UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
PROGRAM PLANNING AND INTEGRATION
Silver Spring, Maryland 20910

JUL 8 2013

To All Interested Government Agencies and Public Groups:

Under the National Environmental Policy Act (NEPA), an environmental review has been performed on the following action.

TITLE: Adoption of the U.S. Navy's *Environmental Assessment for the Barge Mooring Project Conducted at Naval Base Kitsap Bangor, Silverdale, WA*

LOCATION: Naval Base Kitsap Bangor, Silverdale, Washington

SUMMARY: The Navy will conduct a barge mooring project to accommodate a larger research barge equipped with new equipment and upgraded technology necessary for continuing the Navy mission. The project includes the installation of a maximum of twenty steel pipe piles by vibratory and impact pile driving over approximately twenty workdays from July 16 to September 30, 2013.

The Navy prepared a comprehensive Environmental Assessment to evaluate the environmental effects of the action including effects on marine mammals. Based on the low intensity of the action, as well as implementation of appropriate mitigation and monitoring measures documented in the EA and included in the Incidental Harassment Authorization (IHA), the Navy's action, and the National Marine Fisheries Service's (NMFS) issuance of an IHA, will not result in significant impacts to the human environment.

RESPONSIBLE
OFFICIAL: Donna S. Wieting, Director
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NMFS/NOAA
1315 East-West Highway, SSMC-3
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NMFS reviewed the Navy's EA and determined it adequate to support issuance of the IHA. The environmental review process led us to conclude that this action will not have a significant effect on the human environment. Therefore, an environmental impact statement will not be prepared. A copy of the finding of no significant impact (FONSI) including the supporting environmental assessment (EA), prepared by the Navy, is enclosed for your information. Although NOAA is not soliciting comments on this completed EA/FONSI we will consider any comments submitted that would assist us in preparing future NEPA documents. Please submit any written comments to the responsible official named above.

Sincerely,

Patricia A. Montanio
NOAA NEPA Coordinator

Enclosure

FINAL ENVIRONMENTAL ASSESSMENT
FOR THE BARGE MOORING PROJECT
CONDUCTED AT NAVAL BASE KITSAP BANGOR
SILVERDALE, WASHINGTON

May 2013

Naval Facilities Engineering Command Northwest

1101 Tautog Circle

Silverdale, WA 98315

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Lead Agency: United States Department of the Navy

FINAL ENVIRONMENTAL ASSESSMENT FOR THE BARGE MOORING PROJECT CONDUCTED AT NAVAL BASE KITSAP BANGOR SILVERDALE, WASHINGTON

MAY 2013

ABSTRACT

This Environmental Assessment (EA) evaluates potential environmental effects of constructing a mooring location for a new research barge at the Service Pier along the waterfront at Naval Base Kitsap Bangor located in Silverdale, WA. The Proposed Action consists of the following three components: moving and reconfiguring sections of an existing Port Operations floating pier from the north side of the Service Pier to the south side, and installing new float sections; removing an existing mooring dolphin and concrete pile cap in order to accommodate the new barge; and installing pier moorings within the southeast corner of the Service Pier complex for the new research barge. 16 steel piles would be installed primarily using a vibratory pile driver, and installation may need to be completed using an impact hammer. Construction is planned to begin on approximately July 16, 2013 and is planned to be completed by approximately September 30, 2013. This EA analyzes two action alternatives and a no-action alternative. The purpose of the Proposed Action is to provide a safe, secure mooring location for a new research barge in order to accommodate research equipment upgrades. The Proposed Action is needed to support water-dependent research, development, testing, and evaluation activities.

This EA analyzes the potential effects on the environment of the Preferred Alternative, Alternative 2, and the no-action alternative. The following resource areas have been addressed in the EA: air quality, noise, water quality and marine sediment, biological resources, marine traffic and transportation, socioeconomics and environmental justice, cultural and historical resources, and American Indian traditional resources.

