPS are least likely to be present as their prey (juvenile salmonids) would be least likely to occur in the Action Area during the in-water work window. However, adult bull trout that may occur in deeper water of the harbor during pile driving may be temporarily exposed to injurious noise levels.

Migration habitats and abundant food base PCEs for CPS bull trout DPS critical habitat occur within the Action Area. The injurious noise threshold zone will extend over the migration habitats PCE. Impacts will be minimized by not exceeding 75 days of impact pile driving. Impacts to bull trout prey from pile driving will cause a localized reduction, affecting the abundant food base PCE during pile driving.

Marbled Murrelet

Little is known about the general airborne hearing or underwater hearing capabilities of birds. What has been determined is that there are three classes of potential effects identified for birds from noise (e.g., traffic or construction). These are: (1) physiological and behavioral effects; (2) damage to hearing from acoustic over-exposure; and (3) masking of important bioacoustic and communication signals (Dooling and Popper 2007). Studies have not been specific to seabirds or shorebirds, and these studies reflect research done on other avian species (i.e., owls and songbirds) until recent guidance provided by the Marbled Murrelet Science Panel became available (SAIC 2011, 2012).

Like the fish injury thresholds, underwater onset of injury thresholds for marbled murrelets only apply to impact pile driving, and the distance to the injury criterion is dependent upon the number of strikes of the impact hammer that are carried out within a 24-hour period. The USFWS uses thresholds for two general forms of injury: (1) auditory injury (generally damage to sensory hair cells of the ear) beginning at 202 dB SEL cumulative, and (2) non-auditory injury (trauma to non-auditory body tissues/organs) 208 dB SEL cumulative (SAIC 2011, 2012). The onset of auditory injury is defined as the loss of hair cells due to impulsive acoustic overexposure. Injuries associated with non-auditory injury (barotrauma) could include bruising, hemorrhaging, rupture of internal organs, and/or death. Since the underwater criterion for auditory injury was the lower of the two thresholds, this is the criterion used for assessing injurious impacts to the marbled murrelet in this analysis.

Based on the above, the auditory injury threshold (cumulative SEL = 202 dB) is estimated to extend a maximum of 92 m during pile driving of a 30-inch diameter pile (Table 5-5; Figure 5-5 and 5-6). Therefore, marbled murrelets could be exposed to injurious noise levels if they were at or within 92 m of a pile during impact pile driving after all strikes were completed. Because the cumulative SEL formula takes into account all impact pile strikes within a 24-hour period, the 92 m area is the size of the injury zone

as it has increased to its maximum extent through the course of the pile driving day. As a result, during the early portion of the construction day, the injury zone would be smaller and would only gradually increase out to a distance of 92 m after all strikes have been completed.

Table 5-5. Maximum Range to Marbled Murrelet Underwater Injury and Airborne Masking Sound Threshold During Impact Pile Driving

Steel Pile Size	Underwater Injury Threshold: 202 dB SEL (distance/area)	Airborne (Masking) (distance/area)
24 inches	43 m/<0.01 km^2	42 m (<0.01 km^2)
30 inches	92 m/0.03 km^2	42 m (<0.01km^2)
36 inches	68 m/0.01 km^2	168 m (0.09 km^2)

Notes: Assume 8 dB attenuation. Practical spreading loss model (15 log R, or 4.5 dB per doubling of distanced) used for calculations. Cumulative SEL calculated as Single Strike SEL + 10 * log (# of pile strikes) and assumes 7,000 pile strikes/day.

In addition, airborne pile driving noise could mask communications between foraging pairs of marbled murrelets, potentially affecting their foraging behavior and reducing their foraging efficiency (SAIC 2012). This could result in reduced feeding success, increased expenditure of energy, and potential delays in feeding of young during nesting season. The USFWS has guidance for marbled murrelet communication masking as a result of impact pile driving (USFWS 2014b). The distance to the marbled murrelet airborne masking threshold is set at a radius of 42 m from an impact driven pile less than 36-inches in diameter. For piles 36-inches in diameter or larger, the masking threshold will be 168 m from the pile.

All other construction noise associated with the project is anticipated to be at the level of existing USCG AIRSTA/SFO Port Angeles operations and not expected to result in masking. Figures 5-5 and 5-6 show the distance graphically depicted on the landscape. In addition, USCG and recreational boat traffic transit the area routinely, and this baseline level of activity would not change significantly.

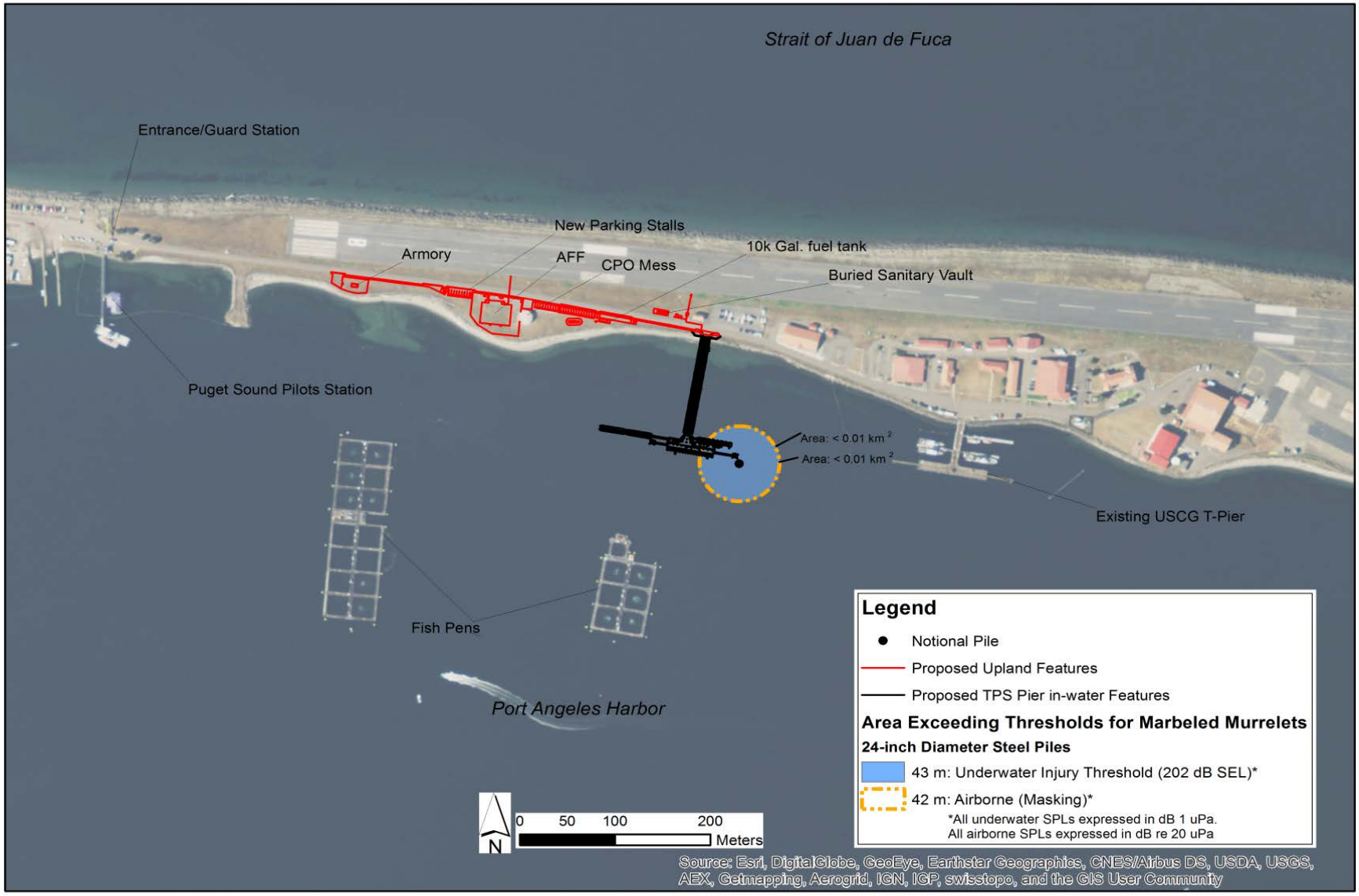

Figure 5-5. Representative View of Affected Areas for Marbled Murrelet from Underwater and Airborne (Masking) Noise Due to Impact Pile Driving 24-inch Diameter Steel Piles

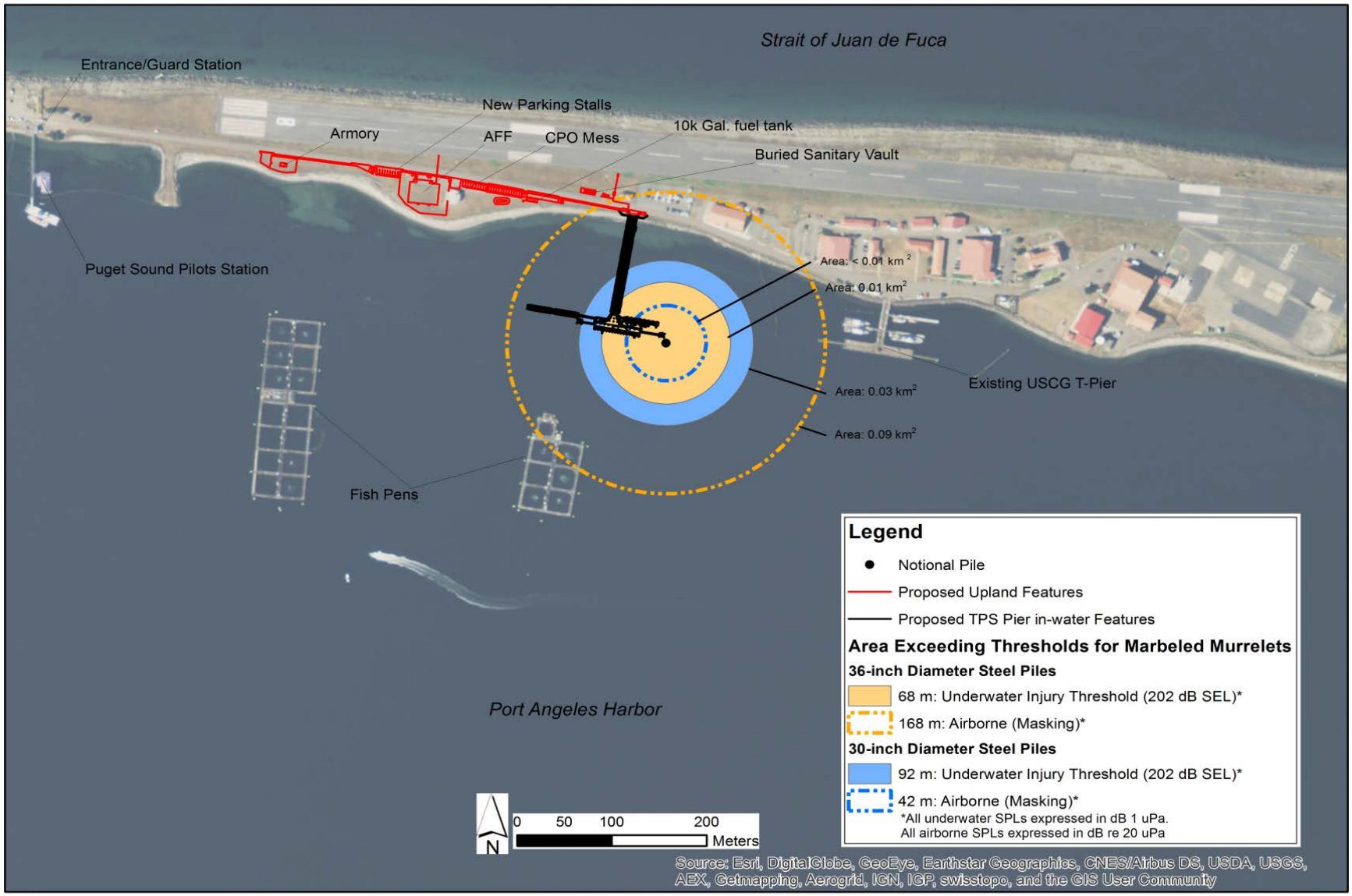

Figure 5-6. Representative View of Affected Areas for Marbled Murrelets from Underwater and Airborne (Masking) Noise Due to Impact Pile Driving 30- and 36-inch Diameter Steel Piles

All pile driving will begin 2 hours after sunrise and cease 2 hours before sunset to minimize effects to foraging marbled murrelets during the nesting season. All impact pile driving will occur with the use of a noise attenuation device.

5.1.2 Physical Barriers and Overwater Shade

Within a small region of the juvenile salmonid migration corridor, 34 piles will be permanently driven between +7 and -45 ft (+2 and – 14 m) MLLW and creating overwater coverage of 8,650 ft^2 (804 m^2) (trestle) at this depth range. Between the depth range of -45 to -63 ft (-13 to 19 m) MLLW, 110 piles will be permanently driven and will create overwater coverage of 16,886 ft^2 (1,568 m^2). The impact of physical barriers on fish will be greatest in the habitats used by juvenile salmonids as a migratory pathway. Because adult salmonids are less dependent on nearshore habitats and also have much greater mobility, they will not experience the same barrier effect as nearshore-dependent juvenile salmonids. Should adults encounter these nearshore construction activities, they could migrate around these structures with little or no overall delay in their movements.

Nightingale and Simenstad (2001) cite multiple studies that indicate juvenile salmon, notably fry, migrate within shallow nearshore waters. These studies have shown that smaller juveniles (e.g., fry less than 1.9 inches [5 centimeters] long) migrate along the shoreline in waters less than 3 ft (1 m) in depth (Whitmus 1985). Simenstad et al. (1999) refer to shallow-water habitat as "…that portion of the nearshore estuarine and marine environment habitually occupied by migrating salmon fry (i.e., approximately 30-80 millimeters long), which includes the intertidal zone to approximately 6 feet below MLLW." When juvenile salmonids are migrating along the shorelines and encounter a modified habitat within the shallow water zone, they may be forced to move out into deeper water to swim around the barrier, exposing them to predators. A study found that juvenile salmonids would move offshore when encountering barriers (i.e., piles, pier) and would occur in higher densities (schools) at overwater structures. However, juveniles were not observed underneath the structures but were more schooling along the edge of the overwater structure, near open water (Toft et al. 2004). This supports the premise that juvenile salmon may avoid overwater structures due to barriers to normal movement patterns or low light levels (Simenstad et al. 1999).

During construction, barrier and overwater shade impacts will include nearshore construction activity, barge anchoring, and small temporary clouds of increased suspended sediment produced during pile driving activity. However, these activities will occur during the in-water work window for Tidal Reference Area 10 (July 16 through February 15) (USACE 2012) when juvenile salmonids are least likely to be present.

No impacts from physical barriers and overwater shade to southern eulachon DPS, southern green sturgeon DPS, SRKW DPS, humpback whale, CPS bull trout DPS, or marbled murrelet are expected within the nearshore areas during construction time frame.

There will be no impacts from physical barriers and overwater shade to the nearshore and offshore critical habitat PCEs for PS chinook; coastal marine water quality and food resources PCEs for southern green sturgeon; water quality, prey species, and passage conditions for SRKW; or abundant food resources and migration habitat PCEs for CPS bull trout during construction.

5.1.3 Water Circulation and Bathymetry

The Port Angeles Harbor should not experience any changes in circulation as a result of the pier structure. The location of the proposed action is on the further western end of Ediz Hook in a fairly calm region where circulation at this end of the hook is primarily driven by vessel and recreational boat traffic. Further, no dredging is proposed and thus there will be no change to existing bathymetry. No impacts to ESA-listed species will result.

5.1.4 Water Quality

Pile installation will resuspend bottom sediments within the immediate area of each pile, resulting in temporary and localized increases in suspended sediment concentrations that, in turn, will increase turbidity levels. The suspended sediment/turbidity plumes will be generated periodically during active pile driving during the in-water work window. The western portion of Port Angeles Harbor has a Category 5 rating due to low dissolved oxygen. Pile driving could further degrade water quality within the immediate in-water construction area but for only a short period of time (approximately 75 days of pile driving).

Temporary increases in turbidity and suspended sediments could impact fish by creating cloudy or murky conditions that interfere with predator avoidance, covering food sources or vegetation with sediments, and interfering with oxygen exchange via impacts to the gills. A bubble curtain will be used as mitigation for in-water noise during pile driving. When the bubble curtain is operating increased levels of turbidity and suspended sediment are anticipated. For project-related construction activities, such as barge anchoring, fine-grained particles resuspended from the bottom will be confined to the near-bottom depth layers by natural density stratification of the water column. The subsurface suspended sediment plume will disperse rapidly as a result of particle settling and current mixing.

Based on the above analysis, in-water work could produce measurable, temporary increases in turbidity and sedimentation, and could cause fish to temporarily avoid areas near construction. However, construction activities will not result in persistent increases in turbidity levels or cause changes that would violate water quality standards because processes that generate suspended sediments, which result in turbid conditions, will be short-term and localized and suspended sediments will disperse and/or settle rapidly (within a period of minutes to hours after construction activities cease). Therefore effects to water quality are unlikely to result in large enough increases to result in changes to predator avoidance, significantly affect the availability of prey or habitat, or impact fish gill function. In addition, in-water work will occur during the July 16 to February 15 work period when juvenile salmonids are least likely to occur and exposure will be discountable. Additionally, adult life stages of PS Chinook ESU, PS steelhead DPS, CPS bull trout DPS, HC chum ESU, southern green sturgeon DPS, and southern eulachon DPS are unlikely to be in the nearshore work area at the time of pile driving as they would be expected further offshore if within the Action Area at all during construction. Therefore, exposure of fish at these life stages to construction-related activities is likely to be discountable within and near the project area and insignificant further from the project area.

No impacts to SRKW DPS or humpback whales are expected as generated turbidity will be localized to the project area where these species are not expected.

Although the increased turbidity may make it difficult for marbled murrelets to locate prey, they are not expected to be foraging that close; however, this will be minimized with implementation of impact pile driving hours to occur between 2 hours after sunrise to 2 hours before sunset (July 16 through September 23) for purposes of avoiding the time of day when marbled murrelets are foraging.

Lastly, impacts from turbidity on nearshore and offshore critical habitat PCEs for PS Chinook; coastal marine water quality and food resources PCEs for southern green sturgeon; water quality, prey species, and passage conditions PCEs for SRKW; and abundant food resources and migration habitat PCEs for CPS bull trout during construction are anticipated to be insignificant.

5.1.5 Sediment Quality

As described in Section 4.2.4, Port Angeles Harbor is a priority bay under Ecology's Puget Sound Initiative. Several contaminants of concern (COCs) exist within the harbor and sampling has not been done within the project area to determine presence or absence of these COCs. However, a site sampled within 1,000 ft (305 m) of the proposed pier construction found that COCs were not detected above SQS and CSL screening levels at this location. Therefore, increases in chemical contamination concentrations in marine waters as a result of sediment resuspension during construction activities will be negligible. Further, the potential for accidental spills or releases of hazardous materials (e.g., from barges, construction platforms, fueling activities on land or in water) will be minimized through implementation of spill prevention and response plans. Contractors will be required to prepare and implement a spill response plan (e.g., Spill Prevention, Control, and Countermeasure) to clean up fuel or fluid spills. As sediments are below the SQS level and increases in chemical contaminants as a result of spill would be minimized through implementation of these prevention and response plans, impacts to ESA-listed species and their critical habitat will be negligible.

5.1.6 Marine Vegetation

Marine vegetation is present within the project area, encompassing various species of eelgrass, kelp, and algae (SEE LLC 2015). ESA-listed salmonids use eelgrass for nursery habitat, refuge, and foraging. A survey conducted in July documented eelgrass occurring in a continuous bed between 0 and -20 ft MLLW with some plants occurring as deep as -35 ft MLLW. The total eelgrass present within the project area is 98,873 ft^2 (9,185 m^2) (see Appendix A – Eelgrass Survey Report). Direct impacts to existing eelgrass from proposed construction activities may result from turbidity during pile driving and temporary shading from construction barges. Avoidance and minimization measures will be implemented to avoid directly damaging or minimizing impacts to eelgrass in the project area during construction. For example, construction barges will avoid anchoring in eelgrass areas and will likely be further offshore and away from potential shading of eelgrass during trestle installation. However, pile installation will occur within documented eelgrass beds. Approximately 745 ft^2 (69 m^2) of eelgrass will be directly affected from placement of piles. Impacts are expected to be offset and minimized as

discussed in Section 2.2.5. All other construction related impacts will be temporary and short-term and insignificant to species.

After construction, a long-term reduction in light within the trestle footprint (8,650 ft^2) is expected which could result in a reduction of eelgrass density in the area. Compensatory mitigation is expected to create habitat for eelgrass to potentially grow and offset loss from shade coverage of the trestle. However, reestablishment is not expected to occur immediately and there would be a localized reduction in eelgrass habitat utilized by juvenile PS Chinook, PS steelhead, and HC chum. This localized loss will also affect the nearshore critical habitat PCE for PS Chinook.

No impacts to southern eulachon, southern green sturgeon and critical habitat, SRKW and critical habitat, humpback whale, CPS bull trout, and marbled murrelet will result from impacts to vegetation during construction and with implementing compensatory mitigation.

5.1.7 Underwater Structures and Benthic Community

The existing underwater rock pile located between the -20 and -75 ft (-6 and 23 m) MLLW depth range west of the project area is covered with various forms of vegetation and utilized as habitat by various species of juvenile and adult fish as well as invertebrates. Benthic organisms that inhabit the rock pile are prey for juvenile salmon and forage fish, which are part of the marine forage base for ESA-listed fish and marbled murrelets. Construction may disturb soft bottom habitat within the area and cause increases in turbidity that could potentially affect species within the rock pile. However, turbidity impacts are expected to be temporary and to remain relatively localized to the immediate project area and expected to settle out before reaching the rock pile that is approximately 1,600 ft (488 m) away. Construction barges and tugs will avoid the area so as not to damage the rock pile or create prolong shading over the rock pile. With implementation of these minimization measures, impacts to underwater structures will be insignificant.

Benthic communities occurring within the footprint of the piles will be at risk of direct mortality during pile install or loss of habitat due to seafloor displacement. Approximately 745 ft^2 (69 m^2) of seafloor will be displaced by piles. However, this is small in comparison to seafloor habitat available adjacent and outside of the immediate project area. Therefore, no adverse impacts to ESA-listed species and their critical habitat will result.

5.1.8 Forage Fish

There is a documented sand lance spawning site (1000 ft [304 m] long) on the south side of Ediz Hook, approximately 0.6 miles (0.9 km) west of the proposed pier. The temporary increase of suspended solids during pile driving will be expected to remain in the vicinity of the project and will not impact the spawning success of the sand lance spawning area west of the project. Therefore, no impacts from turbidity to spawning sand lance are anticipated.

Placement of the piles and associated disturbance activities (i.e., support vessels, construction barge) will cause a loss to benthic prey either existing within the pile footprint or disturbance from turbidity which may impact forage fish use of that area for

seeking prey. Impacts would be short-term and limited to the duration of pile installation and would not impact forage fish ability to seek prey outside of the project area.

Noise generated from pile driving activities will reach levels that could injure or disturb forage fish (see Section 5.1.1.1) occurring within the impact threshold zones during impact pile driving. However, the limited duration (75 days) of pile driving and use of a bubble curtain will minimize any potential impacts. Therefore, effects from noise are not expected to measurably reduce the overall forage base.

Although larval or juvenile forage may provide some portion of their prey base, adult salmonids and marbled murrelets utilize juvenile and adult forage fish as a major component of their prey base. Injury or temporary avoidance of the construction area by forage fish may cause temporary, localized reduction in available prey for adult salmonids and marbled murrelets that may attempt to forage there. This would result in short-term impacts to ESA-listed species for the duration of construction. However, effects to overall populations of forage fish are not expected. Therefore, long-term impacts to forage fish availability for ESA-listed salmonids and marbled murrelets would not be measurable.

5.2 Indirect Effects

Indirect effects are those effects caused by or resulting from the proposed action that are later in time, but are still reasonably certain to occur (50 CFR 402.2).

The resulting overwater coverage of 25,465 ft^2 (2,365 m^2) will prevent light penetration to existing benthic vegetation, causing die off and localized reduction in prey species for juvenile and adult salmonids. Overwater structures have shown to cause decreases or changes to epibenthos density, diversity, and assemblage composition. Permanent shade created by the proposed pier structure will reduce natural light penetration and lead to a reduction in vegetation or comprised benthic vegetation function (Haas et al. 2002). It will also alter existing species composition inhabiting the area to more shade-preferring species. Further, shadows cast by overwater structures allow ambush predators to remain in darkened areas to wait for prey (Helfman 1981) as prey become more susceptible to predation when moving around the structure and unable to locate the predator. Artificial lighting may also expose juvenile salmonids to nocturnal predation (Kahler et al. 2000). In addition, shadows from large overwater structures built within nearshore environments can disrupt juvenile Pacific salmon migratory behavior. A study conducted at ferry terminals found that juvenile salmon (predominantly pink salmon [*O. gorbuscha*]) would avoid swimming under docks and shaded areas causing delay in migration by several hours during the daytime at high tide periods and on sunny days (Ono et al. 2010).

The loss of light will likely cause the eelgrass within the footprint of the trestle to die off. Juvenile fish and forage fish utilize eelgrass and other submerged aquatic vegetation as nursery habitat and refuge. Further, eelgrass is designated as EFH and a Habitat Area of Particular Concern for Pacific coast salmon (See Section 7). This reduction will be localized to no more than 8,650 ft^2 (803 m^2) of which 4,595 ft^2 (426 m^2) of eelgrass exists within the proposed footprint. A reduction in eelgrass would reduce habitat and prey for forage fish species as well as reduce presence of forage fish. However, this reduction would be localized and not result in a long-term reduction to the overall forage fish base. Loss of eelgrass that exists within the footprint of the proposed trestle is expected to be

offset and minimized by way of the proposed removal of two overwater/inwater structures that would be expected to result in the availability of additional nearshore habitat for eelgrass over time (see Section 2.2.5).

The resulting overwater coverage and reduction in aquatic vegetation will impact the nearshore PCE for PS Chinook critical habitat. Impacts will be localized to 25,465 ft^2 and are expected to be offset and minimized through compensatory mitigation.

5.3 Effects from Interrelated and Interdependent Activities

Interrelated actions are those actions that are part of a larger action, and that depend on a larger action for its justification. Interdependent actions are those that have no independent utility apart from the proposed action.

The Proposed pier project does not have other projects dependent on its actions for their implementation, nor is it dependent on other projects or actions for its justification. Therefore, no interrelated or interdependent actions are associated with the pier project.

5.4 Cumulative Effects

"Cumulative effects" are those effects of future state or private activities, not involving federal activities, that are reasonably certain to occur within the Action Area of the federal action subject to consultation (50 CFR 402.02). Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to Section 7 of the Act. There are no non-federal projects reasonably certain to occur within the Action Area.

6 Conclusions and Effects Determinations

A "may affect, is not likely to adversely affect" determination means that effects are insignificant and discountable. Insignificant effects are generally very small in scale, do not reach the level of take as defined by the ESA, and cannot be meaningfully measured, detected, or evaluated. Discountable effects are those that are extremely unlikely to occur. A "may affect, is likely to adversely affect" determination means that the effects rise to the level of take for one or more individuals of the species. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.

6.1 Puget Sound Chinook Salmon ESU

The project ***may affect*** PS Chinook ESU because:

- Pile driving will temporarily increase turbidity levels. However, increases in suspended sediments and turbidity will be temporary and localized to pile driving installation locations and would not result in violation of water quality standards. Therefore, exposure of PS Chinook ESU or their forage base to changes in water quality that could decrease prey detection or avoidance or result in gill damage are considered unlikely.
- The completed pier structure will result in 25,465 ft^2 (2,365 m^2) of new overwater coverage and increase of physical barriers with the installed piles. This will result in a localized reduction of prey, vegetation, refugia, and increased vulnerability to predators for juvenile Chinook salmon that may rear within the project area. However, this is only a small portion of the available nearshore foraging and rearing habitat relative to the rest of Ediz Hook, Port Angeles Harbor, and the Action Area in general. Therefore impacts to PS Chinook ESU or their forage base are considered insignificant.
- Pile driving will produce noise above the behavior threshold during vibratory pile driving and above the behavior and injury thresholds during impact pile driving.
- Pile driving impacts could reduce forage fish prey availability. A temporary reduction in forage fish could occur within the project area during impact pile driving. However, effects will be temporary and localized and minimization measures will be used during impact driving. Therefore, reductions to the overall population of forage fish are not expected and effects to PS Chinook would be immeasurable.
- Aquatic vegetation (4,595 ft^2 [426 m^2] of eelgrass) may be exposed to physical removal with placement of piles and/or die off from light reduction/overwater shade from the pier.
- The project ***is likely to adversely affect*** PS Chinook ESU because:
- Impact pile driving of steel piles will be conducted during the in-water work window of July 16 – February 15 when juvenile salmon are least likely to be present, however juveniles could still occur in the Action Area and be exposed to injurious sound levels. Larger juveniles and adult PS Chinook will also be

exposed to injurious levels, temporarily, if migrating through the harbor within the deeper water where the injurious zones extend. To minimize impacts, pile installation will use vibratory pile driving methods to the extent practicable and will utilize a noise attenuation device for impact pile driving steel piles. A bubble curtain will be turned on prior to impact pile driving, resulting in a spatially limited injury zone with an estimated duration at less than 4 hours. Behavioral effects from pile driving will occur with installation of 144 piles and primarily occur from vibratory pile driving. Affects to aquatic vegetation are expected to occur both during and after construction. During construction, short-term, temporary turbidity is expected during pile installation. Installation of piles will also result in removal of plants within the pile footprint. After construction, a long-term reduction in light within the trestle footprint (8,650 ft^2) is expected which could result in a reduction of eelgrass density in the area. Compensatory mitigation is expected to create habitat for eelgrass to grow and offset loss from shade coverage of the trestle. However, reestablishment is not expected to occur immediately and there will be a localized reduction in eelgrass habitat for juvenile PS Chinook ESU and their prey species until reestablishment.

Therefore, the Navy's effect determination for PS Chinook ESU within the Action Area is ***may affect, is likely to adversely affect*** *due to exposure to injurious noise levels and loss of eelgrass habitat.*

6.1.1 Puget Sound Chinook Salmon ESU Critical Habitat

- The project ***may affect*** two critical habitat PCEs: Nearshore marine areas and offshore marine areas because:
- Pile driving will temporarily increase turbidity levels within the nearshore and offshore (to -60 ft MLLW) areas of the project area. However, increases in suspended sediments and turbidity will be temporary and localized to pile driving installation locations and would not result in violation of water quality standards. Therefore, exposure impacts to the nearshore and offshore PCEs would be insignificant.
- Pile driving will produce noise above the behavior threshold during vibratory pile driving and above the behavior and injury thresholds during impact pile driving temporarily degrading nearshore and offshore critical habitat PCEs. Pile driving impacts could reduce forage fish prey availability. A temporary reduction in forage fish could occur within the project area during impact pile driving. However, effects will temporary and localized and minimization measures will used during impact driving. Therefore, reductions to the overall population of forage fish are not expected. The completed pier structure will result in 25,465 ft^2 (2,365 m^2) of new overwater coverage and added barriers (piles).
- Aquatic vegetation (4,595 ft^2 [426 m^2] of eelgrass) may be exposed to physical removal with placement of piles and/or die off from light reduction/overwater shade from the pier.

The project ***is likely to adversely affect*** PS Chinook ESU critical habitat because:

- Although noise from pile driving is not expected to exceed 75 days and will occur during the in-water work window when juvenile nearshore marine dependent Chinook salmon are least likely to be present, some juveniles could still occur in the Action Area and be exposed to injurious sound levels. Larger juveniles and adult Chinook occurring within the offshore marine areas of the harbor will likely be exposed temporarily to injurious noise levels as the injurious noise zone extends over deeper water. These impacts would be minimized by using an attenuation device (bubble curtain), and will likely not exceed 75 days of pile driving. Therefore, impacts to nearshore and offshore PCEs from noise would occur during construction.
- Installed piles and overwater coverage will result in permanent obstruction for juveniles to navigate around and result in a reduction of macroinvertebrate and epibenthic prey source. Further, reduction in eelgrass will remove refuge and nursery habitat utilized by juvenile chinook within the trestle footprint. Effects to the nearshore marine PCE due to loss of eelgrass is expected to be offset and minimized (see Section 2.2.5). However, reestablishment of new eelgrass is not expected to occur immediately and there will be a localized reduction in eelgrass habitat affecting the nearshore marine PCE for juvenile PS Chinook ESU and their prey species until reestablishment.
- Various life-stages of forage fish occur within the existing eelgrass in the project area and may be reduced from overwater coverage. The loss of eelgrass would result in a localized reduction to prey, affecting both the nearshore and offshore PCEs. Through compensatory mitigation effects to these PCEs would be expected to be offset and minimized.

The Navy has determined that the effect determination for PS Chinook ESU critical habitat within the Action Area is ***may affect, is likely to adversely affect*** *the nearshore and offshore marine PCEs due to injurious noise levels and loss of eelgrass***.**

6.2 Hood Canal Summer-Run Chum Salmon ESU

- The project ***may affect*** the HC Chum ESU because:
- Pile driving will temporarily increase turbidity levels. However, increases in suspended sediments and turbidity will be temporary and localized to pile driving installation locations and would not result in violation of water quality standards. Therefore, exposure of HC chum ESU or their forage base to changes in water quality that are significant enough to decrease prey detection or avoidance or result in gill damage are considered unlikely
- The completed pier structure will result in 25,465 ft^2 (2,365 m^2) of new overwater coverage. This will result in a localized reduction of prey, vegetation, refugia, and increased vulnerability to predators for juvenile chum salmon that may rear within the project area. However, this is only a small portion of the available nearshore foraging and rearing habitat relative to the rest of Ediz Hook, Port Angeles Harbor, and the Action Area in general. Therefore impacts to HC chum ESU or their forage base are considered insignificant.

- Pile driving will produce noise above the behavior threshold during vibratory pile driving and above the behavior and injury thresholds during impact pile driving.
- Pile driving impacts could reduce forage fish prey availability. A temporary reduction in forage fish could occur within the project area during impact pile driving. However, effects will be temporary and localized and minimization measures will be used during impact driving. Therefore, reductions to the overall population of forage fish are not expected and effects to HC chum would be immeasurable.Aquatic vegetation may be exposed to physical removal with placement of piles or light reduction/overwater shade from the pier.

The project ***is likely to adversely*** affect HC chum ESU because:

- Impact pile driving of steel piles will be conducted during the in-water work window of July 16 – February 15 when juvenile salmon are least likely to be present. However, juveniles could still occur in the Action Area and be exposed to injurious sound levels. Larger juveniles and adult HC Chum ESU will also be exposed to injurious levels temporarily if migrating through the harbor within the deeper water where the injurious zones extend. To minimize impacts, pile installation will use vibratory pile driving methods to the extent practicable and will utilize a noise attenuation device for impact pile driving steel piles. A bubble curtain will be turned on prior to impact pile driving, resulting in a spatially limited injury zone with an estimated duration at less than 4 hours. Adult chum could be passing by the area at the beginning of the in-water work window (July – August) and potentially exposed to behavioral effects from pile driving.
- Affects to aquatic vegetation are expected to occur both during and after construction. During construction, short-term, temporary turbidity is expected during pile installation. Installation of piles will also result in removal of plants within the pile footprint. After construction, a long-term reduction in light within the trestle footprint (8,650 ft^2) is expected which could result in a reduction of eelgrass density in the area. Compensatory mitigation is expected to create habitat for eelgrass to grow and offset loss from shade coverage of the trestle. However, reestablishment is not expected to occur immediately and there will be a localized reduction in eelgrass habitat for juvenile HC chum ESU and their prey species until reestablishment.

Therefore, the Navy's effect determination for HC chum salmon ESU within the Action Area is ***may affect, is like***ly to adversely affect due to exposure to injurious noise levels and loss of eelgrass habitat.

6.3 Puget Sound Steelhead DPS

The project ***may affect*** PS steelhead DPS because:

- Pile driving will temporarily increase turbidity levels. However, increases in suspended sediments and turbidity will be temporary and localized to pile driving installation locations and would not result in violation of water quality standards. Therefore, exposure of PS steelhead DPS or their forage base to changes in water

quality that are significant enough to decrease prey detection or avoidance or result in gill damage are considered unlikely.

- The completed pier structure will result in 25,465 ft^2 (2,365 m^2) of new overwater coverage and increase of physical barriers with the installed piles. The pier will result in an increase of physical barriers and overwater coverage. This will result in a localized reduction of prey within the project area. However, this is only a small portion of the available nearshore foraging and rearing habitat relative to the rest of Ediz Hook, Port Angeles Harbor, and the Action Area in general. Therefore impacts to PS steelhead DPS or their forage base are considered insignificant.
- Pile driving will produce noise above the behavior threshold during vibratory pile driving and above the behavior and injury thresholds during impact pile driving.
- Pile driving impacts could reduce forage fish prey availability. A temporary reduction in forage fish could occur within the project area during impact pile driving. However, effects will be temporary and localized and minimization measures will be used during impact driving. Therefore, reductions to the overall population of forage fish are not expected and effects to PS steelhead would be immeasurable.
- Aquatic vegetation may be exposed to physical removal with placement of piles or light reduction/overwater shade from the pier.

The project ***is likely to adversely affect*** PS steelhead DPS because:

- Impact pile driving of steel piles will be conducted during the in-water work window of July 16 – February 15 when juvenile salmonids are least likely to be present. However, larger juveniles and adult PS steelhead will still be exposed to injurious levels, temporarily, if migrating through the harbor within the deeper water where the injurious zones extend. To minimize impacts, pile installation will use vibratory pile driving methods to the extent practicable and will utilize a noise attenuation device for impact steel driving. A bubble curtain will be turned on prior to impact pile driving, resulting in a spatially limited injury zone with an estimated duration at less than 4 hours. Behavioral effects from pile driving will occur during installation of 144 piles and primarily occur from vibratory pile driving. Affects to aquatic vegetation are expected to occur both during and after construction. During construction, short-term, temporary turbidity is expected during pile installation. Installation of piles will also result in removal of plants within the pile footprint. After construction, a long-term reduction in light within the trestle footprint (8,650 ft^2) is expected which could result in a reduction of eelgrass density in the area. Compensatory mitigation is expected to create habitat for eelgrass to grow and expected to offset loss from shade coverage of the trestle. However, reestablishment is not expected to occur immediately and there will be a localized reduction in eelgrass habitat for juvenile PS Steelhead ESU and their prey species until reestablishment.

Therefore, the Navy's effect determination for PS steelhead DPS within the Action Area is ***may affect, is likely to adversely affect*** *due to exposure to injurious noise levels and loss of eelgrass habitat.*

6.4 Pacific Eulachon Southern DPS

The project ***may affect*** Southern eulachon DPS because:

- Pile driving will produce noise above the behavior threshold during vibratory pile driving and above the behavior and injury thresholds during impact pile driving.
- Pile driving will temporarily increase turbidity levels.

However, the project is ***not likely to adversely affect*** southern eulachon DPS because:

- Adult eulachon could be passing by further offshore on their way to spawning in the Elwha River. Pile installation will use vibratory pile driving methods to the extent practicable and will utilize a noise attenuation device for impact pile driving steel piles. A bubble curtain will be turned on prior to impact pile driving, resulting in a spatially limited injury zone with an estimated duration at less than 4 hours. Adult and juvenile eulachon occur in deeper water than the project area and are not expected within the injury zone. Behavioral effects from pile driving may occur during installation of 144 piles (extending out a distance of 6.5ft [2,929 m]) during impact pile driving activity. Therefore, injurious effects are considered discountable to southern eulachon DPS.
- Increases in suspended sediments and turbidity will be temporary and localized to pile driving installation locations, in shallower water than eulachon occur, and would not result in violation of water quality standards. Therefore, exposure of Pacific eulachon to changes in water quality will be discountable.

Therefore, the Navy's effect determination for Pacific eulachon southern DPS within the Action Area is ***may affect, is not likely to adversely affect.***

6.5 North American Green Sturgeon Southern DPS

The project ***may affect*** southern green sturgeon DPS because:

- Pile driving will produce noise above the behavior threshold during vibratory pile driving and above the behavior and injury thresholds during impact pile driving.
- Pile driving will temporarily increase turbidity levels.

However, the project is ***not likely to adversely affect*** southern green sturgeon DPS because:

- Adult green sturgeon could be present within the Action Area during their annual coastal summer migrations to bays and estuaries in the state. However, green sturgeon have never been sighted within Port Angeles Harbor and are unlikely to occur because they are typically found further offshore and are likely present in the deeper waters of the Strait of Juan de Fuca during their migrations.
- Pile installation will use vibratory pile driving methods to the extent practicable and will utilize a noise attenuation device for impact pile driving. A bubble

curtain will be turned on prior to impact pile driving, resulting in a spatially limited injury zone with an estimated duration at less than 4 hours. Green sturgeon occur in depths within 110 m and are unlikely to be near the injury zone. Behavioral effects from pile driving may occur during installation of 144 piles (extending out a distance of 6.5 ft [2,929 m]) during impact pile driving activity. Since green sturgeon are likely to be occurring within the Strait of Juan de Fuca and only passing by the harbor during their migrations, injurious effects are considered discountable to green sturgeon.

- Increases in suspended sediments and turbidity will be temporary and localized to pile driving installation locations, in shallower water than green sturgeon are likely to occur, and would not result in violation of water quality standards. Therefore, exposure of green sturgeon to changes in water quality will be discountable.

Therefore, the Navy's effect determination for southern green sturgeon DPS within the Action Area is ***may affect, is not likely to adversely affect.***

6.5.1 Southern Green Sturgeon DPS Critical Habitat

The project ***may affect*** the two critical habitat PCEs: Water quality and food resources because:

- Pile driving will produce noise above the behavior threshold during vibratory pile driving and above the behavior thresholds during impact pile driving as well as create turbidity in the water column and may temporarily degrade the water quality PCE for coastal marine waters.
- Installed piles will permanently displace benthic habitat for potential juvenile prey species and may affect the food resources PCE.

However, the project is ***not likely to adversely affect*** southern green sturgeon DPS critical habitat because:

- Noise and turbidity from pile driving will occur for 75 days but the behavioral disturbance zone would likely not impact the green sturgeon water quality PCE for coastal marine waters as they are likely to be outside the behavioral zone threshold, migrating along the Strait of Juan de Fuca and the threshold does not include the Strait. Therefore, impacts to the water quality PCE for coastal marine waters will be discountable.
- Installed piles will permanently displace 745 ft^2 (69 m^2) of benthic invertebrate habitat. However, the reduction will be localized to the project area only and would not cause an overall reduction in prey for green sturgeon that may come in to the area to forage. Therefore, effects to the food resources PCE will be discountable.

The Navy has determined that the effect determination for southern green sturgeon DPS critical habitat within the Action Area is ***may affect, is not likely to adversely affect.***

6.6 Southern Resident Killer Whale DPS

The project ***may affect*** the SRKW DPS because:

- Pile driving will produce noise above the injury and behavior threshold during vibratory and impact pile driving.
- Pile driving will temporarily increase turbidity levels.
- Noise and water quality impacts could temporarily reduce prey species.

However, the project is ***not likely to adversely affect*** SRKW DPS because:

- SRKW are not expected to come into the harbor where they would be within behavior and injury thresholds for impact pile driving, nor are they expected to be present within the behavioral threshold for vibratory pile driving. Because SRKW are likely to swim past the harbor into the Strait of Juan de Fuca rather than into Port Angeles Harbor; and monitoring and shutdown protocols will be in place, impacts to SRKW from pile driving noise will be discountable.
- Pile driving will temporarily increase suspended sediments and turbidity levels within the harbor. The turbidity will be localized to the nearshore project area where SRKW are not likely to occur. Therefore, impacts to SRKW DPS from increased turbidity will be discountable.
- Impact pile driving of steel piles could result in injury or death of individual salmon, the primary prey species of SRKW; however reductions to overall populations of salmon are not expected to occur. Minimization measures will be included to reduce impacts to salmon including adherence to the work window, use of vibratory pile driving methods to the extent practicable, and use of a noise attenuation device for impact pile driving steel piles. Additionally, SRKW are not expected to occur in the action area and would not be affected by the resulting localized reduction of prey. Therefore, there would not be a measurable effect to SRKW and effects resulting from reduced prey availability are considered insignificant and discountable.

Therefore, the Navy's effect determination for the SRKW DPS within the Action Area is ***may affect, is not likely to adversely affect.***

6.6.1 Southern Resident Killer Whale DPS Critical Habitat

The project ***may affect*** all three critical habitat PCEs (water quality, prey species, and passage conditions) because:

- Pile driving will produce noise above the injury and behavior threshold during vibratory and impact pile driving that may temporarily affect the water quality and passage PCEs. Increased turbidity in the water may also temporarily degrade the water quality PCE.
- Noise and water quality impacts could temporarily reduce prey species, affecting the prey species PCE.
- Prey availability could be reduced due to pile driving activities.

However, the project is ***not likely to adversely affect*** SRKW critical habitat because:

- Exceeded behavior thresholds for vibratory pile driving are anticipated to extend east to the furthest extent of the harbor bordering the Strait of Juan de Fuca for no more than 75 days. With implementation of monitoring and shutdown zones in place, impacts to SRKW DPS passage PCE from pile driving noise will be discountable.
- Increased turbidity during pile driving would be localized to the project area only where SRKW would not occur. Therefore, impacts to the water quality PCE are discountable.
- Although salmon prey may avoid the area temporarily during pile driving, SRKW are not expected to occur in the action area and would not be affected by the resulting localized reduction of prey. Impact pile driving of steel piles could result in injury or death of individual salmon, however reductions to overall populations of salmon are not expected to occur and effects to SRKW are considered to be immeasurable. Therefore effects to SRKW DPS prey PCE are considered discountable and insignificant.

The Navy has determined that the effect determination for SRKW DPS critical habitat within the Action Area is ***may affect, is not likely to adversely affect.***

6.7 Humpback Whale

The project ***may affect*** humpback whales because:

- Humpback whales frequently travel within deep waters of the Strait of Juan de Fuca, located north of the project site.

However, the project is ***not likely to adversely affect*** humpback whales because:

- Humpback whales have not been sighted within the Port Angeles Harbor. Sightings that have occurred have been offshore, not within Port Angeles Harbor, and predominantly outside the in-water work window that will be adhered to for pile driving work. Further, the 120 dB RMS threshold zone will be monitored during pile driving with established shutdown protocols in place should a humpback whale be observed. Therefore, exposure of humpback whales to project noise is discountable.

Therefore, the Navy's effect determination for humpback whale within the Action Area is ***may affect, is not likely to adversely affect.***

6.8 Coastal Puget Sound Bull Trout DPS

- The project ***may affect*** CPS bull trout DPS because:
- Pile driving will temporarily increase turbidity levels. However, increases in suspended sediments and turbidity will be temporary and localized to pile driving installation locations and would not result in violation of water quality standards. Therefore, exposure of CPS bull trout DPS or their forage base to changes in water quality that are significant enough to decrease prey detection or avoidance or result in gill damage are considered unlikely.

- The completed pier structure will result in 25,465 ft^2 (2,365 m^2) of new overwater coverage and increase of physical barriers with the installed piles. This will result in a localized reduction of prey and vegetation for forage fish that occur within the project area. However, this is only a small portion of the available nearshore foraging and rearing habitat relative to the rest of Ediz Hook, Port Angeles Harbor, and the Action Area in general. Therefore impacts to the CPS bull trout DPS forage base are considered insignificant.
- Pile driving will produce noise above the behavior threshold during vibratory pile driving and above the behavior and injury thresholds during impact pile driving.
- Pile driving impacts could reduce forage fish prey availability. A temporary reduction in forage fish could occur within the project area during impact pile driving. However, effects will be temporary and localized and minimization measures will be used during impact driving. Therefore, reductions to the overall population of forage fish are not expected and effects to bull trout would be immeasurable.
- Aquatic vegetation may be exposed to physical removal with placement of piles or light reduction/overwater shade from the pier.

The project ***is likely to adversely affect*** CPS bull trout DPS because:

- Impact pile driving of steel piles will be conducted during the in-water work window of July 16 – February 15 when juvenile salmon and bull trout are least likely to be present. However, adult CPS bull trout will still be exposed to injurious levels, temporarily, if migrating through the harbor within the deeper water where the injurious zones extend. Further, adults may be present during pile driving as they have been documented within Ennis Creek accessed from the south side of Port Angeles Harbor. To minimize impacts, pile installation will use vibratory pile driving methods to the extent practicable and will utilize a noise attenuation device for impact pile driving steel piles. A bubble curtain will be turned on prior to impact pile driving, resulting in a spatially limited injury zone with an estimated duration at less than 4 hours. Behavioral effects from pile driving may occur during installation of 144 piles and primarily occur from vibratory pile driving.
- Affects to aquatic vegetation are expected to occur both during and after construction. During construction, short-term, temporary turbidity is expected during pile installation. Installation of piles will also result in removal of plants within the pile footprint. After construction, a long-term reduction in light within the trestle footprint (8,650 ft^2) is expected which could result in a reduction of eelgrass density in the area. Compensatory mitigation is expected to create habitat for eelgrass to grow and offset loss from shade coverage of the trestle. However, reestablishment is not expected to occur immediately and there will be a localized reduction in eelgrass habitat for CPS bull trout prey species until reestablishment.
- Therefore, the Navy's effect determination for the CPS bull trout DPS within the Action Area is **may affect, is likely to adversely affect** due to exposure to injurious noise levels and loss of eelgrass habitat**.**

6.8.1 Coastal Puget Sound Bull Trout DPS Critical Habitat

The project ***may affect*** two critical habitat PCEs (migration habitats and abundant food base) because:

- Pile driving will produce noise above the behavior threshold during vibratory pile driving and above the behavior and injury thresholds during impact pile driving temporarily degrading migration habitats and abundant food base PCEs.
- The completed pier structure will result in 25,465 ft^2 of new overwater coverage and added barriers (piles). This will result in permanent obstruction for juveniles to navigate around and result in a reduction of macroinvertebrate and epibenthic prey source for bull trout. However, reduction in prey would be localized to the project area only and would not cause an overall reduction in prey base for bull trout occurring within the Action Area. Therefore, effects to the abundant prey PCE will be insignificant.

The project ***is likely to adversely affect*** CPS bull trout DPS critical habitat because:

- Noise from pile driving will create an injurious level zone that extends over migrating habitat and degrading the ability for it to serve as migration habitats PCE. Impacts will be minimized by not exceeding 75 days of pile driving, using a vibratory pile driving as the primary method of pile installation, and using a bubble curtain during impact pile driving.
- Installed piles and overwater coverage would cause a localized reduction in eelgrass that would impact the area to function as an abundant food base PCE for CPS bull trout.

The Navy has determined that the effect determination for the CPS bull trout DPS critical habitat within the Action Area is ***may affect, is likely to adversely affect*** *due to injurious noise levels to the abundant food source PCE and extending offshore within the migration habitats PCE.*

6.9 Marbled Murrelet

- The project ***may affect*** marbled murrelets because:
- Pile driving will temporarily increase turbidity levels. Construction-related increases in levels of suspended sediment and turbidity will be temporary, sporadic during construction (during pile driving and barge anchoring), localized, and will not result in a violation of water quality standards. Therefore, exposure of marbled murrelets to changes in water quality that are significant enough to decrease prey detection are considered insignificant because sediment is anticipated to drop out of the water column close to construction or dissipate further from construction.
- The completed pier structure will result in 25,465 ft^2 (2,365 m^2) of new overwater coverage and increase of physical barriers with the installed piles, affecting prey. The pier structure will result in an increase of physical barriers and overwater coverage. This will result in a localized reduction of prey and vegetation for forage fish that occur within the project area. However, this is only a small

portion of the available nearshore foraging and rearing habitat relative to the rest of Ediz Hook, Port Angeles Harbor, and the Action Area in general. Therefore impacts to marbled murrelets or their forage base are considered insignificant.. Further, compensatory mitigation will create habitat for eelgrass to grow and is expected to offset and minimize loss from shade coverage of the trestle.

- Pile driving impacts could reduce forage fish prey availability. A temporary reduction in forage fish could occur within the project area during impact pile driving. However, effects will temporary and localized and minimization measures will used during impact driving. Therefore, reductions to the overall population of forage fish are not expected and effects to marbled murrelet would be immeasurable.
- Impact pile driving 24-, 30-, and 36-inch steel piles will produce noise levels within the 92 meter (injury) and 168 m (masking) zones.

The project ***is likely to adversely affect*** marbled murrelets because:

- Marbled murrelets occurring within 92 meters of impact pile driving could potentially be injured. Their vocalizations will be masked for up to 4 hours per day for 75 days. Impacts would be minimized by vibratory pile driving as the primary method to drive piles. Therefore, exposure of marbled murrelets to noise levels resulting in injury or masking may occur.

Therefore, the Navy's effect determination for marbled murrelet within the Action Area is ***may affect, is likely to adversely affect*** *due to pile driving noise masking vocalizations.*

Table 6-1 summarizes the effects determinations to ESA-listed species and designated critical habitat from the proposed pier project.

Table 6-1. Effects Determinations for ESA-Listed Species and Critical Habitat

Species **Common name** **(*Scientific name*)**	**ESA Status**	**Critical Habitat Status**	**Effects Determination for Species**	**Effects Determination for Critical Habitat**
NMFS-Regulated Species				
Puget Sound Chinook Salmon ESU (*Oncorhynchus tshawytscha*)	T	Designated within Action Area	*likely to adversely affect*	*likely to adversely affect*
Hood Canal Summer-run Chum ESU (O. keta)	T	Not designated within Action area	*likely to adversely affect*	*NA*
Puget Sound Steelhead DPS (*O. mykiss*)	T	Proposed but not within Action Area	*likely to adversely affect*	*NA*
Pacific Eulachon Southern DPS (*Thaleichthys pacificus*)	T	Not designated within Action Area	*not likely to adversely affect*	*NA*
North American Green Sturgeon Southern DPS (*Acipenser medirostris*)	T	Designated within Action Area	*not likely to adversely affect*	*not likely to adversely affect*
Southern Resident Killer Whale DPS (*Orcinus orca*)	E	Designated within Action Area	*not likely to adversely affect*	*not likely to adversely affect*
Humpback Whale (rangewide) Western North Pacific DPS Central America DPS (*Megaptera novaeangliae*)	E PT PT	Not Designated	*not likely to adversely affect*	*NA*
USFWS-Regulated Species				
Coastal-Puget Sound Bull Trout DPS (*Salvelinus confluentus*)	T	Designated within Action Area	*likely to adversely affect*	*likely to adversely affect*
Marbled Murrelet (*Brachyramphus marmoratus*)	T	Not designated within Action Area	*likely to adversely affect*	*NA*

Notes: E = endangered; NA = Not Applicable; PT = proposed threatened; T = threatened.

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7 Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act (MSA), as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), through the EFH provision, protects the waters and substrate necessary for the spawning, breeding, feeding, or growth to maturity of certain commercially-managed fisheries species (16 USC 1802(10)). Federal agencies are required to consult with NMFS on proposed actions authorized, funded, or undertaken by the agency that may adversely affect EFH (Section 305(b)(2)). NMFS is required to provide conservation recommendations for any federal activity that would adversely affect EFH (Section 305(b)(4)(A)). Adverse effect means any impact that reduces the quality and/or quantity of EFH, and may include direct, indirect, site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810).

Pursuant to the MSA, the PFMC has designated EFH for federally managed species within the waters of Washington, Oregon, and California. The waters within Port Angele Harbor are designated EFH for Pacific Coast groundfish, coastal pelagic species, and Pacific Coast salmon (PFMC 2011a, 2014a, 2014b).

In addition to EFH designations, areas called Habitat Areas of Particular Concern (HAPCs) are also designated by the regional Fishery Management Councils (FMCs). Designated HAPC are discrete subsets of EFH that provide extremely important ecological functions or are especially vulnerable to degradation (50 CFR 600.805-600.815). Regional FMCs may designate a specific habitat area as an HAPC based on one or more of the following reasons: (1) importance of the ecological function provided by the habitat; (2) the extent to which the habitat is sensitive to human-induced environmental degradation; (3) whether, and to what extent, development activities are, or will be, stressing the habitat type; and (4) rarity of the habitat type (67 FR 2343-2383). Categorization as HAPC does not confer additional protection or restriction to the designated area.

The objective of this assessment is to determine whether the Proposed Action “may adversely affect” designated EFH for relevant federally managed commercial species.

7.1 Project Description

As discussed in Chapter 2, the Navy proposes to construct a pier consisting of an approach trestle, fixed pier and associated floats. The proposed action also includes upland construction of support facilities. Construction will begin in 2016 and with in-water work occurring during the in-water work season of July 16 through February 15. Pile driving is anticipated to begin in mid to late July and require approximately 75 days. Pile driving could occur intermittently over two in-water work windows. A detailed description of the project’s elements, including construction, operations, and impact avoidance and minimization measures is located in Chapter 2.

7.2 EFH Designations

The PFMC is responsible for designating EFH for all federally managed species occurring in the coastal and marine waters off the coasts of Washington, Oregon, and

California, including Puget Sound. The PFMC designated EFH for these species within the Fishery Management Plans (FMPs) for each of the four primary fisheries that they manage: Coastal Pelagic Species, Pacific Coast Salmon, Pacific Coast Groundfish, and West Coast Fisheries for Highly Migratory Species (PFMC 2011a, 2011b, 2014a, 104b, 2014c). Of these fisheries, three (Pacific Coast groundfish, coastal pelagic species and Pacific Coast salmon) contain species for which EFH has been designated in the water off Ediz Hook and within Port Angeles Harbor in general.

7.2.1 Pacific Coast Groundfish

Pacific coast groundfish species are considered sensitive to over-fishing, the loss of habitat, and water and sediment quality. The groundfish EFH consists of the aquatic habitat necessary to allow for groundfish production to support long-term sustainable fisheries for groundfish and for groundfish contributions to a healthy ecosystem (PFMC 2014a). The PFMC (2014a) identifies the overall area designated as groundfish EFH for all species covered in the FMP as all waters and substrate within "depths less than or equal to 11,500 ft (3,500 m) MHHW or the upriver extent of saltwater intrusion, defined as upstream and landward to where ocean-derived salts measure less than 0.5 parts per thousand (ppt) during the period of average annual low flow." Furthermore, the PFMC (2014a) has also designated EFH for each individual groundfish species by lifestage. These designations are contained within Appendix B of the FMP (PFMC 2005a, b). Using the Pacific Habitat Use Relational Database developed by the PFMC, it was determined which groundfish species and lifestages have EFH designated within the vicinity of the project area (Appendix B). The management unit in the Pacific Coast Groundfish FMP includes over 90 groundfish species (PFMC 2014a). Of these, 40 were identified through the analysis of the Habitat Use Relational Database as having EFH designated in the vicinity of the project area.

Based on the analysis, the primary habitats designated as EFH for groundfish include:

- The epipelagic zone of the water column, including macrophyte canopies and "drift algae";
- Unconsolidated sediments consisting of mud, sand, or mixed mud/sand;
- Hard-bottom habitats composed of boulder, bedrock, cobble, gravel, or mixed gravel/cobble;
- Mixed sediments composed of sand and rocks; and
- Vegetated bottoms consisting of algal beds, macrophytes, or rooted vascular plants.

Site-specific nearshore dive surveys and seine surveys conducted in the project area confirmed occurrence of seven groundfish species: black rockfish, blue rockfish, quillback rockfish, cabezon, kelp greenling, lingcod as well as unidentified flatfishes/sole species, and unidentified juvenile rockfish (Sebastes spp.) (Appendix B). This confirms the nearshore occurrence of these species but is not intended to indicate the lack of occurrence of the other groundfish species, particularly based on the shallow-water limits of the surveys.

7.2.2 Coastal Pelagic Species

The Pacific Council's Coastal Pelagic Species FMP specifies a management framework for northern anchovy (*Engraulis mordax*), market squid (*Loligo opalescens*), Pacific sardine, Pacific mackerel, and jack mackerel. In October 2006, the Coastal Pelagic Species FMP was amended to include all krill species. In July 2009, Amendment 12 to the Coastal Pelagic Species FMP prohibited the harvest of krill within California, Oregon, and Washington waters (74 FR 33372). No krill harvest will occur in conjunction with the proposed project. EFH for non-krill coastal pelagic species addresses five pelagic species that are treated as a single species complex because of similarities in life histories and habitat requirements: Northern anchovy, Pacific sardine, Pacific (chub) mackerel, jack mackerel, and market squid. Two of these coastal pelagic species are known to occur in the Strait of Juan de Fuca and Port Angeles Harbor waters: northern anchovy and market squid. A table of these species/life stages and their designated habitat is contained within Appendix B of this EFH assessment. The definition for coastal pelagic species EFH is based on the geographic range and in-water temperatures where these species are present during a particular life stage (67 FR 2343-2383). EFH for these species includes all estuarine and marine waters above the thermocline where sea surface temperatures range from 50 to 68 °F (10 to 20 °C). These boundaries include the waters surrounding Ediz Hook.

Coastal pelagic species have value to commercial Pacific fisheries, and are also important as food for other fish, marine mammals, and birds (63 FR 13833). Coastal pelagic species are considered sensitive to overfishing, loss of habitat, reduction in water and sediment quality, and changes in marine hydrology, including entrainment through water intakes.

The general descriptions of northern anchovy and market squid provided in the FMP (PFMC 1998) were reviewed for information on designated EFH pertinent to consideration of effects from construction and operation of the project.

Northern anchovy are small, short-lived fish that are typically found in schools near the surface. They eat phytoplankton and zooplankton and spawn year round with peaks from February to April. All life stages are preyed on by a variety of predators, including salmon and numerous fishes. At least one juvenile Northern anchovy was collected during seining surveys along Ediz Hook in the fall (Shaffer and Galuska 2009), confirming occurrence of this species in the nearshore zone.

Market squid are harvested near the surface, but they also can occur at great depths. They prefer the salinity of the ocean and are rarely found in estuaries, bays, or river mouths. This species feeds on copepods as juveniles and on euphausiids, other small crustaceans, small fish, and other squid as they grow. Habitat requirements for spawning are not well understood, although documented spawning areas along the coast consist of shallow, semi-protected nearshore areas with sandy or mud bottoms adjacent to submarine canyons. Spawning occurs during most of the year, typically beginning in late summer off Washington. Squid are important as forage foods for many fish such as Chinook salmon, coho salmon, lingcod, and rockfish. Market squid are fished for recreationally in Puget Sound and Strait of Juan de Fuca and are likely to occur within the Action Area.

7.2.3 Pacific Coast Salmon

The Pacific coast salmon management unit includes Chinook (*Oncorhynchus tshawytscha*), coho (*Oncorhynchus kisutch*), and pink (*Oncorhynchus gorbuscha*) salmon. The EFH designation for the Pacific coast salmon fishery in estuarine and marine environments in the state of Washington extends from nearshore and tidal submerged environments within state territorial waters out to the full extent of the exclusive economic zone (200 miles [322 kilometers]) offshore (PFMC 2014b). In addition to marine and estuarine waters, salmon species have a defined freshwater EFH, which includes all lakes, streams, ponds, rivers, wetlands, and other bodies of water that have been historically accessible to salmon (PFMC 2014b). Chinook, coho, and pink salmon all use the marine environment for rearing as juveniles and offshore environment for migration as adults.

Pacific salmon EFH is primarily affected by the loss of suitable spawning habitat, barriers to fish migration (habitat access), reduction in water and sediment quality, changes in estuarine hydrology, and decreases in prey food source (PFMC 2014b). The most common forage fish species for salmonids include Pacific herring, surf smelt, and Pacific sand lance, all of which occur within the waters surrounding Ediz Hook.

The current salmon FMP includes 18 subsequent amendments. Amendment 18 was updated to reflect new information on EFH, including criteria for impassable barriers; addition of HAPCs; adjustments to geographic extent of EFH; and addition of non-fishing activities and conservation measures (PFMC 2014c). As indicated in the 2008 Final Rule that codified Pacific coast salmon EFH (73 FR 60987), all streams, estuaries, marine waters, and other water bodies occupied or historically accessible to salmon in Washington, Oregon, Idaho, and California are included within the EFH description. Juvenile Chinook and coho were collected during beach seine surveys along Ediz Hook in 2007 (Shaffer and Galuska 2009). Pink salmon were the most common salmonid collected during the spring and summer surveys conducted between 2006 and 2014 and chinook were common second most common during the spring time of those years (Fresh 2015). Documented spawning of pink salmon (odd year) occur in Morse creek located on the south side of the harbor.

7.3 Habitat Areas of Particular Concern

Designated HAPCs are regarded as essential for protection of federally managed species. HAPCs may be more vulnerable to degradation than the more general EFH designated by the PFMC. HAPCs are designated based on four criteria: rarity of the habitat type, ecological importance to EFH species, sensitivity of the habitat to human-induced environmental degradation, and whether and to what extent development will stress the habitat type. Categorization as HAPC does not confer additional protection or restrictions to the designated area.

7.3.1 Pacific Coast Groundfish

Designated HAPCs for Pacific groundfish include seagrass, canopy kelp, rocky reef, and estuarine habitats along the Pacific coast. The estuarine habitats HAPC extends landward to MHHW or the upriver extent of saltwater intrusion. The seagrasses HAPC includes eelgrass beds in estuaries, which occur in small patches along Ediz Hook.

7.3.2 Coastal Pelagic Species

No HAPCs have been formally designated for coastal pelagic species.

7.3.3 Pacific Coast Salmon

Five HAPCs have been designated for Pacific coast salmon. These include: 1) complex channels and floodplain habitats; 2) thermal refugia; 3) spawning habitat; 4) estuaries; and 5) marine and estuarine submerged aquatic vegetation (SAV) (PFMC 2014c).

Eelgrass and kelp are HAPCs within the Action Area and they provide important nursery, foraging, and shelter habitats to a variety of fish species including salmon as well as spawning substrate to Pacific herring which is an important prey species for all marine life stages of Pacific salmon. Juvenile salmon utilize eelgrass beds as migratory corridors as they transition to the open ocean, and the beds provide both refuge from predators and an abundant food supply. Eelgrass and canopy kelp occur along Ediz Hook, within the Action Area.

7.4 Description of Habitats

The project will occur in the nearshore marine waters along Ediz Hook within the Port Angeles Harbor. Chapter 4 provides a detailed description of the existing environmental conditions within the Harbor.

7.5 Assessment of Impacts

Potential effects of construction and operation of the project are addressed in Chapter 5.

The area where EFH may be affected beyond the immediate project area takes into account potential for direct and indirect physical, biological, and chemical effects of the project on motile marine fish species. Based on evaluation of all project impact areas (including upland and marine, construction and operations, and direct and indirect effects), it was determined that underwater noise, particularly pile driving noise during construction, was the project effect with the largest geographic extent impacting Pacific coast groundfish, coastal pelagic, and Pacific coast salmon EFH. As discussed in Sections 5.1.1 the most conservative area for evaluating the potential effects of noise on fish is where underwater noise exceeds levels that disturb marine fish, 150 dB RMS re 1 μPa which ultimately impacts use of EFH that occurs within this threshold zone. The maximum distance at which this guidance level will be exceeded during pile driving is 2,929 m for impact pile driving.

7.5.1 Construction Impacts

In-water construction will impact marine habitats used by EFH species through water column effects (underwater noise, water quality effects, presence of physical barriers and shading), which will affect both unvegetated and vegetated substrates. The greatest impact during construction will occur during impact pile driving.

7.5.1.1 Underwater Noise

Construction of the pier will result in increased underwater noise levels in Port Angeles Harbor, due primarily to the installation of piles, supporting the trestle, fixed pier, and floats. Some noise will also be generated from support vessels, small boat traffic, and

barge-mounted equipment, such as generators. However, the most significant in-water noise potentially affecting EFH will be from pile driving using an impact hammer.

The effects of elevated noise levels to fish with designated EFH in the project area are anticipated to be similar to those described for ESA-listed salmon (see Chapter 5). Pile driving will exceed the underwater noise threshold for fish injury and guideline for fish behavior, resulting in the greatest potential for adverse impacts on water column EFH. Pile driving will require 75 days to complete during a single in-water work season. The most significant underwater noise will be from impact pile driving of the 144 steel piles. As previously discussed, a vibratory pile driver will be used as the primary source of pile installation and will therefore minimize impacts to EFH. In the unlikely event that difficult subsurface conditions are encountered (i.e., cobble/boulder zones) requiring increased need for using impact hammer pile driving methods, the maximum number of days for impact pile driving will not exceed 75 of which intermittent impact pile driving will occur over the 75 day duration (using two in-water work windows). A maximum of 4 hours of impact pile driving may occur in a day and use of a bubble curtain would also minimize impacts to EFH.

7.5.1.2 Water Quality

Temporary increases in turbidity and suspended sediments could affect EFH by creating cloudy or murky conditions that interfere with predator avoidance, covering food sources or vegetation with sediments, and interfering with oxygen exchange via impacts to the gills. Nearshore habitat disturbance and localized turbidity increases could also affect the eggs and larvae of EFH species. Some species (e.g., market squid) deposit their eggs on, or in, the substrate. These eggs have the potential to be damaged directly by construction activities or smothered by sediments settling out of the water column. In addition, should nearshore spawning habitats be disturbed during the eggs' presence, these eggs could be dispersed into the water column, increasing their risk of predation. Other EFH species (e.g., English sole) have eggs that are positively buoyant. Elevated turbidity could alter normal dispersal patterns within the water column, potentially reducing their survival. Larvae for a number of species for which EFH has been designated could also be affected by increased turbidity. Although turbidity can improve the avoidance of predation by some species (e.g., English sole), it can be a limiting factor for other EFH species (De Robertis et al. 2003; Lemke and Ryer 2006). Hence, project-related changes in turbidity will be relatively small scale and localized and may affect EFH differently depending on varying life histories.

Circulation patterns and currents are important factors in the distribution of early life stages of a number of groundfish EFH species, including flatfish and rockfish. In the immediate vicinity of barges, tug boats, and other in-water construction equipment, small-scale changes in current direction and intensity of flow over periods of hours are anticipated during in-water construction of the pier. However, these effects will be localized, with the overall circulation patterns, current velocities, and water levels along Ediz Hook would be relatively unaffected during in-water construction. Since in-water construction activity will be limited to temporary and localized effects on circulation and currents, with no changes on overall nearshore current patterns, EFH for overall larval groundfish recruitment along Ediz Hook will not be affected.

7.5.1.3 Sediment Quality

Several COCs exist within the harbor and presence of these in the project area has not yet been determined. However, samples collected within 1,000 ft (304.8 m) of the proposed pier were found to be above the SQS and CSL screening levels. Therefore, increases in chemical contamination concentrations in marine waters as a result of sediment resuspension during construction activities will be negligible. Further, the potential for accidental spills or releases of hazardous materials (e.g., from barges, construction platforms, fueling activities on land or in water) will be minimized through implementation of spill prevention and response plans. Contractors will be required to prepare and implement a spill response plan (e.g., SPCC) to clean up fuel or fluid spills. As sediments are below the SQS level and increases in chemical contaminants as a result of spill would be minimized through implementation of these prevention and response plans, impacts to EFH would be negligible.

7.5.1.4 Marine Vegetation

Marine vegetation (eelgrass) within the project area will encounter some direct disturbance from overwater coverage and turbidity that will likely affect vegetation EFH that eggs are attached to. Barge anchoring within eelgrass that is present immediately adjacent to the proposed pier will be avoided to reduce further impacts. Avoidance and minimization measures will be in place to avoid eelgrass habitat surrounding the footprint of the proposed pier. However, eelgrass EFH and HAPC within the footprint of the pier (trestle) will be adversely affected. As discussed in section 2.2.5, compensatory mitigation will be implemented to offset the potential loss of approximately 4,595 ft^2 (426 m^2) of eelgrass.

7.5.1.5 Underwater Structures and Benthic Community

An underwater rock pile located just offshore of the jetty and approximately 1,600 ft (488 m) west of the proposed pier provides nursery habitat for juvenile rockfish and other groundfish. Further, kelp and algae are abundant within the rock pile structure and may be utilized as EFH by Pacific coast salmon EFH species and as Pacific coast salmon HAPC.

Pile driving will occur during the in-water work window when juvenile salmonids are least likely to be present and thus impacts to their use of the rock pile will be insignificant as they would not be present. However, groundfish are there year-round and will be exposed, although temporarily, to injurious noise thresholds from impact pile driving that will degrade use of the rock pile as EFH for groundfish species as well as potential exposure to temporary turbidity levels that may affect groundfish as well as coastal pelagic eggs that may be present within the structure. Pile driving activity will primarily occur using a vibratory pile driver with a maximum of 4 hours per day of impact pile driving over a duration of 75 days. Turbidity will be localized to the immediate project area and not likely to impact the rock pile west of the proposed pier site. Further, suspended sediments would likely settle out before they could reach the rock pile.

Indirect impacts to Groundfish EFH would result as prey, refugia, and vegetation will be reduced with overwater coverage of existing eelgrass habitat, causing permanent

reduction of light. However, this reduction of EFH would be insignificant in comparison with the EFH available within the Action Area in general.

Installation of piles will reduce and displace approximately 745 ft^2 (69 m^2) of benthic habitat and species that would otherwise serve as prey for EFH species. The muddy sandy EFH within the project area used by groundfish would experience a temporary reduction in benthic prey species and loss of muddy sandy habitats to utilize with installation of the piles. This reduction will be small in comparison to the availability of benthic prey and habits to utilize within the Action Area in general.

7.5.2 Potential Adverse Effects on Pacific Coast Groundfish EFH

Designated groundfish EFH includes all estuarine and marine waters from the MHHW line seaward, and the upriver extent of saltwater intrusion in rivers, and specific inland sea and estuarine designated EFH includes the epipelagic zone of the water column. This EFH includes macrophyte canopies and drift algae, soft-bottom habitats, hard-bottom habitats, mixed sediments (sand and rocks), and vegetated bottoms consisting of algal beds, macrophytes, or rooted vascular plants. Pacific coast groundfish species are considered sensitive to overfishing, the loss of habitat, and reduction in water and sediment quality. In addition to use of these habitat types, larval and juvenile groundfish (notably rockfish) are dependent on a variety of habitat factors, including current patterns for larval transport to suitable recruitment habitat (e.g., kelp and eelgrass), good water quality, and abundant food resources.

Noise and turbidity during pile driving will impact groundfish EFH. Although pile driving would primarily occur using a vibratory pile driver, impact pile driving will still be necessary for proofing piles. Impact pile driving will exceed the injury thresholds for fish for a maximum of 75 days and affecting groundfish EFH as this habitat would be used by these species year-round. Further, a reduction in muddy sandy benthic habitat utilized as groundfish EFH will be reduced within the project area with the installation of piles. Lastly, a permanent reduction in light penetration over the existing eelgrass, leading to a reduction in vegetation, prey, and refugia will result. Therefore, construction and operation of the pier may adversely affect EFH for Pacific coast groundfish, specifically rockfish.

7.5.3 Potential Adverse Effects on Coastal Pelagic EFH

EFH for coastal pelagic species includes all estuarine and marine waters above the thermocline where sea surface temperatures range from 50 to 68°F (10 to 20°C). These boundaries include the waters of Port Angeles Harbor. Coastal pelagic species are considered sensitive to overfishing, loss of habitat, reduction in water and sediment quality, and changes in marine hydrology, including entrainment through water intakes. These species are considered rare in the nearshore environments of Ediz Hook and Port Angeles Harbor in general and are more likely to occur in the offshore areas closer to and within the Strait of Juan de Fuca. However, Northern anchovy do use estuarine habitats such as the intertidal zone, eelgrass, kelp, and macroalgae, and could therefore be affected by the impacts on designated EFH.

Construction and operation of the proposed project will not cause an increase in fishing or entrainment through water intakes. As discussed in Section 2.4, implementation of

suitable BMPs and current practices, and consideration of appropriate stormwater management controls through the base SWPPP will minimize potential for violations of state water quality standards from construction and operation of the pier.

Underwater noise, water column turbidity, temporary and permanent shading effects, and physical disruption from pile driving activities, work barges, and spud/anchoring systems during construction will create short-term disturbances in habitats used by coastal pelagic species and long-term reduction in nursery habitat, localized to the project area. Therefore, construction and operation of the pier will adversely affect EFH for coastal pelagic species, specifically northern anchovy.

7.5.4 Potential Adverse Effects on Pacific Coast Salmonid EFH

The EFH designation for the Pacific coast salmon includes nearshore and tidal submerged environments and locations of freshwater discharges in the nearshore zone (PFMC 2014b). Pacific salmon EFH is primarily affected by the loss of suitable spawning habitat, barriers to fish migration (habitat access), reduction in water and sediment quality, changes in estuarine hydrology, and decreases in prey food source. During construction, implementation of in-water BMPs and current practices will prevent anticipated violations of state water or sediment quality standards that will otherwise degrade water column EFH (i.e., turbidity, DO, salinity, temperature, contaminants). Increased turbidity during pile driving and anchor/spudding of vessels will not violate State water quality standards and any impacts will be localized, temporary, and not likely to occur during outmigration of Pacific coast salmon EFH species.

Pile driving during construction will result in a significant increase in water column noise in Port Angeles Harbor where the threshold for injury and guideline behavioral response will be exceeded, leading to potential injury, mortality, or behavioral effects. Primary use of a vibratory pile driver, use of an attenuation device during impact pile driving, and conducting pile driving during the in-water work window will avoid most affects to migrating Pacific coast salmon species that may be using EFH within the area. However, esonification of the water column as a result of the pile driving activities will have an adverse effect on habitats designated as EFH for Pacific Coast salmon. Further, SAV is a HAPC for Pacific coast salmon (PFMC 2014c). Construction will impact water column and SAV through an increase in pile driving noise, turbidity, and long-term permanent overwater shade. Therefore, construction and operation of the pier will adversely affect EFH for Pacific coast groundfish, coastal pelagic, and Pacific coast salmon species.

Table 7-1. Summary of Potential Impacts on EFH by Impact Type

Type of Impact	Temporary (days to weeks)	Short Term (<2 years)	Long Term (≥2 to <20 years)	Permanent (≥20 years)
Water Quality	✓			
Sediment Quality	✓			
Physical Barriers				✓
Marine Vegetation				✓
Benthic Communities & Prey Availability		✓		
Forage Fish	✓			
Underwater Noise	✓			

7.6 EFH Conservation Measures

Section 2.4 lists measures that will be incorporated into the project to avoid, reduce, and minimize the effects on marine habitats and fish including ESA-listed species. Measures to reduce project effects include BMPs and current practices to minimize impacts on water quality and the seafloor during construction and operations, measures to attenuate underwater noise, and habitat mitigation.

7.7 Conclusions

Based on a review of the EFH in Port Angeles Harbor, findings pertaining to EFH habitats and federally managed species occurrence in waters within Ediz Hook based on site-specific fish surveys, review of the life histories, habitat requirements, and potential conservation measures from the FMPs, and review of the conservation measures developed to minimize adverse effects on EFH, the Navy concludes that construction and operation of the TPS project ***may adversely affect Pacific coast groundfish, coastal pelagics, and Pacific coast salmon EFH.*** However, BMPs and minimization measures that will be implemented will minimize adverse effects to the extent practicable and all effects other than permanent shade will cease upon completion of the TPS project.

Table 7-2. EFH Effects Determinations

EFH	Effects Determination
Pacific Coast Groundfish EFH	*May adversely effect*
Coastal Pelagics EFH	*May adversely effect*
Pacific Coast Salmon EFH	*May adversely effect*

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APPENDIX A — EELGRASS SURVEY

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Eelgrass and Macroalgae Habitat Surveys

Proposed Transit Protection System Pier
U.S. Coast Guard Air Station/Sector Field Office
Port Angeles, WA

Final

Prepared for:

U.S. Navy
Naval Facilities Engineering Command Northwest
1101 Tautog Circle, Bldg. 1101
Silverdale, WA 98315

and

Cardno Inc
2825 Eastlake Avenue East
Suite 300
Seattle, WA 98102

Prepared by:

Science and Engineering for the Environment, LLC
4401 Latona Ave NE
Seattle, WA 98105

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TABLE OF CONTENTS

1. Introduction 1

2. Survey Methods 1
   2.1 Site Reconnaissance Survey 1
   2.2 Preliminary Survey 2
   2.3 Advanced Survey 2
   2.4 Post-Processing 3

3. Results 4
   3.1 Alternative 1 4
   3.2 Alternative 2 5
   3.3 Alternative 3 5

4. Discussion 6

5. References 7

LIST OF TABLES

Table 1 Video eelgrass, macroalgae, invertebrate and fish observations at Alternative 1 (Midwestern) 8

Table 2. Upper Intertidal Eelgrass Turion Counts at Alternatives 1 and 2 18

Table 3. Diver Eelgrass and Macroalgal Survey at Alternative 1 (Midwestern) 19

Table 4. Video eelgrass, macroalgae, invertebrate and fish observations at Alternative 2 (Western) 21

Table 5. Advance Eelgrass and Macroalgae Survey: Alternative 2 (Western) 27

Table 6. Video eelgrass, macroalgae, invertebrate and fish observations at Alternative 3 (Eastern) 29

Table 7. Advance Eelgrass and Macroalgae Survey: Alternative 3 (Eastern) 33

LIST OF FIGURES

Figure 1 Site Location and Existing Conditions 35

Figure 2 Eelgrass Observations from Site Reconnaissance Survey, June 4, 2014 36

Figure 3 Results of Eelgrass Video and Diver Surveys at Alternative 1 37

Figure 4 Estimated areal extent of eelgrass within the Alternative 1 project area.....38

Figure 5 Results of Eelgrass Video and Diver Surveys at Alternative 2 39

Figure 6 Estimated areal extent of eelgrass within the Alternative 2 project area.....40

Figure 7 Results of Eelgrass Video and Diver Surveys at Alternative 3 41

Figure 8 Estimated areal extent of eelgrass within the Alternative 3 project area.....42

LIST OF APPENDICES

Appendix A Eelgrass and Macroalgae Habitat Survey Plan

Appendix B Video Surveys

Appendix C Diver Survey Sheets

1. INTRODUCTION

This document presents the results of the eelgrass (*Zostera marina*) and macroalgae surveys conducted on the south side of Ediz Hook, in the waters of the U.S. Coast Guard (USCG) Air Station/Sector Field Office Port Angeles (USCG AIRSTA/SFO Port Angeles), Clallam County, WA. These surveys followed the procedures described in the Survey Plan (the Plan) dated June 29, 2015 and submitted to the U.S. Navy. The Plan may be found in Appendix A to this report.

The surveys support the Environmental Assessment being prepared by the U.S. Navy to evaluate proposed pier and support facilities for the United States Coast Guard operated Transit Protection System (TPS) vessels at Port Angeles. The Navy is considering three action alternatives for analysis that meet the purpose and need for supporting the Transit Protection System's mission. The three action alternatives are located at USCG AIRSTA/SFO Port Angeles (see Figure 1). Alternative 1 is the Midwestern Site and its proposed pier is located to the west of the existing USCG pier. Alternative 2 is the Western Site and its proposed pier is located on the west portion of USCG AIRSTA/SFO Port Angeles, just east of the Puget Sound Pilot Station. Alternative 3 is the Eastern Site and its proposed pier is located on the east end of the installation near the end of the abandoned cross wind runway. The location of the pier alternatives are shown in Figure 1.

The objectives of the surveys were to:

- Video record the presence of eelgrass and macroalgae within the proposed pier footprints,
- Provide to the degree practicable geo-referenced delineations of the eelgrass beds, and,
- Conduct diver surveys to confirm the findings of the video survey and to conduct eelgrass shoot ("turions") density measures,
- Produce GIS-based figures of eelgrass location(s) with associated bathymetry within the proposed project areas, and
- Provide an estimate of eelgrass that may be impacted within the proposed project areas.

2. SURVEY METHODS

Survey methods for both the preliminary and advanced surveys followed Washington Department of Fish and Wildlife (WDFW) Eelgrass/ Macroalgae Interim Survey Guidelines and are detailed in the June 29, 2015 Survey Plan (Appendix A). A description of the process and where the actual survey varied from the Plan is described below.

2.1 SITE RECONNAISSANCE SURVEY

A shore-walk reconnaissance survey was conducted by SEE on June 4, 2015, between 10:26 and 12:36 hrs. Low tide on that day was 10:36 at -1.76 ft MLLW. Eelgrass (*Zostera marina*) was observed at all three proposed alternative locations. Generally, the eelgrass was in discontinuous patches from the Washington Pilot Association Pier to the jetty/rock groin at Alternative 2. From the east side of the jetty, the eelgrass is in a continuous band through the proposed Alternative 1 (Figure 2). Eelgrass was not observed from the shore through the area at the USCG T-Pier. Beyond the T-Pier wave attenuator on the eastern side of the USCG operational pier the eelgrass was again contiguous out through the approximate location of Alternative 3.

The major macroalgae cover species observed principally in the lower intertidal at Alternatives 1 and 2 locations included species of *Ulva, Laminaria*, *Costaria, Iridea*, and *Sarcodiotheca.* Other algal genera observed included *Smithora naidadum, Lethesia difformis, Fucus distichus*, and coralline algae (species not identified). At the Eastern proposed pier site there were no major macroalgae within the intertidal areas, but offshore and outside (southward) of the eelgrass beds *Nereocystis lutkeana* was observed.

2.2 PRELIMINARY SURVEY

The preliminary survey was conducted in two separate events using a combination of shore-based delineation with a Differential Global Positioning System (dGPS) for eelgrass exposed during an extreme low tide, and an underwater video survey tied to position (latitude/longitude) during a high tide event.

The shore-based survey was conducted on July 3, 2015 beginning at 0900 hrs, taking advantage of a -2.2 ft MLLW tide at 1037 hrs. At Alternatives 1 and 2 (Midwestern and Western, respectively), a hand-held Trimble 6000 dGPS was used to mark the upper intertidal boundaries of the eelgrass beds as a continuous track in approximately 25 ft intervals. Eelgrass turion counts in 0.25 m^2 quadrants were made at approximately 100 ft intervals at the upper intertidal eelgrass limit. The surveys were completed for Alternatives 1 and 2, but the tide returned and re-submerged all the eelgrass at Alternative 3 (Eastern) prior to being able to conduct the shore-survey.

The subtidal video survey occurred on July 6, 2015 principally following the procedures described in the *Survey Plan*. Inclement weather with near-gale winds blowing west-northwest and small craft advisories were issued in the afternoon at Port Angeles on that day. This created difficulties in holding the boat on the planned track line, which resulted in the following changes to the survey execution.

- All of the tracklines (8) for Alternative 2 were completed.
- Only tracks 1 – 9 for Alternative 1 (10 tracks were planned for). This was due to the fact that by the time the first nine tracks were completed it was 1730 hrs, the winds were still increasing and, in holding the track lines in the wind more fuel had been expended than had been anticipated[1]. A field decision was to abandon Track 10 at Alternative 1 and accomplish the survey at Alternative 3.
- For safety reasons only 5 of the planned 8 survey tracks at Alternative 3 were accomplished. The eastern site was very exposed to wind and wave, and it was very difficult to maintain the trackline. Given fuel limits and safety concerns, the video surveys were conducted along tracks 1, 2, 4, 6, and 8 at the Eastern site.

2.3 ADVANCED SURVEY

The advance diver-based survey was conducted on July 21, 2013. The divers used were from Dickinson Marine Services and Ardea Enterprises. The divers from both firms have conducted

[1] all fuel tanks were full at the start of the day

numerous eelgrass surveys. The surveys were conducted along four transect lines at the center of each of the proposed alternatives (see Figures 6 – 8 in the *Survey Plan*) as follows:

- Alternative 1 (Midwestern) transects MWT05 – MWT08
- Alternative 2 (Western) transects WT03 – WT04, and WT06 – WT07
- Alternative 3 (Eastern) transects ET04 – ET07.

For Alternative 2, the center-line transect WT05 was not included in the diver survey as the video survey had shown very little offshore eelgrass along that line.

For each transect, a fixed point was set in the upper intertidal at approximately +5 ft MLLW. A 300 ft fiberglass measuring tape was staked at each point, and the divers swam the tape out, perpendicular to the shoreline, to the furthest (deepest) edge of the eelgrass bed, or 300 ft, whichever came first.

Once the transect line was fixed, the divers followed the tape line back toward the shore recording the following information on water-proof paper:

- Time the dive began
- Compass bearing for the diver transect
- Distance from the fixed point to the lower edge of the eelgrass bed
- Counts of the number of turions (eelgrass shoots) per 0.25 m^2 quadrats approximately every 25 ft
- The distance from the fixed point and the diver-depth at each location where counts were made
- The presence of major macroalgae at each of those locations, and the approximate area covered within the quadrats
- Substrate type (e.g., sand, cobble)
- Any observed macroinvertebrates
- Distance from the fixed point to the upper edge of the eelgrass bed
- Time the dive ended

The *Survey Plan* required a minimum of 30 quadrat counts per alternative. In order to achieve that count number, either two quadrat counts were made at each 25 ft interval, or in one case (ET04) the divers conducted parallel transects: the first on the planned track and the second 25 ft immediately east.

2.4 POST-PROCESSING

For the preliminary survey, post-processing the data included a 100% review of all transect videos. For each transect, the time, latitude, longitude, presence/absence of eelgrass, presence of macroalgae, macrofauna and fish, and general substrate type were recorded onto an Excel spreadsheet. Within the eelgrass beds these notes were taken every 15 seconds; seaward of the eelgrass beds every 30 seconds. The shore-based eelgrass data were combined with the video survey locations to create a general map of the bed locations.

The results of the advanced survey results were transcribed into an Excel spreadsheet. For each survey point, the distance from the fixed point along the transect line were plotted onto the site

map in GIS, and the corresponding latitude, longitude, and depth based on site bathymetry were reported out to the spreadsheet.

The following information was used to generate a GIS-map of the eelgrass distribution along the project areas:

- Results from this survey
- Washington Department of Natural Resources Marine Vegetation Atlas
- Washington Ecology Coastal Atlas Survey aerial photos
- 2012 – Ediz Hook Transit Protection System Preliminary Eelgrass and Macroalgae Survey (Grette and Associates Memorandum dated December 7, 2012)
- 2003 – Diver surveys in support of proposed small craft pier expansion (MCS Environmental 2003)

The resultant eelgrass distribution was used to estimate the potential impact area for each of the proposed alternatives. Two numbers are provided by alternative: (1) the total area of eelgrass within the surveyed transects and (2) the area of eelgrass directly under the proposed piers.

3. RESULTS

The results of the surveys horizontal are presented by alternative, below. Generally, at the head and west of the jetty at Alternative 2 the eelgrass is patchy and sparse. East of the jetty begins a large bed that is contiguous all the way through to the east of Alternative 2, ending just west of the USCG T-pier. Eelgrass is patchy within the T-pier up to the wave attenuator on the east, and then again a contiguous bed through the eastern edge of Alternative 3.

The recorded video surveys are included with this report as Appendix B, but only on the DVD version of the report submitted to the Navy. Copies of the diver data sheets are given in Appendix C.

3.1 ALTERNATIVE 1

At Alternative 1 the eelgrass is a continuous bed beginning at the east side of the jetty at Alternative 2, and is principally found between 0 and -20 ft MLLW (Figure 2). Individual plants were observed in the video survey down to as deep as -35 ft MLLW, but in the diver survey the lower limit was -20 ft MLLW (Figure 3, Table 1). Turion counts along the upper intertidal limit of the eelgrass beds were 23 – 40 per 0.25 m^2 (Table 2). As noted previously, time and tides prevented surveys at transect MWT 10.

The diver survey confirmed the findings of the video survey, with the exception that the divers generally reported the eelgrass at approximately -1.5 ft to -20 ft MLLW (Table 3). The divers further confirmed that the eelgrass within the surveyed transect were contiguous, and not patchy. The average eelgrass density of the 42 sampled quadrats was 18 turions/0.25 m^2 (Table 3). Figure 3 shows the shoreside, video and diver survey eelgrass locations; again the areas between points, unless otherwise indicated, are contiguous eelgrass.
Macroalgae observed at the Alternative 1 were principally *Ulva*, *Laminaria*, and *Sarcodiotheca* spp. Other algal species and invertebrates observed during the video and diver surveys are given in Tables 1 and 3.

Eelgrass distribution relative to Alternative 1 is shown in Figure 4. The extent of eelgrass within the transect area (MWT01 – MWT10) is 98,873 ft^2; eelgrass that is directly under the proposed pier structure is 4,595 ft^2.

3.2 ALTERNATIVE 2

For Alternative 2 eelgrass on the west side of the jetty consisted principally of relatively small, discontinuous patches (Transects WT01 – 04). Very little eelgrass was observed along transects WT03 through WT06, and what was seen in either the video or by the divers were solitary plants. On the east side of the finger pier there is one dense, contiguous bed of eelgrass between approximately –1 ft and -20 ft MLLW and east through transect MWT 10 at Alternative 1 (Figure 5, Table 4). The shallowest eelgrass observed was to -0.5 ft MLLW, and deeper than -20 ft MLLW there were occasional solitary plants down to as deep as -30 ft MLLW. Turion counts along the upper intertidal limit of the eelgrass beds were between 13 – 19 per 0.25 m^2 to the west of the finger pier, and from 14 to 52 turions per 0.25 m^2 on the eastern side of the jetty (Table 2).

Diver survey results are given in Table 5. The diver's confirmed that eelgrass on the west side of the jetty is very sparse, but is a wide, dense bed to the east. On the east side of the project area eelgrass is between approximately -0.2 to as deep as -29 ft MLLW, but principally between 0 and -20 ft MLLW. Turion counts on the east edge of the project averaged 8.1 per 0.25 m^2 quadrat (Table 5). Shore-based, video and diver survey eelgrass locations are given in Figure 5; except where noted eelgrass is contiguous between the recorded points.

Macroalgae observed at the Alternative 2 were principally *Ulva*, *Laminaria*, and *Sargassum* spp. Other algal species and invertebrates observed during the video and diver surveys are given in Tables 4 and 5.

Eelgrass distribution relative to Alternative 2 is shown in Figure 6. The eelgrass within the transect areas (WT01 – WT08) is 49,693 ft^2. There are small discrete patches of eelgrass under the approach trestle (<10 ft^2), but no eelgrass directly under the proposed pier structure.

3.3 ALTERNATIVE 3

For Alternative 3 the WDNR Marine Vegetation Atlas and the Ecology Coast Atlas Survey aerial photos indicate a relatively contiguous bed beginning at the eastern edge of the USCG T-Pier to just east of the proposed project location. During the reconnaissance survey, eelgrass up through the eastern edge of the proposed alternative was confirmed to be contiguous, not patchy.

The results from the video and diver surveys are shown on Figure 6. As noted above, video transects were done for ET01, ET02, ET04, ET06, and ET08; dive surveys were done for ET04 through ET07. Some additional points on Figure 3 near transect ET03 were drift positions; due to the high winds along transect ET04 it was necessary to move the boat forward into the wind. The video survey equipment remained on during the course adjustments. Of note is that there is not an equivalent shore-side survey here, and for Alternative 3 bathymetric surveys have not been conducted.

Eelgrass was in a relatively narrow bed between transects ET01 and ET06. Based upon the diver-collected depth measurements that were corrected for tidal elevation, eelgrass from ET01 to ET06 was between approximately -1.5 to -19 ft MLLW, but is limited to approximately -3 to -19 ft MLLW at ET07. No eelgrass was observed in the video survey at ET08. Diver survey results are given in Table 7. Turion counts averaged 30 per 0.25 m^2 quadrat (Table 7). This may be due to the fact that in progressing eastward, the shore becomes steep and is principally dominated by large cobble.

Eelgrass distribution relative to Alternative 3 is shown in Figure 8. The total extent of eelgrass within the transect area (ET01 – ET08) is 47,909 ft^2. The eelgrass area that is directly under the proposed pier structure is 15,233 ft^2.

Macroalgae observed at Alternative 3 was principally *Laminaria*, *Nereocystis, Ulva*, and *Sarcodiotheca*. Other algal species and invertebrates observed are given in Tables 6 and 7.

4. DISCUSSION

These findings are principally consistent with those of the previous studies cited in the *Survey Plan*. While the WDNR Plant Atlas shows eelgrass along all of the south side of Ediz Hook, the Ecology aerial photos, the 2012 surveys at Alternatives 2 and 3 (Grette Associates 2012), and this study demonstrate a somewhat more restricted area. Of particular note is the general sparsity of eelgrass west of the jetty at Alternative 2.