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ACRONYMS AND ABBREVIATIONS

APE	Area of Potential Effect
AQCR	Air Quality Control Region
BMPs	Best Management Practices
BA	Biological Assessment
°C	degrees Celsius
CAA	Clean Air Act
Caltrans	California Department of Transportation
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CNEL	Community Noise Equivalent Level
CNRNW	Commander Navy Region Northwest
CSDS-5	Commander Submarine Development Squadron Five
CSL	Cleanup Screening Level
CO	Carbon Monoxide
CO_2	Carbon Dioxide
$CO_{2\text{-e}}$	CO_2-Equivalent
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
CRM	Cultural Resources Manage
dB	decibel(s)
dB re 20 μPa	decibels relative to 20 micropascals
dBA	A-weighted decibel(s)
dBC	C-weighted decibel(s)
DO	Dissolved Oxygen
DoD	Department of Defense
DPS	Distinct Population Segment
EA	Environmental Assessment
Ecology	Washington State Department of Ecology
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
EHW	Explosive Handling Wharf
EIS	Environmental Impact Statement
EO	Executive Order
EPA	U.S. Environmental Protection Agency
EPNA	environmental designation for noise abatement
ESA	Endangered Species Act
ESU	Evolutionary Significant Unit
°F	degrees Fahrenheit
FHWA	Federal Highway Administration
FHWG	Fisheries Hydroacoustic Working Group
FMC	Fishery Management Councils
FMP	Fisheries Management Plan
FONSI	Finding of No Significant Impact
ft	foot/feet
ft^2	square foot/feet
FR	Federal Register
FY	fiscal year
GHG	Greenhouse Gases
HAP	Hazardous Air Pollutants
HAPC	Habitat Areas of Particular Concern
HCDOP	Hood Canal Dissolved Oxygen Program
Hz	hertz
IHA	Incidental Hazard Assessment
INRMP	Integrated Natural Resources Management Plan
IR	Installation Restoration
kHz	kilohertz
km	kilometer
km^2	square kilometers
Lpeak	Peak Sound Pressure Level
m	meter(s)
MBTA	Migratory Bird Treaty Act
μg/L	micrograms per liter
μPa	micropascal
min	minutes
mg/L	milligram per liter
mL	milliliters
MLLW	mean lower low water
MMPA	Marine Mammal Protection Act
MSA	Magnuson-Stevens Fishery Conservation and Management Act
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NAVFAC NW	Naval Facilities Engineering Command Northwest
NAVBASE	Naval Base
Navy	U.S. Navy
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NO_2	Nitrogen Dioxide
NOA	Notice of Availability
NOAA	National Oceanic and Atmospheric Administration
NOC	Notice of Construction
NRHP	National Register of Historic Places
NSR	New Source Review

NTU	nephelometric turbidity unit
NWTRC	Northwest Training Range Complex
NWTT	Northwest Training and Testing
OPNAVINST	Chief of Naval Operations Instruction
PAH	polycyclic aromatic hydrocarbons
PCE	primary constituent elements
PFMC	Pacific Fishery Management Council
$PM_{2.5}$	particulate matter <2.5 microns in diameter
PM_{10}	particulate matter <10 microns in diameter
PSAMP	Puget Sound Ambient Monitoring Program
PSCAA	Puget Sound Clean Air Agency
PSD	Prevention of Significant Deterioration
PSWQAT-PSEP	Puget Sound Water Quality Action Team and Puget Sound Estuary Program
PNPTC	Point No Point Treaty Council
RCRA	Resource Conservation and Recovery Act
RDT&E	research, development, test and evaluation
rms	root mean square
ROI	region of influence
s.d.	standard deviation
SEL	sound exposure level
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SMS	Washington State Sediment Management Standards
SO_2	Sulfur Dioxide
SPL	Sound Pressure Level
SQS	Sediment Quality Standards
TOC	Total Organic Carbon
U&A	Usual and Accustomed
U.S.	United States
USACE	U.S. Army Corps of Engineers
USC	U.S. Code
USFWS	U.S. Fish and Wildlife Service
VOCs	Volatile Organic Compounds
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WDNR	Washington Department of Natural Resources
WRIA	Water Resource Inventory Area
WSDOT	Washington State Department of Transportation