While some of the video transects listed in the Survey Plan were not able to be conducted, the omission of Transect 10 at Alternative 1 and Transects 3, 5 and 7 from Alternative 3 do not significantly impact the conclusions from this report. At Alternative 1, the gap in information was supplemented by the existing bathymetry along with the WDNR Marine Vegetation Atlas and the Ecology Coastal Atlas Survey to provide a reasonable estimate of the eelgrass at the eastern edge of Alternative 1. For Alternative 3, the information from the missing video transects (3, 5 and 7) was filled in by the diver transects at Transects 4, 5, 6 and 7. Again the information was supplemented by the WDNR and Ecology resources, as well as the 2012 survey at Alternative 3.

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Table 1 Video eelgrass, macroalgae, invertebrate and fish observations at Alternative 1 (Midwestern)

MWT01: Offshore to Inshore Transect								
Date	**Time**	**Latitude (NAD 83)**	**Longitude (NAD 83)**	**Substrate**	**Eelgrass**	**Macroalgae**	**Invertebrates**	**Fish**
6-Jul	14:39:09	48 08.3783	123 25.1429	Silty Sand	---	---	*Pandalus*	---
	14:39:29	48 08.3773	123 25.1399	Silty Sand	---	---	---	---
	14:40:00	48 08.3801	123 25.1444	Silty Sand	---	drift *Laminaria, Ulva*	---	---
	14:40:30	48 08.3883	123 25.1436	Silty Sand	---	---	---	---
	14:41:00	48 08.3947	123 25.1407	Silty Sand	---	*Laminaria, Ulva, Sarcodiotheca*	---	---
	14:41:30	48 08.3997	123 25.1374	Silty Sand	---	*Laminaria, Sarcodiotheca, Plocamium*	---	---
	14:42:00	48 08.4037	123 25.1393	Silty Sand	present	*Laminaria*	---	---
	14:42:15	48 08.4061	123 25.1402	Silty Sand	present	*Laminaria*	---	---
	14:42:30	48 08.4077	123 25.1370	Silty Sand	present	*Laminaria*	---	---
	14:42:45	48 08.4093	123 25.1347	Silty Sand	present	*Laminaria, Smithora*	*Aurelia*	---
	14:43:00	48 08.4110	123 25.1324	Silty Sand	present	*Laminaria, Smithora*	---	---
	14:43:15	48 08.4118	123 25.1303	Silty Sand	present	*Laminaria, Smithora*	---	---
	14:43:30	48 08.4127	123 25.1325	Silty Sand	present	*Smithora*	---	---
	14:43:45	48 08.4134	123 25.1347	Silty Sand	present	*Smithora*	---	---
	14:44:00	48 08.4137	123 25.1351	Silty Sand	present	*Smithora*	---	---
	14:44:15	48 08.4161	123 25.1345	Silty Sand	present	*Smithora*	---	---
	14:44:30	48 08.4191	123 25.1347	Silty Sand	present	*Ulva, Smithora*	---	---
	14:44:45	48 08.4209	123 25.1357	Silty Sand	present	*Smithora*	---	---
	14:45:00	48 08.4237	123 25.1365	Silty Sand	present	*Smithora*	---	---
	14:45:09	48 08.4261	123 25.1358	Silty Sand	present	*Smithora*	---	---

Table 1 Video eelgrass, macroalgae, invertebrate and fish observations at Alternative 1 (Midwestern)

MWT02: Inshore to Offshore Transect								
Date	**Time**	**Latitude (NAD 83)**	**Longitude (NAD 83)**	**Substrate**	**Eelgrass**	**Macroalgae**	**Invertebrates**	**Fish**
6-Jul	14:58:56	48 08.4281	123 25.1047	Silty Sand	present	*Smithora*	---	---
	14:59:15	48 08.4257	123 25.1071	Silty Sand	present	*Ulva, Smithora*	---	---
	14:59:30	48 08.4230	123 25.1097	Silty Sand	present	*Ulva, Smithora*	---	---
	14:59:45	48 08.4204	123 25.1106	Silty Sand	present	*Ulva, Smithora*	---	---
	15:00:00	48 08.4172	123 25.1122	Silty Sand	present	*Ulva, Smithora*	*Aurelia*	---
	15:00:15	48 08.4141	123 25.1108	Silty Sand	present		---	---
	15:00:30	48 08.4106	123 25.1119	Silty Sand	present	*Ulva, Smithora*	*Aurelia*	---
	15:01:00	48 08.4042	123 25.1102	Silty Sand with cobble	---	*Ulva, Laminaria, Sarcodiotheca, Iridea*	---	---
	15:01:30	48 08.4038	123 25.1137	Silty Sand with cobble	---	*Ulva, Laminaria, Sarcodiotheca, Iridea*	---	---
	15:02:02	48 08.3957	123 25.1144	Silty Sand	---	---	---	---
	15:02:30	48 08.3934	123 25.1119	Silty Sand	---	*Ulva*	---	---
	15:03:00	48 08.3929	123 25.1110	Silty Sand	---	*Ulva*	---	---
	15:03:30	48 08.3865	123 25.1147	Silty Sand	---	---	---	---
	15:04:00	48 08.3832	123 25.1184	Silty Sand	---	---	---	---
	15:04:30	48 08.3803	123 25.1202	Silty Sand	---	---	---	---
	15:05:00	48 08.3851	123 25.1126	Silty Sand	---	---	---	---
	15:05:13	48 08.3881	123 25.1127	Silty Sand	---	---	---	---

Table 1 Video eelgrass, macroalgae, invertebrate and fish observations at Alternative 1 (Midwestern)

MWT03: Inshore to Offshore Transect								
Date	**Time**	**Latitude (NAD 83)**	**Longitude (NAD 83)**	**Substrate**	**Eelgrass**	**Macroalgae**	**Invertebrates**	**Fish**
6-Jul	15:15:10	48 08.4265	123 25.0803	Silty Sand	present	*Smithora*	---	---
	15:15:30	48 08.4253	123 25.0811	Silty Sand	present	---	---	---
	15:15:45	48 08.4232	123 25.0831	Silty Sand	present	*Ulva*	---	---
	15:16:00	48 08.4209	123 25.0852	Silty Sand	present	---	---	---
	15:16:15	48 08.4164	123 25.0840	Silty Sand	present	---	---	---
	15:16:30	48 08.4132	123 25.0837	Silty Sand	present	---	---	---
	15:16:38	48 08.4111	123 25.0859	Silty Sand	present	*Laminaria,*	---	---
	15:17:00	48 08.4058	123 25.0875	Silty Sand with cobble	---	*Laminaria, Ulva, Sarcodiotheca*	---	---
	15:17:30	48 08.4013	123 25.0874	Silty Sand with cobble	---	*Laminaria, Ulva, Sarcodiotheca*	---	---
	15:18:00	48 08.4020	123 25.0821	Silty Sand with cobble	---	*Laminaria, Ulva, Sarcodiotheca*	---	---
	15:18:30	48 08.3939	123 25.0825	Silty Sand	---	---	---	---
	15:19:00	48 08.3995	123 25.0791	Silty Sand	---	*Laminaria, Ulva*	---	---
	15:19:30	48 08.3952	123 25.0797	Silty Sand	---	---	---	---
	15:20:00	48 08.4009	123 25.0701	Silty Sand	---	*Laminaria, Ulva*	---	---
	15:20:30	48 08.4014	123 25.0592	Silty Sand with cobble	present	*Laminaria, Ulva, Sarcodiotheca*	---	---
	15:21:00	48 08.4025	123 25.0647	Silty Sand with cobble	---	*Laminaria, Ulva, Sarcodiotheca*	*Aurelia*	---
	15:22:30	48 08.3918	123 25.0548	Silty Sand	---	---	---	---
	15:22:49	48 08.3944	123 25.0447	Silty Sand with cobble	present	*Laminaria, Ulva, Sarcodiotheca*	---	---

Table 1 Video eelgrass, macroalgae, invertebrate and fish observations at Alternative 1 (Midwestern)

MWT04: Inshore to Offshore Transect								
Date	**Time**	**Latitude (NAD 83)**	**Longitude (NAD 83)**	**Substrate**	**Eelgrass**	**Macroalgae**	**Invertebrates**	**Fish**
6-Jul	15:35:38	48 08.4226	123 25.0577	Silty Sand	present	---	---	---
	15:36:00	48 08.4212	123 25.0599	Silty Sand	present	*Ulva, Laminaria*	*Aurelia*	---
	15:36:15	48 08.4185	123 25.0604	Silty Sand	present	---	---	---
	15:36:30	48 08.4157	123 25.0610	Silty Sand	present	*Ulva*	---	---
	15:36:45	48 08.4121	123 25.0597	Silty Sand	present	*Ulva, Laminaria*	*Aurelia*	---
	15:37:00	48 08.4118	123 25.0614	Silty Sand	present	*Smithora*	*Aurelia*	---
	15:37:15	48 08.4164	123 25.0600	Silty Sand	present	*Ulva, Laminaria, Smithora*	---	---
	15:37:30	48 08.4130	123 25.0566	Silty Sand	present	*Ulva, Laminaria, Smithora*	---	---
	15:37:45	48 08.4086	123 25.0574	Silty Sand	present	---	---	---
	15:38:02	48 08.4036	123 25.0572	Silty Sand	present	---	---	---
	15:38:14	48 08.4120	123 25.0574	Silty Sand	present	---	---	---
	15:38:30	48 08.4143	123 25.0541	Silty Sand	present	*Smithora*	---	---
	15:38:45	48 08.4110	123 25.0576	Silty Sand	present	---	---	---
	15:39:29	48 08.4000	123 25.0608	Silty Sand with cobble	---	*Laminaria, Nerocystis,Iridea, Sarcodiotheca, Ulva*	---	---
	15:40:00	48 08.3982	123 25.0677	Silty Sand with cobble	---	*Laminaria, Ulva*	---	---
	15:40:30	48 08.3948	123 25.0602	Silty Sand	---	---	---	---
	15:41:00	48 08.3943	123 25.0652	Silty Sand	---	*Gracilaria*	---	---
	15:41:30	48 08.3903	123 25.0671	Silty Sand	---		---	---
	15:42:00	48 08.3853	123 25.0659	Silty Sand	---	---	---	---
	15:42:30	48 08.3792	123 25.0673	Silty Sand	---	---	---	---
	15:43:07	48 08.3760	123 25.0644	Silty Sand	---	---	*Pandalus*	---
	15:43:30	48 08.3751	123 25.0668	Silty Sand	---	---	---	---
	15:44:00	48 08.3706	123 25.0668	Silty Sand	---	---	---	---
	15:44:14	48 08.3682	123 25.0674	Silty Sand	---	---	---	---

Table 1 Video eelgrass, macroalgae, invertebrate and fish observations at Alternative 1 (Midwestern)

MWT05: Inshore to Offshore Transect								
Date	**Time**	**Latitude (NAD 83)**	**Longitude (NAD 83)**	**Substrate**	**Eelgrass**	**Macroalgae**	**Invertebrates**	**Fish**
6-Jul	15:52:46	48 08.4217	123 25.0483	Silty Sand	present	---	---	---
	15:53:00	48 08.4196	123 25.0513	Silty Sand	present	---	---	---
	15:53:15	48 08.4145	123 25.0480	Silty Sand	present	---	---	---
	15:53:30	48 08.4085	123 25.0459	Silty Sand	present	*Laminaria*	*Cancer magister*	---
	15:53:45	48 08.4085	123 25.0459	Silty Sand	present	---	---	---
	15:54:00	48 08.4059	123 25.0498	Silty Sand	present	*Laminaria, Costaria*	---	---
	15:54:15	48 08.4054	123 25.0513	Silty Sand	present	*Laminaria*	---	---
	15:54:30	48 08.4041	123 25.0521	Silty Sand	present	*Laminaria*	---	---
	15:54:45	48 08.4024	123 25.0495	Silty Sand with cobble	---	*Laminaria, Ulva*	---	---
	15:55:15	48 08.3963	123 25.0516	Silty Sand with cobble	---	*Laminaria, Ulva, Sarcodiotheca*	---	Numerous small (2 - 3 inch) undefined schooled fish
	15:55:45	48 08.3958	123 25.0556	Silty Sand	---	*Laminaria, Ulva, Sarcodiotheca*	*C. productus, C.magister, Parastichapus*	---
	15:56:15	48 08.3898	123 25.0514	Silty Sand	---	Small unidentified red algae	*C. magister*	---
	15:56:45	48 08.3860	123 25.0546	Silty Sand	---	Small unidentified red algae	---	---
	15:57:15	48 08.3852	123 25.0538	Silty Sand	---	Small unidentified red algae	---	---
	15:57:45	48 08.3820	123 25.0580	Silty Sand	---	Small unidentified red algae	---	---
	15:58:09	48 08.3779	123 25.0564	Silty Sand	---	Small unidentified red algae	---	---

Table 1 Video eelgrass, macroalgae, invertebrate and fish observations at Alternative 1 (Midwestern)

MWT06: Inshore to Offshore Transect								
Date	**Time**	**Latitude (NAD 83)**	**Longitude (NAD 83)**	**Substrate**	**Eelgrass**	**Macroalgae**	**Invertebrates**	**Fish**
6-Jul	16:07:45	48 08.4192	123 25.0305	Silty Sand	present	*Ulva*	---	---
	16:08:00	48 08.4195	123 25.0350	Silty Sand	present	---	---	---
	16:08:15	48 08.4147	123 25.0356	Silty Sand	present	*Laminaria*	---	---
	16:08:30	48 08.4106	123 25.0355	Silty Sand	present	---	---	---
	16:08:45	48 08.4058	123 25.0350	Silty Sand with cobble	---	*Laminaria, Ulva*	---	---
	16:09:00	48 08.4042	123 25.0346	Silty Sand with cobble	present	*Laminaria, Ulva*	---	---
	16:09:15	48 08.4048	123 25.0360	Silty Sand with cobble	present	*Laminaria, Ulva*	---	---
	16:09:30	48 08.4068	123 25.0356	Silty Sand with cobble	present	*Laminaria, Ulva*	---	---
	16:09:45	48 08.4047	123 25.0353	Silty Sand with cobble	---	*Laminaria, Ulva*	---	---
	16:10:15	48 08.3987	123 25.0385	Silty Sand with cobble	---	*Laminaria, Ulva*	---	---
	16:10:45	48 08.3907	123 25.0422	Silty Sand with shell hash	---	Small unidentified red algae	---	---
	16:11:15	48 08.3928	123 25.0387	Silty Sand	---	*Gracilaria*, Small unidentified red algae	---	*Platichthys stellatus*
	16:11:45	48 08.3835	123 25.0438	Silty Sand	---	*Gracilaria*, Small unidentified red algae	---	---
	16:12:15	48 08.3757	123 25.0439	Silty Sand	---	Small unidentified red algae	---	---
	16:12:45	48 08.3719	123 25.0429	Silty Sand	---	Small unidentified red algae	---	---
	16:12:52	48 08.3704	123 25.0431	Silty Sand	---	Small unidentified red algae	---	---

Table 1 Video eelgrass, macroalgae, invertebrate and fish observations at Alternative 1 (Midwestern)

MWT07: Inshore to Offshore Transect								
Date	**Time**	**Latitude (NAD 83)**	**Longitude (NAD 83)**	**Substrate**	**Eelgrass**	**Macroalgae**	**Invertebrates**	**Fish**
6-Jul	16:44:30	48 08.4251	123 25.0094	Silty Sand with cobble	---	*Ulva*	---	---
	16:44:45	48 08.4225	123 25.0104	Silty Sand with cobble	present	*Ulva*	---	---
	16:45:00	48 08.4191	123 25.0112	Silty Sand with cobble	present	---	---	---
	16:45:15	48 08.4165	123 25.0123	Silty Sand	present	*Smithora*	---	---
	16:45:30	48 08.4173	123 25.0116	Silty Sand	present	*Smithora, Ulva*	---	---
	16:45:45	48 08.4136	123 25.0098	Silty Sand	present	---	*Aurelia*	---
	16:46:00	48 08.4108	123 25.0087	Silty Sand	present	---	*Aurelia*	---
	16:46:15	48 08.4152	123 25.0102	Silty Sand	present	---	---	---
	16:46:30	48 08.4126	123 25.0138	Silty Sand	present	---	---	---
	16:46:45	48 08.4117	123 25.0155	Silty Sand	present	---	---	---
	16:47:00	48 08.4077	123 25.0163	Silty Sand	present	---	---	---
	16:47:15	48 08.4041	123 25.0132	Silty Sand	present	---	---	---
	16:47:30	48 08.4012	123 25.0119	Silty Sand	present	---	---	---
	16:47:39	48 08.4008	123 25.0123	Silty Sand	present	---	---	---
	16:48:00	48 08.3992	123 25.0152	Silty Sand	---	*Laminaria, Ulva*	---	---
	16:48:30	48 08.3936	123 25.0173	Silty Sand with cobble	---	*Laminaria, Ulva, Sarcodiotheca*	---	---
	16:49:00	48 08.3873	123 25.0173	Silty Sand	---	*Ulva, Sarcodiotheca*	---	---
	16:49:30	48 08.3849	123 25.0157	Silty Sand	---	*Ulva, Sarcodiotheca*	---	---
	16:50:00	48 08.3821	123 25.0195	Silty Sand	---	*Ulva, Sarcodiotheca*	---	---
	16:50:30	48 08.3824	123 25.0185	Silty Sand	---	Unidentified small red algae	---	---
	16:51:35	48 08.3681	123 25.0216	Silty Sand	---	Unidentified small red algae	---	---

Table 1 Video eelgrass, macroalgae, invertebrate and fish observations at Alternative 1 (Midwestern)

MWT08: Inshore to Offshore Transect								
Date	**Time**	**Latitude (NAD 83)**	**Longitude (NAD 83)**	**Substrate**	**Eelgrass**	**Macroalgae**	**Invertebrates**	**Fish**
6-Jul	16:20:48	48 08.4226	123 25.0200	Silty Sand with cobble	present	*Ulva*	---	---
	16:21:00	48 08.4218	123 25.0156	Silty Sand with cobble	present	---	---	---
	16:21:15	48 08.4188	123 25.0191	Silty Sand	present	*Ulva*	---	---
	16:21:30	48 08.4163	123 25.0272	Silty Sand	present	*Ulva*	---	---
	16:21:45	48 08.4113	123 25.0278	Silty Sand	present	---	---	---
	16:22:00	48 08.4068	123 25.0287	Silty Sand	present	---	---	---
	16:22:15	48 08.4068	123 25.0287	Silty Sand	present	---	---	---
	16:22:30	48 08.4051	123 25.0290	Silty Sand	present	---	---	---
	16:22:45	48 08.4057	123 25.0236	Silty Sand with cobble	present	*Ulva, Laminaria, Sarcodiotheca*	---	---
	16:23:00	48 08.4031	123 25.0236	Silty Sand with cobble	---	*Ulva, Laminaria, Sarcodiotheca*	---	---
	16:23:30	48 08.4022	123 25.0279	Silty Sand with cobble	---	*Ulva, Laminaria*	---	---
	16:24:00	48 08.3971	123 25.0260	Silty Sand with cobble	---	*Gracilaria, Plocamium (Ceramium?), Ulva*	---	---
	16:24:30	48 08.4016	123 25.0248	Silty Sand with cobble	---	*Gracilaria, Laminaria, Costaria, Ulva*	---	---
	16:25:00	48 08.3957	123 25.0296	Silty Sand with cobble	---	*Gracilaria, Plocamium (Ceramium?), Ulva*	---	---
	16:25:30	48 08.3924	123 25.0280	Silty Sand	---	*Gracilaria, Ulva*	---	---
	16:26:00	48 08.3878	123 25.0304	Silty Sand	---	*Gracilaria, Ulva*	---	---
	16:26:30	48 08.3808	123 25.0303	Silty Sand	---	*Gracilaria, Ulva*	---	---
	16:27:00	48 08.3762	123 25.0322	Silty Sand	---	*Palmaria*	---	---
	16:27:30	48 08.3711	123 25.0300	Silty Sand	---	---	---	---
	16:27:48	48 08.3710	123 25.0307	Silty Sand	---	---	---	---

Table 1 Video eelgrass, macroalgae, invertebrate and fish observations at Alternative 1 (Midwestern)

MWT09: Inshore to Offshore Transect								
Date	**Time**	**Latitude (NAD 83)**	**Longitude (NAD 83)**	**Substrate**	**Eelgrass**	**Macroalgae**	**Invertebrates**	**Fish**
6-Jul	17:00:35	48 08.4286	123 24.9859	Cobble	---	*Ulva*	---	---
	17:02:00	48 08.4176	123 24.9846	Cobble with silty sand	---	*Ulva*	---	---
	17:02:15	48 08.4164	123 24.9913	Cobble with silty sand	---	*Ulva*	---	---
	17:02:39	48 08.4122	123 24.9908	Cobble with silty sand	present	*Ulva*	---	---
	17:02:45	48 08.4117	123 24.9920	silty sand	present	*Smithora*	---	---
	17:03:00	48 08.4099	123 24.9910	silty sand	present	*Smithora*	---	---
	17:03:15	48 08.4041	123 24.9841	Silty sand with cobble	present	*Ulva, Laminaria, Iridea*	*Aurelia*	---
	17:03:30	48 08.4040	123 24.9860	Silty sand with cobble	present	*Ulva, Laminaria, Iridea*	---	---
	17:03:45	48 08.4050	123 24.9864	Silty sand with cobble	present	*Ulva, Laminaria, Gigartina*	---	---
	17:04:00	48 08.4020	123 24.9887	Silty sand with cobble	present	*Ulva, Smithora*	---	---
	17:04:15	48 08.3979	123 24.9900	Silty sand with cobble	present	---	---	---
	17:04:30	48 08.3964	123 24.9900	Silty sand with cobble	present	*Ulva, Laminaria, Sarcodiotheca*	---	---
	17:04:45	48 08.3959	123 24.9904	Silty sand with cobble	present	*Ulva, Laminaria, Sarcodiotheca*	---	---
	17:05:00	48 08.3954	123 24.9899	Silty sand with cobble	---	*Ulva, Laminaria, Sarcodiotheca*	---	---
	17:05:30	48 08.3904	123 24.9919	Silty sand with cobble	---	*Ulva, Laminaria, Sarcodiotheca*	---	---
	17:06:00	48 08.3856	123 24.9916	Silty sand	---	---	---	---
	17:06:30	48 08.3806	123 24.9918	Silty sand	---	---	---	---
	17:07:00	48 08.3753	123 24.9961	Silty sand	---	---	---	---
	17:07:30	48 08.3676	123 24.9909	Silty sand	---	---	---	---

Table 1 Video eelgrass, macroalgae, invertebrate and fish observations at Alternative 1 (Midwestern)

MWT09: Inshore to Offshore Transect (continued)								
Date	**Time**	**Latitude (NAD 83)**	**Longitude (NAD 83)**	**Substrate**	**Eelgrass**	**Macroalgae**	**Invertebrates**	**Fish**
	17:08:00	48 08.3652	123 24.9961	Silty sand	---	---	---	---
	17:08:27	48 08.3578	123 24.9939	Silty sand	---	---	---	---

Table 2. Upper Intertidal Eelgrass Turion Counts at Alternatives 1 and 2

Alternative 1: Midwestern					
Date	**Transect**	**Latitude North (NAD 83)**	**Longitude West (NAD 83)**	**Substrate**	**# Turions/0.25 m^2**
3-Jul-15	MWT01	48.14054	123.418824	Silty Sand	23
	MWT02	48.14049	123.418113	Silty Sand	30
	MWT03	48.14083	123.417708	Silty Sand	24
	MWT04	All eelgrass submerged and unaccessible on-foot			
	MWT05				
	MWT06	Lat/Lon not recorded		Silty Sand	22
	MWT07	48.1403967		Silty Sand	38
	MWT08	48.1403645		Silty Sand	40
	MWT09	48.1403376		Silty Sand	28
	MWT10	No intertidal eelgrass			
Alternative 2: Western					
3-Jul-15	WT01	No intertidal eelgrass			
	WT02	48.141011	123.424910		13
	WT03	48.140952	123.424497		15
	WT04	48.140919	123.424095		19
	WT05	All eelgrass submerged and unaccessible on-foot			
	WT06				
	WT07				
	WT08	48.140979	123.423258		14
	WT09	48.140877	123.422870		52
	WT10	48.107787	123.422583		48
Alternative 3: Eastern					
3-Jul-15	All eelgrass submerged and unaccessible on-foot				

Table 3. Diver Eelgrass and Macroalgal Survey at Alternative 1 (Midwestern)

Transect MWT05	Dive Start: 14:03	Dive Completed: 14:43			Compass Bearing: 200° S/SW		Eelgrass Counts		Comments/ Associated Species
Time	Distance from Fixed Point	Latitude North (NAD 83)	Longitude West (NAD 83)	Diver Depth (ft below surface)	Bathymetric-interpolated depth	Substrate	# Turions/0.25 m^2		
14:03	0	48.1407869	-123.4174441	0	---	CB	---	---	---
14:15	274	48.1400304	-123.4174497	18	-20	FS, SH	---	---	Lower edge eelgrass
14:15	272	48.1400359	-123.4174495	18	-19.1	FS, SH	8	---	*Ulva 20%, Laminaria 50%, Sarcodiotheca*
	247	48.1401044	-123.4174476	10	-11.1	FS, SH, GR,CB	11	2	*Laminaria 100%*
	222	48.1401729	-123.4174457	7	-6.5	FS, SH, GR,CB	2	---	*Laminaria 40%, Ulva 20%*
	197	48.1402414	-123.4174438	5	-4.5	FS, GR	31	---	*Ulva and Laminaria 60%*
14:30	172	48.1403100	-123.4174419	4	-3.3	FS	53	---	*Ulva and Laminaria 80%*
	147	48.1403785	-123.4174401	4	-2.4	FS	27	38	*Ulva 50%*
14:41	122	48.1404470	-123.4174382	3.5	-1.5	FS,GR,CB	37	---	---
	120	48.1404525	-123.4174380	3.5	-1.5	FS,GR,CB	---	---	Upper edge of eelgrass
Transect MWT06	Dive Start: 13:55	Dive Completed: 14:20			Compass Bearing: 200° S/SW		Eelgrass Counts		Comments/ Associated Species
Time	Distance from Fixed Point	Latitude North (NAD 83)	Longitude West (NAD 83)	Diver Depth (ft below surface)	Bathymetric-interpolated depth	Substrate	# Turions/0.25 m^2		
13:55	0	48.1407628	-123.4172081	0	---	CB	---	---	---
	249	48.1400748	-123.4172119	14	-14.2	FS, CB	---	---	*Laminaria, Ulva, Sarcodiotheca*
	247	48.1400802	-123.4172117	14	-13.9	FS, CB	9	0	---
	222	48.1401488	-123.4172098	8	-7.3	FS, CB	7	5	---
	197	48.1402173	-123.4172079	6	-4.5	FS, CB	7	9	---
	172	48.1402858	-123.4172060	6	-3.1	FS, CB	16	22	---
	147	48.1403543	-123.4172041	5	-2.1	FS, CB	61	13	---
	132	48.1403954	-123.4172030	3	-1.7	FS, CB	16	0	*Ulva, Mastocarpus* 50%
14:20	132	48.1403954	-123.4172030	---	-1.7	FS, CB	---	---	Upper edge eelgrass

Notes:

FS = fine sand
SLT = silt
GR = gravel
CB = Cobble
SH = shell hash

Table 3. Diver Eelgrass and Macroalgal Survey at Alternative 1 (Midwestern)

Transect MWT07		Dive Start: 14:27	Dive Completed: 15:00		Compass Bearing: 200° S/SW		Eelgrass Counts		Comments/ Associated Species
Time	Distance from Fixed Point	Latitude North (NAD 83)	Longitude West (NAD 83)	Diver Depth (ft below surface)	Bathymetric-interpolated depth	Substrate	# Turions/0.25 m^2		
14:27	0	48.1407409	-123.4170305	0	---	CB	---	---	---
	252	48.1400447	-123.4170344	17	-15.9	FS, CB	---	---	Lower edge eelgrass
	251	48.1400474	-123.4170343	17	-15.6	FS, CB	21	0	*Laminaria, Ulva, Sarcodiotheca*
	227	48.1401132	-123.4170325	10	-9.2	CB	0	28	
	202	48.1401818	-123.4170306	6	-4.9	CB	16	11	
	177	48.1402503	-123.4170287	5	-3.6	CB, GR	5	25	
	152	48.1403188	-123.4170268	3	-2.2	CB, GR	7	30	
	127	48.1403873	-123.4170249	3	-1.3	CB,GR	9	0	
15:00	126	48.1403901	-123.4170249	3	-1.3	CB,GR	---	---	Upper edge eelgrass
Transect MWT08		Dive Start: 14:50	Dive Completed: 15:36		Compass Bearing: 200° S/SW		Eelgrass Counts		Comments/ Associated Species
Time	Distance from Fixed Point	Latitude North (NAD 83)	Longitude West (NAD 83)	Diver Depth (ft below surface)	Bathymetric-interpolated depth	Substrate	# Turions/0.25 m^2		
14:50	0	48.1407013	-123.4168345	0	---	CB	---	---	---
	269	48.1399585	-123.4168399	19	-18.7	FS, SH, GR	---	---	Lower edge eelgrass
	267	48.1399639	-123.4168397	19	-18	FS, SH, GR	3	---	*Laminaria 30%, Ulva 20%*
	242	48.1400325	-123.4168378	14	-11.2	FS, SH, CB	41	16	*Laminaria 20%, Ulva 40%*
	217	48.1401010	-123.4168359	10	-6.8	FS, SH, CB	35	---	*Laminaria 80%*
	192	48.1401695	-123.4168340	8	-4.5	CB, GR, FS	7	---	*Laminaria 60%*
	167	48.1402380	-123.4168321	7	-3.3	CB, GR, FS	22	31	*Ulva, Laminaria, Iridea 50%*
	142	48.1403065	-123.4168302	5	-2.1	FS, GR	43	---	*Ulva 20%*
	125	48.1403531	-123.4168289	4	-1.4	FS, GR	30	---	*Ulva 20%*
15:36	125	48.1403531	-123.4168289	4	-1.4	FS, GR	---	---	Upper edge eelgrass

Notes:

FS = fine sand
SLT = silt
GR = gravel
CB = Cobble
SH = shell hash

Average	18.0
Std Dev	15.5
N	42

Table 4. Video eelgrass, macroalgae, invertebrate and fish observations at Alternative 2 (Western)

WT01: Offshore to Inshore Transect								
Date	**Time**	**Lat**	**Lon**	**Substrate**	**Eelgrass**	**Macroalgae**	**Invertebrates**	**Fish**
6-Jul	10:59:00	48 08.3894	123 25.5090	Silty Sand	---	---	*Pandalus*	gunnel
	11:05:45	48 08.4204	123 25.5070	Silty Sand with shell hash	---	*Iridea, Laminaria, Ulva*	*Cancer productus* *Cancer magister*	
	11:06:44	48 08.4300	123 25.5057	Silty Sand with cobble	---	*Laminaria, Iridea, Sarcodiotheca, Ulva, Sargassum*	---	---
	11:08:42	48 08.4430	123 25.5039	Silty Sand with cobble	present	---	---	---
	11:09:05	48 08.4434	123 25.5040	Silty Sand with cobble	present	---	---	---
	11:09:13	48 08.4442	123 25.5040	Silty Sand with cobble	present	*Laminaria, Iridea, Gracilaria, Ulva*	---	---
	11:09:16	48 08.4446	123 25.5043	Silty Sand	present	---	---	---
	11:09:24	48 08.4464	123 25.5052	Silty Sand	present	---	---	---
	11:09:48	48 08.4485	123 25.5052	Silty Sand	present	---	---	---
	11:09:56	48 08.4490	123 25.5056	Silty Sand with cobble	---	Laminaria	---	---

Table 4. Video eelgrass, macroalgae, invertebrate and fish observations at Alternative 2 (Western)

WT02: Inshore to Offshore Transect								
Date	**Time**	**Lat**	**Lon**	**Substrate**	**Eelgrass**	**Macroalgae**	**Invertebrates**	**Fish**
6-Jul	11:20:43	48 08.4481	123 25.4677	Silty Sand with cobble	-	*Laminaria, Ulva*	---	---
	11:20:48	48 08.4488	123 25.4690	Silty Sand with cobble	present	*Laminaria, Ulva, Costaria, Callophyllis*	---	---
	11:21:01	48 08.4499	123 25.4720	Silty Sand with cobble	present	---	---	---
	11:21:15	48 08.4484	123 25.4742	Silty Sand with cobble	present	---	---	---
	11:21:28	48 08.4476	123 25.4733	Silty Sand with cobble	present	---	---	---
	11:21:47	48 08.4476	123 25.4798	Silty Sand	present	---	---	---
	11:22:00	48 08.4496	123 25.4815	Silty Sand	present	---	---	---
	11:22:30	48 08.4511	123 25.4792	Silty Sand	present	---	---	---
	11:23:00	48 08.4522	123 25.4776	Silty Sand	present	---	---	---
	11:23:15	48 08.4516	123 25.4759	Silty Sand	present	---	---	---
	11:23:30	48 08.4488	123 25.4757	Silty Sand	present	---	---	---
	11:23:45	48 08.4454	123 25.4762	Silty Sand	present	---	---	---
	11:24:05	48 08.4426	123 25.4798	Silty Sand with cobble	present	*Laminaria, Iridea, Gracilaria, Ulva*	*Aurelia*	---
	11:25:19	48 08.4327	123 25.4817	Silty Sand with shell hash	---	---	*Metridium*	---
	11:27:56	48 08.4092	123 25.4787	Silty Sand	---	---	*Cancer productus* *Cancer magister Pandulus*	gunnels
	11:30:14	48 08.3943	123 25.4819	Silty Sand	---	---	---	---

WT03: Offshore to Inshore								
Date	**Time**	**Lat**	**Lon**	**Substrate**	**Eelgrass**	**Macroalgae**	**Invertebrates**	**Fish**
6-Jul	11:55:55	48 08.3906	123 25.4551	Silty sand	---	---	*Ptilosarcus*	Unidentified gunnel species *Psettichthys melanostictus*
	12:02:29	48 08.4140	123 25.4568	Silty sand	---	---	*Cancer productus* *Cancer magister*	Unidentified gunnel *Psettichthys melanostictus*
	12:04:25	48 08.4213	123 25.4559	Silty sand	---	*Ulva*	---	---
	12:05:06	48 08.4255	123 25.4547	Silty sand	---	*Ulva, Laminaria*	*Pugettia productus Henricia leviuscula*	
	12:07:31	48 08.4405	123 25.4532	Silty Sand with cobble	present	*Ulva, Laminaria*	---	---
	12:09:10	48 08.4458	123 25.4528	Silty Sand with cobble	present	*Ulva, Laminaria*	---	---

Table 4. Video eelgrass, macroalgae, invertebrate and fish observations at Alternative 2 (Western)

WT04: Offshore to Inshore								
Date	**Time**	**Lat**	**Lon**	**Substrate**	**Eelgrass**	**Macroalgae**	**Invertebrates**	**Fish**
6-Jul	12:18:52	48 08.3926	123 25.4461	Silty sand	No eelgrass in this transect	---	*Pandalus*	Unidentified gunnel species *Psettichthys melanostictus*
	12:21:42	48 08.4035	123 25.4468	Rock		---	*Metridium*	---
	12:23:19	48 08.4096	123 25.4458	Rock		---	*Metridium, Parastichopus*	---
	12:23:29	48 08.4113	123 25.4493	Rock		*Ulva, Laminaria (drift)*	*Parastichopus*	---
	12:24:11	48 08.4139	123 25.4414	Rock		*Ulva, Laminaria, Iridea*	*Metridium, Pisaster*	---
	12:25:11	48 08.4166	123 25.4463	Rock		*Ulva*	*Metridium, Parastichopus, Anthopleura*	---
	12:26:51	48 08.4232	123 25.4446	Silty sand		*Ulva*	*Parastichopus*	---
	12:27:41	48 08.4265	123 25.4429	Rock		*Ulva, Laminaria*	*Metridium, Parastichopus, Anthopleura*	---
	12:28:32	48 08.4296	123 25.4432	Rock		*Ulva, Laminaria, Iridea, Sargassum*	*Anthopleura*	---
	12:31:46	48 08.4414	123 25.4425	Rock		*Ulva, Laminaria, Callophyllus*	*Anthopleura*	---

WT05: Inshore to Offshore								
Date	**Time**	**Lat**	**Lon**	**Substrate**	**Eelgrass**	**Macroalgae**	**Invertebrates**	**Fish**
6-Jul	12:41:18	48 08.4378	123 25.4276	Silty Sand with cobble	present	*Ulva, Laminaria, Costaria*	---	---
	12:42:39	48 08.4313	123 25.4303	Rock	---	unidentified corallinne algae, *Iridea*	*Metridium, Anthopleura*	---
	12:42:58	48 08.4264	123 25.4297	Silty Sand with cobble	present	*Laminaria, Ulva*	*Anthopleura*	---
	12:43:28	48 08.4245	123 25.4306	Silty Sand with cobble	present	*Ulva*	*Parastichopus, Anthopleura*	*Platichthys stellatus*
	12:44:54	48 08.4097	123 25.4314	Silty Sand with shell hash	---	*Ulva*	*Parastichopus, Anthopleura*	---
	12:45:02	48 08.4080	123 25.4321	Rock	---	*Ulva*, unidentified coralline algae	*Metridium, Anthopleura, Cancer magister*	Unidentified rock fish species
	12:45:34	48 08.4008	123 25.4352	Silty sand	---	---	---	Unidentified gunnel species
	12:45:10	48 08.3935	123 25.4342	Silty sand	---	---	---	Unidentified gunnel species

Table 4. Video eelgrass, macroalgae, invertebrate and fish observations at Alternative 2 (Western)

WT06: Inshore to Offshore								
Date	**Time**	**Lat**	**Lon**	**Substrate**	**Eelgrass**	**Macroalgae**	**Invertebrates**	**Fish**
6-Jul	12:56:00	48 08.4436	123 25.3963	Silty sand	present	---	---	---
	12:56:15	48 08.4427	123 25.4027	Silty sand	present	---	---	---
	12:56:30	48 08.4398	123 25.4057	Silty sand	present	---	---	---
	12:56:45	48 08.4337	123 25.4037	Silty sand	present	---	---	---
	12:57:00	48 08.4348	123 25.4045	Silty sand	present	---	---	---
	12:57:15	48 08.4388	123 25.4049	Silty sand	present	---	---	---
	12:57:30	48 08.4411	123 25.4048	Silty sand	present	---	---	---
	12:57:45	48 08.4387	123 25.4106	Silty sand	present	---	---	---
	12:58:00	48 08.4353	123 25.4130	Silty sand	present	---	---	---
	12:58:15	48 08.4346	123 25.4188	Silty sand	present	---	---	---
	12:58:30	48 08.4331	123 25.4211	Silty sand	present	---	---	---
	12:58:37	48 08.4324	123 25.4203	Silty sand	present	*Laminaria, Ulva, Costaria*	*Parastichopus*	---
	13:00:06	48 08.4169	123 25.4205	Silty sand with cobble	---	*Ulva, Laminaria*	*Parastichopus, Cancer magister*	---
	13:00:15	48 08.4142	123 25.4197	Rock	---	---	*Metridium, Parastichopus, Pisaster, Helianthus*	---
	13:03:11	48 08.3927	123 25.4226	Silty sand	---	---	---	---

Table 4. Video eelgrass, macroalgae, invertebrate and fish observations at Alternative 2 (Western)

WT07: Offshore to Inshore								
Date	**Time**	**Lat**	**Lon**	**Substrate**	**Eelgrass**	**Macroalgae**	**Invertebrates**	**Fish**
6-Jul	13:19:08	48 08.3887	123 25.4081	Silty sand	---	---	*Pandalus*	---
	13:20:58	48 08.3945	123 25.4071	Silty sand	---	---	*Pandulus* *Cancer productus*	Unidentified gunnel *Psettichthys melanostictus*
	13:25:20	48 08.4200	123 25.4072	Silty sand with cobble	---	*Ulva, Laminaria, Gracilaria, Costaria*	*Cancer productus* *Cancer magister*	---
	13:26:02	48 08.4248	123 25.4063	Silty sand with cobble	present	*Ulva, Laminaria, Gracilaria, Costaria*	---	---
	13:26:08	48 08.4251	123 25.4047	Silty sand	---	*Ulva, Laminaria*	---	---
	13:26:36	48 08.4278	123 25.4025	Silty sand	present	*Ulva, Laminaria*	*Cancer magister*	
	13:26:45	48 08.4281	123 25.4029	Silty sand	present	---	---	---
	13:27:00	48 08.4306	123 25.4048	Silty sand	present	---	---	---
	13:27:15	48 08.4320	123 25.4035	Silty sand	present	---	---	---
	13:27:30	48 08.4332	123 25.4017	Silty sand	present	---	---	---
	13:27:46	48 08.4352	123 25.4038	Silty sand	present	---	---	---
	13:28:00	48 08.4364	123 25.4052	Silty sand	present	---	---	---
	13:28:15	48 08.4370	123 25.4041	Silty sand	present	---	---	---
	13:28:30	48 08.4367	123 25.4019	Silty sand	present	---	---	---
	13:28:45	48 08.4373	123 25.4011	Silty sand	present	---	---	---
	13:29:00	48 08.4400	123 25.4018	Silty sand	present	---	---	---
	13:29:15	48 08.4427	123 25.4047	Silty sand	present	---	---	---
	13:29:30	48 08.4441	123 25.4052	Silty sand	present	---	---	---
	13:29:45	48 08.4453	123 25.4050	Silty sand	present	---	---	---
	13:30:06	48 08.4466	123 25.4038	Silty sand	present	*Ulva, Laminaria*	---	---
WT08: Inshore to Offshore								
Date	**Time**	**Lat**	**Lon**	**Substrate**	**Eelgrass**	**Macroalgae**	**Invertebrates**	**Fish**
6-Jul	14:05:20	48 08.4516	123 25.3843	Silty sand	present	*Ulva, Laminaria*	---	---
	14:05:45	48 08.4504	123 25.3835	Silty sand	present	---	---	---
	14:06:00	48 08.4512	123 25.3860	Silty sand	present	---	---	---
	14:06:15	48 08.4520	123 25.3860	Silty sand	present	---	---	---
	14:06:30	48 08.4495	123 25.3853	Silty sand	present	---	---	---
	14:06:45	48 08.4483	123 25.3834	Silty sand	present	---	---	---
	14:07:00	48 08.4454	123 25.3807	Silty sand	present	---	---	---
	14:07:15	48 08.4436	123 25.3784	Silty sand	present	---	---	---

Table 4. Video eelgrass, macroalgae, invertebrate and fish observations at Alternative 2 (Western)

WT08: Inshore to Offshore (continued)								
Date	**Time**	**Lat**	**Lon**	**Substrate**	**Eelgrass**	**Macroalgae**	**Invertebrates**	**Fish**
	14:07:30	48 08.4406	123 25.3777	Silty sand	present	---	---	---
	14:07:45	48 08.4385	123 25.3783	Silty sand	present	---	---	---
	14:08:00	48 08.4360	123 25.3815	Silty sand	present	---	---	---
	14:08:32	48 08.4283	123 25.3815	Silty sand with cobble	---	*Ulva*	---	---
	14:11:49	48 08.4022	123 25.3829	Silty sand	---	---	*Pandalus*	Unidentified gunnel species
WT09: Inshore to Offshore								
Date	**Time**	**Lat**	**Lon**	**Substrate**	**Eelgrass**	**Macroalgae**	**Invertebrates**	**Fish**
6-Jul	14:22:40	48 08.4378	123 25.3510	Silty sand	present	---	---	---
	14:23:00	48 08.4389	123 25.3510	Silty sand	present	*Ulva, Laminaria, Smithora*	---	---
	14:23:15	48 08.4379	123 25.3495	Silty sand	present	---	---	---
	14:23:30	48 08.4361	123 25.3529	Silty sand	present	---	*Aurelia*	---
	14:23:45	48 08.4349	123 25.3567	Silty sand	present	---	---	---
	14:24:00	48 08.4306	123 25.3568	Silty sand	present	*Ulva, Laminaria*	---	---
	14:24:15	48 08.4278	123 25.3565	Silty sand	---	*Ulva, Laminaria*	---	---
	14:24:30	48 08.4254	123 25.3570	Silty sand	---	*Ulva, Laminaria*	---	---
	14:24:45	48 08.4244	123 25.3573	Silty sand	---	*Ulva, Laminaria*	---	---
	14:25:00	48 08.4224	123 25.3578	Silty sand	---	*Ulva, Laminaria*	---	---
	14:25:15	48 08.4195	123 25.3578	Silty sand	---	*Ulva*	---	---
	14:25:30	48 08.4166	123 25.3563	Silty sand	---	---	---	---
	14:26:00	48 08.4144	123 25.3568	Silty sand	---	---	---	---
	14:26:30	48 08.4087	123 25.3589	Silty sand	---	---	---	---
	14:27:00	48 08.4027	123 25.3597	Silty sand	---	---	---	---
	14:27:30	48 08.3982	123 25.3605	Silty sand	---	---	*Anthopleura*	---
	14:28:00	48 08.3982	123 25.3605	Silty sand	---	---	---	---

Table 5. Advance Eelgrass and Macroalgae Survey: Alternative 2 (Western)

Transect WT03		Dive Start: 17:30	Dive Completed: 18:03		Compass Bearing: 180° S		Eelgrass Counts		
Time	Distance from Fixed Point	Latitude North (NAD 83)	Longitude West (NAD 83)	Diver Depth (ft below surface)	Tide-Corrected Depth (ft)	Substrate	# Turions/0.25 m^2		Comments/ Associated Species
	0	48.1413267	-123.4241900	0	---	CB	---	---	---
17:30	216	48.1407292	-123.4241909	16	-13	SLT, GR	---	---	Lower end of eelgrass
	214	48.1407292	-123.4240891	17	-11.1	SLT, GR	0	3	
	214 (25 ft east)	48.1407347	-123.4241908	17	-12.2	SLT, GR	0	0	
	189	48.1408002	-123.4240856	10	-5	SLT, GR	0	0	*Laminaria 60%, Ulva 40%, Sargassum*
	189 (25 ft east)	48.1408032	-123.4241889	12	-6	SLT, GR	0	0	*Laminaria 60%, Ulva 40%, Sargassum*
	164	48.1408669	-123.4240863	8	-2.6	SLT, GR	6	7	*Laminaria 30%, Ulva 70%, Sargassum*
	164 (25 ft east)	48.1408717	-123.4241870	9	-2.8	SLT, GR	0	0	*Laminaria 30%, Ulva 70%, Sargassum*
	158	48.1408882	-123.4241866	8	-2.2	---	---	---	Upper end of Eelgrass
Transect WT04		Dive Start: 16:45	Dive Completed: 17:15		Compass Bearing: 180° S		Eelgrass Counts		
Time	Distance from Fixed Point	Latitude North (NAD 83)	Longitude West (NAD 83)	Diver Depth (ft below surface)	Bathymetric-interpolated depth	Substrate	# Turions/0.25 m^2		Comments/ Associated Species
16:45	0	48.1412972	-123.4239966	0	---	CB	---	---	---
	300	48.1404749	-123.4240188	Not recorded	-34	**Note:** Thick algal mat (~10") from 200'-300' tape Any grass is in mat -- An algal mat, approximately 10 inches thick, exists from 200-300 feet tape distance. Any associated grass is anchored within the mat, and not in sediment.			
	200	48.1407490	-123.4240114		-1				
	150	48.1408860	-123.4240077	8	-2	FS, CB	Sparse eelgrass. 1 - 2 turions per infrequent patches		*Ulva*
	142	48.1409080	-123.4240071	5	-2	FS, CB			*Ulva*
17:15	142	48.1409080	-123.4240071	5	-2	**Note:** No eelgrass inside of the 142 foot distance.			

Notes:

FS = fine sand **CB =** Cobble

SLT = silt **SH =** shell hash

GR = gravel

Table 5. Advance Eelgrass and Macroalgae Survey: Alternative 2 (Western)

Transect WT06		Dive Start: 16:36	Dive Completed: 17:19		Compass Bearing: 180° S		Eelgrass Counts		Comments/ Associated Species
Time	Distance from Fixed Point	Latitude North (NAD 83)	Longitude West (NAD 83)	Diver Depth (ft below surface)	Bathymetric-interpolated depth	Substrate	# Turions/0.25 m^2		
14:27	0	48.1411646	-123.4236133	0	---	CB	---	---	---
	278	48.1404026	-123.4236351	23	-29	FS	---	---	Lower end of eelgrass
	277	48.1404054	-123.4236351	23	-28.7	FS	4	0	*Ulva, 100%*
	252	48.1404739	-123.4236331	16	-20.7	FS, CB	8	5	*Ulva, 30%*
	227	48.1405424	-123.4236311	12	-13.9	FS	4	16	*Laminaria 20%*
	202	48.1406109	-123.4236292	9	-9.2	FS	19	12	*Ulva, 100%*
	177	48.1406795	-123.4236272	8	-6.2	FS	13	15	*Ulva, 100%*
	152	48.1407480	-123.4236252	8	-2.2	FS	8	13	*Ulva, 100%*
	127	48.1408165	-123.4236233	6	-3.2	FS	9	15	*Ulva, 100%*
	102	48.1408850	-123.4236213	5	-0.9	FS	0	0	---
	95	48.1409042	-123.4236207	3.5	-0.2	FS	1	0	---
17:19	95	48.1409042	-123.4236207	3.5	-0.2	FS	---	---	---
Transect WT07		Dive Start: 17:36	Dive Completed: 18:10		Compass Bearing: 180° S		Eelgrass Counts		Comments/ Associated Species
Time	Distance from Fixed Point	Latitude North (NAD 83)	Longitude West (NAD 83)	Diver Depth (ft below surface)	Bathymetric-interpolated depth	Substrate	# Turions/0.25 m^2		
17:36	0	48.1411629	-123.4233860	0	---	CB	---	---	---
	289	48.1403763	-123.4234239	26	-29.9	FS	0	0	Lower end of eelgrass
	289	48.1403763	-123.4234239	26	-29.9	FS	0	0	*Ulva, Laminaria 70%*
	287	48.1403818	-123.4234238	24	-29.2	FS	0	2	*Ulva, Laminaria 70%*
	262	48.1404503	-123.4234218	17	-21.4	FS	8	2	*Ulva, Laminaria 70%*
	237	48.1405188	-123.4234199	11	-12.8	FS	20	6	*Ulva, 100%*
	Note: Dive truncated due to diver safety: cold, fatigue and low on air. Skipped middle of bed and did upper and lower edges								
	94	48.1409107	-123.4234086	6	-1.7	FS	6	40	*Ulva, 40%*
	79	48.1409519	-123.4234074	6	-1.3	FS	32	0	*Ulva, 60%*
	79	48.1409519	-123.4234074	6	-1.3	FS	---	---	---

Notes:

FS = fine sand **CB =** Cobble

SLT = silt **SH =** shell hash

GR = gravel

Eelgrass East of the Jetty

Average	8.1	N=	32
Standard Dev	9.9		

Table 6. Video eelgrass, macroalgae, invertebrate and fish observations at Alternative 3 (Eastern)

ET01: Offshore to Inshore Transect								
Date	**Time**	**Latitude (NAD 83)**	**Longitude (NAD 83)**	**Substrate**	**Eelgrass**	**Macroalgae**	**Invertebrates**	**Fish**
6-Jul	17:26:22	48 08.3383	123 24.3693	Sand	---	---	---	*Platichthys stellatus*
	17:26:58	48 08.3310	123 24.3570	Sand	---	---	---	---
	17:27:20	48 08.3239	123 24.3568	Sand	---	---	---	---
	17:20:32	48 08.3507	123 24.4278	Sand	Present	---	---	---
	17:20:39	48 08.3486	123 24.4276	Sand	present	---	---	---
	17:20:57	48 08.3485	123 24.4276	Sand	Present	*Ulva, Smithora*	---	---
	17:21:17	48 08.3505	123 24.4295	Sand	Present	---	*Aurelia*	---
	17:21:22	48 08.3494	123 24.4278	Sand	present	---	---	---
	17:21:31	48 08.3479	123 24.4299	Sand	Present	---	---	---
	17:21:41	48 08.3481	123 24.4303	Sand	Present	---	---	---
	17:22:00	48 08.3484	123 24.4310	Sand	Present	---	---	---
	17:22:10	48 08.3478	123 24.4311	Sand	Present	---	---	---
	17:22:17	48 08.3474	123 24.4297	Sand	Present	---	---	---
	17:22:29	48 08.3476	123 24.4315	Sand	Present	*Smithora*	---	---
	17:22:49	48 08.3491	123 24.4334	Sand	Present	---	---	---
	17:23:14	48 08.3426	123 24.4308	Sand	Present	---	---	---
	17:23:30	48 08.3440	123 24.4291	Sand	Present	---	---	---
	17:23:44	48 08.3454	123 24.4331	Sand	Present	---	---	---
	17:24:19	48 08.3378	123 24.4280	Sand	Present	---	---	---
	17:25:16	48 08.3360	123 24.4052	Sand	Present	---	---	---
	17:25:51	48 08.3357	123 24.3845	Sand	Present	---	---	---
	17:26:16	48 08.3370	123 24.3711	Sand	Present	---	---	---
	17:26:46	48 08.3355	123 24.3598	Sand	Present	---	---	---
	17:24:02	48 08.3436	123 24.4336	Sand with cobble	Present	*Nerocystis, Smithora*	---	---
	17:25:57	48 08.3345	123 24.3805	Sand with cobble	Present	*Nerocystis, Smithora*	---	---

Table 6. Video eelgrass, macroalgae, invertebrate and fish observations at Alternative 3 (Eastern)

***ET01: Offshore to Inshore Transec**t (continued)*								
Date	**Time**	**Latitude (NAD 83)**	**Longitude (NAD 83)**	**Substrate**	**Eelgrass**	***Macroalgae***	***Invertebrates***	**Fish**
	17:20:45	48 08.3479	123 24.4273	Sand with cobble	present	---	---	---
	17:20:55	48 08.3482	123 24.4266	Sand with cobble	present	---	---	---
	17:20:22	48 08.3534	123 24.4299	Course Sand with cobble	---	*Ulva*	---	---
ET02: Offshore to Inshore Transect								
Date	**Time**	**Latitude (NAD 83)**	**Longitude (NAD 83)**	**Substrate**	**Eelgrass**	**Macroalgae**	**Invertebrates**	**Fish**
6-Jun	17:56:56	48 08.3181	123 24.4204	Sand	---	*Ulva, Sarcodiotheca*	---	---
	17:59:55	48 08.3315	123 24.4127	Sand with cobble	present	*Nereocystis*	---	---
	18:00:10	48 08.3345	123 24.4055	Sand with cobble	present	*Nereocystis*	---	---
	18:00:26	48 08.3329	123 24.4040	Sand with cobble	present	---	---	---
	18:01:00	48 08.3339	123 24.4087	Sand with cobble	present	*Nereocystis, Laminaria, Smithora*	---	---
	18:01:45	48 08.3337	123 24.4121	Sand	present	---	---	---
	18:02:01	48 08.3350	123 24.4109	Sand	present	---	---	---
	18:02:15	48 08.3360	123 24.4071	Sand	present	---	---	---
	18:02:31	48 08.3354	123 24.4113	Sand	present	---	---	---
	18:02:45	48 08.3377	123 24.4115	Sand	present	---	---	---
	18:03:00	48 08.3394	123 24.4090	Sand	present	---	---	---
	18:03:15	48 08.3383	123 24.4072	Sand	present	---	---	---
	18:03:30	48 08.3412	123 24.4088	Sand	present	---	---	---
	18:03:45	48 08.3431	123 24.4081	Sand	present	---	---	---
	18:04:00	48 08.3427	123 24.4070	Sand	present	---	---	---
	18:05:11	48 08.3484	123 24.4044	Sand	present	---	---	---
	18:05:19	48 08.3478	123 24.4078	Sand	present	---	---	---
	18:05:56	48 08.3506	123 24.3973	Cobble	---	---	---	---

Table 6. Video eelgrass, macroalgae, invertebrate and fish observations at Alternative 3 (Eastern)

ET04: Offshore to Inshore Transect								
Date	**Time**	**Latitude (NAD 83)**	**Longitude (NAD 83)**	**Substrate**	**Eelgrass**	**Macroalgae**	**Invertebrates**	**Fish**
6-Jun	18:19:03	48 08.3054	123 24.3706	Sand	---	*Gracilaria, Nereocystis*	---	---
	18:21:41	48 08.3270	123 24.3624	Sand	present	---	---	---
	18:22:00	48 08.3268	123 24.3601	Sand	present	---	---	---
	18:22:42	48 08.3252	123 24.3614	Sand	present	---	---	---
	18:23:00	48 08.3282	123 24.3606	Sand	present	---	---	---
	18:23:15	48 08.3284	123 24.3607	Sand	present	---	---	---
	18:23:30	48 08.3298	123 24.3631	Sand	present	---	---	---
	18:23:45	48 08.3331	123 24.3592	Sand	present	---	---	---
	18:24:05	48 08.3350	123 24.3595	Sand	present	---	---	---
	18:24:14	48 08.3347	123 24.3587	Sand	present	---	---	---
	18:24:22	48 08.3339	123 24.3579	Sand	---	---	---	---
ET06: Offshore to Inshore Transect								
Date	**Time**	**Latitude (NAD 83)**	**Longitude (NAD 83)**	**Substrate**	**Eelgrass**	**Macroalgae**	**Invertebrates**	**Fish**
6-Jun	18:33:15	48 08.3033	123 24.3348	Sand	---	*Gracilaria, Nereocystis, Plocamium, Laminaria*	*C. magister, Pugettia productus, Metridium, Pandalus*	---
	18:36:15	48 08.3198	123 24.3231	Sand	present	---	---	---
	18:36:25	48 08.3207	123 24.3240	Sand	present	---	---	---
	18:37:12	48 08.3212	123 24.3304	Sand	present	---	---	---
	18:37:30	48 08.3252	123 24.3273	Sand	present	---	---	---
	18:38:07	48 08.3207	123 24.3280	Sand	present	---	---	---
	18:38:15	48 08.3233	123 24.3273	Sand	present	---	---	---
	18:38:30	48 08.3255	123 24.3250	Sand	present	---	---	---
	18:38:35	48 08.3259	123 24.3230	Sand	present	---	---	---
	18:39:11	48 08.3264	123 24.3207	Sand	---	*Ulva*		

Table 6. Video eelgrass, macroalgae, invertebrate and fish observations at Alternative 3 (Eastern)

ET08: Offshore to Inshore Transect								
Date	**Time**	**Latitude (NAD 83)**	**Longitude (NAD 83)**	**Substrate**	**Eelgrass**	**Macroalgae**	**Invertebrates**	**Fish**
6-Jun	17:41:42	48 08.2949	123 24.2947	Sand	No eelgrass	---	---	---
	17:49:04	48 08.3231	123 24.2918	Sand	No eelgrass	---	---	---

Table 7. Advance Eelgrass and Macroalgae Survey: Alternative 3 (Eastern)

Transect ET04		Dive Start: 10:07	Dive Completed: 10:40		Compass Bearing: 190° S		Eelgrass Counts		Comments/ Associated Species
Time	Distance from Fixed Point	Latitude North (NAD 83)	Longitude West (NAD 83)	Diver Depth (ft below surface)	Tide-Corrected Depth (ft)	Substrate	# Turions/0.25 m^2		
10:07	0	48.139151	-123.405948	0		CB	---	---	---
	154	48.138700	-123.406059	22	-19.12	CB, S	---	---	Lower end eelgrass
	152	48.138695	-123.405958	22	-19.12	CB, S	7	5	---
	152 (25' east)	48.138706	-123.406058	17	-14.5	CB, S	21	27	*Laminaria 30%*
	127	48.138780	-123.406042	9	-6.5	CB, S	54	36	
	127 (23' east)	48.138771	-123.405955	8	-5.5	CB, S	18	25	*Laminaria 60%*
	98	48.138866	-123.406024	9	-6.5	CB, S	74	82	
	96	48.138872	-123.406023	5	-2.5	CB, S	---	---	Upper end eelgrass
	96 (25' east)	48.138866	-123.405924	4	-1.5	CB, S	43	31	

Transect ET05		Dive Start: 10:57	Dive Completed: 11:09		Compass Bearing: 190° S		Eelgrass Counts		Comments/ Associated Species
Time	Distance from Fixed Point	Latitude North (NAD 83)	Longitude West (NAD 83)	Diver Depth (ft below surface)	Tide-Corrected Depth (ft)	Substrate	# Turions/0.25 m^2		
10:57	0	48.139062	-123.405566	0		CB	---	---	---
	143	48.138665	-123.405669	21	-18.8	CB, S	---	---	Lower end eelgrass
	143	48.138665	-123.405669	21	-18.8	CB, S	24	10	---
	118	48.138736	-123.405654	15	-12.8	CB, S	67	51	*Laminaria*, 40%
	95	48.138801	-123.405640	5	-2.8	CB, S	11	---	---
11:09	92	48.138810	-123.405638	5	-2.8	CB, S	---	---	Upper end eelgrass

Notes:

S = sand
FS = fine sand
SLT = silt
GR = gravel
CB = Cobble
SH = shell hash

Table 7. Advance Eelgrass and Macroalgae Survey: Alternative 3 (Eastern)

Transect ET06	Dive Start: 11:19	Dive Completed: 11:30			Compass Bearing: 190° S		Eelgrass Counts		
Time	Distance from Fixed Point	Latitude North (NAD 83)	Longitude West (NAD 83)	Diver Depth (ft below surface)	Tide-Corrected Depth (ft)	Substrate	# Turions/0.25 m^2		Comments/ Associated Species
11:19	0	48.139027	-123.405374	0		CB	---	---	---
	131	48.138657	-123.405471	20	-18	S	---	---	Lower end eelgrass
	130	48.138660	-123.405470	20	-18	S	11	0	Algal presence not recorded
	111	48.138714	-123.405459	12	-10	S	34	29	
	93	48.138766	-123.405448	not recorded		S	54	17	
	91	48.138772	-123.405446	not recorded		S	---	---	Upper end eelgrass

Transect ET07	Dive Start: 11:36	Dive Completed: 11:44			Compass Bearing: 190° S		Eelgrass Counts		
Time	Distance from Fixed Point	Latitude North (NAD 83)	Longitude West (NAD 83)	Diver Depth (ft below surface)	Tide-Corrected Depth (ft)	Substrate	# Turions/0.25 m^2		Comments/ Associated Species
	0	48.138990	-123.405169	0		CB	---	---	---
	142	48.138584	-123.405273	21	-19.2	S	---	---	Lower end eelgrass
	142	48.138584	-123.405273	21	-19.2	S	4	8	
	121	48.138645	-123.405260	13	-11.2	S	13	29	
	102	48.138700	-123.405248	5	-3.2	S	47	39	
	101	48.138703	-123.405248	5	-3.2	S	---	---	Upper end eelgrass

Notes:

S = sand
FS = fine sand
SLT = silt
GR = gravel
CB = Cobble
SH = shell hash

Average	30.0
Std Dev	21.8
N	29

Figure 1. Site Locations and Existing Conditions.

Figure 2 Eelgrass Observations from Site Reconnaissance Survey, June 4, 2014

Eelgrass bed is continuous from the east side of the Alternative 2 jetty through to just west of the USCG T-Pier

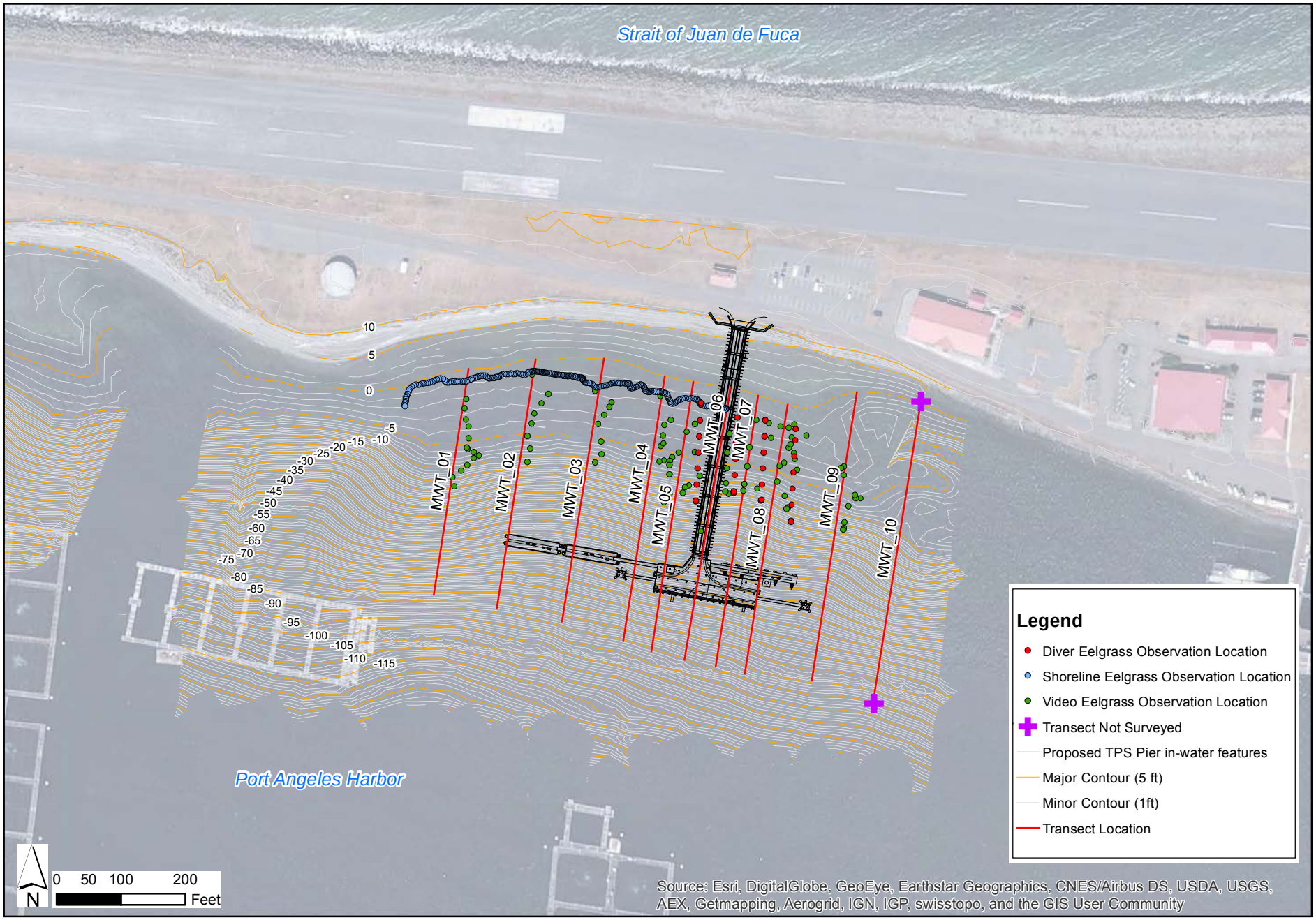

Figure 3. Results of Eelgrass Video and Diver Surveys at Alternative 1.

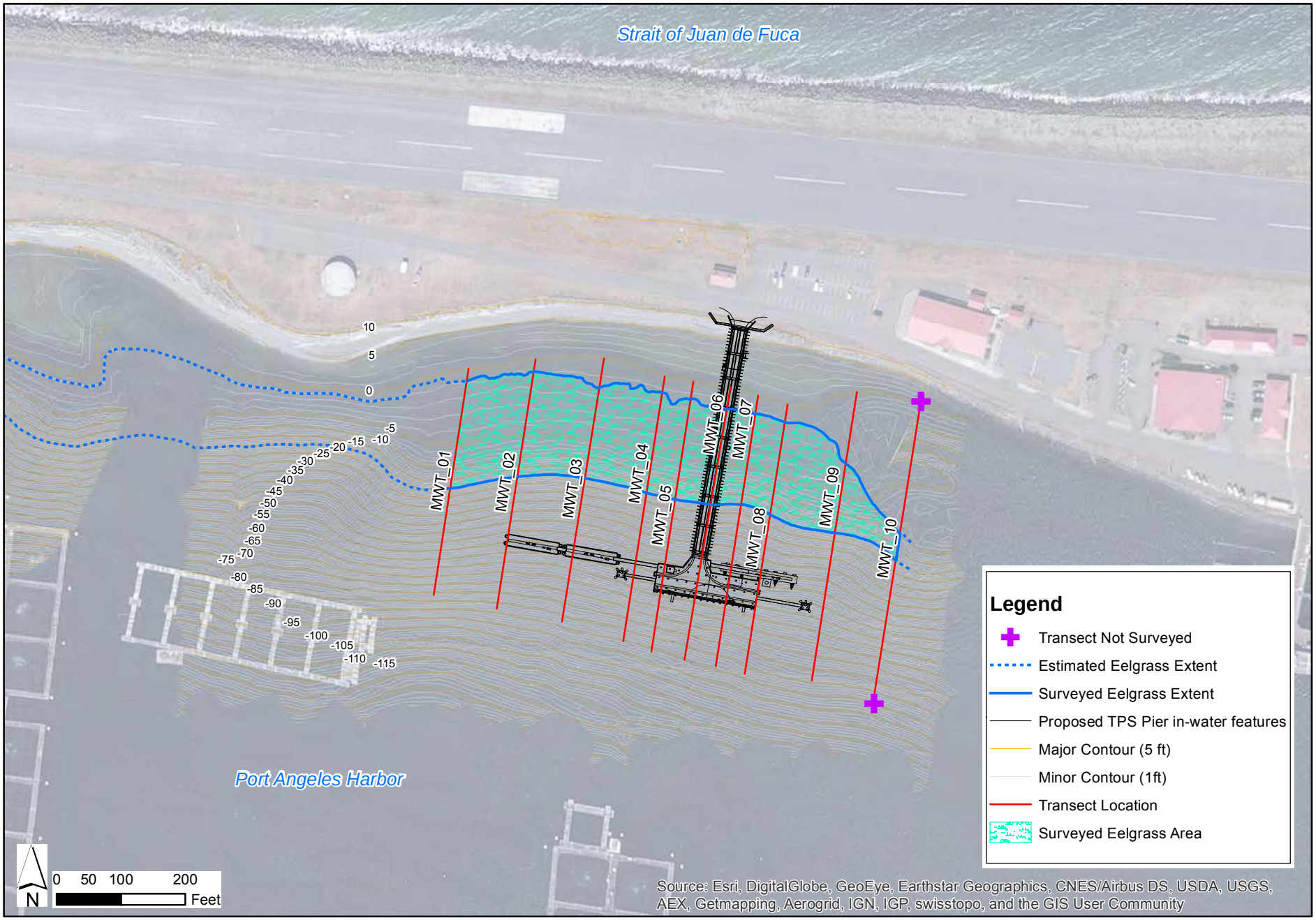

Figure 4. Estimated areal extent of eelgrass within the Alternative 1 project area.

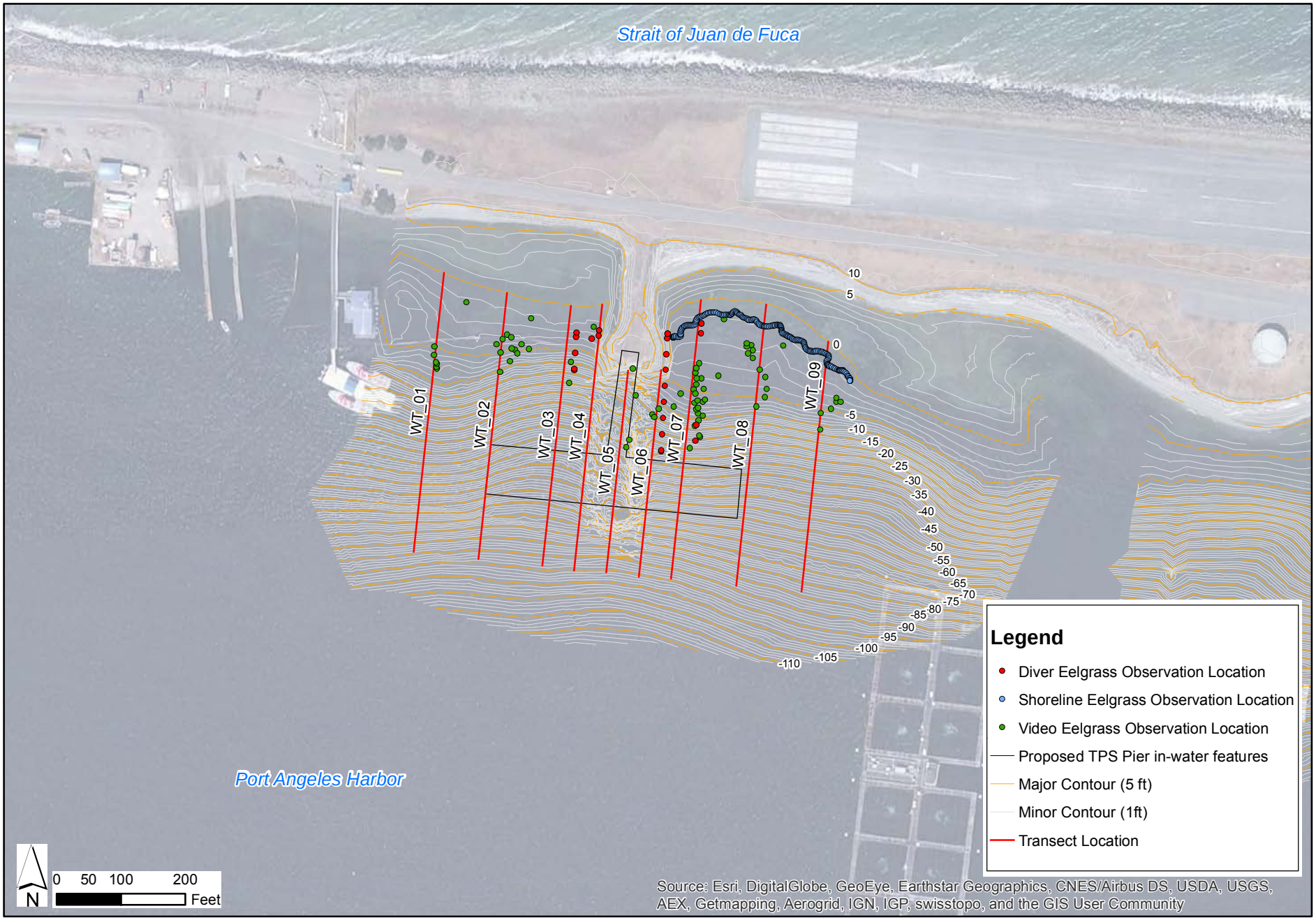

Figure 5. Results of Eelgrass Video and Diver Surveys at Alternative 2.

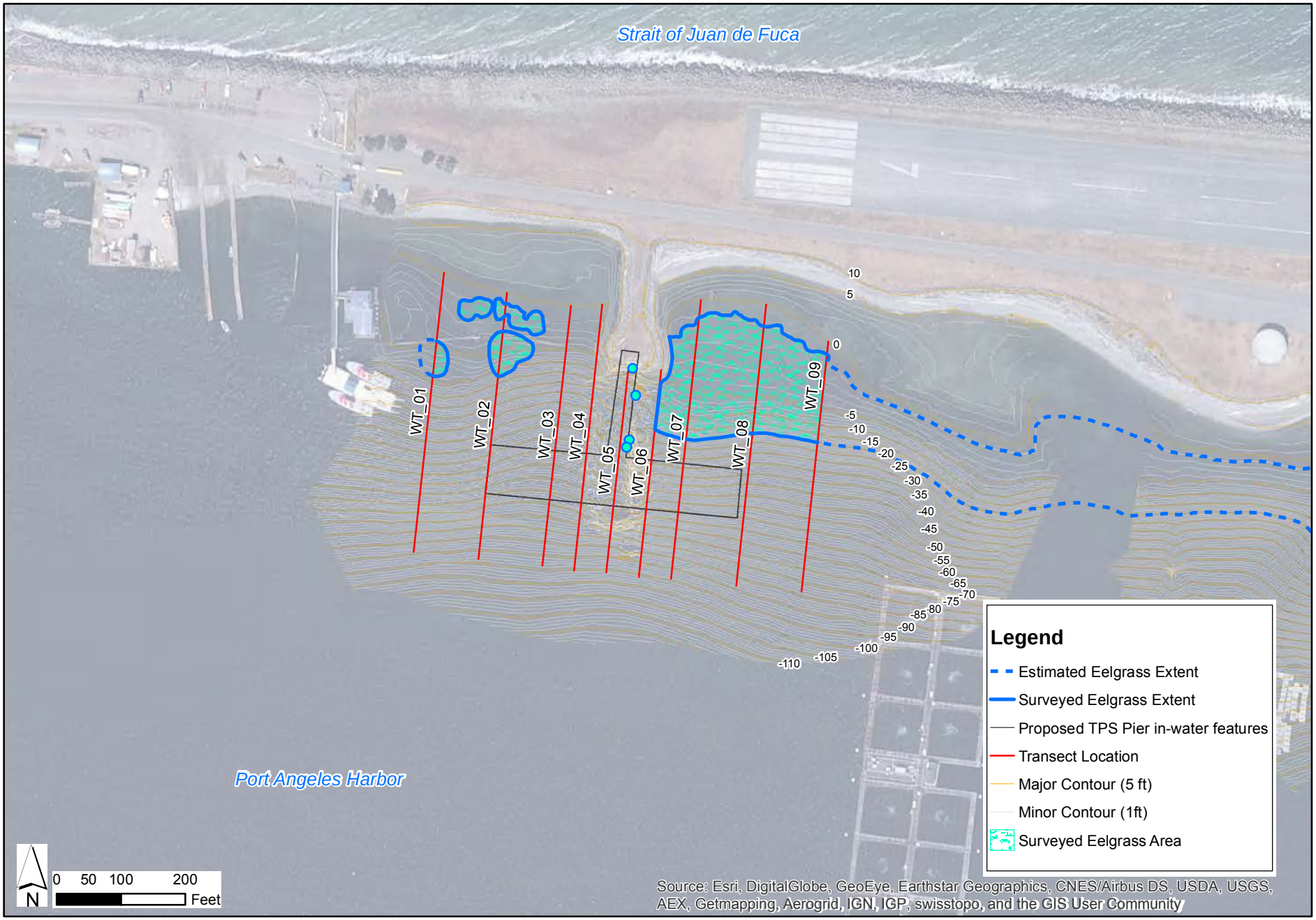

Figure 6. Estimated areal extent of eelgrass within the Alternative 2 project area.

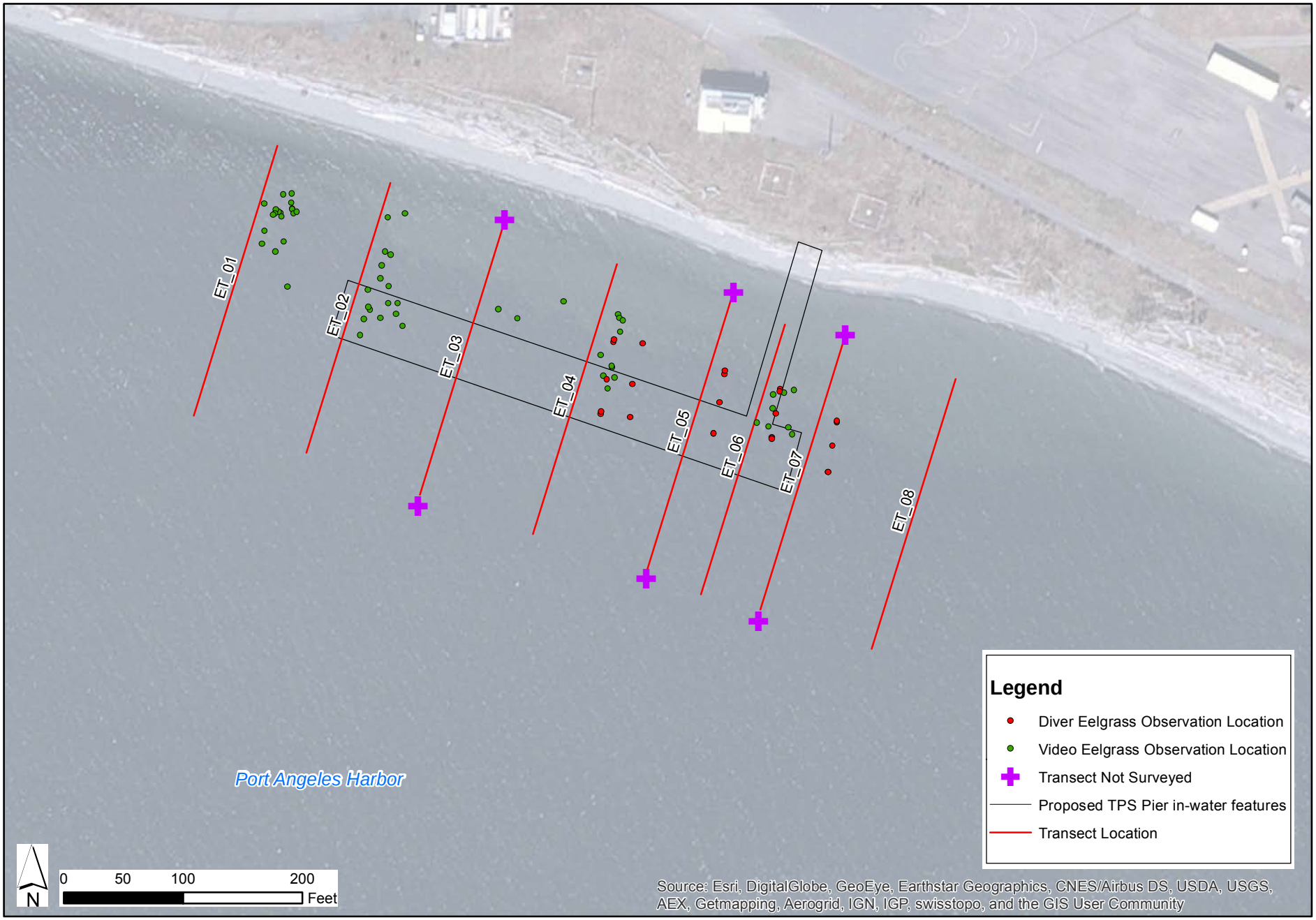

Figure 7. Results of Eelgrass Video and Diver Surveys at Alternative 3.

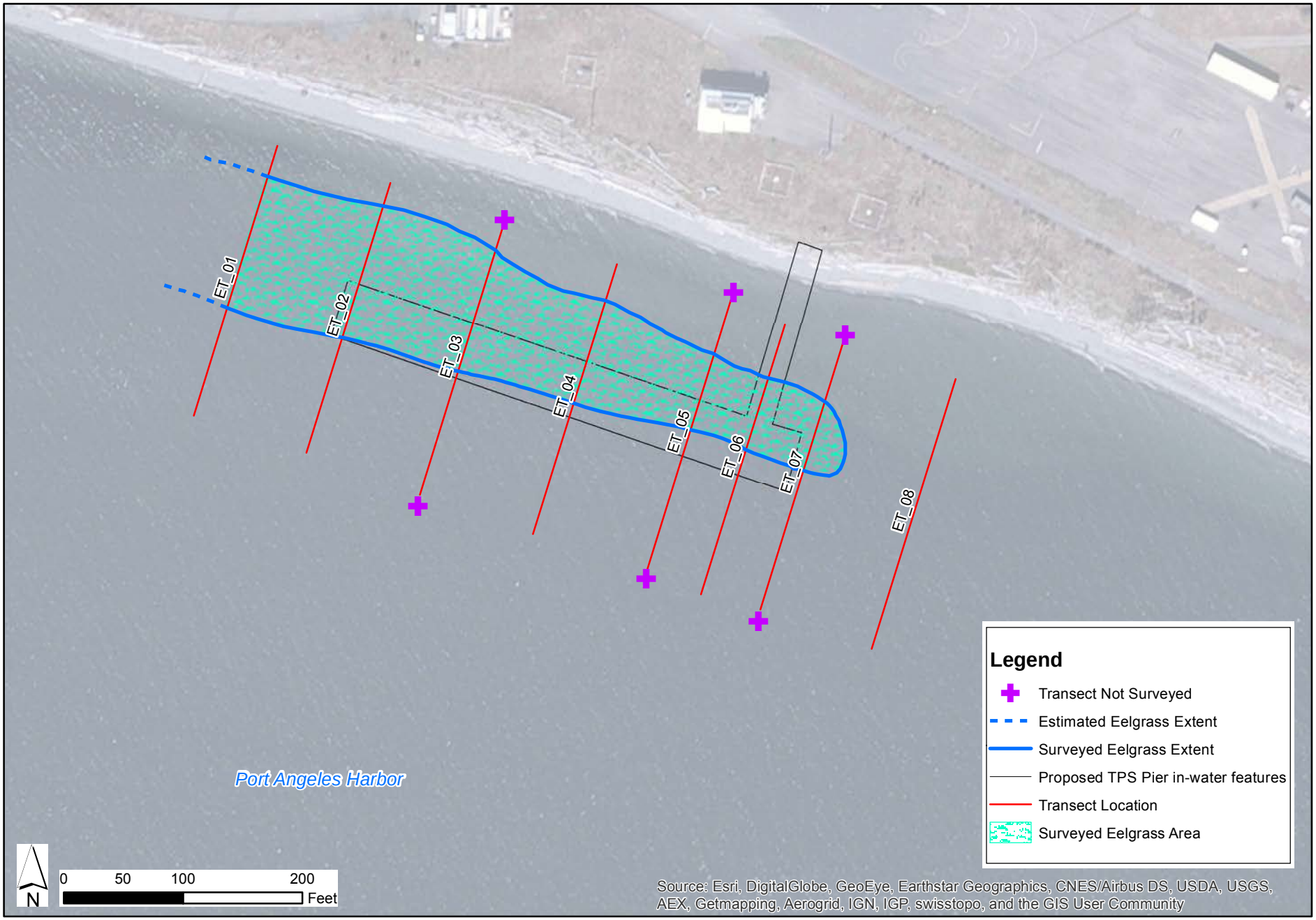

Figure 8. Estimated areal extent of eelgrass within the Alternative 3 project area.

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Appendix A

Eelgrass and Macroalgae Habitat Survey Plan

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Proposed Transit Protection System Pier Eelgrass and Macroalgae Habitat Surveys

U.S. Coast Guard Air Station/Sector Field Office Port Angeles, WA

Prepared for:

U.S. Navy
Naval Facilities Engineering Command Northwest
1101 Tautog Circle, Bldg. 1101
Silverdale, WA 98315

and

Cardno Inc
2825 Eastlake Avenue East
Suite 300
Seattle, WA 98102

Prepared by:

Science and Engineering for the Environment, LLC
4401 Latona Ave NE
Seattle, WA 98105

June 29, 2015

TABLE OF CONTENTS

1. Introduction 2

2. Existing Information 3
   2.1 Previous Surveys 3
   2.2 Washington Department of Natural Resources Marine Vegetation Atlas 4
   2.3 Washington Department of Ecology Aerial Photos 4
   2.4 Site Reconnaissance Survey 4
   2.5 Summary of Existing Information to Inform Survey Design 4

3. Survey Methods 5
   3.1 Preliminary Survey 5
   3.2 Advanced Survey 6

LIST OF TABLES

Table 1 Eelgrass and Macroalgae Transect Start and Endpoints 8

LIST OF FIGURES

Figure 1 Site Location and Existing Conditions 9

Figure 2 Screen shot from the WDNR Marine Vegetation Atlas showing identified eelgrass locations along the USCG study area. 10

Figure 3 Washington Ecology Coastal Atlas Survey aerial photo of Western (Alternative 2) location 11

Figure 4 Washington Ecology Coastal Atlas Survey aerial photo of Midwestern (Alternative 1) location 12

Figure 5 Washington Ecology Coastal Atlas Survey aerial photo of Eastern (Alternative 3) location 13

Figure 6 Transect Lanes for the Eelgrass and Macroalgae Surveys at the Wester (Alternative 2) Proposed Pier Location. 14

Figure 7 Transect Lanes for the Eelgrass and Macroalgae Surveys at the Midwestern (Alternative 1) Proposed Pier Location. 15

Figure 8 Transect Lanes for the Eelgrass and Macroalgae Surveys at the Eastern (Alternative 3) Proposed Pier Location. 16

1. INTRODUCTION

This document presents the proposed survey plans for eelgrass (*Zostera marina*) and macroalgae surveys to be on the south side of Ediz Hook, in the waters of the U.S. Coast Guard (USCG) Air Station/Sector Field Office Port Angeles (USCG AIRSTA/SFO Port Angeles), Clallam County, WA. This survey supports the Environmental Assessment being conducted by the U.S. Navy to provide permanent moorage and support facilities to the United States Coast Guard operated Transit Protection System (TPS) vessels at Port Angeles.

The Navy is considering three action alternatives for analysis that meet the purpose and need for supporting the Transit Protection System's mission. The three action alternatives are located at USCG AIRSTA/SFO Port Angeles (see Figure 1). Alternative 1 is the Midwestern Site and its proposed pier is located just to the west of the existing USCG pier. Alternative 2 is the Western Site and its proposed pier is located on the west portion of USCG AIRSTA/SFO Port Angeles, just east of the Puget Sound Pilot Station. Alternative 3 is the Eastern Site and its proposed pier is located on the east end of the installation near the end of the abandoned cross wind runway. The location of the pier alternatives are shown in Figure 1.

The Washington Department of Fish and Wildlife (WDFW) developed *Eelgrass/ Macroalgae Interim Survey Guidelines* ("Guidelines")[1]. The Washington Administrative Code (WAC) defines eelgrass and macroalgae as saltwater habitats of special concern (WACs 220-110-250 (3)(a,b)). As part of the process to permit the proposed construction at the fuel pier, WDFW requires proponents for projects to avoid impacting eelgrass and macroalgae, minimize unavoidable impacts, and mitigate for any impacts.

Accordingly, the objectives of this survey are:

- Determine the location of eelgrass and/or macroalgae proximal to the three proposed TPS pier locations,
- Conduct both a Preliminary and Advanced Survey in accordance with WDFW Guidelines, and
- Provide the information necessary to support the EA.

[1] Available on line at wdfw.wa.gov/habitat/files/wdfw_eelgrass-macroalgae_interim_survey_ guidelines061608.pdf

2. EXISTING INFORMATION

Existing studies, including previous diver surveys, Washington Department of Ecology aerial photographs, and the Puget Sound Atlas were evaluated to inform the design of this survey. The area along the south side of Ediz Hook within the proposed project area has been well-characterized with regards to eelgrass, macroalgae, macroinvertebrates and fish. A comprehensive review and compilation of the surveys and species within the proposed pier areas will be presented in the Biological Assessment and Essential Fish Habitat Assessment for the EA.

2.1 PREVIOUS SURVEYS

A brief review of the previous diver surveys conducted within this area is listed below in reverse chronological order.

2014 – Diver survey of the Western TPS Pier Site (BergerABAM Technical Memorandum No. 4). This survey was conducted principally to survey the bottom for potential obstructions to pile driving. The dive was conducted parallel to the shoreline from -15 ft to -80 ft Mean Lower Low Water (MLLW) and across the subtidal rock pile that is considered as an artificial reef. Underwater videos made by the divers allowed for identification of eelgrass in the upper intertidal elevations.

2012 – Ediz Hook Transit Protection System Preliminary Eelgrass and Macroalgae Survey (Grette and Associates Memorandum dated December 7, 2012). This survey was conducted at the proposed Western (Alternative 2) and Eastern (Alternative 3) locations in October of 2012. That study determined that there is approximately 638 square feet (ft^2) of eelgrass within the proposed Western project area, and approximately 4,792 ft^2 of eelgrass within the Eastern project area.

2003 – Diver surveys in support of proposed small craft pier expansion (MCS Environmental 2003). Diver-transect surveys were conducted within the existing USCG pier footprint. That study identified a total of approximately 3,024 ft^2 of eelgrass, located principally on the eastern side of the dock. Of that total, only 41 ft^2 was identified on the western side of the existing pier. The transect lanes in this study were east of the proposed Alternative 1 (Midwestern) pier location in this current study.

1999 – Port Angeles Pilot House (Parametrix, 1999). Eelgrass and macroalgae surveys were conducted in support of pier renovations at the Pilot House piers located to the west of the Western Site (Alternative 2). Eelgrass was present, but in small discontiguous patches.

1993 – Subtidal eelgrass/macroalgae surveys were conducted in support of the then proposed breakwaters at the USCG pier (Battelle, 1993). Eelgrass was identified both to the east, and to the west of the existing pier at that time. The furthest west transects were still east of the proposed Alternative 1 (Midwestern) pier location in this study.

2.2 WASHINGTON DEPARTMENT OF NATURAL RESOURCES MARINE VEGETATION ATLAS

WDNR maintains an on-line atlas of natural resources, including locations of eelgrass and kelp beds. Figure 2 is a screen shot from the atlas for eelgrass along the study area. The figure shows eelgrass present at all three proposed pier locations.

2.3 WASHINGTON DEPARTMENT OF ECOLOGY AERIAL PHOTOS

Ecology maintains an online resource, the Washington Coastal Atlas that includes oblique aerial photos taken at low day-time tides in order to provide an indication of subtidal resources. Figures 3 – 5 show the photographs for the Western, Midwestern, and Eastern proposed pier locations, respectively.

All three locations show subtidal patches of aquatic vegetation that are consistent with eelgrass locations cited in the studies above, and were confirmed during a reconnaissance survey of the sites on June 4, 2015 (see below).

2.4 SITE RECONNAISSANCE SURVEY

A shore-walk reconnaissance survey was conducted by SEE on June 4, 2015, between 10:26 and 12:36 hrs. Low tide on that day was 10:36 at -1.76 ft MLLW. Eelgrass (*Zostera marina*) was observed at all three proposed alternative locations. Generally, the eelgrass was in discontinuous patches from Washington Pilot Association Pier to the remnant pier at the Western Site (Alternative 2), and then in a relatively continuous band from the eastern side of the remnant pier through the proposed Midwestern Site (Alternative 1). Eelgrass was not observed through the area at the USCG pier. Beyond the breakwater on the eastern side of the USCG operational pier the eelgrass was again contiguous out through the approximate location of the Eastern Site (Alternative 3). Of note is that around the Eastern Alternative Site the eelgrass was all restricted to a relatively narrow subtidal band; intertidal eelgrass was not observed.

The major macroalgae cover species observed principally in the lower intertidal at the Western and Midwestern proposed pier locations included *Ulva lactuca, Laminaria saccharina, Costaria costata,and Iridea cordata.* Other algal genera observed included *Gracilaria* sp.*, Smithora naidadum, Lethesia difformis,*and coralline algae (species not identified).

At the Eastern proposed pier site there were no major macroalgae within the intertidal areas, but offshore and outside (southward) of the eelgrass beds *Nereocystis lutkeana* was observed.

2.5 SUMMARY OF EXISTING INFORMATION TO INFORM SURVEY DESIGN

Based on existing data and the 2015 site-walk reconnaissance survey, eelgrass is present at all three proposed pier locations in the locations indicated in the Washington Coastal Atlas. The boundaries of those beds to date have not been geo-referenced, and with the exception of the 2012 study (Grette and Associates), density surveys have not recently been conducted at the proposed pier locations. No survey to date has included the Midwestern (Alternative 1) location.

3. SURVEY METHODS

Both preliminary and advanced surveys will be conducted according to the WDFW Guidelines at all three proposed pier locations. The objectives and methods are described, below.

3.1 PRELIMINARY SURVEY

The objectives of the preliminary survey will be to

1. video record the presence of eelgrass and macroalgae within the proposed pier footprints,
2. provide to the degree practicable geo-referenced delineations of the eelgrass beds, and,
3. produce CAD-based figures with existing bathymetry that would allow the USN to determine whether the project can be located and constructed to avoid eelgrass impacts.

The preliminary survey will be conducted using a combination of shore-based delineation using a Differential Global Positioning System (dGPS) for eelgrass exposed during an extreme low tide, and an underwater video survey tied to depth and position (lat/lon) during a high tide event. The video survey methods have been previously approved by WDFW and used by SEE to conduct eelgrass and macroalgae surveys previously at other USN facilities in Puget Sound (SEE 2010, 2012).

The shore-based survey will be a walk along the shoreline during a low tide event. It is anticipated that this will occur on July 3, 2015 around the time of a -2.2 ft MLLW tide. At all three locations, a hand-held Trimble 6000 dGPS will be used to mark boundaries of the eelgrass beds in approximately 25 ft intervals. To the degree practicable, this may include some wading beyond the tide line in order to delineate at a minimum the upper (landward) boundary of the eelgrass beds. Post-processing will include determining the tidal elevation at each surveyed point.

The subtidal video survey is scheduled for July 6, 2015 during high tide sequence. The planned survey areas are shown in Figures 6 – 8. The study area for each proposed pier location is from 100 ft west of the westernmost edge, to 100 ft east of the easternmost edge, and 100 ft south of the southernmost edge of the proposed pier footprint. Track lines are perpendicular to the shoreline, and are spaced 100 ft apart, except at the center-line of the proposed pier where they are every 50 ft. To the degree allowed by sea levels during the survey, each transect will run up to the 0 MLLW mark. At least one video track line will be run at each alternative location parallel to the shoreline within the eelgrass band; this depth track (e.g., -4 ft MLLW) will be determined in the field.

Each track line is numbered by alternative location from west-to-east. For example, ET_01 is the first (and western-most) transect at the Eastern Site (Alternative 3). Table 1 shows the planned start and end coordinates for each track line.

The survey will be conducted by Science, Engineering and the Environment LLC (SEE), with support by Browning Environmental Services and Marine Sampling Systems . The plan is to use a towed video seabed survey aboard the Research Vessel (R/V) *Peter R*. A wide angle low-light camera will be mounted to a video sled towed off the bow of the vessel close to the

seabed. The weight of the sled generally positions the camera directly beneath a dGPS antenna. This will ensure that the data recorded on the video log reflected the geographic position of the camera. The survey team will use the hydraulic winch to raise and lower the camera sled as the bottom topography changes. Navigation data will be logged in Universal Time Coordinated (UTC) (Pacific Standard Time + 7:00). Real-time video footage with navigation and time overlay will be observed live in the cab of the *Peter R*, and also recorded to DVD media. Eelgrass and other targets observed during the survey are navigationally "tagged" for later plotting.

Post-processing the data will include a 100% review of the video survey, with confirmation of eelgrass and macroalgal targets, general substrate type within the project area, and noting of fish and invertebrates observed within the project area. All observed targets will be plotted, and re-evaluated relative to depth and substrate type. Qualitative bathymetric data for the site will be available from the video survey; the most recent bathymetric contours are shown in Figures 6 – 8.

A memorandum for the preliminary survey will be prepared for the USN which will include the geo-referenced eelgrass bed points from the intertidal survey, the actual track lines surveyed, and locations of contacts with eelgrass and/or macroalgae. A set of CAD-drawings delineating the eelgrass beds will also be prepared. Those will be used to estimate the area of eelgrass that may be potentially impacted by the proposed project(s).

The results of the survey will be provided by the Navy to WDFW prior to conducting the advanced survey.

3.2 ADVANCED SURVEY

The results of the preliminary survey will be used to inform the final design of the advanced survey. It is expected that advanced surveys will be conducted along the same four center-line transects for each proposed pier area, and begin 25 ft offshore from the seaward edge, and proceed shoreward to 25 ft beyond the landward edge of the of the delineated eelgrass beds. Tentatively the advanced survey is scheduled for on or about July 22.

The advanced surveys will be conducted by a diver team, assisted by a live boat. Prior to entering the water, the transect line will be anchored using either a fiberglass tape measure, or 3/8 inch braid rope marked off in 25 ft intervals. The divers will begin offshore, and count both eelgrass density (as number of turions per 0.25 m^2 grid), as well as a general assessment of macroalgal species present and percent coverage of the grid area every 25 ft. WDFW Guidelines require a minimum of 30 samples; given the four transects at each proposed pier location it is anticipated that there will be at least 10 sample points per transect, and thus 40 or more locations surveyed for each alternative location.

Post processing will include converting all field turion counts to number per square meter per WDFW guidelines, and reporting the overall mean and sample variance for eelgrass density within the surveyed area(s).

4. REFERENCES

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SEE 2012. Naval Air Station Whidbey Island Fuel Pier 2012 Preliminary Eelgrass/Macroalgae Habitat Survey. Naval Air Station Whidbey Island, Oak Harbor, WA. Science and Engineering for the Environment, LLC, Seattle, WA. October 31, 2012.

SEE 2010. Naval Air Station Whidbey Island Fuel Pier Preliminary Eelgrass/Macroalgae Habitat Survey. Naval Air Station Whidbey Island, Oak Harbor, WA. Science and Engineering for the Environment, LLC, Seattle, WA. July 25, 2010.

Table 1 Eelgrass and Macroalgae Transect Start and Endpoints
Coordinates expressed in the North American Datum of 1983

Transect ID	Latitude	Longitude	Latitude	Longitude
	South (Seaward)		Finish North (Landward)	
Western Site (Alternative 2) Transects				
WT_01	48.139932	-123.425176	48.141127	-123.425043
WT_02	48.139911	-123.424762	48.141049	-123.424636
WT_03	48.139891	-123.424353	48.141004	-123.424229
WT_04	48.139877	-123.424152	48.141015	-123.424030
WT_05	48.139873	-123.423946	48.140736	-123.423850
WT_06	48.139859	-123.423738	48.140744	-123.423639
WT_07	48.139856	-123.423534	48.141048	-123.423403
WT_08	48.139835	-123.423116	48.141038	-123.422987
WT_09	48.139820	-123.422700	48.140889	-123.422583
Midwestern Site (Alternative 1) Transects				
MWT_01	48.139599	-123.419099	48.140566	-123.418926
MWT_02	48.139546	-123.418696	48.140616	-123.418501
MWT_03	48.139502	-123.418277	48.140628	-123.418068
MWT_04	48.139427	-123.417883	48.140561	-123.417677
MWT_05	48.139387	-123.417702	48.140543	-123.417493
MWT_06	48.139355	-123.417490	48.140520	-123.417258
MWT_07	48.139334	-123.417291	48.140493	-123.417078
MWT_08	48.139306	-123.417104	48.140459	-123.416889
MWT_09	48.139287	-123.416676	48.140523	-123.416452
MWT_10	48.140478	-123.416043	48.139236	-123.416274
Eastern Site (Alternative 3) Transects				
ET_01	48.138661	-123.407441	48.139287	-123.407185
ET_02	48.138584	-123.407050	48.139210	-123.406794
ET_03	48.138496	-123.406657	48.139122	-123.406400
ET_04	48.138415	-123.406263	48.139041	-123.406007
ET_05	48.138342	-123.405868	48.138968	-123.405611
ET_06	48.138289	-123.405680	48.138915	-123.405424
ET_07	48.138259	-123.405475	48.138885	-123.405219
ET_08	48.138175	-123.405087	48.138803	-123.404832

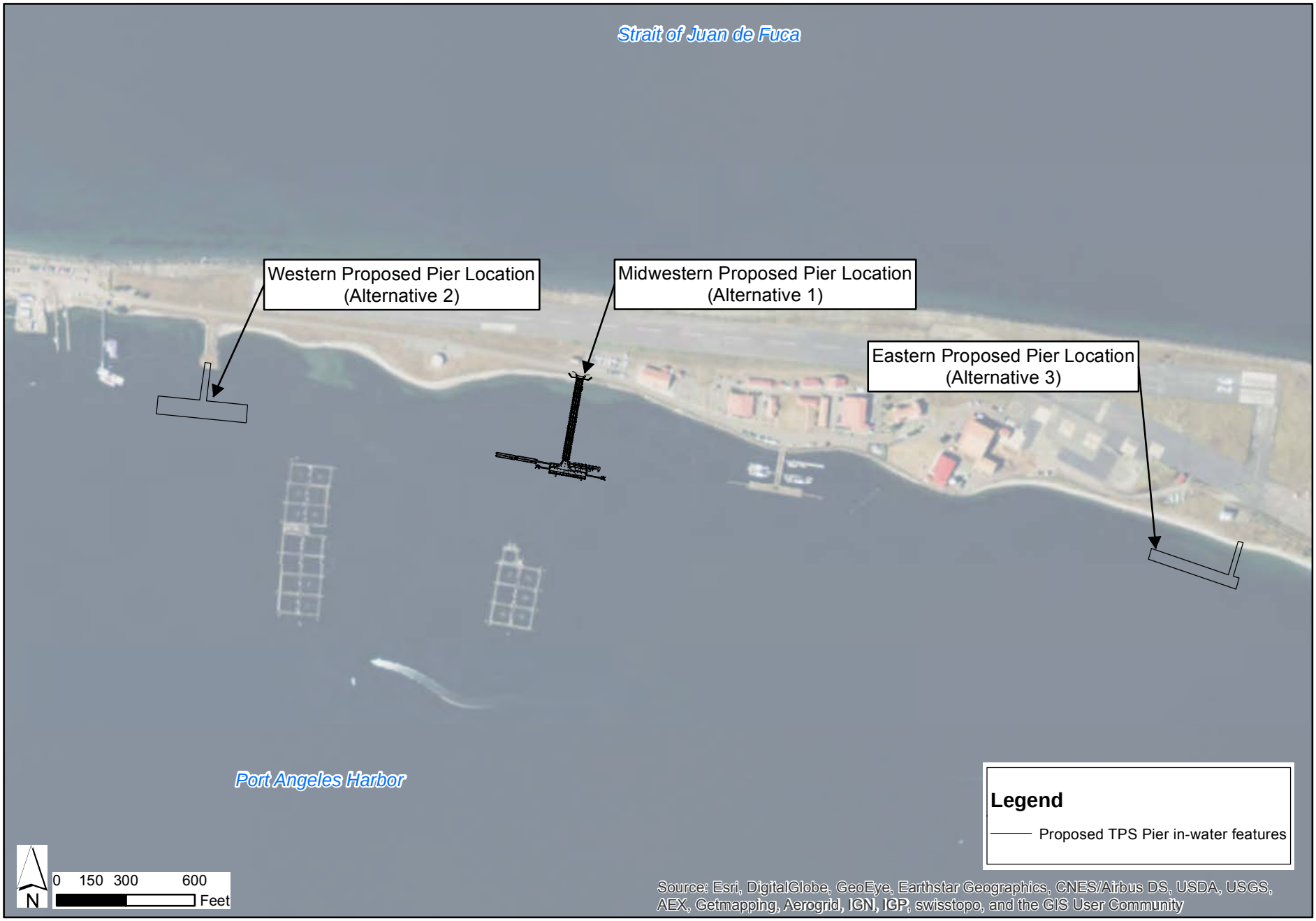

Figure 1. Site Location and Existing Conditions

Figure 2 Screen shot from the WDNR Marine Vegetation Atlas showing identified eelgrass locations along the USCG study area.

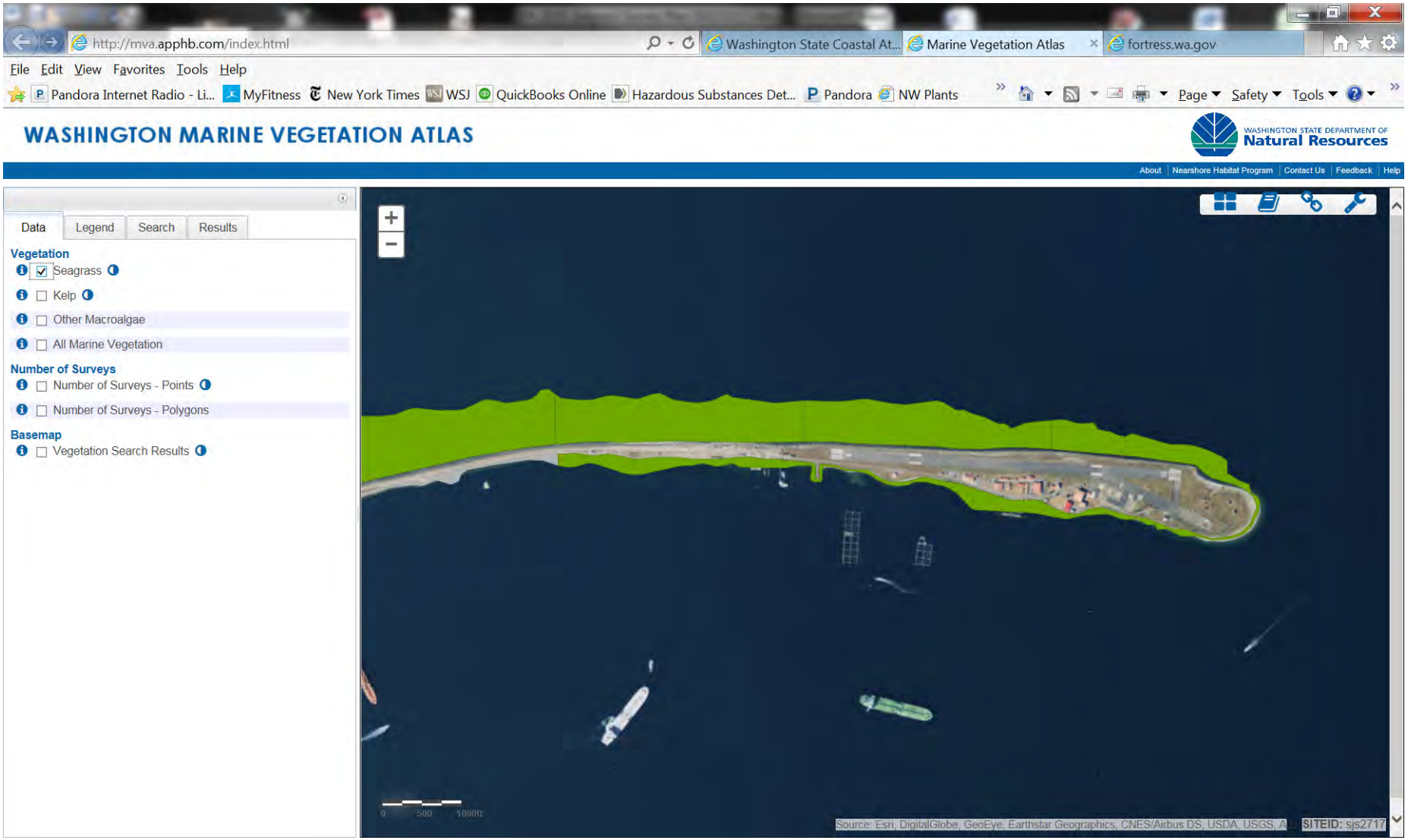

Figure 3 Washington Ecology Coastal Atlas Survey aerial photo of Western (Alternative 2) location
Arrows indicate probable eelgrass locations in proximity to the proposed pier location.

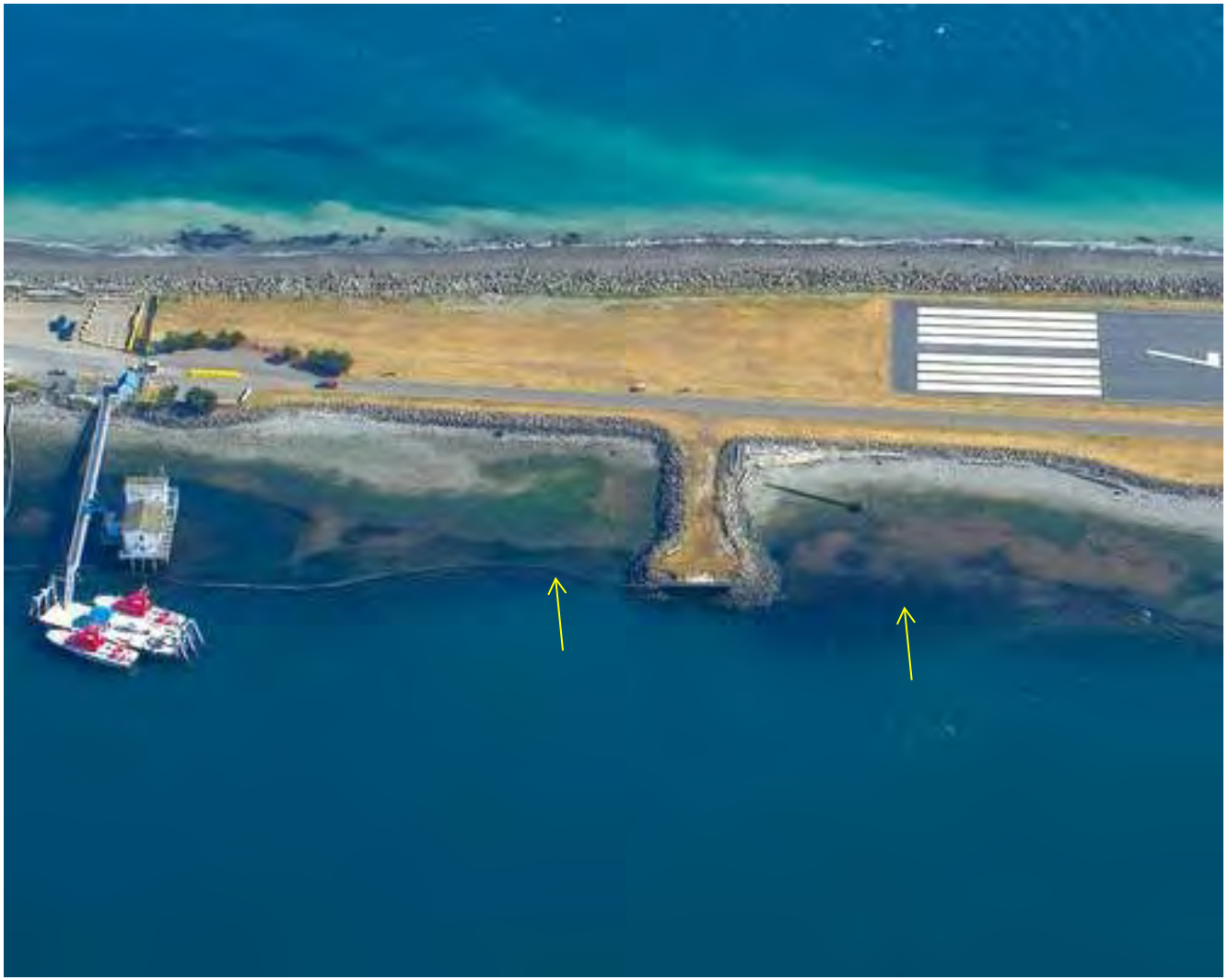

Figure 4 Washington Ecology Coastal Atlas Survey aerial photo of Midwestern (Alternative 1) location
Arrows indicate probable eelgrass locations in proximity to the proposed pier location.

Figure 5 Washington Ecology Coastal Atlas Survey aerial photo of Eastern (Alternative 3) location
Arrows indicate probable eelgrass locations in proximity to the proposed pier location

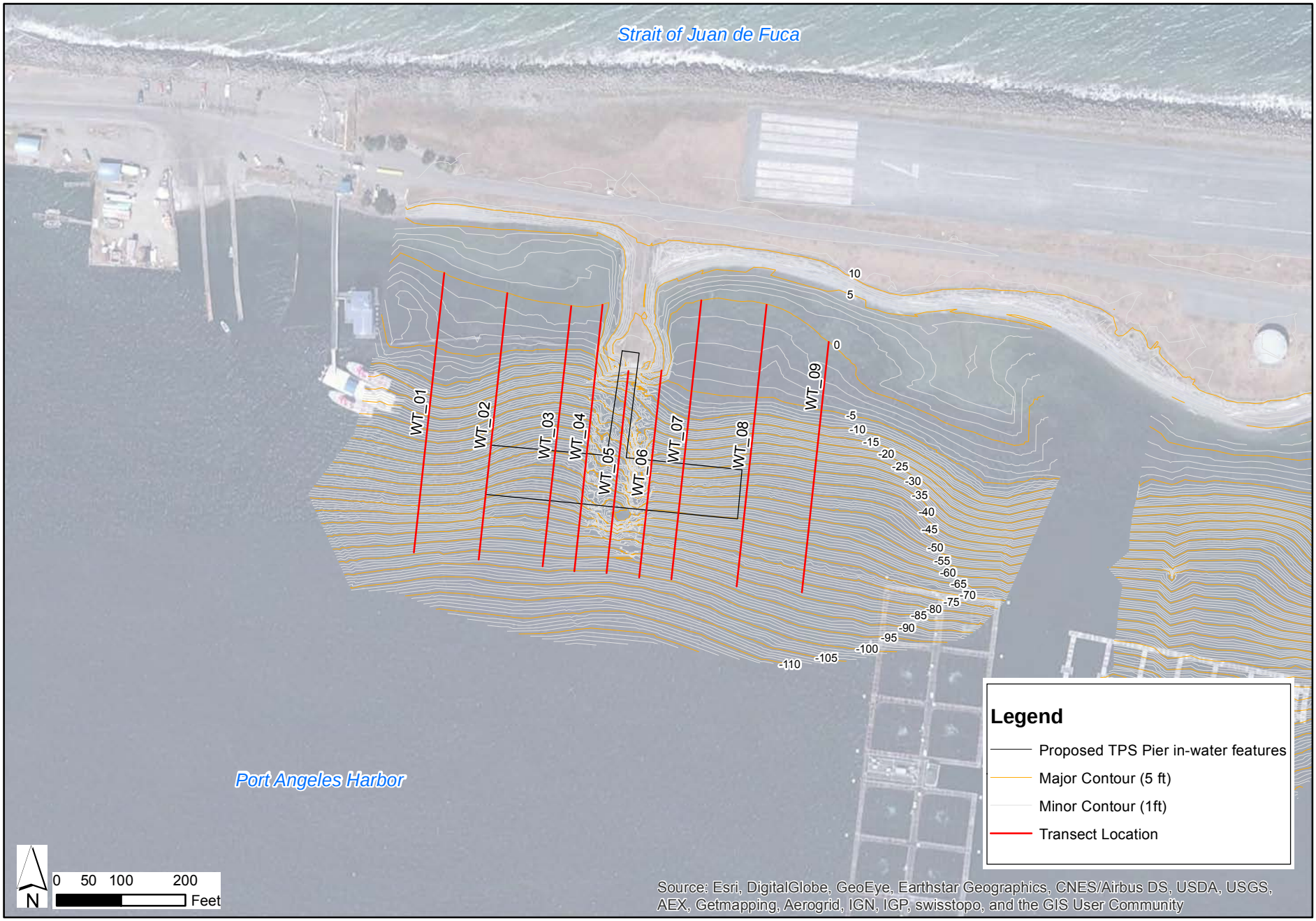

Figure 6. Transect Lanes for the Eelgrass and Macroalgae Surveys at the Western (Alternative 2) Proposed Pier Location.

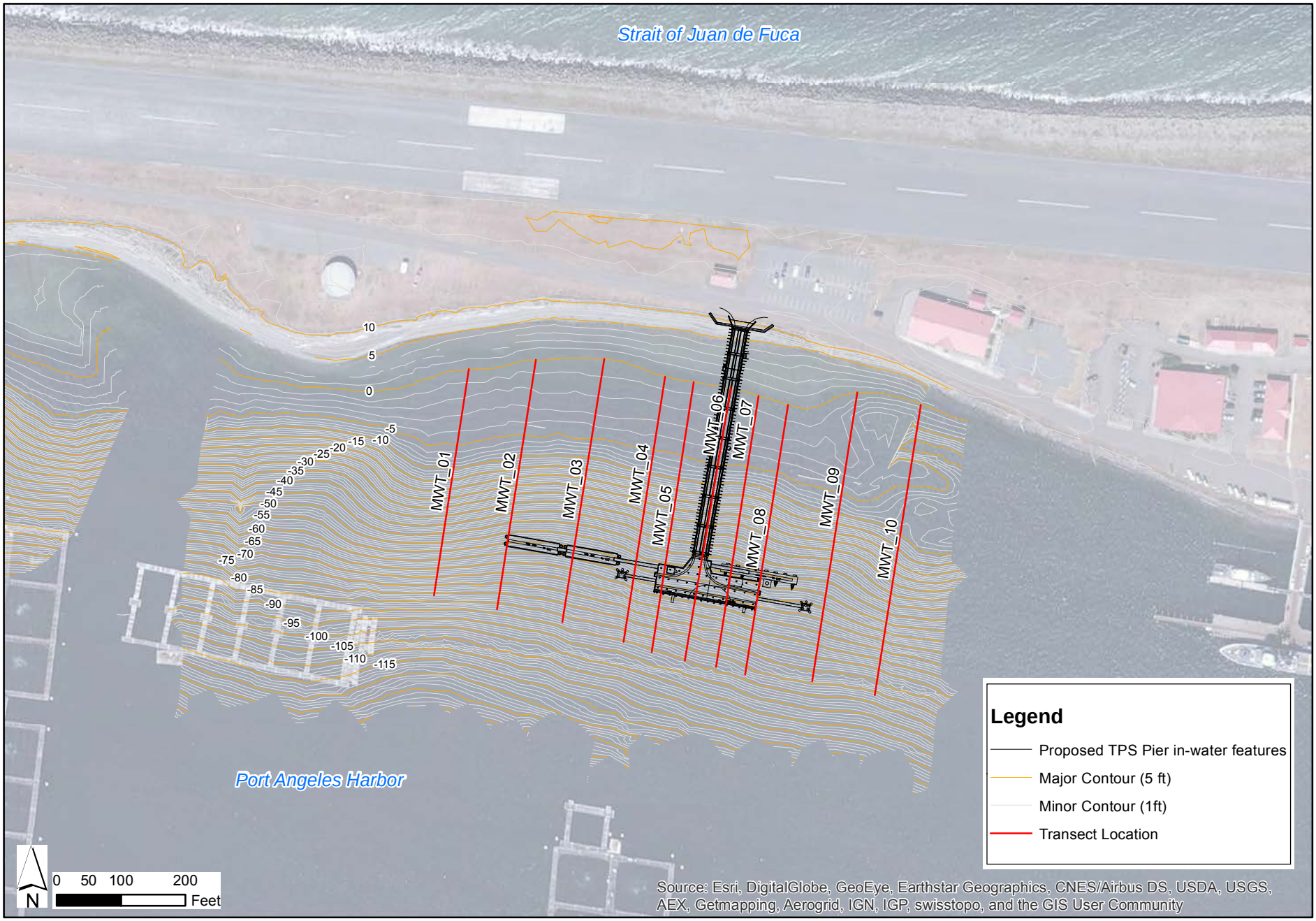

Figure 7. Transect Lanes for the Eelgrass and Macroalgae Surveys at the Midwestern (Alternative 1) Proposed Pier Location.

Figure 8. Transect Lanes for the Eelgrass and Macroalgae Surveys at the Eastern (Alternative 3) Proposed Pier Location.

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Appendix B

Video Surveys

(provided on DVD only)

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Appendix C

Diver Survey Sheets

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Bearing 180°

WT 03 + WT04

EELGRASS DENSITY DELINEATION

Date 7/21/15 Job Number Location USCG Port Angeles West

Transect no. WT04 Quadrat size 0.25 Visibility Recorder Dickinson Page

Distance (ft)				Substrate	Macroalgae (percent cover)/Shoot Counts							
Transect	Lateral(L/R)	Time	Depth	Type	Quad 1	Quad 2	Quad 3	Quad 4		Comments/Associated Species		
			142'	UPPER								
DENSE			THICK ALGAL MAT			(~10")	FR 200-300'		TAPE. ANY GRASS IS IN MAT			
	SEDIMEN		SHOWS @ 200' - 14' @ 170B					SILT/W/OD-ORGANIC				
	WT03											
		1730	158'	UPPER	8'D	U	216'	LOWER	16'D		MAT @ 228'	
214				214	0/3	BLK SILT GRAVEL						
214	25R		17		0/0							
189			10		0/0	60 LAM	40 ULVA	SARGA			COB	
189	25R		12		0/0	SAME						
164		1755	8		6/7	70 ULV	30 LAM		COBBLE			
164	25R	1	9		0/0	SAME						

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12 cards

WT 06

EELGRASS DENSITY DELINEATION

Date 7/21/15 Job Number Location USCG PA Western

Transect no. WT 06 Quadrat size 0.25 Visibility Recorder Kyte Page 1

Distance (ft) Transect	Lateral(L/R)	Time	Depth	Substrate Type	Macroalgae (percent cover)/Shoot Counts Quad 1	Quad 2	Quad 3	Quad 4	Comments/Associated Species			
278'			23	Sand	Lower edge of Eelgrass				Ulva	100%		
277			23	"	4	0	–	–				
252			16	Sand Cobble	8	5	–	–	Ulva	30%		
227			12	Sand	4	16	–	–	Lam	20%		
202			9'	"	19	12			Ulva	100%		
177			8	"	13	15			Ulva	–		
152			8	Sand	8	13			"	"		
127			6	"	9	15			"	100%		
102			5	"	0	0						
95			–	Upper Edge of Eelgrass								

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16 cont

WT07

EELGRASS DENSITY DELINEATION

Date 7/21/15 Job Number Location USCG PA Western Alternative

Transect no. WT07 Quadrat size . 25 m² Visibility Recorder Kyle Page 1

Distance (ft)				Substrate	Macroalgae (percent cover)/Shoot Counts							
Transect	Lateral(L/R)	Time	Depth	Type	Quad 1	Quad 2	Quad 3	Quad 4	Comments/Associated Species			
289			26	Lowest edge of Eelgrass								
289			26	sad	—	—			Ulva, Lam			
287			24	"	0	2			"	"		
262			17	"	8	2			"	"	70%	
237			11	"	20	6			Ulva	100%		
	Note: Dive truncated due to diver being tied, cold & low on air											
↓												
94			6	sad	6	40	—	—	Ulva	40%		
79			6	sad	62	0	—	—	"	60%		
79	Upper Edge of Eelgrass Bed											

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10 cont

EELGRASS DENSITY DELINEATION

Date 7/21 Job Number Location USCG PA Midwest AH.

Transect no. MWT05 Quadrat size 0.25 Visibility Recorder Dickinson Page 1

Distance (ft)				Substrate	Macroalgae (percent cover)/Shoot Counts				Comments/Associated Species
Transect	Lateral(L/R)	Time	Depth	Type	Quad 1	Quad 2	Quad 3	Quad 4	
			120'	Upper	Eelgrass	274' lower eelgrass			
272		1415	18	Fine Sand/Shell	8	—	—	—	20% Ulva, 50% Lam, Sarcodeatheca
247			10	FS/Shell/Gravel/Cobble	11	2			100% Laminaria
222			7	"	2	—	—	—	"
197			5	FS/Gravel	31	—	—	—	40% Lam, 20% Ulva
172		1430	4	FS	53				60% Ulva/Laminaria
147			4	FS	27	38			80% " "
122		1441	3.5	FS/Gravel/Cobbles	34	—			50% Ulva
120'		Upper Edge of Eelgrass bed							

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9 counts

EELGRASS DENSITY DELINEATION

Date 7/21/ Job Number Location USCG MWT 06

Transect no. MWT 06 Quadrat size 0.25 Visibility Recorder Kate Page 1

Distance (ft)				Substrate	Macroalgae (percent cover)/Shoot Counts				Comments/Associated Species			
Transect	Lateral(L/R)	Time	Depth	Type	Quad 1	Quad 2	Quad 3	Quad 4				
	Lower Edge		249'		Depth =	14'			Laminaria, Ulva, Sarcodetheca			
				Sad kobble								
	247		~~249~~ 14	"	9	0						
	222		8'	"	7	5						
	197		6'	"	7	9						
	172		6'	"	16	22						
	147		~5'	"	61	13						
Edge	132		3'		16	0			Ulva, Mastocarpus, 50% cov			
	↓											
	Distance from other point											

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12 cuts

EELGRASS DENSITY DELINEATION

Date 7/21/15 Job Number Location USCG Alt. 1 MWT 07

Transect no. MWT 07 Quadrat size 0.25 Visibility Recorder Kate Page 1

Distance (ft)				Substrate	Macroalgae (percent cover)/Shoot Counts				Comments/Associated Species			
Transect	Lateral(L/R)	Time	Depth	Type	Quad 1	Quad 2	Quad 3	Quad 4				
	Lower Edge 252' 17' depth								Laminaria,	Sarco,	Ulva	
	251		17'	Sand/cobble	21	0						
	227		10'	Cobble.	0	28			Laminaria	50%		
	202		6'	Cobble	16	11			Laminaria	50%		
	177		5'	"/Gravel	5	25			Ulva, Laminaria	30%		
	152		3'	Cobble/Gravel	7	30			Ulva	30%		
	127		3'	Cobble	9	0						
	128 Edge of bed											

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12 counts

EELGRASS DENSITY DELINEATION

Date 7/21/15 Job Number Location USCG PA Midwest Alternative

Transect no. MWT 08 Quadrat size 0.25 Visibility 15' Recorder Dickinson Page 1

Distance (ft)				Substrate	Macroalgae (percent cover)/Shoot Counts							
Transect	Lateral(L/R)	Time	Depth	Type	Quad 1	Quad 2	Quad 3	Quad 4	Comments/Associated Species			
269		Lower	Edge 26'	of	Eelgrass	Bed						
267		1458	19'	FS/Shell/Gravel	3	—	—	—	30% Laminaria,		20%	Ulva
242			14	FS/Shell/~~Brit~~ Cobble	41	16	—	—	40% Ulva		20%	Laminaria
217			10	"	35	—	—	—	80%	Laminaria		
192		1517	8	cobble over Grav/FS	7	—	—	—	60%	"		
167			7	"	22	31	—	—	50%	Ulva, Lam,		Tridea
142			5	FS over Gravel/FS	43	—	—	—	20%	Ulva		
125		1533	4	"	30	—	—	—	"	"		

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9 counts

25ft offset

Compass bearing offset: _____

Dickinson

Compass bearing transect 124°

EELGRASS DENSITY DELINEATION

Date 7/21/15 Job Number

Location USCG Port Angeles

Transect no. ET_04 Quadrat size 0.25 Visibility

Recorder Dickinson Page 1

Distance (ft)				Substrate	Macroalgae (percent cover)/Shoot Counts							
Transect	Lateral(L/R)	Time	Depth	Type	Quad 1	Quad 2	Quad 3	Quad 4		Comments/Associated Species		
154	2											
98	25R		17	sand	21	27		LAMIN 30%				
127	23R		8		18	25		LAM 80%	3	PILE @ 28R → 5' ϕ		
	~~25R~~		~~4~~		~~0~~			TRESUS		4' HT		SCOUR
98	25R		4		0	0						
46	25R				43	31		TRESUS				
104												

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8 counts

EELGRASS DENSITY DELINEATION

Date 7/21/15 Job Number Location USGS Port Angeles Eastern Alternative

Transect no. ET04 Quadrat size 0.25 Visibility Recorder Kyle Page 1

Distance (ft)				Substrate	Macroalgae (percent cover)/Shoot Counts							
Transect	Lateral(L/R)	Time	Depth	Type	Quad 1	Quad 2	Quad 3	Quad 4		Comments/Associated Species		
96	Top edge											
154	Bottom edge		22	Sand						Some, Saccharina		
152			4	Sand	7	5						
127			9	Sand	54	36						
98			5	Sand	74	82						

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6 cuts

Compass Bearing 64

EELGRASS DENSITY DELINEATION

Date 7/21/15 Job Number Location USCG PA

Transect no. 8TOS **Quadrat size** **Visibility** Recorder Kyte Page 1

Distance (ft)				Substrate	Macroalgae (percent cover)/Shoot Counts							
Transect	Lateral(L/R)	Time	Depth	Type	Quad 1	Quad 2	Quad 3	Quad 4	Comments/Associated Species			
99	TOP OF GRASS											
143	BOTTOM OF GRASS											
143			24		10							
95			5		11							
118			15		67	51		LAM 40%				

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4 cats

ET 06 Compass Bearing 124°

EELGRASS DENSITY DELINEATION

Date 7/21/15 Job Number Location USCG PA East Alternate

Transect no. ET 06 **Quadrat size** 0.25 **Visibility** Recorder Kyte Page 1

Distance (ft)				Substrate	Macroalgae (percent cover)/Shoot Counts							
Transect	Lateral(L/R)	Time	Depth	Type	Quad 1	Quad 2	Quad 3	Quad 4	Comments/Associated Species			
135			22	SAND - BOTTOM								
130					17	0						
91	TOP - SAND											
93					54	17						
111			12		34	29						

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6 cuts

EELGRASS DENSITY DELINEATION

Date 7/21 Job Number Location ET 07

Transect no. **Quadrat size** 0.25 **Visibility** Recorder Kyte Page 1

Distance (ft)				Substrate	Macroalgae (percent cover)/Shoot Counts				Comments/Associated Species			
Transect	Lateral(L/R)	Time	Depth	Type	Quad 1	Quad 2	Quad 3	Quad 4				
142			21	SND	4	8		BOTTOM	PATCH			
101	TOP OF GRASS					SND	51					
102			5'		47'	39						
121			13		13	29		10% LAM.				

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6 cuts

APPENDIX B – FISH SPECIES WITH DESIGNATED ESSENTIAL FISH HABITAT WITHIN THE PROJECT VICINITY

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Appendix B. Fish Species with Designated EFH in Project Vicinity

Species	Applicable Life Stages	Habitat
Pacific Coast Groundfish		
Arrowtooth flounder *(Atheresthes stomias)*	A, J, L, E	Unconsolidated bottom, epipelagic zone.
Big Skate *(Raja binoculata)*	A, J, E	Unconsolidated and soft bottom sediments.
Black rockfish *(Sebastes melanops)*	A, J	Vegetated bottom, hard bottom, Unconsolidated sediment.
Blue rockfish *(Sebastes mystinus)*	A, L	Vegetated bottom, hard bottom, epipelagic zone.
Butter sole *(Isopsetta isolepis)*	A	Muddy or silty sediment.
Bocaccio *(Sebastes paucispinis)*	J, L	Vegetated bottom, hard bottom, epipelagic zone.
Cabezon *(Scorpaenichthys marmoratus)*	A	Hard bottom.
California skate *(Raja inornata)*	A, J, E	Soft (muddy) bottom sediments.
Chilipepper *(Sebastes goodie)*	J	Sandy vegetated bottoms (kelp), epipelagic zone.
China rockfish *(Sebastes nebulosus)*	A, J	Rocky reef, vegetated bottoms (kelp).
Curlfin sole *(Pleuronichthys decurrens)*	A	Soft bottoms.
Darkblotched rockfish *(Sebastes cramen)*	A, J, L	Soft bottoms near cobble or boulders, epipelagic zone.
Dover *sole (Solea solea)*	A, J	Muddy bottom.
English sole *(Parophrys vetulus)*	A, J, L	Unconsolidated bottom, epipelagic zone.
Flathead sole *(Hippoglossoides elassodon)*	A, J	Unconsolidated sediments.
Greenstriped rockfish *(Sebastes elongates)*	A, J	Rocky reefs, soft bottoms.
Kelp greenling *(Hexagrammos decagrammus)*	A, L	Rocky reefs near dense algae or kelp, epipelagic zone.
Lingcod *(Ophiodon elongates)*	A, J, L, E	Unconsolidated sediments, rocky reefs, kelp and eelgrass beds, epipelagic zone.
Longnose skate *(Raja rhina)*	A, E, J	Mixed sediments.
Pacific cod *(Gadus microcephalus)_*	A, J, E, L	Unconsolidated sediments.
Pacific Grenadier *(Coryphaenoides acrolepis)*	E, L	Unconsolidated sediments, epipelagic zone.
Pacific Hake *(Merluccius productus)*	A, E	Epipelagic zone.
Pacific ocean perch *(Sebastes alutus)*	L	Epipelagic zone.
Pacific sanddab *(Citharichthys sordidus)*	A	Sandy sediments.
Petrale sole *(Eopsetta jordani)*	A, J	Soft sediments.
Quillback rockfish *(Sebastes maliger)*	A	Artificial structure, mixed bottom, vegetated bottom.
Rex sole *(Glyptocephalus zachirus)*	A, J	Unconsolidated sediments.

Appendix B. Fish Species with Designated EFH in Project Vicinity

Species	Applicable Life Stages	Habitat
Rock sole *(Lepidopsetta bilineata)*	A	Hard bottom.
Rougheye rockfish *(Sebastes aleutianus)*	A, J	Steeply sloped bottom and muddy bottom.
Sablefish *(Anoplopoma fimbria)*	A, J, E	Unconsolidated sediments, drifting kelp, epipelagic zone.
Sand sole *(Psettichthys melanostictus)*	A, J, L	Unconsolidated sediments, epipelagic zone.
Sharpchin rockfish *(Sebastes zacentrus)*	A, J	Unconsolidated sediments.
Shortspine thornyhead *(Sebastolobus alascanus)*	J	Muddy bottom near rocks.
Soupfin shark *(Galeorhinus galeus)*	A, J	Unconsolidated sediments, epipelagic zone.
Spiny dogfish *(Squalus acanthias)*	A, J	Unconsolidated sediments, epipelagic zone.
Splitnose rockfish *(Sebastes diploproa)*	A, J, L	Muddy, vegetated bottoms (specifically eelgrass and kelp), epipelagic zone.
Spotted ratfish *(Hydrolagus colliei)*	A, J, E	Unconsolidated sediments, low-rocky relief.
Starry flounder *(Platichthys stellatus)*	A, J, E	Unconsolidated sediments, epipelagic zone.
Stripetail rockfish *(Sebastes saxicola)*	A, J	Unconsolidated sediments.
Widow rockfish *(Sebastes entomelas)*	J	Sand channels among rocks, soft substrata.
Coastal Pelagics		
Anchovy *(Engraulis mordax)*	A, L, E	All estuarine waters above the thermocline and falling between 10 and 20 degrees Celsius.
Market squid *(Loligo opalescens)*	A	Same as above.
Pacific Coast Salmon		
Coho *(Oncorhynchus kisutch*	A, J	Estuarine waters and substrates, including the nearshore and tidal submerged environments, and most freshwater bodies historically accessible to salmon (except above certain impassable natural barriers).
Chinook *(Oncorhynchus tshawytscha)*	A, J	Same as above.
Pink *(Oncorhynchus gorbuscha)*	A, J	Same as above.

Notes: A = adult, E = eggs, J = juvenile, L = larvae.
Sources: PFMC 2005a, 2005b, 2011a, 2011b, 2012.

Appendix C
Consultation

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National Historic Preservation Act Section 106 Documentation

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DEPARTMENT OF THE NAVY
NAVAL BASE KITSAP
120 SOUTH DEWEY ST
BREMERTON, WA 98314-5020

5090
Ser PRB4/01562
12 Sep 14

Allyson Brooks, PhD
State Historic Preservation Officer
Department of Archaeology and Historic Preservation
P.O. Box 48343
Olympia, WA 98504-8343

Dear Dr. Brooks:

SUBJECT: REQUEST FOR SECTION 106 CONSULTATION ON THE DEFINITION OF THE AREA OF POTENTIAL EFFECTS FOR THE NAVY'S TRANSIT PROTECTION SYSTEM PORT ANGELES FORWARD OPERATING LOCATION, WEST SITE, U.S. COAST GUARD AIR STATION, PORT ANGELES, WASHINGTON

Naval Base (NAVBASE) Kitsap is initiating consultation in accordance with Section 106 of the National Historic Preservation Act as amended, and 36 CFR Part 800 for the construction of the Transit Protection System (TPS) Port Angeles Forward Operating Location at the United States Coast Guard Air Station on the "west" site of Ediz Hook (Navy Project P-993). This letter is to request your comments on our definition of the Area of Potential Effects (APE) for this project.

The Navy is proposing to construct the TPS at the Ediz Hook Coast Guard Station to provide overnight docking and berthing facilities for Maritime Force Protection Unit personnel who escort naval submarines to the Strait of Juan de Fuca. Ediz Hook is a 3-mile long sand spit that separates Port Angeles from the Strait of Juan de Fuca (Enclosure 1). The project is located in the north half of Section 35, Township 31 North, Range 6 West (USGS Ediz Hook, 7.5" quadrangle). Elevation is approximately 10 feet above sea level.

The new facility consists of a number of components including a T-pier with a trestle/bridge, fuel storage and distribution system, one small building (the Alert Force Facility for berthing personnel), and a concrete pad for a Ready Service Locker (for the storage of weapons), a small number of parking spaces, associated underground utilities (Enclosure 2), and a possible wave barrier in the east waterway. The project is still in the design phase and the precise location of the support facilities has yet to be determined. The floating pier would be constructed off an existing rock jetty with mooring

dolphins to hold it in place, and it would require a full suite of utilities including power, potable water, fire protection, sewage and other drainage, fuel, and telecommunications. A 10,000 gallon diesel fuel tank and underground distribution system would be installed on shore next to the pier. Nearby, the berthing facility and the Ready Service Locker, both small low rise structures on shallow foundations, would be constructed and supplied with utilities. The subsurface utilities supplied to the buildings and pier would tie into existing buried lines on the U.S. Coast Guard Station. The standard depth for most utility lines is no more than 3 feet, however, the possibility exists that some excavations, such as for gravity flow drainage or trestle support may extend much deeper. The project also entails considerable shallow ground disturbance in the form of new paving for roadways and parking areas, grading, concrete curbs, sidewalks, and storage pads, stormwater management, landscaping, retaining walls, fencing, and signage.

The APE is a large irregular area, 40 acres in size, with a 100-foot buffer. It is expected that all construction, parking, and equipment staging would take place within the confines of the APE. The Navy proposes to conduct a pedestrian survey of the APE with systematic shovel testing in areas of subsurface disturbance.

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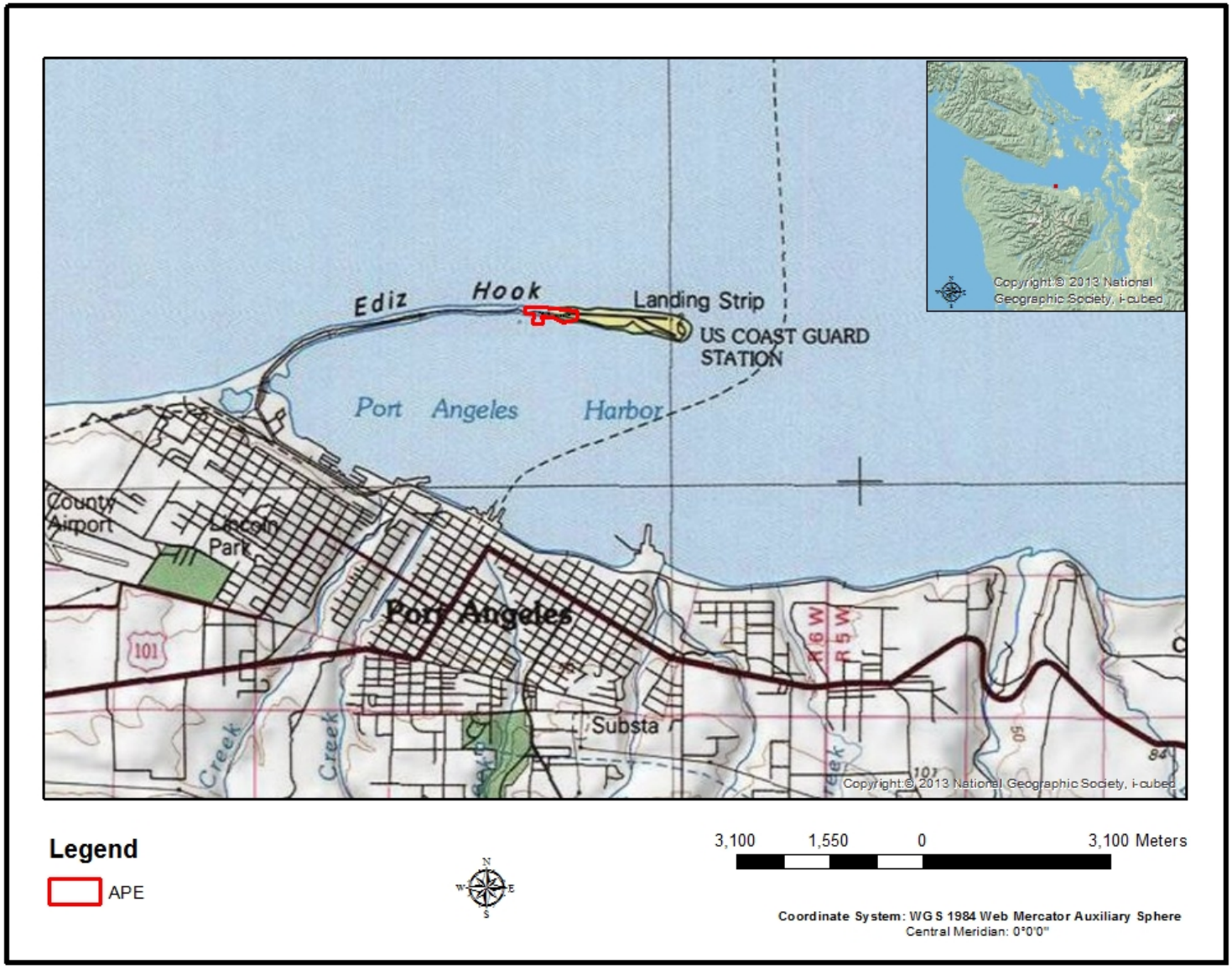
Sincerely,

T. A. ZWOLFER
Captain, U. S. Navy
Commanding Officer

Enclosures:
1. APE on a U.S.G.S. Topographic map.
2. Construction locations on satellite imagery.



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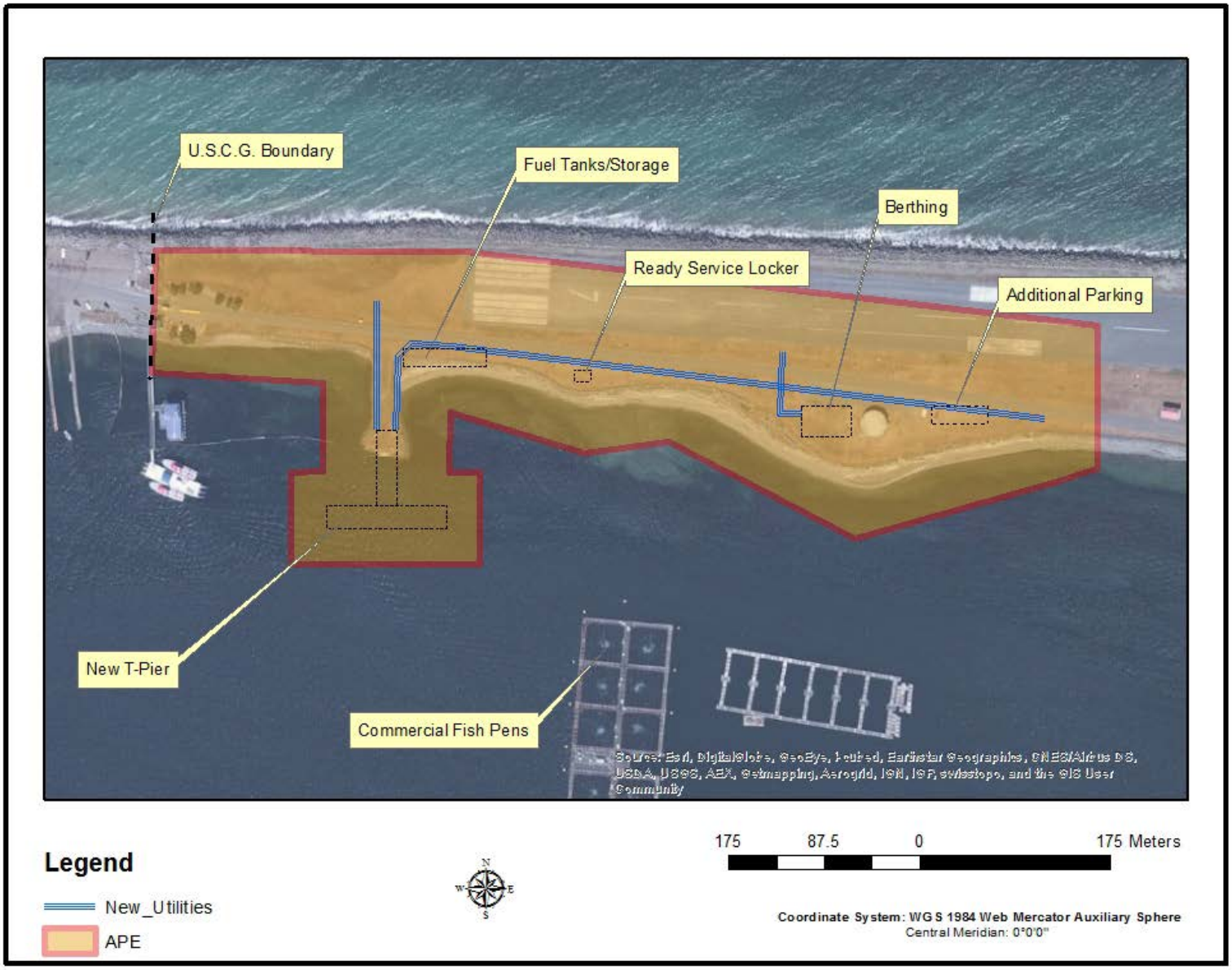

Enclosure 2. Construction locations within the APE on satellite imagery.

DEPARTMENT OF THE NAVY
NAVAL BASE KITSAP
120 SOUTH DEWEY ST
BREMERTON, WA 98314-5020

5090
Ser PRB4/01564
12 Sep 14

Lower Elwha Klallam Tribe
Mr. William S. White
Cultural Resources Department
2851 Lower Elwha Road
Port Angeles, Washington 98363

Dear Mr. White:

SUBJECT: REQUEST FOR SECTION 106 CONSULTATION ON THE DEFINITION OF THE AREA OF POTENTIAL EFFECTS FOR THE NAVY'S TRANSIT PROTECTION SYSTEM PORT ANGELES FORWARD OPERATING LOCATION, WEST SITE, U.S. COAST GUARD AIR STATION, PORT ANGELES, WASHINGTON

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Sincerely,

T. A. ZWOLFER
Captain, U. S. Navy
Commanding Officer

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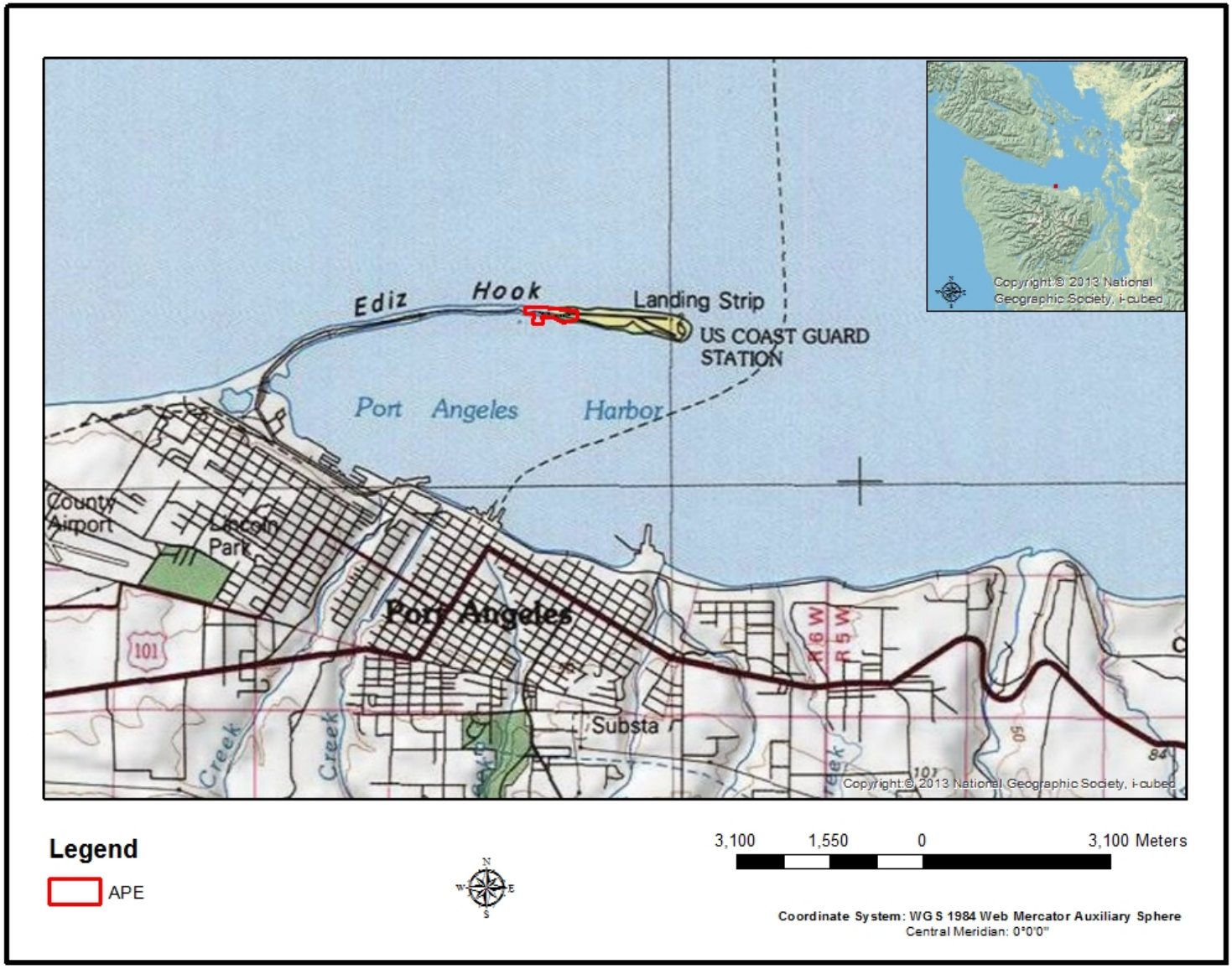

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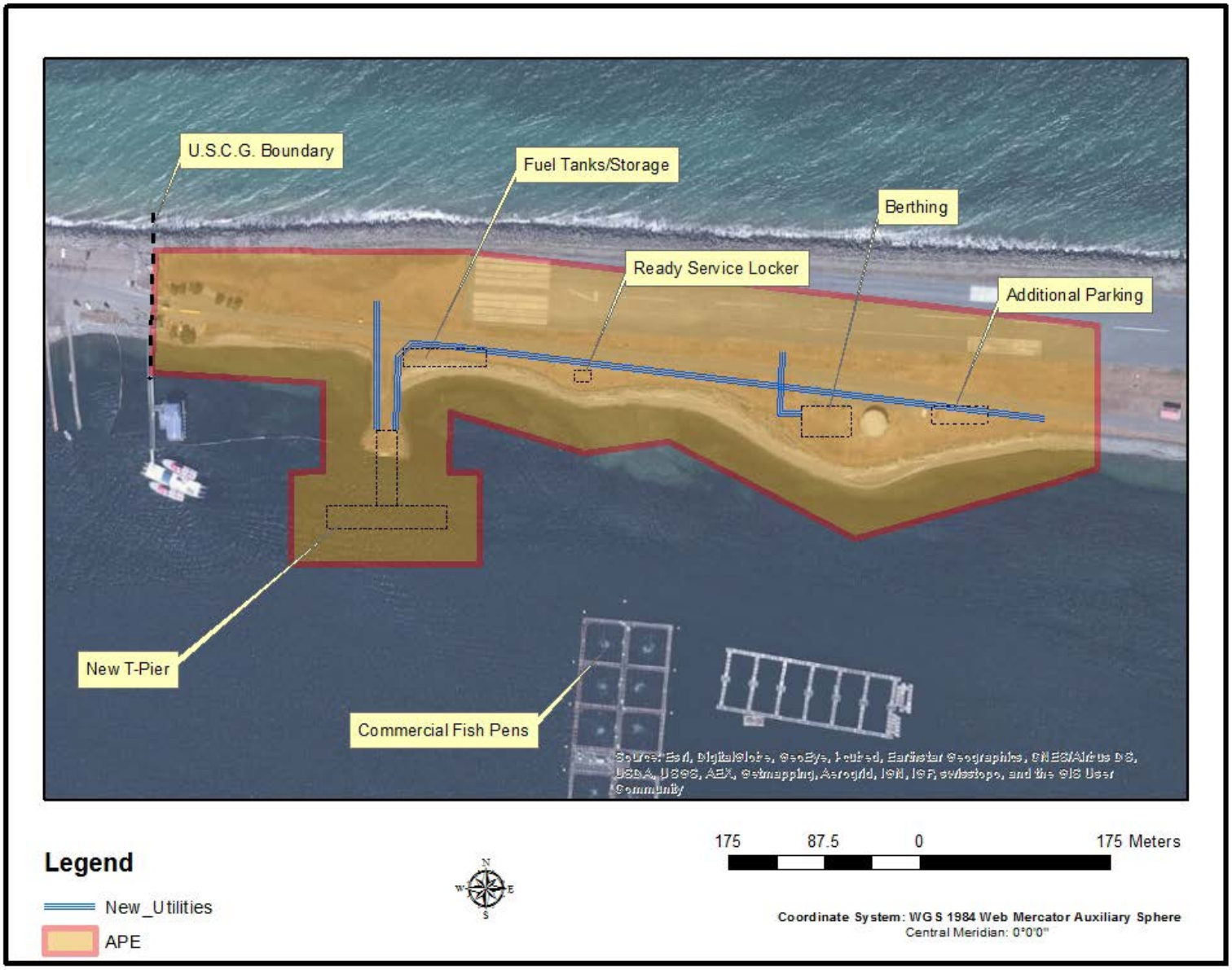

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DEPARTMENT OF THE NAVY
NAVAL BASE KITSAP
120 SOUTH DEWEY ST
BREMERTON, WA 98314-5020

5090
Ser PRB4/01563
12 Sep 14

The Jamestown S'Klallam Tribe
Mr. Gideon Cauffman, Tribal Historic Preservation Officer
1033 Old Blyn Highway
Sequim, WA 98382

Dear Mr. Cauffman:

SUBJECT: REQUEST FOR SECTION 106 CONSULTATION ON THE DEFINITION OF THE AREA OF POTENTIAL EFFECTS FOR THE NAVY'S TRANSIT PROTECTION SYSTEM PORT ANGELES FORWARD OPERATING LOCATION, WEST SITE, U.S. COAST GUARD AIR STATION, PORT ANGELES, WASHINGTON

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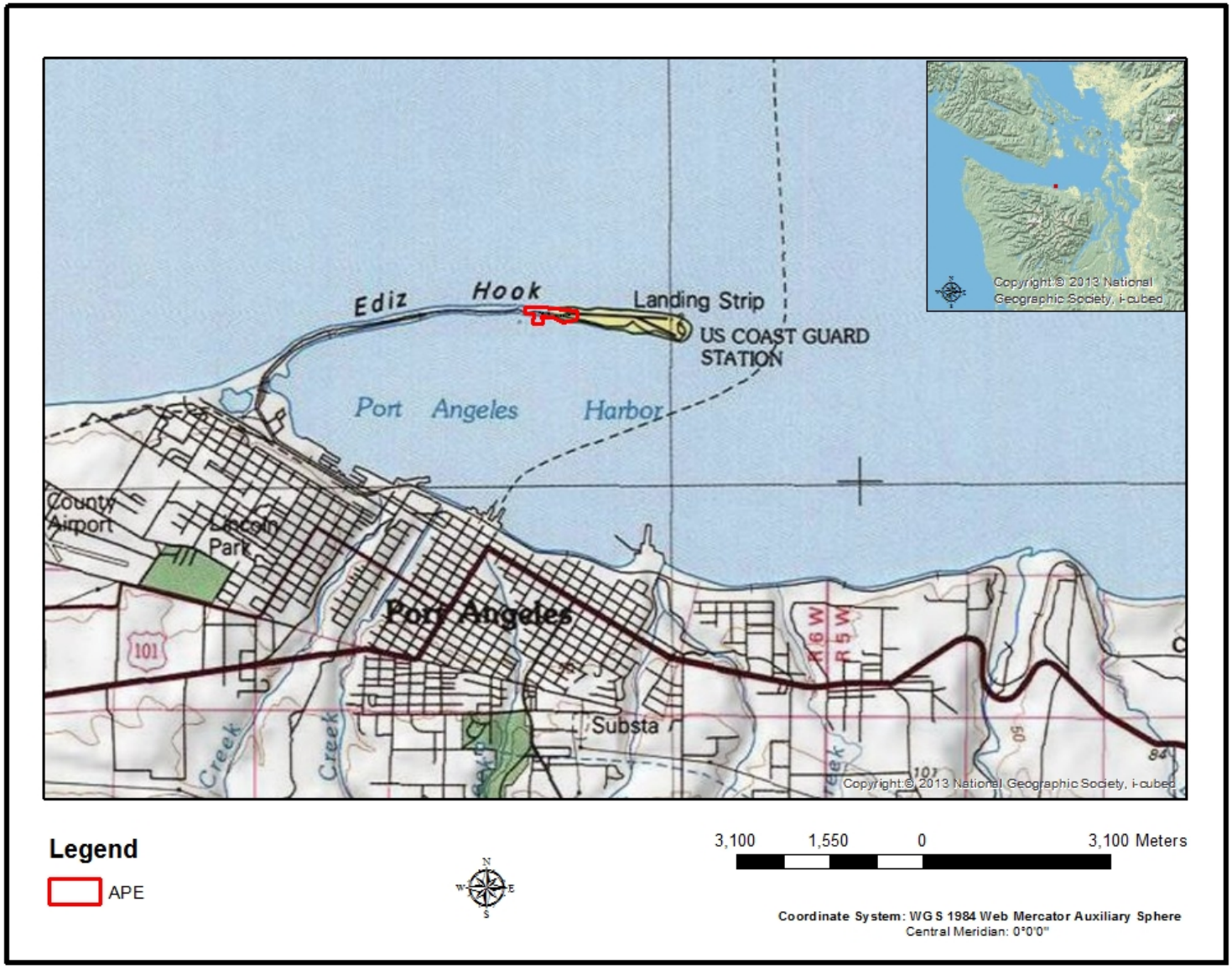

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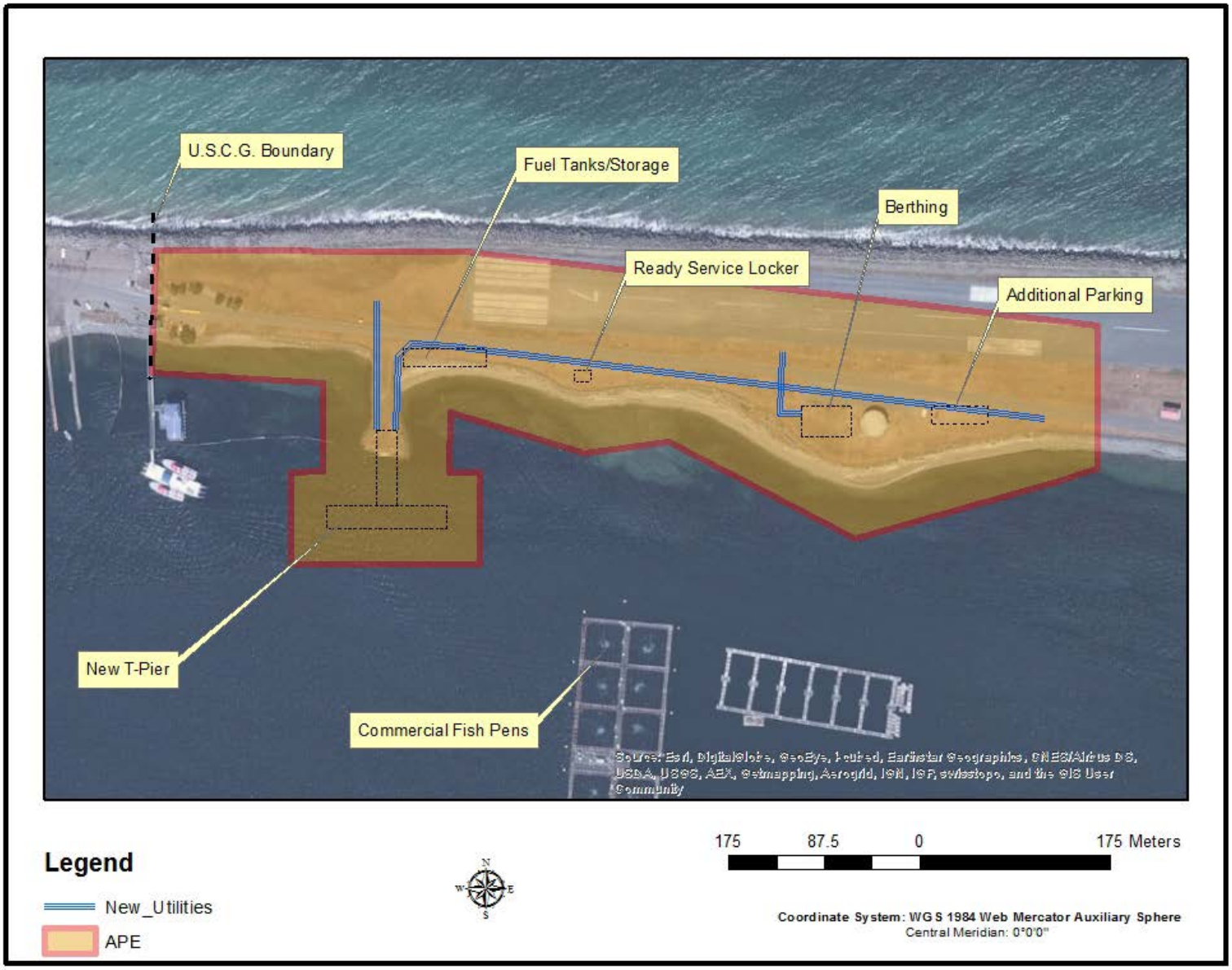

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DEPARTMENT OF THE NAVY
NAVAL BASE KITSAP
120 SOUTH DEWEY ST
BREMERTON, WA 98314-5020

5090
Ser PRB4/01565
12 Sep 14

The Port Gamble S'Klallam Tribe
Dr. Josh Wisniewski, Tribal Historic Preservation Officer
31912 Little Boston Road NE
Kingston, WA 98346

Dear Dr. Wisniewski:

SUBJECT: REQUEST FOR SECTION 106 CONSULTATION ON THE DEFINITION OF THE AREA OF POTENTIAL EFFECTS FOR THE NAVY'S TRANSIT PROTECTION SYSTEM PORT ANGELES FORWARD OPERATING LOCATION, WEST SITE, U.S. COAST GUARD AIR STATION, PORT ANGELES, WASHINGTON

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Sincerely,

T. A. ZWOLFER
Captain, U. S. Navy
Commanding Officer

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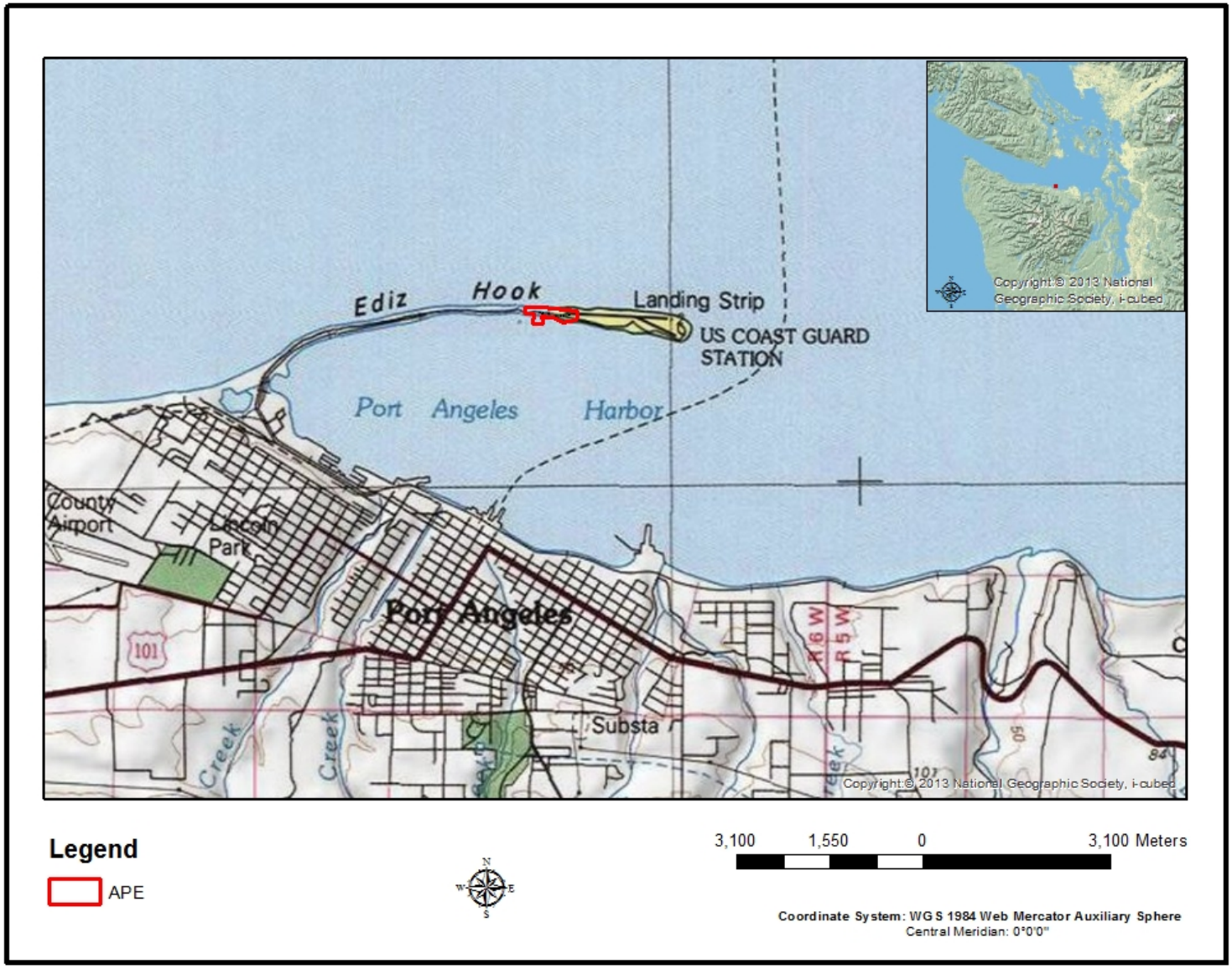

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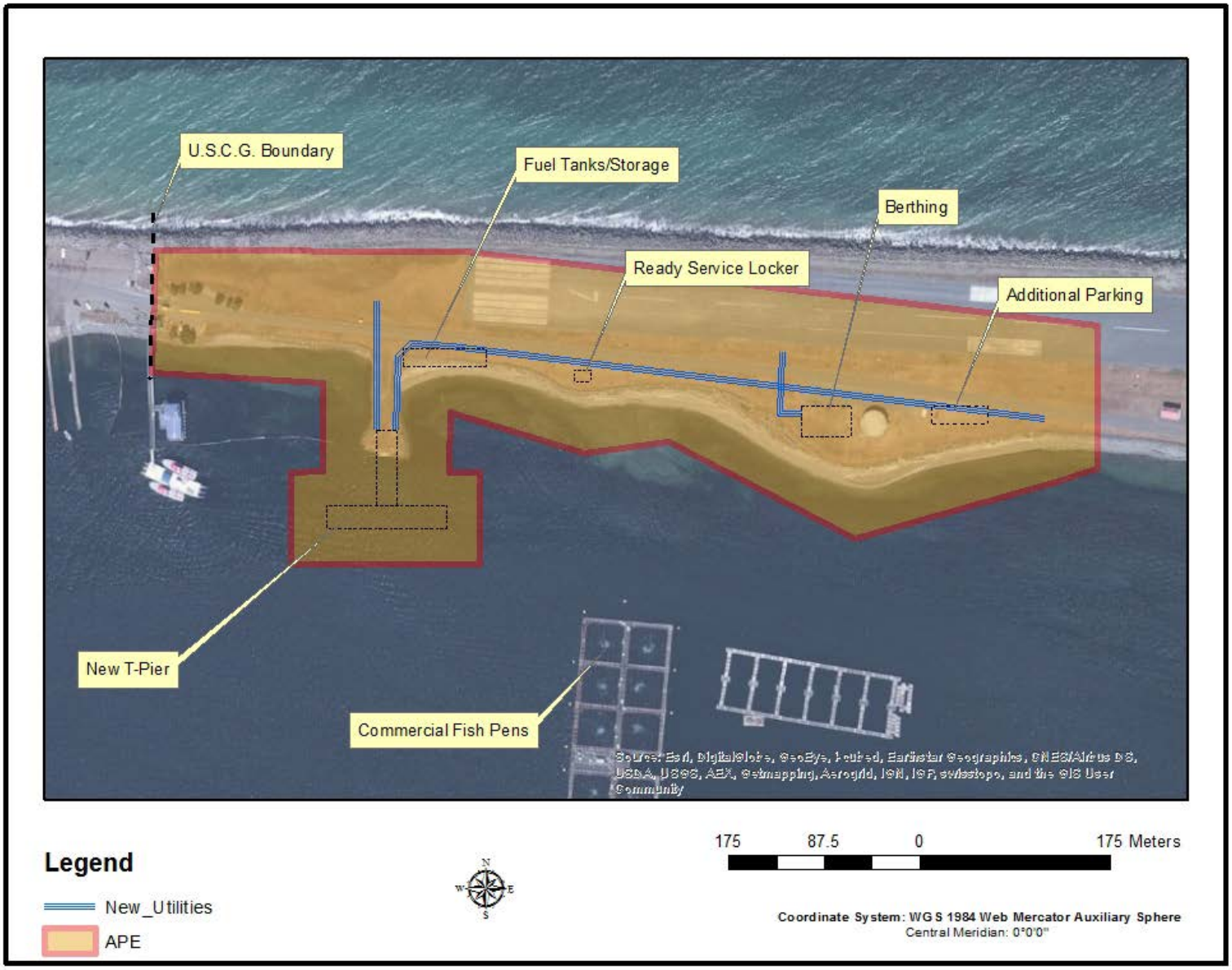

Enclosure 2. Construction locations within the APE on satellite imagery.

DEPARTMENT OF
ARCHAEOLOGY &
HISTORIC PRESERVATION
Protect the Past, Shape the Future

Allyson Brooks Ph.D., Director
State Historic Preservation Officer

September 17, 2014

Captain T.A. Zwolfer
Naval Base Kitsap
Department of the Navy
120 South Dewey Street
Bremerton, Washington 98314

RE: Transit Protection System & Alert Force Facility
Log No. 091714-10-USN

Dear Commander Zwolfer;

Thank you for contacting our department. We have reviewed the materials you provided for the proposed Transit Protection System & Alert Force Facility at Port Angeles Forward Operating Location at USCG Air Station on Ediz Hook, Port Angeles, Clallam County, Washington.

We concur with your determination of the Area of Potential Effect (APE) as described and presented in your figures and text.

We look forward to the results of your professional cultural resources identification efforts, professional review, consultations with concerned tribes, and Determination of Effect.

We would appreciate receiving any correspondence or comments from concerned tribes or other parties that you receive as you consult under the requirements of 36CFR800.4(a)(4).

These comments are based on the information available at the time of this review and on the behalf of the State Historic Preservation Officer in conformance with Section 106 of the National Historic Preservation Act, as amended, and its implementing regulations 36CFR800. Should additional information become available, our assessment may be revised. Thank you for the opportunity to comment and a copy of these comments should be included in subsequent environmental documents.

Sincerely,

Robert G. Whitlam, Ph.D.
State Archaeologist
(360) 586-3080
email: *rob.whitlam@dahp.wa.gov*

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DEPARTMENT OF THE NAVY
NAVAL BASE KITSAP
120 SOUTH DEWEY ST
BREMERTON, WA 98314-5020

5090
PRB4/ 00912
15 May 15

Allyson Brooks, PhD
State Historic Preservation Officer
Department of Archaeology and Historic Preservation
P.O. Box 48343
Olympia, WA 98504-8343

Dear Dr. Brooks:

SUBJECT: AMENDED AREA OF POTENTIAL EFFECT FOR THE NAVY'S PIER AND SUPPORT FACILITIES FOR TRANSIT PROTECTION SYSTEM AT U.S. COAST GUARD AIR STATION/SECTOR FIELD OFFICE PORT ANGELES, WASHINGTON

In September 2014, Naval Base (NAVBASE) Kitsap initiated consultation and defined the area of potential effect (APE) for the proposed construction of a Pier and Support Facilities as part of a Transit Protection System (TPS) at the U.S. Coast Guard Air Station/Sector Field Office on Ediz Hook. Your office concurred with the APE definition (DAHP Log. No. 091714-10-USN). This letter is to request your comments on our proposed amendment to the APE.

As you may recall, the Navy is proposing to construct a pier and support facilities at the Ediz Hook Coast Guard Station to provide a staging location for TPS vessels and crews that escort Navy submarines to and from their dive/surface points in the Strait of Juan de Fuca and NAVBASE Kitsap Bangor. Through the planning and consultation process, the Navy has developed an alternate location that requires amending the APE. The new alternative location shifts the previous APE to the east and requires an extension of water and communication utilities (Enclosure 1).

The new facility comprises similar elements as detailed in letter from September: a fixed pier with an approach trestle, fuel storage and distribution system, an 8,200 sq. ft. building to provide office and sleeping spaces, a small prefab building to serve as a Ready Service Armory, a small number of parking spaces, and associated underground utilities (Enclosure 2).

The expanded construction footprint APE is approximately 6.5 acres with communication and water utility alignments extending

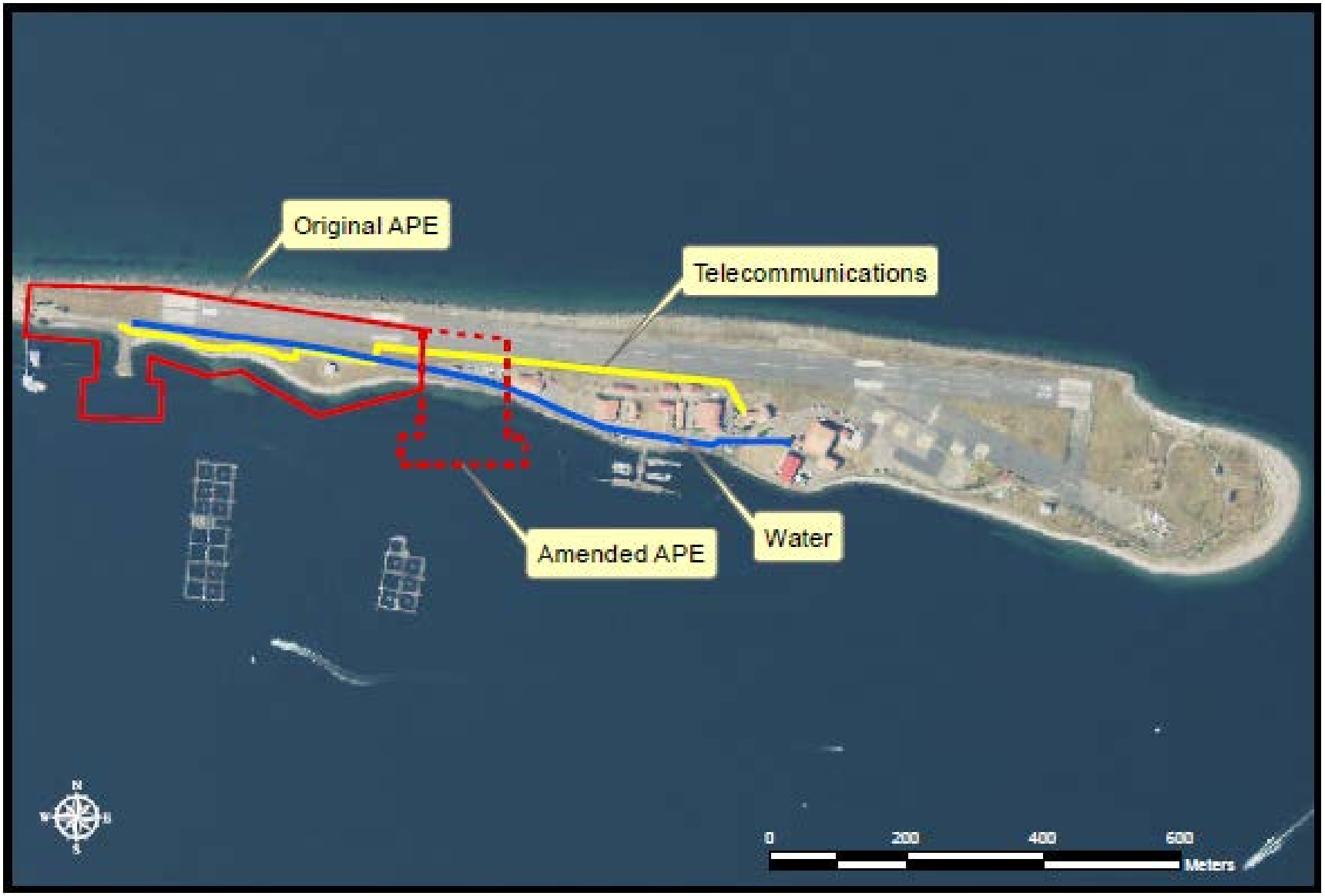
430 and 470 meters to the east, respectively. Navy staff and the archaeologist for the Lower Elwha Klallam Tribe, Mr. Bill White, conducted monitoring of geotechnical testing in the original APE (DAHP Log. No. 011314-19-USN) in September 2014. The results of that effort are documented in an October 2014 report (Hughes 2014). Additional pedestrian survey and subsurface testing in the expended APE will be presented for your review and comment in an addendum to the Hughes report.

The Navy respectfully requests your concurrence with the amended APE for this proposed undertaking. If you require further information or have any questions, please contact Mr. David Grant. He can be reached at (360) 396-0919 or at dave.m.grant@navy.mil.

Sincerely,

T. A. ZWOLFER
Captain, U. S. Navy
Commanding Officer

Enclosures: 1. Amended APE on satellite imagery
2. Preliminary construction locations in the amended APE



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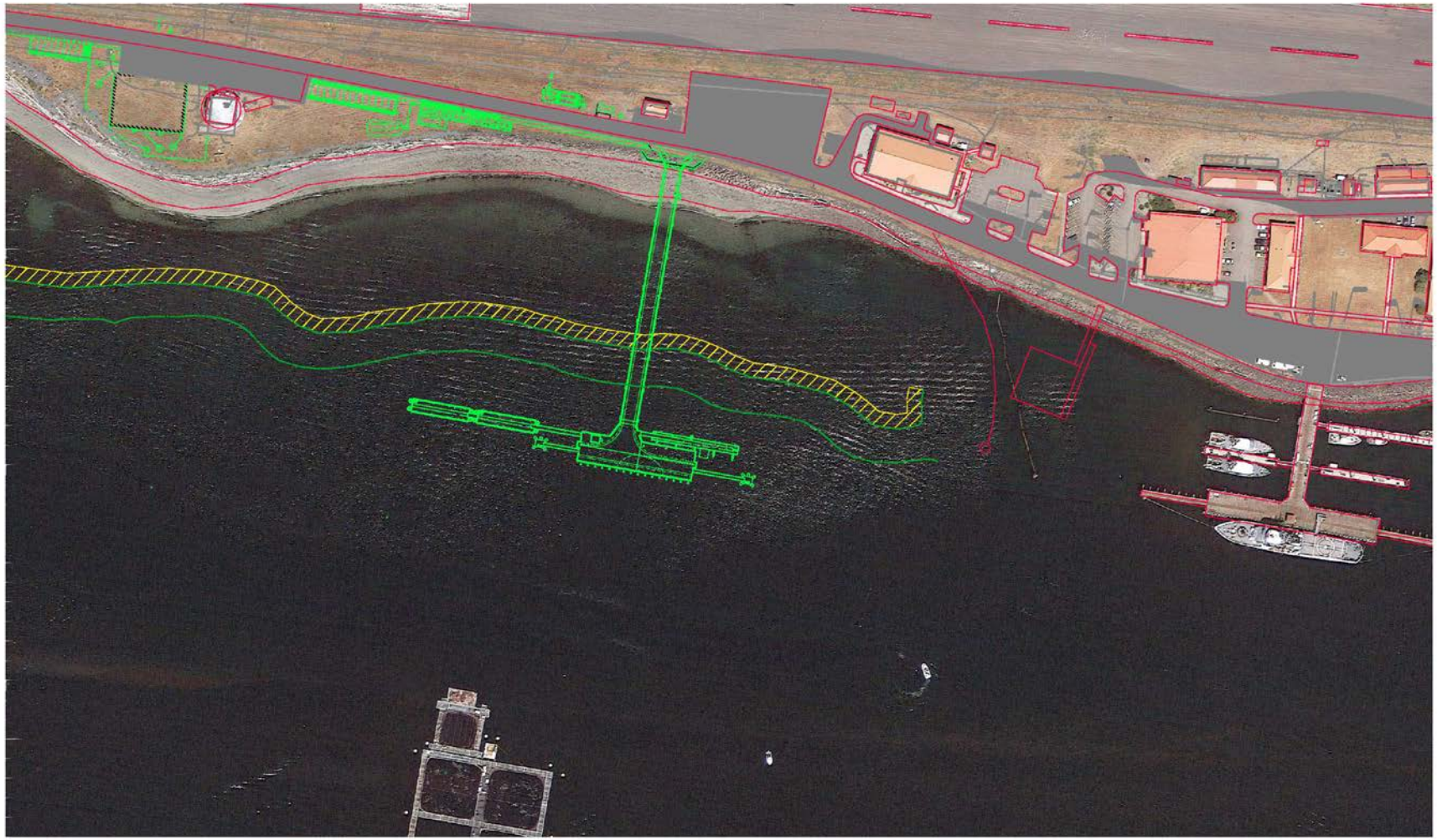

Enclosure 2. Preliminary construction location in the amended APE.

DEPARTMENT OF THE NAVY
NAVAL BASE KITSAP
120 SOUTH DEWEY ST
BREMERTON, WA 98314-5020

5090
PRB4/ 00908
15 May 15

Lower Elwha Klallam Tribe
The Honorable Francis Charles
2851 Lower Elwha Road
Port Angeles, Washington 98363

Dear Chairwoman Charles:

SUBJECT: AMENDED AREA OF POTENTIAL EFFECT AND SOLICITATION OF INFORMATION ON TRADITIONAL CULTURAL PROPERTIES FOR THE NAVY'S PIER AND SUPPORT FACILITIES FOR TRANSIT PROTECTION SYSTEM AT U.S. COAST GUARD AIR STATION/SECTOR FIELD OFFICE PORT ANGELES, WASHINGTON

Naval Base (NAVBASE) Kitsap previously defined the area of potential effect (APE) for the proposed construction of the Transit Protection System (TPS) Port Angeles Forward Operating Location at the United States Coast Guard Air Station on the "west" site of Ediz Hook (Navy Project P-993). This letter is to request your comments on a proposed amendment of the APE.

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The Navy respectfully requests your comments on the APE for this proposed undertaking. If you require further information or have any questions, please contact Mr. David Grant. He can be reached at (360) 396-0919 or at dave.m.grant@navy.mil.

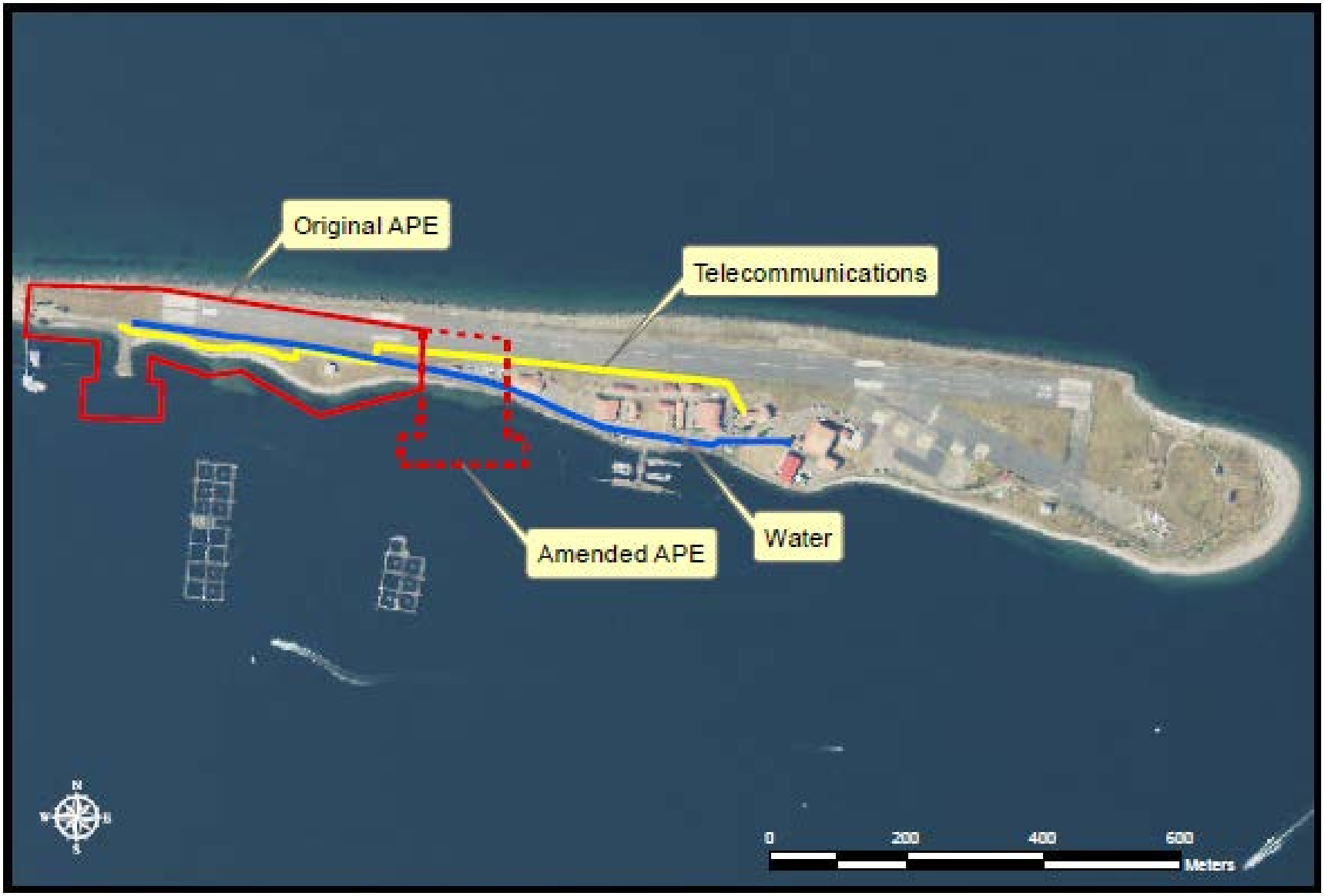
In addition, pursuant to 36 CFR 800.4(a)(4), the Navy respectfully solicits any knowledge or concerns you may have about the proposed undertaking's effects on properties of traditional cultural or religious importance to the people of the Lower Elwha Tribe. The Navy is aware of the importance of Ediz Hook to the Tribe and your letter of October 9, 2007 to the Coast Guard regarding the Environmental Assessment for the construction of Covered Moorings wherein you indicated the Tribe considered the Ediz Hook to be a traditional cultural property. We would like to discuss the next steps to take regarding this important landform. If you prefer, we would be happy to discuss this matter in a separate meeting or include it as a topic for an upcoming government-to-government meeting.