EXECUTIVE SUMMARY

Naval Base (NAVBASE) Kitsap Bangor is proposing to install pier moorings to accommodate a new research barge equipped with upgraded technology necessary for Commander Submarine Development Squadron Five Detachment (CSDS-5), to continue their water-dependent mission. CSDS-5 is a tenant command at NAVBASE Kitsap Bangor and is the U.S. Navy's technical expert for deep ocean technology and the operational, at-sea application of that technology. The project proponent is NAVBASE Kitsap. NAVBASE Kitsap Bangor is located in Kitsap County on Hood Canal, approximately 20 miles west of Seattle, Washington and east of Silverdale, Washington. The Proposed Action is within the waterfront restricted area in Hood Canal on NAVBASE Kitsap Bangor that provides berthing and support services to Navy submarines and other fleet assets.

PURPOSE AND NEED FOR THE PROPOSED ACTION

The purpose of the Proposed Action is to provide mooring infrastructure to accommodate research equipment upgrades to the level and type required by new tasks and research equipment assigned to CSDS-5 at NAVBASE Kitsap Bangor.

The Proposed Action is needed to support the evolution of the CSDS-5 in water-dependent research, development, testing and evaluation activities and continuing mission operations. New research, development, testing, and evaluation needs drive the requirements for new equipment. In turn, new equipment and methods require additional infrastructure to house this equipment and associated operations.

ALTERNATIVES CONSIDERED

This Environmental Assessment (EA) addresses two alternatives for the location of mooring facilities for the new research barge. Operations of a new research barge would not change from existing operations; therefore, operations are not discussed further in the EA.

> Alternative 1 would install 16 steel pipe piles at the NAVBASE Kitsap Bangor Service Pier and relocate a Port Operations floating pier to the south side of the Service Pier access trestle. In addition, the existing mooring dolphin infrastructure that supports the existing barge would be removed and demolished.
>
> Alternative 2 would install anchored pier moorings for the new research barge within a sheltered area along the installation shoreline, south of the Service Pier, south of Carlson Spit and Carderock Pier.
>
> The Preferred Alternative site is located on the north side of Carlson Spit 1198 feet (365 meters), but not on the Carlson Spit. Alternative 2 is located in water at a depth of -40 ft MLLW and south of Carlson 1132 feet (345 meters) Spit.

This EA also evaluates a No-Action Alternative under which no piles would be installed and the research barge would not be moored at NAVBASE Kitsap Bangor. The smaller barge would be maintained on-site and the research activities would continue to be constrained.

The Navy evaluated alternative ways to meet the purpose and need based on several screening criteria. The screening criteria for alternatives focused primarily on location and natural constraints (i.e., depth of water, wave, and wind action), space availability on existing piers, avoidance of obstructing other activities conducted on the waterfront, easy access to moving key equipment on and off the barge, and location (i.e., close proximity to the Service Pier).

The Navy selected Alternative 1 as the Preferred Alternative as it fully meets all screening criteria and provides greater flexibility in adapting to any future change in CSDS-5 missions. Alternative 1 meets all 8 of the screening criteria, while Alternative 2 meets 7 of the 8 screening criteria. Alternative 2 fails to fully meet the criteria of "easy access to moving key equipment on and off the barge" because this alternative is not located adjacent to an existing pier or wharf and moving equipment to and from the barge would require additional vessels and coordination. Additionally, Alternative 1 ranked higher than Alternative 2 in its capability to meet several key criteria:

Location in close proximity to Service Pier - Alternative 1 is located at the Service Pier, while Alternative 2 is approximately 1/4 mile away.