Sincerely,

T. A. ZWOLFER
Captain, U. S. Navy
Commanding Officer

Enclosures: 1. Amended APE on satellite imagery
2. Preliminary construction locations in the amended APE

Copy to:
Bill White, Tribal Archaeologist, LEKT



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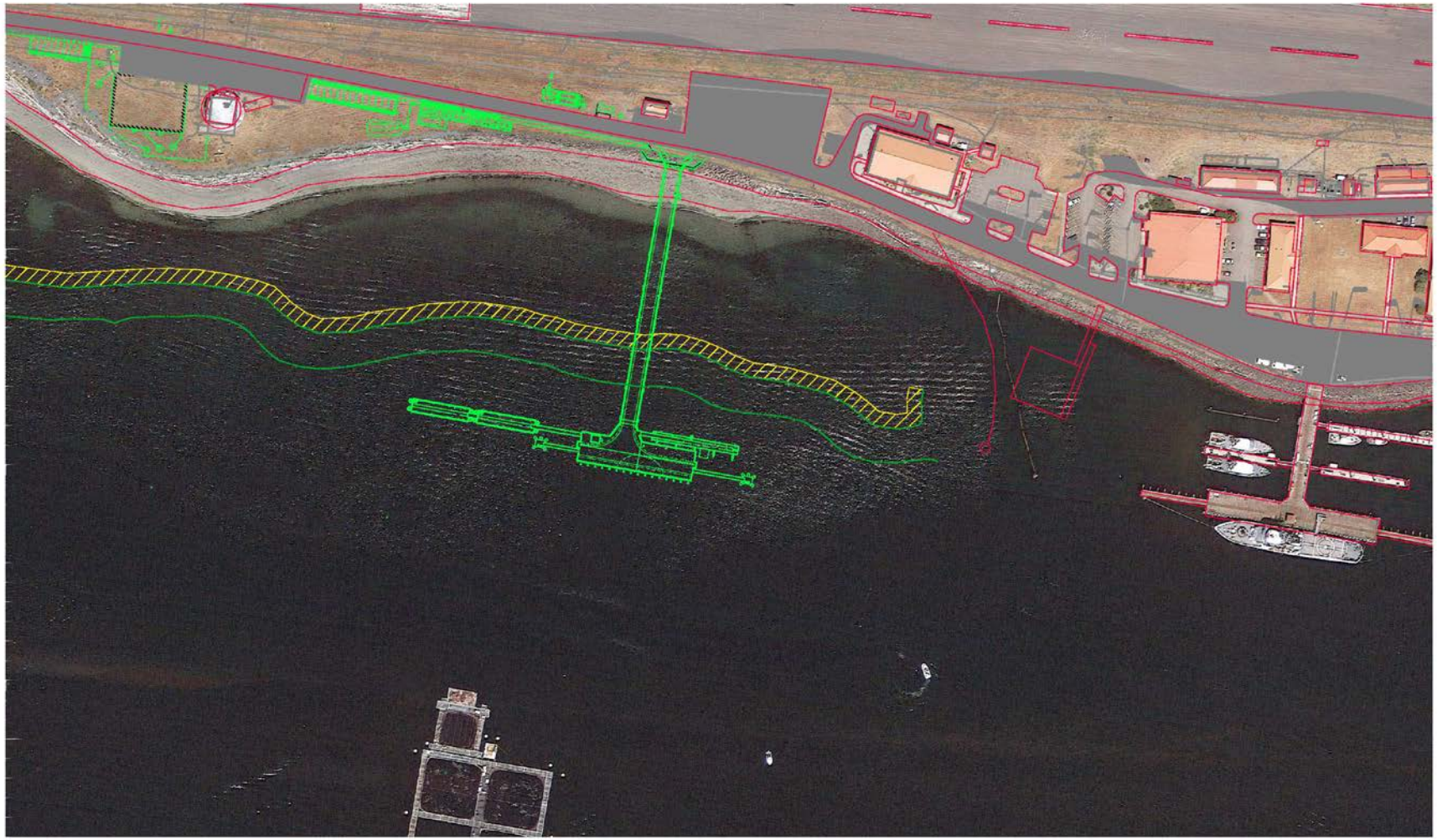

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DEPARTMENT OF THE NAVY
NAVAL BASE KITSAP
120 SOUTH DEWEY ST
BREMERTON, WA 98314-5020

5090
PRB4/ 00910
15 May 15

The Jamestown S'Klallam Tribe
Ms. Leanne Jenkins
Planning Director
1033 Old Blyn Highway
Sequim, WA 98382

Dear Ms. Jenkins:

SUBJECT: AMENDED AREA OF POTENTIAL EFFECT FOR THE NAVY'S PIER AND SUPPORT FACILITIES FOR TRANSIT PROTECTION SYSTEM AT U.S. COAST GUARD AIR STATION/SECTOR FIELD OFFICE PORT ANGELES, WASHINGTON

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As you may recall, the Navy is proposing to construct a pier and support facilities at the Ediz Hook Coast Guard Station to provide a staging location for TPS vessels and crews that escort Navy submarines to and from their dive/surface points in the Strait of Juan de Fuca and NAVBASE Kitsap Bangor. Through the planning and consultation process, the Navy has developed an alternate location that requires amending the APE. The new alternative location shifts the previous APE to the east and requires an extension of water and communication utilities (Enclosure 1).

The new facility comprises similar elements as detailed in letter from September: a fixed pier with an approach trestle, fuel storage and distribution system, an 8,200 sq. ft. building to provide office and sleeping spaces, a small prefab building to serve as a Ready Service Armory, a small number of parking spaces, and associated underground utilities (Enclosure 2).

The expanded construction footprint APE is roughly 6.5 acres with communication and water utility alignments extending 430 and 470 meters to the east, respectively. Navy staff and the Archaeologist for the Lower Elwha Klallam Tribe, Mr. Bill White,

SUBJECT: AMENDED AREA OF POTENTIAL EFFECT FOR THE NAVY'S PIER AND SUPPORT FACILITIES FOR TRANSIT PROTECTION SYSTEM AT U.S. COAST GUARD AIR STATION/SECTOR FIELD OFFICE PORT ANGELES, WASHINGTON

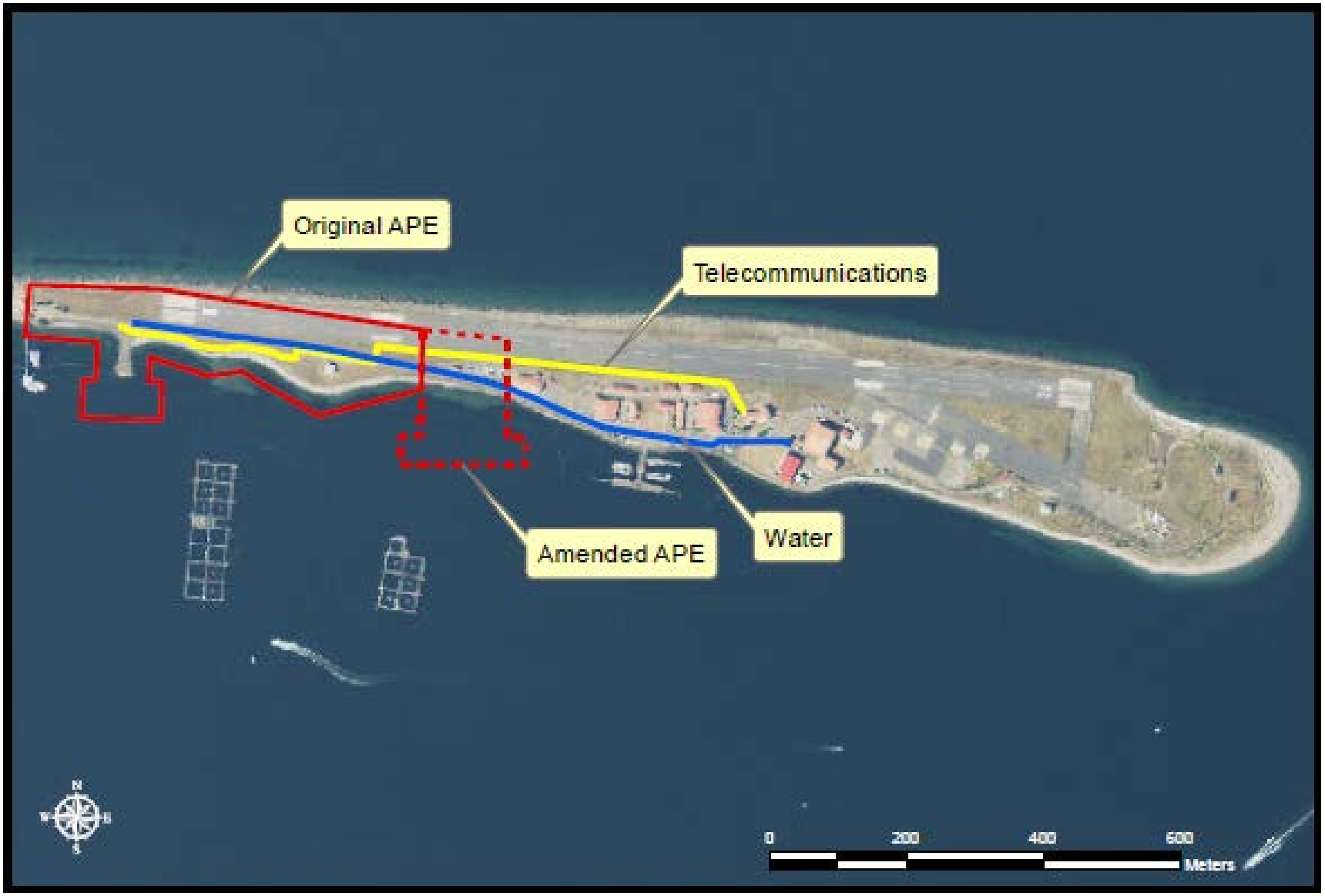
conducted monitoring of geotechnical testing in the original APE (DAHP Log. No. 011314-19-USN) in September 2014. The results of that effort are documented in an October 2014 report (Hughes 2014). Additional pedestrian survey or subsurface testing in the expended APE will be presented for your review and comment in an addendum to the Hughes report.

The Navy respectfully requests your comments on the APE for this proposed undertaking. If no response is received within 30 days of receipt of this letter, the Navy will assume your concurrence with our definition of the APE. If you require further information or have any questions, please contact Mr. David Grant. He can be reached at (360) 396-0919 or at dave.m.grant@navy.mil.

Sincerely,

T. A. ZWOLFER
Captain, U. S. Navy
Commanding Officer

Enclosures: 1. Amended APE on satellite imagery
2. Preliminary construction locations in the amended APE



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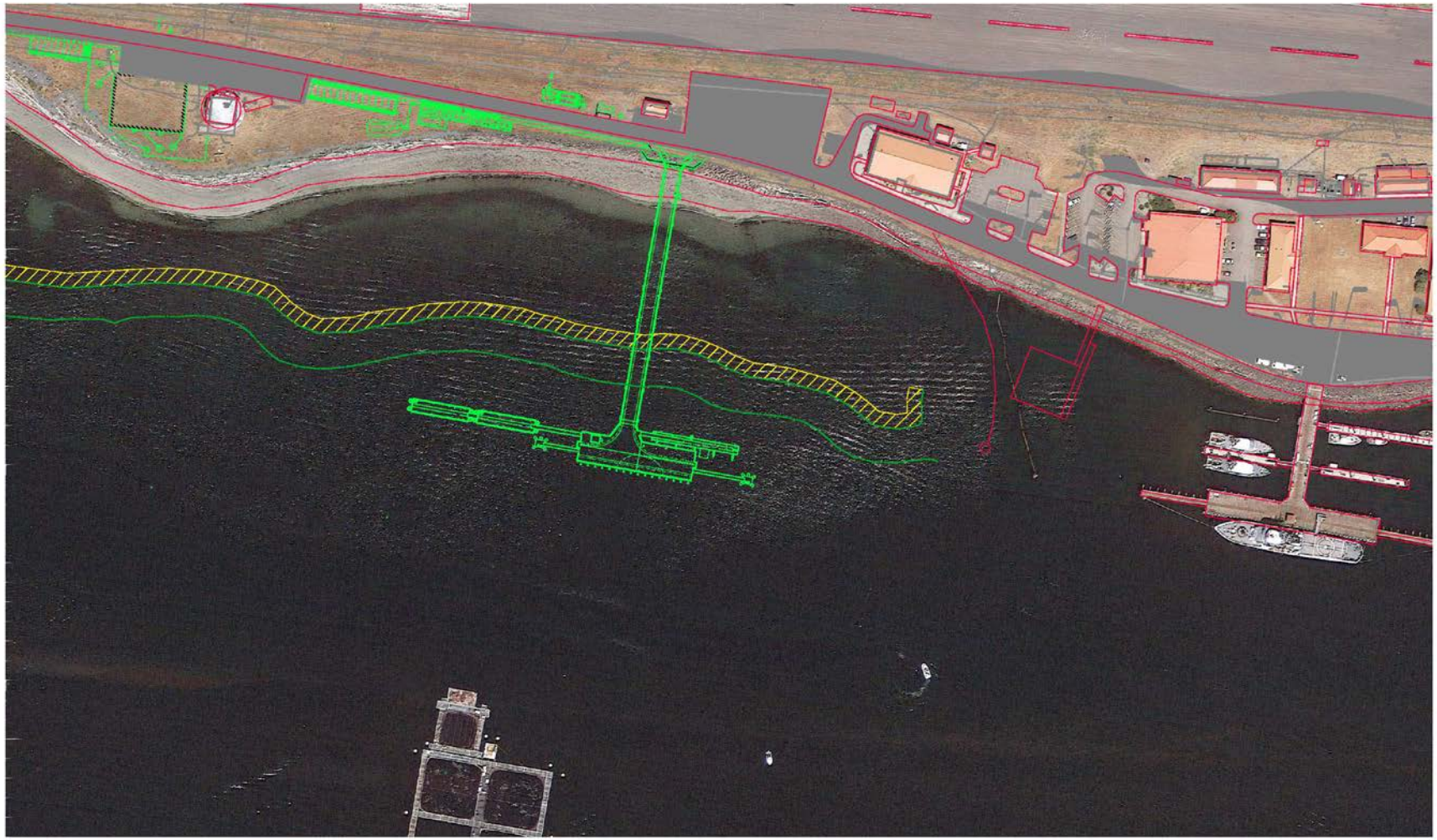

Enclosure 2. Preliminary construction location in the amended APE.

DEPARTMENT OF THE NAVY
NAVAL BASE KITSAP
120 SOUTH DEWEY ST
BREMERTON, WA 98314-5020

5090
PRB4/ 00911
15 May 15

The Port Gamble S'Klallam Tribe
Dr. Josh Wisniewski, Tribal Historic Preservation Officer
31912 Little Boston Road NE
Kingston, WA 98346

Dear Dr. Wisniewski:

SUBJECT: AMENDED AREA OF POTENTIAL EFFECT FOR THE NAVY'S PIER AND SUPPORT FACILITIES FOR TRANSIT PROTECTION SYSTEM AT U.S. COAST GUARD AIR STATION/SECTOR FIELD OFFICE PORT ANGELES, WASHINGTON

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Sincerely,

T. A. ZWOLFER
Captain, U. S. Navy
Commanding Officer

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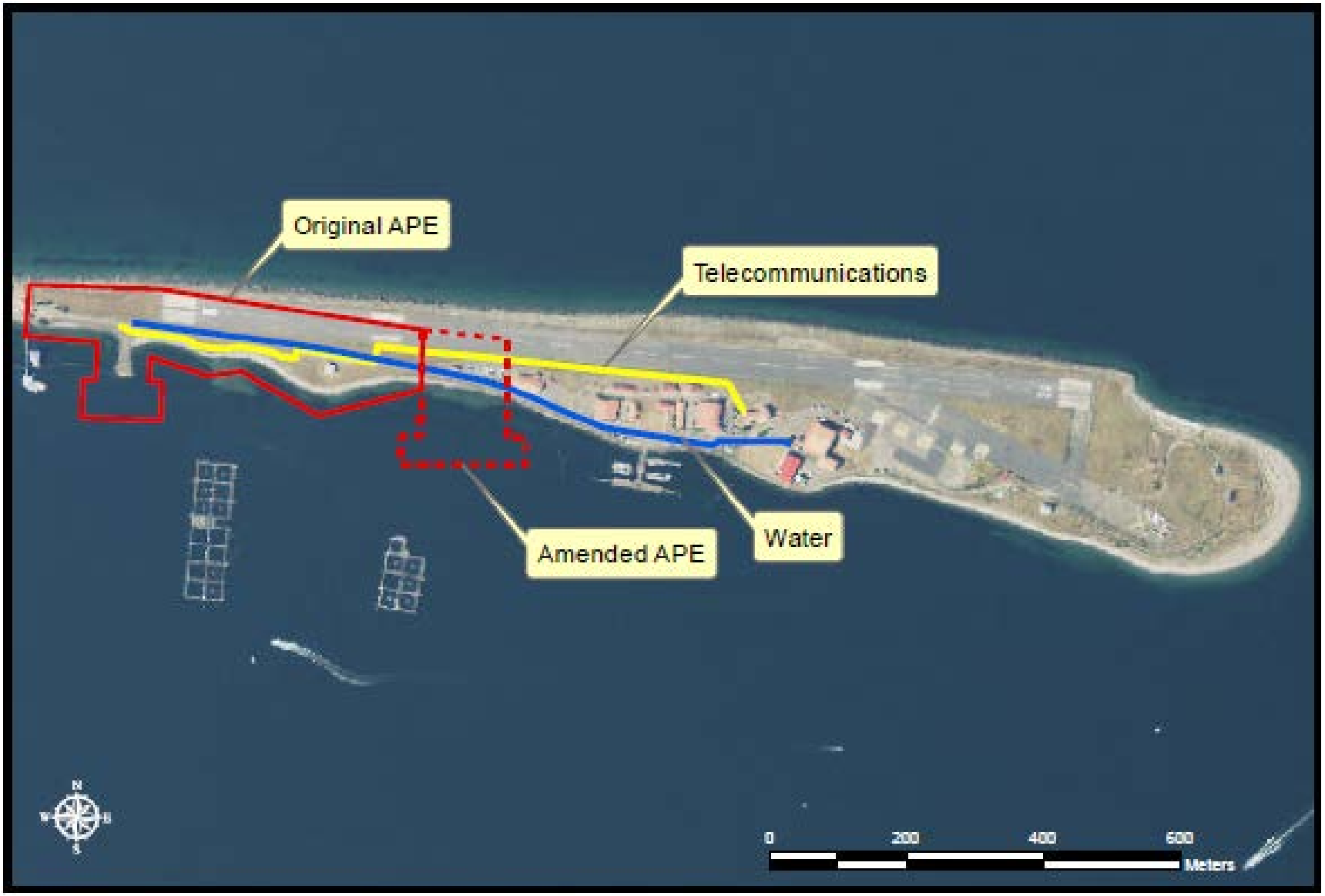
2. Preliminary construction locations in the amended APE



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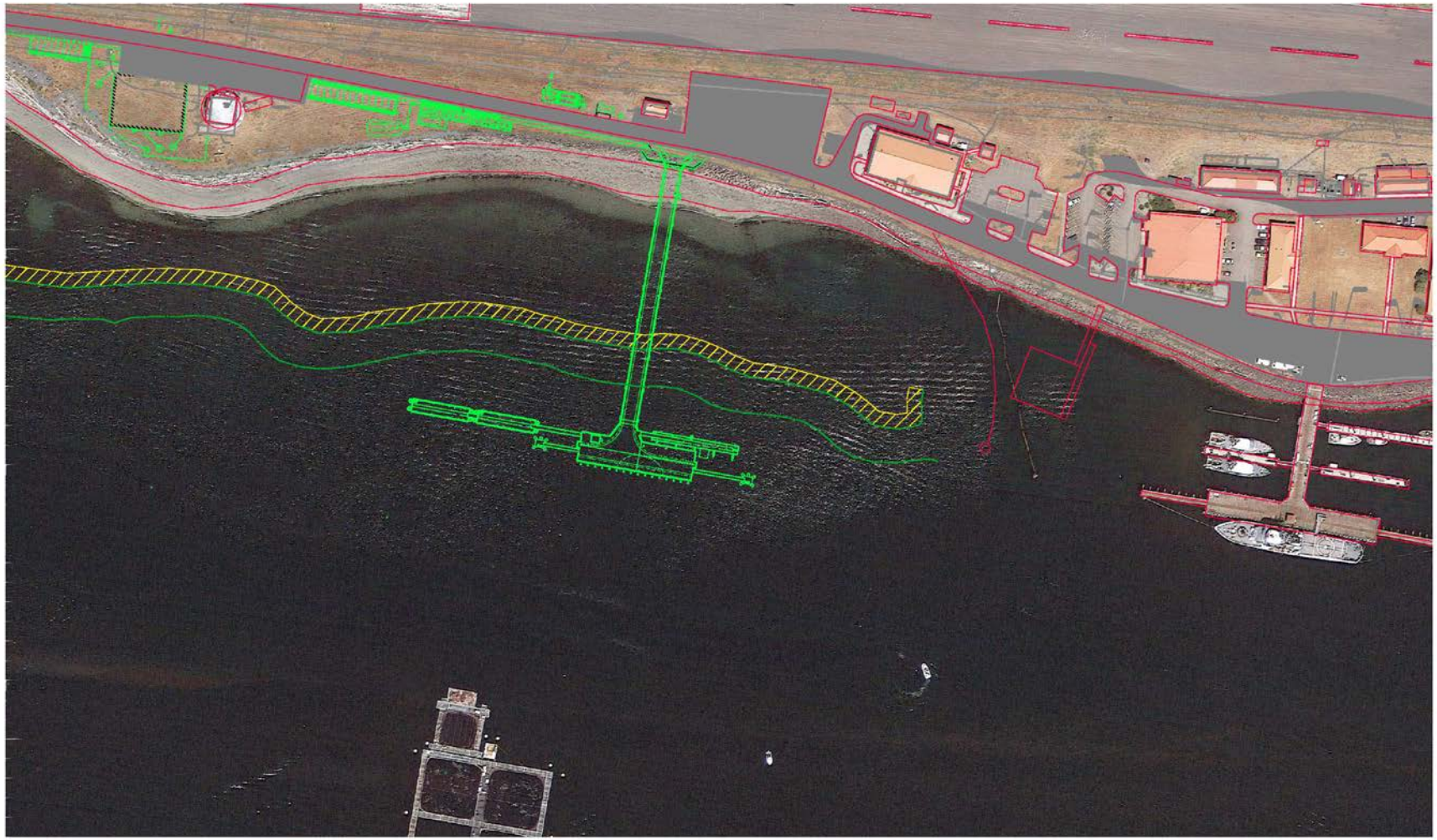

Enclosure 2. Preliminary construction location in the amended APE.

Allyson Brooks Ph.D., Director
State Historic Preservation Officer

June 8, 2015

Captain T.A. Zwolfer
Naval Base Kitsap
Department of the Navy
120 South Dewey Street
Bremerton, Washington 98314

RE: Transit Protection System & Alert Force Facility
Log No. 091714-10-USN

Dear Commander Zwolfer;

Thank you for contacting our department. We have reviewed the revised materials you provided for the proposed Transit Protection System & Alert Force Facility at Port Angeles Forward Operating Location at USCG Air Station on Ediz Hook, Port Angeles, Clallam County, Washington.

We concur with your determination of the Area of Potential Effect (APE) as described and presented in your figures and text.

We look forward to the results of your professional cultural resources identification efforts, professional review, consultations with concerned tribes, and Determination of Effect.

We would appreciate receiving any correspondence or comments from concerned tribes or other parties that you receive as you consult under the requirements of 36CFR800.4(a)(4).

These comments are based on the information available at the time of this review and on the behalf of the State Historic Preservation Officer in conformance with Section 106 of the National Historic Preservation Act, as amended, and its implementing regulations 36CFR800. Should additional information become available, our assessment may be revised. Thank you for the opportunity to comment and a copy of these comments should be included in subsequent environmental documents.

Sincerely,

Robert G. Whitlam, Ph.D.
State Archaeologist
(360) 890-2615
email: *rob.whitlam@dahp.wa.gov*

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DEPARTMENT OF THE NAVY
NAVAL BASE KITSAP
120 SOUTH DEWEY ST
BREMERTON, WA 98314-5020

5090
PRB4/ 00154
28 Jan 16

Allyson Brooks, PhD
State Historic Preservation Officer
Department of Archaeology and Historic Preservation
P.O. Box 48343
Olympia, WA 98504-8343

Dear Dr. Brooks:

SUBJECT: UPDATED AREA OF POTENTIAL EFFECTS FOR THE NAVY'S TRANSIT PROTECTION SYSTEM PIER AND SUPPORT FACILITIES AT THE U.S. COAST GUARD AIR STATION, PORT ANGELES, WASHINGTON

In September 2014, Naval Base (NAVBASE) Kitsap initiated consultation with you and defined the Area of Potential Effects (APE) for the planned construction of the Transit Protection System (TPS) pier and support facilities at the U.S. Coast Guard Air Station/Sector Field Office on Ediz Hook. Your office concurred with the definition of the APE (DAHP Log No. 091714-10-USN) on September 17, 2014. The APE was amended on May 15, 2015 to accommodate a design change that moved the pier farther east. Your office concurred with the amended APE on June 8, 2015 (Log No. 091714-10-USN). This letter is to request your concurrence on an update to the APE to include a proposed mitigation area, the Icicle Seafoods laydown area, located west of the USCG Air Station on Ediz Hook.

As described in our previous letters, the Navy is proposing to construct a new pier and support facilities at the Ediz Hook Coast Guard Station to provide overnight docking and berthing facilities for Maritime Force Protection Unit personnel who escort Naval submarines to the Strait of Juan de Fuca. As part of the undertaking, the Navy is proposing to implement treaty mitigation by removing a portion of the Icicle Seafoods laydown area. The mitigation project would remove existing rock armoring, imported fill and debris, concrete/asphalt pads, and storage structures. The site would be graded to create a low slope beach. Clean suitable-sized gravel/sand beach nourishment and large woody debris would be added and appropriate native vegetation planted in the back beach areas. A nearby derelict building would also be removed. The need for a wave attenuation structure (floating or fixed) to protect the western edge of the city's boat ramp from erosion would be evaluated and, if necessary, it would be included in the mitigation project. The mitigation project would also include a small section of upland property west of the Icicle Seafoods laydown area. A fifteen foot wide back beach area (15' from the Ordinary High Watermark) will be redeveloped with native vegetation, connecting the Icicle Seafoods laydown area with the existing beach area west of the Icicle Seafoods area as shown in Enclosure 3. The mitigation project is located in the eastern one quarter of Section 34, Township 31 North, Range 26 East (Ediz Hook 7.5" quadrangle; -123.427, 48.1413 decimal degrees).

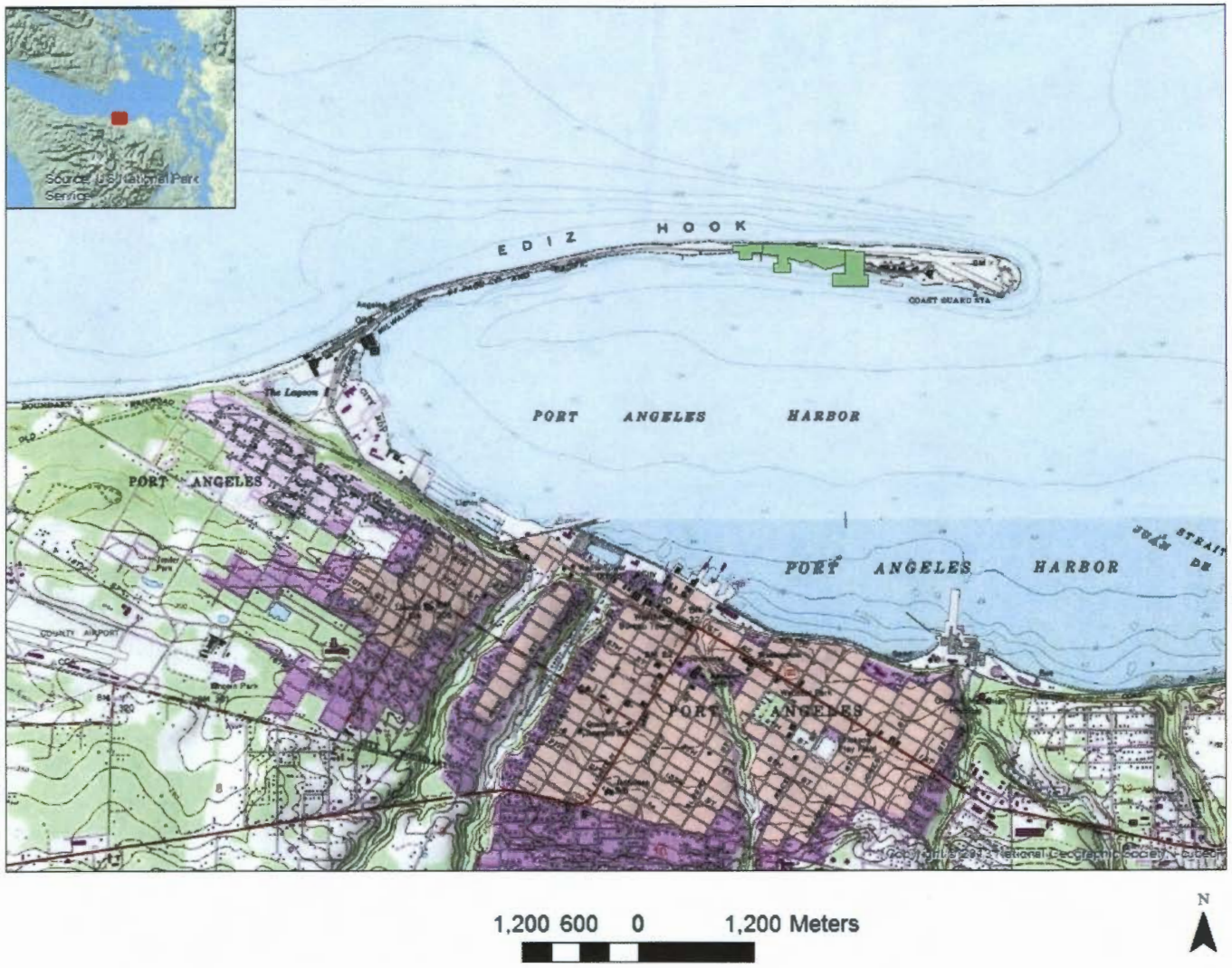
SUBJECT: UPDATED AREA OF POTENTIAL EFFECTS FOR THE NAVY'S TRANSIT PROTECTION SYSTEM PIER AND SUPPORT FACILITIES AT THE U.S. COAST GUARD AIR STATION, PORT ANGELES, WASHINGTON

The Navy respectfully requests your concurrence on the updated APE for this proposed undertaking. If no response is received within 30 days of receipt of this letter, the Navy will assume your concurrence with our updated APE. If you require further information or have any questions, please contact Greg Leicht at 360-315-5411 or email at gregory.leicht@navy.mil.

Sincerely,

T. A. ZWOLFER
Captain, U. S. Navy
Commanding Officer, Naval Base Kitsap

Enclosures: 1. APE and amendments on a USGS topographic map
2. Closeup of APE and amendments on satellite imagery
3. Elements of the Undertaking



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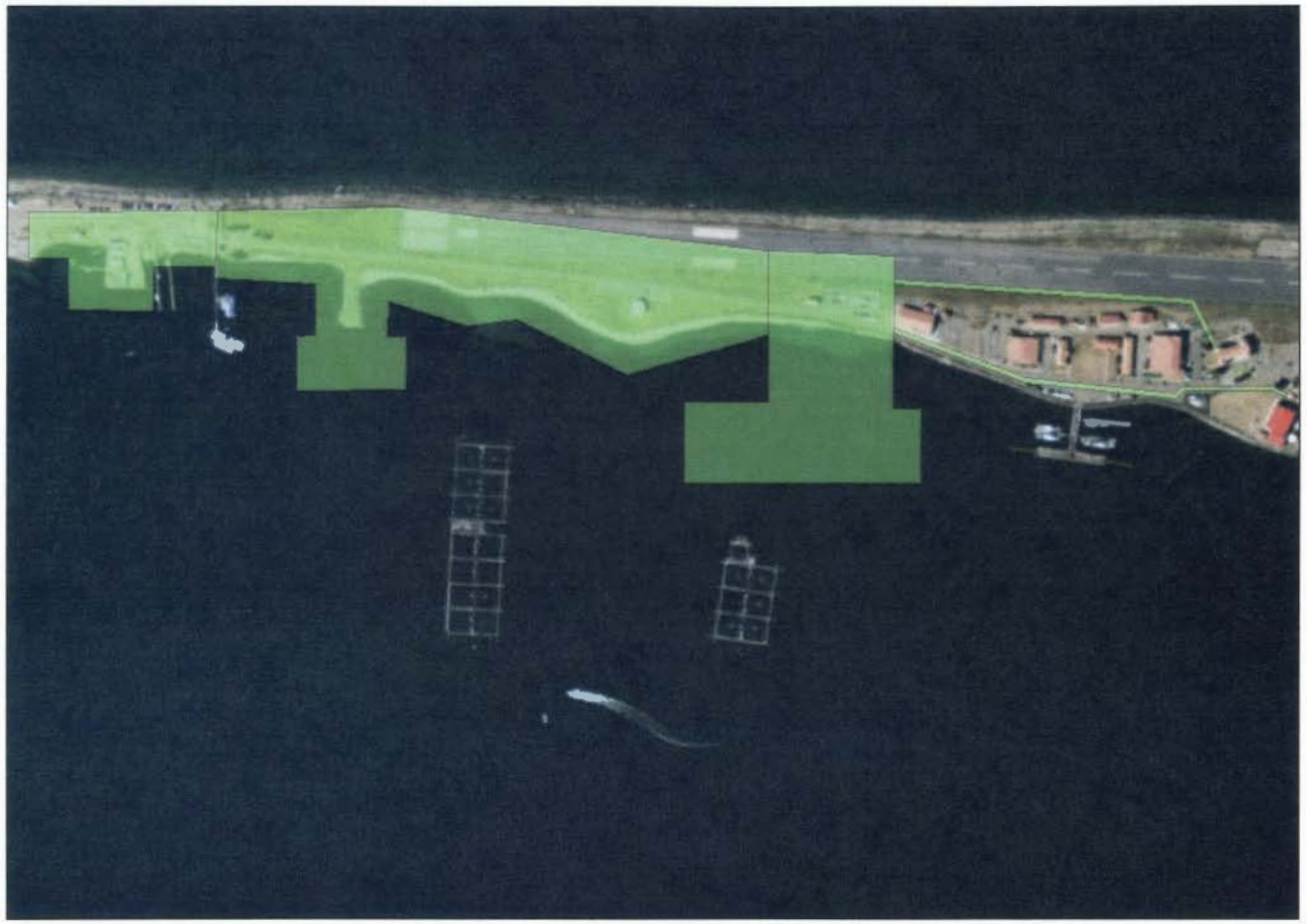

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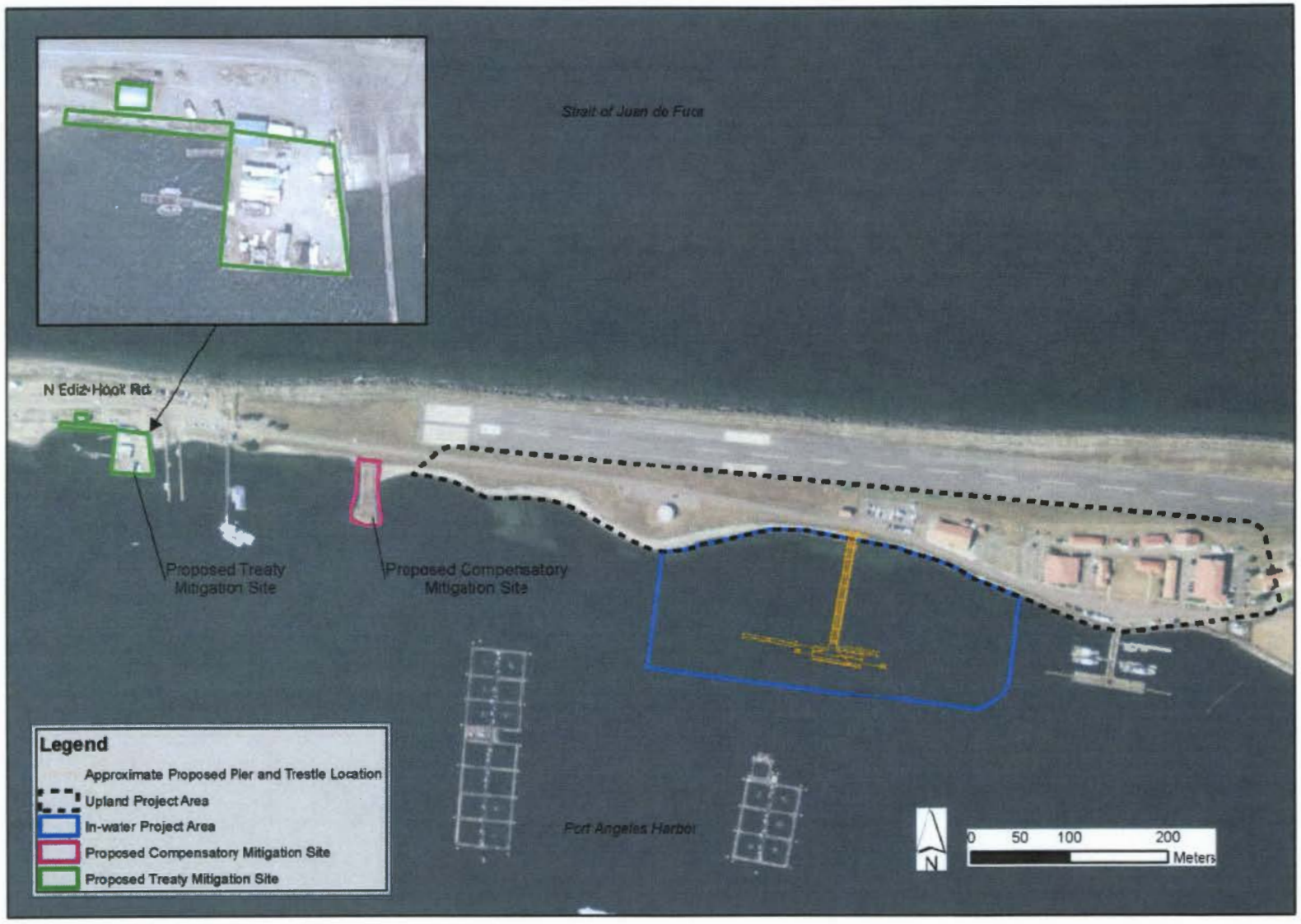

Enclosure 3. Elements of the Undertaking

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DEPARTMENT OF THE NAVY
NAVAL BASE KITSAP
120 SOUTH DEWEY ST
BREMERTON, WA 98314-5020

5090
PRB4/ 00161
28 Jan 16

The Honorable Frances G. Charles
Lower Elwha Klallam Tribe
2851 Lower Elwha Road
Port Angeles, WA 98363

Dear Chairwoman Charles:

SUBJECT: UPDATED AREA OF POTENTIAL EFFECTS FOR THE NAVY'S TRANSIT PROTECTION SYSTEM PIER AND SUPPORT FACILITIES AT THE U.S. COAST GUARD AIR STATION, PORT ANGELES, WASHINGTON

In September 2014, Naval Base (NAVBASE) Kitsap initiated consultation with you under the National Historic Preservation Act and defined the Area of Potential Effects (APE) for the planned construction of the Transit Protection System (TPS) pier and support facilities at the U.S. Coast Guard Air Station/Sector Field Office on Ediz Hook. The APE has been amended to accommodate a design change that moved the pier farther east, and to include the treaty mitigation site described below. This letter is to request your concurrence on the updated APE.

As described in our previous correspondence, the Navy is proposing to construct a new pier and support facilities at the Ediz Hook Coast Guard Station to provide overnight docking and berthing facilities for Maritime Force Protection Unit personnel who escort Naval submarines to the Strait of Juan de Fuca. As part of the undertaking, the Navy is proposing to implement treaty mitigation by removing a portion of the Icicle Seafoods laydown area. The mitigation project would remove existing rock armoring, imported fill and debris, concrete/asphalt pads, and storage structures. The site would be graded to create a low slope beach. Clean suitable-sized gravel/sand beach nourishment and large woody debris would be added and appropriate native vegetation planted in the back beach areas. A nearby derelict building would also be removed. The need for a wave attenuation structure (floating or fixed) to protect the western edge of the city's boat ramp from erosion would be evaluated and, if necessary, it would be included in the mitigation project. The mitigation project would also include a small section of upland property west of the Icicle Seafoods laydown area. A fifteen foot wide back beach area (15' from the Ordinary High Watermark) will be redeveloped with native vegetation, connecting the Icicle Seafoods laydown area with the existing beach area west of the Icicle Seafoods area as shown in Enclosure 3. The mitigation project is located in the eastern one quarter of Section 34, Township 31 North, Range 26 East (Ediz Hook 7.5" quadrangle; -123.427, 48.1413 decimal degrees).

SUBJECT:UPDATED AREA OF POTENTIAL EFFECTS FOR THE NAVY'S TRANSIT PROTECTION SYSTEM PIER AND SUPPORT FACILITIES AT THE U.S. COAST GUARD AIR STATION, PORT ANGELES, WASHINGTON

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Sincerely,

T. A. ZWOLFER
Captain, U. S. Navy
Commanding Officer, Naval Base Kitsap

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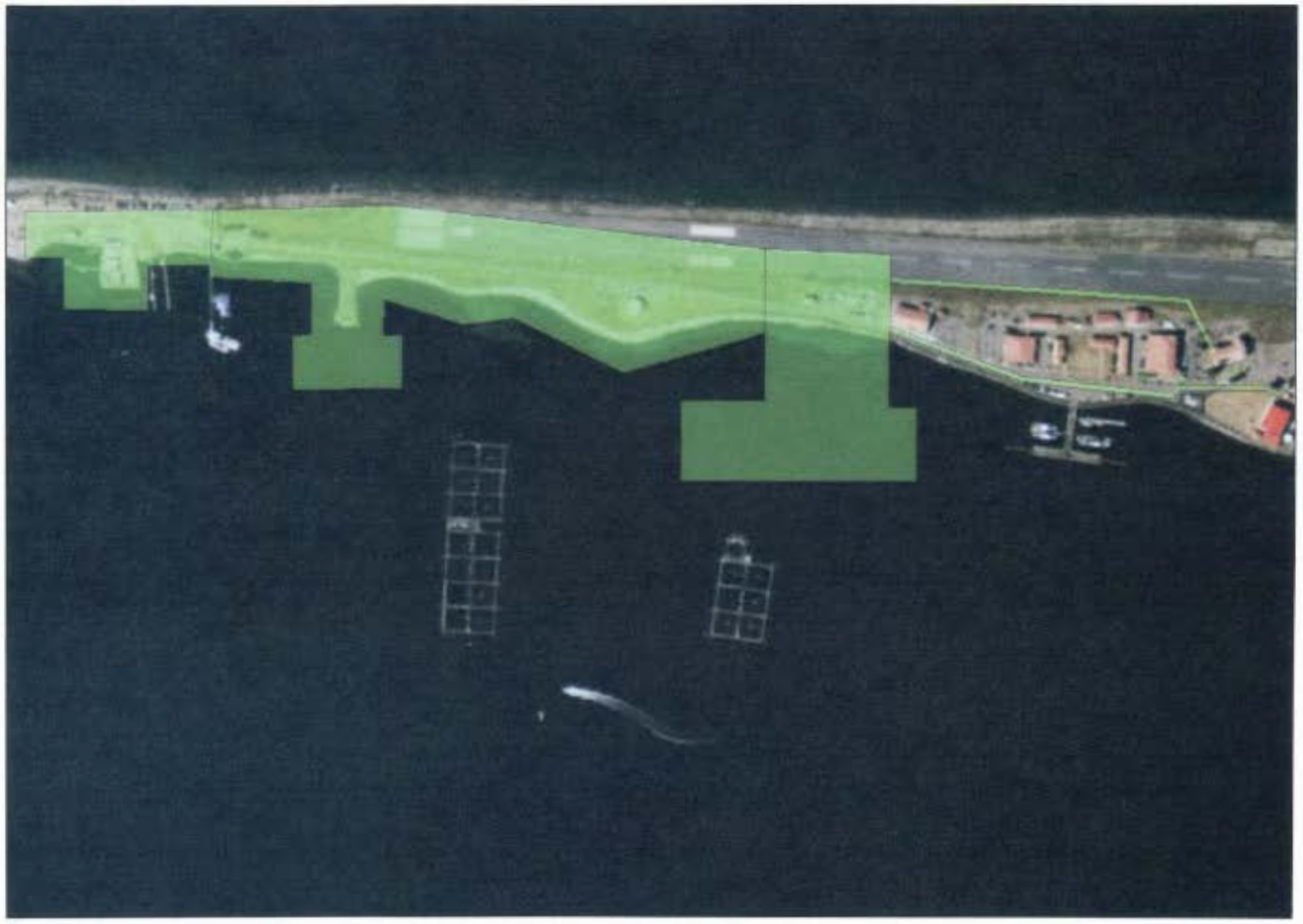

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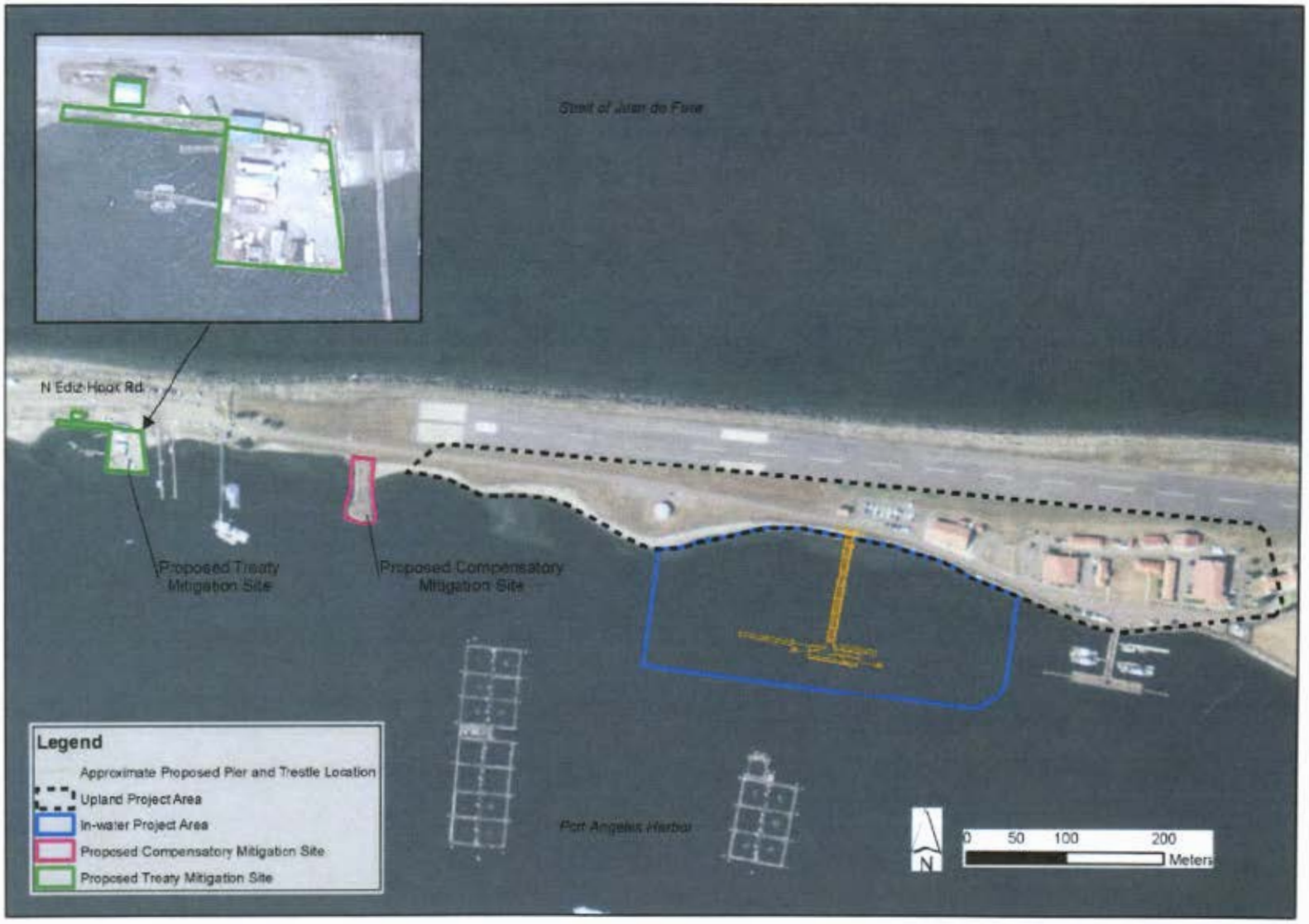

Enclosure 3. Elements of the Undertaking

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DEPARTMENT OF THE NAVY
NAVAL BASE KITSAP
120 SOUTH DEWEY ST
BREMERTON, WA 98314-5020

5090
PRB4/00155
28 Jan 16

The Honorable W. Ron Allen
Jamestown S'Klallam Tribe
1033 Old Blyn Hwy
Sequim, WA 98382

Dear Chairman Allen:

SUBJECT: UPDATED AREA OF POTENTIAL EFFECTS FOR THE NAVY'S TRANSIT PROTECTION SYSTEM PIER AND SUPPORT FACILITIES AT THE U.S. COAST GUARD AIR STATION, PORT ANGELES, WASHINGTON

In September 2014, Naval Base (NAVBASE) Kitsap initiated consultation with you under the National Historic Preservation Act and defined the Area of Potential Effects (APE) for the planned construction of the Transit Protection System (TPS) pier and support facilities at the U.S. Coast Guard Air Station/Sector Field Office on Ediz Hook. The APE has been amended to accommodate a design change that moved the pier farther east, and to include the treaty mitigation site described below. This letter is to request your concurrence on the updated APE.

As described in our previous correspondence, the Navy is proposing to construct a new pier and support facilities at the Ediz Hook Coast Guard Station to provide overnight docking and berthing facilities for Maritime Force Protection Unit personnel who escort Naval submarines to the Strait of Juan de Fuca. As part of the undertaking, the Navy is proposing to implement treaty mitigation by removing a portion of the Icicle Seafoods laydown area. The mitigation project would remove existing rock armoring, imported fill and debris, concrete/asphalt pads, and storage structures. The site would be graded to create a low slope beach. Clean suitable-sized gravel/sand beach nourishment and large woody debris would be added and appropriate native vegetation planted in the back beach areas. A nearby derelict building would also be removed. The need for a wave attenuation structure (floating or fixed) to protect the western edge of the city's boat ramp from erosion would be evaluated and, if necessary, it would be included in the mitigation project. The mitigation project would also include a small section of upland property west of the Icicle Seafoods laydown area. A fifteen foot wide back beach area (15' from the Ordinary High Watermark) will be redeveloped with native vegetation, connecting the Icicle Seafoods laydown area with the existing beach area west of the Icicle Seafoods area as shown in Enclosure 3. The mitigation project is located in the eastern one quarter of Section 34, Township 31 North, Range 26 East (Ediz Hook 7.5" quadrangle; -123.427, 48.1413 decimal degrees).

SUBJECT:UPDATED AREA OF POTENTIAL EFFECTS FOR THE NAVY'S TRANSIT PROTECTION SYSTEM PIER AND SUPPORT FACILITIES AT THE U.S. COAST GUARD AIR STATION, PORT ANGELES, WASHINGTON

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Sincerely,

T. A. ZWOLFER
Captain, U. S. Navy
Commanding Officer, Naval Base Kitsap

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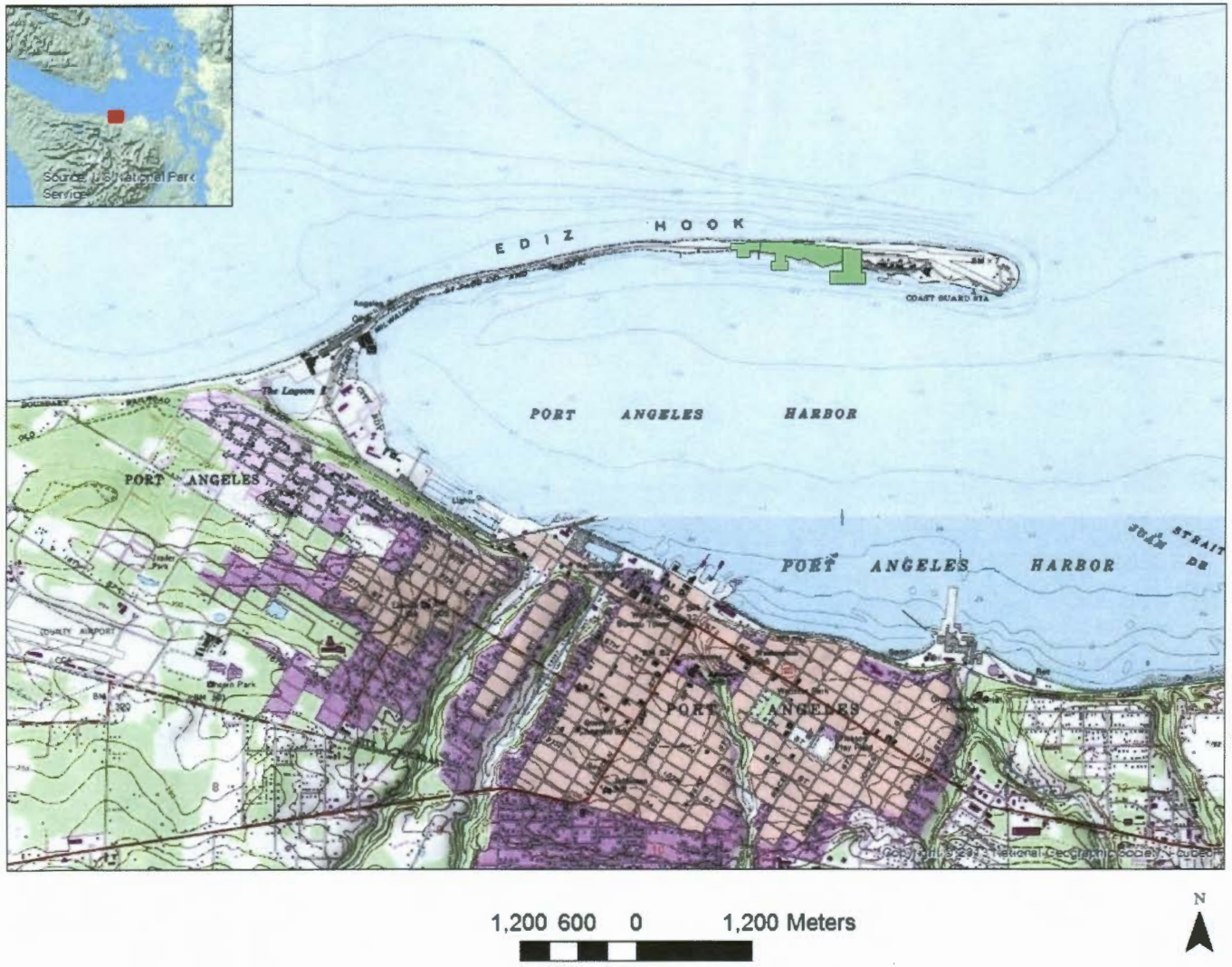

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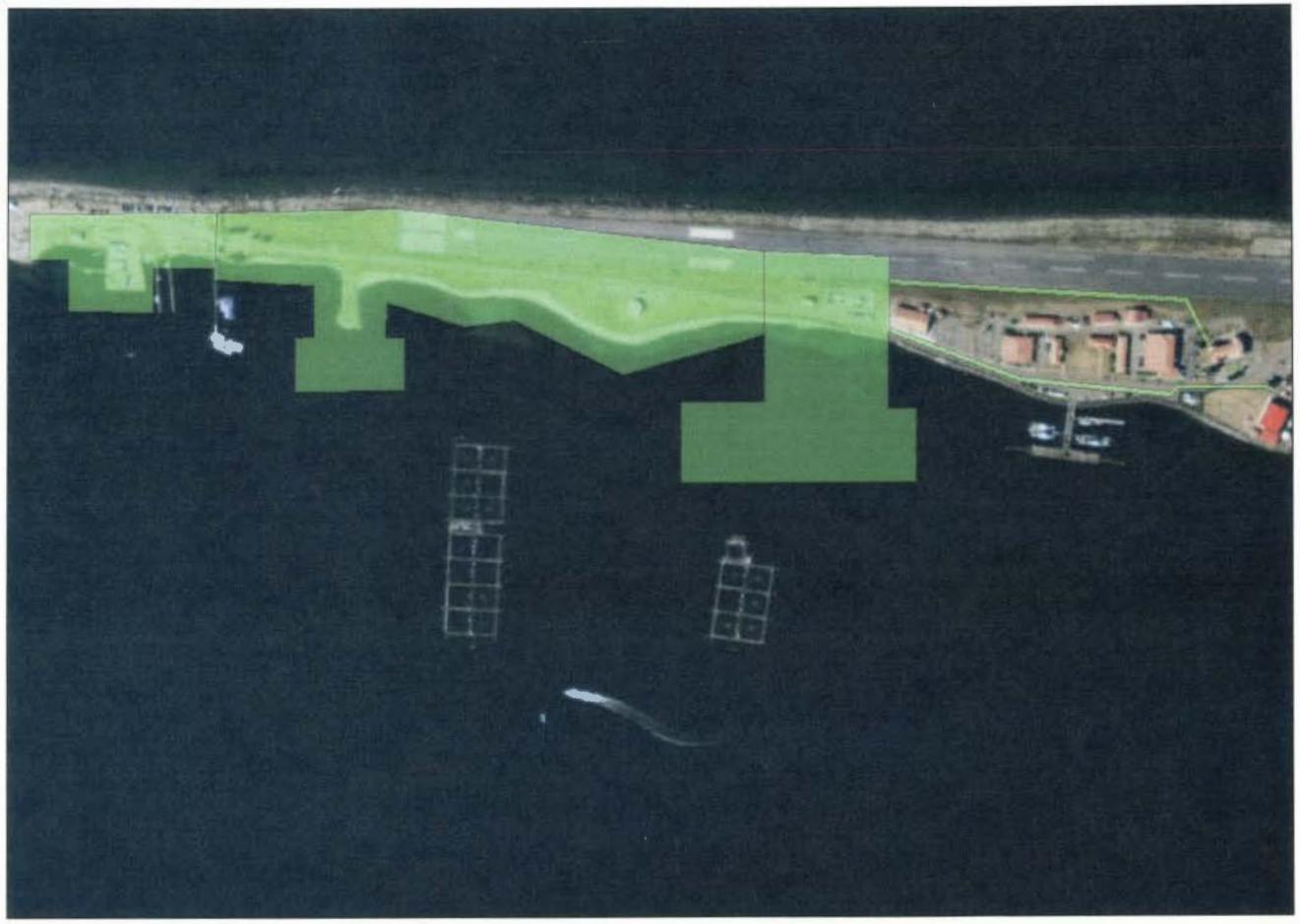

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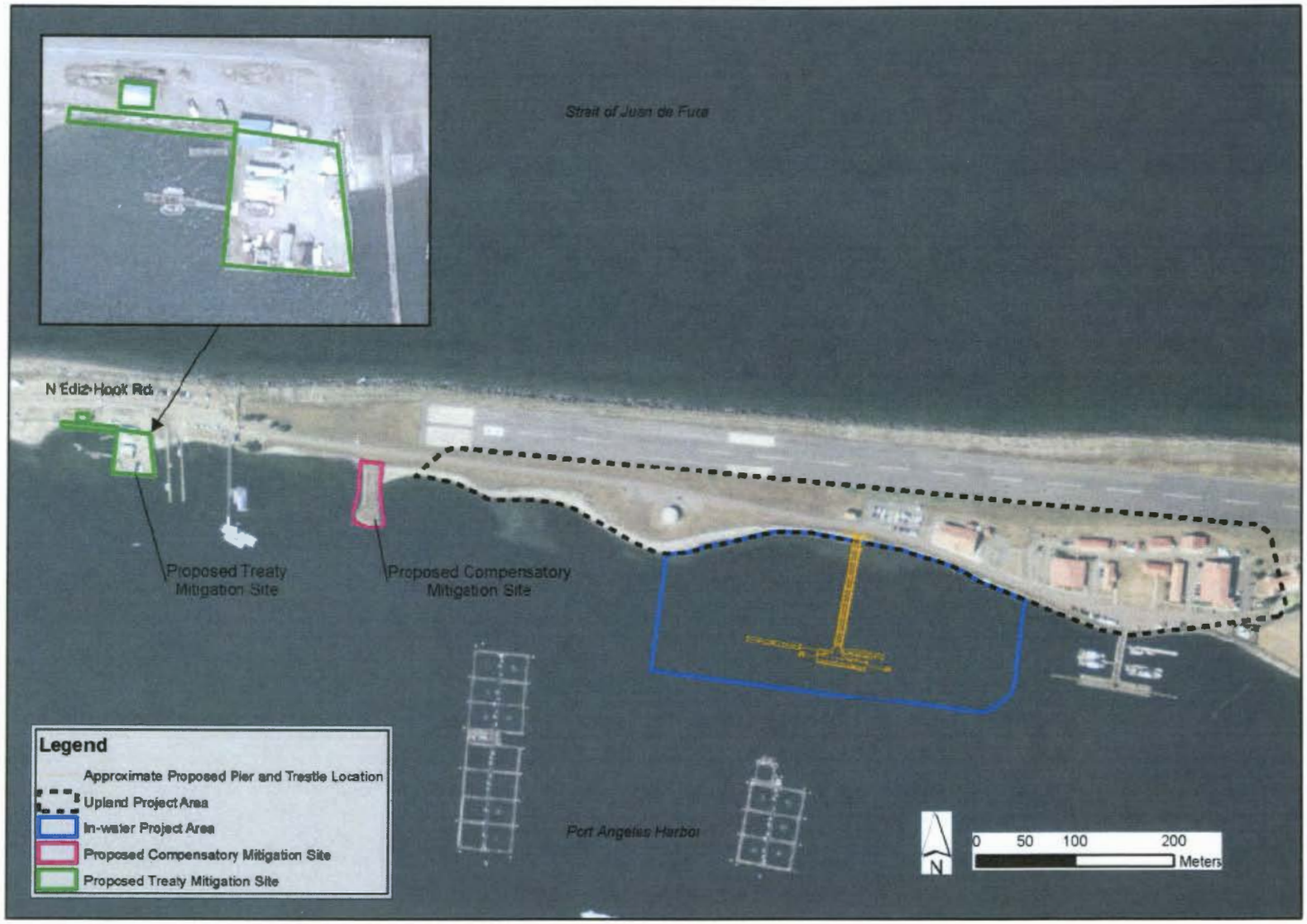

Enclosure 3. Elements of the Undertaking

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DEPARTMENT OF THE NAVY
NAVAL BASE KITSAP
120 SOUTH DEWEY ST
BREMERTON, WA 98314-5020

5090
PRB4/ 00157
28 Jan 16

The Honorable Jeromy Sullivan
Chairman, Port Gamble S'Klallam Tribe
31912 Little Boston Road NE
Kingston, WA 98346

Dear Chairman Sullivan:

SUBJECT: UPDATED AREA OF POTENTIAL EFFECTS FOR THE NAVY'S TRANSIT PROTECTION SYSTEM PIER AND SUPPORT FACILITIES AT THE U.S. COAST GUARD AIR STATION, PORT ANGELES, WASHINGTON

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SUBJECT:UPDATED AREA OF POTENTIAL EFFECTS FOR THE NAVY'S TRANSIT PROTECTION SYSTEM PIER AND SUPPORT FACILITIES AT THE U.S. COAST GUARD AIR STATION, PORT ANGELES, WASHINGTON

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Sincerely,

T. A. ZWOLFER
Captain, U. S. Navy
Commanding Officer, Naval Base Kitsap

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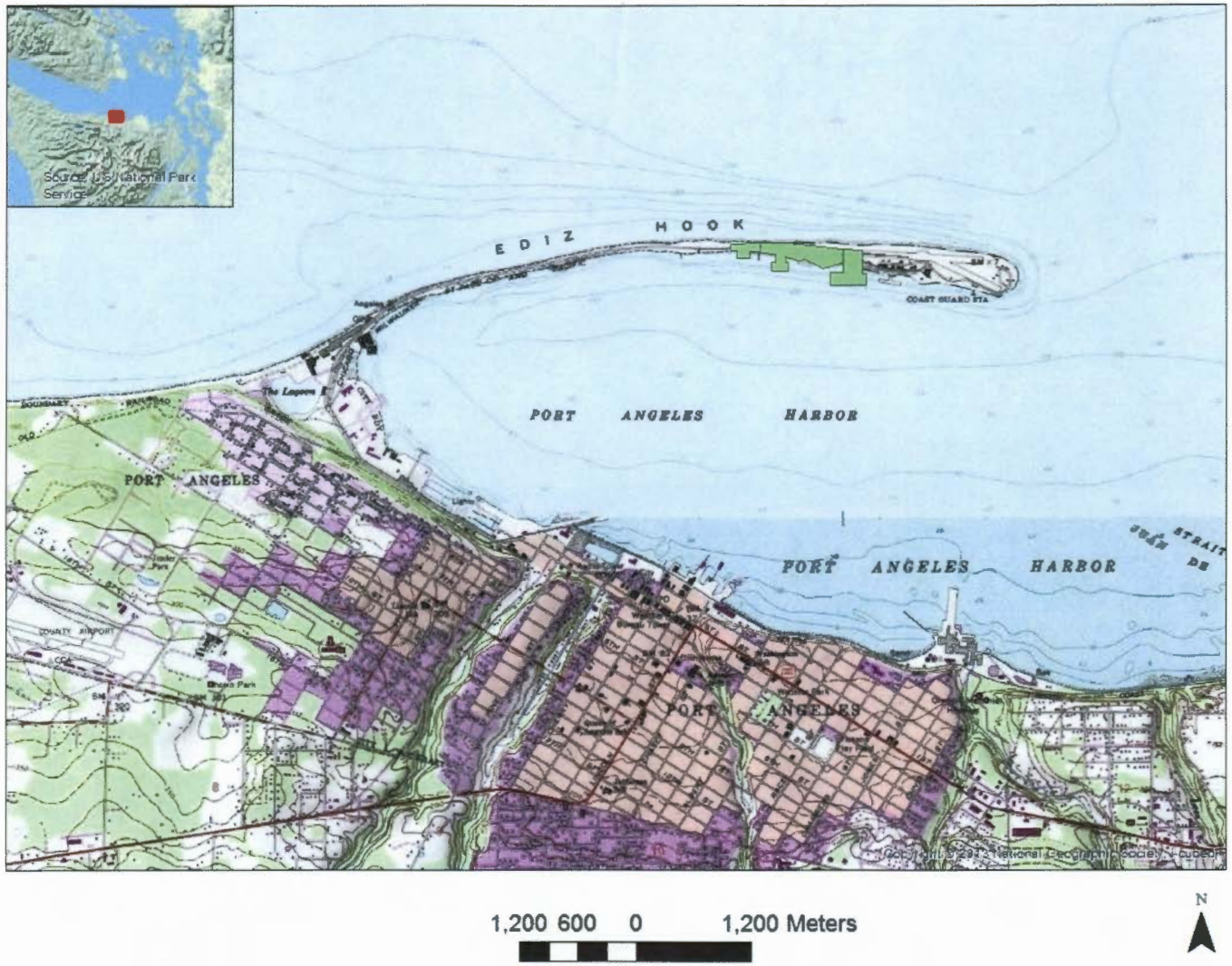
3. Elements of the Undertaking



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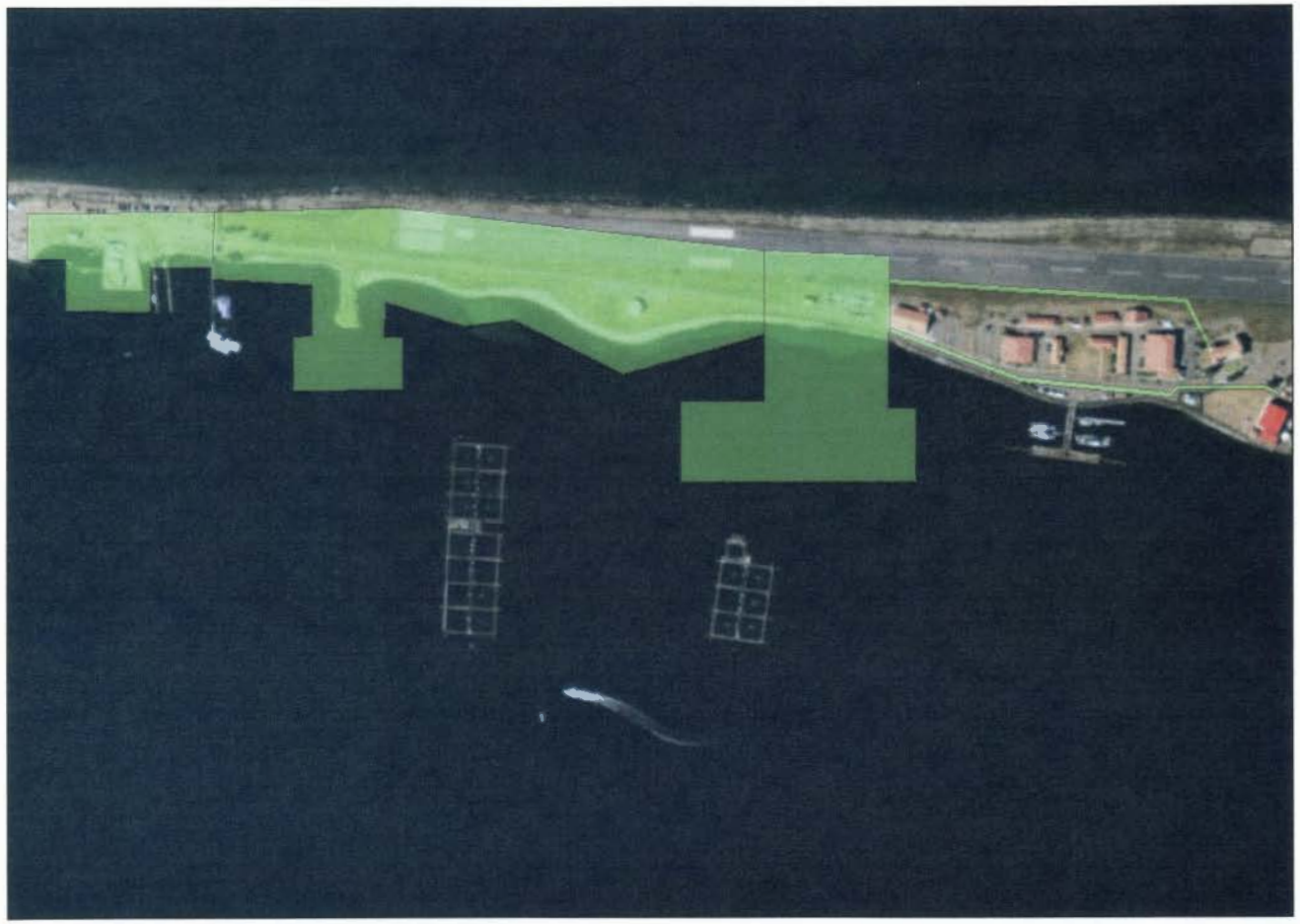

Enclosure 2. Closeup of APE on satellite imagery

Enclosure 3. Elements of the Undertaking

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Allyson Brooks Ph.D., Director
State Historic Preservation Officer

February 8, 2016

Captain T.A. Zwolfer
Naval Base Kitsap
Department of the Navy
120 South Dewey Street
Bremerton, Washington 98314

RE: Transit Protection System Pier & Support Facilities Project
Log No. 091714-10-USN

Dear Commander Zwolfer;

Thank you for contacting our department. We have reviewed the revised materials you provided for the proposed Transit Protection System Pier & Support Facilities Project – Icicle Seafoods Laydown Area at the USCG Air Station/Sector FO on Ediz Hook, Clallam County, Washington.

We concur with your revised determination of the Area of Potential Effect (APE) as described and presented in your figures and text.

We look forward to the results of your professional cultural resources identification efforts and the professional report, the professional review, results of consultations with concerned tribes, and Determination of Effect.

We would appreciate receiving any correspondence or comments from concerned tribes or other parties that you receive as you consult under the requirements of 36CFR800.4(a)(4).

These comments are based on the information available at the time of this review and on the behalf of the State Historic Preservation Officer in conformance with Section 106 of the National Historic Preservation Act, as amended, and its implementing regulations 36CFR800. Should additional information become available, our assessment may be revised. Thank you for the opportunity to comment and a copy of these comments should be included in subsequent environmental documents.

Sincerely,

Robert G. Whitlam, Ph.D.
State Archaeologist
(360) 890-2615
email: *rob.whitlam@dahp.wa.gov*

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DEPARTMENT OF THE NAVY
NAVAL BASE KITSAP
120 SOUTH DEWEY ST
BREMERTON, WA 98314-5020

5090
Ser PRB4/00901
21 Apr 16

Allyson Brooks, PhD
State Historic Preservation Officer
Washington Department of Archaeology and Historic Preservation
PO Box 48343
Olympia, WA 98504-8343

SUBJECT: DAHP Log NO. 091714-10-USN – DETERMINATION OF EFFECT FOR THE NAVY'S PIER AND SUPPORT FACILITIES FOR TRANSIT PROTECTION SYSTEM AT UNITED STATES COAST GUARD AIR STATION/SECTOR FIELD OFFICE PORT ANGELES ON EDIZ HOOK, CLALLAM COUNTY, WASHINGTON

Dear Dr. Brooks:

In September 2014, Naval Base (NAVBASE) Kitsap initiated consultation with you and defined the Area of Potential Effects (APE) for the planned construction of the Transit Protection System (TPS) pier and support facilities at the U.S. Coast Guard Air Station/Sector Field Office on Ediz Hook. Your office concurred with the definition of the APE and APE amendments (DAHP Log No. 091714-10-USN) on September 17, 2014, June 8, 2015 and February 8, 2016. This letter is to provide you a copy of the final cultural resources review report and request your concurrence on the determination of effect that the proposed undertaking will have on cultural resources.

As stated in previous correspondence, the Navy proposes to construct facilities for the Transit Protection System (TPS) at the Ediz Hook Coast Guard Station to provide overnight docking and berthing facilities for Maritime Force Protection Unit personnel who escort Naval submarines from Naval Base Kitsap Bangor to the Strait of Juan de Fuca.

The undertaking for this project will consist of four separate components: 1) construction of a new pier and support facilities on the Ediz Hook Coast Guard Station, 2) removal of an unused basalt jetty at the west end of the Station, 3) removal of the Ediz Hook Mole and nearby Old Public Dock Building west of the Coast Guard Station, and 4) shoreline restoration after removal of the jetty and Mole. The TPS includes a fixed pier with an approach trestle, a fuel storage and distribution system, an 8,200 sq. ft. berthing facility, a small armory on a concrete pad, a small number of parking spaces, and underground utilities for power, potable water, fire protection, sewage and other drainage, fuel, and telecommunications. As part of the project, the Navy also proposes to remove two artificial landforms that jut out into Port Angeles Harbor, the basalt jetty and Ediz Hook Mole, as compensatory mitigation for the loss of aquatic resources and as mitigation for impacts on treaty reserved rights and resources. The undertaking will result in both surface and subsurface disturbance.

The U.S. Navy is providing the enclosed final report entitled *Cultural Resources Review of the Navy's Pier and Support Facilities for Transit Protection System at United States Coast Guard Air Station/Sector Field Office Port Angeles on Ediz Hook, Clallam County, Washington*, dated April 2016 for your review. In the report you will find that the Navy has not identified any archaeological sites within the APE, but has identified undocumented architectural resources and found none to be eligible for

SUBJECT: DAHP Log NO. 091714-10-USN – DETERMINATION OF EFFECT FOR THE NAVY'S PIER AND SUPPORT FACILITIES FOR TRANSIT PROTECTION SYSTEM AT UNITED STATES COAST GUARD AIR STATION/SECTOR FIELD OFFICE PORT ANGELES ON EDIZ HOOK, CLALLAM COUNTY, WASHINGTON

the National Register of Historic Places. These resources have been covered in the report and recorded in WISAARD. The Navy has also identified and recorded a Traditional Cultural Property (TCP), *Ĉixw ícən,* which is eligible for listing to the National Register of Historic Places.

As noted in the TCP Site Form (see report), the TCP lacks integrity of design, materials and workmanship as result of built-environment alterations at the east end of Ediz Hook. The TCP retains integrity of location, setting, feeling and association through the preserved general shape of the bay and sandspit, and the expansive marine and mountain views from the Port Angeles shoreline and Ediz Hook. The proposed TPS pier and associated buildings, located in close proximity to the USCG pier, runway and other buildings, are consistent with the industrial nature of the altered environment and will result in insignificant alteration to the natural shape of the spit. Removal of the jetty, Ediz Hook Mole, and Old Public Dock Building, along with shoreline restoration, will reestablish a more natural character of the sandspit at the western end of the USCG AIRSTA/SFO Port Angeles property, improving the integrity of the TCP. As such, the Navy finds that the proposed undertaking will have No Adverse Effect on historic properties. The LEKT are in agreement with this finding. The Navy also proposes archaeological monitoring for any excavations that will extend below known fill depths by an archaeologist who meets the Secretary of the Interior's minimum professional standards as set forth in 36 CFR § 61. A Monitoring Plan is appended to the Cultural Resources Review Report.

The Cultural Resources Review Report has been uploaded to WISSARD.

If you have any questions or require additional information, please contact Ms. Amanda J. Bennett . She can be reached at (360) 476-6613 or amanda.j.bennett@navy.mil.

Sincerely,

T. A. ZWOLFER
Captain, U.S. Navy
Commanding Officer

DEPARTMENT OF THE NAVY
NAVAL BASE KITSAP
120 SOUTH DEWEY ST
BREMERTON, WA 98314-5020

5090
Ser PRB4/00903
21 Apr 16

The Lower Elwha Klallam Tribe
The Honorable Frances Charles
2851 Lower Elwha Road
Port Angeles WA 98362

SUBJECT: FINDING OF EFFECT FOR THE NAVY'S PIER AND SUPPORT FACILITIES FOR TRANSIT PROTECTION SYSTEM AT UNITED STATES COAST GUARD AIR STATION/SECTOR FIELD OFFICE PORT ANGELES ON EDIZ HOOK, CLALLAM COUNTY, WASHINGTON

Dear Chairwoman Charles:

In September 2014, Naval Base (NAVBASE) Kitsap initiated consultation with you for the planned construction of the Transit Protection System (TPS) pier and support facilities at the U.S. Coast Guard Air Station/Sector Field Office on Ediz Hook. This letter is to provide you a copy of the final cultural resources review report and request your concurrence on the determination of effect that the proposed undertaking will have on cultural resources.

As stated in previous correspondence, the Navy proposes to construct facilities for the Transit Protection System (TPS) at the Ediz Hook Coast Guard Station to provide overnight docking and berthing facilities for Maritime Force Protection Unit personnel who escort Naval submarines from Naval Base Kitsap Bangor through the Strait of Juan de Fuca.

The undertaking for this project will consist of four separate components: 1) construction of a new pier and support facilities on the Ediz Hook Coast Guard Station, 2) removal of an unused basalt jetty at the west end of the Station, 3) removal of the Ediz Hook Mole and nearby Old Public Dock Building west of the Coast Guard Station, and 4) shoreline restoration after removal of the jetty and Mole. The TPS includes a fixed pier with an approach trestle, a fuel storage and distribution system, an 8,200 sq. ft. berthing facility, a small armory on a concrete pad, a small number of parking spaces, and underground utilities for power, potable water, fire protection, sewage and other drainage, fuel, and telecommunications. As part of the project, the Navy also proposes to remove two artificial landforms that jut out into Port Angeles Harbor, the basalt jetty and Ediz Hook Mole, as compensatory mitigation for the loss of aquatic resources and as mitigation for impacts on treaty reserved rights and resources. The undertaking will result in both surface and subsurface disturbance.

The U.S. Navy is providing the enclosed final report entitled *Cultural Resources Review of the Navy's Pier and Support Facilities for Transit Protection System at United States Coast Guard Air Station/Sector Field Office Port Angeles on Ediz Hook, Clallam County, Washington*, dated April 2016 for your review (Enclosure 1). In the report you will find that the Navy has not identified any archaeological sites within the APE, but has identified undocumented architectural resources and found none to be eligible for the National Register of Historic Places. These resources have been covered in the report and recorded in WISAARD. The Navy has also identified and recorded a Traditional Cultural Property (TCP), *Ĉixw ícən,* which is eligible for listing to the National Register of Historic Places.

SUBJECT: FINDING OF EFFECT FOR THE NAVY'S PIER AND SUPPORT FACILITIES FOR TRANSIT PROTECTION SYSTEM AT UNITED STATES COAST GUARD AIR STATION/SECTOR FIELD OFFICE PORT ANGELES ON EDIZ HOOK, CLALLAM COUNTY, WASHINGTON

As noted in the TCP Site Form, the TCP lacks integrity of design, materials and workmanship as result of built-environment alterations at the east end of Ediz Hook. The TCP retains integrity of location, setting, feeling and association through the preserved general shape of the bay and sandspit, and the expansive marine and mountain views from the Port Angeles shoreline and Ediz Hook. The proposed TPS pier and associated buildings, located in close proximity to the USCG pier, runway and other buildings, are consistent with the industrial nature of the altered environment and will result in insignificant alteration to the natural shape of the spit. Removal of the jetty, Ediz Hook Mole, and Old Public Dock Building, along with shoreline restoration, will reestablish a more natural character of the sandspit at the western end of the USCG AIRSTA/SFO Port Angeles property, improving the integrity of the TCP. As such, the Navy finds that the proposed undertaking will have No Adverse Effect on historic properties. The Navy also proposes archaeological monitoring for any excavations that will extend below known fill depths by an archaeologist who meets the Secretary of the Interior's minimum professional standards as set forth in 36 CFR § 61. A Monitoring Plan is appended to the Cultural Resources Review Report.

If you have any questions or require additional information, please contact Ms. Amanda J. Bennett. She can be reached at (360) 476-6613 or amanda.j.bennett@navy.mil.

Sincerely,

T. A. ZWOLFER
Captain, U. S. Navy
Commanding Officer

Enclosure 1: Cultural Resources Review Report

DEPARTMENT OF THE NAVY
NAVAL BASE KITSAP
120 SOUTH DEWEY ST
BREMERTON, WA 98314-5020

5090
Ser PRB4/00902
21 Apr 16

David Brownell
Jamestown S'Klallam Tribe
1033 Old Blyn Hwy
Sequim, WA 98382

SUBJECT: FINDING OF EFFECT FOR THE NAVY'S PIER AND SUPPORT FACILITIES FOR TRANSIT PROTECTION SYSTEM AT UNITED STATES COAST GUARD AIR STATION/SECTOR FIELD OFFICE PORT ANGELES ON EDIZ HOOK, CLALLAM COUNTY, WASHINGTON

Dear Mr. Brownell:

In September 2014, Naval Base (NAVBASE) Kitsap initiated consultation with you for the planned construction of the Transit Protection System (TPS) pier and support facilities at the U.S. Coast Guard Air Station/Sector Field Office on Ediz Hook. This letter is to provide you a copy of the final cultural resources review report and request your concurrence on the determination of effect that the proposed undertaking will have on cultural resources.

As stated in previous correspondence, the Navy proposes to construct facilities for the Transit Protection System (TPS) at the Ediz Hook Coast Guard Station to provide overnight docking and berthing facilities for Maritime Force Protection Unit personnel who escort Naval submarines from Naval Base Kitsap Bangor through the Strait of Juan de Fuca.

The undertaking for this project will consist of four separate components: 1) construction of a new pier and support facilities on the Ediz Hook Coast Guard Station, 2) removal of an unused basalt jetty at the west end of the Station, 3) removal of the Ediz Hook Mole and nearby Old Public Dock Building west of the Coast Guard Station, and 4) shoreline restoration after removal of the jetty and Mole. The TPS includes a fixed pier with an approach trestle, a fuel storage and distribution system, an 8,200 sq. ft. berthing facility, a small armory on a concrete pad, a small number of parking spaces, and underground utilities for power, potable water, fire protection, sewage and other drainage, fuel, and telecommunications. As part of the project, the Navy also proposes to remove two artificial landforms that jut out into Port Angeles Harbor, the basalt jetty and Ediz Hook Mole, as compensatory mitigation for the loss of aquatic resources and as mitigation for impacts on treaty reserved rights and resources. The undertaking will result in both surface and subsurface disturbance.

The U.S. Navy is providing the enclosed final report entitled *Cultural Resources Review of the Navy's Pier and Support Facilities for Transit Protection System at United States Coast Guard Air Station/Sector Field Office Port Angeles on Ediz Hook, Clallam County, Washington*, dated April 2016 for your review (Enclosure 1). In the report you will find that the Navy has not identified any archaeological sites within the APE, but has identified undocumented architectural resources and found none to be eligible for the National Register of Historic Places. These resources have been covered in the report and recorded in WISAARD. The Navy has also identified and recorded a Traditional Cultural Property (TCP), *Ĉixw ícən,* which is eligible for listing to the National Register of Historic Places.

SUBJECT: FINDING OF EFFECT FOR THE NAVY'S PIER AND SUPPORT FACILITIES FOR TRANSIT PROTECTION SYSTEM AT UNITED STATES COAST GUARD AIR STATION/SECTOR FIELD OFFICE PORT ANGELES ON EDIZ HOOK, CLALLAM COUNTY, WASHINGTON

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If you have any questions or require additional information, please contact Ms. Amanda J. Bennett. She can be reached at (360) 476-6613 or amanda.j.bennett@navy.mil.

Sincerely,

T. A. ZWOLFER
Captain, U.S. Navy
Commanding Officer

Enclosure 1: Cultural Resources Review Report

DEPARTMENT OF THE NAVY
NAVAL BASE KITSAP
120 SOUTH DEWEY ST
BREMERTON, WA 98314-5020

5090
Ser PRB4/00904
21 Apr 16

The Honorable Jeromy Sullivan
Chairman, Port Gamble S'Klallam Tribe
31912 Little Boston Road NE
Kingston, WA 98346

SUBJECT: FINDING OF EFFECT FOR THE NAVY'S PIER AND SUPPORT FACILITIES FOR TRANSIT PROTECTION SYSTEM AT UNITED STATES COAST GUARD AIR STATION/SECTOR FIELD OFFICE PORT ANGELES ON EDIZ HOOK, CLALLAM COUNTY, WASHINGTON

Dear Chairman Sullivan:

In September 2014, Naval Base (NAVBASE) Kitsap initiated consultation with you for the planned construction of the Transit Protection System (TPS) pier and support facilities at the U.S. Coast Guard Air Station/Sector Field Office on Ediz Hook. This letter is to provide you a copy of the final cultural resources review report and request your concurrence on the determination of effect that the proposed undertaking will have on cultural resources.

As stated in previous correspondence, the Navy proposes to construct facilities for the Transit Protection System (TPS) at the Ediz Hook Coast Guard Station to provide overnight docking and berthing facilities for Maritime Force Protection Unit personnel who escort Naval submarines from Naval Base Kitsap Bangor through the Strait of Juan de Fuca.

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The U.S. Navy is providing the enclosed final report entitled *Cultural Resources Review of the Navy's Pier and Support Facilities for Transit Protection System at United States Coast Guard Air Station/Sector Field Office Port Angeles on Ediz Hook, Clallam County, Washington*, dated April 2016 for your review (Enclosure 1). In the report you will find that the Navy has not identified any archaeological sites within the APE, but has identified undocumented architectural resources and found none to be eligible for the National Register of Historic Places. These resources have been covered in the report and recorded in WISAARD. The Navy has also identified and recorded a Traditional Cultural Property (TCP), *Ĉixw icən,* which is eligible for listing to the National Register of Historic Places.

SUBJECT: FINDING OF EFFECT FOR THE NAVY'S PIER AND SUPPORT FACILITIES FOR TRANSIT PROTECTION SYSTEM AT UNITED STATES COAST GUARD AIR STATION/SECTOR FIELD OFFICE PORT ANGELES ON EDIZ HOOK, CLALLAM COUNTY, WASHINGTON

As noted in the TCP Site Form, the TCP lacks integrity of design, materials and workmanship as result of built-environment alterations at the east end of Ediz Hook. The TCP retains integrity of location, setting, feeling and association through the preserved general shape of the bay and sandspit, and the expansive marine and mountain views from the Port Angeles shoreline and Ediz Hook. The proposed TPS pier and associated buildings, located in close proximity to the USCG pier, runway and other buildings, are consistent with the industrial nature of the altered environment and will result in insignificant alteration to the natural shape of the spit. Removal of the jetty, Ediz Hook Mole, and Old Public Dock Building, along with shoreline restoration, will reestablish a more natural character of the sandspit at the western end of the USCG AIRSTA/SFO Port Angeles property, improving the integrity of the TCP. As such, the Navy finds that the proposed undertaking will have No Adverse Effect on historic properties. The Lower Elwha Klallam Tribe is in agreement with this finding. The Navy also proposes archaeological monitoring for any excavations that will extend below known fill depths by an archaeologist who meets the Secretary of the Interior's minimum professional standards as set forth in 36 CFR § 61. A Monitoring Plan is appended to the Cultural Resources Review Report.

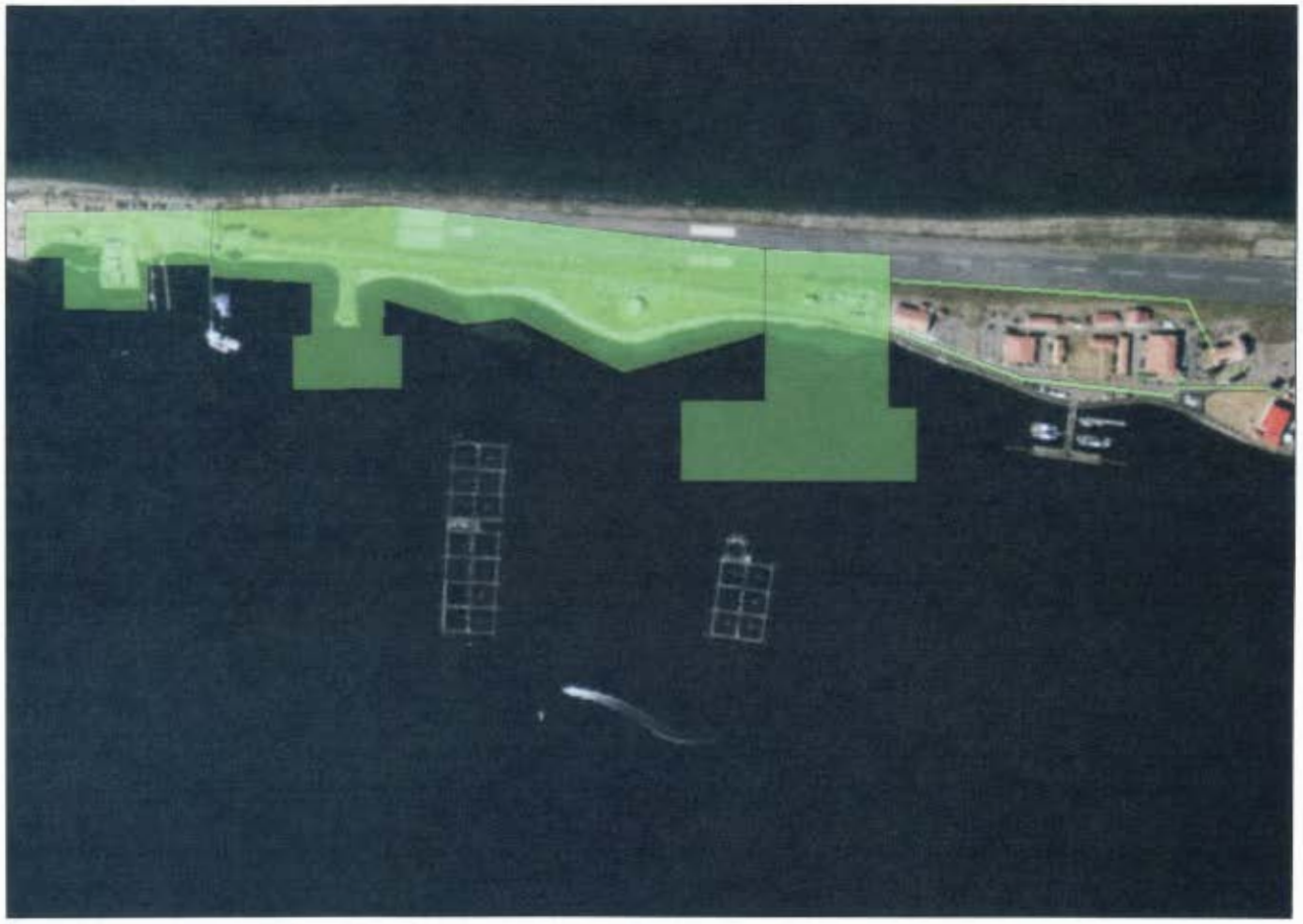
If you have any questions or require additional information, please contact Ms. Amanda J. Bennett. She can be reached at (360) 476-6613 or amanda.j.bennett@navy.mil.

Sincerely,

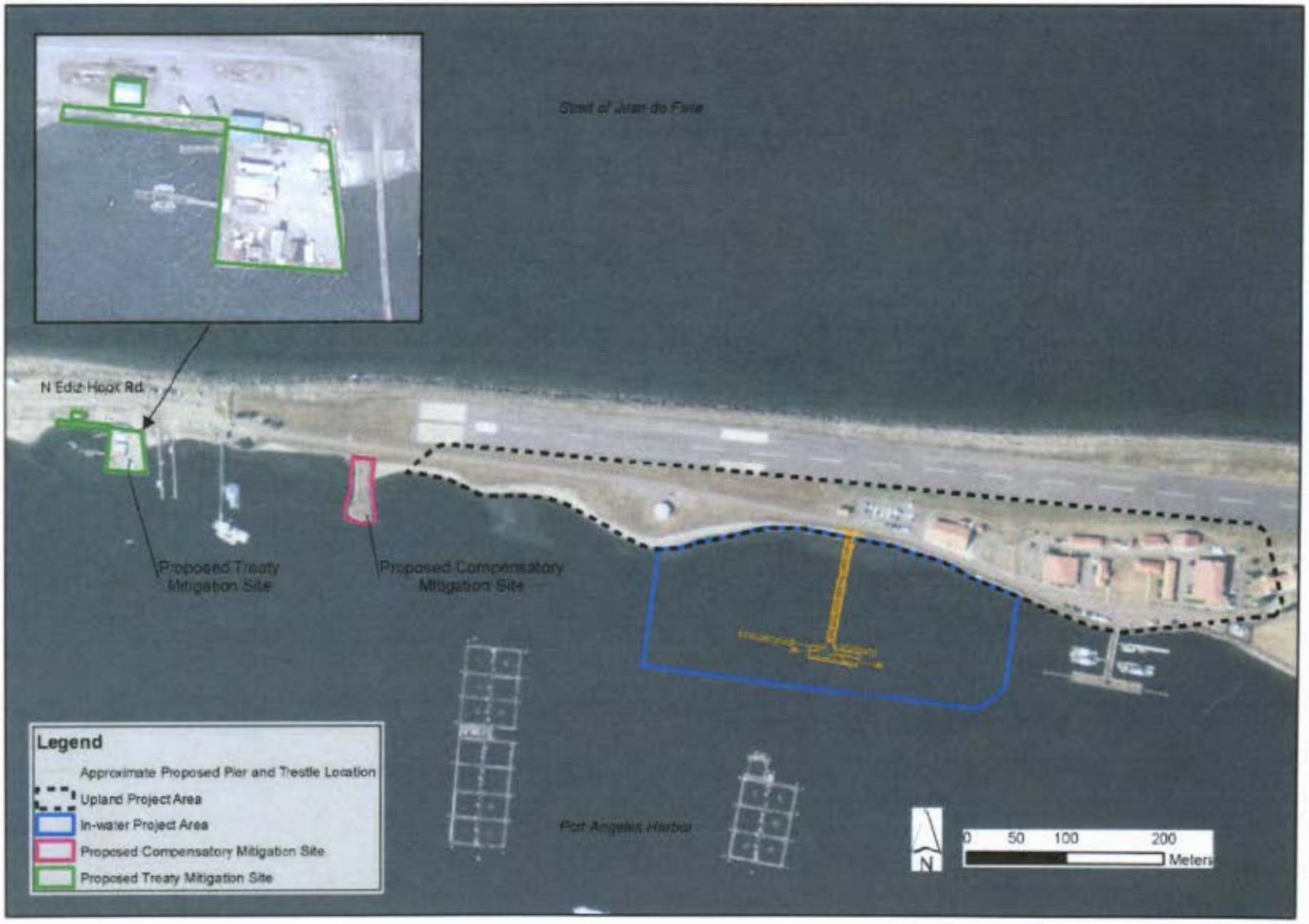
T. A. ZWOLFER
Captain, U. S. Navy
Commanding Officer

Enclosure 1: Cultural Resources Review Report

Enclosure 1. Location of the APE on a USGS topographic map



Enclosure 2. Closeup of APE on satellite imagery



Enclosure 3. Elements of the Undertaking

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Allyson Brooks Ph.D., Director
State Historic Preservation Officer

April 25, 2016

Captain T.A. Zwolfer
Department of the Navy
Naval Base Kitsap
120 South Dewey Street
Bremerton, Washington 98314-5020

Re: Transit Protection System at USCG Ediz Hook Project
Log No.: 091714-10-USN

Dear Captain Zwolfer

Thank you for contacting our department. We have reviewed the professional archaeological survey report you provided for the proposed Transit Protection System at USCG Air Station/Sector Field Office Ediz Hook Project, Port Angeles, Calllam County, Washington.

We concur with your Determination that the Traditional Cultural Properties of *Cixw icən* is eligible to the National Register. We concur with your Determination of No Adverse Effect. Please provide the monitoring report when available.

We would appreciate any correspondence or comments from concerned tribes or other parties that you receive as you consult under the requirements of 36CFR800.4(a)(4). Such documents can be provided in a pdf format.

In the event that archaeological or historic materials are discovered during project activities, work in the immediate vicinity must stop, the area secured, and the concerned tribe's cultural staff and cultural committee and this department notified.

These comments are based on the information available at the time of this review and on the behalf of the State Historic Preservation Officer in conformance with Section 106 of the National Historic Preservation Act and its implementing regulations 36CFR800. Should additional information become available, our assessment may be revised. Thank you for the opportunity to comment and a copy of these comments should be included in subsequent environmental documents.

Sincerely,

Robert G. Whitlam, Ph.D.
State Archaeologist
(360) 890-2615
email: *rob.whitlam@dahp.wa.gov*

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JAMESTOWN S'KLALLAM TRIBE
1033 Old Blyn Highway, Sequim, WA 98382 360/683-1109 FAX 360/681-4643

ATTN: Amanda Bennett May 3, 2016
U.S. Army Corps of Engineers
Seattle District
Re: Cultural Resources Review of the Navy's Pier and Support Facilities…On Ediz Hook

Ms. Bennett,

The Jamestown S'Klallam Tribe has received and reviewed NAVFAC's report "Cultural Resources Review of the Navy's Pier and Support Facilities for Transit Protection System at United States Coast Guard Air Station/Sector Field Office Port Angeles on Ediz Hook, Clallam County, Washington." With respect to cultural resources, the Jamestown S'Klallam Tribe will defer to the Lower Elwha Klallam Tribe and the concur with the Navy's determination of "no adverse effect." However, should the scope change or if new data is revealed during implementation, please let us know.

Thank you for the opportunity to comment on this project. If you need any additional information, please contact me at 360-681-4638 or dbrownell@jamestowntribe.org .

Sincerely,

David Brownell
Cultural Resources Specialist
Jamestown S'Klallam Tribe

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Navy and Tribes
Government to Government Consultation
Documentation

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DEPARTMENT OF THE NAVY
NAVAL BASE KITSAP
120 SOUTH DEWEY ST
BREMERTON, WA 98314-5020

5090
Ser PRB4/01750
25 Oct 13

The Honorable Frances G. Charles
Lower Elwha Klallam Tribe
2851 Lower Elwha Road
Port Angeles, WA 98363

Dear Chairwoman Charles:

SUBJECT: INVITATION TO INITIATE GOVERNMENT-TO-GOVERNMENT CONSULTATION ON PROPOSED PIER AT U.S. COAST GUARD AIR STATION/SECTOR FIELD OFFICE, PORT ANGELES, WA

I am writing to inform you of a facility construction project being planned for the U.S. Coast Guard Air Station/Sector Field Office, Port Angeles in Clallam County, Washington. The project is being planned by the Navy in cooperation with the U.S. Coast Guard. The project may be of interest to your tribe. The proposed action, which is depicted in the attached enclosure, includes the following:

- A 200 foot pier, including mooring dolphins and access bridge
- A 8,300 square foot single-story shoreside facility

The purpose of the facility would be to provide a stopping and rest point for Coast Guard personnel.

Pursuant to the Navy's policy for American Indian/Alaska Native tribal government-to-government consultation, I would like to extend the opportunity to review the proposed action and to evaluate whether you believe there would be a potential to significantly affect tribal treaty rights resulting from the implementation of the proposed action. Your comments and concerns will be considered and will enable the Navy and U.S. Coast Guard to address potential issues.

I would appreciate receiving your written comments or concerns within 60 days of receipt of this letter. My staff will be contacting Doug Morrill to discuss scheduling a government-to-government consultation meeting. We look forward to discussing your questions and concerns about the proposed pier and support facilities.

SUBJECT: INVITATION TO INITIATE GOVERNMENT-TO-GOVERNMENT CONSULTATION ON PROPOSED PIER AT U.S. COAST GUARD AIR STATION/SECTOR FIELD OFFICE, PORT ANGELES, WA

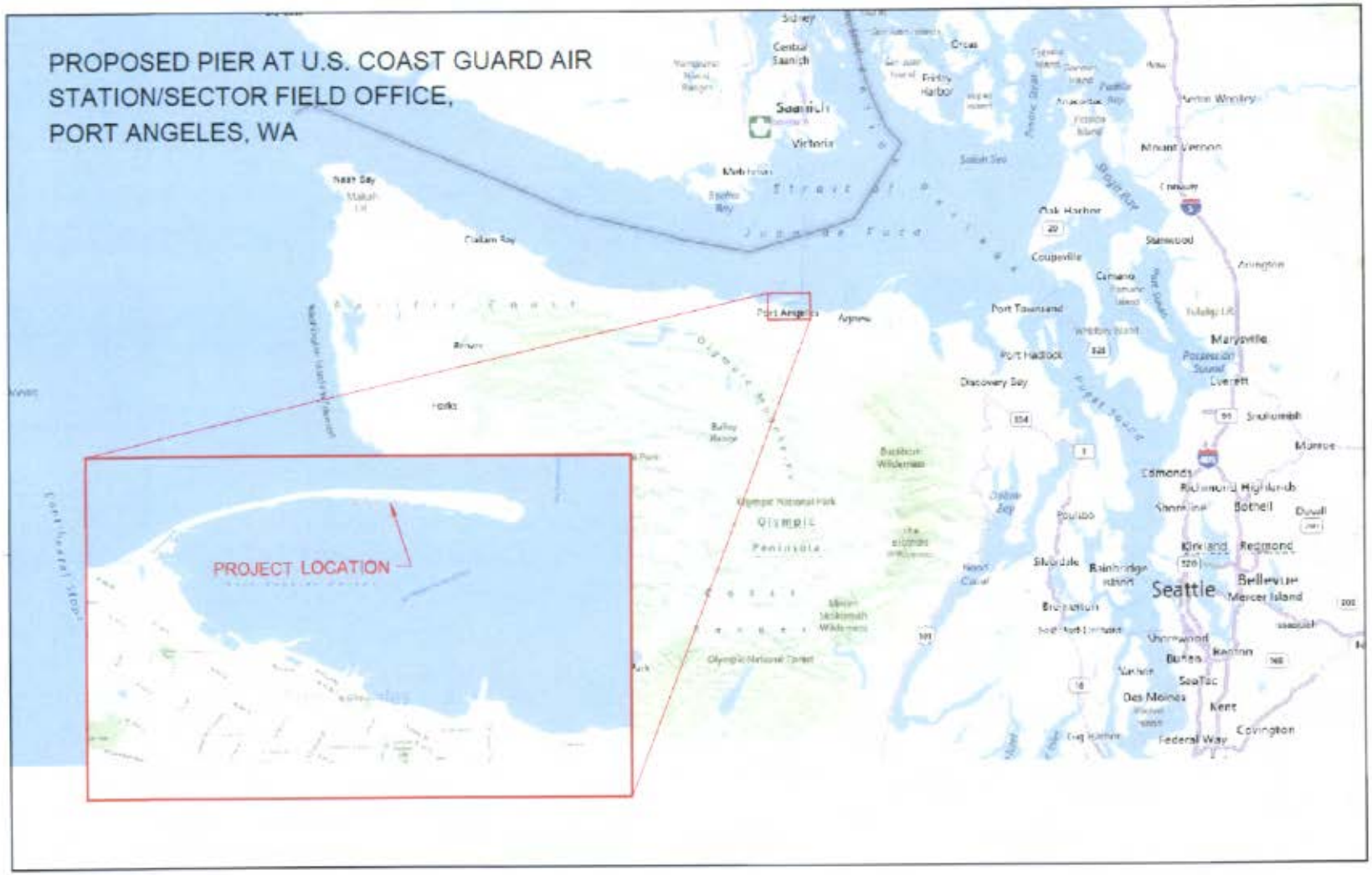
If you have questions or concerns, please contact me directly at (360) 627-4000 or at thomas.zwolfer@navy.mil, or contact my Environmental Director, Mr. Greg Leicht, at (360) 315-5411 or gregory.leicht@navy.mil.

Sincerely,

T. A. ZWOLFER
Captain, U.S. Navy
Commanding Officer

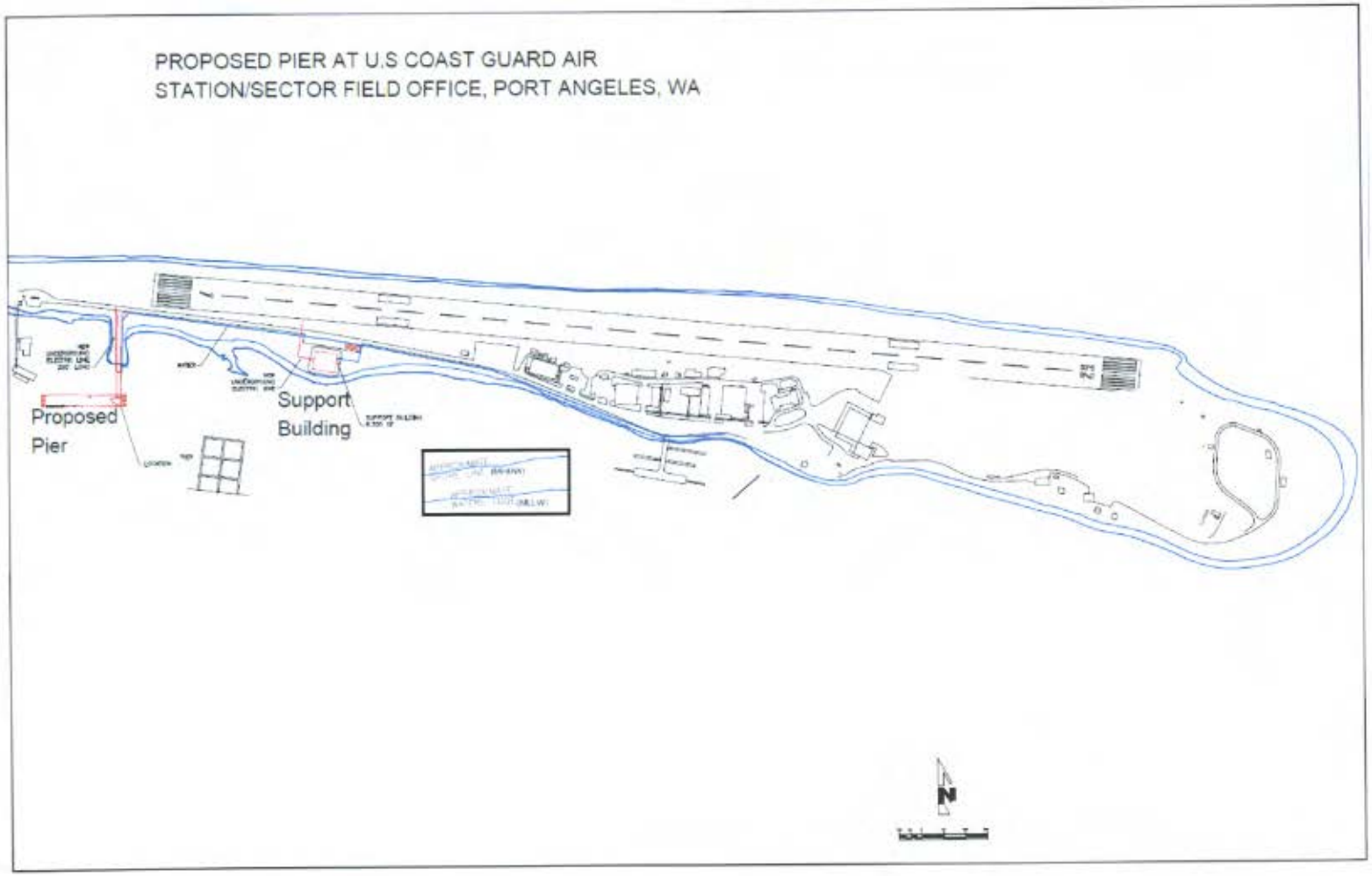
Enclosures: 1. Proposed Project Location and Conceptual Drawings

SUBJECT: INVITATION TO INITIATE GOVERNMENT-TO-GOVERNMENT CONSULTATION ON PROPOSED PIER AT U.S. COAST GUARD AIR STATION/SECTOR FIELD OFFICE, PORT ANGELES, WA



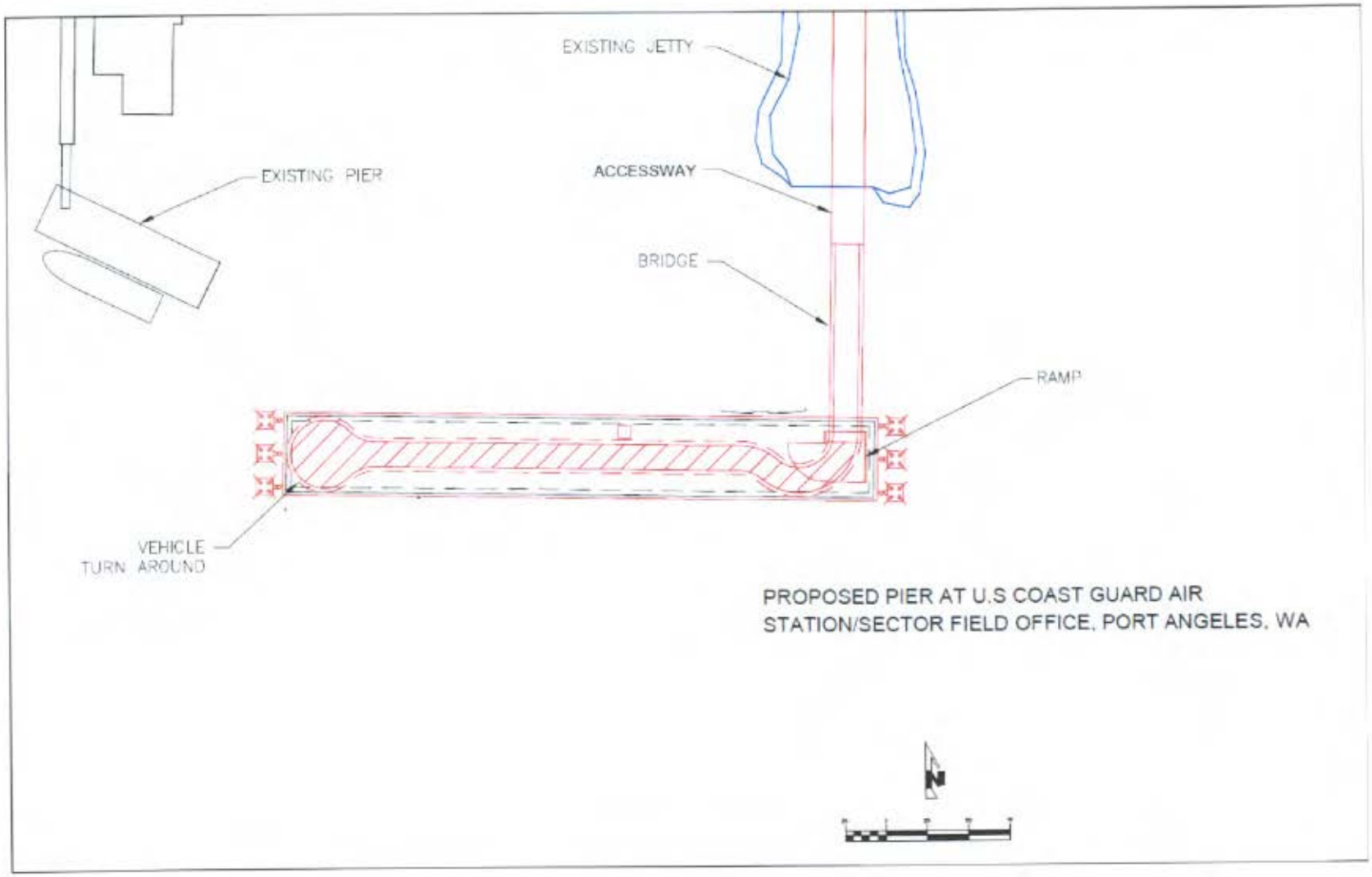
Enclosure 1

SUBJECT: INVITATION TO INITIATE GOVERNMENT-TO-GOVERNMENT CONSULTATION ON PROPOSED PIER AT U.S. COAST GUARD AIR STATION/SECTOR FIELD OFFICE, PORT ANGELES, WA



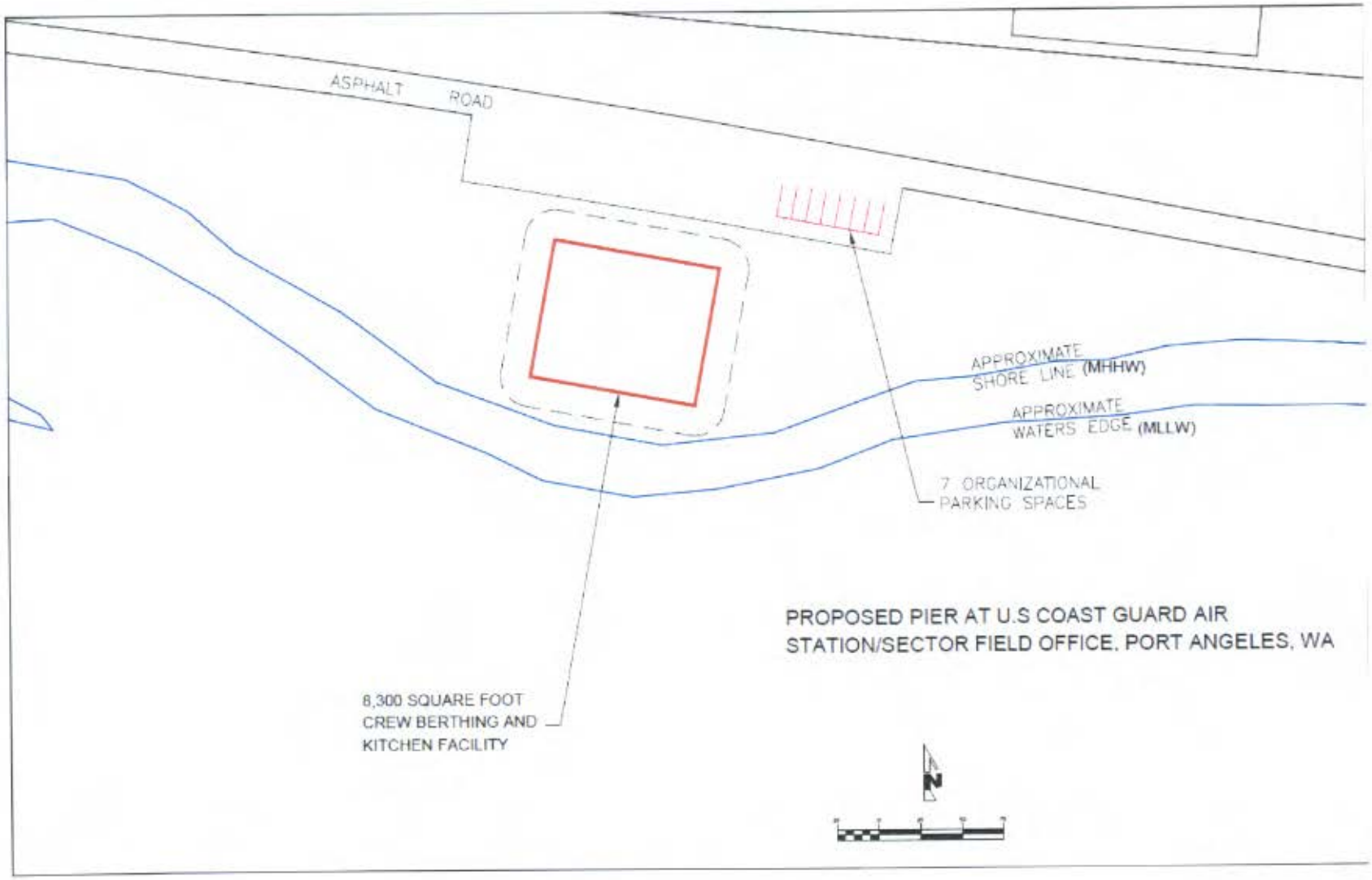
Enclosure 1

SUBJECT: INVITATION TO INITIATE GOVERNMENT-TO-GOVERNMENT CONSULTATION ON PROPOSED PIER AT U.S. COAST GUARD AIR STATION/SECTOR FIELD OFFICE, PORT ANGELES, WA



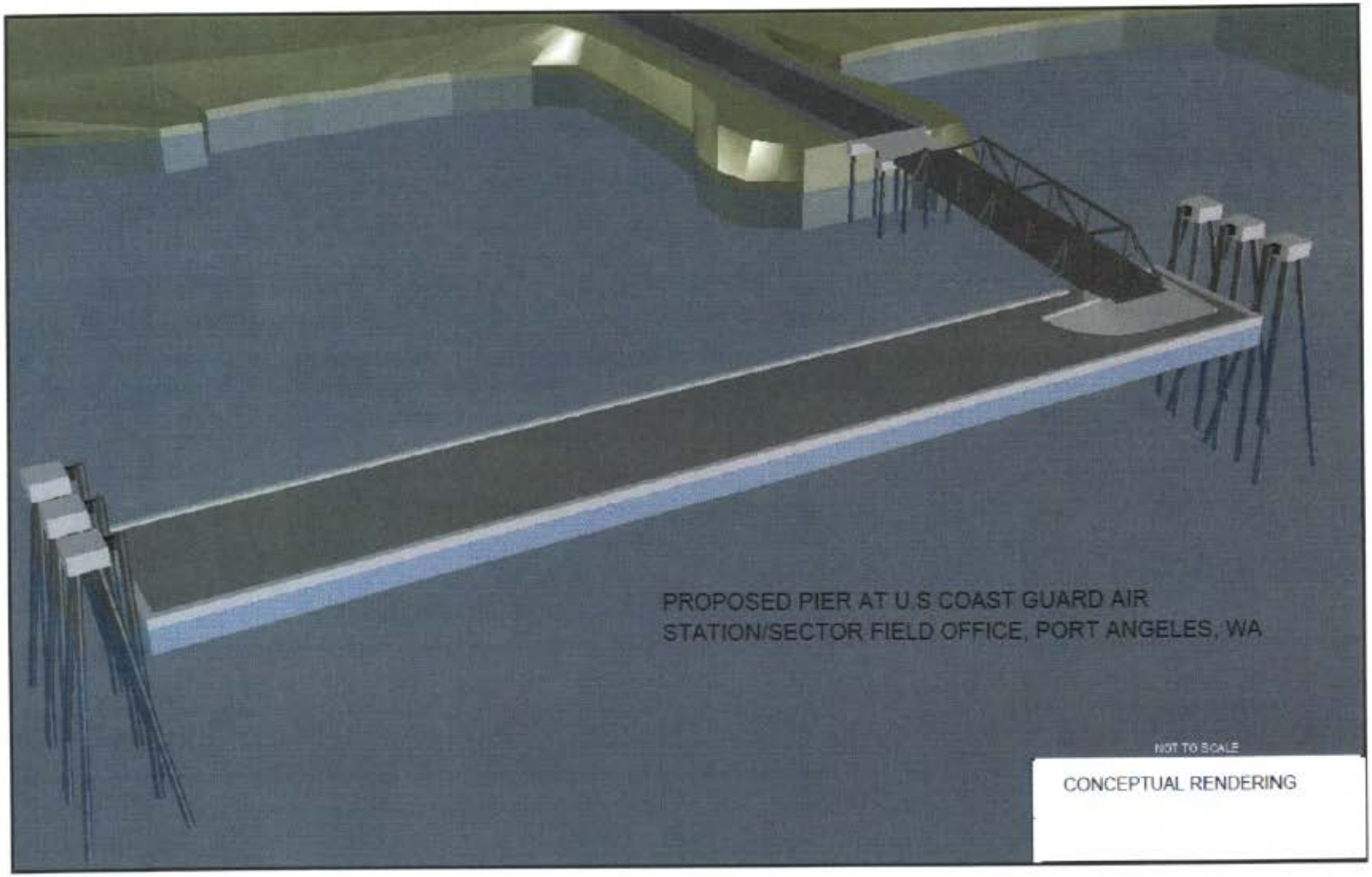
Enclosure 1

SUBJECT: INVITATION TO INITIATE GOVERNMENT-TO-GOVERNMENT CONSULTATION ON PROPOSED PIER AT U.S. COAST GUARD AIR STATION/SECTOR FIELD OFFICE, PORT ANGELES, WA



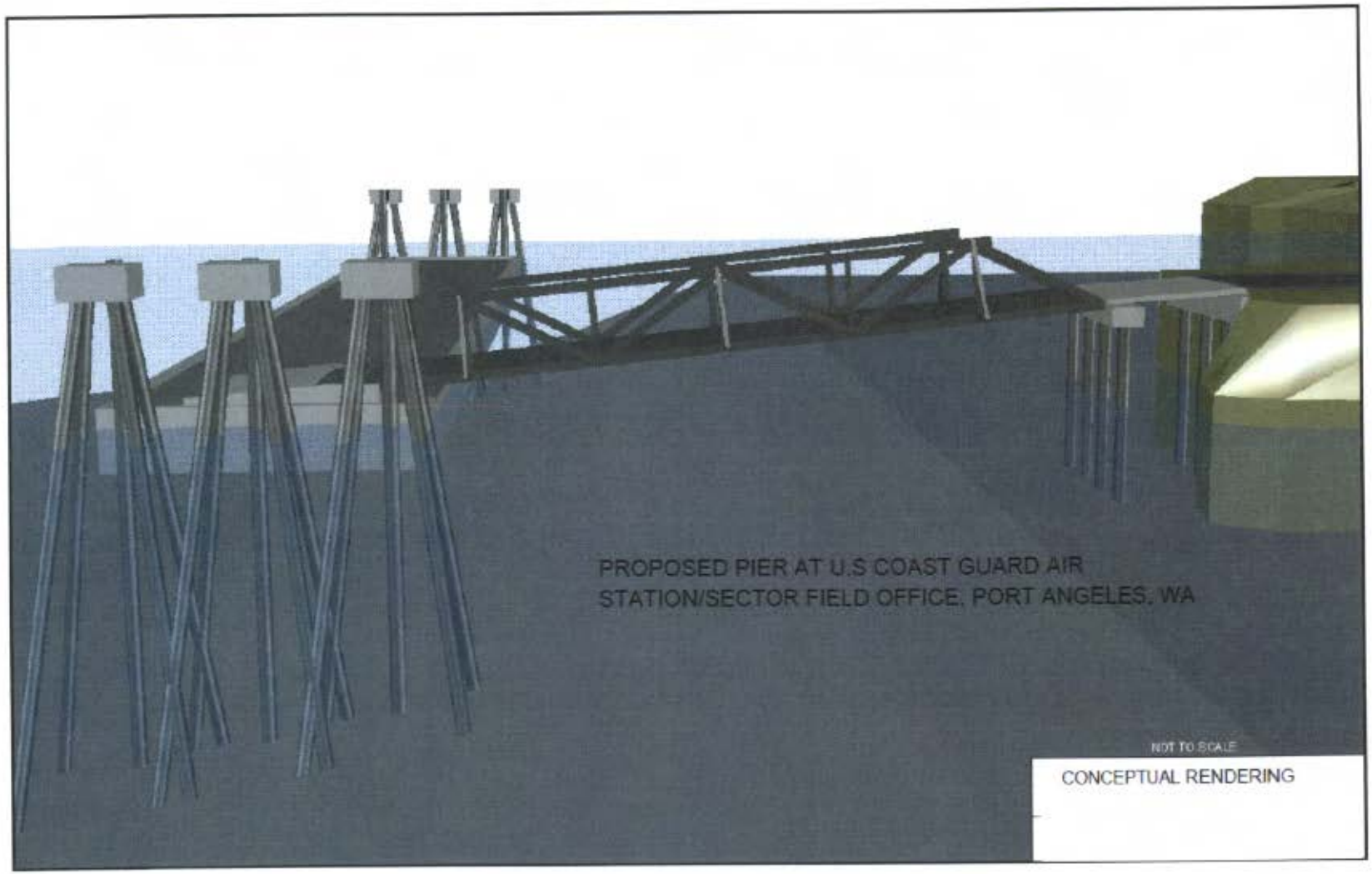
Enclosure 1

SUBJECT: INVITATION TO INITIATE GOVERNMENT-TO-GOVERNMENT CONSULTATION ON PROPOSED PIER AT U.S. COAST GUARD AIR STATION/SECTOR FIELD OFFICE, PORT ANGELES, WA



Enclosure 1

SUBJECT: INVITATION TO INITIATE GOVERNMENT-TO-GOVERNMENT CONSULTATION ON PROPOSED PIER AT U.S. COAST GUARD AIR STATION/SECTOR FIELD OFFICE, PORT ANGELES, WA



Enclosure 1

DEPARTMENT OF THE NAVY
NAVAL BASE KITSAP
120 SOUTH DEWEY ST
BREMERTON, WA 98314-5020

5090
Ser PRB4/00283
14 Feb 14

The Honorable W. Ron Allen
Jamestown S'Klallam Tribe
1033 Old Blyn Highway
Sequim, WA 98382

Dear Chairman Allen:

SUBJECT: INVITATION TO INITIATE GOVERNMENT-TO-GOVERNMENT CONSULTATION ON PROPOSED PIER AT U.S. COAST GUARD AIR STATION/SECTOR FIELD OFFICE, PORT ANGELES, WA

I am writing to inform you of a facility construction project being planned for the U.S. Coast Guard Air Station/Sector Field Office, Port Angeles in Clallam County, Washington. The project is being planned by the Navy in cooperation with the U.S. Coast Guard. The project may be of interest to your tribe. The proposed action, which is depicted in the attached enclosure, includes the following:

- A 200 foot pier, including mooring dolphins and access bridge
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The purpose of the facility would be to provide a stopping and rest point for Coast Guard personnel.

Pursuant to the Navy's policy for American Indian/Alaska Native tribal government-to-government consultation, I would like to extend the opportunity to review the proposed action and to evaluate whether you believe there would be a potential to significantly affect tribal treaty rights resulting from the implementation of the proposed action. Your comments and concerns will be considered and will enable the Navy and U.S. Coast Guard to address potential issues.

I would appreciate receiving your written comments or concerns within sixty (60) days of receipt of this letter. My staff will be contacting Scott Chitwood to discuss scheduling a government-to-government consultation meeting. We look forward to discussing your questions and concerns about the proposed pier and support facilities.

SUBJECT: INVITATION TO INITIATE GOVERNMENT-TO-GOVERNMENT CONSULTATION ON PROPOSED PIER AT U.S. COAST GUARD AIR STATION/SECTOR FIELD OFFICE, PORT ANGELES, WA

If you have questions or concerns, please contact me directly at (360) 627-4000 or at thomas.zwolfer@navy.mil, or contact my Environmental Director, Mr. Greg Leicht, at (360) 315-5411 or gregory.leicht@navy.mil.

Sincerely,

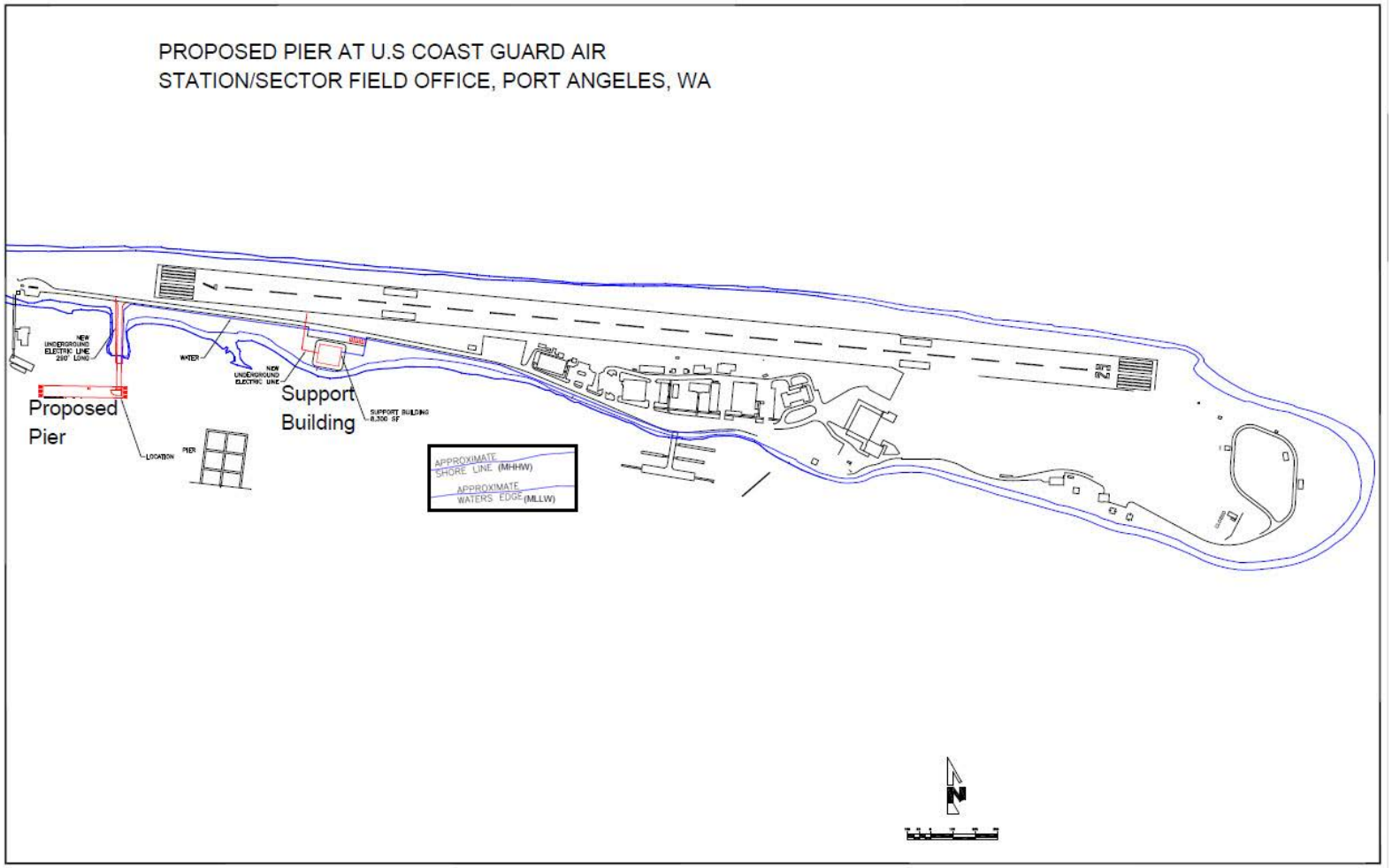
T. A. ZWOLFER
Captain, U.S. Navy
Commanding Officer

Enclosures: 1. Proposed Project Location and Conceptual Drawings

SUBJECT: INVITATION TO INITIATE GOVERNMENT-TO-GOVERNMENT CONSULTATION ON PROPOSED PIER AT U.S. COAST GUARD AIR STATION/SECTOR FIELD OFFICE, PORT ANGELES, WA

Enclosure 1

SUBJECT: INVITATION TO INITIATE GOVERNMENT-TO-GOVERNMENT CONSULTATION ON PROPOSED PIER AT U.S. COAST GUARD AIR STATION/SECTOR FIELD OFFICE, PORT ANGELES, WA



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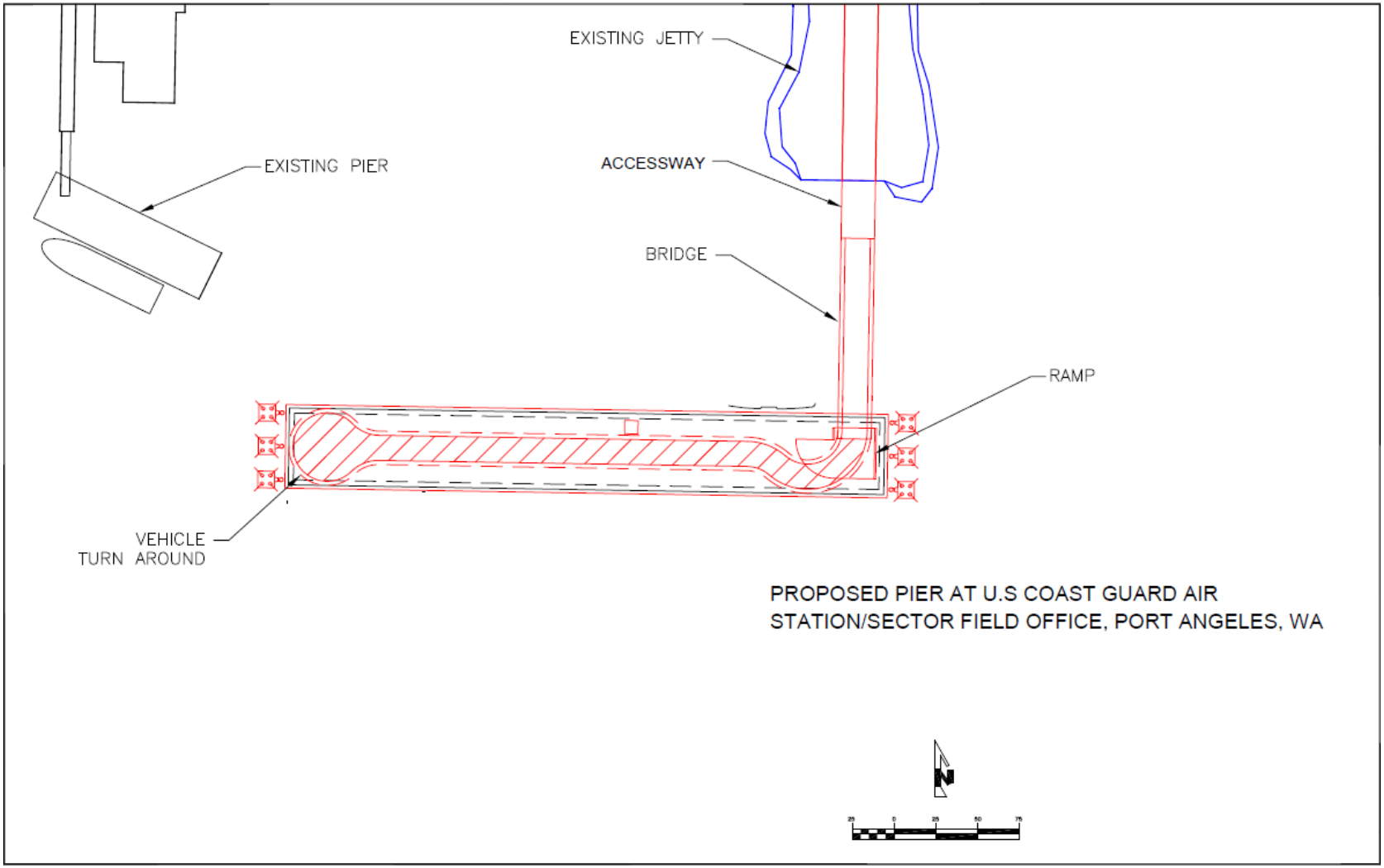

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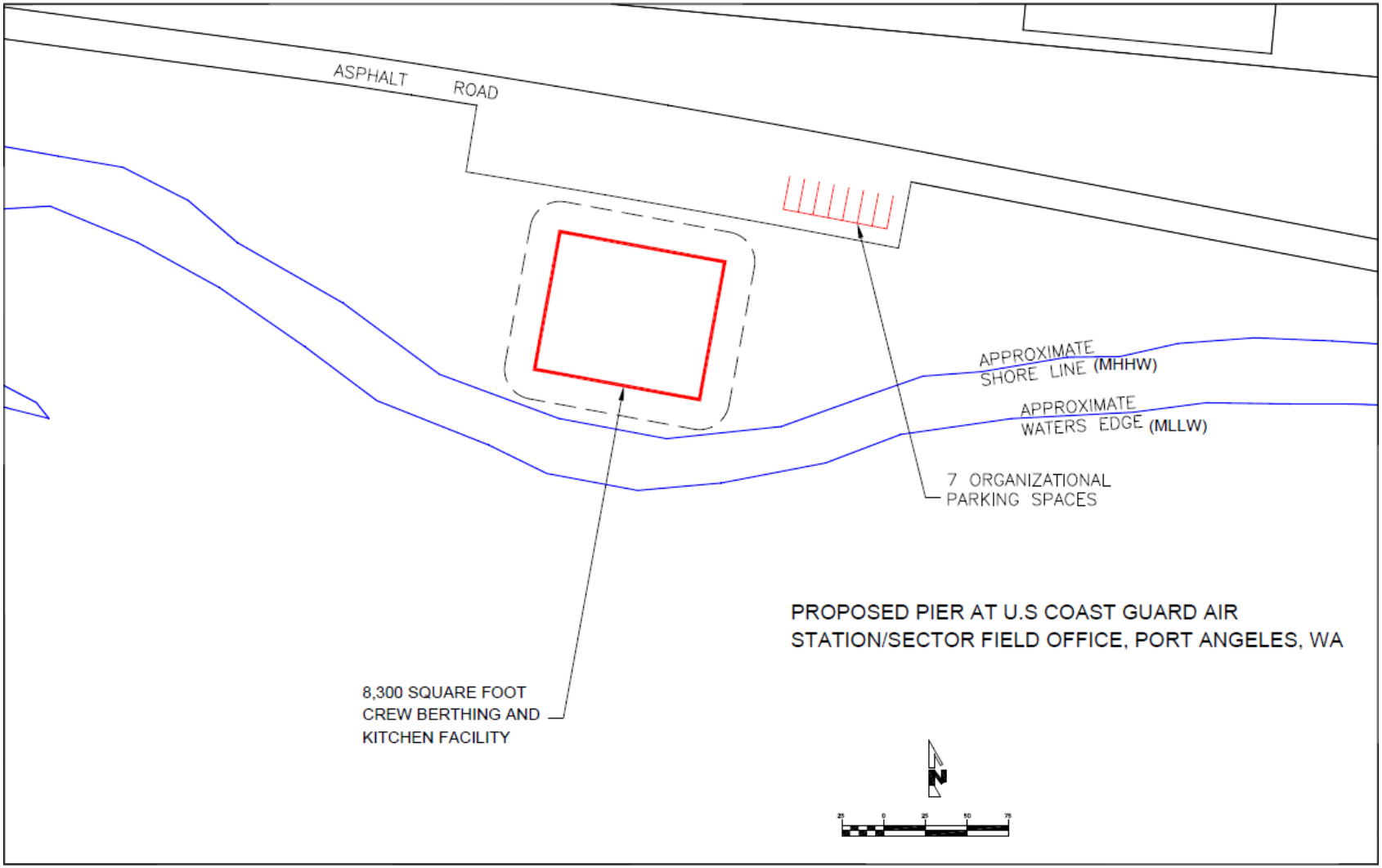

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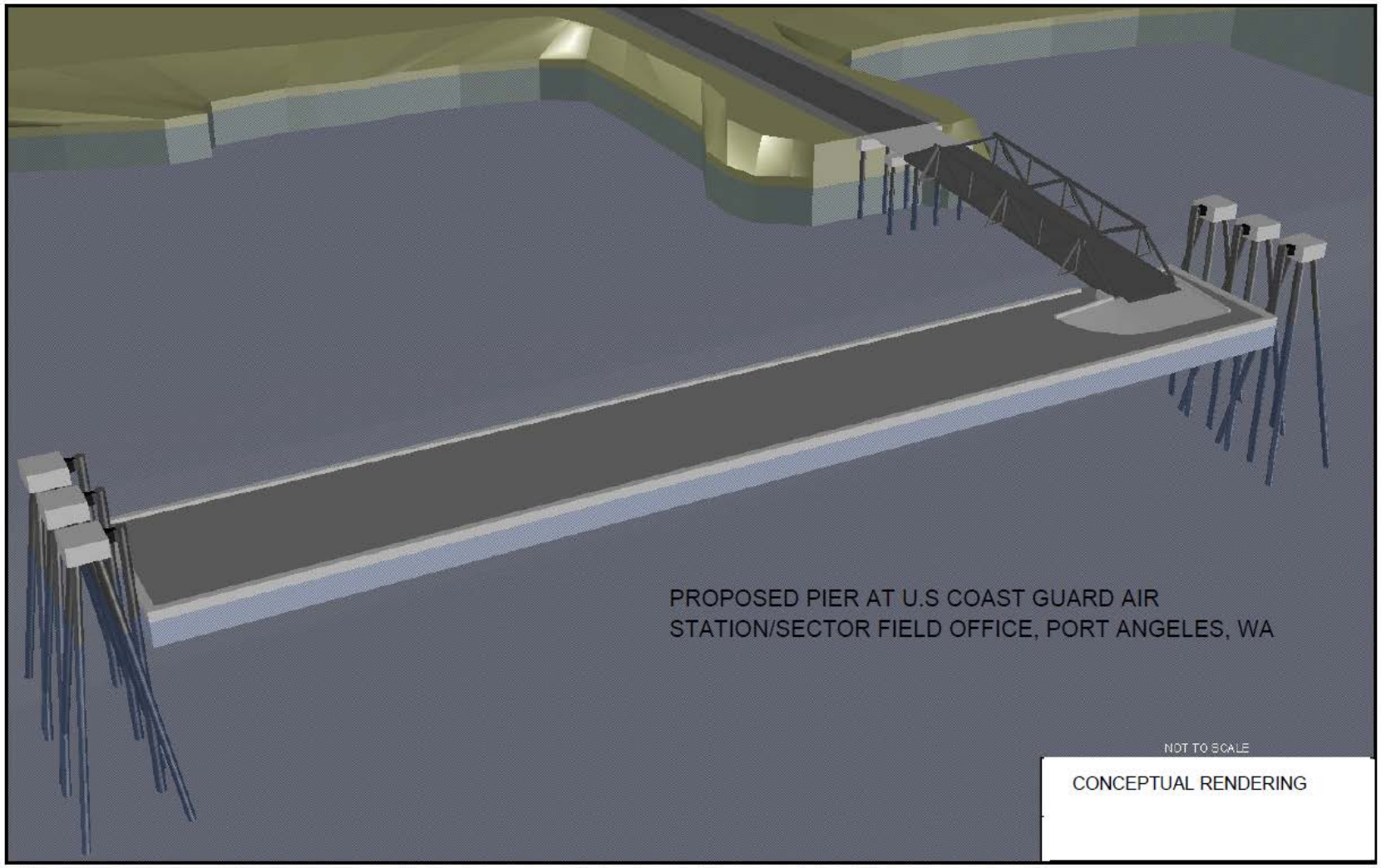

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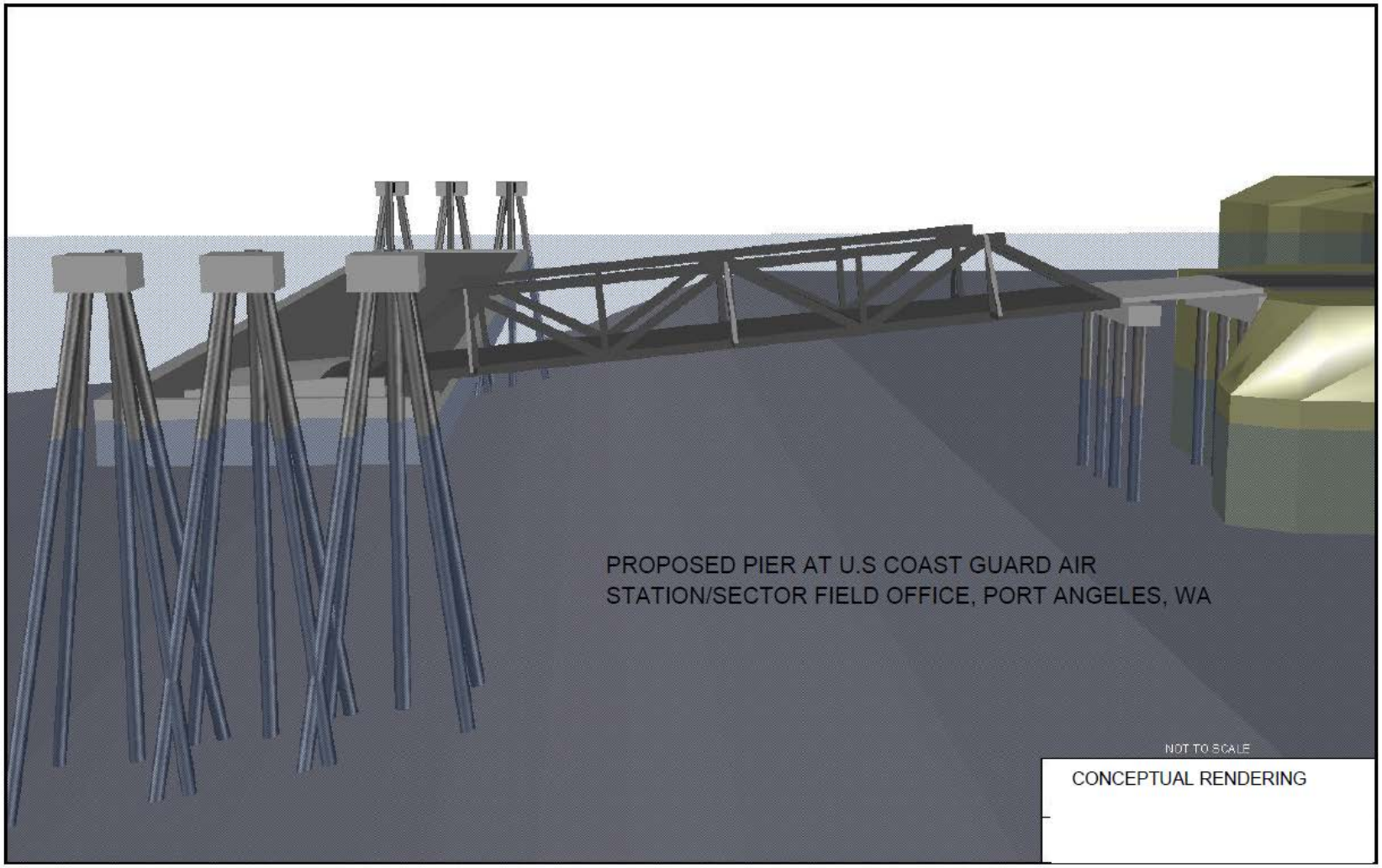

Enclosure 1

DEPARTMENT OF THE NAVY
NAVAL BASE KITSAP
120 SOUTH DEWEY ST
BREMERTON, WA 98314-5020

5090
Ser PRB4/00282
14 Feb 14

The Honorable Jeromy Sullivan
Port Gamble S'Klallam Tribe
31912 Little Boston Road NE
Kingston, WA 98346

Dear Chairman Sullivan:

SUBJECT: INVITATION TO INITIATE GOVERNMENT-TO-GOVERNMENT CONSULTATION ON PROPOSED PIER AT U.S. COAST GUARD AIR STATION/SECTOR FIELD OFFICE, PORT ANGELES, WA

I am writing to inform you of a facility construction project being planned for the U.S. Coast Guard Air Station/Sector Field Office, Port Angeles in Clallam County, Washington. The project is being planned by the Navy in cooperation with the U.S. Coast Guard. The project may be of interest to your tribe. The proposed action, which is depicted in the attached enclosure, includes the following:

- A 200 foot pier, including mooring dolphins and access bridge
- A 8,300 square foot single-story shoreside facility

The purpose of the facility would be to provide a stopping and rest point for Coast Guard personnel.

Pursuant to the Navy's policy for American Indian/Alaska Native tribal government-to-government consultation, I would like to extend the opportunity to review the proposed action and to evaluate whether you believe there would be a potential to significantly affect tribal treaty rights resulting from the implementation of the proposed action. Your comments and concerns will be considered and will enable the Navy and U.S. Coast Guard to address potential issues.

I would appreciate receiving your written comments or concerns within sixty (60) days of receipt of this letter. My staff will be contacting Roma Call to discuss scheduling a government-to-government consultation meeting. We look forward to discussing your questions and concerns about the proposed pier and support facilities.

SUBJECT: INVITATION TO INITIATE GOVERNMENT-TO-GOVERNMENT CONSULTATION ON PROPOSED PIER AT U.S. COAST GUARD AIR STATION/SECTOR FIELD OFFICE, PORT ANGELES, WA

If you have questions or concerns, please contact me directly at (360) 627-4000 or at thomas.zwolfer@navy.mil, or contact my Environmental Director, Mr. Greg Leicht, at (360) 315-5411 or gregory.leicht@navy.mil.

Sincerely,

T. A. ZWOLFER
Captain, U.S. Navy
Commanding Officer

Enclosures: 1. Proposed Project Location and Conceptual Drawings

SUBJECT: INVITATION TO INITIATE GOVERNMENT-TO-GOVERNMENT CONSULTATION ON PROPOSED PIER AT U.S. COAST GUARD AIR STATION/SECTOR FIELD OFFICE, PORT ANGELES, WA

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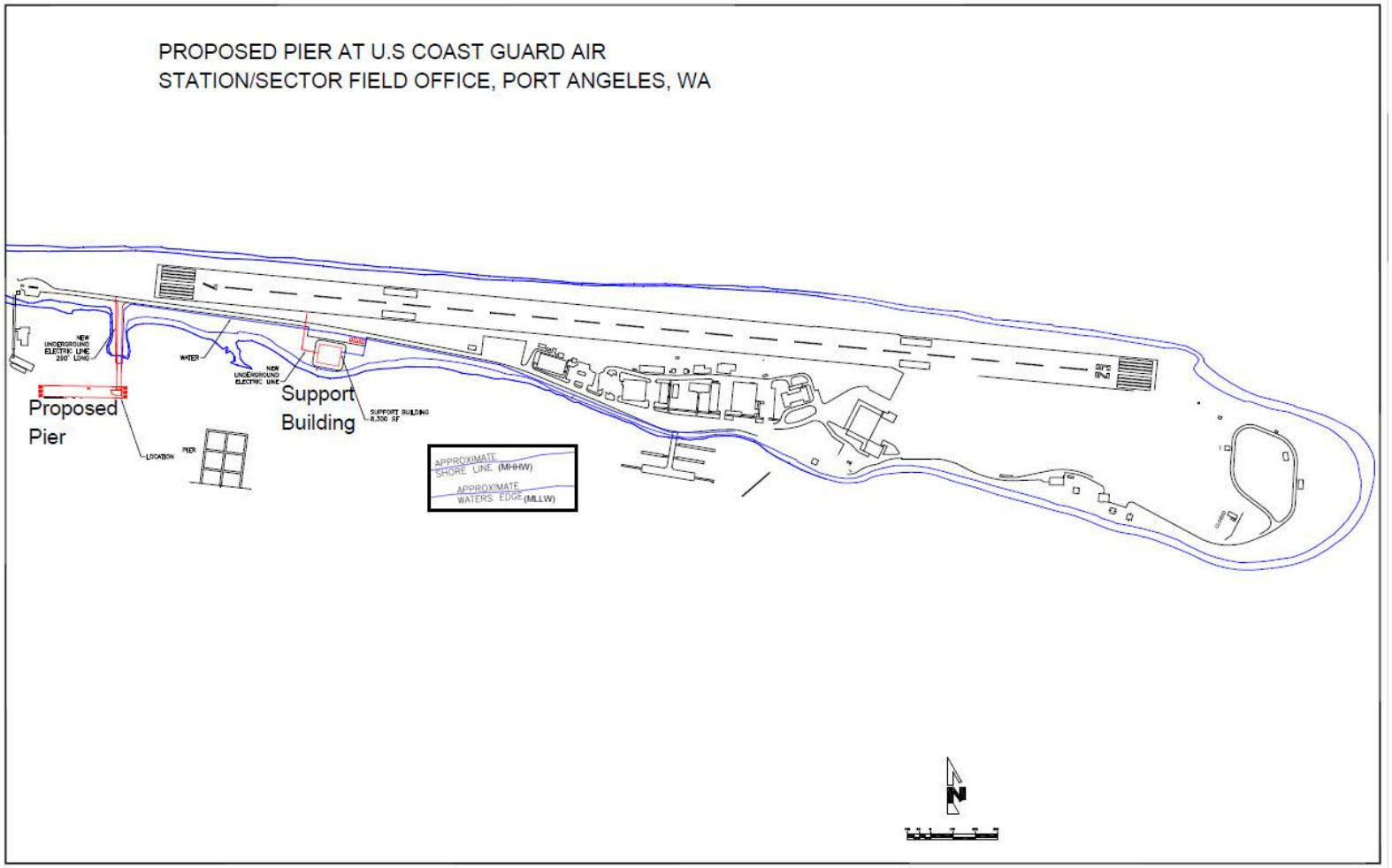

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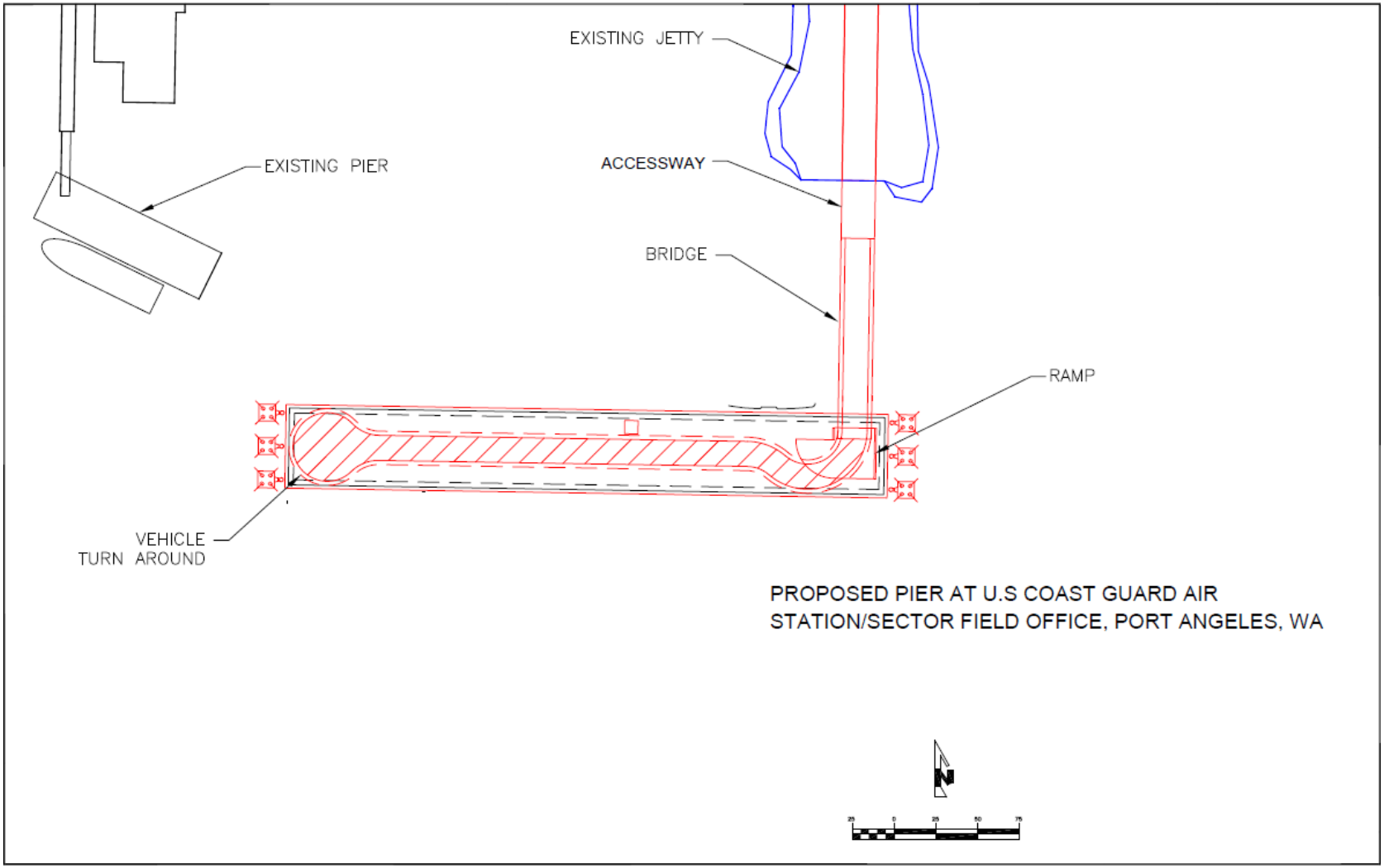

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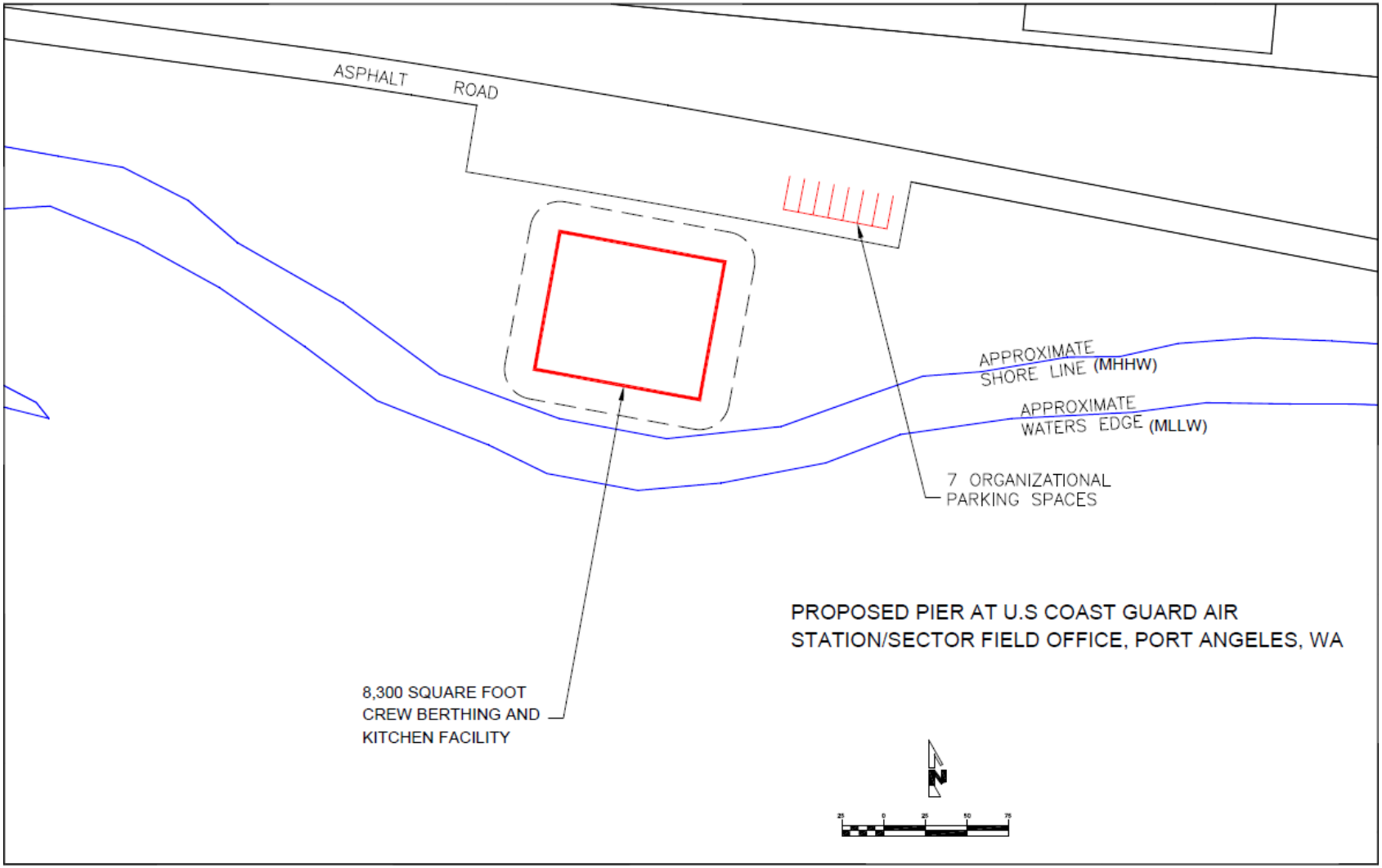

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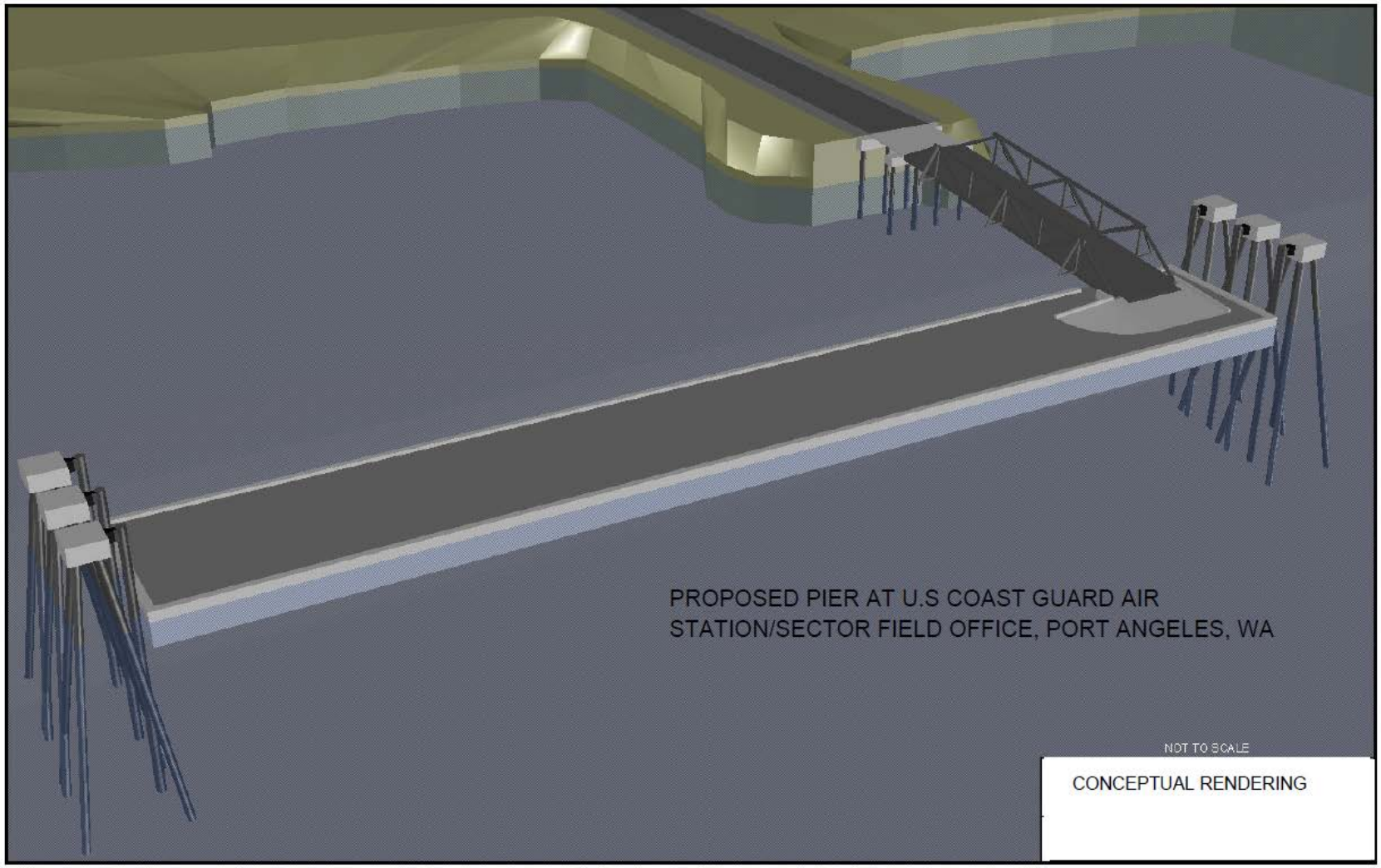

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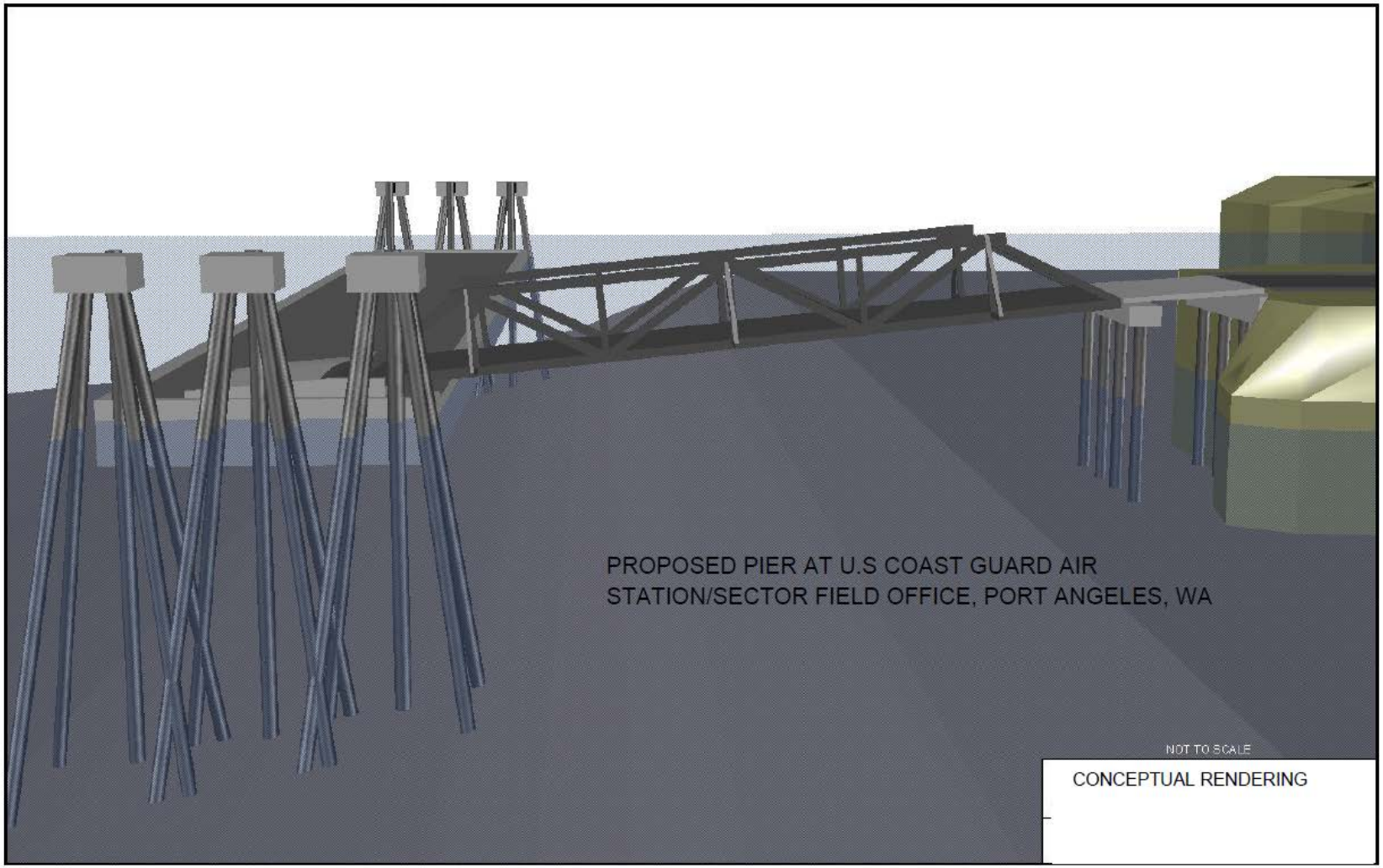


Enclosure 1

MEMORANDUM OF AGREEMENT
BETWEEN
THE DEPARTMENT OF THE NAVY
AND
THE LOWER ELWHA KLALLAM TRIBE, JAMESTOWN S'KLALLAM TRIBE AND PORT GAMBLE S'KLALLAM TRIBE
Regarding
Construction and Operation of a Pier and Support Facilities for Transit Protection System
at
U.S. Coast Guard Air Station/Sector Field Office
Port Angeles, Washington

THIS MEMORANDUM OF AGREEMENT (hereinafter the "Agreement") is entered into this 14th day of June, 2016, by and between the United States Navy (hereinafter the "Navy"), and the Lower Elwha Klallam Tribe, Jamestown S'Klallam Tribe and Port Gamble S'Klallam Tribe (hereinafter the "Tribes") for the specific purposes hereafter set forth.

BACKGROUND

WHEREAS, Article 1, Section 8 of the United States Constitution empowers the United States Congress to provide and maintain a Navy; and in 1944 the Navy established Naval Base Kitsap (NBK) Bangor located on Hood Canal in Silverdale, Washington; and

WHEREAS, NBK Bangor provides berthing and support services to Navy OHIO Class Ballistic Missile submarines (TRIDENT submarines) and a Seawolf Class Submarine; and

WHEREAS, the Navy is proposing to construct and operate a pier and support facilities for Transit Protection System at U.S. Coast Guard Air Station/Sector Field Office in Port Angeles, Washington (hereinafter "Proposed Action"); and

WHEREAS, each of the Tribes is a federally recognized American Indian tribe and sovereign Indian nation; and

WHEREAS, the Tribes and the United States are signatories to the 1855 Treaty of Point No Point; and

WHEREAS, the Tribes have Treaty reserved fishing rights in Western Washington, including the right to take fish at their usual and accustomed fishing grounds and stations (hereinafter "U&A"); and

WHEREAS, the Proposed Action will occur in shared marine waters of Port Angeles Harbor where Navy and U.S. Coast Guard operations are conducted; and

WHEREAS, Klallam Indians occupied traditional villages on Port Angeles Harbor for millennia, and the Tribes' U&A includes the waters of Port Angeles Harbor; and

WHEREAS, the Lower Elwha Klallam Tribe owns real property on Ediz Hook adjacent to Port Angeles Harbor, has been actively working for the past twenty years to restore aquatic habitat along the shoreline and within the Harbor in order to improve opportunities for its members to exercise treaty rights, and has worked to protect cultural resources and tribal burial sites on the Port Angeles Harbor waterfront; and

WHEREAS, the federal government has enacted numerous statutes and promulgated regulations that establish and define a trust relationship with Indian tribes; and

WHEREAS, by complying with statutes, regulations and any applicable common law that establish and define a trust responsibility, and with other laws such as the National Environmental Policy Act (NEPA), the Navy complies with Department of Defense (DoD) policy to meet responsibilities to tribes as derived from the Federal trust doctrine, treaties and agreements between the federal government and tribal governments and to protect tribal rights and resources as defined in Department of Defense Instruction (DODI) 4710.02, DoD Interactions with Federally-Recognized Tribes, September 14, 2006; and

WHEREAS, in October, 1998 Secretary of Defense William S. Cohen signed the DoD American Indian and Alaska Native Policy, which requires agencies within DoD to undertake DoD actions and manage DoD lands consistent with the conservation of protected tribal resources and in recognition of Indian Treaty rights to fish, hunt, and gather resources at both on- and off-reservation locations; and

WHEREAS, the DoD American Indian and Alaska Native Policy also requires DoD Agencies to enhance, to the extent permitted by law, tribal capabilities to effectively protect and manage natural and tribal trust cultural resources whenever DoD acts to carry out a program that may have the potential to significantly affect those tribal resources at both on- and off- reservation locations; and

WHEREAS, the Department of the Navy Policy for Consultation with Federally Recognized Indian Tribes, SECNAV Instruction 11010.14A, dated October 11, 2005, reiterates the Navy's obligation to consult openly and in good faith with federally recognized Indian Tribes on issues with the potential to significantly impact protected tribal resources, tribal rights, or Indian lands and provides a framework to provide meaningful consultation with tribes; and

WHEREAS, the Commander Navy Region Northwest Policy for government-to-government consultation, CNRNW Instruction 11010.14A, requires the Navy to offer government-to-government consultation at the earliest opportunity on projects that have the potential to significantly impact to tribal Treaty protected resources.

WHEREAS, the Navy and the Tribes have conducted government-to-government consultations to discuss the nature, scope, and schedule of the Navy's project and the Lower Elwha Klallam Tribe has taken the lead on behalf of the Tribes in consulting with the Navy regarding the Proposed Action and the potential effects on reserved tribal Treaty rights and resources; and

WHEREAS, the Navy in accordance with NEPA has published a Draft Environmental Assessment (EA) for the construction of the Pier and Support Facilities for Transit Protection System that describes the proposed action and analyzes the impacts on the quality of the human environment; and

WHEREAS, the Tribes have received a copy of the Draft EA for the Pier and Support Facilities for Transit Protection System project and were provided an opportunity to review and comment on the draft document; and

WHEREAS, construction and operation of the Proposed Action may have the potential to impact tribal Treaty rights and resources and the environment; and

WHEREAS, in conjunction with the project, the Navy requires Department of the Army (DA) permits issued by the U.S. Army Corps of Engineers and must comply with the Compensatory Mitigation for Losses of Aquatic Resources, Final Rule dated April 10, 2008, 33 CFR Parts 325 and 332; and

WHEREAS, as compensatory mitigation the Navy intends to propose the Inner Ediz Hook Jetty Restoration project which is described in the Draft EA. This restoration would involve the removal of 16,800 feet (0.39 acres) of fill located in aquatic tidelands off the south shoreline of inner Ediz Hook east of the USCG AIRSTA/SFO Port Angeles entrance gate. The fill extends approximately 215 feet south from the shoreline and is protected by a rock and timber bulkhead capped by a concrete slab. The timber piles comprising the bulkhead will be removed by vibratory extraction. The bulkhead and fill are located in aquatic tidelands owned by the US Coast Guard. The shoreline at the jetty site will be nourished with sand and gravel suitable for beach nourishment and contoured to be consistent with the surrounding low-slope shoreline. Large wood will be incorporated into the reconstructed beach. A new rock armored embankment section will be tied into the existing embankment armoring by reusing removed material to the maximum extent possible. Revegetation of upland sites will be accomplished using native dune grass species or other native vegetation.

WHEREAS, the Navy and Tribes desire to mutually resolve differences as to the potential effect of the Navy project on the Tribes' Treaty rights and resources and on the environment without resorting to litigation and have therefore agreed to enter into this agreement for the Pier and Support Facilities for Transit Protection System project;

NOW, THEREFORE, the Navy and the Tribes ("Parties" herein) hereby agree that when the Navy begins in-water construction for the Pier and Support Facilities for Transit Protection System project the following terms and conditions will apply:

TERMS AND CONDITIONS

1. Mitigation.

a. In General. In order to settle disagreements between the Parties over the potential impacts of the Navy projects as described in the draft EA to Treaty reserved rights or resources, and to the environment, the Parties agree to the measures (considered off-site mitigation under the Sikes Act) generally described and set forth in subparagraphs l.b and 1.c below. These agreed measures are referred to for the Navy's purposes as "the mitigation measures." The Parties agree that the mitigation measures are acceptable for any alleged impacts to Treaty reserved rights or resources, and to the environment, associated with the proposed project for the term of this Agreement, including associated facility maintenance activities.

b. TPS Project Site Eelgrass Salvage. Prior to the initiation of the TPS in water construction, the Lower Elwha Tribe and the Navy will examine the feasibility of salvaging eelgrass from the planned TPS pier footprint and transplanting on shallow subtidal restoration sites along Ediz Hook. If the parties agree that the project is feasible, the Navy will enter into a Cooperative Agreement under the Sikes Act with the Lower Elwha Klallam Tribe for the Tribe to perform the work and Navy will provide funding not to exceed $50,000.00 (or actual costs if less) to support this salvaging and transplanting activity. This work must be completed in a manner that does not delay the start of in-water construction.

c. Description of Treaty Mitigation Measures. Icicle Seafoods Laydown Area Restoration –This restoration will remove existing rock armoring, imported fill and debris, concrete/asphalt pads, and storage structures. The site will be graded to create a low-slope beach. Clean suitable-sized gravel/sand beach nourishment and large woody debris will be added and appropriate native vegetation planted in the back beach areas. A nearby derelict building (the former City of Port Angeles "Thunderbird" concession stand) will also be removed. The need for a wave attenuation structure (floating or fixed) to protect the western edge of the city's boat ramp from erosion will be evaluated in a technical review that includes Lower Elwha tribal representation and, if necessary, it will be included in the treaty mitigation. The proposed Treaty mitigation project also includes a small section of upland property west of the Icicle Seafoods laydown area. An approximately fifteen foot wide back beach area (15' from the Ordinary High Watermark) will be redeveloped with native vegetation. The intent is to connect the restored Icicle Seafoods laydown area with the existing beach area west of the Icicle Seafoods area as shown on the attached figure. The project will restore intertidal, beach, and nearshore habitat, and will be consistent with the Tribe's ongoing restoration efforts along the southern shoreline of Ediz Hook. Lower Elwha technical staff will participate in the

Treaty mitigation project design process to ensure that final designs are consistent with the goals memorialized in this MOA.

d. Navy Funding. Conditioned on the Tribes' compliance with subparagraph 1.e the Navy agrees to provide funding for the implementation of the Treaty mitigation measures and shall ensure that all funds required under this Agreement are available for obligation no later than 30 days after the start of the Pier and Support Facilities for Transit Protection System project's in-water construction. The Parties acknowledge that, if funded, the sole source of funding for the Pier and Support Facilities for Transit Protection System and Treaty mitigation projects (subparagraphs 1.b and 1.c) will be the military construction funding (MILCON) appropriated by Congress for the specific project. Navy mitigation funding for the Treaty mitigation project (subparagraph 1.b and 1.c) must be obligated no later than four (4) years after the start of in-water construction of the Pier and Support Facilities for Transit Protection System project.

e. NEPA Compliance and Permitting for the Navy Projects. The Tribes agree that neither they nor anyone acting on their behalf shall challenge the Navy's NEPA documentation for the Navy's project or will pose any objections to issuance of DA permits and state water quality certifications for the construction and mitigation projects (compensatory and treaty) provided that there are no significant changes from the descriptions provided in the final EA. In the event of a significant change in the project or the mitigation measures, the Tribes' commitments in this subparagraph 1.e shall apply to such changes to the project, mitigation measures, or NEPA documentation only by written amendment to this Agreement.

2. Significant Change(s) to the Proposed Action.

a. In the event of a significant change in the Pier and Support Facilities for Transit Protection System project, the Navy shall notify the Tribes prior to making such change. A change is considered significant if the change: 1) affects any aspect of in-water construction or operation that requires a supplemental or new EA, as appropriate, prepared for the project; or, 2) has a substantial potential to degrade tribal Treaty rights or resources. The Navy will also notify the Tribes if the project is cancelled.

b. In the event of a significant change to the Pier and Support Facilities for Transit Protection System project, the Navy agrees to consult with the Tribes regarding the significant change to determine if the change has resulted or will result in any adverse effects on reserved tribal Treaty rights or resources. If the Parties agree that such effects have occurred or will occur, they will seek to negotiate an amendment to this Agreement.

3. Significant Change(s) to the Treaty Mitigation Measures. In the event of a significant change to the Treaty Mitigation Measures described in subparagraphs 1.c, the Navy shall notify the Tribes and the Parties agree to consult to determine whether a

change to the mitigation measures is warranted. A significant change includes but is not limited to: the discovery of contamination at the project site; unforeseen site conditions; bulkheading, or additional shoreline hardening; an increase in overwater coverage between -30 and 0 MLLW; or a change in the scope or scale of the mitigation that exceeds 10% of the footprint of the project as shown on the attached figure (Attachment 1).

4. Consultation. The Navy and the Tribes shall each designate a single point of contact for coordinating all activities under this Agreement. Until otherwise changed by written notice to the other Parties, the following are designated as the initial points of contact:

For the Navy:

Installation Environmental Program Director
Naval Base Kitsap
7001 Finback Circle, Room E300
Silverdale, WA 98315-7001
(360) 315-5411 or (360) 649-1623

For the Lower Elwha Klallam Tribe:

Matt Beirne (or successor), Environmental Coordinator
Lower Elwha Klallam Tribe
2851 Lower Elwha Road
Port Angeles, WA 98363
360-457-4012, ext. 7480
Matt.beirne@elwha.org

For the Jamestown S'Klallam Tribe:

Scott Chitwood (or successor), Natural Resources Director
1033 Old Blyn Highway
Sequim, WA 98382
360-681-4616
schitwood@jamestowntribe.org

For the Port Gamble S'Klallam Tribe:

Roma Call (or successor)
Port Gamble S'Klallam Tribe
Environmental Program
31912 Little Boston Road
Kingston, WA 98346
360-297-6293
romac@pgst.nsn.us

5. Dispute Resolution.

a. If a dispute regarding the interpretation and implementation of obligations undertaken in this Agreement arises between the Parties, the Parties will strive to address the matter informally.

b. The points of contact set forth in Paragraph 4 shall coordinate all activities under this Agreement, including working together to resolve disputes. It is the intention of the Parties that all disputes shall be resolved at the lowest possible level of authority as expeditiously as possible. In the event the dispute is not resolved within fourteen (14) calendar days, the dispute shall be elevated for resolution as follows:

i. The disputing Party shall elevate the matter that is the subject of the dispute to the Chair of each of the Tribes and the Commanding Officer of Naval Base Kitsap in writing. The Parties shall meet and confer as many times as necessary for a period not to exceed thirty (30) calendar days thereafter in an attempt to resolve the dispute.

ii. If the Parties are unable to resolve the dispute, an alternative dispute resolution method(s) may be used by mutual agreement prior to initiating legal action. For each such dispute, the Parties shall agree on the type of alternative dispute resolution method, a schedule, payment of costs, whether the outcome of the dispute resolution process shall be binding, and the method for enforcing such outcome.

iii. Any Party may initiate legal action in a court of competent jurisdiction notwithstanding any limitations set forth in this Agreement.

6. Sovereignty and Disclaimer. The Parties recognize and respect the sovereignty and legal status of one another. The Parties further recognize that each has and reserves all rights, powers and remedies now or hereafter existing at law or in equity, or by statute, Treaty, or otherwise. Except as specifically stated herein, this Agreement does not modify, diminish, or alter the rights and entitlements of the Parties. The acceptance and execution of this Agreement shall not constitute a waiver of any Party's sovereign immunity. This Agreement is entered in compromise of disputed claims, and nothing in this Agreement shall be construed as an admission or adjudication of fact or law, except as specifically set forth in this Agreement.

7. Anti-Deficiency Act. Nothing in this Agreement shall be construed as obligating the Navy, its officers, employees, or agents to expend any funds in excess of appropriations authorized for such purposes in violation of the Anti-Deficiency Act (31 U.S.C Section 1341).

8. Force Majeure. A force majeure shall mean any event arising from causes beyond the control of a Party that causes delay in or prevents the performance of any obligation under this Agreement.

a. A force majeure includes but is not limited to, the following:

i. acts of God, fire, war, or explosion;

ii. restraint by court order or order of public authority;

iii. inability to obtain, after exercise of due diligence, any necessary authorizations, approvals, permits or licenses due to action or inaction of any governmental agency other than the Navy; and

iv. insufficient Congressional appropriation of funds.

b. Should force majeure occur, the Parties shall consult to determine whether an amendment to this Agreement is required. If the Parties do not agree on an amendment, the Tribes may invoke the dispute resolution provisions of this Agreement.

9. Integration and Severability. This Agreement constitutes the entire agreement of the Parties. Any prior representations or agreements, whether oral or written, in regard to this Agreement or its subject matter are hereby superseded in their entirety by this Agreement. If any provision in this Agreement is held invalid, it shall be considered severable from the remainder, and the remaining provisions shall be given full force and effect, provided that such remainder conforms to the intent of this Agreement.

10. Amendment. This Agreement may be modified or amended only in writing upon consent of the Parties.

11. Term of the Agreement. The Navy's obligations under Paragraph 1 herein shall be deemed satisfied when the mitigation measures set forth in that Paragraph have been completed or five (5) years after execution of this Agreement, whichever event occurs last.

12. Agreement Binding. The terms and conditions of this Agreement shall be binding on and shall inure to the benefit of the Parties and their respective successors and assigns.

13. Authority to Sign. The Parties acknowledge that the terms of the Agreement were reached after government-to-government consultations and have been received by and discussed with respective counsel for each Party. The Parties further agree that this Agreement shall not be construed in favor of or against any party. The under signed warrant and represent that they, and each of them, have complete and proper authority to execute this Agreement and understand its contents, and that any and all necessary minutes and resolutions authorizing the Parties to enter into this Agreement and to undertake the actions, terms, conditions, and covenants thereof have been duly made and approved.

14. Effective Date. This Agreement may be signed in counterparts; it shall take effect on the date of the signing of the Agreement by the last Party to sign.

IN WITNESS WHEREOF, the Parties hereto agree to the terms and conditions of this agreement as of the date last written below.

FOR THE U.S. NAVY:

Jeffrey S Ruth Date: 14 JUN 16

J. S. RUTH
Rear Admiral, U.S. Navy
Commander, Navy Region Northwest

REVIEW AND CONCUR:

Date: 14 JUN 16

THOMAS A. ZWOLLER
Captain, U.S. Navy
Commanding Officer, Naval Base Kitsap

Mark T Jeronime Date: 14 Jun 2016

MARK T. GERONIME
Captain, U.S. Navy
Director for Facilities and Environment
Navy Region Northwest

FOR THE LOWER ELWHA KLALLAM TRIBE:

Frances G. Charles Date: June 15, 2016

FRANCES G. CHARLES
Chairwoman
Lower Elwha Klallam Tribe

FOR THE JAMESTOWN S'KLALLAM TRIBE:

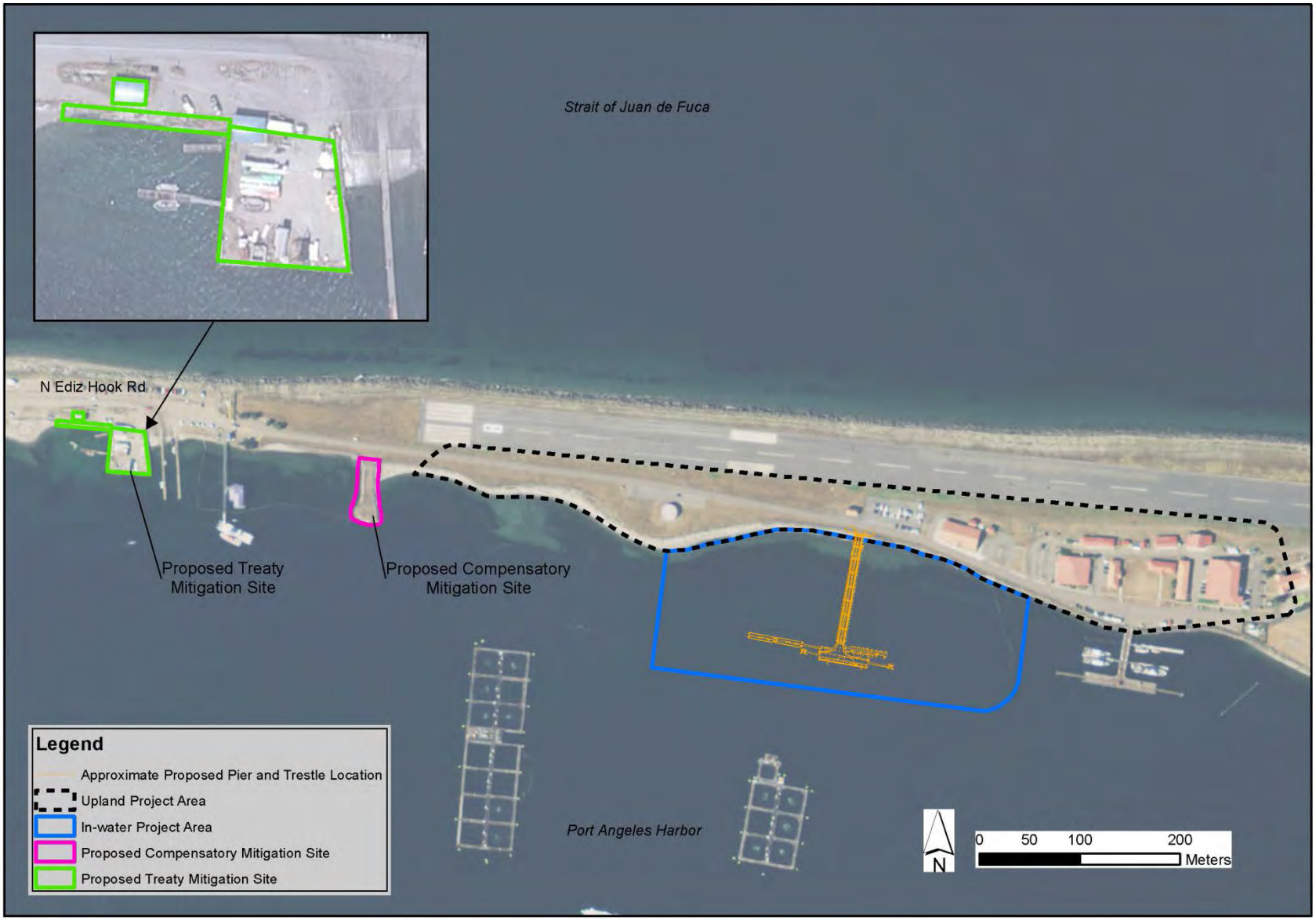
W. Ron Allen Date: 6/10/2016

W. RON ALLEN
Chairman
Jamestown S'Klallam Tribe

FOR THE PORT GAMBLE S'KLALLAM TRIBE:

_____ Date: 06-15-2016

JEROMY SULLIVAN
Chairman
Port Gamble S'Klallam Tribe



Attachment 1 to Memorandum of Agreement for Pier and Support Facilities for TPS at USCG AIRSTA/SFO Port Angeles

Marine Mammal Protection Act Documentation

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DEPARTMENT OF THE NAVY
NAVAL BASE KITSAP
120 SOUTH DEWEY ST
BREMERTON, WA 98314-5020

5000
Ser PRB4/ 01830
11 Sep 15

Ms. Helen M. Golde
Acting Director, Office of Protected Resources
National Marine Fisheries Service
National Oceanic and Atmospheric Administration
1315 East-West Highway
SSMC3, Room 13821
Silver Spring, MD 20910-3282

Dear Ms. Golde:

SUBJECT: INCIDENTAL HARASSMENT AUTHORIZATION REQUEST FOR PIER AND SUPPORT FACILITIES FOR TRANSIT PROTECTION SYSTEM AT U.S. COAST GUARD AIR STATION/SECTOR FIELD OFFICE PORT ANGELES, WASHINGTON

In accordance with the Marine Mammal Protection Act, as amended, and 50 Code of Federal Regulations Part 216.106, the United States Navy requests an Incidental Harassment Authorization for the take of marine mammals associated with the construction of a pier and support facilities for Transit Protection System at U.S. Coast Guard Air Station/Sector Field Office Port Angeles, WA from October 15, 2016 through October 14, 2017.

The proposed action would expose marine mammals in Port Angeles Harbor to sound from pile driving. Enclosures (1) through (3) contain information required by the National Marine Fisheries Service for consideration of an incidental take request.

We appreciate your continued support in helping the Navy to meet its environmental responsibilities. For additional comments or questions the Navy's point of contact is Ms. Tiffany Nabors, Naval Facilities Engineering Command Northwest Biologist. She can be reached by telephone at (360) 315-2531, or by email at tiffany.nabors@navy.mil.

Sincerely,

T. A. ZWOLFER
Captain, U.S. Navy
Commanding Officer

SUBJECT: INCIDENTAL HARASSMENT AUTHORIZATION REQUEST FOR PIER AND SUPPORT FACILITIES FOR TRANSIT PROTECTION SYSTEM AT U.S. COAST GUARD AIR STATION/SECTOR FIELD OFFICE PORT ANGELES, WASHINGTON

Enclosures:

1. Incidental Harassment Authorization (IHA) application, with Marine Mammal Monitoring and Mitigation Plan (2 copies)
2. Pier and Support Facilities for Transit Protection System at U.S. Coast Guard Air Station/Sector Field Office Port Angeles, Washington Draft Environmental Assessment (2 copies)
3. CD-ROM of IHA application, Draft Environmental Assessment and transmittal letter (2 copies)

Copy to:
Mr. Ben Laws (NMFS)
Chief of Naval Operations (N45)
Navy Region Northwest (N45)

Endangered Species Act

Magnuson-Stevens Fishery Conservation and Management Act

Documentation

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DEPARTMENT OF THE NAVY
NAVAL BASE KITSAP
120 SOUTH DEWEY ST
BREMERTON, WA 98314-5020

5090
Ser PRB4/ 01965
30 Sep 15

Mr. William Stelle, Jr., Regional Administrator
National Marine Fisheries Service, West Coast Region
7600 Sand Point Way N.E., Bldg. 1
Seattle, Washington 98115

Dear Mr. Stelle:

SUBJECT: BIOLOGICAL ASSESSMENT AND ESSENTIAL FISH HABITAT ASSESSMENT FOR PIER AND SUPPORT FACILITIES FOR TRANSIT PROTECTION SYSTEM AT U.S. COAST GUARD AIR STATION/SECTOR FIELD OFFICE PORT ANGELES, WASHINGTON

The United States Department of the Navy (Navy) proposes to construct a pier and support facilities for the Transit Protection System (TPS) at U.S. Coast Guard Air Station/Sector Field Office Port Angeles, WA. The purpose of the project is to provide a staging location for TPS vessels and crews that escort Navy submarines to and from their dive/surface points in the Strait of Juan de Fuca and Naval Base Kitsap Bangor.

The project will include construction of upland facilities and site improvements. In-water pile driving will involve installation of 144 permanent 18-inch diameter to 36-inch diameter steel pipe piles to accommodate a vehicle and approach trestle, fixed pier, and floats. The pier, trestle, and other in-water structures will result in 25,465 square feet (2,365 square meters) of overwater coverage.