Construction based on location and natural constraints (including wave and wind) - Alternative 1 provides greater wind and wave protection than Alternative 2 due to the protection provided by the Service Pier.

Ability to adapt to and support future mission requirements - Alternative 1 provides greater flexibility by providing direct utility connections if there is an increased demand in energy generation for research, direct linkage to bldg 7100 and CSDS-5 operations and activities at the Service Pier, and avoiding the potential for future obstructions of Navy vessel movement.

The Navy considered several additional alternatives that were eliminated from detailed consideration. These included installing new mooring dolphins in the existing barge location, installing pier moorings on the outer harbor (western) side of the Service Pier, or mooring the barge at Delta Pier or other nearby piers. These were eliminated due to their inability to meet the screening criteria.

ENVIRONMENTAL ANALYSIS

The Council on Environmental Quality (CEQ) regulations, the National Environmental Policy Act (NEPA), and Navy instructions for implementing NEPA specify that an EA should only address those resource areas that are potentially significant. In addition, the level of analysis should be commensurate with the anticipated level of environmental impact.

This EA analyzes the potential effects on the environment of the Preferred Alternative, Alternative 2, and the No-Action Alternative. Accordingly, the following resource areas have been addressed in the EA: air quality, noise, water quality and marine sediment, biological resources, marine traffic and transportation, socioeconomics and environmental justice, cultural and historical resources, and American Indian traditional resources.

Because potential impacts were considered to be negligible or nonexistent, the following resources were not evaluated in the EA: land use, aesthetics/visual, and utilities. Land use was not considered as the Proposed Action is within the industrial waterfront development. There would be no substantive upland or land use activity associated with the Proposed Action. The Proposed Action would have no impacts to the aesthetic or visual environment associated with the surrounding industrial waterfront and would not impact view sheds from across Hood Canal. The Proposed Action would be limited to existing utility service connections and power lines and require minimal upgrades in the form of onboard power generators. The Proposed Action would not impact public health due to the location in the restricted industrial waterfront area. The Proposed Action would not impact hazardous materials and waste, as any hazardous materials used and hazardous waste generated from the project would be managed in accordance with federal and state regulations and base instructions.

Each resource area evaluated is briefly described below.

Air Quality

The Preferred Alternative and Alternative 2 would have short-term air emissions from construction vehicle emissions. No new major air emission sources are proposed as part of the action. The action alternatives would not exceed United States (U.S.) Environmental Protection Agency (EPA), Washington State Department of Ecology (Ecology), Puget Sound Clean Air Agency (PSCAA) thresholds, or greenhouse gas (GHG) reporting thresholds. No substantive long-term impacts to air quality would result with implementation of either the Preferred Alternative or Alternative 2. Air emissions would not be significant and would not cause or contribute to a significant air quality impact. The No-Action Alternative would not result in any changes to the environment and would not have an impact on air quality.

Noise

The Preferred Alternative and Alternative 2 would have some level of noise impacts, with the Preferred Alternative generating a higher level of noise impacts short term. The Preferred Alternative airborne noise impacts generated by the pile driving would attenuate prior to impacting sensitive noise receptors north and south of the project area. Noise generated by the Preferred Alternative would result in a relatively minor increase relative to the ambient conditions (i.e., 70 a-weighted decibels [dBA] – 90 dBA and as high as 99 dBA) that occur on a daily basis at the NAVBASE Kitsap Bangor's industrial waterfront. The noisiest activity (pile driving) would be temporary and short-term (20 days of pile driving) and would attenuate down to insignificant levels by the time it reaches sensitive noise receptors (residences located approximately 3,700 feet south of the base and shellfish harvesters located at Bangor Beach, approximately 2,700 feet to the north of the project area). Therefore, there would be no significant noise impacts to sensitive noise receptors from the Preferred Alternative.