The project is scheduled to begin October 2016 and conclude October 2017. To minimize impacts to juvenile salmonids and bull trout, in-water work will occur within the work window for Tidal Reference Area 10 (July 16 through February 15) (U.S. Army Corps of Engineers [USACE] 2012). A total of 75 impact pile driving days are anticipated to occur over 18-weeks and be conducted within two in-water work windows.

A review of federally listed species under the jurisdiction of the National Marine Fisheries Service (NMFS) indicates the following species potentially occur within each project's action area:

- Puget Sound Evolutionarily Significant Unit (ESU) Chinook salmon (*O. tshawytscha*)
- Hood Canal ESU summer-run chum salmon (*Oncorhynchus keta*)
- Puget Sound Distinct Population Segment(DPS)steelhead (*O. mykiss*)
- Pacific eulachon Southern DPS (*Thaleichthys pacificus*)
- North American green sturgeon Southern DPS (*Acipenser medirostris*)
- Southern Resident killer whale DPS (*Orcinus orca*)

SUBJECT: BIOLOGICAL ASSESSMENT AND ESSENTIAL FISH HABITAT ASSESSMENT FOR PIER AND SUPPORT FACILITIES FOR TRANSIT PROTECTION SYSTEM AT U.S. COAST GUARD AIR STATION/SECTOR FIELD OFFICE PORT ANGELES, WASHINGTON

- Humpback whale Western North Pacific DPS and Central America DPS (*Eschrichtius robustus*)

Critical habitat is designated in the project's action area for Puget Sound Chinook salmon, North American green sturgeon and Southern Resident killer whale.

The Navy analyzed potential impacts of the proposed project to federally listed species and designated critical habitats using the best scientific and commercial data available, as required under Section 7(c) of the Endangered Species Act. Based on the Navy's analyses, the Navy concluded that with implementation of proposed avoidance and minimization measures, the proposed project *may affect, is likely to adversely affect* Puget Sound Chinook salmon and critical habitat, Hood Canal summer-run chum salmon and Puget Sound steelhead and *may affect, is not likely to adversely affect* Pacific eulachon, North American green sturgeon and critical habitat, Southern Resident killer whale and critical habitat, and humpback whale.

Enclosed is a biological assessment and essential fish habitat assessment (Enclosure 1) that documents our analyses. The Navy understands that within 30 days of this request, you will notify us in writing if additional information is required to initiate formal consultation. Additionally, we understand that NMFS will complete consultation within 90 days and transmit a Biological Opinion (BO) within 45 days of completing the consultation period. Prior to NMFS finalizing and transmitting the BO, the Navy requests an opportunity to review the draft BO, incidental take statement, terms and conditions, and reasonable and prudent measures.

In compliance with the Magnuson-Stevens Fishery Conservation and Management Act, essential fish habitat (EFH) was assessed for each project. Based on the determinations of the EFH assessments (Enclosure 1), it is the Navy's conclusion that the proposed project *may adversely affect* Pacific salmon, coastal pelagic, and Pacific groundfish EFH.

If you have any questions about this project, or need additional clarification, please contact the Navy point-of-contact Ms. Tiffany Nabors. She can be reached at (360) 315-2531 or tiffany.nabors@navy.mil.

Sincerely,

T. A. ZWOLFER
Captain, U.S. Navy
Commanding Officer

Enclosure: 1. Biological Assessment and Essential Fish Habitat Assessment

DEPARTMENT OF THE NAVY
NAVAL BASE KITSAP
120 SOUTH DEWEY ST
BREMERTON, WA 98314-5020

5090
Ser PRB4/ 01966
30 Sep 15

Mr. Eric Rickerson
U.S. Fish and Wildlife Service
510 Desmond Dr. SE, Suite 102
Lacey, WA 98503

Dear Mr. Rickerson:

SUBJECT: BIOLOGICAL ASSESSMENT FOR PIER AND SUPPORT FACILITIES FOR TRANSIT PROTECTION SYSTEM AT U.S. COAST GUARD AIR STATION/SECTOR FIELD OFFICE PORT ANGELES, WASHINGTON

The United States Department of the Navy (Navy) proposes to construct a pier and support facilities for the Transit Protection System (TPS) at U.S. Coast Guard Air Station/Sector Field Office Port Angeles, WA. The purpose of the project is to provide a staging location for TPS vessels and crews that escort Navy submarines to and from their dive/surface points in the Strait of Juan de Fuca and Naval Base Kitsap Bangor.

The project will include construction of upland facilities and site improvements. In-water pile driving will involve installation of 144 permanent 18-inch diameter to 36-inch diameter steel pipe piles to accommodate a vehicle and approach trestle, fixed pier, and floats. The pier, trestle, and other in-water structures will result in 25,465 square feet (2,365 square meters) of overwater coverage.

The project is scheduled to begin October 2016 and conclude October 2017. To minimize impacts to juvenile salmonids and bull trout, in-water work will occur within the work window for Tidal Reference Area 10 (July 16 through February 15) (U.S. Army Corps of Engineers [USACE] 2012). A total of 75 impact pile driving days are anticipated to occur over 18-weeks and be conducted within two in-water work windows.

A review of federally listed species under the jurisdiction of the U.S. Fish and Wildlife Service (USFWS) indicates the following species potentially occur within the project's action area:

- Bull trout (*Salvelinus confluentus*)
- Marbled murrelet (*Brachyramphus marmoratus*)

Critical habitat is designated in the project's action area for bull trout.

The Navy analyzed potential impacts of the proposed project to federally listed species using the best scientific and commercial data available, as required under Section 7(c) of the

SUBJECT: BIOLOGICAL ASSESSMENT FOR PIER AND SUPPORT FACILITIES FOR TRANSIT PROTECTION SYSTEM AT U.S. COAST GUARD AIR STATION/SECTOR FIELD OFFICE PORT ANGELES, WASHINGTON

Endangered Species Act. Based on the Navy's analyses, the Navy concluded that with implementation of proposed avoidance and minimization measures, the proposed project *may affect, is likely to adversely affect* the above listed species. Critical habitat was also analyzed, and the Navy determined that the proposed project *may affect, is likely to adversely affect* critical habitat for bull trout.

Enclosed is a biological assessment and essential fish habitat assessment (Enclosure 1) that documents our analyses. The Navy understands that within 30 days of this request, you will notify us in writing if additional information is required to initiate formal consultation. Additionally, we understand that USFWS will complete consultation within 90 days and transmit a Biological Opinion (BO) within 45 days of completing the consultation period. Prior to USFWS finalizing and transmitting the BO, the Navy requests an opportunity to review the draft BO, incidental take statement, terms and conditions, and reasonable and prudent measures.

If you have any questions about this project, or need additional clarification, please contact the Navy point-of-contact Ms. Tiffany Nabors. She can be reached at (360) 315-2531 or tiffany.nabors@navy.mil.

Sincerely,

T. A. ZWOLFER
Captain, U.S. Navy
Commanding Officer

Enclosure: 1. Biological Assessment and Essential Fish Habitat Assessment

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

Refer to NMFS No.:
WCR-2015-3514

July 13, 2016

T.A ZWolfer
Captain, U.S. Navy
Commanding Officer
120 South Dewey St
Bremerton WA 98314

Re: Endangered Species Act Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Pier and Support Facilities at U.S. Coast Guard Air Station/Sector Field Office, Port Angeles, Washington, Sixth Field HUC 17110020

Dear Captain ZWolfer:

Thank you for your letter of September 30, 2015, requesting initiation of formal consultation with NOAA's National Marine Fisheries Service (NMFS) pursuant to section 7 of the Endangered Species Act of 1973 (ESA) (16 U.S.C. 1531 et seq.) for the proposed construction and operation of a pier and support facilities for the Transit Protection System (TPS) at U.S. Coast Guard Air Station/Sector Field Office Port Angeles, WA.

The enclosed biological opinion (opinion) analyzes the effects of your proposal. In this opinion, we conclude that the proposed action, is not likely to jeopardize the continued existence of Puget Sound (PS) Chinook salmon (*Oncorhynchus tshawytscha*), or PS steelhead (*O. mykiss*). Further, we conclude that the proposed action would not result in the destruction or adverse modification of their designated critical habitats.

You have determined that the: southern distinct population segment (DPS) of Pacific eulachon (*Thaleichthys pacificus*), southern DPS of North American green sturgeon (*Acipenser medirostris*), southern resident killer whale DPS, and humpback whale DPS may be affected by the project but would not likely be adversely affected. We concur.

As required by section 7 of the ESA, we are providing an incidental take statement with the opinion. The incidental take statement describes reasonable and prudent measures we consider necessary or appropriate to minimize incidental take associated with this action.
The take statement sets forth nondiscretionary terms and conditions, including reporting requirements that the Navy and any person who performs the action must comply with to carry out the reasonable and prudent measures. Incidental take from actions that meet these terms and conditions would be exempt from the ESA take prohibition.

This document also includes the results of our analysis of the action's likely effects on essential fish habitat (EFH) pursuant to section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA), and includes one conservation recommendations to avoid, minimize, or otherwise offset potential adverse effects on EFH. Section 305(b) (4) (B) of the MSA requires Federal agencies to provide a detailed written response to NMFS within 30 days after receiving these recommendations.

If the response is inconsistent with the essential fish habitat conservation recommendation, the Navy must explain why the recommendation would not be followed, including the scientific justification for any disagreements over the effects of the action and the recommendation. In response to increased oversight of overall essential fish habitat program effectiveness by the Office of Management and Budget, NMFS established a quarterly reporting requirement to determine how many conservation recommendations are provided as part of each essential fish habitat consultation and how many are adopted by the action agency. Therefore, we request that, in your statutory reply to the essential fish habitat portion of this consultation, you clearly identify the conservation recommendation accepted.

Please contact Matt Longenbaugh of my staff at the Oregon/Washington Area Office in Lacey, Washington at (360) 534-9341, by e-mail at Matthew.Longenbaugh@noaa.gov if you have questions regarding this section 7 consultation, or if you require additional information.

Sincerely,

William W. Stelle, Jr.
Regional Administrator

cc: Cindi Kunz, USN

Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation and Fish

Pier and Support Facilities for Transit Protection System
U.S. Coast Guard Air Station/Sector Field Office
Port Angeles, Washington

NMFS Consultation Number: WCR-2015-3514

Action Agency: U.S. Department of Navy

Affected Species and Determinations:

ESA-Listed Species	ESA Status	Is the action likely to adversely affect this species or its critical habitat?	Is the action likely to jeopardize this species?	Is the action likely to destroy or adversely modify critical habitat for this species?
Puget Sound Chinook salmon (*Oncorhynchus tshawytscha*)	T	Yes	No	No
Hood Canal summer-run chum salmon (*O. keta*)	T	Yes	No	No
Puget Sound steelhead (*O. mykiss*)	T	Yes	No	No
Pacific eulachon southern DPS (*Thaleichthys pacificus*)	T	No	No	No
North American green sturgeon southern DPS (*Acipenser medirostris*)	T	No	No	No
Southern resident killer whale (*Orcinus orca*)	E	No	No	No
Humpback whale (rangewide) Western north Pacific DPS Central America DPS (*Megaptera novaeangliae*)	T	No	No	No

*Please refer to Section 2.11 for the analysis of species or critical habitat that are not likely to be adversely affected.

Fishery Management Plan that Describes EFH in the Action Area	Would the action adversely affect EFH?	Are EFH conservation recommendations provided?
Pacific Coast groundfish	Yes	No
Pacific salmon	Yes	No
Coastal pelagics	Yes	No

Consultation Conducted By: National Marine Fisheries Service, West Coast Region

Issued By:

for William W. Stelle, Jr.
Regional Administrator

Date: July 13, 2016

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TABLE OF CONTENTS

1. INTRODUCTION 1
1.1 Background 1
1.2 Consultation History 1
1.3 Proposed Action 2
1.3.2 Construction Access and Staging 7
1.3.3 Project Sequencing and Timeline 7
1.3.4 Compensatory Mitigation 8
1.3.5 Operations and Maintenance 9
1.3.6 Impact Avoidance and Minimization Measures 9
1.4 Action Area 11
2. ENDANGERED SPECIES ACT: BIOLOGICAL OPINION AND INCIDENTAL TAKE STATEMENT 14
2.1 Analytical Approach 14
2.2 Rangewide Status of the Species and Critical Habitat 15
2.2.1 Status of the Species 16
2.2.2 Status of the Critical Habitats 26
2.3 Environmental Baseline 30
2.3.1 Ambient Sound 30
2.3.2 Physical Barriers and Overwater Shade 31
2.3.3 Marine Habitat Conditions 31
2.4 Effects of the Action 38
2.4.1 Construction Effects 38
2.4.2 Operations and Maintenance Effects 50
2.4.3 Effects of Proposed Mitigation Measures 52
2.4.4 Effects from Interrelated and Interdependent Activities 52
2.5 Cumulative Effects 53
2.5.1 Human Population Growth, Land Use, and Climate Change 53
2.5.2 Washington State 53
2.5.3 PS Chinook Recovery Plan and the Shared Strategy for Puget Sound 54
2.6 Integration and Synthesis 55
2.7 Conclusion 56
2.8 Incidental Take Statement 57
2.8.1 Amount or Extent of Take 57
2.8.2 Effect of the Take 57
2.8.3 Reasonable and Prudent Measures 57
2.8.4 Terms and Conditions 58
2.9 Conservation Recommendations 59
2.10 Reinitiation of Consultation 59
2.11 “Not Likely to Adversely Affect” Determinations 59
2.11.1 Green Sturgeon 59
2.11.2 Eulachon 60
2.11.3 Southern Resident Killer Whales 61
2.11.4 Humpback Whales 62

3. MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT ESSENTIAL FISH HABITAT CONSULTATION 64
3.1 Essential Fish Habitat in the Action Area 65
3.1.1 Pacific Coast Groundfish 65
3.1.2 Coastal Pelagic Species 65
3.1.3 Pacific Coast Salmon 66
3.2 Habitat Areas of Particular Concern 67
3.2.1 Pacific Coast Groundfish 67
3.2.2 Coastal Pelagic Species 67
3.2.3 Pacific Coast Salmon 67
3.3 Description of Habitats 68
3.4 Assessment of Impacts 68
3.4.1 Construction Impacts 68
3.4.2 Potential Adverse Effects on Pacific Coast Groundfish EFH 70
3.4.3 Potential Adverse Effects on Coastal Pelagic EFH 71
3.4.4 Potential Adverse Effects on Pacific Coast Salmonid EFH 71
3.5 EFH Conservation Recommendations 72
3.6 Conclusions 73
3.7 Statutory Response Requirement 73
3.8 Supplemental Consultation 73
4. DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW 73
5. REFERENCES 75

LIST OF ABBREVIATIONS AND ACRONYMS

AFF	Alert Force Facility
AIRSTA/SFO	Air Station / Sector Field Office
BA	Biological Assessment
BMP	best management practice
BV	Blocking Vessel
°C	degrees Celsius
CFR	Code of Federal Regulations
CNRNW	Commander Navy Region Northwest
COC	contaminant of concern
CPO	Chief Petty Officer
CSL	Cleanup Screening Levels
dB	decibel(s)
dBA	A-weighted decibel(s)
dB RMS	decibel root-mean-square
DFM	diesel fuel, marine
DPS	Distinct Population Segment
Ecology	Washington Department of Ecology
EFH	Essential Fish Habitat
ESA	Endangered Species Act
ESU	Evolutionarily Significant Unit
°F	degrees Fahrenheit
FHWG	Fisheries Hydroacoustic Working Group
FMP	Fishery Management Plan
ft	foot/feet
ft^2	square foot/feet
HAPC	Habitat Areas of Particular Concern
HC	Hood Canal
Hz	hertz (cycles per second)
IHA	Incidental Harassment Authorization
km	kilometer(s)
LEED	Leadership in Energy and Environmental Design
m	meter(s)
m^2	square meter(s)
MFPU	Marine Force Protection Unit
MHHW	mean higher high water
MLLW	mean lower low water
MMPA	Marine Mammal Protection Act
MSA	Magnuson-Stevens Fishery Conservation and Management
Navy	U.S. Department of the Navy
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
PCB	polychlorinated biphenyls
PCE	Primary Constituent Element
PFMC	Pacific Fisheries Management Council

PS	Puget Sound
psf	pounds per square foot
PSTRT	Puget Sound Technical Recovery Team
RMS	Root-mean-square
RSA	Ready Service Armory
RV	Reaction Vessel
SEL	sound exposure level
SMS	Sediment Management Standards
SPCC	Spill Prevention, Control, and Countermeasure
SPL	sound pressure level
SPL	Peak sound pressure level
SQS	Sediment Quality Standards
SRKW	Southern resident killer whale
SV	Screening Vessel
SWPPP	Stormwater Pollution Prevention Plan
TMDL	total maximum daily load
TPS	Transit Protection System
µPa	microPascal
U.S.	United States
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USC	U.S. Code
USCG	U.S. Coast Guard
USFWS	U.S. Fish and Wildlife Service
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WSDOT	Washington State Department of Transportation

1. INTRODUCTION

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

1.1 Background

The National Marine Fisheries Service (NMFS) prepared the biological opinion (opinion) and incidental take statement portions of this document in accordance with section 7(b) of the Endangered Species Act (ESA) of 1973 (16 USC 1531 et seq.), and implementing regulations at 50 CFR 402.

We also completed an essential fish habitat (EFH) consultation on the proposed action, in accordance with section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. 1801 et seq.) and implementing regulations at 50 CFR 600.

We completed pre-dissemination review of this document using standards for utility, integrity, and objectivity in compliance with applicable guidelines issued under the Data Quality Act (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001, Public Law 106-554). A complete record of this consultation is on file at NMFS' Portland, Oregon office.

This Opinion analyzes the U.S. Navy Naval Facilities Engineering Command's (Navy's) proposed action to construct and operate a new pier and associated support facilities at the U.S. Coast Guard (USCG) Air Station/Sector Field Office (AIRSTA/SFO), Port Angeles located in Clallam County, Washington. The proposed pier and facilities would support USCG Transit Protection System (TPS) operations by providing a pier for berthing of up to seven TPS vessels and support facilities for the Marine Force Protection Unit (MFPU).

1.2 Consultation History

On September 30, 2015 NMFS received a request from the U.S. Navy's Naval Facilities Engineering Command (Navy) to enter into consultation under Section 7 of the Endangered Species Act of 1974, as amended, on its proposal to construct a new pier at the U.S. Coast Guard Air Station at Ediz Hook, near Port Angeles, WA. The Navy provided a complete biological assessment (BA) with its request. Also enclosed was an essential fish habitat (EFH) assessment for our use in determining the projects effects on EFH. Our EFH determination follows the biological opinion under the same cover.

The Navy queried NMFS regarding whether consultation would be needed to address ESA-listed bocaccio, canary, and yelloweye rockfish distinct population segments (DPS) since the action area is not within the boundaries of these DPSs. NMFS concurred that any yelloweye rockfish, canary rockfish, and bocaccio rockfish occurring within the project area would not be considered listed under the ESA.

The Navy identified several ESA-listed species that may occur or have designated critical habitat within the action area and may be affected by the action, but would not be likely to be adversely affected: Pacific eulachon southern DPS, North American green sturgeon southern DPS, southern resident killer whale (SRJW) DPS, and humpback whale – both rangewide (current listing), and western North Pacific and Central America DPSs (proposed listing); and is seeking our concurrence. We present our determinations and concurrences for these species in Section 2.11.

1.3 Proposed Action

"Action" means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies (50 CFR 402.02).

This description of the proposed action was excerpted from the biological assessment produced for this project (Navy 2015).

The Navy proposes to construct a pier and support facilities at U.S. Coast Guard (USCG) Air Station/Sector Field Office (AIRSTA/SFO) Port Angeles located in Clallam County, Washington. The proposed pier and facilities would support USCG Transit Protection System (TPS) operations by providing a pier for berthing of up to seven TPS vessels and support facilities for the Marine Force Protection Unit (MFPU). The MFPU's mission is to provide security escort to the Navy's Fleet Ballistic Missile Submarines along their transit route from the homeport at Naval Base Kitsap, Bangor to the dive/surface sites in the Strait of Juan de Fuca. The proposed pier and support facilities would ensure that MFPU personnel can consistently comply with the established policy and safety requirements for underway hours limitations and rest between missions.

The U.S. Coast Guard facility AIRSTA/SFO Port Angeles is located at the eastern end of Ediz Hook peninsula in Port Angeles, Washington about 60 miles northwest of downtown Seattle (Figure 1). The project area includes the terrestrial/upland portion of Ediz Hook from near the western end of the runway to the existing USCG T-Pier and nearshore marine areas extending south into the Port Angeles Harbor to a depth of -65 feet (ft) mean lower low water (MLLW). The upland area of the USCG AIRSTA/SFO Port Angeles consists of a complex of support buildings including a two-story group support building, warehouse, station maintenance building, base exchange, medical/dental clinic, and officer's mess. There is also a 4,500 x 150-foot (ft) asphalt runway and 100 x 100 ft asphalt helipad with hangar and aircraft support facilities to support three full-time MH-65C dolphin helicopters. The marine neashore operational areas contain an existing T-Pier that is used for berthing USCG vessels.

Figure 1. Project location, showing Ediz Hook, the U.S. Coast Guard Air Station and Port Angeles, Washington. Source: Navy 2015

Figure 2. Project area and existing facilities. Source: Navy 2015*1.3.1 In-water WorkThe proposed pier would be located about 950 ft (290 m) west of the existing USCG T-Pier. It would consist of a pile-supported trestle that extends offshore to a pile-supported fixed pier (Figure 2).*

The trestle would be about 355 ft (108 m) long by 24 ft (7 m) wide and constructed of precast concrete. The trestle would be supported by thirty-six size 18-inch to 36-inch diameter steel piles between 7 ft and -45 ft (2.1 m and -13.7 m) MLLW. The trestle would connect to three upland piles and about 60 upland sheet piles.

The fixed pier would be installed at the end of the trestle and would be constructed of precast concrete measuring about 160 ft (48 m) long by 42 ft (12 m) wide. The fixed pier would have two mooring dolphins that connect to the pier via a catwalk. The fixed pier would be supported by eighty-seven 24-inch to 36-inch diameter piles and would be constructed between -45 ft and -63 ft MLLW. Attached to the fixed pier would be several floats for the smaller TPS vessels that would be supported by twenty-one 24-inch to 36-inch diameter piles. There would be two floats on the west side of the pier that would each be about 80 ft (24 m) long and 17 ft (5 m) wide. The floats would be connected to each other and the fixed pier by a walkway and transfer span. On the east side of the fixed pier would be a 120 ft (37 m) long by 12 ft (4 m) wide floating dock.

The pier would have full hotel services at each of the six berths including power, potable water, fire protection, sewage connections, ship overboard drainage collection, fueling connections, and telephone and Local Area Network (LAN) service. The pier would also be equipped with lighting, mooring, fendering, brows (gangways), corrosion protection systems, access control, and stormwater protection systems. Anticipated vessel mooring would accommodate up to seven TPS vessels: two Blocking Vessels (BVs), one Reaction Vessel (RV), and up to four Screening Vessels (SV-64s).

Due to the size of the impervious area of the trestle and pier, all stormwater from these structures would be captured and treated prior to being released into the harbor. For this reason, grating is not proposed for the fixed trestle and pier. Water quality basin would be located on the pier and trestle. Stormwater would be collected through an oil/water separator device and then passed through a filter cartridge. Following treatment, stormwater would be discharged directly to the surface water below each water quality basin.

1.3.1.1 Pile Installation

Pile driving would be necessary for installation of the trestle, fixed pier, and floats. All of the piles would be installed using vibratory and impact pile driving methods. Vibratory pile driving involves hydraulic-powered weights to vibrate a pile until the surrounding sediment liquefies, enabling the weight of the pile plus the pile driver to push the pile into the ground. Once a pile hits “refusal,” which is where hard dense substrate (i.e., gravel, boulders) prevents further pile movement by vibratory methods, impact pile driving is used to drive the pile to depth. Impact hammer pile driving uses a rising and falling piston to repeatedly strike a pile and drive it into the substrate. The number of strikes would vary, depending on the substrate at each pile location and the pile size. A maximum number of pile strikes are considered for each pile size to be installed. The following bullets and Table 1 below provides further details on pile installation for each structure associated with the pier structure.

- Trestle – permanent installation of 16, 18-inch diameter; 12, 24-inch diameter; and 8, 36-inch diameter steel pipe piles about 100 ft (30.5 m) long would be driven to a depth of 75-80 ft.
- Fixed Pier – permanent installation of 28, 24-inch diameter; 49, 30-inch diameter; and 10, 36-inch diameter steel pipe piles about 100 ft long would be driven to a depth of 100 ft.
- Floats – permanent installation of 3, 24-inch diameter; 6, 30-inch diameter; and 12, 36-inch diameter steel pipe piles about 100 ft long would be driven to a depth of 100 ft.
- Falsework/Indicator Piles – temporary installation of 80, 24-inch diameter steel pipe piles about 100 ft long driven to a depth of 50 ft.

Table 1. Summary of the Number of Permanent Steel Piles for Proposed TPS Pier, Trestle, and Floats. Source: Navy 2015.

	Structure			
Pile Size	**Trestle**	**Fixed Pier**	**Floats**	**Total**
18 inches	16	0	0	**16**
24 inches	12	28	3	**43**
30 inches	0	49	6	**55**
36 inches	8	10	12	**30**
Total	**36**	**87**	**21**	**144**

Permanent Piles

It is anticipated that eight piles could be installed per day with only one pile driver operating at one time. Each pile size is anticipated to take 60-90 minutes to vibrate into place. Following vibratory pile driving, a single impact hammer would then be used to proof [1] all eight piles. Proofing is anticipated to occur at a rate of eight piles per day for a total of 75 days. Proofing would take a maximum of 200 strikes per pile or a total of 1,600 pile strikes per day. Each pile is expected to take up to 10 minutes to proof.

In the event that hard subsurface conditions (i.e., cobble/boulder zones) are encountered during the early vibratory pile driving phase, it may be necessary to drive a pile or piles to required depth with an impact hammer pile driver. Under these circumstances, it is expected that a maximum of 875 pile strikes per pile (7,000 pile strikes per day, inclusive of proofing) would occur over 75 days.

Temporary Piles

It is anticipated that 80, 24-inch diameter indicator (temporary) piles would be driven. The indicator piles are required to assess whether required bearing capacities would be achieved with the permanent piles and to assess whether the correct vibratory and impact hammers are being used. The indicator piles would be installed using a vibratory pile driver to within 5 ft (1.5 m) of the embedment depth (installed to a depth of 50 ft [15 m]) required for the trestle and fixed pier

[1] "Proofing" is driving the pile the last few feet into the substrate to determine the capacity of the pile. The capacity during proofing is established by measuring the resistance of the pile to a hammer that has a piston with a known weight and stroke (distance the hammer rises and falls) so that the energy on top of the pile can be calculated. The blow count in "blows per inch" is measured to verify resistance, and pile compression capacities are calculated using a known formula.

piles. The piles would then rest for 1 day and would then be impact driven the final 5 ft (1.5 m). If the indicator piles cannot be successfully vibrated in, then a larger impact hammer would be used for the production piles. The impact driving would also provide an indication of bearing capacity via proofing.

Each pile is anticipated to take up to 30 minutes to vibrate in place with eight piles installed per day. Proofing would take up to a maximum of 200 strikes per day and would occur on successive days (total of 5 days). Each temporary pile would then be vibratorily extracted, 40 minutes per pile, in 10 days. A total of 25 days for pile driving/vibratory extraction would be required for the indicator piles.

A total of 75 days of pile driving would be required, as described above, and would occur within the in-water work window for this Tidal Reference Area 10 [2] (July 16 through February 15).

1.3.1.2 Resulting Overwater Coverage and Seafloor Displacement at Project Completion

Upon completion, the trestle, fixed pier, and associated floats would result in a permanent increase in overwater coverage of about 25,465 ft^2 (2,365 m^2). Of this area, about 8,650 ft^2 (804 m^2) would be over water depths shallower than -30 ft. [3] In addition, about 745 ft^2 of benthic seafloor would be displaced from the installation of permanent piles. About 76 ft^2 would be within depths shallower than -30 ft.

1.3.2 Construction Access and Staging

In-water pile driving would be conducted from a barge. The barge would be anchored to avoid impacting existing aquatic vegetation as much as practical. All upland construction activities would use previously developed areas for equipment and materials staging. The upland site has very little undeveloped areas aside from grass and minimal pre-existing landscaped areas. Construction vehicles would use existing roads and parking areas only.

All appropriate best management practices (BMPs) and minimization measures would be implemented during in-water pile driving and upland construction activities.

1.3.3 Project Sequencing and Timeline

To minimize impacts to salmon, in-water work would occur within the work window for Tidal Reference Area 10 (July 16 through February 15). The in-water work is scheduled to begin October 2016 and conclude October 2017. A total of 75 impact pile driving days are anticipated to occur over 18-weeks and be conducted within two in-water work windows.

Although all in-water construction would occur during daylight hours, the construction equipment barge would likely be lit with industrial lighting during non-daylight hours for safety.

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[2] Tidal reference areas are delineated segments of the state's marine shorelines that are used to identify authorized in-water work times.

[3] All depths are from mean lower low water (MLLW) elevation, unless otherwise noted.

1.3.4 Compensatory Mitigation

The objective of compensatory mitigation is to restore, establish, enhance, or preserve aquatic resources for the purpose of offsetting unavoidable losses to aquatic resources resulting from activities authorized by USACE permits. The USEPA and USACE issued a final rule under 33 CFR Parts 325 and 332 governing compensatory mitigation for authorized impacts to wetlands, streams, and other waters of the U.S. under section 404 of the CWA and other USACE permits. The amount of compensatory mitigation required for a proposed project depends on the size of the project footprint, the quality of habitat at the project site, and the type of compensatory mitigation proposed.

The proposed project would result in a permanent increase in overwater coverage of about 25,465 ft^2. Of this area, about 8,650 ft^2 would occur in water depths shallower than -30 ft and could impact about 4,595 ft^2 of eelgrass growing in this area. Existing eelgrass beds and turions could be disturbed during construction and shaded by the completed facility. About 745 ft^2 (69 m^2) of eelgrass could be impacted due to placement of piles within the beds.

The Navy is currently working with the USACE to identify and develop compensatory mitigation for the loss of aquatic resource, as required by USACE/U.S. EPA Rule on Loss of Aquatic Resources. The Navy is also working with the Lower Elwha Klallam Tribe to identify and develop mitigation for impacts to treaty reserved rights and resources. The anticipated mitigation projects include the following:

(1) Inner Ediz Hook Jetty Restoration (Compensatory Mitigation) – This restoration would involve the removal of 16,800 ft^2 (1,561 m^2) of fill located in aquatic tidelands off the south shoreline of inner Ediz Hook east of the USCG AIRSTA/SFO Port Angeles entrance gate and Puget Sound Pilots Station pier. The fill extends about 215 feet (65 m) south from the shoreline and is protected by a timber bulkhead capped by a concrete slab. The timber piles comprising the bulkhead would be cut off and capped below the mudline.
(2) Icicle Seafoods Laydown Area Restoration (Mitigation for Impacts to Treaty Reserved Rights and Resources) – This restoration would involve the removal of 18,980 ft^2 (1,764 m^2; 0.44 acre) of fill in aquatic tidelands off the south shoreline of inner Ediz Hook adjacent to and west of the Ediz Hook Boat Launch.

The proposed mitigation projects would provide a combined total of about 35,780 ft^2 (0.83 acres) of new nearshore habitat. Removal of the structures and fill would create unshaded, shallow, nearshore habitats suitable for eelgrass and other marine vegetation. It is anticipated that eelgrass beds adjacent to the mitigation sites would increase and occupy the new habitat over time. The locations of over/in-water structures proposed for removal are shown in Figure 2.

1.3.5 Operations and Maintenance

Post-construction operations associated with the proposed pier would be similar to the activities at the USCG AIRSTA/SFO Port Angeles and other marine facilities within Port Angeles Harbor. The facility would have an operational Spill Prevention, Control, and Countermeasure (SPCC) Plan and spill response equipment to minimize the impact from potential fuel releases or spills.

Vessel operations at the new pier would replace existing operations elsewhere in Port Angeles harbor. No additional vessel trips would be produced by the new pier.

1.3.6 Impact Avoidance and Minimization Measures

Integrated into the project are design features and measures to avoid environmental impacts. Where avoidance is not possible, the design has been modified to minimize those impacts. Implementing the proposed project would incorporate the following design measures, current practices, and construction BMPs to avoid or minimize potential environmental impacts.

Design Measures

- The trestle and fixed pier have been designed to minimize the amount of disturbance to the seabed and amount of overwater shading as much as practical.
- In the upland, pervious pavement over crushed stone infiltration beds would be implemented as much as possible to reduce stormwater runoff and allow natural infiltration. This includes new parking areas and pedestrian walkways.
- Runoff from the roof of the AFF would be infiltrated.
- The AFF is being designed to LEED Silver standards, which require that the building be constructed in an environmentally responsible way for sustainability. This includes the use of recycled material and facilities that save water and energy, quality control of stormwater runoff, and measures to manage waste.

Current Practices, Operations, and Maintenance

- Spills would be handled according to applicable laws and regulations.
- To reduce the likelihood of any petroleum products, chemicals, or other toxic or deleterious materials from entering the water, fuel hoses, oil or fuel transfer valves, and fittings would be checked regularly for drips or leaks, and be maintained and stored properly to prevent spills.
- A Hazardous Materials Management Plan would be developed and implemented to ensure proper handling, storage, and disposal of hazardous materials.
- Maintenance of the trestle and fixed pier infrastructure would include routine inspections, repair, and replacement of facility components. Any extensive maintenance would incorporate the measures listed below under Construction BMPs and would be evaluated to determine if re-initiation under ESA is required.
- The installed piles would be designed to not require replacement during the design life of the structure. A protective coating and additional steel thickness would be installed on all piles to ensure that they would not need replacement. Piles would be inspected annually to verify the integrity of the structure. Maintenance would be performed on the pile-protection system to ensure it continues to operate as designed. Maintenance would include repairing any damage to the coatings. Other actions would involve repairing the

pile coating as it becomes worn. Fouling organisms would be routinely removed from the piles.

Construction BMPs

- In-water construction would observe the in-water work window (July 16 through February 15).
- Measures would be implemented to avoid anchor dragging and line dragging during construction.
- Construction vessels would be excluded from shallow areas (less than 30 ft in depth) outside the immediate construction site (within 150 ft of the trestle or pier).
- Within the immediate construction site:
    - Vessel operators would be instructed to avoid using excess engine thrust in waters less than 30 ft.
    - Vessel operators would be instructed to avoid bottoming out (running aground) in shallow areas.
    - Work barges would not be allowed to ground out or rest on the substrate, or be over or within 25 ft of vegetated shallows (except where such vegetation is limited to state-designated noxious weeds).
    - Barges would not be anchored over vegetated shallows for more than 96 hours (4 days).
- All equipment (except for clamshell buckets, spuds, etc. required to remove piles) would be kept out of the water, above the waterline, to minimize and prevent contaminant releases.
- To the maximum extent practicable, a vibratory hammer would be used for the pile driving actions; however, it may be necessary to use an impact hammer complete pile driving if refusal is met where the pile cannot reach the required depth. An impact pile driver would also be used to proof piles.
- Temporary barriers, such as silt curtains, may be installed to control the spread of silt from pile driving, although their efficacy would be strongly influenced by wind, current, and wave conditions at the site.
- The use of bubble curtains or other attenuation device to minimize the noise from pile driving would be implemented.
- A Debris Management Plan and Spill Response Plan to retrieve and clean up any accidental spill and construction debris would be developed and implemented. Personnel would be trained in hazardous materials handling and spill response, and be equipped with all necessary response tools, including absorbent oil booms. In the event of a spill, spill cleanup and containment efforts would begin immediately and take precedence over normal work.
- During in-water and overwater work, containment booms and absorbent booms (or other oil-absorbent fabric) would be placed around the perimeter of the work area to capture wood debris, oil, and other materials if released into marine waters. All accumulated debris would be collected and disposed of at an approved upland site. Following completion of in-water construction activities, an underwater survey would be conducted to remove any lost construction materials.
- Fuel hoses and oil or fuel transfer valves and fittings on equipment would be inspected regularly for drips or leaks to prevent spills into the surface water. Spill containment

booms and absorbent materials would be kept readily available at all times during in-water and over-water work.

- Water quality monitoring for turbidity and other water quality parameters would be completed to ensure that construction activities comply with Washington State Surface Water Quality Standards, or other conditions as specified in the standards and project permits.
- A Stormwater Pollution Prevention Plan (SWPPP) would be implemented for construction and operation and include measures for avoiding or minimizing erosion and sedimentation.
- All chemicals, liquid products, petroleum products, and other wastes at the construction site would be covered, contained, and protected.
- Soil areas disturbed by upland grading would be re-vegetated by hydroseeding.
- All construction activities would occur during daylight hours.

Minimization Measures

- To reduce impacts to juvenile salmonids, pile driving activities would occur up to 5 days per week within the in-water work window (July 16 through February 15).
- Prior to construction, the contractor shall conduct an advanced eelgrass survey per the Washington Department of Fish and Wildlife (WDFW) Eelgrass/Macroalgae Habitat Interim Survey Guidelines (WDFW 2008). The following restrictions would be enforced within the project area to avoid impacts to eelgrass:
    - No derrick spudding or anchoring would occur.
    - No scouring of sediments or significant sediment contamination would occur within eelgrass beds.
- In order to comply with the ESA and MMPA, monitoring for marine mammals would occur within pre-determined shutdown zones for purposes of avoiding injurious effects. The duration of monitoring would take place from 15 minutes prior to initiation through 15 minutes after completion of pile driving activities to ensure marine mammals are absent from the area. Should a marine mammal enter the shutdown zone, pile driving would be immediately halted until the marine mammal has left the area.
  The monitoring zones would be as follows:
    - During impact pile driving, visual monitoring of SRKW and humpback whales would be conducted for the 180 decibels root mean square (dB RMS) shutdown radius zone of 95 ft (29 m) and 160 dB RMS behavioral disturbance zone of 2,070 ft (631 m).
    - During vibratory pile driving, visual monitoring of SRKW and humpback whales would be conducted of the 120 dB RMS behavioral disturbance zone of 8.5 miles (13.6 km). Pile driving would cease should a SRKW or humpback whale approach the behavioral disturbance zone.
    - A bubble curtain would be used during impact pile driving and pile driving would not exceed 75 days.

1.4 Action Area

"Action area" means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02).

The action area includes the about 10-foot wide concrete ramp, the 6-foot by 120-foot float, the riparian area from which work with heavy equipment would be conducted, and a 20-foot wide work corridor around these structures. As sound created by project construction activities, particularly pile driving, is an effect of the action, the action area extends to the point where construction sound is unlikely to affect any ESA-listed fish or cetaceans. This extent is discussed in Section 2.3, Effects of the Action.

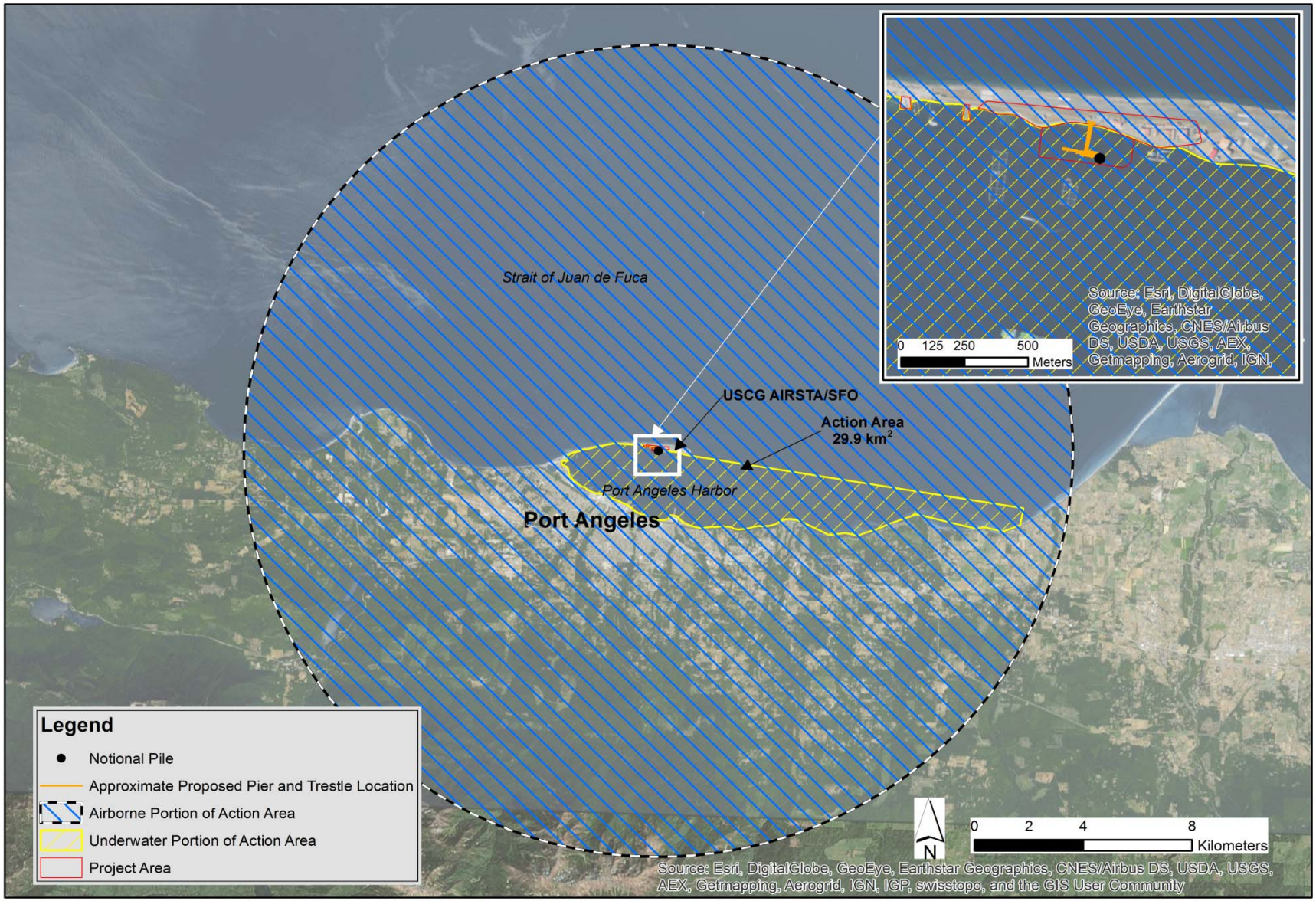

Figure 3. Action Area

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

The ESA establishes a national program for conserving threatened and endangered species of fish, wildlife, plants, and the habitat upon which they depend. As required by section 7(a)(2) of the ESA, Federal agencies must ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species, or adversely modify or destroy their designated critical habitat. Per the requirements of the ESA, Federal action agencies consult with NMFS and section 7(b)(3) requires that, at the conclusion of consultation, NMFS provides an opinion stating how the agency's actions would affect listed species and their critical habitat. If incidental take is expected, section 7(b)(4) requires NMFS to provide an incidental take statement (ITS) that specifies the impact of any incidental taking and includes non-discretionary reasonable and prudent measures and terms and conditions to minimize such impacts.

2.1 Analytical Approach

This biological opinion includes both a jeopardy analysis and an adverse modification analysis.

The jeopardy analysis relies upon the regulatory definition of "to jeopardize the continued existence of a listed species," which is "to engage in an action that would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species" (50 CFR 402.02). Therefore, the jeopardy analysis considers both survival and recovery of the species.

This biological opinion relies on the definition of "destruction or adverse modification", which "means a direct or indirect alteration that appreciably diminishes the value of critical habitat for the conservation of a listed species. Such alterations may include, but are not limited to, those that alter the physical or biological features essential to the conservation of a species or that preclude or significantly delay development of such features" (81 FR 7414).

We use the following approach to determine whether a proposed action is likely to jeopardize listed species or destroy or adversely modify critical habitat:

- Identify the rangewide status of the species and critical habitat likely to be adversely affected by the proposed action.
- Describe the environmental baseline in the action area.
- Analyze the effects of the proposed action on both species and their habitat using an "exposure-response-risk" approach.
- Describe any cumulative effects in the action area.
- Integrate and synthesize the above factors to assess the risk that the proposed action poses to species and critical habitat.
- Reach jeopardy and adverse modification conclusions.
- If necessary, define a reasonable and prudent alternative to the proposed action.

2.2 Rangewide Status of the Species and Critical Habitat

This opinion examines the status of each species that would be affected by the proposed action. The status is the risk of extinction that the listed species face, based on parameters considered in documents such as recovery plans, status reviews, and listing decisions. The species status section helps to inform the description of the species' current reproduction, numbers, or distribution as described in 50 CFR 402.02. The opinion also examines the condition of critical habitats throughout the designated area, evaluates the conservation value of the various watersheds and coastal and marine environments that make up the designated areas, and discusses the current function of the essential physical and biological features that help to form that conservation value.

One factor affecting the status of ESA-listed salmon and steelhead considered in this opinion, and aquatic habitat at large, is climate change. Climate change is likely to play an increasingly important role in determining the abundance of ESA-listed species, and the conservation value of designated critical habitats, in the Pacific Northwest. These changes would not be spatially homogeneous across the Pacific Northwest and depend on elevation, vegetation, geology, source of hydrology in the watershed (groundwater, rain, and snowmelt), and other local factors (Melillo et al., 2014).

During the last century, average regional air temperatures increased by an average of 1.3°F. Warming is likely to continue and annual average air temperatures are predicted to increase 3°F to 10°F by 2070 to 2099 compared to 1970 to 1999. Temperature increases are expected to be largest in the summer (Melillo et al., 2014). Overall, about one-third of the current cold-water fish habitat in the Pacific Northwest is likely to exceed key water temperature thresholds by the end of this century (Karl et al., 2009). And in the interior western U.S. suitable habitat for salmon and steelhead is projected to decline an average of 47 percent by 2080 compared to 1978-1997 (Melillo et al., 2014).

Forecasts for precipitation trends during the next century are less certain than for air temperature and vary depending on model assumptions and season. However, assuming continued growth in global heat-trapping gas emissions, summer precipitation in the Pacific Northwest is projected to decrease by an average of 10 percent during the remainder of this century (Melillo et al., 2014). Where snow occurs, a warmer climate would cause earlier snowmelt, resulting in increased late winter/early spring stream flows and reduced summer/fall flows (ISAB, 2007; Karl et al., 2009; Melillo et al., 2014).

Global warming projections show the highest risk for flooding in basins where rivers derive their water from both, winter rainfall and spring snowmelt runoff (Melillo et al., 2014). Higher winter stream flows increase the risk that winter floods would damage spawning redds and wash away incubating eggs. Earlier peak stream flows would also flush some young salmon and steelhead from rivers to estuaries before they are physically mature, increasing stress and the risk of predation. Lower stream flows and warmer water temperatures during summer would degrade summer rearing conditions, in part by increasing the prevalence and virulence of fish diseases and parasites (Karl et al., 2009). Other adverse effects are likely to include altered migration patterns, accelerated embryo development, premature emergence of fry, variation in quality and

quantity of tributary rearing habitat, and increased competition and predation risk from warm-water, non-native species (ISAB, 2007).

The earth's oceans are also warming, with considerable interannual and interdecadal variability superimposed on the longer-term trend (Bindoff et al. 2007). Historically, warm periods in the coastal Pacific Ocean have coincided with relatively low abundances of salmon and steelhead, while cooler ocean periods have coincided with relatively high abundances (Zabel et al., 2006; Karl et al., 2009). Ocean conditions adverse to salmon and steelhead may be more likely under a warming climate (Zabel et al., 2006).

In addition to the changes noted above, ocean acidification resulting from the uptake of carbon dioxide by ocean waters threatens corals, shellfish, and phytoplankton (e.g. foraminifera and coccolithophores) that form their shells and skeletons from calcium carbonate (Orr et al., 2005; Feely et al., 2012). Such ocean acidification is essentially irreversible over a time scale of centuries (Royal Society, 2005). Increasing carbon dioxide concentrations are reducing ocean pH and dissolved carbonate ion concentrations, and thus calcium carbonate saturation. Over the past several centuries, ocean pH has decreased by about 0.1 pH units (an about 30 percent increase in acidity), and is projected to decline by another 0.3 to 0.4 pH units (about 100 to 150 percent increase in acidity) by the end of this century (Orr et al. 2005; Feely et al. 2012). As aqueous carbon dioxide concentrations increase, carbonate ion concentrations decrease, making it more difficult for marine calcifying organisms to form biogenic calcium carbonate needed for shell and skeleton formation. The reduction in pH also affects photosynthesis, growth, and reproduction. Further, the upwelling of deeper ocean water, deficient in carbonate, and thus potentially detrimental to the food chains supporting juvenile salmon, has recently been observed along the U.S. west coast (Feely et al. 2008).

Acidification in Oregon and Washington State coastal and estuarine waters is compounded by a combination of factors (Feely et al. 2012). Upwelling of carbon dioxide-rich offshore waters with naturally low pH from respiration processes exacerbates the effects of anthropogenic carbon dioxide. Inputs of nutrients such as nitrogen, silicate, and phosphorus from upwelling and surface runoff stimulate the growth of marine algae, temporarily decreasing carbon dioxide and increasing pH. As these blooms die and decompose, carbon dioxide is released and pH is driven down in deeper waters. Similarly, carbon dioxide is released via bacterial respiration from decaying organic matter delivered to coastal and estuarine waters from freshwater rivers and streams. All of these forces converge and interact at the coasts and estuaries, making these areas particularly sensitive to the impacts of climate change.

2.2.1 Status of the Species

For Pacific salmon, steelhead, and certain other species, we commonly use the four "viable salmonid population" (VSP) criteria (McElhany *et al.* 2000) to assess the viability of the populations that, together, constitute the species. These four criteria (spatial structure, diversity, abundance, and productivity) encompass the species' "reproduction, numbers, or distribution" as described in 50 CFR 402.02. When these parameters are collectively at appropriate levels, they

maintain a population's capacity to adapt to various environmental conditions and allow it to sustain itself in the natural environment.

"Spatial structure" refers both to the spatial distributions of individuals in the population and the processes that generate that distribution. A population's spatial structure depends on habitat quality and spatial configuration, and the dynamics and dispersal characteristics of individuals in the population.

"Diversity" refers to the distribution of traits within and among populations. These range in scale from DNA sequence variation in single genes to complex life history traits (McElhany *et al.* 2000).

"Abundance" generally refers to the number of naturally-produced adults (*i.e*., the progeny of naturally-spawning parents) in the natural environment (*e.g*., on spawning grounds).

"Productivity," as applied to viability factors, refers to the entire life cycle (*i.e*., the number of naturally-spawning adults produced per parent). When progeny replace or exceed the number of parents, a population is stable or increasing. When progeny fail to replace the number of parents, the population is declining. McElhany *et al*. (2000) use the terms "population growth rate" and "productivity" interchangeably when referring to production over the entire life cycle. They also refer to "trend in abundance," which is the manifestation of long-term population growth rate.

In identifying salmonid Evolutionary Significant Units (ESUs) or Distinct Population Segments, NMFS' biological review teams (BRTs) identify demographically independent populations (DIPs) and major population groups (MPGs), based on geographic and biological characteristics. DIPs provide the basic unit for viability modeling and recovery planning, while MPGs provide a structure for conserving life history diversity. For species with multiple populations, once the biological status of a species' populations has been determined, we assess the status of the entire species using criteria for groups of populations, as described in recovery plans and guidance documents from technical recovery teams. Considerations for species viability include having multiple populations that are viable, ensuring that populations with unique life histories and phenotypes are viable, and that some viable populations are both widespread to avoid concurrent extinctions from mass catastrophes and spatially close to allow functioning as metapopulations (McElhany *et al.* 2000).

The summaries that follow describe the status of the 23 ESA-listed species, and their designated critical habitats, that occur within the geographic area of this proposed action and are considered in this opinion. More detailed information on the status and trends of these listed resources, and their biology and ecology, are in the listing regulations and critical habitat designations published in the Federal Register (Table 2).

Table 2. Listing status, status of critical habitat designations and protective regulations, and relevant Federal Register (FR) decision notices for ESA-listed species considered in this opinion. Listing status: 'T' means listed as threatened; 'E' means listed as endangered; 'P' means proposed for listing or designation.

Species	Listing Status	Critical Habitat	Protective Regulations
Chinook salmon *(Oncorhynchus tshawytscha)*			
Puget Sound	T 6/28/05; 70 FR 37160	9/02/05; 70 FR 52630	6/28/05; 70 FR 37160
Chum salmon *(O. keta)*			
Hood Canal summer-run	T 6/28/05; 70 FR 37160	9/02/05; 70 FR 52630	6/28/05; 70 FR 37160
Steelhead (*O. mykiss*)			
Puget Sound	T 5/11/07; 72 FR 26722	P 1/14/13; 78 FR 2726	P 2/7/07; 72 FR 5648

NMFS' Puget Sound Technical Recovery Team (TRT) developed criteria to identify independent populations of Puget Sound Chinook salmon, Puget Sound steelhead, and Hood Canal summer-run chum salmon, identified viability criteria for each independent population and the species as a whole, and described limiting factors for species survival. Viability criteria are prescriptions of the abundance, productivity, diversity, and spatial structure conditions for populations, biogeographic strata, and evolutionarily significant units (ESU) or distinct population segments (DPS) that, if met, would indicate that an ESU would have a negligible risk of extinction over a 100-year time frame.[4]

The diversity of salmonid species and populations makes it impossible to set narrow quantitative guidelines that would fit all populations in all situations. For this and other reasons, viability criteria vary among species, mainly in the number and type of metrics and the scales at which the metrics apply (*i.e.*, population, major population group (MPG), or ESU) (Busch *et al.* 2008).

Boundaries of each population were defined using a combination of genetic information, geography, life-history traits, morphological traits, and population dynamics that indicate the extent of reproductive isolation among spawning groups. The overall viability of a species is a function of the VSP attributes of its constituent populations. Until a viability analysis of a species is completed, the VSP guidelines recommend that all populations should be managed to retain the potential to achieve viable status to ensure a rapid start along the road to recovery, and that no significant parts of the species are lost before a full recovery plan is implemented (McElhany *et al.* 2000).

Viability status or probability of population persistence is described below for each of the populations considered in this opinion.

Puget Sound Recovery Domain. Species considered in the PS recovery domain include PS Chinook salmon, Hood Canal (HC) summer-run chum salmon, Lake Ozette (LO) sockeye

[4] For Pacific salmon, NMFS uses its 1991 ESU policy, which states that a population or group of populations would be considered a DPS if it is an ESU. An ESU represents a DPS of Pacific salmon under the ESA that 1) is substantially reproductively isolated from conspecific populations and 2) represents an important component of the evolutionary legacy of the species. The species *O. mykiss* is under the joint jurisdiction of NMFS and the U.S. Fish and Wildlife Service (USFWS), so in making its January 2006 ESA listing determinations, NMFS elected to use the 1996 joint USFWS-NMFS DPS policy for this species.

salmon, PS steelhead, and eulachon. The PS-TRT identified 22 extant demographically-independent populations of Chinook salmon and two of summer-run chum salmon[5] (Ford 2011). These populations were further aggregated into strata (*i.e.,* groupings above the population level that are connected by some degree of migration), based on ecological subregions. The PS steelhead TRT has not finalized its viability criteria for the PS steelhead DPS and is still identifying populations and MPGs within the DPS.

2.2.1.1 Status of PS Chinook Salmon

We adopted the recovery plan for Puget Sound Chinook in January 2007. The recovery plan consists of two sets of documents: the Puget Sound salmon recovery plan (Shared Strategy for Puget Sound 2007) and a supplement by NMFS (2006). The recovery plan adopts ESU and population level viability criteria recommended by the Puget Sound Technical Recovery Team (PSTRT) (Ruckelshaus *et al.* 2002). The PSTRT's biological recovery criteria would be met when the following conditions are achieved:

- All watersheds improve from current conditions, resulting in improved status for the species;
- At least two to four Chinook salmon populations in each of the five biogeographical regions of Puget Sound attain a "low" risk status over the long-term;
- At least one or more populations from major diversity groups historically present in each of the five Puget Sound regions attain a "low" risk status;
- Tributaries to Puget Sound not identified as primary freshwater habitat for any of the 22 identified populations are functioning in a manner that is sufficient to support an ESU-wide recovery scenario; and
- Production of Chinook salmon from tributaries to Puget Sound not identified as primary freshwater habitat for any of the 22 identified populations occurs in a manner consistent with ESU recovery.

Spatial Structure and Diversity. This species includes all naturally spawned populations of Chinook salmon from rivers and streams flowing into Puget Sound including the Straits of Juan De Fuca from the Elwha River, eastward, including rivers and streams flowing into Hood Canal, South Sound, North Sound and the Strait of Georgia in Washington, and progeny of 26 artificial propagation programs (USDC 2014). The PS-TRT identified 22 historical populations, grouped into five major geographic regions, based on consideration of historical distribution, geographic isolation, dispersal rates, genetic data, life history information, population dynamics, and environmental and ecological diversity (Table 3).

Indices of spatial distribution and diversity have not been developed at the population level. Based on a Shannon Diversity Index at the ESU level, diversity is declining (due primarily to the increased abundance of returns to the Whidbey Basin region) for both distribution among populations and among regions (Ford 2011). Overall, the new information on abundance,

[5] One HC chum salmon population has four extant spawning aggregations and one has 10 extant spawning aggregations; some of these are recently reintroduced. Spawning aggregations are also referred to as subpopulations.

productivity, spatial structure and diversity since the 2005 status review does not indicate a change in the biological risk category (Ford 2011).

Table 3. Extant PS Chinook salmon populations in each geographic region (Ford 2011)

Geographic Region	Population (Watershed)
Strait of Georgia	North Fork Nooksack River
	South Fork Nooksack River
Strait of Juan de Fuca	Elwha River
	Dungeness River
Hood Canal	Skokomish River
	Mid Hood Canal River
Whidbey Basin	Skykomish River
	Snoqualmie River
	North Fork Stillaguamish River
	South Fork Stillaguamish River
	Upper Skagit River
	Lower Skagit River
	Upper Sauk River
	Lower Sauk River
	Suiattle River
	Upper Cascade River
Central/South Puget Sound Basin	Cedar River
	North Lake Washington/ Sammamish River
	Green/Duwamish River
	Puyallup River
	White River
	Nisqually River

Abundance and Productivity. No trend was notable for the total ESU escapements; while trends vary from decreasing to increasing among populations. Natural-origin pre-harvest recruit escapements remained fairly constant from 1985-2009. Returns (pre-harvest run size) from the natural spawners were highest in 1985, declined through 1994, remained low through 1999, increased in 2000 and again in 2001, and have declined through 2009, with 2009 having the lowest returns since 1997. Median recruits per spawner for the last 5-year period (brood years 2002-2006) is the lowest over any of the 5-year intervals. Many of the habitat and hatchery actions identified in the Puget Sound Chinook salmon recovery plan are likely to take years or decades to be implemented and to produce significant improvements in natural population attributes, and these trends are consistent with these expectations (Ford 2011).

Limiting Factors. Limiting factors for this species include:

- Degraded floodplain and in-river channel structure
- Degraded estuarine conditions and loss of estuarine habitat
- Riparian area degradation and loss of in-river large woody debris
- Excessive fine-grained sediment in spawning gravel
- Degraded water quality and temperature

- Degraded nearshore conditions
- Impaired passage for migrating fish
- Severely altered flow regime

Occurrence in the Action Area. The action area includes ocean habitats only. No inland habitats (rivers and streams) would be affected by the action. Juvenile Chinook salmon, primarily from the Dungeness River and Elwha River populations, rear in the action area. Schools of Chinook salmon fry congregate in nearshore areas prior to their offshore migration to feed in open water (Nightingale and Simenstad 2001). Smaller emigrants tend to migrate along nearshore areas and would use river deltas and pocket estuaries as rearing areas (Beamer et al. 2003). Larger emigrants are not as associated with the nearshore.

The Elwha River Chinook salmon population is believed to be comprised of two subpopulations: an early and a late returning run. Chinook return to the Elwha River from late spring through late-September and spawn from late-August through mid-October (Puget Sound Indian Tribes and WDFW 2004).

The Dungeness Chinook population is comprised of a single population of native origin fish with spring/summer run timing. Chinook return to the Dungeness River in the late spring to mid-summer, with spawning occurring early August through early October. Fry emerge in the early spring with a majority of them emigrating to rear in the estuary during their first year of life, while remaining fry would rear in the river for a year and emigrate out as yearlings. Fish spend the first year of their life within estuarine nearshore habitat (Puget Sound Indian Tribes and WDFW 2004). Both the Elwha and Dungeness populations likely occur in the project area. During nearshore surveys conducted from 2006 through 2014, juvenile Chinook salmon were recorded from April to September. Out of about 40 different species collected during these surveys, Chinook salmon were among the most abundant species collected (Fresh 2015).

2.2.1.2 Status of HC Summer-run Chum Salmon

We adopted a recovery plan for HC summer-run chum salmon in May of 2007. The recovery plan consists of two documents: the Hood Canal and Eastern Strait of Juan de Fuca Summer Chum Salmon Recovery Plan (Hood Canal Coordinating Council 2005) and a supplemental plan by NMFS (2007). The recovery plan adopts ESU and population level viability criteria recommended by the Puget Sound Technical Recovery Team (PS-TRT) (Sands *et al.* 2007). The PSTRT's biological recovery criteria would be met when the following conditions are achieved:

- Spatial Structure: 1) Spawning aggregations are distributed across the historical range of the population. 2) Most spawning aggregations are within 20 km of adjacent aggregations. 3) Major spawning aggregations are distributed across the historical range of the population and are not more than about 40 km apart. Further, a viable population has spawning, rearing, and migratory habitats that function in a manner that is consistent with population persistence
- Diversity: Depending on the geographic extent and ecological context of the population, a viable population includes one or more persistent spawning aggregations from each of the two to four major ecological diversity groups historically present within the two

populations (see also McElhany *et al.* 2000).

- Abundance and Productivity: Achievement of minimum abundance levels associated with persistence of Hood Canal Summer Chum ESU populations that are based on two assumptions about productivity and environmental response (Table 4).

Table 4. Hood Canal summer-run chum ESU abundance and productivity recovery goals (Sands et al. 2007).

Population	Low Productivity Planning Target for Abundance (productivity in parentheses)	High Productivity Planning Target for Abundance (productivity in parentheses)
Strait of Juan de Fuca	12,500 (1.0)	4,500 (5.0)
Hood Canal	24,700 (1.0)	18,300 (5.0)

Spatial Structure and Diversity. This species includes all naturally spawned aggregations of summer-run chum salmon in Hood Canal and its tributaries; aggregations in Olympic Peninsula rivers between Hood Canal and Dungeness Bay, Washington; and progeny of four artificial propagation programs (USDC 2014). The Strait of Juan de Fuca population spawns in rivers and streams entering the eastern Strait and Admiralty Inlet. The Hood Canal population includes all spawning aggregations within the Hood Canal area (Hood Canal Coordinating Council 2005; NMFS 2007).

Abundance and Productivity. Overall, the new information considered does not indicate a change in the biological risk category since the last status review in 2005 (Ford 2011). The spawning abundance of this species has clearly increased since the time of listing, although the recent abundance is down from the previous 5 years. However, productivity in the last 5-year period (2002-2006) has been very low, especially compared to the relatively high productivity in the 5-10 previous years (WDFW and Point No Point Treaty Tribes 2007). This is a concern for viability. Since abundance is increasing and productivity is decreasing, improvements in habitat and ecosystem function likely are needed. A recovery plan was finalized for this species on January 19, 2007.

Limiting factors. Limiting factors for this species include (Hood Canal Coordinating Council 2005; NOAA Fisheries 2011):

- Reduced floodplain connectivity and function
- Poor riparian condition
- Loss of channel complexity (reduced large wood and channel condition, loss of side channels, channel instability)
- Sediment accumulation
- Altered flows and water quality

Occurrence in the Action Area. Small numbers of summer chum salmon enter the Dungeness River in August through October and spawn in low gradient sections of the river and its tributaries through September. Eggs incubate in redds for 5-6 months with fry emerging between January and early April. After hatching, fry migrate rapidly downstream and out to the

estuary and nearshore areas (National Oceanic and Atmospheric Administration [NOAA] Fisheries 2005).

During nearshore surveys conducted from 2006 through 2014, juvenile chum salmon (likely fall-run and not summer-run) were recorded from April through September, with higher abundances during the spring months (April-June) (Fresh 2015). There is little evidence of HC chum using the Action Area.

2.2.1.3 Status of PS Steelhead

The PS steelhead TRT produced viability criteria, including population viability analyses (PVAs), for 20 of 32 demographically independent populations (DIPs) and three major population groups (MPGs) in the DPS (Hard *et al.* 2015). It also completed a report identifying historical populations of the DPS (Myers *et al.* 2015). The DIPs are based on genetic, environmental, and life history characteristics. Populations display winter, summer, or summer/winter run timing (Myers *et al.* 2015). The TRT concludes that the DPS is currently at "very low" viability, with most of the 32 DIPs and all three MPGs at "low" viability.

The designation of the DPS as "threatened" is based upon the extinction risk of the component populations (Table 5). Hard *et al.* (2015) identified several criteria for the viability of the DPS, including that a minimum of 40 percent of summer-run and 40 percent of winter-run populations historically present within each of the MPGs must be considered viable using the VSP-based criteria. For a DIP to be considered viable, it must have at least an 85 percent probability of meeting the viability criteria, as calculated by Hard *et al.* (2015).

We are currently developing a recovery plan for this species.

Table 5. PS steelhead populations and risk of extinction by MPG (modified from Hard et al. 2014).

Geographic Region (MPG)	Population (Watershed)	Extinction Risk (Probability of decline to an established quasi-extinction threshold [QET] for each population)
Northern Cascades	Drayton Harbor Tributaries (winter)	Insufficient data to calculate percentage
	Samish River/Bellingham Bay Tributaries (winter)	Low – about 30% within 100 years
	Skagit River (summer/winter)	Low – about 10% within 100 years
	Snohomish/Skykomish Rivers (winter)	Low – about 40% within 100 years
	Stillaguamish River (winter)	High – about 90% within 25 years
	Tolt River (summer)	High – about 80% within 100 years
	Snoqualmie River (winter)	High – about 70% within 100 years
	Nooksack River (winter)	Insufficient data to calculate percentage
	South Fork Nooksack River (summer)	Insufficient data to calculate percentage
	Pilchuck River (winter)	Low – about 40% within 100 years
	Nookachamps River (winter)	Insufficient data to calculate percentage
	North Fork Skykomish River (summer)	Insufficient data to calculate percentage
	Baker River (summer/winter)	Insufficient data to calculate percentage
	Sauk River (summer/winter)	Insufficient data to calculate percentage
	Deer Creek (summer)	Insufficient data to calculate percentage
	Canyon Creek (summer)	Insufficient data to calculate percentage
Central and South Puget Sound	North Lake Washington Sammamish River (winter)	Insufficient data to calculate percentage
	Cedar River (summer/winter)	High – about 90% within the next few years
	Green River (winter)	Moderately High – about 50% within 100 years
	Nisqually River (winter)	High – about 90% within 25 years
	Puyallup River (winter)	High – about 90% within 30 years
	White River (winter)	Low – about 40% within 100 years
	South Sound Tributaries (winter)	Insufficient data to calculate percentage
Hood Canal and Strait de Fuca	Elwha River (summer/winter)	High – about 90% currently
	Dungeness River (winter)	High – about 90% within 20 years
	Strait of Juan de Fuca Independents (winter)	High – about 90% within 60 years
	South Hood Canal	High – about 90% within 20 years
	West Hood Canal (winter)	Low – about 20% within 100 years
	East Hood Canal (winter)	Low – about 40% within 100 years
	Skokomish River (winter)	High – about 70% within 100 years
	Strait of Juan de Fuca Lowland Tributaries (winter)	High – about 90% within 100 years (Snow Creek); about 90% within 100 years (Morse and McDonald creeks)

Spatial Structure and Diversity**.** The PS steelhead DPS includes all naturally spawned anadromous steelhead populations in streams in the river basins of the Strait of Juan de Fuca, Puget Sound, and Hood Canal, Washington, bounded to the west by the Elwha River (inclusive) and to the north by the Nooksack River and Dakota Creek (inclusive). The listed DPS also includes six hatchery stocks that are considered no more than moderately diverged from their associated natural-origin counterparts: Green River natural winter-run; Hamma Hamma winter-run; White River winter-run; Dewatto River winter-run; Duckabush River winter-run; and Elwha River native winter-run (USDC 2014). Steelhead are the anadromous form of *Oncorhynchus mykiss* that occur in rivers, below natural barriers to migration, in northwestern Washington State (Ford 2011). Non-anadromous ''resident'' *O. mykiss* occur within the range of PS steelhead but are not part of the DPS due to marked differences in physical, physiological, ecological, and behavioral characteristics (Hard *et al.* 2007).

DIPs can include summer steelhead only, winter steelhead only, or a combination of summer and winter run timing (*e.g.,* winter run, summer run or summer/winter run). Most DIPs have low viability criteria scores for diversity and spatial structure, largely because of extensive hatchery influence, low breeding population sizes, and freshwater habitat fragmentation or loss (Hard *et al.* 2007). In the Central and South Puget Sound and Hood Canal and Strait of Juan de Fuca MPGs, nearly all DIPs are not viable (Hard *et al.* 2015). More information on PS steelhead spatial structure and diversity can be found in NMFS' technical report (Hard *et al.* 2015).

Abundance and Productivity. Since 1995, PS steelhead abundance has shown a widespread declining trend throughout the majority of the DPS (Ford 2011). In the most recent comprehensive review of the status of the PS Steelhead DPS, the major risk factors facing Puget Sound steelhead were: (1) widespread declines in abundance and productivity for most natural steelhead populations in the ESU, including those in Skagit and Snohomish rivers (previously considered to be strongholds); (2) the low abundance of several summer run populations; and (3) the sharply diminishing abundance of some steelhead populations, especially in south PS, Hood Canal, and the Strait of Juan de Fuca (Hard *et al.* 2007).

For all but a few PS steelhead populations, estimates of mean population growth rates obtained from observed spawner or redd counts are declining (typically 3 to 10 percent annually). PS winter run steelhead abundance has continued to be low over the majority of the DPS, with a geometric mean less than 250 fish annually in seven of the 15 populations examined from 2005 to 2009 (Ford 2011). Seven populations had a geometric mean greater than 500 fish—Nooksack River, Samish River, Skagit River, Pilchuck River, Snohomish River/ Skykomish River, Snoqualmie River, and Green River winter-run. All but one of these populations are in the Northern Cascades MPG (Hard *et al.* 2015). The lowest mean abundances (fewer than 15 fish) occur in the Elwha River, Lake Washington, and South Puget Sound Tributaries winter-run populations (Ford 2011). Extinction risk within 100 years for most populations in the DPS is estimated to be "moderate to high," especially for steelhead populations in the Central and Southern Cascades and Hood Canal and Strait of Juan de Fuca MPGs.

Most populations within the DPS continue downward trends in estimated abundance, a few sharply so (Ford 2011). Only three winter run steelhead populations examined exhibit positive growth rate (*i.e.,* East Hood Canal, Skokomish River, and West Hood Canal winter run) (Ford

2011). The lowest growth rates occur in the Elwha River, Dungeness River, Lake Washington, Stillaguamish River, Nisqually River, and Puyallup River winter run steelhead populations (Ford 2011). Trends could not be calculated for the South Puget Sound Tributaries winter-run population.

Little or no data is available on summer-run populations to evaluate extinction risk or abundance trends. Because of their small population size and the complexity of monitoring fish in headwater holding areas, summer steelhead have not been broadly monitored.

Limiting factors. In our 2013 proposed rule designating critical habitat for this species (USDC 2013c), we noted that the following factors for decline for PS steelhead persist as limiting factors:

- The continued destruction and modification of steelhead habitat
- Widespread declines in adult abundance (total run size), despite significant reductions in harvest in recent years
- Threats to diversity posed by use of two hatchery steelhead stocks (Chambers Creek and Skamania)
- Declining diversity in the DPS, including the uncertain but weak status of summer run fish
- A reduction in spatial structure
- Reduced habitat quality through changes in river hydrology, temperature profile, downstream gravel recruitment, and reduced movement of large woody debris
- In the lower reaches of many rivers and their tributaries in Puget Sound where urban development has occurred, increased flood frequency and peak flows during storms and reduced groundwater-driven summer flows, with resultant gravel scour, bank erosion, and sediment deposition
- Dikes, hardening of banks with riprap, and channelization, which have reduced river braiding and sinuosity, increasing the likelihood of gravel scour and dislocation of rearing juveniles

Occurrence in the Action Area. Of the 32 independent populations of PS steelhead DPS, 1 may occur in the Action Area; the Strait of Juan de Fuca Independent Tributaries winter-run steelhead (PSSTRT 2013).

The Strait of Juan de Fuca independent tributaries winter-run steelhead population consists of steelhead spawning in small independent tributaries of the Strait of Juan de Fuca between the Dungeness and Elwha rivers, including: Ennis, White, Morse, Siebert, and McDonald creeks (PSSTRT 2013).

2.2.2 Status of the Critical Habitats

This section examines the status of designated critical habitat affected by the proposed action by examining the condition and trends of essential physical and biological features throughout the designated areas. These features are essential to the conservation of the listed species because

they support one or more of the species' life stages (*e.g.*, sites with conditions that support spawning, rearing, migration and foraging).

The physical or biological features of near-shore ocean habitats like Port Angeles harbor include: access to forage, absence of artificial obstruction, natural cover, and appropriate water quality (Table 6). These features are essential to juvenile rearing and adult migration.

Table 6. Primary constituent elements (PCEs) of critical habitats designated for ESA-listed salmon and steelhead species considered in the opinion, and corresponding species life history events.

Primary Constituent Elements		**Species Life History Event**
Site Type	**Site Attribute**	
Freshwater spawning	Substrate Water quality Water quantity	Adult spawning Embryo incubation Alevin growth and development
Freshwater rearing	Floodplain connectivity Forage Natural cover Water quality Water quantity	Fry emergence from gravel Fry/parr/smolt growth and development
Freshwater migration	Free of artificial obstruction Natural cover Water quality Water quantity	Adult sexual maturation Adult upstream migration and holding Kelt (steelhead) seaward migration Fry/parr/smolt growth, development, and seaward migration
Estuarine areas	Forage Free of artificial obstruction Natural cover Salinity Water quality Water quantity	Adult sexual maturation and "reverse smoltification" Adult upstream migration and holding Kelt (steelhead) seaward migration Fry/parr/smolt growth, development, and seaward migration
Nearshore marine areas	Forage Free of artificial obstruction Natural cover Water quantity Water quality	Adult growth and sexual maturation Adult spawning migration Nearshore juvenile rearing

Critical habitats throughout the Puget Sound basin have been degraded by numerous management activities, including hydropower development, loss of mature riparian forests, increased sediment inputs, removal of large wood, intense urbanization, agriculture, alteration of floodplain and stream morphology (*i.e.*, channel modifications and diking), riparian vegetation disturbance, wetland draining and conversion, dredging, armoring of shorelines, marina and port development, road and railroad construction and maintenance, logging, and mining. Changes in habitat quantity, availability, and diversity, and flow, temperature, sediment load and channel instability are common limiting factors in areas of critical habitat.

Status of Critical Habitat Conditions within Action Area

Critical habitat was designated for the PS Chinook salmon ESU in September 2005 (NMFS 2005b). Critical habitat consists of water, substrate, and the adjacent riparian zone of accessible estuarine and riverine reaches. In marine areas, critical habitat includes all nearshore marine areas (including areas adjacent to islands) of the Strait of Georgia (south of the Canada-United States border), Puget Sound, Hood Canal, and the Strait of Juan de Fuca (to the western end of the Elwha River delta) from the line of extreme high tide out to a depth of 98 ft. Nearshore critical habitat for PS Chinook salmon occurs within Port Angeles Harbor, along Ediz Hook and extending north, south, and east to -98 ft (Figure 4).

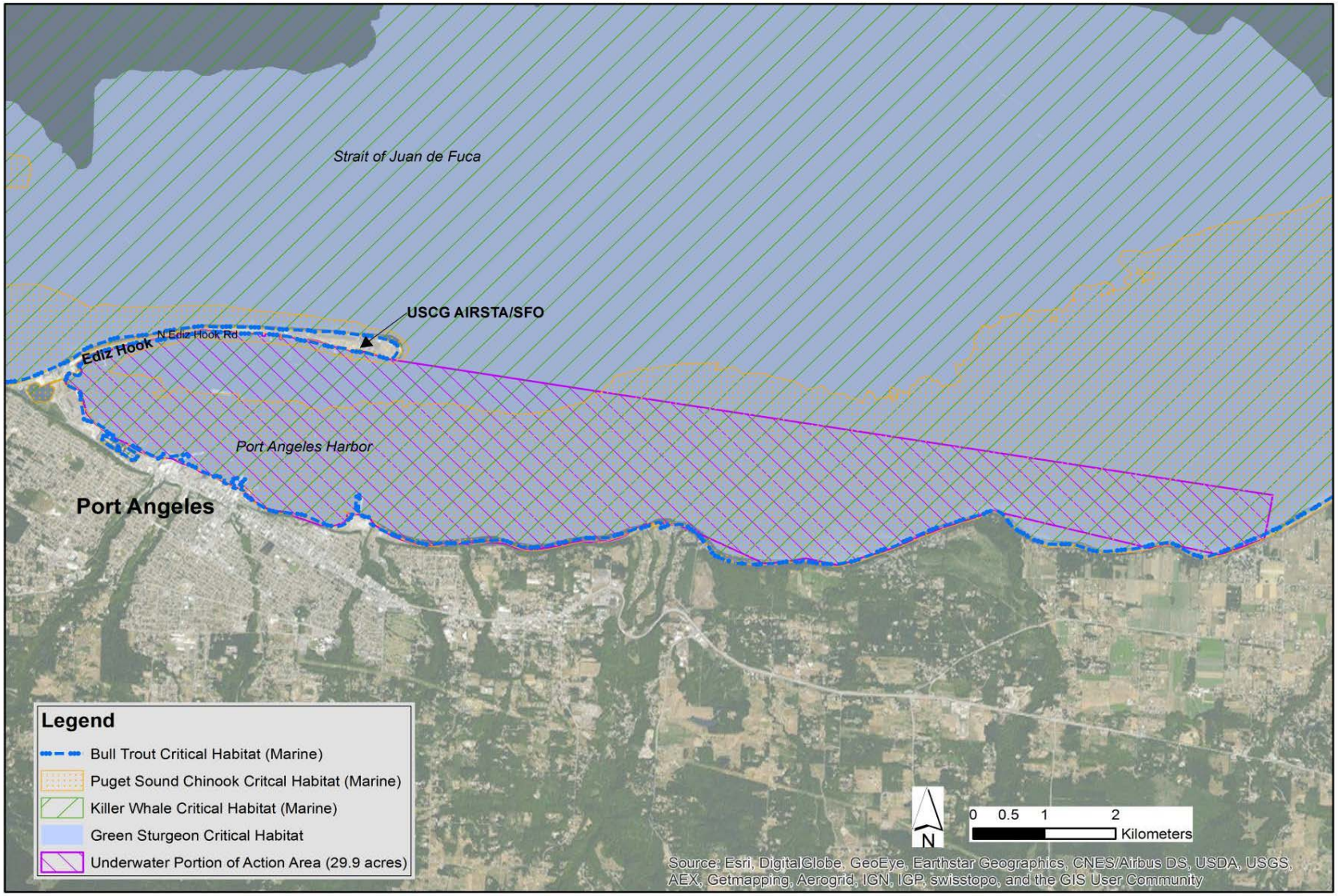

Figure 4. Designated critical habitat within the project action area. Source: Navy (2014)

2.3 Environmental Baseline

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

Climate change effects on the environmental baseline are described in Section 2.2 above.

The proposed project would occur on, just off-shore of, and on the south side of Ediz Hook within Port Angeles Harbor. Ediz Hook is a narrow spit of land, with widths ranging from 90 to 750 ft, and juts 3.5 miles into the Strait of Juan de Fuca, forming the northern boundary of Port Angeles Harbor. The Ediz Hook spit is lined with public beaches, picnic spots, and parking areas, and a multi-use recreational trail begins just outside the USCG AIRSTA/SFO Port Angeles entrance gate and follows the shoreline around the harbor to the downtown Port Angeles waterfront. There is a public boat launch west of the Puget Sound Pilots Station and numerous public access points for hand-launched watercraft, fishing, swimming, and scuba diving along the length of Ediz Hook.

Most of Ediz Hook outside of the USCG AIRSTA/SFO Port Angeles upland operational area is owned by the federal government and leased long-term to the City of Port Angeles. The Puget Sound Pilots Association has a pier with training and sleeping facilities on the south shore of Ediz Hook just outside (west) of the main entrance to the USCG station. They provide dispatch and other support services for pilots as well as direct vessels into and out of the harbor and the Strait of Juan de Fuca and provide quick response to vessels in emergency situations.

The USCG AIRSTA/SFO Port Angeles is primarily composed of paved roads and parking lots, buildings, and a runway along the eastern half of Ediz Hook. The upland habitat is composed of terrestrial salt-tolerant grasses and shrubs and shore pines planted near the USCG buildings. Beaches occur along Ediz Hook, containing small pea gravel, rip rap, and drift wood. Because ESA-listed species evaluated in this document inhabit the marine environment, existing marine habitat conditions are described below and evaluated in detail in Section 5.

2.3.1 Ambient Sound

2.3.1.1 Ambient Underwater Sound

Underwater ambient sound is comprised of sounds produced by a number of natural and anthropogenic sources and varies both geographically and temporally. Natural sound sources include wind, waves, precipitation, and biological sources such as shrimp, fish, and cetaceans. These sources produce sound in a wide variety of frequency ranges (Urick 1983; Richardson et al. 1995) and can vary over both long (days to years) and short (seconds to hours) time scales. In shallow waters, precipitation may contribute up to 35 dB to the existing sound level, and an increase in wind speed of 5-10 knots can cause a 5 dB increase in ambient ocean sound between 20 and 100,000 hertz (Hz) (Urick 1983).

Human-generated noise contributes to the ambient acoustic environment within Port Angeles Harbor. Activities within the area include transiting of large USCG ships and support boats, recreational boats, and general maintenance activities at both the USCG AIRSTA/SFO, adjacent Puget Sound Pilots Station, as well as commercial and recreational boat activity associated with the Port of Port Angeles. Ambient underwater noise has not been recorded for the area but is likely similar to a range measured at the Seattle Ferry Terminal (124-128 dB RMS re 1 μPa) (Laughlin 2012; WSDOT 2015).

2.3.2 Physical Barriers and Overwater Shade

The existing structures that likely serve as physical barriers along Ediz Hook (from east to west from the tip of the Hook) include the existing T-Pier at the USCG AIRSTA/SFO Port Angeles, a rock groin/jetty about 0.5 miles (0.77 km) west of the T-Pier, the Puget Sound Pilots Station pier and dock, the public boat launch (composed of two ramps. Most of the nearshore barriers in the Action Area are about 1.5 miles (2.5 km) south of Ediz Hook at the Port of Port Angeles. The Port has about 10 terminals with various pier and dock configurations that create physical barriers (Port of Port Angeles 2015).

Overwater shade is also created by the existing T-pier, Pilots Station pier and dock, and the Port of Port Angeles piers and docks.

2.3.3 Marine Habitat Conditions

Marine habitat conditions within the Port Angeles Harbor are described below for physical barriers, water circulation and bathymetry, water quality, sediment quality, marine vegetation, underwater structures and benthic community, forage fish, and ambient sound. Where data is available, marine habitat conditions are described at the project scale.

2.3.3.1 Water Circulation and Bathymetry

The currents within the Port Angeles Harbor are driven by the tidal flow in the Strait of Juan de Fuca. During flood-tide, a large eddy is established between the Dungeness Spit and Ediz Hook that extends a short way into the harbor and circulates water in a clockwise direction (Ebbesmeyer et al. 1979; Yang et al. 2003). The direction of the eddy is driven by water moving along the northern edge of the harbor during flood tides and along the southern edge of the harbor during ebb tides. The eddy circulates at a slower rate than the flows outside the harbor and is constrained by the size of the harbor itself. Surface currents within the harbor are generally slow (less than 0.8 ft/second) with long periods of slack water, especially in the northern and western portions of the Harbor (along the southern shore of Ediz Hook) (Federal Water Pollution Control Administration 1967).

The Port Angeles Harbor is over 1,400 acres and over 1.3 miles across. Bathymetry within the project area is from -5 ft (at the tip of the jetty) to – 60 ft.

2.3.3.2 Water Quality

Circulation patterns have a variety of influences on local water quality. The higher velocities reduce residence times, increase the re-suspension and transport of sediment and more rapidly disperse pollutants. Lower velocities result in more deposition, less mixing, longer residence times, and lower transport rates.

The U.S. Environmental Protection Agency (USEPA) approved the marine Water Quality Assessment 305(b) report and 303(d) list (Washington Department of Ecology [Ecology] 2012a). Ecology's Toxics Cleanup Program provides information on state-wide sediment contamination and the relationship it has with water quality and potential impairment of waterbodies in the state. Ecology's Water Quality Program uses this information in the listing of impaired water bodies for Section 303d list as Sediment Management Standards (SMS) were approved by the USEPA's Water Quality Program as Water Quality Standards.

Assessed water bodies were placed into one of five categories based on methods outlined in the Integrated Report. Port Angeles Harbor has Category 1, 2, and 5 waterbody impairments. Category 1 is waters that meet tested standards for clean waters. Category 2 is waters of concern where there is some evidence of water quality impairment but not enough to require immediate action. Category 5 indicates polluted waters that require a total maximum daily load (TMDL) [6] allocation, but one is not currently in place and implemented. The western portion of Port Angeles Harbor has a Category 5 rating for presence of mercury in sediment and a Category 2 for cadmium and zinc presence in sediment. The southern portion of the Harbor has a Category 5 rating for sediment due to the presence of over 30 contaminants. The east end of the hook, adjacent to the USCG station, is a Category 5 for 5 contaminants detected in tissue (mussel [*Mytilus* sp.]) and a Category 1 for about 20 contaminants detected in tissue (Ecology 2012a).

2.3.4.3 Sediment Quality

Ecology identifies Port Angeles Harbor as a priority bay under Ecology's Puget Sound Initiative. It is one of seven areas identified as a priority site because of legacy sediment contamination above the Washington State SMS. Ecology has identified two sites in the Port Angeles Harbor that require remedial action: the Western Port Angeles Harbor area and the Rayonier Mill site in the southern portion of the harbor (Ecology 2014).

Surface sediments within the Action Area consist of sand and silt with increasing amounts of gravel closer to the Ediz Hook shoreline. Surface sediments are generally characterized as the top 3.9 inches (10 centimeters) of sediment on the seafloor. Surface and subsurface sediment in Port Angeles Harbor has been affected by historical industrial activities near the western portion of Port Angeles Harbor and the activities at the Rayonier Mill site, south of Ediz Hook, which operated from 1930 to 1997. The sediment quality within the Harbor is above the Washington State SMS cleanup levels based on benthic toxicity (Ecology 2012b). A sediment investigation

[6] A Total Maximum Daily Load (TMDL) is a regulatory term in the U.S. Clean Water Act, describing a value of the maximum amount of a pollutant that a body of water can receive while still meeting water quality standards. Alternatively, TMDL is an allocation of that water pollutant deemed acceptable to the subject receiving waters.

that focused on several areas within Port Angeles Harbor identified several contaminants of concern (Ecology 2012c):

- Dioxins and furans;
- PCBs;
- Semi-volatile organic compounds (SVOCs);
- Ammonia and sulfides;
- Metals (arsenic, mercury, cadmium, lead, and zinc); and
- Petroleum hydrocarbons.

The sediments within the project area have not been analyzed. Contaminant concentrations in the three surface sediment samples collected within 1,000 ft (305 m) of the project site were below the Sediment Quality Standards (SQS) and Cleanup Screening Levels (CSL) screening levels, that is, they were of acceptable quality. Surface sediment results may not be a good indicator of the potential of underlying subsurface contamination (Ecology 2012b). However, subsurface sediment samples indicate that sediments are less impacted farther from the source areas. Tidally driven currents, wave action, and vessel scour may also have an impact on sediment contamination dispersion and transport.

2.3.4.4 Marine Vegetation

Aquatic vegetation includes intertidal and subtidal species as well as floating and attached species. Macroalgae species such as *Laminaria*, a genus of brown algae commonly referred to as "kelp," are common in the area. Kelp are large brown seaweeds that attach to bedrock or cobbles in high wave energy areas within shallow waters; they are typically found at depths less than 66 ft (Mumford 2007). Eelgrass (*Zostera* spp.) creates high quality aquatic habitat and is most abundant in low wave energy areas. It occurs in the lower intertidal and shallow subtidal photic zone, where organic matter and nutrients are abundant (Johnson and O'Neil 2001). Eelgrass is found in sediments ranging from mud to clean sand with its upper limit distribution within the intertidal zone and its lower limit distribution controlled by light limitation in the shallow subtidal zone. The depth of eelgrass presence is typically less than 32 ft (Mumford 2007).

Eelgrass and macroalgae surveys were conducted along the south side of Ediz Hook in 1993, 2003, 2012, and 2015 (Shreffler 1993; MCS Environmental 2003; Grette Associates 2012; SEE LLC 2015) (Figure 5).

Video and diver surveys were conducted along the south side of Ediz Hook within the Action Area in July 2015. The surveys documented eelgrass presence on the west side of the jetty/rock groin but occurring in relatively small and discontinuous patches. On the east side of the jetty is one dense, contiguous bed of eelgrass between about -1 ft and -20 ft. The shallowest eelgrass observed in this location was to -0.5 ft, and deeper than -20 ft where occasional solitary plants down to as deep as -30 ft were observed. Turion counts along the upper intertidal limit of the eelgrass beds were between 13 to 19 per 0.25 m^2 to the west of the jetty, and from 14 to52 turions on the eastern side of the jetty. On the east side of the project area, eelgrass is between

about -0.2 to as deep as -29 ft, but primarily between 0 and -20 ft MLLW. The total eelgrass within the surveyed transects of the jetty is 49,693 ft^2 (SEE LLC 2015).

Eelgrass occurs in a continuous bed beginning at the east side of the jetty/rock groin and primarily occurs between 0 and -20 ft MLLW. Individual plants were observed in a video survey down to as deep as -35 ft MLLW, but were found at a lower limit of -20 ft during a diver survey. Turion counts along the upper intertidal limit of the eelgrass beds were 23-40 per 0.25 m^2. The average eelgrass density of the area was 18 turion counts per 0.25 m^2. The total eelgrass within the footprint of the project area is 98,873 ft^2 (SEE LLC 2015).

Eelgrass occurs in a relatively narrow bed at the east end of Ediz Hook between about -1.5 to -19 ft but becoming limited to about -3 to -19 ft at the easternmost surveyed location where the shore becomes steep and dominated by large cobble. Turion counts averaged 30 per 0.25 m^2 quadrat. Total eelgrass at the eastern end of Ediz Hook is 47,909 ft^2 (SEE LLC 2015).

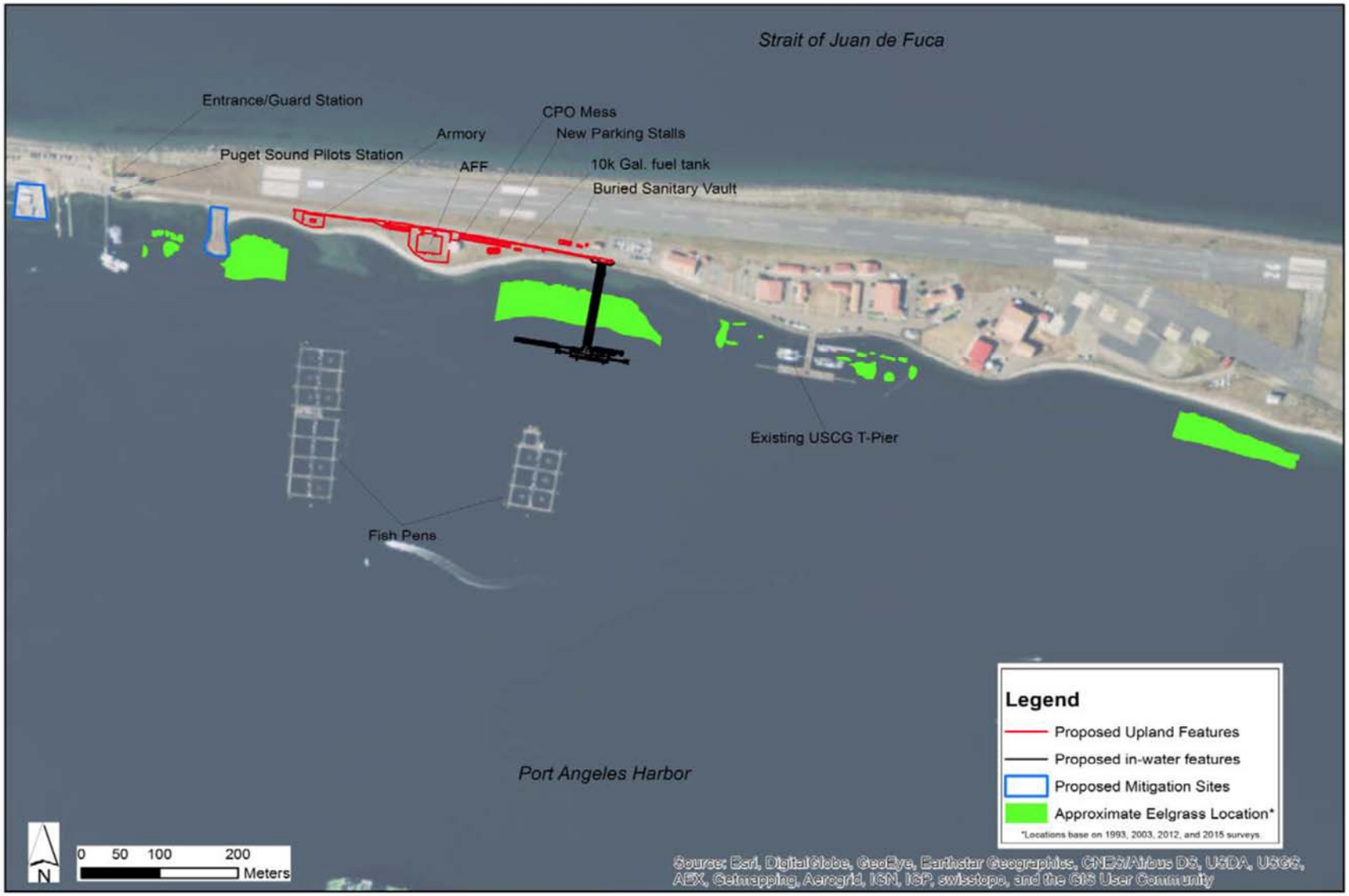

Figure 5. Current eelgrass coverage in the project vicinity. Source: Shreffler 1993; MCS Environmental 2003; Grette Associates 2012; SEE LLC 2015)

Macroalgae coverage near the existing jetty and eastern end of Ediz Hook was 55% and 19%, respectively (Grette Associates 2012). Macroalgae was observed in a dense layer throughout both the east and west sides of the existing T-Pier. Algae recorded was predominantly sea lettuce (*Ulva lactuca*) and kelp (*Laminaria* spp.) accounting for 71% and 20%, respectively, of bottom algae covered. Some red algae (2%) was also present (MCS Environment 2003). For the purposes of this Opinion, macroalgae provide two broad levels of ecological function for juvenile Chinook salmon. Beds of bull kelp are cover for emigrating fish and all types of macroalgae contribute to the food chain that supports invertebrates that fish eat.

During the 2015 survey, macroalgae coverage within the area of the jetty and west primarily consisted of *Ulva*, *Laminaria,* and *Sarcodiotheca* spp. Macroalgae occurring east of the jetty and extending toward the T-pier consisted mainly of *Ulva* and *Laminaria* as well as *Sargassum* spp. At the eastern end of Ediz Hook, the main macroalgae species observed were *Laminaria*, *Nereocystis*, *Ulva*, and *Sarcodiotheca* spp (SEE 2015). A summary of macroalgae species observed within the project area is provided in Table 7.

Table7. Summary of macroalgae species observed within the project area. Source: Navy 2015.

Common Name	Scientific Name
Bleachweed	*Prionitis lanceolata*
Brown algae	*Leathesia difformis*
Bull Kelp	*Nereocystis spp.*
Callophyllis	*Callophyllis* spp.
Coralline algae	*Corallinaceae* spp.
Gracilaria	*Gracilaria* spp.
Kelp	*Laminaria* spp.
Palmaria	*Palmaria spp.*
Plocamium	*Plocamium spp.*
Red Iridescent algae	*Iridea codata*
Sarcodiotheca	*Sarcodiotheca spp.*
Sargassum	*Sargassum spp.*
Seagrass laver	*Smithora naiadum*
Sea lettuce	*Ulva lactuca*
Seersucker kelp	*Costaria costata*
Splendid iridescent seaweed	*Mazzaella splendens*
Sugar kelp	*Saccharina latissima*

2.3.4.5 Underwater Structures and Benthic Community

A manmade underwater rock structure was inadvertently formed during construction activities that occurred in the area years ago. It is located a distance of about 50 ft immediately offshore from the tip of the jetty and about 1,600 ft west of the project area. The structure is composed of three individual rock piles, two main north-south rock piles with an about 50-ft gap between

them, and an east-west pile to the north. The combined rock pile structure measures about 80 ft wide and extends from -20 to -75 ft within the Action Area. Rock habitats provide the appropriate substratum for colonization of diverse algal and invertebrates assemblages, creating a complex physical and biogenic habitat that provides important shelter and foraging opportunities for many species of groundfish (PFMC 2014a).

Bottom substrate in the project area is highly varied. Silty sand is predominant, and patches of sand, silt, clay, a sticky sand-clay mixture, shells, gravel, and wood debris are also found (MCS Environmental 2003; Berger Abam 2014). Pandalid shrimp (*Pandalus* spp.), Dungeness crab (*Cancer magister*), and hard shell clam (*Mercenaria mercenaria*) occur south of Ediz Hook, further into Port Angeles Harbor (WDFW 2015).

Surveys in 2003 recorded an abundance of Sitka periwinkle turban snail (*Littorina sitkana*) occurring on *Laminaria* and eelgrass at the existing USCG T-Pier site. Other species observed included leopard dorid nudibranch (*Diaulula sandiegensis*), Monterey sea lemon nudibranch (*Archidoris montereyensis*), slender tube worms (*Phyllochaetopterus prolifica*), slender kelp crab (*Pugettia gracilis*), helmet crab (*Telmessus cheiragonus*), plumrose anemone (*Metridium senile*), painted anemone (*Urticina crassicornis*), leafy hornmouth snail (Ceratastoma foliatum), and smooth pink scallop (*Chlamys rubida*) (MSC Environmental 2003).

Dive surveys in 2014 along Ediz Hook recorded the presence of crabs and starfish as well as an abundance of coral attached to existing piles (Berger Abam 2014). Additional surveys within the project area observed about 20 different species of invertebrates including red rock crab (*Cancer productus*), northern kelp crab (*Pugettia producta*), Dungeness crab, spiny pink sea star (*Pisaster brevispinus*), leather sea star (*Dermasterias imbricata*), sunflower sea star (*Pycnopodia helianthoides*); and various species of anemones, shrimp, and jellyfish (Reef.org 2015).

2.3.4.6 Forage Fish

Forage fish are an important and abundant group of species that occur in the marine waters of Washington. As the name implies, forage fish are important as prey for a large variety of other marine organisms, including birds, fish, marine mammals, and Pacific salmonids. The most common forage fish in Puget Sound include Pacific herring (*Clupea harengus pallasi*), surf smelt (*Hypomesus pretiosus*), and Pacific sand lance (*Ammodytes hexapterus*). All three forage fish species occur within the Action Area (Shaffer and Galuska 2009; Fresh 2015).

The majority of spawning by herring in Washington State waters occurs annually from late January through early April (Bargmann 1998). Herring deposit their transparent eggs on intertidal and shallow subtidal eelgrass and marine algae. Although no herring spawning locations have been documented in the Action Area (WDFW 2015b), juvenile herring are common in the eastern Straits and have been caught during seining just off Ediz Hook (Shaffer and Galuska 2009).

Surf smelt are most abundant within the Action Area in late spring through summer. Surf smelt spawn throughout the year with the heaviest spawn occurring from mid-October through

December. Although no surf smelt spawning locations have been documented in the Action Area (WDFW 2015), adult and juvenile surf smelt may be present year round.

As with other forage fish, the Pacific sand lance is an important part of the trophic link between zooplankton and larger predators in local marine food webs. Sand lance spawning activity occurs annually from early November through mid-February. They deposit eggs on a range of upper intertidal substrates, from soft, pure, fine sand beaches to mixed coarse gravel (Bargmann 1998). Bargmann (1998) indicates that 35% of all juvenile salmon diets and 60% of the juvenile Chinook diet, in particular, are sand lance. The closest documented sand lance spawning area is a 1,000-ft long area on the south side of Ediz Hook about 0.6 mile west of the USCG AIRSTA/SFO Port Angeles (WDFW 2015). Adult, juvenile, and larval sand lance are expected to be present within the Action Area throughout the year.

Between 2006 and 2014, Fresh (2015) conducted monthly surveys from April to September within the nearshore of the project area and recorded a higher abundance of adult and juvenile life stage surf smelt and sand lance as compared to other marine species collected over the 8-year sampling period (Fresh 2015). This abundance is typical of nearshore waters in the Eastern Straits.

2.4 Effects of the Action

Under the ESA, "effects of the action" means the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, that would be added to the environmental baseline (50 CFR 402.02). Direct effects are defined as the direct or immediate effects of the project on the species or its habitat. Indirect effects are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur.

Anticipated effects of the Proposed Action include short-term effects during construction and long-term effects associated with continued operation and maintenance of the new structure.

Construction Related Effects:

- Noise caused by pile driving,
- Localize water quality effects, primarily increased turbidity, and
- New physical barriers.

Operations and Maintenance Effects:

- New physical barriers in the marine bed and water column, and
- Overhead shade.

2.4.1 Construction Effects

Construction activity associated with the project would result in increased underwater noise levels. Noise would be generated from support vessels, small boat traffic, and barge-mounted equipment, such as generators, and pile installation. Noise levels from all activities except pile driving would typically not exceed underwater sound levels resulting from existing routine

waterfront operations in Port Angeles Harbor. The most significant underwater noise potentially affecting listed species would be from impact pile driving 144 steel piles ranging from 18 to 36 inches in diameter. The proposed pile driving would exceed the NMFS and USFWS underwater noise threshold for fish injury and guideline for fish behavior, resulting in the greatest potential for adverse impacts to fish. Pile driving would require about 75 days to complete over two in-water work seasons (July 16 through February15). Impact pile-driving hammers normally have a repetition rate of about 1 to 1.5 seconds per strike (Illingworth and Rodkin 2013). Based on these rates and a maximum of 7,000 impact strikes per day for 18-, 24-, 30-, and 36-inch diameter steel piles the estimated duration of impact pile driving would range from 60 to 90 minutes per pile and installing up to 8 piles per day.

The vast majority of pile driving would be completed using the much quieter vibratory pile driver as opposed to the impact pile driver. Underwater noise levels associated with vibratory pile drivers are less than impact drivers, and do not exceed the NMFS and USFWS injurious noise level threshold for fish (WSDOT 2015).

To reduce potential impacts to ESA-listed species, the piles would first be driven using a vibratory pile driver until either the pile hits refusal, necessitating an impact hammer to reach required depth, or depth is achieved with only impact proofing necessary to verify the structural capacity of the piles. With the use of a vibratory driver as the primary means of installation, estimates of impact driving durations would range from several minutes to proof piles up to about 90 minutes per pile to fully drive a pile. In the unlikely event that difficult subsurface conditions are encountered (i.e., cobble/boulder zones) requiring increased need for using impact hammer pile driving methods, the maximum time for impact pile driving would not exceed 75 days, during which intermittent impact pile driving would occur over the 75-day duration.

The intensity of pile driving sound is greatly influenced by factors such as the type of piles, drivers, and the physical environment in which the activity takes place. The intensity of the sound (acoustic pressure wave) decreases as it propagates out from a source. This loss in acoustic intensity as the sound propagates is known as transmission loss. Transmission loss parameters vary with frequency, temperature, sea conditions, current, source and receiver depth, water depth, water chemistry, and bottom composition and topography. Three metrics are commonly used to evaluate underwater sound (Caltrans 2009):

- Peak Sound Pressure level (SPL Peak) – Peak sound pressure level based on the largest absolute value of the instantaneous sound pressure over the frequency range from 20 to 20,000 Hz. [7]
- Root Mean Square (RMS) – RMS level is the square root of the energy divided by a defined time period.
- Sound Exposure Level (SEL) – Constant level over 1 second that has the same amount of acoustic energy, as indicated by the square of the sound pressure, as the original sound.

[7] Peak and RMS values for underwater sound are referenced to 1 microPascal (1 μPa) throughout this document. SEL is referenced to 1 $\mu Pa^2 \cdot sec$.

2.4.1.1 Potential Effects of Pile Driving Noise Exposure to Fish

Thresholds for Analysis of Hydroacoustic Effects on Fish from Pile Driving
The USFWS and NMFS have adopted thresholds or guidance for evaluating the effects of sound exposure on fish exposed to underwater sound levels. FHWG (2008) identified the current injury thresholds and behavioral guidance currently used by NMFS and USFWS for fish (Table 8). [8] The criteria use a dual threshold for injury using both peak SPLs and cumulative SEL. The underwater noise threshold criterion for fish injury from a single impact hammer pile strike is at an SPL peak of 206 dB (Fisheries Hydroacoustic Working Group [FHWG 2008]). Cumulative SEL is a measure of the risk of injury from exposure to multiple pile strikes over one day. The cumulative SEL criterion for injury to fish is 187 dB SEL for fish greater than or equal to 2 grams in weight, and 183 dB SEL for fish less than 2 grams in weight (FHWG 2008). As reference points of total fish length at 2 grams weight in Puget Sound, including some variability due to fish health and food availability, early emigrating juvenile chum salmon are about 2.7-2.8 inches (Tynan 2013, personal communication) and juvenile English sole are 2.4-2.8 inches (Hunt 2005).

Table 8. Pile driving noise injury thresholds and behavior guideline for fish. Source: FHWG 2008.

Fish Size	Impact Pile Driving		Vibratory Pile Driving	
	Injury Threshold	Behavioral Guideline	Injury Threshold	Behavioral Guideline
≥ 2 grams	187 dB cumulative SEL	150 dB RMS	n/a	150 dB RMS
< 2 grams	183 dB cumulative SEL			
All sizes	206 dB PEAK			

The method used to calculate distances to the cumulative SEL thresholds involves limiting the maximum affected distance to a point ("effective quiet") at which the acoustic energy from a single strike attenuates to 150 dB SEL (WSDOT 2015). No physical injury is expected beyond this distance.

In addition to the injury thresholds, Hastings (2002) recommended an underwater noise guideline for behavioral impacts on fish, including startle response, at a level of 150 dB RMS. The effect of behavior alterations, whether or not an alteration results in injury, is dependent on project specific factors. Project specific factors could be a behavioral change that results in a migration delay or disturbance to juvenile rearing. This behavioral guideline applies to both impact hammer and vibratory pile driving.

Estimation of Extent of Elevated Underwater Noise Levels Above Thresholds
To determine how far project noise would exceed these thresholds, noise levels anticipated from installation of 24- and 30-inch diameter steel piles were estimated. The Practical Spreading Loss

[8] The Fisheries Hydroacoustic Working Group (FHWG) is a multi-agency group that includes members from Caltrans, Oregon Department of Transportation, WSDOT, Federal Highway Administration, NMFS, USFWS, California Department of Fish and Game, and USACE. This technical working group is responsible for generating underwater noise effects criteria for fish exposed to pile driving activities.

model was used to calculate the expected noise propagation from both impact and vibratory pile driving using representative sound levels for installing 24- and 30-inch diameter steel piles estimated from past acoustic studies as these source levels were higher than that of 18- and 36-inch diameter piles (Navy 2014). Because a bubble curtain or other attenuation device would be used to minimize the level of underwater noise generated into the water column by driving steel pipe piles, an expected attenuation of 8 dB was first subtracted from the source levels (Navy 2014). To calculate cumulative SEL, the number of pile strikes were estimated from past project information and engineering staff (Navy 2015). About 200 strikes for each pile proofed and up to 7,000 strikes for a pile fully impact driven were estimated. Because piles are not anticipated to be impact driven other than the last few feet, the number of strikes per day used in the analysis was 7,000 to be conservative (Table 9).

Table 9. Representative underwater source levels for 24- and 30- inch diameter steel pipe piles.

Pile Driving Method	Pile Size	Average RMS dB re 1 µPa	Average Peak dB re 1 µPa	Average SEL
Impact	24 inches	185	202	173
	30 inches	187	208	178
Vibratory	24 inches	162	NA	NA
	30 inches	167	NA	NA

Source: Navy 2014
Notes: Sound pressure levels include a reduction of 8 dB with use of a bubble curtain during impact pile driving. SPLs were measured at 10 m.

Calculated distances using the Practical Spreading Loss Model to fish noise thresholds and adjusted maximum areas are provided in Table 10. The areas only include the area encompassed to the extent of the shoreline (Figure 6). The area above the threshold values decreases the closer to shore pile driving occurs and where shallow water and land block noise transmission.

Table 10. Maximum range to fish sound effect criteria thresholds from pile driving. Source: Navy 2015.

Method and Pile Size	Criteria Threshold (distance/area)			
	206 dB PEAK (injury)	187 dB Cumulative SEL for fish >2 g (injury)	183 dB Cumulative SEL for fish <2 g (injury)	150 dB RMS (behavioral)
Impact Pile Driving				
24 inches	5 m/<0.01 km^2	341 m/0.2 km^2	341 m/0.3 km^2	2.5 km/9.8 km^2
30 inches	14 m/<0.01 km^2)	736 m/1.0 km^2	736 m/1.0 km^2	2.9 km/11.8 km^2
Vibratory Pile Driving				
24 inches	NA	NA	NA	63 m/0.01 km^2
30 inches	NA	NA	NA	136 m/0.06 km^2

Notes: NA = not applicable. Practical spreading loss model (15 log R, or 4.5 dB per doubling of distance) used for calculations. Assumes 8 dB attenuation with use of bubble curtain. Cumulative SEL calculated as Single Strike SEL + 10 *log (# of pile strikes), assumes 8 piles installed/day at 7,000 pile strikes/day.

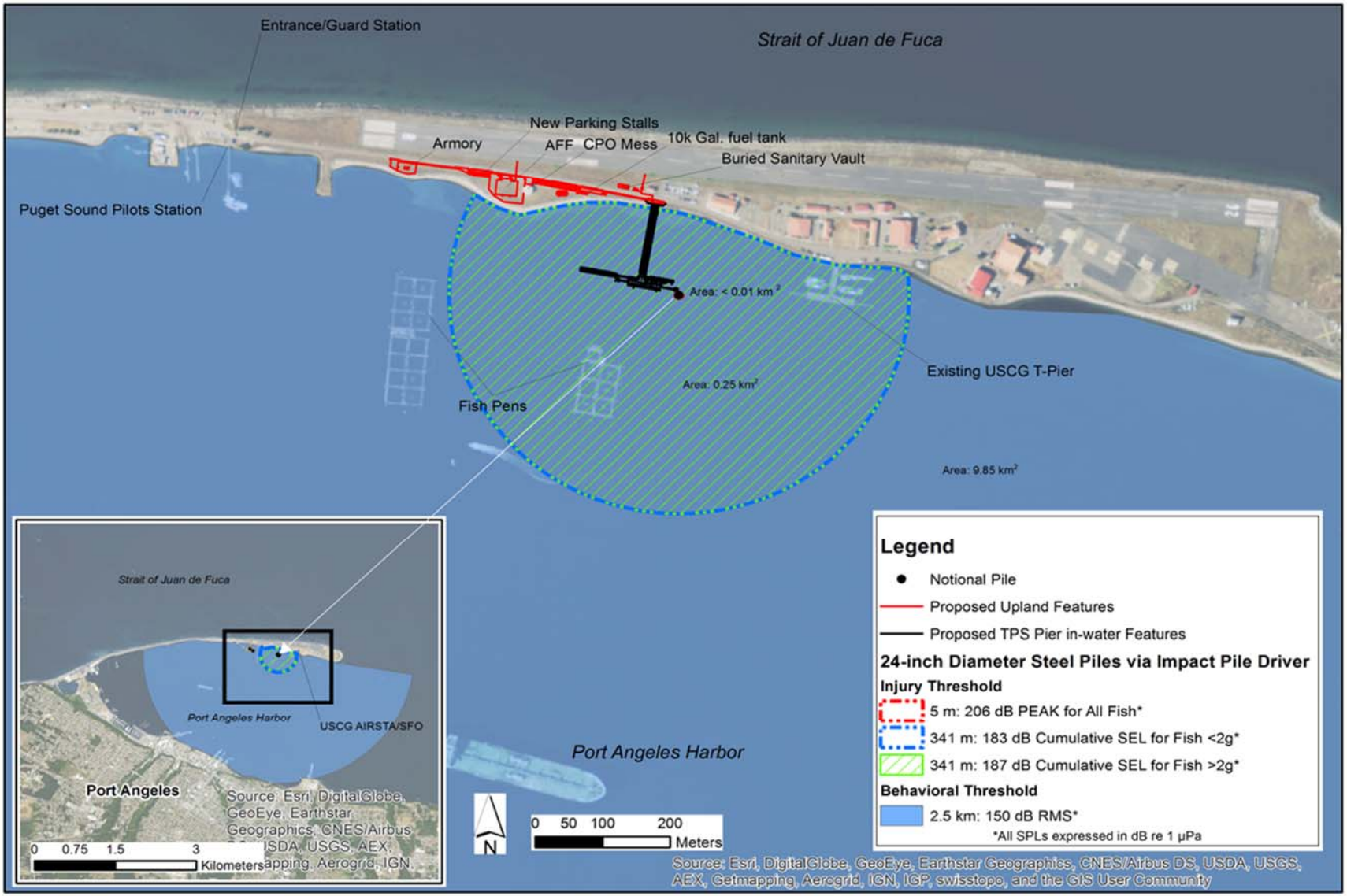

Figure 6. Underwater noise caused fish-effect areas from pile driving. Source: Navy 2015.

2.4.1.2 Potential Effects Exceeding the Injury Threshold and Behavioral Guidance

The degree to which an individual fish exposed to underwater sound would be affected depends on a number of variables, including species, size, and physical condition of the fish; presence of a swim bladder; maximum sustained sound pressure and frequency; shape of the sound wave (rise time); depth of the water; depth of the fish in the water column; amount of air in the water; size and number of waves on the water surface; bottom substrate composition and texture; effectiveness of bubble curtain sound/pressure attenuation technology (if used); currents; and presence of predators. Depending on these factors, effects on fish can range from changes in behavior to immediate mortality. Fish injury and mortality from impact pile driving steel piles has been documented (Caltrans 2009). Therefore, the discussion below on the physiological responses of fish is focused on impact driving of steel piles.

Physiological Responses
All fish fall into two hearing categories: "hearing generalists" such as salmon and trout and "hearing specialists" such as herring and eulachon (Hastings and Popper 2005). The majority of fish on the Pacific coast are hearing generalists and do not have specialized hearing capabilities apart from their swim bladder, inner ear, and lateral line. They sense sound directly through the inner ear, and some use the inner ear coupled with the swim bladder to sense additional energy. Hearing specialists (i.e., eulachon) have particular adaptations that enhance their hearing bandwidth and sensitivity versus hearing generalists (Hastings and Popper 2005). The hearing category for sturgeon is still undetermined. Popper (2005) found that sturgeon can detect an extremely wide range of sounds, and several studies have found that some sturgeon produce sounds that may be used to facilitate breeding. Further studies are necessary to determine how sturgeon vocalize, what sound levels are produced in the natural environment, and how their vocalizations are used in their behavior.

The effects on fish at different intensities of underwater sound are unclear. Many of the previous studies cited for the physical effects, including injury and mortality, of underwater sound on fish were based on seismic air gun and underwater explosives studies. These physical effects can include swim bladder, otolith, and other organ damage; hearing loss; and mortality (Hastings and Popper 2005).

Fish with swim bladders, including salmonids and larval rockfish, are more susceptible to barotraumas from impulsive sounds (sounds of very short duration with a rapid rise in pressure like steel impact pile driving) because of swim bladder resonance (vibration at a frequency determined by the physical parameters of the vibrating object). When a sound pressure wave strikes a gas-filled space, such as the swim bladder, it causes that space to vibrate (expand and contract) at its resonant frequency. When the amplitude of this vibration is sufficiently high, the pulsing swim bladder can press against, and strain, adjacent organs, such as the liver and kidney. This pneumatic compression causes demonstrable injury, in the form of ruptured capillaries, internal bleeding, and maceration of highly vascular organs (Caltrans 2009).

Hastings and Popper (2005) also noted that sound waves can cause different types of tissue to vibrate at different frequencies, and that this differential vibration can cause tearing of mesenteries and other sensitive connective tissues. Exposure to high noise levels can also lead to

injury through "rectified diffusion," the formation and growth of bubbles in tissues. These bubbles can cause inflammation, cellular damage, and blockage or rupture of capillaries, arteries, and veins (Crum and Mao 1996; Vlahakis and Hubmayr 2000; Stroetz et al. 2001). These effects can lead to overt injury or even mortality. Death from barotrauma and rectified diffusion injuries can be instantaneous, or delayed for minutes, hours or even days after exposure.

Even in the absence of mortality, elevated noise levels can cause sublethal injuries affecting survival, and fitness. Fish suffering damage to hearing organs may suffer equilibrium problems, and may have a reduced ability to detect predators and prey (Turnpenny et al. 1994; Hastings et al. 1996). Other types of sublethal injuries can place the fish at increased risk of predation and disease.

Adverse effects on survival and fitness can occur even in in the absence of overt injury. Exposure to elevated noise levels can cause a temporary shift in hearing sensitivity (referred to as a temporary threshold shift, or TTS), decreasing sensory capability for periods lasting from hours to days (Turnpenny et al. 1994; Hastings et al. 1996). The severity of effects from high noise levels produced by impact pile driving of steel piles depends on several factors, including the size and species of fish exposed. Regardless of species, smaller fish appear to be more sensitive to injury of non-auditory tissues (Yelverton et al. 1975). About 100 surf perch from three different species (*Cymatogaster aggregata, Brachyistius frenatus*, and *Embiotoca lateralis*) were killed during impact pile driving of 30-inch diameter steel pilings at Bremerton, Washington, (Stadler 2002). Dissections revealed complete swim bladder destruction across all species in the smallest fish (80 mm fork length), while swim bladders in the largest fish 170 mm fork length) were nearly intact. However, swim bladder damage was typically more extensive in *C. aggregata* when compared to *B. frenatus* of similar size.

To better understand the effects of impulsive sounds from impact pile driving, Halvorsen et al. (2011, 2012) conducted a controlled study with juvenile Chinook (mean standard length 103 mm, mean weight 11.8 grams). Based on the results of the study, the authors conclude that the onset of injury to Chinook salmon occurred at a minimum cumulative SEL of 210 dB. However, due to a number of concerns with the study and to be protective of ESA-listed fish species, the FHWG has not adopted the higher threshold (Caltrans 2009).

Because of their large size, adult salmon can tolerate higher noise levels and are generally less sensitive to injury of non-auditory tissues than juveniles (Hubbs and Rechnitzer 1952). However, no information is available to determine whether or not the risk of auditory tissue damage decreases with increasing size of the fish.

Behavioral Responses

Field investigations of the behavior of Puget Sound juvenile salmon, when present near pile driving projects, found little evidence that normally nearshore migrating juvenile salmonids moved further offshore to avoid the general project area (Feist 1991; Feist et al. 1992). In fact, some studies indicate that construction site behavioral responses, including site avoidance, may be as strongly tied to visual stimuli as underwater sound (Feist 1991; Feist et al. 1992; Ruggerone et al. 2008). However, the level of sound to which fish are exposed is not controlled in field studies (Caltrans 2009), and Halvorsen et al. (2012) noted that caged field studies (Abbot

et al. 2005; Ruggerone et al. 2008; Caltrans 2010) lacked appropriate biological control groups because the experimental fishes may not have been neutrally buoyant resulting in a lower risk of injury because there swim bladder may have been deflated.

Fish in the area where the behavioral disturbance guidance is exceeded may display a startle response during initial stages of pile driving and could avoid the immediate project vicinity during construction activities, including pile driving. Similarly, if injury does not occur, noise may modify fish behavior that may make them more susceptible to predation. Although pile driving would adhere to the July16 through February 15 period for in-water work to minimize underwater noise impacts on juvenile salmon, juvenile Chinook salmon and chum salmon have been documented within the area during a portion of this window (note: the juvenile chum salmon sampled were likely fall-run fish and not ESA-listed HC summer-run chum salmon).

Further, adult PS Chinook salmon ESU, HC chum salmon ESU, and PS steelhead DPS would be expected to occur within the behavioral threshold area during periods of pile driving activity. The southern green sturgeon DPS and southern eulachon DPS may pass through the Strait of Juan de Fuca during project construction but are not expected to occur within the action area. These species are the least likely of the ESA-listed fish to be present during pile driving or in the area at all, as there are no reported sightings of them within the Port Angeles Harbor.

To minimize underwater noise impacts during pile driving, a majority of pile driving activity would be conducted using a vibratory pile driver with only impact pile driving to proof piles. Although behavioral effects could occur from vibratory pile driving, no injury threshold has been identified for this type of pile driving due to its lower amplitude and non-impulsive waveform (FHWG 2008). All pile driving would require a maximum of 75 days to complete during two in-water work seasons, with an estimated duration of impact pile driving ranging from 60 to 90 minutes per pile or a maximum of 4 hours per day for up to 75 days. In addition, a nightly reprisal from pile driving is expected to give fish an opportunity to pass through the Action Area without being subject to noise.

2.4.1.3 Water Quality

Pile installation would resuspend bottom sediments within the immediate area of each pile, resulting in temporary and localized increases in suspended sediment concentrations that, in turn, would increase turbidity levels. The suspended sediment/turbidity plumes would be generated periodically during active pile driving during the in-water work window. The western portion of Port Angeles Harbor has a Category 5 rating due to high concentrations of mercury (see Section 2.3.3.2). Pile driving could further degrade water quality within the immediate in-water construction area by resuspending sediments, but for only a short period of time (about 75 days of pile driving).

Temporary increases in turbidity and suspended sediments could impact fish by creating cloudy or murky conditions that interfere with predator avoidance, covering food sources or vegetation with sediments, and interfering with oxygen exchange via impacts to the gills. A bubble curtain would be used as mitigation for in-water noise during pile driving. When the bubble curtain is operating increased levels of turbidity and suspended sediment are anticipated. For project-

related construction activities, such as barge anchoring, fine-grained particles resuspended from the bottom would be confined to the near-bottom depth layers by natural density stratification of the water column. The subsurface suspended sediment plume would disperse rapidly as a result of particle settling and current mixing.

Based on the above analysis, in-water work could produce measurable, temporary increases in turbidity and sedimentation, and could cause fish to temporarily avoid areas near construction. However, construction activities would not result in persistent increases in turbidity levels or cause changes that would violate water quality standards because processes that generate suspended sediments, which result in turbid conditions, would be short-term and localized, and suspended sediments would disperse and/or settle rapidly (within a period of minutes to hours after construction activities cease). Therefore effects on water quality are unlikely to result in large enough increases in water column conditions to result in changes to predator avoidance, significantly affect the availability of prey or habitat, or impact fish gill function. Additionally, adult life stages of PS Chinook salmon ESU, PS steelhead DPS, HC chum salmon ESU, southern green sturgeon DPS, and southern eulachon DPS are unlikely to be in the nearshore work area at the time of pile driving as they would be expected to occur further offshore if within the Action Area at all during construction. Therefore, water quality effects and fish exposure to them are likely to be small within and near the project area and insignificant further from the project area.

2.4.1.4 Sediment Quality

Port Angeles Harbor is a priority bay under Ecology's Puget Sound Initiative. Several contaminants of concern (COCs) exist within the harbor and sampling has not been done within the project area to determine presence or absence of these COCs. However, a site sampled within 1,000 ft (305 m) of the proposed pier construction found that COCs were not detected above SQS and CSL screening levels at this location. Therefore, increases in chemical contamination concentrations in marine waters as a result of sediment resuspension during construction activities would be negligible. Further, the potential for accidental spills or releases of hazardous materials (e.g., from barges, construction platforms, fueling activities on land or in water) would be minimized through implementation of spill prevention and response plans. Contractors would be required to prepare and implement a spill response plan (e.g., Spill Prevention, Control, and Countermeasure) to clean up fuel or fluid spills. As sediments are below the SQS level and increases in chemical contaminants as a result of spill would be minimized through implementation of these prevention and response plans, impacts to ESA-listed species and their critical habitat would be negligible.

The small, localized increase in turbidity on nearshore critical habitat PCEs for PS Chinook are anticipated to be insignificant.

2.4.1.5 Underwater Structures and Benthic Community

The existing underwater rock pile located between the -20 and -75 ft depth range west of the project area is covered with various forms of vegetation and utilized as habitat by various species of juvenile and adult fish as well as invertebrates. Benthic organisms that inhabit the rock pile are prey for juvenile salmon and forage fish, which are part of the marine forage base for ESA-

listed fish and marbled murrelets. Construction may disturb soft bottom habitat within the area and cause increases in turbidity that could potentially affect species within the rock pile. However, turbidity impacts are expected to be temporary and to remain relatively localized to the immediate project area and expected to settle out before reaching the rock pile that is about 1,600 ft away. Construction barges and tugs would avoid the area so as not to damage or shade the rock. With implementation of these minimization measures, impacts to underwater structures would be insignificant.

Benthic communities occurring within the footprint of the piles would be altered during pile installation. About 745 ft^2 of seafloor would be displaced by piles. However, this is small in comparison to seafloor habitat available adjacent and outside of the immediate project area. Therefore, no adverse impacts to ESA-listed species and their critical habitat would result.

2.4.1.4 Forage Fish

There is a documented sand lance spawning site (1000 ft [304 m] long) on the south side of Ediz Hook, about 0.6 miles (0.9 km) west of the proposed pier. The temporary increase of suspended solids during pile driving would be expected to remain in the vicinity of the project and would not impact the spawning success of the sand lance spawning area west of the project. Therefore, no impacts from turbidity to spawning sand lance are anticipated.

Placement of the piles and associated disturbance activities (i.e., support vessels, construction barge) would slightly diminish benthic prey either existing within the pile footprint or disturbance from turbidity which may impact forage fish use of that area for seeking prey. Impacts would be short-term and limited to the duration of pile installation and would not impact forage fish ability to seek prey outside of the project area.

Noise generated from pile driving activities would reach levels that could injure or disturb forage fish occurring within the impact threshold zones during impact pile driving. However, the limited duration (75 days) of pile driving and use of a bubble curtain would minimize any potential impacts. Therefore, effects from noise are not expected to measurably reduce the overall forage base.

Adult salmonids eat juvenile and adult forage fish. During construction, injury or temporary avoidance of the construction area by forage fish may cause temporary, localized reduction in available prey for adult salmonids that may attempt to forage there. This would result in small, short-term impacts to ESA-listed species for the duration of construction. However, due to the small scale of project-associated disturbance, effects on the overall abundance of forage fish are not expected. Therefore, long-term impacts to forage fish availability for ESA-listed salmonids would be negligible.

2.4.1.5 Summary of Construction Effects by Species or Species Group

All Fish Species
All steel piles would be installed initially using a vibratory hammer followed by impact pile driving (to required depth and/or proofing). Impact pile driving would be preempted with start-

up of a bubble curtain. Therefore, most fish are likely to leave the area next to the pile where injurious levels of sound would occur before impact pile driving commences and exposure to injurious levels above the 206 dB PEAK threshold. Based on a critical threshold analysis (Table 5), fish within 14 m (46 ft) of the pile are likely to be injured or killed by sound. For this effects analysis, we therefore assume that all juvenile salmon within a 46-foot radius of the pile being impact-driven would die. This is a conservative assumption as it is likely that non-injurious noise from vibration pile-driving and the bubble curtain would cause most fish to move away. Behavioral response (startle) extends to 736 m (2,415 ft).

All in-water construction activities would be conducted during the in-water work window (July 16 through February15). As previously stated, juvenile Chinook salmon have been documented in the Action Area during the spring and summer; therefore juvenile salmon would likely be exposed to the effects of underwater sound despite adherence to the work windows. Resident and returning Chinook, and steelhead that occur within the harbor could be present during the period of in-water construction and would be exposed to elevated underwater sound levels during pile driving.

Fresh (2016) reported the numbers of juvenile salmon collected along Ediz Hook between May and September from 2006 through 2015 (no sampling was conducted in 2009, 2012, or 2013) (Table 11). Using the 46-foot radius of lethal exposure presented above, about 6,650 ft^2 around each pile being driven would present an injurious environment. Based on the calculated density of young-of-year Chinook sampled near the project area, about 12 fish would be expected to be within the injury zone for each pile driven by impact hammer during July. In August and September, the low density of Chinook juveniles indicates that only about 0.16 fish would be injured per pile. Because the density of fish varies seasonally and impact-hammer pile-driving could occur anytime between July 16 and February 15, to estimate the number of fish exposed to injurious noise levels, we assume that impact-hammer pile-driving would be evenly distributed throughout the 214-day work windows, and the fish density seen in September is applicable from September through February 15. We estimate that around 126 juvenile PS Chinook salmon would be killed in July, 3 in August through January, and 2 in February, for a total of 148 fish. Behavioral response to impact-hammer pile-driving would cover an area of up to 18,322,475 ft^2. Based on the density of fish observed during July, about 32,125 Chinook juveniles would be exposed to noise levels likely to cause a behavioral response. From August through February, 458 fish would be exposed to behavior-modifying noise levels for each pile driven. There is no information available to estimate the number of fish that would be injured or killed due to behavioral response to project-caused noise. Further, it is likely that fish would move away from the project area during a single pile-driving event, such that subsequent pile driving would affect far fewer fish. Given the available data, we estimate that between 200 and 500 juvenile PS Chinook salmon would be lost due to project construction.

Table 31. Juvenile Chinook salmon collected during Northwest Fisheries Science Center beach seining along Ediz Hook. Source: Fresh 2016

Sample Date	Species	Life stage	Mean	Density Fish/ft^2
12-Jul-06	Chinook	0+	2.5	0.00025
12-Jun-07	Chinook	0+	1.5	0.00015
18-Jul-07	Chinook	0+	84.7	0.00847
17-Jun-08	Chinook	0+	224	0.0224
15-Jul-08	Chinook	0+	5	0.0005
25-May-10	Chinook	0+	0.5	0.00005
22-Jun-10	Chinook	0+	14.7	0.00147
21-Jul-10	Chinook	0+	0.5	0.00005
24-Aug-10	Chinook	0+	0.25	0.000025
24-Sep-10	Chinook	0+	0.25	0.000025
24-Jun-11	Chinook	0+	32.3	0.00323
26-Jul-11	Chinook	0+	11.5	0.00115
07-Jul-14	Chinook	0+	1	0.0001
10-Jun-15	Chinook	0+	4	0.0004
13-Jul-15	Chinook	0+	2.5	0.00025

Forage fish, the prey species of listed salmonids, could occur within the behavioral or injury zones during pile driving. Effects from in-water noise would most likely occur on sand lance for which the peak spawning periods (November to mid-February) would coincide with the in-water construction period. Minimization measures listed in Section 2.4 would limit exposure of forage fish species to temporary construction impacts. Exposure to noise levels above the injury threshold would be limited to impact pile driving and/or proofing 144 piles with a maximum 4 hours per day over a maximum of 75 days. During this time, a reduction in forage fish may occur either through injury/mortality or avoidance of the area during pile driving. This could affect adult salmonids that may be foraging at the time. Therefore, a temporary reduction in forage fish could occur within the project area during impact pile driving. However, due to the temporary and localized effects and minimization measures used during impact driving, reductions to the overall population of forage fish are not expected. Therefore the proposed action would not affect the availability of forage fish for salmon or steelhead.

During construction, barrier and overwater shade impacts would include nearshore construction activity, barge anchoring, and small temporary clouds of increased suspended sediment produced during pile driving activity. However, these activities would occur during the in-water work window (July 16 through February 15) when juvenile salmonids are least likely to be present.

PS Chinook ESU and Critical Habitat, HC Chum ESU, and PS Steelhead DPS and Critical Habitat

Pile installation would be conducted during the in-water work window when juvenile salmon are least likely to be present; so exposure of juvenile PS Chinook salmon, HC chum salmon, and PS

steelhead to all in-water work would be small (PS Chinook salmon and steelhead) to negligible (HC chum). Some larger juveniles, adult PS Chinook salmon, and PS steelhead could potentially be present when pile driving would occur. As described above for all fish species, these larger juvenile salmon and adult salmon and steelhead may still be exposed to injurious levels during pile driving as the zone extends out into deeper water where they may occur. Therefore, impacts from exposure to injurious noise levels may result during the 75 days of pile driving.

The nearshore marine area PCE for PS Chinook salmon ESU critical habitat occurs within the Action Area. Small numbers of nearshore-dependent juvenile chinook may be present during pile driving and would be exposed to injurious sound levels and impacting the nearshore PCE. Adult and larger (less nearshore dependent) PS Chinook salmon would be exposed if present in the harbor during pile driving. As previously stated, pile driving is anticipated to occur a maximum of 75 days.

2.4.2 Operations and Maintenance Effects

2.4.2.1 Physical Barriers and Overwater Shade

Within a small area of the nearshore juvenile salmonid rearing habitat, 34 piles would be permanently driven between +7 and -45 ft creating overwater coverage of 8,650 ft^2 (trestle) at this depth range. Between the depth range of -45 to -63 ft MLLW, 110 piles would be permanently driven that would create overwater coverage of 16,886 ft^2. The impact of physical barriers on fish would be greatest in the habitats used by juvenile salmonids as a migratory pathway. Because adult salmonids are less dependent on nearshore habitats and also have much greater mobility, they would not experience the same barrier effect as nearshore-dependent juvenile salmonids. Should adults encounter these nearshore construction activities, they could migrate around these structures with little or no overall delay in their movements.

Nightingale and Simenstad (2001) cite multiple studies that indicate juvenile salmon, notably fry, migrate within shallow nearshore waters. These studies have shown that smaller juveniles (e.g., fry less than 1.9 inches long) migrate along the shoreline in waters less than 3 ft in depth (Whitmus 1985). Simenstad et al. (1999) refer to shallow-water habitat as "…that portion of the nearshore estuarine and marine environment habitually occupied by migrating salmon fry (i.e., about 30-80 millimeters long), which includes the intertidal zone to about 6 feet below MLLW." When juvenile salmonids are migrating along the shorelines and encounter a modified habitat within the shallow water zone, they may be forced to move out into deeper water to swim around the barrier, exposing them to predators. A study found that juvenile salmonids would move offshore when encountering barriers (i.e., piles, pier) and would occur in higher densities (schools) at overwater structures. However, juveniles were not observed underneath the structures but were more schooling along the edge of the overwater structure, near open water (Toft et al. 2004). This supports the premise that juvenile salmon avoid overwater structures due to barriers to normal movement patterns or low light levels (Simenstad et al. 1999).

The resulting overwater coverage of 25,465 ft^2 would reduce light penetration to existing benthic vegetation. Each dock defines a shade footprint specific to its structural specifications. Dock height, width, construction materials, and the dock's orientation to the arc of the sun are primary

factors in determining the shade footprint that a given dock casts over the submerged substrates. Studies of eelgrass under piers have shown that about 50% survival below docks at least 6 feet above the seabed (Burdick and Short 1999). Juvenile fish and forage fish utilize eelgrass and other submerged aquatic vegetation as nursery habitat and refuge. Further, eelgrass is designated as EFH and a Habitat Area of Particular Concern for Pacific coast salmon (See Section 3). The anticipated reduction in eelgrass would reduce habitat and prey for forage fish species as well as reduce presence of forage fish. In addition, shadows from large overwater structures built within nearshore environments can disrupt juvenile Pacific salmon migratory behavior. A study conducted at ferry terminals found that juvenile salmon (predominantly pink salmon [*O. gorbuscha*]) would avoid swimming under docks and shaded areas causing delay in migration by several hours during the daytime at high tide periods and on sunny days (Ono et al. 2010).

Reduction of eelgrass that exists within the footprint of the proposed trestle would be offset and minimized by way of the proposed removal of two overwater/inwater structures that would be expected to result in the availability of additional nearshore habitat for eelgrass over time (see Section 2.2.5).

The resulting overwater coverage and reduction in aquatic vegetation would impact the nearshore PCE for PS Chinook critical habitat. Impacts would be localized to 25,465 ft^2 and are expected to be offset and minimized through compensatory mitigation.

Physical barriers and overwater shade caused by the new pier would insignificantly affect the nearshore critical habitat PCEs for PS Chinook salmon.

2.4.2.2 Water Circulation and Bathymetry

The Port Angeles Harbor should not experience any changes in circulation as a result of the pier structure. The location of the proposed action is on the further western end of Ediz Hook in a fairly calm region where circulation at this end of the hook is primarily driven by vessel and recreational boat traffic. Further, no dredging is proposed and thus there would be no change to existing bathymetry. No impacts to ESA-listed species would result.

2.4.2.3 Marine Vegetation

Marine vegetation is present within the project area, encompassing various species of eelgrass, kelp, and algae (SEE LLC 2015). ESA-listed salmonids use eelgrass for nursery habitat, refuge, and foraging. A survey conducted in July documented eelgrass occurring in a continuous bed between 0 and -20 ft with some plants occurring as deep as -35 ft. The total eelgrass present within the project area is 98,873 ft2 (Navy 2015 – Eelgrass Survey Report). Direct impacts to existing eelgrass from proposed construction activities may result from turbidity during pile driving and temporary shading from construction barges. Avoidance and minimization measures would be implemented to avoid directly damaging or minimizing impacts to eelgrass in the project area during construction. For example, construction barges would avoid anchoring in eelgrass areas and would likely be further offshore and away from potential shading of eelgrass during trestle installation. However, pile installation would occur within documented eelgrass beds. About 745 ft2 (69 m2) of eelgrass would be directly affected from placement of piles.

Impacts are expected to be offset and minimized as discussed in Section 2.2.5. All other construction related impacts would be temporary and short-term and insignificant to species.

After construction, a long-term reduction in light within the trestle footprint (8,650 ft2) is expected which could result in a reduction of eelgrass density in the area. Compensatory mitigation is expected to create habitat for eelgrass to potentially grow and offset loss from shade coverage of the trestle. However, reestablishment is not expected to occur immediately and there would be a localized reduction in eelgrass habitat utilized by juvenile PS Chinook salmon. This localized loss would also slightly affect the nearshore critical habitat PCE for PS Chinook.

2.4.2.5 Summary of Operation and Maintenance Effects on ESA-Listed Fish Species

Following construction, juvenile Chinook salmon survival would be slightly reduced by behavioral responses to the new pier that may subject them to higher rates of predation and potentially lower growth. The minor reduction in suitable nearshore habitat would inconsequentially affect PS Chinook salmon critical habitat. Adult salmon likely make only temporary use of the action area and can easily avoid adverse conditions by moving away. Hence, the pier's effects on adult salmonids are expected to be negligible.

2.4.3 Effects of Proposed Mitigation Measures

The proposed mitigation projects would disturb about 35,780 ft^2 (0.83 acres) of nearshore habitat. Removing existing structures and fill would create small areas of sediment disturbance and localized turbidity and non-injurious noise levels. The likely effect on PS Chinook salmon during construction would be small, primarily causing juvenile fish in the area to move away, potentially increasing their exposure to predation. HC chum and PS steelhead are unlikely to be in the nearshore environment of the action area and would be unaffected by the construction of the mitigation measures. Removal of the structures and fill would create unshaded habitat suitable for eelgrass and other marine vegetation. It is anticipated that eelgrass beds adjacent to the mitigation sites would increase and occupy the new habitat over time. This would increase the conservation value of the affected habitat for juvenile Chinook salmon and forage fishes, and by removing coarse rock fill, decrease the habitat for predatory fishes.

2.4.4 Effects from Interrelated and Interdependent Activities

Interrelated actions are those actions that are part of a larger action, and that depend on a larger action for its justification. Interdependent actions are those that have no independent utility apart from the proposed action.

Any increase in ship traffic caused by operation of the new pier would be an interdependent activity with new, or additional effects. However, ship operations that would be associated with the new pier are currently being conducted from existing slips and marinas in the Port Angeles harbor area and there would be no additional ship traffic associated with the proposed action. The proposed pier project does not have other projects dependent on its actions for their implementation, nor is it dependent on other projects or actions for its justification. Therefore, no interrelated or interdependent actions are associated with the pier project.

2.5 Cumulative Effects

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

Because of the small scope and action area, no non-Federal actions are reasonably certain to occur in the action area. However, future activities upstream and in the vicinity of the action area are likely to influence habitat conditions in Puget Sound, including the action area. Many of the ongoing and future activities in the Puget Sound basin would be caused by population growth and land development. We consider human population growth and associated development to be one of the main drivers for future negative effects on salmon and steelhead and their habitat.

Activities that we include here as cumulative effects are; state, tribal or local agency actions such as the Washington State legislation to enhance salmon recovery through tributary enhancement programs, Washington's Total Maximum Daily Load (TMDL) development, state efforts to reduce greenhouse gas emissions and respond to climate change, human population growth and associated land use changes, and tribal efforts to restore native culturally important fish populations in Puget Sound.

2.5.1 Human Population Growth, Land Use, and Climate Change

Some characteristics of the environmental baseline in the action area described above are expected to change over time due to the effects of increased human population in the Puget Sound region, attendant changes in land use, and climate change. (Climate change is discussed in Section 2.2.4). The Puget Sound Regional Council anticipates that the Puget Sound region's population would grow from about 3.7 million in 2014 to almost 5 million by 2040 (PSRC 2013). This growth would likely occur mostly within existing urban areas and their peripheries located in valley bottoms and the coastal plain. With such urbanization would come increased water pollution, more channel simplification and bank hardening to protect developed property.

As described in Section 2.2.4, recent projections of the likely physical changes in fish habitats in the Puget Sound ecoregion from the changing climate are: increased water temperatures (marine and freshwater), increased ocean acidification, and increased peak flows (floods). All of these changes are expected to adversely affect PS Chinook salmon and PS steelhead throughout their ranges, including the action area

2.5.2 Washington State

Several legislative measures have been passed in the State of Washington to facilitate the recovery of listed species and their habitats, as well as the overall health of watersheds and ecosystems. The 1998 Salmon Recovery Planning Act provides the basis for developing watershed restoration projects and establishes a funding mechanism for local habitat restoration projects. The Salmon Recovery Planning Act also created the Governor's Salmon Recovery

Office, to coordinate and assist in the development of salmon recovery plans. Although this Act is already in effect, it directs future actions to support salmon recovery.

The Statewide Strategy to Recover Salmon is also designed to improve watersheds, while the 1998 Watershed Planning Act encourages voluntary water resource planning by local governments, citizens, and Tribes in regards to water supply, water use, water quality, and habitat at the water resource inventory area (WRIA) level. The Salmon Recovery Funding Act established a board to approve localized salmon recovery funding activities.

The WDFW and Tribal co-managers implemented the Wild Stock Recovery Initiative in 1992 and completed comprehensive management plans that identify limiting factors and habitat restoration activities. These plans also include actions in the harvest and hatchery components.

There are global efforts to reduce greenhouse gas emissions (e.g. Kyoto Protocols), but it is too early to determine their effectiveness. The State of Washington has also undertaken several initiatives to reduce emissions of greenhouse gases (primarily carbon dioxide). This effort involves efforts to reduce emissions from transportation by reducing motor vehicle miles driven, adopting low emissions standards (California standards), implementing fuel quality standards, provisions for electric vehicles, and others. To reduce emissions from electrical generating stations, the state has set building efficiency standards, including retrofits of existing public buildings, and efforts to encourage greater use of renewable energy. The state's overall goal is to achieve 1990 levels of greenhouse gas emissions by 2020, to be 25% below 1990 levels by 2035, and to be 50% below 1990 levels by 2050 (RCW 70.235.020 – Washington Legislature 2008). Washington has also conducted a comprehensive assessment of the likely impacts of climate change on the state and has developed climate change mitigation and adaptation programs. Based on the state legislative initiatives, there would likely be many follow-up actions that would be aimed at reducing greenhouse gases. While these programs and regulations are likely to be beneficial, climate change and emission of greenhouse gases are global issues and climate projections continue to show adverse climate effects for decades to come.

2.5.3 PS Chinook Recovery Plan and the Shared Strategy for Puget Sound

The Shared Strategy for Puget Sound, a regional collaborative effort of state and local governments, tribes, interested citizens, technical experts, and policy makers in the Puget Sound region, developed a proposed recovery plan for PS Chinook salmon and bull trout and submitted it to NMFS in 2002 (Shared Strategy 2002). NMFS (2006) supplemented the Shared Strategy plan and, after the Shared Strategy participants agreed to the NMFS supplement, adopted the two documents as the species' recovery plan in January 2007. The plan focuses on regional actions and regulations to improve watershed health, thereby improving the status of the species. The State of Washington then enacted The Puget Sound Partnership Act (Section 49(3), RCW 77.85.090(3)) on January 1, 2008 to coordinate plan implementation. This broad, regional support for PS Chinook salmon recovery planning strongly suggests that over time, the plan would be implemented and measurable improvements in the status of the species would ensue. However, plan participants estimate it would take between 50 and 100 years to fully implement the plan.

In 2011, NMFS evaluated progress, to date, in implementing the recovery plan (Judge 2011) and identified the following accomplishments by numerous parties:

- The Co-Managers (the WDFW and Puget Sound Treaty Tribes, collectively) met or exceeded the harvest management performance measures required in the 2004 Harvest Management Plan.
- The WDFW completed its 21st Century Salmon and Steelhead Initiative, which would help them identify, monitor and evaluate long-term, science-based hatchery management strategies.
- Numerous high priority habitat restoration projects have been accomplished across every watershed in Puget Sound, funded by local government and private parties.
- The Nisqually watershed completed a major portion of their largest project, the Nisqually Refuge Estuary restoration project, with the support and shared contribution of funds from other South Sound watershed groups.
- The Elwha River Dam removal project, funded by the Federal government, is near completion. [9]
- Despite a severe recession, significant change in the organizational structure supporting Puget Sound salmon recovery, a loss of staff and severe funding shortages; the local commitment to salmon recovery across the ESU remains firm and work is continuing.

Given this substantial ongoing effort to recover PS Chinook salmon, it is likely that recovery practitioners would continue to provide increasing benefits to salmon and steelhead recovery into the future.

2.6 Integration and Synthesis

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

In addition to their poor status, degraded baseline, and adverse effects of climate change, growth-driven cumulative effects would likely continue to adversely affect critical habitat and the species that depend on critical habitat function. The extent of cumulative effects is difficult to predict because of the uncertainties associated with government and private actions in the face of changing economies in the region. Still, over the long term, the growth driven cumulative effects are likely to increase and be adverse unless radical changes to zoning and development practices are implemented and/or restoration actions increase exponentially.

[9] Elwha Dam was removed in 2012 and Glines Canyon Dam has been breached, allowing fish unencumbered access to over 70 miles of spawning and rearing habitat.

During construction, noise caused by pile-driving would be likely to injure, kill, or disrupt the behavior of salmon in the action area. Because rearing juvenile salmon are known to use the near-shore environment where the noise produced by pile-driving is estimated to be injurious, a small number of PS Chinook salmon juveniles are expected to be killed or injured by the project. Juvenile salmon located within 14 m of impact-hammer pile-driving are likely to be injured or killed. Bubble curtains would reduce this effect by reducing sound transmission and by initiating an avoidance response in fish prior to initiating pile-driving. Based on beach-seining data (Fresh 2016) we estimate that up to 500 juvenile Chinook salmon would be killed during construction. Adult salmon and steelhead are less common in the action area and would likely respond to pile-driving noise by leaving the area. Moving out of Port Angeles harbor would increase adult salmon exposure to predators (e.g. killer whales), but the overall effect on adult salmon and steelhead would be small to negligible due to the minor nature of the effect and the small number of individuals likely to be affected. Construction is expected to cause direct injury or mortality to juvenile Chinook salmon because they are known to use near-shore habitats within the action area. These effects are expected to be locally moderate, but inconsequential at the ESU level.

It is not possible to accurately estimate the reduction in fish numbers likely to be caused by the new overwater structure because fish are mobile, making the number of fish exposed impossible to estimate. However, at the maximum density of juvenile Chinook salmon observed in July (Fresh 2016), about 45 fish would be expected currently in the 25,465 ft^2 area to be covered by the new pier. The Navy has proposed removing rock fill along the beach, at 2 sites south of the pier with a total area of 35,780 ft2, meaning that more new suitable juvenile salmonid rearing habitat would be created than would be lost due to the project.

The likely effects of the action on critical habitat include a net increase in juvenile rearing habitat and a slight reduction in forage. While measurable in the action area, on an ESU scale the effect on critical habitat would be very small. Puget Sound has over 2,500 miles of shoreline. The project footprint would occupy about 0.01% of the near-shore habitat in the Sound.

Even though the baseline is degraded and cumulative effects likely would continue to adversely affect critical habitat, the added adverse effect of the proposed action is too small on an ESU-level to substantially reduce the conditions of critical habitat or preclude re-establishing properly functioning conditions. Overall, when added to the baseline and cumulative effects, the effects of the action on critical habitat would not significantly affect the conservation value of critical habitat at the designation scale.

Given the known presence of listed salmonids in the action area, PS Chinook salmon, which are common in the action area would be most affected. HC chum salmon, which are not known to use the action area, and steelhead, which rarely occur in the action area, would be unaffected, or negligibly affected by the proposed action, respectively.

2.7 Conclusion

After reviewing and analyzing the current status of the listed species and critical habitat, the environmental baseline within the action area, the effects of the proposed action, any effects of interrelated and interdependent activities, and cumulative effects, it is NMFS' biological opinion

that the proposed action is not likely to jeopardize the continued existence of Puget Sound Chinook salmon, Puget Sound steelhead, or Hood Canal chum salmon, or destroy or adversely modify their designated critical habitat.

2.8 Incidental Take Statement

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without a special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm" is further defined by regulation to include significant habitat modification or degradation that actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding, or sheltering (50 CFR 222.102). "Incidental take" is defined by regulation as takings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant (50 CFR 402.02). Section 7(b)(4) and section 7(o)(2) provide that taking that is incidental to an otherwise lawful agency action is not considered to be prohibited taking under the ESA if that action is performed in compliance with the terms and conditions of this incidental take statement.

2.8.1 Amount or Extent of Take

In the biological opinion, NMFS determined that incidental take would occur as follows:

Injury or Death of Juvenile Salmonids from Pile Driving. For the jeopardy analysis, we conservatively estimated the maximum number of PS Chinook salmon juveniles that would be taken by the project at 500 fish during the 2 years of construction. Take of HC chum salmon is not expected, and the take of PS steelhead is likely be very small, probably less than 10 fish. No take of adult salmonids is anticipated. The restrictive inwater work window, reduces the exposure of juvenile salmonids to the adverse effects of pile-driving. Because it would not be possible to collect, or otherwise enumerate the number of juvenile salmon taken during pile driving, we are using the number of piles driven using impact hammers and the duration of impact-hammer pile driving as a surrogate for take. Thus, the amount of take authorized is the amount of take caused by driving 224 piles from 18 inches to 36 inches in diameter over no more than 100 days, during two inwater work windows (July 16 through February 15).

2.8.2 Effect of the Take

In the biological opinion, NMFS determined that the amount or extent of anticipated take, coupled with other effects of the proposed action, is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

2.8.3 Reasonable and Prudent Measures

"Reasonable and prudent measures" are nondiscretionary measures that are necessary or appropriate to minimize the impact of the amount or extent of incidental take (50 CFR 402.02).

To minimize the impact of incidental take of listed salmon and steelhead species from the proposed action (50 CFR 402.14(i)(3)), the Navy must:

1. Minimize incidental take from project-related activities by applying conditions to the proposed action (Navy 2015) that avoid or minimize adverse effects on water quality and the ecology of aquatic systems, including:
   - minimizing the use of impact-hammer pile driving to the extent practical, and
   - employing the best management practices (Navy 2015),

2. Complete the compensatory mitigation measures described in Section 1.3.4 of this Opinion (Section 2.2.5 of the BA [Navy 2015]) within 2 years of issuance of this Opinion.

3. Ensure completion of a reporting form to confirm that the take exemption for the proposed action is not exceeded, and that the terms and conditions in this incidental take statement are effective in minimizing incidental take.

2.8.4 Terms and Conditions

The terms and conditions described below are non-discretionary, and the COE or any applicant must comply with them in order to implement the reasonable and prudent measures (50 CFR 402.14). The COE or any applicant has a continuing duty to monitor the impacts of incidental take and must report the progress of the action and its impact on the species as specified in this incidental take statement (50 CFR 402.14). If the entity to whom a term and condition is directed does not comply with the following terms and conditions, protective coverage for the proposed action would likely lapse.

1. The following term and condition implements reasonable and prudent measure 1:
   a. The Navy, or its contractor, must initiate bubble curtain deployment prior to initiating impact-hammer pile driving.
   b. Confine pile driving to 100 days over two consecutive inwater work windows (July 16 through February 15).
   c. Limit the number of piles driven to no more than 144 permanent and 80 temporary.

2. The following term and condition implements reasonable and prudent measure 2:
   a. Obtain all necessary permits necessary to complete the compensatory mitigation projects within 2 years NMFS issuing this opinion.

3. The following term and condition implements reasonable and prudent measure 3:
   a. The Navy must report in writing the number of piles driven of each size, the mechanism of pile driving, and dates of pile driving to NMFS within 60 days of project completion. Any exceedance of take covered by this opinion must be reported to NMFS immediately.
   b. The Navy must provide photographic evidence of completion of the compensatory mitigation projects within 2 years of the date of this Opinion.

c. The applicant would submit the report to:

National Marine Fisheries Service
510 Desmond Drive SE, Suite 103
Lacey, WA 98503
or electronically to: Matthew.Longenbaugh@noaa.gov

2.9 Conservation Recommendations

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

The following conservation recommendations are discretionary measures that NMFS believes are consistent with this obligation and therefore should be carried out by the Navy:

- To the extent practical, avoid impact-hammer pile driving during the month of July. Relatively large numbers of PS Chinook salmon would be within the injury and behavior effect zones of impact-hammer pile driving during July. There would remain sufficient days to complete pile driving during the remainder of the inwater work window.
- Remove invasive plant species from riparian and upland areas and plant native species

Please notify NMFS if the Navy carries out these recommendations so that we would be kept informed of actions that are intended to improve the conservation of listed species or their designated critical habitats.

2.10 Reinitiation of Consultation

This concludes formal consultation.

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

2.11 "Not Likely to Adversely Affect" Determinations

2.11.1 Green Sturgeon

The only known spawning population of this DPS occurs in the Sacramento River, and juveniles spend 1 to 4 years in freshwater before migrating to the ocean. Sturgeon have been observed on a

southward migration within the deep waters of the Strait of Juan de Fuca waters during the summer. It is assumed that most green sturgeon migrating between Canadian and United States waters cross the Strait of Juan de Fuca over deep water to the west of the Strait of Juan de Fuca line (Lindley et al. 2008). There have been no sightings of green sturgeon within the Port Angeles Harbor. It is unlikely that any subadult and non-spawning adult green sturgeon would be present in the action area. Consequently, the proposed action would have no impact on green sturgeon spawning or juvenile rearing.

Green sturgeon are bottom feeders. Their diet has been found to be comprised primarily of invertebrates including mollusks, shrimp, and amphipods (Moyle et al. 1992). They generally don't feed on salmon. We expect a small reduction in primary productivity in the action area from the continued shading. This would likely translate through the food chain into an imperceptible reduction of green sturgeon food sources. However, because of the small scale of the impact, we expect the ESU-wide effect to sturgeon food sources from the proposed action to be insignificant. Thus, the proposed action is not likely to adversely affect green sturgeon.

Critical habitat has been designated on October 9, 2009 for green sturgeon (74CFR 52300). Critical habitat in the LCR is designated from the mouth of the LCR estuary to RKM 74 (RM 46). Relevant PCEs in the action area include: Food resources with abundant prey for subadults; water quality with acceptably low levels of contaminants; and an unobstructed migratory corridor. The proposed action would result in a very small reduction of water quality and food sources in the action area, as discussed above and in Section 2.4.2. However, at the scale of critical habitat designation, the proposed action would not interfere with the functions of these essential features. Thus, we concur that the proposed action is not likely to adversely affect green sturgeon or its critical habitat.

2.11.2 Eulachon

Eulachon are endemic to the eastern Pacific Ocean and range from northern California to southwest Alaska and into the southeastern Bering Sea. The Southern DPS of eulachon includes populations spawning in rivers south of the Nass River in British Columbia to the Mad River in California. Eulachon prefer large river systems, such as the Columbia and Fraser rivers that are fed by snowmelt or extensive spring freshets. In Washington and Oregon eulachon primarily spawn in the Columbia River system. Eulachon leave saltwater to spawn in their natal streams in late winter through early summer and typically spawn in the lower reaches of larger rivers fed by snowmelt, glacial runoff, or extensive spring freshets (Gustafson et al., 2010). Adult eulachon weigh an average of 0.1 pounds each and are 15 to 20 cm long with a maximum recorded length of 30 cm. Spawning in the Columbia River begins as early as December, peaks in February, and can continue through May (Gustafson et al. 2010). Eulachon eggs, averaging 1 millimeter in size, are generally broadcast over and attach to sand to pea-sized gravel. Hatching occurs 20 to 40 days after spawning, depending upon water temperature. Newly hatched larvae, are transparent, slender, and, in the Columbia River, 4 to 8 millimeter in length (WDFW and ODFW, 2001). Larvae as well as some eggs are carried downstream with the current to estuaries. Larval eulachon may reside for up to a year in estuaries feeding on pelagic plankton after the yolk sac is depleted before entering marine waters (Gustafson et al. 2010).

Prior to dam removal, eulachon had been rare in the Elwha River system for the past 60 years and only occasional spawning had been reported (Gustafson et al. 2010). Removal of the dam has restored eulachon habitat that was altered by the dam. In January 2015, seining surveys in the lower Elwha River estuary collected hundreds of egg-bearing and spent eulachon, indicating that local spawning was occurring (Coastal Watershed Institute 2015). While nearby, this apparently growing population of eulachon in the Elwha River is confined to that river as they are anadromous fish that spawn in fresh water and typically rear in lower river sections and their estuaries.

Larval and juvenile eulachon are planktivorous (WDFW and ODFW, 2001). Adult eulachon in marine waters have been shown to consume krill, crustaceans, copepods, and some small fish; they are thought to consume little to no food during the freshwater portion of their upstream migration (Scott and Crossman, 1973); (Yang et al., 2006). While we expect a small reduction of primary production from shading, the magnitude of this effect is insignificant on an ESU-scale. Thus, the proposed action is not likely to adversely affect any life stage of eulachon.

No eulachon critical habitat occurs in the action area.

2.11.3 Southern Resident Killer Whales

NMFS listed the SR killer whales DPS, composed of J, K, and L pods, as endangered under the ESA on November 18, 2005 (70 FR 69903). The final rule listing SR killer whales as endangered identified several potential factors that may have caused their decline or may be limiting recovery. These include declining quantity and quality of prey, toxic chemicals that accumulate in top predators, and disturbance from sound and vessel traffic. The rule also identified oil spills as a potential risk factor for this species. The final recovery plan (NMFS 2008) includes more information on these potential threats to SR killer whales. This section summarizes information taken largely from the recovery plan and recent 5-year status review (NMFS 2011), as well as new data that have become available more recently.

The SR killer whale DPS is composed of a single population that ranges as far south as central California and as far north as Southeast Alaska. From late spring to early autumn, SR killer whales spend considerable time in the Salish Sea (Strait of Georgia, Strait of Juan de Fuca, and Puget Sound (Bigg 1982, Ford *et al.* 2000, Krahn *et al.* 2002, Hanson and Emmons 2010), with concentrated activity around the San Juan Islands. During fall and early winter, Southern Resident pods, and J pod in particular, expand their routine movements into Puget Sound, likely to take advantage of chum and Chinook salmon runs (Hanson *et al.* 2010, Osborne 1999). During late fall, winter, and early spring, the ranges and movements of the SR killer whales are less known. Sightings through the Strait of Juan de Fuca in late fall suggest that activity shifts to the outer coasts of Vancouver Island and Washington (Krahn *et al.* 2002).

The historical abundance of SR killer whales is estimated to have been at least 140 individuals. We do not know what the maximum may have been. The minimum historical estimate (~140) included whales killed or removed for public display in the 1960s and 1970s added to the remaining population at the time the captures ended. Several lines of evidence (*i.e.*, known kills and removals [Olesiuk *et al.* 1990], salmon declines [Krahn *et al.* 2002] and genetics [Krahn *et al.* 2002, Ford *ed.* 2011]) all indicate that the population used to be much larger than it is now,

but there is currently no reliable estimate of the upper bound of the historical population size. When faced with developing a population viability analysis for this population, NMFS' biological review team found it reasonable to assume an upper bound of as high as 400 whales to estimate carrying capacity (Krahn *et al.* 2004).

The Whale Museum maintains a compendium of SRKW sightings made from 1990 through 2008 (Osborn 2008). SR killer whales are seldom observed in or near the action area. There have been one or two observations in or near the action area in March, July, August, September, October, and December (Osborn 2008). Killer whales have highly developed hearing and use sound to locate prey (echolocation).

The Navy submitted a Marine Mammal Monitoring and Mitigation Plan to NOAA. The plan requires that two trained observers be stationed where they have the best view practical. "If humpback whale, minke whale, gray whale, killer whale, Dall's porpoise, or Pacific white-sided dolphin approach the behavioral harassment zone (120 dB RMS) during pile driving/removal, work will be paused until the marine mammal exits the behavioral harassment zone to avoid Level B harassment take" (Navy 2016). With monitoring and shutdown zones in place, impacts to SR killer whales from pile driving noise would be discountable. Even if an SR killer whale entered the behavioral harassment zone unobserved (e.g. underwater), during impact-hammer pile driving, the most likely response would be to move away, unharmed. Due to the low probability of any SR killer whale entering the action area and the distance between the project area and past occurrences of SR killer whales, we concur that the proposed action is not likely to adversely affect SR killer whales or their designated critical habitat.

2.11.4 Humpback Whales

Humpback whales were listed in 1970 as endangered under the Endangered Species Conservation Act of 1969 (USFWS 1970), the predecessor to the ESA. When the ESA was passed in 1973, the humpback whale was listed as endangered throughout its range. In April 2015, NMFS proposed to divide the globally listed endangered humpback whale species into 14 DPSs, remove the current species-level listing, and in its place list 2 DPSs as endangered and 2 DPSs as threatened. The remaining 10 DPSs are not proposed for listing based on their current statuses (NMFS 2015). Based on the fidelity of humpback whales to feeding grounds, two of the DPS' proposed for threatened status (Western North Pacific and Central America) are known to use the eastern North Pacific waters of Alaska, British Columbia, and Washington for feeding. Two additional DPSs that are not proposed for listing (Hawaii and Mexico) are also known to use Eastern North Pacific waters for feeding (NMFS 2015). In this concurrence determination, we focus on the existing listing of all humpback whales as endangered as this global analysis covers all proposed DPSs, including the western North Pacific and Central America DPSs. The action area is within the feeding area of humpback whales from the Mexico, Central America, Hawaii, and Western North Pacific DPSs.

Humpback whales occur in all major oceans of the world. In the North Pacific, humpback whales feed in coastal waters from California to Russia, including in the Bering Sea. These humpback whales migrate south off Mexico, Central America, Hawaii, southern Japan, and the Philippines (Carretta et al. 2013). Significant levels of nuclear and mtDNA differences exist between the

North Pacific humpback whale populations (Baker et al. 1998). Currently, there are four separate stocks (defined based on feeding areas) in the North Pacific recognized in the U.S. MMPA Pacific stock assessment reports: the Central North Pacific Stock, the Western North Pacific Stock, the California/Oregon/Washington Stock, and the American Samoa Stock (Carretta et al. 2013). These stocks are defined based on feeding areas because maternally directed fidelity appears stronger in feeding areas than in wintering areas. The California/Oregon/Washington stock winters in coastal waters of Mexico and Central America and migrates to feeding areas ranging from the coast of California to southern British Columbia in summer/fall (Carretta et al. 2013). Humpback whales forage on a variety of crustaceans, other invertebrates, and forage fish (reviewed in NMFS 1991). In their summer foraging areas, humpback whales tend to occupy shallow, coastal waters. In contrast, during their winter migrations humpback whales tend to occupy deeper waters further offshore, and are less likely to occupy shallow, coastal waters.

Humpback whales routinely make extensive migrations between breeding and feeding areas within an ocean basin. For example, the proposed Central America DPS routinely makes migrations in excess of 3,000 miles between winter breeding grounds off the Central American coast and feeding areas along the Canadian coast. Despite this potential for long distance dispersal, there is considerable evidence that dispersal or interbreeding of individuals from different major ocean basins is extremely rare and that whales from the major ocean basins are differentiated by a number of characteristics. Humpback whale DPSs show strong fidelity to established feeding and breeding areas.

The abundance and population trends of humpback whales are difficult to estimate, but based on the available data humpback whales appear to be increasing in abundance across much of their range (Carretta et al. 2013). Calambokidis et al. (2008) estimated that the current population of humpback whales in the North Pacific is approximately 18,000 to 20,000 whales, not counting calves. More recently, the abundance was estimated to be over 21,000 individuals (Barlow et al. 2011). The estimated growth rate for this stock is between 6% and 8%, annually (Carretta et al. 2013). Global abundance was estimated at 1,400 whales in 1966, shortly before harvest was curtailed. The best estimate of abundance for the California/Oregon/Washington stock is 2,043 (Calambokidis et al. 2009). Within this stock, regional abundance estimates vary among the feeding areas. Average abundance estimates ranged from 200 to 400 individuals for southern British Columbia/northern Washington, and 1,400 to 2,000 individuals for California/Oregon (Calambokidis et al. 2008, Barlow et al. 2011). There is a high degree of site fidelity in these feeding ranges with almost no interchange between these two feeding regions.

The California/Oregon/Washington stock winters in coastal waters of Mexico and Central America and migrates to feeding areas ranging from the coast of California to southern British Columbia in summer/fall. In their summer foraging areas, humpback whales tend to occupy shallow, coastal waters. In contrast, during their winter migrations humpback whales tend to occupy deeper waters further offshore, and are less likely to occupy shallow, coastal waters.

The primary threats to humpback whales are entanglement in fishing gear, ship strikes, whale watch harassment, harvest, and habitat impacts. Entanglement in gear from several fisheries can occur along their long migration from Hawaii to Alaska. Longline gear, crab pots, and other non-fishery related lines have impacted the species. Shipping traffic, or low- and mid-frequency

active sonar have had a potential impact on humpback whale habitat. Studies have not been conducted on humpback whales, but data collected on blue whales (*Balaenoptera musculus*) showed signs of disturbance by way of increasing swimming speed, moving away from source, and cessation of feeding (Carretta et al. 2014).

Between January 2003 and July 2012 there were over 60 sightings of humpback whales reported within inland waters of Washington (Orca Network 2012). Of these 60 sightings, a majority were within the main basin of Puget Sound. The number of humpback whales potentially present within the action area are expected to be very low in any month and even lower from August through March. The closest and most recent sightings of humpback whales to the action area have been within the deep waters of the Strait of Juan de Fuca, approximately 20 miles (32 km) north of the Ediz Hook during the month of May (Orca Network 2015).

The Navy submitted a Marine Mammal Monitoring and Mitigation Plan to NOAA in February 2016. The plan requires that two trained observers be stationed where they have the best view practical. "If humpback whale, minke whale, gray whale, killer whale, Dall's porpoise, or Pacific white-sided dolphin approach the behavioral harassment zone (120 dB RMS) during pile driving/removal, work will be paused until the marine mammal exits the behavioral harassment zone to avoid Level B harassment take" (Navy 2016). With monitoring and shutdown zones in place, impacts to humpback whales from pile driving noise would be discountable. Even if a humpback whale entered the behavioral harassment zone unobserved (e.g. underwater) during impact-hammer pile driving, the most likely response would be to move away, unharmed. Due to the low probability of any SR killer whale entering the action area and the distance between the project area and past occurrences of humpback whales, we concur that the proposed action is not likely to adversely affect humpback whales or their designated critical habitat.

3. MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT ESSENTIAL FISH HABITAT CONSULTATION

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

This analysis is based, in part, on the EFH assessment provided by the Navy (2015) and descriptions of EFH for Pacific coast salmon (PFMC 2014) and Pacific groundfish (PFMC 2005, as approved by NMFS 2006) contained in the fishery management plans developed by the Pacific Fishery Management Council and approved by the Secretary of Commerce. The action area, described in Section 1.4, is also the action for determining the action's effects on EFH.

3.1 Essential Fish Habitat in the Action Area

3.1.1 Pacific Coast Groundfish

Pacific coast groundfish species are considered sensitive to over-fishing, the loss of habitat, and water and sediment quality. The groundfish EFH consists of the aquatic habitat necessary to allow for groundfish production to support long-term sustainable fisheries for groundfish and for groundfish contributions to a healthy ecosystem (PFMC 2014a). The PFMC (2014a) identifies the overall area designated as groundfish EFH for all species covered in the FMP as all waters and substrate within "depths less than or equal to 11,500 ft (3,500 m) MHHW or the upriver extent of saltwater intrusion, defined as upstream and landward to where ocean-derived salts measure less than 0.5 parts per thousand (ppt) during the period of average annual low flow." Furthermore, the PFMC (2014a) has also designated EFH for each individual groundfish species by lifestage. These designations are contained within Appendix B of the FMP (PFMC 2005a, b). Using the Pacific Habitat Use Relational Database developed by the PFMC, it was determined which groundfish species and lifestages have EFH designated within the vicinity of the project area (Appendix B). The management unit in the Pacific Coast Groundfish FMP includes over 90 groundfish species (PFMC 2014a). Of these, 40 were identified through the analysis of the Habitat Use Relational Database as having EFH designated in the vicinity of the project area.

Based on the analysis, the primary habitats designated as EFH for groundfish include:

- The epipelagic zone of the water column, including macrophyte canopies and "drift algae";
- Unconsolidated sediments consisting of mud, sand, or mixed mud/sand;
- Hard-bottom habitats composed of boulder, bedrock, cobble, gravel, or mixed gravel/cobble;
- Mixed sediments composed of sand and rocks; and
- Vegetated bottoms consisting of algal beds, macrophytes, or rooted vascular plants.

Site-specific nearshore dive surveys and seine surveys conducted in the project area confirmed occurrence of seven groundfish species: black rockfish, blue rockfish, quillback rockfish, cabezon, kelp greenling, lingcod as well as unidentified flatfishes/sole species, and unidentified juvenile rockfish (Sebastes spp.) (Appendix B). This confirms the nearshore occurrence of these species but is not intended to indicate the lack of occurrence of the other groundfish species, particularly based on the shallow-water limits of the surveys.

3.1.2 Coastal Pelagic Species

The Pacific Council's Coastal Pelagic Species FMP specifies a management framework for northern anchovy (*Engraulis mordax*), market squid (*Loligo opalescens*), Pacific sardine, Pacific mackerel, and jack mackerel. In October 2006, the Coastal Pelagic Species FMP was amended to include all krill species. EFH for non-krill coastal pelagic species addresses five pelagic species that are treated as a single species complex because of similarities in life histories and habitat requirements: Northern anchovy, Pacific sardine, Pacific (chub) mackerel, jack mackerel, and market squid. Two of these coastal pelagic species are known to occur in the action area: northern anchovy and market squid. A table of these species/life stages and their designated

habitat is contained within Appendix B of the Navy's EFH assessment (Navy 2015). The definition for coastal pelagic species EFH is based on the geographic range and in-water temperatures where these species are present during a particular life stage (67 FR 2343-2383). EFH for these species includes all estuarine and marine waters above the thermocline where sea surface temperatures range from 50 to 68 °F (10 to 20 °C). These boundaries include the waters surrounding Ediz Hook.

The general descriptions of northern anchovy and market squid provided in the FMP (PFMC 1998) were reviewed for information on designated EFH pertinent to consideration of effects from construction and operation of the project.

Northern anchovy are small, short-lived fish that are typically found in schools near the surface. They eat phytoplankton and zooplankton and spawn year round with peaks from February to April. All life stages are preyed on by a variety of predators, including salmon and numerous fishes. At least one juvenile Northern anchovy was collected during seining surveys along Ediz Hook in the fall (Shaffer and Galuska 2009), confirming occurrence of this species in the nearshore zone.

Market squid are harvested near the surface, but they also can occur at great depths. They prefer the salinity of the ocean and are rarely found in estuaries, bays, or river mouths. This species feeds on copepods as juveniles and on euphausiids, other small crustaceans, small fish, and other squid as they grow. Habitat requirements for spawning are not well understood, although documented spawning areas along the coast consist of shallow, semi-protected nearshore areas with sandy or mud bottoms adjacent to submarine canyons. Spawning occurs during most of the year, typically beginning in late summer off Washington. Squid are important as forage foods for many fish such as Chinook salmon, coho salmon, lingcod, and rockfish. Market squid are fished for recreationally in Puget Sound and Strait of Juan de Fuca and are likely to occur within the Action Area.

3.1.3 Pacific Coast Salmon

The Pacific coast salmon management unit includes Chinook (*Oncorhynchus tshawytscha*), coho (*Oncorhynchus kisutch*), and pink (*Oncorhynchus gorbuscha*) salmon. The EFH designation for the Pacific coast salmon fishery in estuarine and marine environments in the state of Washington extends from nearshore and tidal submerged environments within state territorial waters out to the full extent of the exclusive economic zone (200 miles [322 kilometers]) offshore (PFMC 2014b). In addition to marine and estuarine waters, salmon species have a defined freshwater EFH, which includes all lakes, streams, ponds, rivers, wetlands, and other bodies of water that have been historically accessible to salmon (PFMC 2014b). Chinook, coho, and pink salmon all use the marine environment for rearing as juveniles and offshore environment for migration as adults.

Pacific salmon EFH is primarily affected by the loss of suitable spawning habitat, barriers to fish migration (habitat access), reduction in water and sediment quality, changes in estuarine hydrology, and decreases in prey food source (PFMC 2014b). The most common forage fish

species for salmonids include Pacific herring, surf smelt, and Pacific sand lance, all of which occur within the waters surrounding Ediz Hook.

The current salmon FMP includes 18 subsequent amendments. Amendment 18 was updated to reflect new information on EFH, including criteria for impassable barriers; addition of HAPCs; adjustments to geographic extent of EFH; and addition of non-fishing activities and conservation measures (PFMC 2014c). As indicated in the 2008 Final Rule that codified Pacific coast salmon EFH (73 FR 60987), all streams, estuaries, marine waters, and other water bodies occupied or historically accessible to salmon in Washington, Oregon, Idaho, and California are included within the EFH description. Juvenile Chinook and coho were collected during beach seine surveys along Ediz Hook in 2007 (Shaffer and Galuska 2009). Pink salmon were the most common salmonid collected during the spring and summer surveys conducted between 2006 and 2014 and chinook were common second most common during the spring time of those years (Fresh 2015). Documented spawning of pink salmon (odd year) occur in Morse creek located on the south side of the harbor.

3.2 Habitat Areas of Particular Concern

Designated HAPCs are regarded as essential for protection of federally managed species. HAPCs may be more vulnerable to degradation than the more general EFH designated by the PFMC. HAPCs are designated based on four criteria: rarity of the habitat type, ecological importance to EFH species, sensitivity of the habitat to human-induced environmental degradation, and whether and to what extent development would stress the habitat type. Categorization as HAPC does not confer additional protection or restrictions to the designated area.

3.2.1 Pacific Coast Groundfish

Designated HAPCs for Pacific groundfish include seagrass, canopy kelp, rocky reef, and estuarine habitats along the Pacific coast. The estuarine habitats HAPC extends landward to MHHW or the upriver extent of saltwater intrusion. The seagrasses HAPC includes eelgrass beds in estuaries, which occur in small patches along Ediz Hook.

3.2.2 Coastal Pelagic Species

No HAPCs have been formally designated for coastal pelagic species.

3.2.3 Pacific Coast Salmon

Five HAPCs have been designated for Pacific coast salmon. These include: 1) complex channels and floodplain habitats; 2) thermal refugia; 3) spawning habitat; 4) estuaries; and 5) marine and estuarine submerged aquatic vegetation (SAV) (PFMC 2014c).

Eelgrass and kelp are HAPCs within the Action Area and they provide important nursery, foraging, and shelter habitats to a variety of fish species including salmon as well as spawning substrate to Pacific herring which is an important prey species for all marine life stages of Pacific salmon. Juvenile salmon utilize eelgrass beds as migratory corridors as they transition to the

open ocean, and the beds provide both refuge from predators and an abundant food supply. Eelgrass and canopy kelp occur along Ediz Hook, within the Action Area.

3.3 Description of Habitats

The project would occur in the nearshore marine waters along Ediz Hook within the Port Angeles Harbor. Section 2.3 provides a detailed description of the existing environmental conditions within the Harbor.

3.4 Assessment of Impacts

Potential effects of construction and operation of the project are addressed in Section 2.4.

The area where EFH may be affected beyond the immediate project area takes into account potential for direct and indirect physical, biological, and chemical effects of the project on motile marine fish species. Based on evaluation of all project impact areas (including upland and marine, construction and operations, and direct and indirect effects), it was determined that underwater noise, particularly pile driving noise during construction, was the project effect with the largest geographic extent affecting Pacific coast groundfish, coastal pelagic, and Pacific coast salmon EFH. As discussed in Sections 2.4.1 the most conservative area for evaluating the potential effects of noise on fish is where underwater noise exceeds levels that disturb marine fish, 150 dB RMS re 1 μPa which ultimately impacts use of EFH that occurs within this threshold zone. The maximum distance at which this guidance level would be exceeded during pile driving is 2,929 m for impact pile driving.

3.4.1 Construction Impacts

In-water construction would impact marine habitats used by EFH species through water column effects (underwater noise, water quality effects, presence of physical barriers and shading), which would affect both unvegetated and vegetated substrates. The greatest impact during construction would occur during impact pile driving.

3.4.1.1 Underwater Noise

Construction of the pier would result in increased underwater noise levels in Port Angeles Harbor, due primarily to the installation of piles, supporting the trestle, fixed pier, and floats. Some noise would also be generated from support vessels, small boat traffic, and barge-mounted equipment, such as generators. However, the most significant in-water noise potentially affecting EFH would be from pile driving using an impact hammer.

The effects of elevated noise levels to fish with designated EFH in the project area are anticipated to be similar to those described for ESA-listed salmon (see Section 2.4.1). Pile driving would exceed the underwater noise threshold for fish injury and guideline for fish behavior, resulting in the greatest potential for adverse impacts on water column EFH. Pile driving would require 75 days to complete during a single in-water work season. The most significant underwater noise would be from impact pile driving of the 144 steel piles. A

maximum of 4 hours of impact pile driving may occur in a day and use of a bubble curtain would also minimize impacts to EFH.

3.4.1.2 Water Quality

Temporary increases in turbidity and suspended sediments could affect EFH by creating cloudy or murky conditions that interfere with feeding, predator avoidance, covering food sources or vegetation with sediments, and interfering with oxygen exchange via impacts to the gills. Nearshore habitat disturbance and localized turbidity increases could also affect the eggs and larvae of EFH species. Some species (e.g., market squid) deposit their eggs on, or in, the substrate. These eggs have the potential to be damaged directly by construction activities or smothered by sediments settling out of the water column. In addition, should nearshore spawning habitats be disturbed during the eggs' presence, these eggs could be dispersed into the water column, increasing their risk of predation. Other EFH species (e.g., English sole) have eggs that are positively buoyant. Elevated turbidity could alter normal dispersal patterns within the water column, potentially reducing their survival. Larvae for a number of species for which EFH has been designated could also be affected by increased turbidity. Although turbidity can improve the avoidance of predation by some species (e.g., English sole), it can be a limiting factor for other EFH species (De Robertis et al. 2003; Lemke and Ryer 2006). Hence, project-related changes in turbidity would be relatively small scale and localized and may affect EFH differently depending on varying life histories.

Circulation patterns and currents are important factors in the distribution of early life stages of a number of groundfish EFH species, including flatfish and rockfish. In the immediate vicinity of barges, tug boats, and other in-water construction equipment, small-scale changes in current direction and intensity of flow over periods of hours are anticipated during in-water construction of the pier. However, these effects would be localized, with the overall circulation patterns, current velocities, and water levels along Ediz Hook would be relatively unaffected during in-water construction. Since in-water construction activity would be limited to temporary and localized effects on circulation and currents, with no changes on overall nearshore current patterns, EFH for overall larval groundfish recruitment along Ediz Hook would not be adversely affected.

Further, the potential for accidental spills or releases of hazardous materials (e.g., from barges, construction platforms, fueling activities on land or in water) would be minimized through implementation of spill prevention and response plans. Contractors would be required to prepare and implement a spill response plan (e.g., SPCC) to clean up fuel or fluid spills. As sediments contaminant concentrations are below the SQS level and increases in chemical contaminants as a result of spill would be minimized through implementation of these prevention and response plans, impacts to EFH would be negligible.

3.4.1.3 Sediment Quality

Several contaminants of concern (COCs) exist within the harbor and presence of these in the project area has not yet been determined. However, contaminant concentrations in samples collected within 1,000 ft (304.8 m) of the proposed pier were found to be below the SQS and

CSL screening levels. We therefore conclude that increases in chemical contamination concentrations in marine waters as a result of sediment resuspension during construction activities would be negligible.

3.4.1.4 Marine Vegetation

Marine vegetation (eelgrass) within the project area would encounter some direct disturbance from overwater coverage and turbidity that would likely affect vegetation EFH. Barge anchoring within eelgrass that is present immediately adjacent to the proposed pier would be avoided to reduce further impacts. Avoidance and minimization measures would be in place to avoid eelgrass habitat surrounding the footprint of the proposed pier. However, eelgrass EFH and HAPC within the footprint of the pier (trestle) would be adversely affected. As discussed in Section 1.3, compensatory mitigation would be implemented to offset the potential loss of about 4,595 ft^2 (426 m^2) of eelgrass.

3.4.1.5 Underwater Structures and Benthic Community

An underwater rock pile located just offshore of the jetty and about 1,600 ft (488 m) west of the proposed pier provides nursery habitat for juvenile rockfish and other groundfish. Further, kelp and algae are abundant within the rock pile structure and may be utilized as EFH by Pacific coast salmon EFH species and as Pacific coast salmon HAPC. The utility of this habitat would be temporarily reduced by nearby construction noise, primarily impact-hammer pile driving. Indirect impacts to Groundfish EFH would result as prey, refugia, and vegetation would be reduced with overwater coverage of existing eelgrass habitat, causing permanent reduction of light. However, this small reduction of EFH would be insignificant in comparison with the large amount of similar habitat available within the Action Area in general. Further, mitigative measures aimed at improving habitat in the action area would largely replace the habitat lost due to the new overwater structure.

Installation of piles would reduce and displace about 745 ft^2 (69 m^2) of benthic habitat and species that would otherwise serve as prey for EFH species. The muddy sandy EFH within the project area used by groundfish would experience a reduction in benthic prey species and loss of muddy sandy habitats to utilize with installation of the piles. This reduction would be negligible in comparison to the availability of benthic prey and habits to utilize within the Action Area.

3.4.2 Potential Adverse Effects on Pacific Coast Groundfish EFH

Designated groundfish EFH includes all estuarine and marine waters from the MHHW line seaward, and the upriver extent of saltwater intrusion in rivers, and specific inland sea and estuarine designated EFH includes the epipelagic zone of the water column. This EFH includes macrophyte canopies and drift algae, soft-bottom habitats, hard-bottom habitats, mixed sediments (sand and rocks), and vegetated bottoms consisting of algal beds, macrophytes, or rooted vascular plants. Pacific coast groundfish species are considered sensitive to overfishing, the loss of habitat, and reduction in water and sediment quality. In addition to use of these habitat types, larval and juvenile groundfish (notably rockfish) are dependent on a variety of habitat

factors, including current patterns for larval transport to suitable recruitment habitat (e.g., kelp and eelgrass), good water quality, and abundant food resources.

Noise and turbidity during pile driving would impact groundfish EFH. Although pile driving would primarily occur using a vibratory pile driver, impact pile driving would still be necessary for proofing piles. Impact pile driving would exceed the injury thresholds for fish for a maximum of 75 days and affecting groundfish EFH as this habitat would be used by these species year-round. Further, a reduction in muddy sandy benthic habitat utilized as groundfish EFH would be reduced within the project area with the installation of piles. Lastly, a permanent reduction in light penetration over the existing eelgrass, leading to a reduction in vegetation, prey, and refugia would result. Therefore, construction and operation of the pier may adversely affect EFH for Pacific coast groundfish, specifically rockfish.

3.4.3 Potential Adverse Effects on Coastal Pelagic EFH

EFH for coastal pelagic species includes all estuarine and marine waters above the thermocline where sea surface temperatures range from 50 to 68°F (10 to 20°C). These boundaries include the waters of Port Angeles Harbor. Coastal pelagic species are considered sensitive to overfishing, loss of habitat, reduction in water and sediment quality, and changes in marine hydrology, including entrainment through water intakes. These species are considered rare in the nearshore environments of Ediz Hook and Port Angeles Harbor in general and are more likely to occur in the offshore areas closer to and within the Strait of Juan de Fuca. However, Northern anchovy do use estuarine habitats such as the intertidal zone, eelgrass, kelp, and macroalgae, and could therefore be affected by the impacts on designated EFH.

Construction and operation of the proposed project would not cause an increase in fishing or entrainment through water intakes. As discussed in Section 2.4, implementation of suitable BMPs and current practices, and consideration of appropriate stormwater management controls through the base SWPPP would minimize potential for violations of state water quality standards from construction and operation of the pier.

Underwater noise, water column turbidity, temporary and permanent shading effects, and physical disruption from pile driving activities, work barges, and spud/anchoring systems during construction would create short-term disturbances in habitats used by coastal pelagic species and long-term reduction in nursery habitat, localized to the project area. Therefore, construction and operation of the pier would adversely affect EFH for coastal pelagic species, specifically northern anchovy.

3.4.4 Potential Adverse Effects on Pacific Coast Salmonid EFH

The EFH designation for the Pacific coast salmon includes nearshore and tidal submerged environments and locations of freshwater discharges in the nearshore zone (PFMC 2014b). Pacific salmon EFH is primarily affected by the loss of suitable spawning habitat, barriers to fish migration (habitat access), reduction in water and sediment quality, changes in estuarine hydrology, and decreases in prey food source. During construction, implementation of in-water BMPs and current practices would prevent anticipated violations of state water or sediment

quality standards that would otherwise degrade water column EFH (i.e., turbidity, DO, salinity, temperature, contaminants). Increased turbidity during pile driving and anchor/spudding of vessels would not violate State water quality standards and any impacts would be localized, temporary, and not likely to occur during outmigration of Pacific coast salmon EFH species.

Pile driving during construction would result in a significant increase in water column noise in Port Angeles Harbor where the threshold for injury and guideline behavioral response would be exceeded, leading to potential injury, mortality, or behavioral effects. Primary use of a vibratory pile driver, use of an attenuation device during impact pile driving, and conducting pile driving during the in-water work window would avoid most affects to migrating Pacific coast salmon species that may be using EFH within the area. However, esonification of the water column as a result of the pile driving activities would have an adverse effect on habitats designated as EFH for Pacific Coast salmon. Further, SAV is a HAPC for Pacific coast salmon (PFMC 2014c). Construction would impact water column and SAV through an increase in pile driving noise, turbidity, and long-term permanent overwater shade. Therefore, construction and operation of the pier would adversely affect EFH for Pacific coast groundfish, coastal pelagic, and Pacific coast salmon species.

Table 12. Summary of Potential Impacts on EFH by Impact Type

Type of Impact	Temporary (days to weeks)	Short Term (<2 years)	Long Term (≥2 to <20 years)	Permanent (≥20 years)
Water Quality	✓			
Sediment Quality	✓			
Physical Barriers				✓
Marine Vegetation				✓
Benthic Communities & Prey Availability		✓		
Forage Fish	✓			
Underwater Noise	✓			

3.5 EFH Conservation Recommendations

Section 1.3.6 lists measures that would be incorporated into the project to avoid, reduce, and minimize the effects on marine habitats and fish including ESA-listed species. Measures to reduce project effects include BMPs and current practices to minimize impacts on water quality and the seafloor during construction and operations, measures to attenuate underwater noise, and habitat mitigation. Section 1.3.4 describes mitigative measures aimed at restoring shallow, near-shore habitat at two sites previously disturbed with fill. Sections 2.8.3 and 2.8.4 specify measures the Navy must take to avoid or minimize take of ESA-listed species. Together, these measures would avoid, minimize, or replace the adverse effects of the proposed action on EFH.

3.6 Conclusions

Taken together, the mitigative measures described in Section 1.3.4, the BMPs specified in Section 1.3.6, and the ITS' reasonable and prudent measures and terms and conditions specified in Sections 2.83 and 2.84, respectively, would avoid, or minimize adverse EFH effects to the extent practicable.

3.7 Statutory Response Requirement

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

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

3.8 Supplemental Consultation

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

4. DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW

The Data Quality Act (DQA) specifies three components contributing to the quality of a document. They are utility, integrity, and objectivity. This section of the opinion addresses these DQA components, documents compliance with the DQA, and certifies that this opinion has undergone pre-dissemination review.

4.1 Utility

Utility principally refers to ensuring that the information contained in this consultation is helpful, serviceable, and beneficial to the intended users. The intended user of this opinion is the DON. Individual copies of this opinion were provided to the DON. The format and naming adheres to conventional standards for style.

4.2 Integrity

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

4.3 Objectivity

Information Product Category: Natural Resource Plan

Standards: This consultation and supporting documents are clear, concise, complete, and unbiased; and were developed using commonly accepted scientific research methods. They adhere to published standards including the NMFS ESA Consultation Handbook, ESA regulations, 50 CFR 402.01 et seq., and the MSA implementing regulations regarding EFH, 50 CFR 600.

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

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

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

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Appendix D
Public Involvement

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Appendix D – Public Involvement

PUBLICATION OF THE DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

In January 2015, the Navy initiated public involvement for the EA by issuing a Draft Description of the Proposed Action and Alternatives (DoPAA) for public, tribal, and agency review and comment. Public notices announcing the availability of the DoPAA, the date and location of the public meeting, and the dates of the 30-day comment period ending on February 25 were placed in local newspapers. Additionally, public announcements were made at local radio stations, and press releases were sent to other media.

Public Notices

Public notices published during the public comment period included:

Newspaper Notices

Notice of Availability (NOA) in the Peninsula Daily News – January 26 to 28, 2015. The NOA (included as Figure D-1) invited the public to review and comment on the DoPAA and to attend an open house/public meeting to learn about the project. The DoPAA was available on the internet (http://go.usa.gov/tAr4), and in printed form at the Port Angeles Main Library (2210 South Peabody Street, Port Angeles, WA). As announced in the NOA, the official comment period for the DoPAA was from January 24, 2015 through February 25, 2015.

Press releases were distributed to the following media on January 26 and February 2:

Anacortes American	North Kitsap Herald
Associated Press (Seattle Bureau)	Northwest Cable News
Forks Broadcasting (Forks radio)	Northwest Navy Life
Forks Forum	Olympia Olympian
Island Guardian (Friday Harbor)	Peninsula Daily News
KCPQ 13 TV (FOX, Seattle)	Port Townsend-Jefferson County Leader
KING 5 TV (NBC, Seattle)	Puget Sound Business Journal
KIRO 7 TV (CBS, Seattle)	San Juan Islander
KIRO 97.3FM news talk radio	San Juan Journal
Kitsap Sun	Seattle Post-Intelligencer
KOMO 1000 AM talk radio	Seattle Times
KOMO 4 TV (ABC, Seattle)	Sequim Gazette
KONP radio (Port Angeles)	South Whidbey Record
KPLU 88.5 FM NPR News and Jazz	Tacoma News Tribune
KPTZ 91.9 FM Radio Port Townsend	The Bellingham Herald
KUOW 94.9 FM Puget Sound public radio	Whidbey News-Times

Public Meeting

The Navy hosted a public meeting in Port Angeles, Washington on February 5, 2015 from 6:00 p.m. to 8:00 p.m. at the Naval Elks Lodge #353, 131 E. 1st Street in Port Angeles. The meeting was conducted in an open house style and did not include a formal presentation. Navy and USCG personnel were present at the open house and available to answer questions and receive written comments.

The Navy received five written comments during the meeting, including one letter.

Public Comments Received

The Navy received a total of 50 comment submittals (i.e., comment forms, e-mails, or letters), including the 5 comments submitted in writing (4 comment forms and 1 letter) during the February 5, 2015, public meeting. A number of comments expressed concern about the proposed alternative locations, especially the location of the eastern and western sites. Reasons for concern varied from noise impacts on the Puget Sound Pilots Station; potential restrictions that might affect boat access; restrictions/impacts on scuba diving at an existing rock pile; potential impacts on existing and commercial fish pens; and impacts on eelgrass. The Navy considered all of these comments and proposed a new alternative that minimizes project impacts. Table D-1 lists the number of comments by commenter groups.

Table D-1. Summary of Public Comments

Commenter Group	Number of Comments
Private Individual	23
Puget Sound Pilots Association	9
Nongovernmental Organization (NGO)	5
State Agency/Official	4
Local Agency	3
Tribal Government	3
Federal Agency	1
Academic Institution	1
Business	1
Total Comments	**50**

PUBLICATION OF THE DRAFT ENVIRONMENTAL ASSESSMENT

On November 30, 2015, the Navy released the Draft EA for public, tribal, and agency review and comment. Public notices announcing the availability of the Draft EA, the date and location of the public meeting, and the dates of the comment period ending on January 28, 2016 were placed in a local newspaper. Additionally, postcards with this information were mailed to elected officials, agencies, non-governmental organizations, tribal members, private companies, and individuals with an interest in the proposed project, including all individuals who requested to be placed on the mailing list. Public announcements were made at local radio stations, and press releases were sent to other media.

The Draft EA was available on the internet (http://go.usa.gov/tAr4), and in printed form at the Port Angeles Main Library (2210 South Peabody Street, Port Angeles, WA).

Public Notices

Public notices published during the public comment period included:

Newspaper Notices

An NOA of the Draft EA was published in the Peninsula Daily News November 30 through December 2, 2015. The NOA (included as Figure D-2) invited the public to review and comment on the Draft EA and to attend an open house/public meeting to learn about the Proposed Action and to submit written comments. The NOA also stated that the official comment period for the Draft EA was from November 30, 2015 through January 28, 2016.

Press Releases were distributed on November 30 and December 31 to the same media sources listed above for the DoPAA.

Postcards

Postcards announcing the Draft EA and the public meeting, and inviting public review and comment, were mailed out on November 30, 2015 to interested elected officials, agencies, non-governmental organizations (NGOs), tribal members, private companies, and individuals with an interest in the proposed project, including all individuals who requested to be placed on the mailing list. The postcards included information on the location of the Draft EA for public review, details about the public meeting, and instructions for submitting comments.

Public Meeting

The Navy hosted a public meeting on the Draft EA on January 12, 2016, from 6:00 p.m. to 8:00 p.m. at the Naval Elks Lodge #353, 131 E. 1st Street, in Port Angeles, Washington. The meeting was conducted in an open house style and did not include a formal presentation. Navy and USCG personnel were present at the open house and available to answer questions and receive written comments.

The Navy received 9 written comments during the meeting.

Public Comments Received

The Navy received a total of 26 comment documents (i.e., comment forms, e-mails, or letters) during the 60-day public comment period, including the 9 written comments submitted during the January 12, 2016 public meeting. The majority of the comments were concerned with impacts to aquaculture operations at Icicle Seafoods, the rationale for siting the project at Ediz Hook, the rationale for selecting Alternative 1 over other alternatives, impacts to biological resources, impacts to recreation, the presence of increased military facilities and operations in the Port Angeles Harbor and the possibility of the proposed project becoming a terrorist target, the potential for the project to contaminate the harbor, and the potential future impacts of climate change on the proposed project. Other comments pertained to issues such as the regulatory compliance aspects of the project, the Navy's methods of soliciting public comments on the Draft EA, the cumulative effects analysis, and concerns about effects on tourism and the visual clutter of the proposed project. Several commenters suggested that the EA analysis was inadequate and an EIS was warranted. The Navy reviewed and considered all relevant comments that were received during the public comment period. Table D-2 lists the number of comment documents and individual comments by commenter group.

Table D-2. Summary of Public Comments on Draft EA

Commenter Group	Number of Comment Documents	Number of Comments
Private Individual	18	40
State Agency	3	19
Nongovernmental Organization (NGOs)	3	30
Business	1	17
Total Comments	**25**	**106**

DEPARTMENT OF DEFENSE
DEPARTMENT OF THE NAVY

NOTICE OF AVAILABILITY OF A DRAFT DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES, PIER AND SUPPORT FACILITIES FOR THE TRANSIT PROTECTION SYSTEM AT U.S. COAST GUARD AIR STATION/SECTOR FIELD OFFICE, PORT ANGELES, WASHINGTON

The U. S. Department of the Navy (Navy) gives notice that they are preparing an Environmental Assessment (EA) to evaluate the potential environmental effects associated with the construction and operation of a pier and support facilities for the Transit Protection System (TPS) at U.S. Coast Guard (USCG) Air Station/Sector Field Office in Port Angeles, Clallam County, Washington. The Navy invites the public to review and comment on a Draft Description of the Proposed Action and Alternatives (DOPAA). The DOPAA, which describes the proposed action, purpose and need for the action, and alternatives to be analyzed in the EA, is available at: http://go.usa.gov/tAr4. The DOPAA is also available in hardcopy for public review at the Port Angeles Main Library, 2210 South Peabody Street, Port Angeles, WA 98362.

The purpose of the proposed action is to provide a staging location for TPS vessels and crews that escort Navy submarines to and from their dive/surface points in the Strait of Juan de Fuca and NAVBASE Kitsap Bangor. The proposed action is needed to comply with USCG requirements for underway hour limitations and required crew rest between escort missions. Underway hours are defined as the time required for USCG crews to prepare for, perform, and complete small boat operations. The hour limits vary by boat size and type, and are shorter during high sea states and foul weather conditions. The proposed action consists of the construction, maintenance, and operation of a floating pier with utility services; a shore-based single-story facility to meet sleeping and administrative functions known as an Alert Forces Facility; a shore-based ammunition and weapons storage facility (Ready Service Armory); a 10,000 gallon above-ground diesel fuel storage tank and distribution system; and sewer, water, power, stormwater, communications, parking, lighting, physical security structures, signage and landscaping improvements.

The Navy will hold a public meeting in Port Angeles on February 5, 2015 from 6:00 p.m. to 8:00 p.m. at the Naval Elks Lodge #353, 131 E 1st Street, Port Angeles, WA to provide information about the proposed action. The meeting will not include a formal presentation however, Navy and Coast Guard personnel will be present at this open house meeting to answer questions and receive written comments.

The Navy is accepting written comments on the DOPAA for the Pier and Support Facilities for the TPS at USCG Air Station/Sector Field Office in Port Angeles through February 25, 2015. Written comments on the DOPAA will be considered in the preparation of the Draft EA. To be considered in preparation of the Draft EA, comments must be received by Wednesday, February 25, 2015.

The Navy will seek further public input at a future date upon release of the Draft EA.

Written comments may be submitted at the public meeting, sent by email to NWNEPA@navy.mil or mailed to: Commanding Officer, Naval Facilities Engineering Command Northwest, 1101 Tautog Circle, Room 203, Silverdale, WA 98315. Attn: NEPA Project Manager/TPS Facilities.

For media queries, please contact Ms. Liane Nakahara, Navy Region Northwest Public Affairs, at (360) 396-1630 or liane.nakahara@navy.mil.

Figure D-1. Notice of Availability (NOA) for Description of the Proposed Action and Alternatives (DOPAA)

DEPARTMENT OF DEFENSE
DEPARTMENT OF THE NAVY

NOTICE OF AVAILABILITY OF A DRAFT ENVIRONMENTAL ASSESSMENT, PIER AND SUPPORT FACILITIES FOR THE TRANSIT PROTECTION SYSTEM AT U.S. COAST GUARD AIR STATION/SECTOR FIELD OFFICE, PORT ANGELES, WASHINGTON

The U.S. Department of the Navy (Navy) gives notice that they have prepared a Draft Environmental Assessment (EA) to evaluate the potential environmental effects associated with the construction and operation of a pier and support facilities for the Transit Protection System (TPS) at U.S. Coast Guard (USCG) Air Station/Sector Field Office in Port Angeles, Clallam County, Washington. The Navy invites the public to review and comment on the Draft EA. The Draft EA is available at: http://go.usa.gov/tAr4. A printed copy of the Draft EA is also available for public review at the Port Angeles Main Library, 2210 South Peabody Street, Port Angeles, WA 98362.

The purpose of the Proposed Action is to provide a staging location for TPS vessels and crews that escort Navy submarines to and from their dive/surface points in the Strait of Juan de Fuca and Naval Base (NAVBASE) Kitsap Bangor. The Proposed Action is needed to comply with USCG requirements for underway hour limitations and required crew rest between escort missions. Underway hours are defined as the time required for USCG crews to prepare for, perform, and complete small boat operations. The hour limits vary by boat size and type, and are shorter during high sea states and foul weather conditions. The Proposed Action consists of the construction, maintenance, and operation of a pier with utility services; a shore-based single-story facility to meet sleeping and administrative functions known as an Alert Forces Facility; a shore-based ammunition and small arms storage facility (Ready Service Armory); an above-ground diesel fuel storage tank and distribution system; and sewer, water, power, stormwater, communications, parking, lighting, physical security structures, signage, and landscaping improvements.

The Navy will hold a public meeting in Port Angeles on January 12, 2016 from 6:00 p.m. to 8:00 p.m. at the Naval Elks Lodge #353, 131 E 1st Street, Port Angeles, WA to provide information about the Proposed Action. The meeting will not include a formal presentation; however, Navy and USCG personnel will be present at this open house meeting to answer questions and receive written comments.

The Navy is accepting written comments on the Draft EA for the Pier and Support Facilities for the TPS at USCG Air Station/Sector Field Office in Port Angeles through January 28, 2016. To be considered in preparation of the Final EA and the decision making process, written comments must be received by Thursday, January 28, 2016.

Written comments may be submitted at the public meeting, sent by email to NWNEPA@navy.mil, or mailed to: Commanding Officer, Naval Facilities Engineering Command Northwest, 1101 Tautog Circle, Room 203, Silverdale, WA 98315. Attn: NEPA Project Manager/TPS Facilities.

For media queries, please contact Ms. Sheila Murray, Navy Region Northwest Public Affairs, at (360) 396-4981 or sheila.murray@navy.mil.

Figure D.2. Notice of Availability (NOA) for Draft EA

Appendix E

Marine Mammal Monitoring and Mitigation Plan

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Marine Mammal Monitoring and Mitigation Plan

Pier and Support Facilities for Transit Protection System
U.S. Coast Guard Air Station/Sector Field Office Port Angeles, Washington

Submitted to:
Office of Protected Resources, National Marine Fisheries Service,
National Oceanographic and Atmospheric Administration

Prepared by:
Naval Facilities Engineering Command Northwest

For:
Naval Base Kitsap at Bangor and Naval Strategic Systems Program

February 2016

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Contents

1 Introduction 1
2 Methods 1
2.1 Observer Qualifications 1
2.2 Data Collection 2
2.3 Equipment 3
2.4 Injury Shutdown and Behavioral Harassment Monitoring Zones 4
2.4.1 Injury Shutdown Zones 4
2.4.2 Behavioral Harassment Zones 5
2.5 PSO Monitoring Locations 5
2.6 Monitoring Techniques 8
2.6.1 Monitoring to Estimate Level B Take of Pinnipeds and Harbor Porpoise and Prevent Level A Take 8
2.6.2 Monitoring to Prevent Take of Humpback Whale, Minke Whale, Gray Whale, Killer Whale, Dall's Porpoise, and Pacific White-Sided Dolphin 9
2.6.3 Visual Survey Protocol | Pre-Activity Monitoring 9
2.6.4 Visual Survey Protocol | During Activity Monitoring 10
2.6.5 Visual Survey Protocol | Post-Activity Monitoring 11
3 Interagency Notification 11
4 Monitoring Reports 12
5 References 15

Attachments

Attachment A Marine Mammal Observation Record Forms and Sighting Codes
Attachment B Beaufort Wind Scale and Sea State
Attachment C Chain of Custody Form

List of Figures

Figure 2-1. Steel Pile Impact Driving Monitoring 6
Figure 2-2. Steel Pile Vibratory Driving Monitoring 7

List of Tables

Table 2-1. Distances/Areas to Injury and Harassment Thresholds and Monitoring Zones for Marine Mammals 5

Acronyms and Abbreviations

AIRSTA/SFO	Air Station/Sector Field Office
CFR	Code of Federal Regulations
dB	decibel
ft	foot/feet
GPS	global positioning system
IHA	Incidental Harassment Authorization
km	kilometer
m	meter/meters
MMMP	Marine Mammal Monitoring and Mitigation Plan
MMPA	Marine Mammal Protection Act
Navy	United States Department of the Navy
NMFS	National Marine Fisheries Service
PSO	Protected Species Observer
RMS	root mean square
TPS	Transit Protection System
U.S.	United States
USCG	United States Coast Guard
WAC	Washington Administrative Code
µPa	microPascal

1 Introduction

As required by the Marine Mammal Protection Act (MMPA), the United States (U.S.) Department of the Navy (Navy) has requested an Incidental Harassment Authorization (IHA) from the National Marine Fisheries Service (NMFS) for Level B incidental take (behavioral harassment) of marine mammals during the construction of a pier and support facilities at the U.S. Coast Guard (USCG) Air Station/Sector Field Office Port Angeles (AIRSTA/SFO Port Angeles), located in Port Angeles Harbor on the Ediz Hook peninsula, Port Angeles (Department of the Navy 2016).

This Marine Mammal Monitoring and Mitigation Plan (MMMP, the Plan) was developed using guidance from NMFS (2015) and is in accordance with the IHA Application submitted for the Transit Protection System (TPS) Pier and Support Facilities project (the project). The Plan would be implemented during pile driving/removal for the requested IHA period of 1 year from November 1, 2016 to November 1, 2017. Because of the in-water work window (July 16 through February 15 for Tidal Reference Area 10 [Washington Administrative Code (WAC) 220-110-240]) and the fact that an IHA covers a 1-year period, pile driving/removal activities and subsequent marine mammal monitoring could occur from November 1, 2016 to February 15, 2017 and then begin again on July 16, 2017 and end by November 1, 2017.

2 Methods

2.1 Observer Qualifications

Monitoring will be conducted by trained marine mammal observers identified as qualified Protected Species Observers (PSOs, observers). PSOs will be present on site at all times during pile removal and driving. Each PSO must meet a list of qualifications for marine mammal observers to be considered qualified, or undergo training to meet the qualifications before the start of pile driving/removal (NMFS 2015).

The minimum qualifications for PSOs (NMFS 2015) include:

- Visual acuity in both eyes (correction is permissible) sufficient for the discernment of moving targets at the water's surface with the ability to estimate target size and distance. Use of binoculars may be necessary to correctly identify the target.
- Experience or training in the field identification of marine mammals (cetaceans and pinnipeds).
- Sufficient training, orientation, or experience with construction operations to provide for personal safety during observations.

- Experience and ability to conduct field observations and collect data according to assigned protocols (this may include academic experience).
- Ability to communicate orally, by radio or in person, with project personnel to provide real time information on marine mammals observed in the area as necessary.
- Writing skills sufficient to prepare a report of observations that would include such information as the number and type of marine mammals observed; the behavior of marine mammals in the activity area during construction; dates and times when observations were conducted; dates and times when in-water construction activities were conducted; dates and times when marine mammals were present at or within the Level B behavioral harassment zone; and dates and times when pile removal or driving activities were paused due to the presence of marine mammals.

A PSO will be placed at the best vantage point(s) practicable (e.g., from a small boat, the pile driving barge, on shore, or any other suitable location) to monitor for marine mammals and implement shutdown/delay procedures when applicable by calling for the shutdown to the hammer operator. The PSOs will have no other construction-related tasks while conducting monitoring. A dedicated monitoring coordinator (also referred to as the PSO lead) will be on-site during all construction days. The monitoring coordinator will oversee PSOs. The monitoring coordinator will serve as the liaison between the PSOs and the construction contractor to assist in the distribution of information.

2.2 Data Collection

PSOs will use the most current NMFS-approved Marine Mammal Observation Record Forms and sighting codes supplied by the Navy (Attachment A of this MMMP), which will be completed by each PSO for each survey day. Recorded data will include the following:

- Date and time that pile driving/removal begins or ends.
- Construction activities occurring during each sighting.
- Weather parameters (e.g., percent cover, percent glare, visibility).
- Water conditions (e.g., tidal state [incoming (flood), slack (neither direction), or outgoing (ebb)], and sea state). The Beaufort Wind Scale and Sea State (Attachment B of this MMMP) will be used to determine sea-state.
- Species, numbers, and if possible, sex and age class of marine mammals.
- Marine mammal behavior patterns observed, including bearing from PSO and direction of travel. If possible, include the correlation to sound pressure levels for context.
- Distance from pile driving/removal activities to marine mammals and distance from the marine mammal to the observation point.
- Locations of all marine mammal observations.

- Marine mammal behavior, overall numbers of individuals observed, frequency of observation, and the time corresponding to the daily tidal cycle will be recorded.
- Other human activity in the area. Record the hull numbers of fishing vessels if possible.

In addition, the PSO shall respond in a timely manner to reports of dead, stranded marine mammals and cooperate with federal, state, and local government officials and employees and other stranding network participants when responding to these strandings and, if needed, complete a chain of custody form (Attachment C of this MMMP). If the PSO receives a report of a dead, stranded marine mammal and does not have the capability to respond to the report, the PSO shall notify the Regional Stranding Coordinator, NMFS. Also, if the Regional Stranding Coordinator receives a report of a dead, stranded marine mammal, the Regional Stranding Coordinator may contact the PSO to determine whether the PSO has the capability to respond to the stranding.

The monitoring coordinator will complete a Marine Mammal Monitoring Summary Form for each day of monitoring. The summary form compiles information collected on the individual sighting forms and provides additional details about construction activities during marine mammal monitoring. The summary form will be provided to the Navy each day following monitoring.

2.3 Equipment

The following equipment will be required to conduct marine mammal monitoring:

- If boat-based monitors are used, a survey boat (with flying bridge for elevated observations) will include: covered cabin areas to keep electrical equipment dry, a fixed marine radio for the Captain to communicate on Ch. 16 and other marine channels independent of PSOs communicating on a dedicated channel, depth finder, measuring tape, navigational plotting equipment, and both fixed and hand-held global positioning system (GPS) units. Vessels will comply with all USCG regulations and be able to pass a USCG safety inspection.
- Hearing protection for biologists and boat operators working near heavy construction equipment.
- Portable marine radios and headsets for the PSOs to communicate with the monitoring coordinator, construction contractor, and other PSO(s).
- Cellular phones and the contact information for the other PSO(s), monitoring coordinator, and NMFS point of contact.
- Green flags (one per boat/observing location) as back-up for radio communication.
- Red flags (one per boat/observing location) as back-up for radio communication.

- Nautical charts.
- Daily tide tables for the activity area within the Hood Canal.
- Watch or chronometer.
- Binoculars with built-in rangefinder or reticles – (quality 7 x 50 or better).
- Marine Mammal Monitoring and Mitigation Plan, IHA permit, and/or other relevant permit requirement specifications in sealed clear plastic cover.
- Notebook with pre-standardized monitoring Marine Mammal Observation Record Forms on non-bleeding paper (e.g., Rite-in-the Rain ™).
- Marine mammal identification guides on waterproof paper.
- Clipboard, pen / pencil.

2.4 Injury Shutdown and Behavioral Harassment Monitoring Zones

The MMPA defines ''harassment'' as: "*any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild [Level A harassment]; or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering but that does not have the potential to injure a marine mammal*" [Level B harassment] (50 Code of Federal Regulations [CFR], Part 216, Subpart A, Section 216.3-Definitions). Pile driving/removal could generate underwater noise that potentially could result in Level A (injury) or Level B (behavioral harassment) to marine mammals swimming by or near the project site. Distances to injury thresholds and shutdown zones (Level A), as well as behavioral harassment thresholds and monitoring zones (Level B) are provided in Table 2-1 and depicted on Figures 2-1 and 2-2.

During the project, in-water acoustic measurements of vibratory and impact pile driving/removal will be taken. Project monitoring zones may be adjusted based on these measurements.

2.4.1 Injury Shutdown Zones

For the purposes of providing PSOs with clear guidance, injury shutdown zones were rounded up. To preclude injury to pinnipeds, a 10-meter (m) radius shutdown zone from a pile will be implemented during impact pile driving (Figure 2-1). The 10-m shutdown zone is based on encompassing the distance to the 190 decibels (dB) root-mean-square (RMS) referenced to (re) 1 micropascal (µPa) impact pile driving injury zone (calculated at 6 m for pinnipeds). To preclude injury to cetaceans, a 30-m radius shutdown zone will be implemented during impact pile driving (calculated at 29 m for cetaceans). Vibratory pile drivers have relatively low sound levels (<180 dB re 1µPa) and are not expected to cause injury to marine mammals (NMFS

2013). If the Navy determines that another activity may physically harm marine mammals, then a 10-m radius shutdown zone from the activity will be also be monitored.

Table 2-1. Distances/Areas to Injury and Harassment Thresholds and Monitoring Zones for Marine Mammals

Underwater Pile Driving/Removal Noise Source	NMFS Thresholds for Marine Mammals			
	Injury (Level A) Pinnipeds (190 dB_{RMS}) Shutdown Zone (distance)	Injury (Level A) Cetaceans (180 dB_{RMS}) Shutdown Zone (distance)	Behavioral Harassment (Level B) from Impulse Noise (160 dB_{RMS}) (distance)	Behavioral Harassment from Continuous Noise (120 dB_{RMS}) (distance)
Impact Pile Driving	10 m	30 m	631 m	NA
Vibratory Pile Driving/Removal	NA	NA	NA	13,594 m

Note: Thresholds used for loudest pile type, for the TPS project it is 30-inch steel. Injury zone distances were rounded up from calculated distances.
dB = decibel; NA = not applicable; RMS = root mean square.
Source: NMFS 2013.

2.4.2 Behavioral Harassment Zones

The 631-m behavioral harassment zone for impact pile driving is the distance that noise levels are estimated to be at or above the 160 dB re 1µPa Level B behavioral threshold (Table 2-1 and Figure 2-1). A larger behavioral harassment zone is estimated to extend 13.6 kilometer (km) during vibratory pile driving/removal (Table 2-1 and Figure 2-2).

2.5 PSO Monitoring Locations

To effectively monitor the shutdown zones, marine mammal PSOs would be positioned at the best practicable vantage points, taking into consideration security, safety, and space limitations at USCG AIRSTA/SFO Port Angeles. A minimum of three PSOs would be present during both impact and vibratory pile driving/removal. Both the injury and behavioral harassment zones would be monitored in order to remain in compliance with the MMPA. PSOs may be positioned on vessels, on the existing T-Pier, on shore, on the pile driving barge, or at other locations to ensure adequate visual coverage of each zone. The exact locations of PSOs during the monitoring will depend on site conditions during pile driving/removal and locations of the pile being driven or removed. Final placement will be at the professional discretion of the qualified monitoring coordinator.

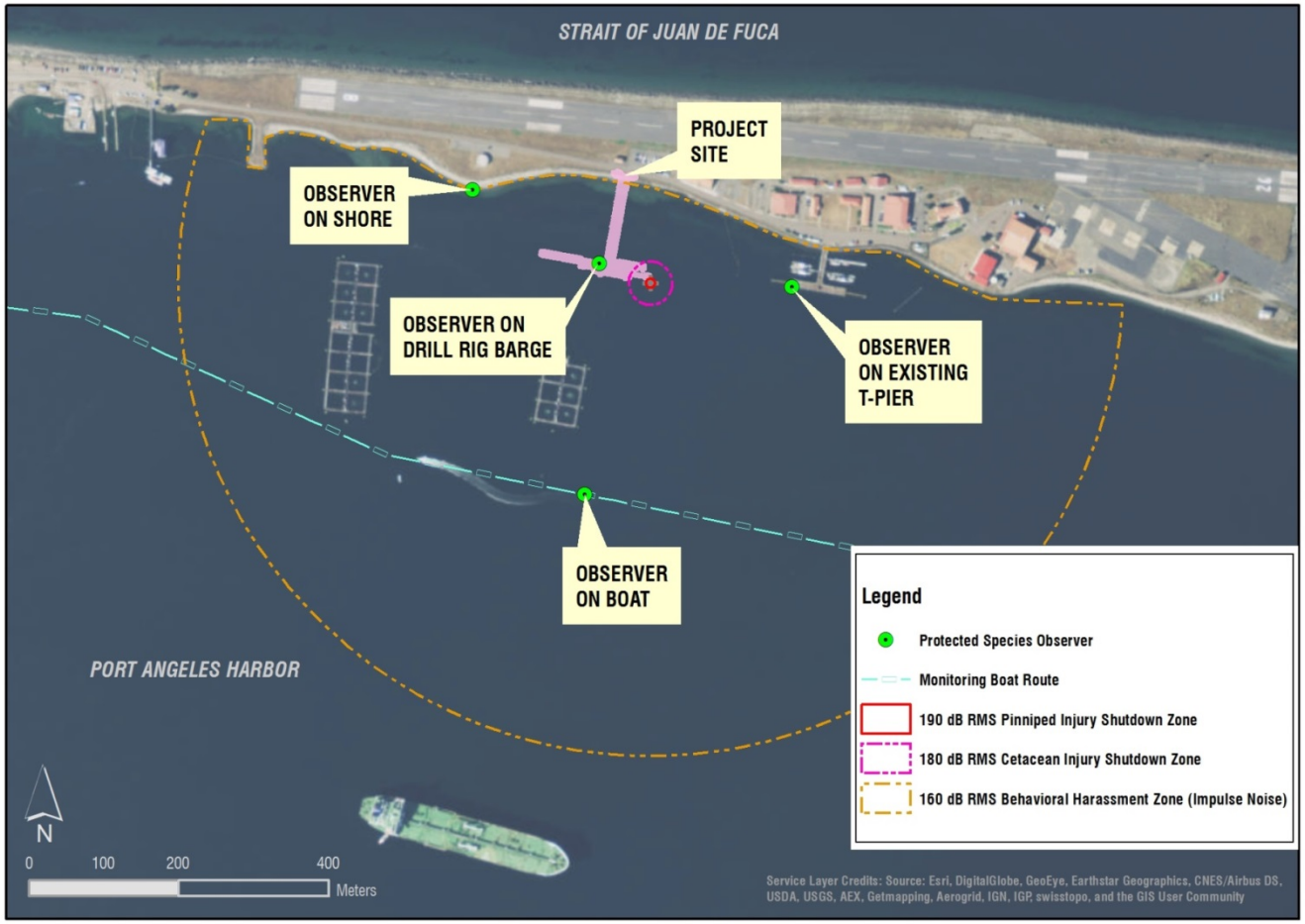

Figure 2-1. Steel Pile Impact Driving Monitoring

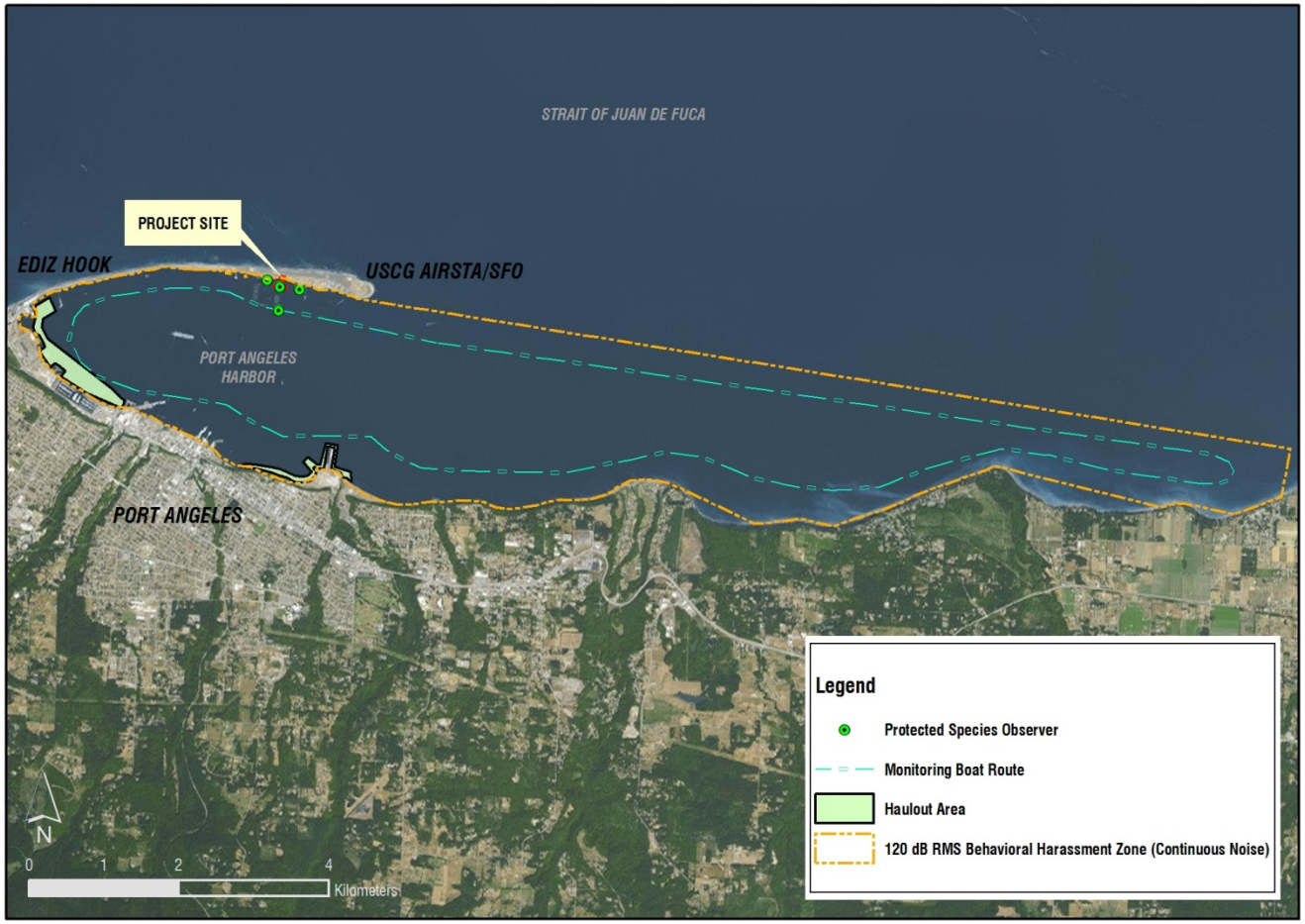

Figure 2-2. Steel Pile Vibratory Driving/Removal Monitoring

2.6 Monitoring Techniques

The Navy would collect sighting data and behaviors of marine mammal species observed before, during, and after pile removal and driving activities. The efficacy of visual detection depends on several factors including the PSO's ability to detect the animal, the environmental conditions (visibility and sea state), and monitoring platforms. The following survey methodology will be implemented for all monitoring activities:

- PSOs will survey the shutdown and behavioral harassment zones. A minimum of three PSOs will be present during all impact and vibratory pile driving/removal. Monitoring of the shutdown zone will take place from 15 minutes prior to initiation through 30 minutes post-completion of pile driving/removal to ensure no marine mammals are present.
- Marine Mammal Observation Record Forms (Attachment A of this MMMP) will be used to document observations.
- Any survey boats engaged in marine mammal monitoring will maintain speeds equal to or less than 10 knots.
- PSOs will be trained and experienced marine mammal experts with the ability to accurately verify species sighted.
- Observers will use binoculars and the naked eye to search continuously for marine mammals.

2.6.1 Monitoring to Estimate Level B Take of Pinnipeds and Harbor Porpoise and Prevent Level A Take

The Navy proposes the following in order to prevent Level A injury take of all marine mammals in the shutdown zones, and to estimate Level B take of pinnipeds and harbor porpoise in the behavioral harassment zone:

- During impact driving, at least two land-based PSO monitors will monitor the injury (shutdown zones) and behavioral harassment zones (Figure 2-1). Pile driving will be shut down if any marine mammal approaches injury zone.
- During vibratory pile removal and installation, at least one land-based PSO and one monitoring boat with a PSO and boat operator will monitor the 120 dB RMS Level B behavioral harassment zone (Figure 2-2).
- To verify the required monitoring distance, the injury (190 [pinnipeds] and 180 [cetaceans] dB RMS) (shutdown zones) and behavioral harassment (160 dB RMS) zones will be determined by using a range finder or hand-held GPS device.

- The behavioral harassment zone will be monitored for the presence of marine mammals 15 minutes before, during, and 30 minutes after any pile removal activity.
- Monitoring will be continuous unless the contractor takes a significant break, in which case monitoring will be required 15 minutes prior to restarting pile removal or driving activities.
- If marine mammals are observed, their location within the behavioral harassment and shutdown zones, and their reaction (if any) to pile removal or driving activities will be documented.

2.6.2 Monitoring to Prevent Take of Humpback Whale, Minke Whale, Gray Whale, Killer Whale, Dall's Porpoise, and Pacific White-Sided Dolphin

The Navy proposes the following measures to prevent Level B behavioral harassment take of humpback whale (*Megaptera novaeangliae*), minke whale (*Balaenoptera acutorostrata*), gray whale (*Eschrichtius robustus*), killer whale (*Orcinus orca*), Dall's porpoise (*Phocoenoides dalli*), and Pacific white-sided dolphin (*Lagenorhynchus obliquidens*):

- If humpback whale, minke whale, gray whale, killer whale, Dall's porpoise, or Pacific white-sided dolphin approach the behavioral harassment zone (120 dB RMS) during pile driving/removal, work will be paused until the marine mammal exits the behavioral harassment zone to avoid Level B harassment take.

2.6.3 Visual Survey Protocol | Pre-Activity Monitoring

The following survey methodology will be implemented prior to commencing pile driving/removal:

- If marine mammal(s) are present within or approaching the shutdown zones prior to pile driving, the start of these activities will be delayed until the animal(s) leave the shutdown zones voluntarily and have been visually confirmed beyond the shutdown zones, or 15 minutes has elapsed without re-detection of the animal.
- If marine mammal(s) are not detected within the shutdown zones (i.e., the zone is deemed clear of marine mammals), the PSOs will raise a green flag and radio the monitoring coordinator/construction contractor that pile driving can commence.
- If harbor porpoise, Steller sea lion, California sea lion, northern elephant seal, or harbor seal are present within the behavioral harassment zone, pile driving/removal would not need to be delayed. PSOs would monitor and document, to the extent practical, the behavior of marine mammals that remain in the zone.
- If humpback whale, minke whale, gray whale, killer whale, Dall's porpoise, Pacific white-sided dolphin, or other marine mammals the Navy does not have incidental harassment authorization for take are present within the behavioral harassment zone, pile

driving/removal would be delayed. PSOs would monitor and document, to the extent practical, the behavior of marine mammals that remain in the zone.

- In case of fog or reduced visibility, the PSOs must be able to see the shutdown zones or impact pile driving would not be initiated, and will cease if already in progress, until visibility in these zones improves to acceptable levels.

2.6.4 Visual Survey Protocol | During Activity Monitoring

The shutdown and behavioral harassment zones would be monitored throughout pile driving/removal. The following survey methodology will be implemented during pile driving/removal:

- If a harbor porpoise, Steller sea lion, California sea lion, northern elephant seal, or harbor seal is observed within or entering the behavioral harassment zones (Level B) during pile driving/removal, an exposure will be recorded, behaviors documented, and the shutdown zones monitor alerted to the position of the animal. However, that pile segment would be completed without cessation, unless the animal approaches or enters the shutdown zones (Level A), at which point all pile driving/removal activities will be halted. The PSOs shall immediately radio to alert the monitoring coordinator/construction contractor and raise a red flag. This action will require an immediate “all-stop” on pile operations.
- If humpback whale, minke whale, gray whale, killer whale, Dall’s porpoise, Pacific white-sided dolphin, or other marine mammals the Navy does not have incidental harassment authorization for take is observed within or entering the behavioral harassment zones (Level B) during pile driving/removal, all pile driving/removal activities will be halted. The PSOs shall immediately radio to alert the monitoring coordinator/construction contractor and raise a red flag. This action will require an immediate “all-stop” on pile operations. Under certain construction circumstances where initiating the shutdown and clearance procedures (which could include a delay of 15 minutes or more) would result in an imminent concern for human safety, the shutdown provision may be waived.
- Once a shutdown has been initiated, pile driving/removal and other in-water construction activities will be delayed until the animal has voluntarily left the shutdown zones and has been visually confirmed beyond the shutdown zones, or 15 minutes have passed without re-detection of the animal.
- Once marine mammals are no longer detected within the shutdown zones (i.e., the zone is deemed clear of marine mammals), the PSO will raise a green flag and radio the monitoring coordinator/construction contractor that activities can re-commence.

- If marine mammals are detected outside the shutdown zones, the PSOs will continue to monitor these individuals and record their behavior, but pile driving and other in-water construction may proceed. Any marine mammals detected outside the shutdown zones after pile driving is initiated shall likewise continue to be monitored and their behaviors recorded.

2.6.5 Visual Survey Protocol | Post-Activity Monitoring

Monitoring of the shutdown zones will continue for 30 minutes following the completion of pile driving/removal. These surveys will record marine mammal observations, and will focus on observing and reporting unusual or abnormal behavior of marine mammals. During these surveys, if any injured, sick, or dead marine mammals are observed, procedures outlined below in Section 3.0 should be followed.

3 Interagency Notification

In the event that the Navy needs to modify the terms of this MMMP, the NMFS representative will be promptly contacted for discussion of the requested modification. In the unanticipated event that the specified activity clearly causes the take of a marine mammal in a manner prohibited by this IHA, such as an injury (Level A harassment), serious injury, or mortality, the Navy shall immediately cease the specified activities and report the incident to the Chief of the

Permits and Conservation Division, Office of Protected Resources, NMFS, and the Northwest Regional Stranding Coordinator, NMFS. The report must include the following information:

- Time and date of the incident.
- Description of the incident.
- Environmental conditions (e.g., wind speed and direction, Beaufort sea state, cloud cover, and visibility).
- Description of all marine mammal observations in the 24 hours preceding the incident.
- Species identification or description of the animal(s) involved.
- Fate of the animal(s).
- Photographs or video footage of the animal(s).

Activities shall not resume until NMFS is able to review the circumstances of the prohibited take. NMFS will work with the Navy to determine what measures are necessary to minimize the likelihood of further prohibited take and ensure MMPA compliance. Navy may not resume their activities until notified by NMFS.

In the event that the Navy discovers an injured or dead marine mammal, and the lead PSO determines that the cause of the injury or death is unknown and the death is relatively recent

(e.g., in less than a moderate state of decomposition), the Navy shall immediately report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS, and the Northwest Regional Stranding Coordinator, NMFS. The report will include the same information as listed above. Construction activities may continue while NMFS reviews the circumstances of the incident. The Navy will work with NMFS to determine whether additional mitigation measures or modifications to the activities are appropriate.

In the event that the Navy discovers an injured or dead marine mammal, and the lead PSO determines that the injury or death is not associated with or related to the activities authorized in the IHA (e.g., previously wounded animal, carcass with moderate to advanced decomposition, or scavenger damage), the Navy shall report the incident to the Chief of Permits and Conservation Division, Office of Protected Resources, NMFS, and the Northwest Regional Stranding Coordinator, NMFS, within 24 hours of the discovery. The Navy shall provide photographs, video footage, or other documentation of the stranded animal sighting to NMFS.

Care should be taken in handling dead specimens to preserve biological materials in the best possible state for later analysis of cause of death, if that occurs. In preservation of biological materials from a dead animal, the finder (i.e., PSO) has the responsibility to ensure that evidence associated with the specimen is not unnecessarily disturbed.

Primary points of contact for the Navy are:

1. Tyler Yasenak - (360) 315-2452
2. Greg Leicht - (360) 315-5411

Primary points of contact at NMFS are:

1. Modification to protocol - (360) 753-5835
2. Chief of the Permits and Conservation Division (301) 427-8425
3. Northwest Regional Stranding Coordinator (206) 526-6550

4 Monitoring Reports

A draft report will be submitted to NMFS within 90 work days of the completion of marine mammal monitoring. A final report will be prepared and submitted to the NMFS within 30 work days following receipt of comments on the draft report from NMFS. At a minimum, the report shall include:

- General data:
  - Date and time of activities.
  - Water conditions (e.g., sea-state, tidal state).
  - Weather conditions (e.g., percent cover, visibility).
- Specific pile data:

  - Description of the pile driving/removal activities including the size and type of pile, the installation methods used for each pile, and the duration each method was used per pile.
  - Impact or vibratory hammer force used to drive/extract piles.
  - Detailed description of the sound attenuation system for impact driving, including the design specifications.
  - Depth of water where the pile was driven/removed.
  - Depth into the substrate that the pile was driven/removed.
- Pre-activity observational survey-specific data:
  - Date and time survey is initiated and terminated.
  - Description of any observable marine mammal behavior in the immediate area during monitoring.
  - If possible, the correlation to underwater sound levels occurring at the time of the observable behavior.
  - Actions performed to minimize impacts on marine mammals.
- During-activity observational survey-specific data:
  - Description of any observable marine mammal behavior within the behavioral harassment zones or in the immediate area surrounding behavioral harassment zones including the following:
    - Distance from animal to source.
    - Reason why/why not shutdown implemented.
    - If a shutdown was implemented, behavioral reactions noted and if they occurred before or after implementation of the shutdown.
    - If a shutdown is implemented, the distance from animal to source at the time of the shutdown.
    - Behavioral reactions noted during soft-starts[3] and if they occurred before or after implementation of the soft-start.

---

3 The objective of a soft-start is to provide a warning and/or give animals in close proximity to pile driving a chance to leave the area prior to a vibratory or impact driver operating at full capacity, thereby exposing fewer animals to loud underwater and airborne sounds.

- A soft-start procedure will be used at the beginning of each day's in-water pile driving or any time pile driving has ceased for more than 30 minutes.
- For impact pile driving, the following soft-start procedures will be conducted:
  - If a bubble curtain is used for impact pile driving, the contractor will start the bubble curtain prior to the initiation of impact pile driving.
  - The contractor will provide an initial set of strikes from the impact hammer at reduced energy, followed by a 30-second waiting period, then two subsequent sets. (The reduced energy of an individual hammer cannot be quantified because they vary by individual drivers. Also, the number of strikes will vary at reduced energy because raising the hammer at less than full power and then releasing it results in the hammer "bouncing" as it strikes the pile resulting in multiple "strikes.") (*continued on next page*)

        - Distance to the animal from the source during soft-start.
    - If possible, the correlation to underwater or airborne sound levels occurring at the time of this observable behavior.
    - Actions performed to minimize impacts on marine mammals.
    - Time when pile driving is stopped due to the presence of marine mammals within the shutdown zones and time when pile driving resumes.
- Post-activity observational survey-specific data:
    - Results, which include the detections of marine mammals, species and numbers observed, sighting rates and distances, and behavioral reactions within and outside of behavioral harassment zones.
    - A refined take estimate based on the number of marine mammals observed during the course of construction. The refined take estimate will use the most current guidelines. If a contractor is used for visual monitoring, the Navy will include these guidelines along with this MMMP as provision in the contract and will ensure contractor compliance.

(*continued from previous page*)

- For vibratory pile driving, the contractor will initiate noise from vibratory hammers for 15 seconds at reduced energy followed by a 30-second waiting period. The procedure shall be repeated two additional times. If additional marine mammal monitoring data indicate that there is no change in behavior of pinnipeds during vibratory pile driving or soft-start procedures and NMFS concurs, then the soft-start procedure would no longer be required. Additionally, if unsafe working conditions during soft-starts are reported by the contractor and verified by an independent safety inspection, the Navy may elect to discontinue vibratory soft-starts. The Navy will inform NMFS HQ if the soft-start procedure is discontinued.

5 References

National Marine Fisheries Service (NMFS). 2013. Draft guidance for assessing the effects of anthropogenic sound on marine mammals: Acoustic threshold levels for onset of permanent and temporary threshold shift in marine mammals. Draft, December. Available at: http://www.nmfs.noaa.gov/pr/acoustics/draft_acoustic_guidance_2013.pdf.

National Marine Fisheries Service (NMFS). 2015*. Guidance for Developing a Marine Mammal Monitoring Plan. website*. Available at: http://www.westcoast.fisheries.noaa.gov/protected_species/marine_mammals/monitoring_plan_guidance.html.

U.S. Department of the Navy. 2016. Incidental Harassment Authorization Application for the U.S. Navy Pier and Support Facilities for TPS Project at the U.S. Coast Guard (USCG) Air Station/Sector Field Office Port Angeles. Naval Facilities Engineering Command Northwest, Environmental. Naval Base Kitsap Bangor, Silverdale, WA.

Attachment A: Marine Mammal Observation Record Forms and Sighting Codes

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MARINE MAMMAL OBSERVATION RECORD FORM

Project Name:_____

Monitoring Location_____
(Pier Location, Vessel based, Land Location, other)

Page_____of _____

Date:_____

Vessel Name:_____

Time Effort Initiated:_____

Time Effort Completed:_____

Sighting Data

Event Code	Sighting Number (1 or 1.1 if resight)	Time/Duration watching sighting (Start/End time if continuous)	WP # (every time a sighting is made)	Observer	Sighting cue	Species	Dist/ Dir to Animal (from Observer)	Dist to Pile (btwn animal & pile)	# of Animals Group Size (min/max/best) # of Calves	Relative Motion/and Behavior Code (see code sheet)	Const Type During Sighting	Miti-gation used during sighting ?	Miti-gation Type?	Visibility	% Glare	Weath Cond	Sea State and Wave Ht	Swell Dir	Behavior Change/ Response to Activity/Comments
		: : : :					m or km °	m or km	/ / ___calves	opening closing parallel none Behavior Code:	PRE POST SSV SSI V I PC DP ST NONE	Y N	DE SD	B P M G E			Light Mod Heavy	N or S W or E	
		: : : :					m or km °	m or km	/ / ___calves	opening closing parallel none Behavior Code:	PRE POST SSV SSI V I PC DP ST NONE	Y N	DE SD	B P M G E			Light Mod Heavy	N or S W or E	
		: : : :					m or km °	m or km	/ / ___calves	opening closing parallel none Behavior Code:	PRE POST SSV SSI V I PC DP ST NONE	Y N	DE SD	B P M G E			Light Mod Heavy	N or S W or E	
		: : : :					m or km °	m or km	/ / ___calves	opening closing parallel none Behavior Code:	PRE POST SSV SSI V I PC DP ST NONE	Y N	DE SD	B P M G E			Light Mod Heavy	N or S W or E	
		: : : :					m or km °	m or km	/ / ___calves	opening closing parallel none Behavior Code:	PRE POST SSV SSI V I PC DP ST NONE	Y N	DE SD	B P M G E			Light Mod Heavy	N or S W or E	
		: : : :					m or km °	m or km	/ / ___calves	opening closing parallel none Behavior Code:	PRE POST SSV SSI V I PC DP ST NONE	Y N	DE SD	B P M G E			Light Mod Heavy	N or S W or E	
		: : : :					m or km °	m or km	/ / ___calves	opening closing parallel none Behavior Code:	PRE POST SSV SSI V I PC DP ST NONE	Y N	DE SD	B P M G E			Light Mod Heavy	N or S W or E	

Sighting #=chronological number of sightings, If resight of same animal, then 1.1, 1.2, etc. WP (Waypoint)=GPS recording of lat/long, time/date stamp. Critical for vessel observers.

Sighting Codes
(Sighting Cue & Behavior Codes)

Behavior codes

Code	Behavior	Definition
BR	Breaching	Leaps clear of water
CD	Change Direction	Suddenly changes direction of travel
CH	Chuff	Makes loud, forceful exhalation of air at surface
DI	Dive	Forward dives below surface
DE	Dead	Shows decomposition or is confirmed as dead by investigation
DS	Disorientation	An individual displaying multiple behaviors that have no clear direction or purpose
FI	Fight	Agonistic interactions between two or more individuals
FO	Foraging	Confirmed by food seen in mouth
MI	Milling	Moving slowly at surface, changing direction often, not moving in any particular direction
PL	Play	Behavior that does not seem to be directed towards a particular goal; may involve one, two or more individuals
PO	Porpoising	Moving rapidly with body breaking surface of water
SL	Slap	Vigorously slaps surface of water with body, flippers, tail etc.
SP	Spyhopping	Rises vertically in the water to "look" above the water
SW	Swimming	General progress in a direction. Note general direction of travel when last seen [Example: “SW (N)” for swimming north]
TR	Traveling	Traveling in an obvious direction. Note direction of travel when last seen [Example: “TR (N)” for traveling north]
UN	Unknown	Behavior of animal undetermined, does not fit into another behavior
Pinniped only		
EW	Enter Water (from haul out)	Enters water from a haul-out for no obvious reason
FL	Flush (from haul out)	Enters water in response to disturbance
HO	Haul out (from water)	Hauls out on land
RE	Resting	Resting onshore or on surface of water
LO	Look	Is upright in water "looking" in several directions or at a single focus
SI	Sink	Sinks out of sight below surface without obvious effort (usually from an upright position)
VO	Vocalizing	Animal emits barks, squeals, etc.
Cetacean only		
LG	Logging	Resting on surface of water with no obvious signs of movement

Marine Mammal Species

Code	Marine Mammal Species
CASL	California Sea Lion
HSEA	Harbor Seal
STSL	Steller Sea Lion
HPOR	Harbor Porpoise
DPOR	Dall's Porpoise
ORCA	Killer Whale
HUMP	Humpback Whale
UNLW	Unknown Large Whale
OTHR	Other
UNKW	Unknown

Event

Code	Activity Type
E ON	Effort On
E OFF	Effort Off
PRE	Pre Watch
POST	Post Watch
SSV	Soft-start-vibratory
SSI	Soft-start-impact
WC	Weather Condition/Change
S	Sighting
M-DE	Mitigation Delay
M-SD	Mitigation Shutdown

Construction Type

Code	Activity Type
SSV	Soft-Start (Vibratory)
SSI	Soft-Start (Impact)
V	Vibratory Pile Driving (installation and extraction)
I	Impact Pile Driving
PC	Pneumatic Chipping
DP	Dead pull
ST	Stabbing
NONE	No Pile Driving
OTH	Other

Mitigation Codes

Code	Activity Type
DE	Delay onset of Pile Driving/Removal
SD	Shut down Pile Driving/Removal

Visibility

Code	Distance Visible
B	Bad (<0.5 km)
P	Poor (0.5 – 1.5 km)
M	Moderate (1.5 – 10 km)
G	Good (10 – 15 km)
E	Excellent (>15 km)

Glare

Percent glare should be the total glare of observers' area of responsibility. Determine if observer coverage is covering 90 degrees or 180 degrees and document daily. Then assess total glare for that area. This will provide needed information on what percentage of the field of view was poor due to glare.

Weather Conditions

Code	Weather Condition
S	Sunny
PC	Partly Cloudy
L	Light Rain
R	Steady Rain
F	Fog
OC	Overcast

Sea State and Wave Height

Use Beaufort Sea State Scale for Sea State Code. This refers to the surface layer and whether it is glassy in appearance or full of white caps. In the open ocean, it also takes into account the wave height or swell, but in inland waters the wave height (swells) may never reach the levels that correspond to the correct surface white cap number. Therefore, include wave height for clarity.

Code	Wave Height
Light	0 – 3 ft
Moderate	4 – 6 ft
Heavy	>6 ft

Swell Direction

Swell direction should be where the swell is coming from (S for coming from the south). If possible, record direction relative to fixed location (pier). Choose this location at beginning of monitoring project.

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Attachment B Beaufort Wind Scale and Sea State

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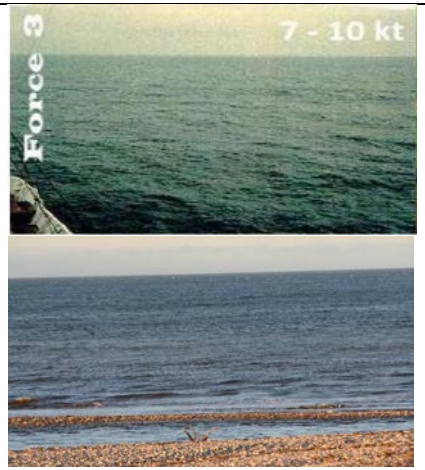
U.S. Navy and Beaufort Wind Scale with Corresponding Sea State Codes
(http://ioc.unesco.org and http://www.wrh.noaa.gov/pqr/info/beaufort.php)

Beaufort SS (Force)	Wind (knots)	Wind Classification	Wave Height (ft)	Wind Effects on Water	Notes Specific to On-Water Protected Species Observations	Photos Indicating Beaufort Sea State from a boat and on shore
0	<1	Calm	0	Calm; like a mirror	Excellent conditions, no wind, small or very smooth swell. You have the impression you could see anything.	
1	1-3	Light air	¼ < ½	Ripples with appearance of scales; no foam crests	Very good conditions, surface could be glassy (Beaufort 0), but with some lumpy swell or reflection from forests, glare, etc.	

Beaufort SS (Force)	Wind (knots)	Wind Classification	Wave Height (ft)	Wind Effects on Water	Notes Specific to On-Water Protected Species Observations	Photos Indicating Beaufort Sea State
2	4-6	Light breeze	½ – 1 (max 1)	Small wavelets; crests with glassy appearance, not breaking	Good conditions, no whitecaps; texture/lighting contrast of water make protected species hard to see. Surface could also be glassy or have small ripples, but with a short, lumpy swell, thick fog, etc.	
3	7-10	Gentle breeze	2 – 3 (max 3)	Large wavelets; crests begin to break; scattered whitecaps	Fair conditions, scattered whitecaps, detection of protected species definitely compromised; a hit-or-miss chance of seeing them owing to water choppiness and high contrast. This could also occur at lesser wind with a very short wavelength, choppy swell.	

Beaufort SS (Force)	Wind (knots)	Wind Classification	Wave Height (ft)	Wind Effects on Water	Notes Specific to On-Water Protected Species Observations	Photos Indicating Beaufort Sea State
4	11-16	Moderate breeze	3 ½ – 5 (max 5)	Small waves becoming longer, numerous whitecaps	Whitecaps abundant, sea chop bouncing the boat around, etc.	
5	17-20	Fresh breeze	6 – 8 (max 8)	Moderate waves, taking longer form; many whitecaps; some spray	Land condition: Branches of a moderate size move. Small trees in leaf begin to sway.	

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Attachment C Chain of Custody Form

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Chain of Custody Record

Date and Time of Collection:	Duty Station:	Collection By:

Source of Specimen (Person and/or Location) Found At:	Project Name:

Item No:	Description of Specimen (include Species and Tag Number):

Item No:	From: (Print Name, Agency)	Release Signature:	Release Date:	Delivered via: FEDEX U.S. Mail In Person Other:
	To: (Print Name, Agency)	Receipt Signature:	Receipt Date:	

Item No:	From: (Print Name, Agency)	Release Signature:	Release Date:	Delivered via: FEDEX U.S. Mail In Person Other:
	To: (Print Name, Agency)	Receipt Signature:	Receipt Date:	
Item No:	From: (Print Name, Agency)	Release Signature:	Release Date:	Delivered via: FEDEX U.S. Mail In Person Other:
	To: (Print Name, Agency)	Receipt Signature:	Receipt Date:	
Item No:	From: (Print Name, Agency)	Release Signature:	Release Date:	Delivered via: FEDEX U.S. Mail In Person Other:
	To: (Print Name, Agency)	Receipt Signature:	Receipt Date:	
Item No:	From: (Print Name, Agency)	Release Signature:	Release Date:	Delivered via: FEDEX U.S. Mail In Person Other:
	To: (Print Name, Agency)	Receipt Signature:	Receipt Date:	
Item No:	From: (Print Name, Agency)	Release Signature:	Release Date:	Delivered via: FEDEX U.S. Mail In Person Other:
	To: (Print Name, Agency)	Receipt Signature:	Receipt Date:	

Appendix F
Compensatory Mitigation Plan

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Permittee-Responsible Compensatory Mitigation Plan

Inner Ediz Hook Jetty Restoration Project
U.S. Coast Guard Air Station/Sector Field Office
Port Angeles, Washington

Permittee: U.S. Navy

Prepared by

Naval Facilities Engineering Command Northwest

May 2016

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PERMITTEE-RESPONSIBLE COMPENSATORY MITIGATION PLAN INNER EDIZ HOOK JETTY RESTORATION PROJECT AT U.S. COAST GUARD AIR STATION/SECTOR FIELD OFFICE PORT ANGELES, WA

TABLE OF CONTENTS

ABBREVIATIONS AND ACRONYMS ii

1.0 PROJECT DESCRIPTION 1

2.0 APPROACH TO MITIGATION 1

3.0 PROPOSED COMPENSATORY MITIGATION PLAN 2

3.1 Proposed Mitigation 2

3.2 Goals and Objectives 2

3.3 Performance Standards 3

3.4 Monitoring Requirements 3

3.5 Site Selection 4

3.6 Site Protection 4

3.7 Mitigation Work Plan 5

3.8 Maintenance Plan 5

3.9 Adaptive Management Plan 5

3.10 Long-term Management Plan 6

3.11 Financial Assurances 6

4.0 REFERENCES 9

Enclosure 1. Preliminary Design Insert design from David Gibson 11

Enclosure 2. Baseline Conditions 13

List of Figures

Figure 1. Vicinity Map 7

Figure 2. Documented Eelgrass Along Inner Ediz Hook 8

Figure 3. Circulation and Sediment Transport 17

Abbreviations and Acronyms

AIRSTA/SFO	Air Station/Sector Field Office
BMPs	Best Management Practices
cy	cubic yards
CEQ	Council on Environmental Quality
CWA	Clean Water Act
dB	decibel
dB re 20 μPa	decibels referenced 20 microPascal
CPs	Current Practices
DNR	Washington Department of Natural Resources
DoD	Department of Defense
EPA	U.S. Environmental Protection Agency
Ft^2	square foot/feet
M	meter
M^2	square meter
MMs	Mitigation Measures
MFPU	Marine Force Protection Unit
MLLW	mean lower low water
MHHW	mean higher high water
Navy	U.S. Department of the Navy
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOPLE	North Olympic Peninsula Lead Entity
PRM	Permittee-responsible mitigation
SPCC	Spill Prevention, Control, and Countermeasures
SWPPP	Stormwater Pollution Prevention Plan
TPS	Transit Protection System
US	United States
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
WRIA	water resource inventory area

1.0 Project Description

The United States (U.S.) Department of the Navy (Navy) proposes to construct a pier and upland support facilities at the U.S. Coast Guard (USCG) Air Station/Sector Field Office Port Angeles (AIRSTA/SFO Port Angeles) located in the City of Port Angeles, Washington (Figure 1). The proposed project is located within the City on the eastern end and southern side of Ediz Hook. The purpose of the project is to provide a staging location for the Transit Protection System (TPS) vessels and crews that escort Navy submarines to and from their dive/surface points in the Strait of Juan de Fuca and Naval Base Kitsap Bangor.

Following completion of the TPS Pier, resulting overwater coverage for the components of the pier (approach trestle, fixed pier, and associated floats) will be approximately 25,465 ft^2. The trestle component will create approximately 8,650 ft^2 of permanent shading over the nearshore areas shallower than -30 ft mean lower low water (MLLW). A continuous bed of eelgrass occurs from approximately -0 ft to -20 ft MLLW within the project footprint. A variety of invertebrates such as crab, periwinkle, anemones, and scallops also occur within the proposed trestle footprint. The total amount of eelgrass impacted from pile placement and shading is expected to be approximately 4,595 ft^2. Further, approximately 745 ft^2 of benthic habitat will be displaced by new piles installed to support the structure. Resulting overwater coverage may also affect prey and habitat availability for ESA-listed salmonids as well as potentially alter their migration behavior. Construction of the pier and installation of the piles are regulated under Section 10 of the Rivers and Harbors Act.

The project would also place concrete in the upper 10 feet of the steel piles to function as pile plugs needed to affix the pile caps to the piles. In some areas on the pier, the concrete within the piles would extend below the mean higher high water (MHHW) line. Roughly 41.6 cubic yards (cy) of concrete would be placed below MHHW. While the placement of concrete in these steel piles below MHHW does not have the effect of fill, the USACE has determined it is fill and therefore regulated under Section 404 of the Clean Water Act. The proposed project would have no impact on wetlands.

Pursuant to the Final U.S. Army Corps of Engineers (USACE)/U.S. Environmental Protection Agency (EPA) Rule on Loss of Aquatic Resources (USACE and EPA 2008), compensatory mitigation is proposed to offset potential adverse impacts to aquatic resources from the addition of shade along the nearshore and displaced benthic habitat from installed hollow steel piles that will result from construction of the proposed pier.

2.0 Approach to Mitigation

In accordance with the hierarchy established under the Final Rule on Loss of Aquatic Resources, the Navy first evaluated the feasibility of utilizing mitigation banks and In-Lieu Fee Programs to compensate for the loss of aquatic resources. However, there are no available mitigation bank credits for the Port Angeles/Clallam County area and no In-Lieu Fee Programs have been established for these areas.

The Navy proposes to implement a permittee-responsible mitigation (PRM) plan that is consistent with both a “watershed” mitigation approach and an “on-site and in-kind” mitigation approach. The proposed project and compensatory mitigation sites are located within water resource inventory area (WRIA) 18. Port Angeles Harbor and Ediz Hook are not addressed in the WRIA 18 limiting factors analysis or in the Chinook recovery plan. This appears to be an oversight as the harbor was likely one of the most important estuary habitats in the central Strait

(Northwest Indian Fisheries Commission 2014). Restoration of inner Ediz Hook has been identified as a priority in the Shoreline Restoration Plan for the City of Port Angeles' Shoreline in the North Olympic Peninsula Lead Entity (NOPLE) nearshore strategy.

The proposed mitigation site is near a sandlance spawning beach and directly adjacent to eelgrass beds. It is immediately east of a three-phase shoreline restoration effort being implemented by the Lower Elwha Klallam Tribe. (Phases 1 and 2 have been completed and phase 3 is underway.) The proposed action and mitigation sites are within the critical recovery area for Puget Sound Chinook, Hood Canal Eastern Strait of Juan de Fuca Summer Chum, and Coastal-Puget Sound bull trout.

3.0 Proposed Compensatory Mitigation Plan

3.1 Proposed Mitigation

The Navy is proposing nearshore habitat restoration by removing a rock jetty that is located approximately 1,600 ft west of the proposed TPS pier. This mitigation, identified herein as the Inner Ediz Hook Jetty Restoration project, would involve the removal of 7,650 cy of fill located in aquatic tidelands off the south shoreline of inner Ediz Hook east of the USCG AIRSTA/SFO Port Angeles entrance gate. The fill extends approximately 215 ft south from the shoreline and is protected by a rock and timber bulkhead capped by a concrete slab. The timber piles comprising the bulkhead will be removed by vibratory extraction. The shoreline at the jetty site will be augmented with sand and gravel suitable for beach nourishment and contoured to be consistent with the surrounding low-slope shoreline. Large wood will be incorporated into the reconstructed beach. A new, rock-armored embankment section will be tied into the existing embankment armoring by reusing removed material as much as possible. Revegetation of upland sites will be accomplished using native dune grass species or other native vegetation.

The jetty, which is no longer used, was built in 1975 to offload basalt blocks for armoring the northern Ediz Hook shoreline. The bulkhead and fill are located in aquatic tidelands owned by the USGC. The site is comprised of rock riprap, a timber bulkhead capped by a concrete slab, and other fill. The surrounding substrate is similar to the project site in that it is highly varied and contains a mix of sand, silt, shells, gravel and wood debris (Berger Abam 2014). Marine vegetation (eelgrass, kelp, and algae) is present adjacent to the mitigation site. Eelgrass was documented on the east and west side of the jetty for a combined total of 49,693 ft2 occurring in discontinuous patches between -0.5 and -20 feet MLLW (SEE LLC 2015), though it would appear that the jetty itself may be an impediment for eelgrass growth (see Figure 2).

Following completion of the Inner Ediz Hook Jetty Restoration project, up to 24,600 ft^2 of aquatic nearshore habitat, free of barriers and shading, will be created. As natural processes take over, eelgrass could potentially populate the newly restored habitat after the mitigation project is complete. With removal of the jetty, the existing nearshore barrier the jetty creates would be gone - no longer causing an artificial obstruction forcing migrating juvenile salmonids to deeper, predator-filled waters.

3.2 Goals and Objectives

The objective of compensatory mitigation is to restore, establish, enhance, or preserve aquatic resources for the purpose of offsetting unavoidable losses to aquatic resources resulting from activities authorized by USACE permits. This section outlines the goals and objectives of the Inner Ediz Hook Jetty Restoration project

Goal 1: Restore the biological, physical, and chemical processes of the aquatic tidelands near the west end of USCG AIRSTA/SFO Port Angeles.

Objective 1.1: remove the existing rock riprap, a timber bulkhead capped by a concrete slab, and other fill associated with the jetty.

Objective 1.2: re-contour intertidal area to match historic or natural conditions.

Goal 2: Restore forage fish spawning habitat as well as migratory corridor habitat used by numerous species of fish including listed populations of Puget Sound Chinook and steelhead.

Objective 2.1: remove the 215-foot jetty extending south into the harbor to eliminate a critical barrier for juvenile salmonids migrating along the nearshore.

Objective 2.2: create 24,600 ft^2 of aquatic nearshore habitat.

Objective 2.3: following jetty removal and recontouring, place sand and gravel suitable for beach nourishment.

Goal 3: Reestablish native vegetation in upland areas.

Objective 3.1: Plant native dune grass species or other native vegetation following completion of jetty removal.

3.3 Performance Standards

Performance Standards are the means to quantify whether the Goals and Objectives have been met. The Performance Standards are designed to be directly linked to the Goals and the Objectives as a means to quantify, where possible, the extent of reaching the goals for the project. Given that ecological parameters often exist along a continuum, it is common for single Performance Standards to be applicable to multiple goals or objectives. The monitoring program is designed to assess the following parameters:

PS 1. Remove existing fill associated with the jetty and recontour consistent with adjacent aquatic nearshore habitat.

Recently collected bathymetric and topographic data will be used to establish the design profile for the tidelands once the jetty has been removed (see Enclosure 1). Because the shoreline and tidelands are part of a dynamic system, natural processes will push the area to a dynamic equilibrium following completion of the restoration project.

PS 2. Native upland vegetation in the restoration area will meet the following performance standards.

Year 1	> 80% survival of planted native vegetation.
Year 2	Percent cover estimates show a minimum of 60% aerial cover of native vegetation.
Year 3	Percent cover estimates show a minimum of 85% aerial cover of native vegetation and invasive non-native species show a maximum 15 % aerial cover.

3.4 Monitoring Requirements

The restoration area will be monitored during and following construction at the restoration area. During construction, monitoring will ensure that BMPs are observed to minimize impacts, and

coordinate the onsite construction work (including recontouring and planting) to ensure that the site is constructed as designed. At the completion of construction, the restored aquatic nearshore area will be resurveyed to verify complete removal of fill and that reestablishment of natural contours has been accomplished.

Post-construction monitoring will be performed for three years to ensure that the goals and objectives of the mitigation are being met. Monitoring of the restoration site will be performed by qualified ecologists/geomorphologists. A combination of qualitative and quantitative monitoring activities will be used to assess the degree to which management objectives and associated performance standards described in this mitigation plan have been met. Activities will include site visits to monitor unnatural site disturbance, photographs to document site development, and data collection for the quantitative evaluation of performance standards.

Appropriate contingency measures will be developed as needed to ensure that the site develops healthy vegetation that meets the obligations described in this mitigation plan and the associated permits.

The proposed mitigation is intended to achieve the performance standards with minimal ongoing maintenance. Species proposed in the plant list will be appropriate to Port Angeles coastal habitats; however, supplemental irrigation may be needed during the first two growing seasons following installation to ensure long-term survival. The need for irrigation will be evaluated based on the conditions observed during the establishment period.

To ensure rapid plant community establishment, native vegetation will be planted closer together than would generally occur in natural mature upland habitats. Some natural mortality is expected to occur during the monitoring period. All dead and downed woody material will be left in place to provide micro-habitats for wildlife. Plants will be replaced as needed to meet performance standards.

Maintenance to control nuisance species in the mitigation areas may be necessary. If during the monitoring period it becomes evident that invasive species are impeding establishment of desirable native plants, measures will be implemented to control nuisance species.

3.5 Site Selection

The proposed mitigation site was selected based on the following three criteria:

- Meets watershed restoration goals of the City of Port Angeles and NOPLE, as identified in Section 2 above.
- Consistent with ongoing restoration on the south shore of Ediz Hook.
- Site restoration would compensate for project impacts, as well as restore many aquatic functions lost to due to historic activities (i.e., installation of the jetty).

3.6 Site Protection

The mitigation site is located on land owned and controlled by the USCG. Access to the general public is restricted. The USCG has no plans for development of the proposed mitigation area and any future development in this area is highly unlikely given the proximity to adjacent land uses such as the underwater dive site and the Pilot's Association facility. Should the USCG propose to develop this area in the future, the Navy would reinitiate consultation with the regulatory agencies and the LEKT to identify an alternate mitigation site.

3.7 Mitigation Work Plan

As discussed in Section 3.1, the Navy's Inner Ediz Hook Jetty Restoration project would involve the removal of 16,800 feet (0.39 acre) of fill, which extends approximately 215 feet south from the shoreline located in aquatic tidelands off the south shoreline of inner Ediz Hook east of the USCG AIRSTA/SFO Port Angeles entrance gate. The shoreline at the jetty site will be augmented with sand and gravel suitable for beach nourishment and contoured to be consistent with the surrounding low-slope shoreline. Large wood will be incorporated into the reconstructed beach. A new rock-armored embankment section will be tied into the existing embankment armoring by reusing removed material. Revegetation of upland sites will be accomplished using native dune grass species or other native vegetation.

Removal of the riprap and fill would be accomplished from equipment working from the jetty itself and not in the water. No discharge of dredge or fill material is expected as a result of this restoration work and all BMPs implemented for the proposed action would be implemented for the restoration project, as appropriate.

Preliminary plans for the Inner Ediz Hook Jetty Restoration project are provided in Enclosure 1. The Navy will develop detailed restoration plans and submit them to the USACE and Ecology for review, prior to implementation of the restoration effort.

3.8 Maintenance Plan

The primary goals of the Inner Ediz Hook Jetty Restoration project are to remove fill from aquatic tidelands and restore the tidal areas to natural contours, which will allow natural processes to take over to control future contouring and revegetation in these areas. As such, no routine maintenance is planned for these restoration areas following completion of the initial restoration effort. See Section 3.9, Adaptive Management Plan, for non-routine measures that may be required for this portion of the restoration effort.

The Navy will maintain the upland vegetation restoration area to ensure the area meets the performance criteria. Required maintenance will include supplemental irrigation to ensure the vegetation survives the first full growing season following planting and, as necessary, removal of nuisance and invasive species from the restoration area. Removal methods will first include hand cutting and removal, and if this fails to control them herbicide will be applied.

3.9 Adaptive Management Plan

Information from the monitoring effort will be used to identify the need for maintenance or corrective action. If problems are encountered during monitoring, the first step will be to identify the reason for the problem, then implement an appropriate corrective or maintenance action.

The following table identifies the corrective actions that will be taken as a result of monitoring.

Contingency Measures for the Inner Ediz Hook Jetty Restoration Project

Problem	Contingency Measure
Post restoration survey identifies that fill removal and/or recontouring incomplete.	Consult with agencies. Reinitiate fill removal and recontouring. Conduct follow-on survey of restoration area, as necessary.
Less than 80 percent of planted vegetation species survive in Year 1.	Navy staff (or other qualified staff) will assess the site to determine what conditions are preventing the plants from thriving. Appropriate measures will be taken to correct any conditions that are limiting growth. Lost plants will be replaced with appropriate native species unless appropriate native species are volunteering at a rate sufficient to replace them. Additional measures (such as the addition of protective measures or modification of irrigation practices) will be considered if necessary.
Percent cover estimates do not show a minimum of 60% aerial cover of native vegetation in Year 2.	Navy staff (or other qualified staff) will assess the site to determine what conditions are preventing the plants from thriving. Appropriate measures will be taken to correct any conditions which are limiting growth
Performance standards not met at Year 3.	Continue the monitoring regime for two additional years. The site will continue to be evaluated every two years until it has met the stated performance standards associated with management objectives. Other contingency measures may be implemented during this period.

3.10 Long-term Management Plan

Following completion of the three-year monitoring period, the site will be managed by the land owner - the USCG. No long-term management of the nearshore habitat is proposed because the site is expected to be in dynamic equilibrium.

3.11 Financial Assurances

Funding for the Inner Ediz Hook Jetty Restoration Project will be provided by the federal government under the Military Construction program. The Navy has requested a total of $950,000 for compensatory mitigation, as a line item of the overall TPS Pier and Upland Facilities military construction funding request. Implementation of the proposed project cannot occur without full funding of the compensatory mitigation portion of the project.

Figure 1. Vicinity Map

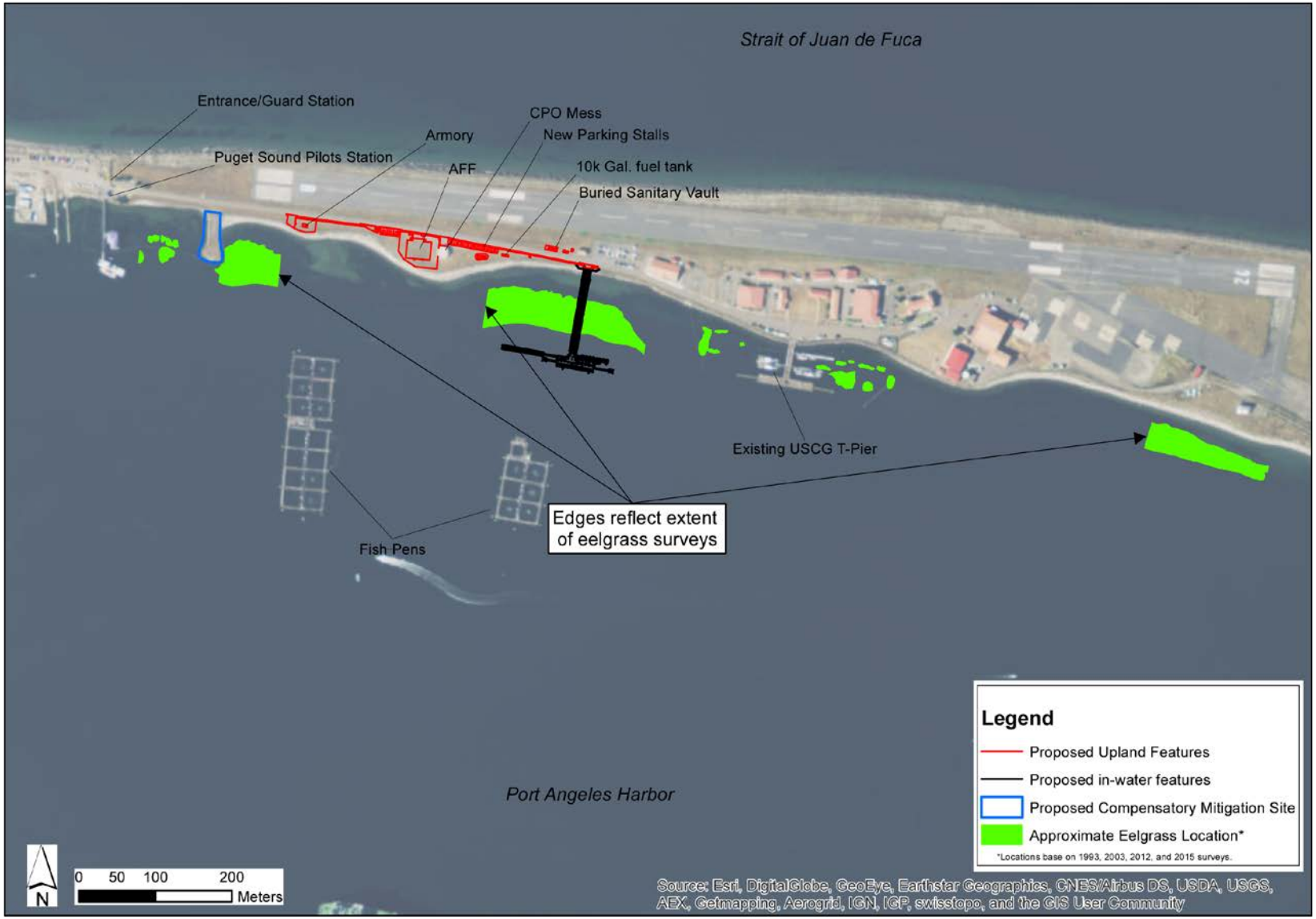

Figure 2. Documented Eelgrass Along Inner Ediz Hook

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Enclosure 1. Inner Ediz Hook Jetty Excavation Area

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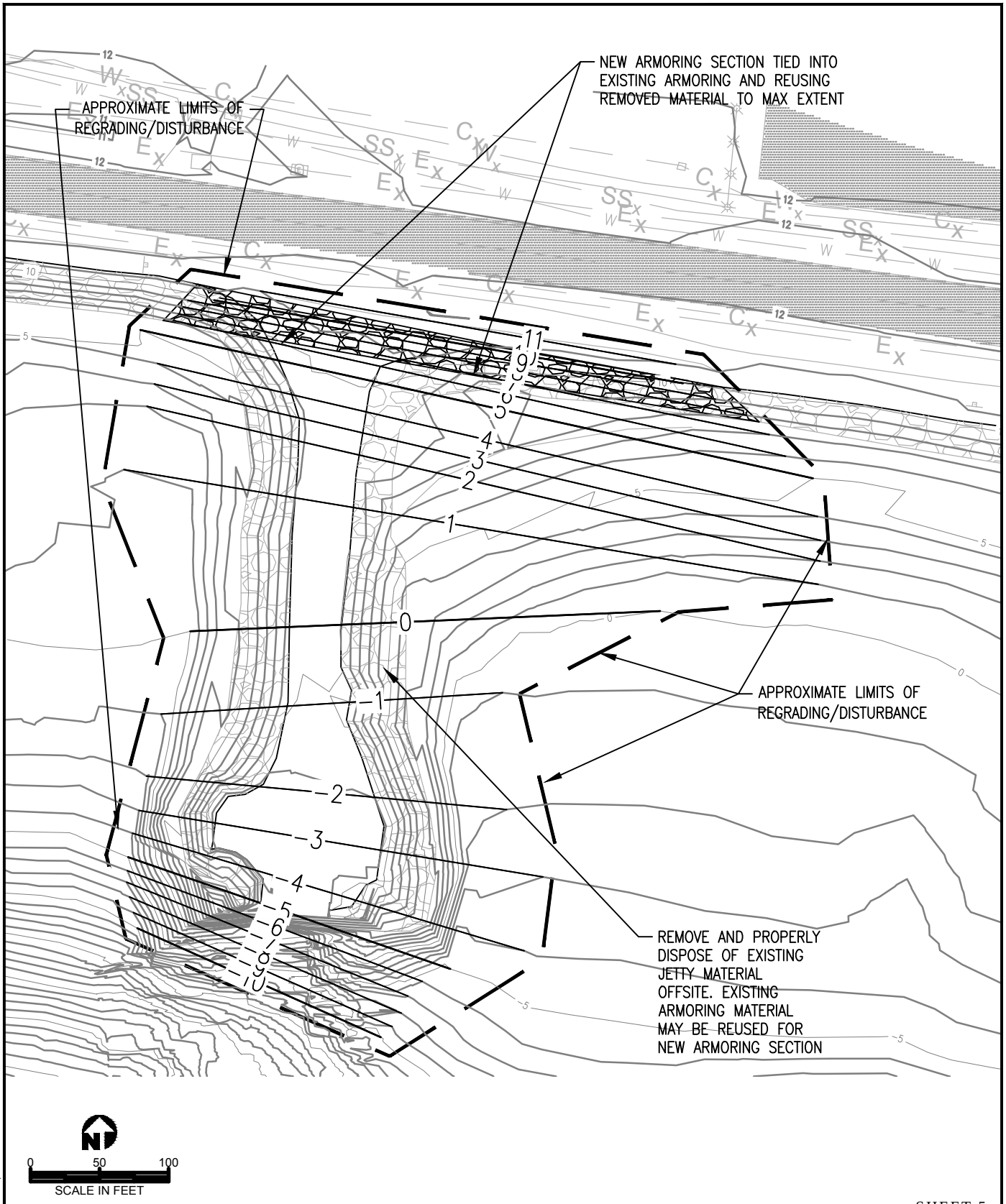

SHEET 5

P-993 MITIGATION

Applicant: U.S. Department of the Navy

Reference Number: _____

Adjacent Property Owners:

Washington State Department of Natural Resources

Location:
U.S. Coast Guard Air Station/Sector Field Office
Port Angeles, WA
Ediz Hook Road
Port Angeles, WA 98362-2201
Lat/Long: 48.14077° / -23.417164°

Sheet: 5 of 5 Date: 05/_04__/2016

Proposed Project:
Construct a pier and upland support facilities at the USCG AIRSTA/SFO Port Angeles

In: Port Angeles Harbor
Near/At: Port Angeles, WA
County: Clallam
State: WA

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Enclosure 2 Baseline Conditions

Tides and Circulation

The patterns of currents in Port Angeles Harbor are driven by the tidal flow in the Strait of Juan de Fuca (Ebbesmeyer et al. 1979; Department of the Interior [DOI] 1967; Newfields 2012). During flood-tide, a large eddy is established between Dungeness Spit and Ediz Hook that extends a short way into the harbor and circulates water in a clockwise direction (Ebbesmeyer et al. 1979; Yang et al. 2003). The duration of the eddy typically lasts six hours during the flood period (Yang et al. 2003). The direction of the eddy is driven by water moving along the northern edge of the harbor during flood tides and along the southern edge of the harbor during ebb tides (DOI 1967). The eddy circulates at a slower rate than the flows outside the harbor and is constrained by the size of the harbor itself. Surface currents within the harbor are generally slow (less than 0.8 feet/sec) with long periods of slack water, especially in the northern and western portions of the Harbor (DOI 1967) (Figure 3).

Shoreline modifications on the south side of Ediz Hook, armoring and jetties in particular, likely have a small, localized effect on currents (The Watershed Company 2010). Based on a review of recent aerial photographs, features in the area that could influence local currents include the following: (1) a wave barrier on the west side of the USCG dock that is roughly 160 feet long; (2) the pile-supported USCG T-Pier, which extends almost 200 feet into the harbor; (3) the rock riprap jetty (Proposed Mitigation Site); (4) the laydown area for the fish pens located west of the Puget Sound Pilots Station (see Figure 3); and (5) the Pilots Station dock, which is about 260 feet long and is located to the west of the existing rock riprap jetty. The rock riprap jetty, breakwater, and fish pen laydown area create areas of slack water during tidal shifts. The dock piles create eddies around the piles, but generally have little effect on tides and currents beyond the end of the dock.

Three spatially segregated sediment transport regimes in the southern, western, and central harbor areas transport sediment from sources to sinks (see Figure 3). A parting zone refers to areas where sediment is both collected and dispersed. The transport front shows the division between sediment movement in the central and western harbor; sediments are unlikely to move between these two areas. In the southern harbor under low-energy conditions, particles entering the harbor from creeks or outfalls are deposited close to the discharge point. Fine-grained material may move in several directions subject to weak wind and tidal conditions. Sediment deposition continues this way until the onset of a high-energy storm event.

Larger storm events deliver fine and heavier grained sediment to the southern harbor. This influx of sediment is subjected to the higher wind- and wave-induced transport mechanisms that do not typically occur during low-energy conditions. Waves produced by strong winds can induce bottom currents capable of re-suspending sediments in the shallow southern harbor (Herrera 2011). These wind-induced waves can also enhance the bottom currents responsible for sediment transport in deeper areas of the harbor. Large wind-driven waves from the northeast, as well as the swell entering the harbor from the Strait of Juan de Fuca, result in westward longshore sediment transport in the southern harbor area.

The western harbor extending out approximately one mile from the shoreline serves as the long-term sink for depositional sediment within the harbor (see Figure 3). During low-energy conditions, sources of sediment are from nearby outfalls and sediment is deposited in close proximity to the discharge point. Under high-energy conditions, in addition to nearby outfalls, sediment is delivered by longshore transport from other areas of the harbor to the western

harbor. As sediment accumulates in the western harbor, intermittent mudflows occur to the east toward the central harbor and typically go no farther than one mile from the western shoreline.

In the central harbor area, both sediment depositional and sediment dispersal processes occur. This area is in a state of dynamic equilibrium with respect to sediment movement (GeoSea 2009). During higher energy events, sediment is eroded, particularly in the shallower areas of the southern harbor and at the same time sediment is deposited from the higher sediment load from higher stormwater runoff rates entering the harbor from creeks and combined sewer overflows (CSOs).

Circulation patterns have a variety of influences on local water quality. The higher velocities reduce residence times, increase the re-suspension and transport of sediment, and more rapidly disperse pollutants. Lower velocities result in more deposition, less mixing, longer residence times, and lower transport rates. Near the project area, the net direction of sediment movement is from the tip of Ediz Hook toward the west (Ecology 2014a).

Water Quality

The majority of chemicals of potential concern (COPCs) and sediment sources to Port Angeles Harbor are along the southern harbor shoreline, or are located in upland areas that contribute to runoff that enters the harbor along the southern shoreline (Ecology and Environment, Inc. 2008). Sources include CSOs, industrial outfalls, and runoff from residences and commercial areas that is transported to the harbor by creeks. Historically (between 1937 and 1972), five nearshore outfalls discharged untreated mill effluent into the harbor. After this period and until 1997 (when the mill was shut down), treated mill effluent was discharged through a deep water outfall.

Ecology's water quality status report (303d list) identifies several Category 5 ratings in Port Angeles Harbor (Ecology 2014b). Water in the western harbor has a Category 5 rating due to low DO levels from decaying wood debris in this area. Water in the southern harbor has a Category 5 rating due to the occasional presence of enterococcus and fecal coliform bacteria from CSOs onto Hollywood Beach (Ecology 2014b).

Water quality in the project area is strongly tied to water quality in the Strait of Juan de Fuca, which is good. The project site and proposed mitigation site are located where greater mixing in the water column occurs, as well as tidal flushing (Floyd Snider 2007). Thus, it is not anticipated that there are water quality concerns at the eastern end of Ediz Hook in the vicinity of these sites.

In addition to the Category 5 ratings for water, there are also Category 5 ratings in the 303d list for the contaminants found in the tissue of clams and mussels. Contaminants in concentrations that exceed the National Toxics Rule criteria include benz[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]flourathene, and chrysene. The locations of these high ratings are near the Rayonier site in the southern harbor and in the western and central harbor and not within the project and proposed mitigation sites.

Sediment Quality

Ecology's Puget Sound Initiative (Ecology 2014c) identifies Port Angeles Harbor as a priority bay for sediment cleanup, because of legacy sediment contamination above the Washington State SMS. Ecology identified two sites in the Port Angeles Harbor that require remedial action: the western harbor area, and the Rayonier Mill site in the southern harbor.

In 2008, Ecology launched a sediment investigation of the western Port Angeles Harbor and developed a strategy to clean up the harbor by identifying potentially liable parties (PLPs) and a remedial strategy. An Agreed Order issued by Ecology was signed on May 28, 2013 between PoPA, Georgia-Pacific LLC, Nippon Paper Industries, the City of Port Angeles, and Merrill & Ring (Ecology 2014d). These are the listed PLPs responsible for remedial action in the western portion of Port Angeles Harbor. A Remedial Investigation was completed in 2013 by the PLPs (Ecology 2014e). A Remedial Investigation/Feasibility Study for this area has not yet been published.

The Rayonier Mill site on the southern shoreline of Port Angeles Harbor is the second identified sediment cleanup site in the Port Angeles Harbor. In 2010, Rayonier signed an Agreed Order with Ecology to implement a cleanup plan for the upland and marine environment of the Rayonier Mill site (Ecology 2014d). Ecology completed sediment investigations in 2008, and all existing marine data were compiled in the Marine Data Summary Report in November 2014 (Windward 2014).

Surface and subsurface sediment in Port Angeles Harbor has been affected by historical industrial activities near the western portion of Port Angeles Harbor and the activities at the Rayonier Mill site located south of Ediz Hook as described above. The sediment quality within Port Angeles Harbor is above the Washington State SMS cleanup levels based on benthic toxicity (Ecology 2012a). A sediment investigation that focused on several areas within the Port Angeles Harbor identified several contaminants of concern (Ecology 2012b):

- Dioxins and furans.
- Polychlorinated biphenyls (PCBs).
- Semi-volatile organic compounds (SVOCs).
- Ammonia and sulfides.
- Metals (arsenic, mercury, and zinc).
- Petroleum hydrocarbons.

A 2013 sediment source survey found dioxins/furans in sediments above background levels in samples located approximately ½ mile to the south of USCG AIRSTA/SFO Port Angeles and one mile west of the base (Newfields 2013). The study interpolated that dioxins/furans were likely spread throughout the harbor, and noted the following: *Federal and state environmental regulatory and health agencies are interested in dioxins/furans because they are toxic to humans and wildlife. Once released into the environment, dioxins/furans resist degradation, do not dissolve in water, and attach strongly to particles such as soil, dust, and sediment* (Newfields 2013). Dioxins/furans are present at some level throughout the environment in air, food, water, soils, and sediments; however, they have been declining since the 1970s due to improved pollution control. Sampling for several other chemicals was also conducted, and PCBs were also detected in the harbor sediments. The greatest concentrations of dioxins/furans and PCBs were in the western harbor and near the Rayonier Mill site.

Surface sediments near the project site and proposed mitigation site generally consist of sand and silt with increasing amounts of gravel closer to the shoreline. Three surface sediment samples collected in a 2012 sediment investigation were located within 1,000 feet of the project site and proposed mitigation site and did not detect contaminant levels above the SQS and CSL. Surface sediment results may not be a good indicator for the potential of underlying

subsurface contamination (Ecology 2012a); however, subsurface sediment samples indicate that sediments are less impacted farther from the source areas, which in this case are located well away from the sites (e.g., the Rayonier Mill on southern shore and Nippon Paper on the western shore).

Turbidity is a measure of the amount of light scatter related to total suspended solids in the water. The suspension of fine-grained sediments can affect water quality in several ways. The re-suspension of organically rich sediments can cause increased biological oxygen demand and result in lowering the DO concentration. Also, turbidity reduces light penetration into the euphotic zone (i.e., close to the water surface) causing a reduced rate of photosynthetic production of oxygen. Oxygen production by rooted aquatic plants may be impacted by a loss of habitat in the euphotic zone.

Suspended particles can also contribute to pollution impacts by binding contaminants such as heavy metals, PCBs, pesticides, and some radionuclides. Nutrients may absorb onto fine-grained particles or be desorbed from them. Contaminants are affected by the distribution and transport of fine suspended sediments. Often, contaminants are transferred to higher trophic levels by their association with suspended particles that are ingested by filter feeders. Such increases in concentration at each trophic level are referred to as “biological magnification” (Schubel 1977). Other effects of turbidity include disruptions to food web dynamics through decreased predator feeding success and enhanced prey survival (Vineyard and O’Brien 1976). Specific substrate, aquatic vegetation, and benthic species of the Project Site and Proposed Mitigation Site are described below.

Project Site

The project site consists of highly varied bottom substrate. Silty sand is predominant with patches of sand, silt, clay, a sticky sand-clay mixture, shells, gravel, and wood debris observed within the site (MCS Environmental 2003; Berger Abam 2014). Surveys of the project area observed approximately 20 different species of invertebrates including red rock crab (*Cancer productus*), northern kelp crab (*Pugettia producta*), Dungeness crab, spiny pink sea star (*Pisaster brevispinus*), leather sea star (*Dermasterias imbricata*), sunflower sea star (*Pycnopodia helianthoides*); and various species of anemones, shrimp, and jellyfish (Berger Abam 2014; Reef.org 2015).

Marine vegetation is present in the project area, encompassing various species of eelgrass, kelp, and algae. A survey conducted in July 2015 documented a total of 98,873 ft^2 of eelgrass occurring in a continuous bed primarily between 0 and -20 feet MLLW (SEE LLC 2015).

Proposed Mitigation Site

The proposed mitigation site is composed of rock riprap that extends approximately 215 feet south of the shoreline and is protected by a rock and timber bulkhead capped by a concrete slab. The surrounding substrate is similar to the project site in that it is highly varied and contains a mix of sand, silt, shells, gravel and wood debris (Berger Abam 2014). Marine vegetation (eelgrass, kelp, and algae) is present within the site. Eelgrass was documented on the east and west side of the jetty for a combined total of 49,693 ft^2 occurring in discontinuous patches between -0.5 and -20 feet MLLW (SEE LLC 2015).

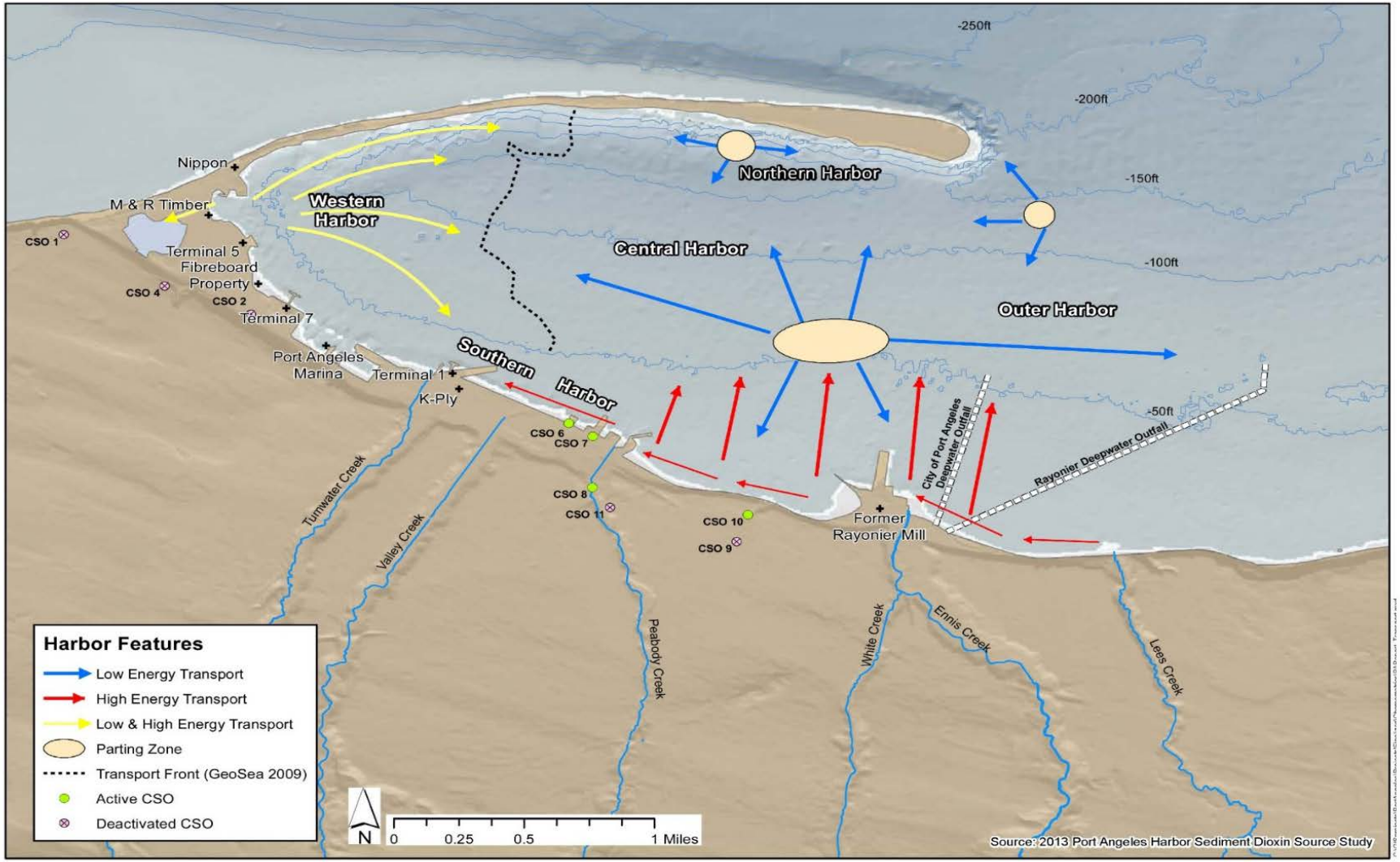

Figure 3. Circulation and Sediment Transport