Alternative 2 would have minor intermittent noise increases at the location, south of Carlson spit (outside the fenced restricted area of the Service Pier) that would be primarily generated by cranes and increased barge/vessel traffic to accommodate the pier mooring construction. This noise would not impact sensitive noise receptors as any slight increase would attenuate down to ambient levels by the time it reaches a sensitive noise receptor. Therefore, there would be no significant noise impacts to sensitive noise receptors from Alternative 2. No substantive long-term impacts to noise and sensitive noise receptors would result with implementation of either the Preferred Alternative or Alternative 2.

The No-Action Alternative would result in no changes to the environment and therefore would result in no impacts.

Water Quality and Marine Sediment

The Preferred Alternative and Alternative 2 would not involve any withdrawals of groundwater and there would not be stormwater runoff associated with the Proposed Action. Impacts to water quality would be as a result of relatively minor suspension of bottom marine sediments turbidity with limited sediment transport during construction activities. The Preferred Alternative would create localized and temporary marine sediment resuspension within a defined drift cell that is between Carlson Spit and Three Spits (also known as KB Point, located just north of KB Dock) from installation of the 16 steel piles to accommodate the new barge and removal of an existing mooring dolphin (40 days total for in-water work). Alternative 2 would result in a smaller and localized area of disturbance with installation of the anchor clumps and construction days would also be less (10 days of in-water work) as compared to the Preferred Alternative. No substantive long-term impacts to water quality or marine sedimentation transporting would result with implementation of either the Preferred Alternative or Alternative 2. The turbidity and limited sediment transport would not significantly impact marine vegetation within the vicinity of either the Preferred Alternative or Alternative 2.

The No-Action Alternative would not result in any changes to the environment and would have no impacts on water quality or marine sediment quality.

Biological Resources

The Preferred Alternative would have temporary (20 days of pile driving) noise disturbance (airborne and underwater) that could potentially expose Endangered Species Act (ESA) listed species to harassment noise levels from impact pile driving. Resident and migratory birds (including marbled murrelets) that occur at the NAVBASE Kitsap Bangor waterfront have likely acclimated to existing baseline noise levels that are not much lower than anticipated airborne noise from pile driving. Eelgrass is not present within the proposed project area, but there are eelgrass beds located to the south and north of the project area, with the nearest eelgrass bed located 175 feet to the south in a lower intertidal terrace. Best management practices would be implemented to avoid impacts to this area. There would be no adverse impacts to geoduck within the project area or to geoduck tracts located outside the project area. Some macroalgae and benthic invertebrates may inadvertently be impacted by pile driving activity and are likely to recover to pre-disturbance levels well within 2 years. Some of the existing steel piles would be cut off at the mudline and the macroalgae and benthic invertebrates (soft and hard) would be re-established in those areas within a relatively short term period. No long-term nearshore environment and marine impacts to the population along the waterfront are expected.

Fish would likely avoid the area during pile driving and work would be conducted within the in-water work window when juvenile salmonids are not expected to be present. Marine mammals (whales) are not expected in the area as they typically avoid areas of nearshore human activity during construction. Pinnipeds (California sea lions and harbor seals) may be temporarily affected if present within the area during construction and Steller sea lions are not expected during the construction period. Temporary and localized disturbance to water quality during pile driving would result in a small reduction of macroalgae, but no long-term impacts to Essential Fish Habitat (EFH) are expected.

The determination of impacts on endangered species are that overall, impacts from sediment disturbance, underwater noise, and general changes to water quality would be temporary, localized, and short-term therefore they would not be significant with implementation of the Preferred Alternative. The Navy concludes that the appropriate ESA effects determination for Puget Sound Chinook salmon, Hood Canal summer-run chum salmon, Puget Sound steelhead trout, bull trout, Puget Sound/Georgia Basin bocaccio, canary, yelloweye rockfish, humpback whales, Steller sea lions, marbled murrelet is “may affect, not likely to adversely affect.” A “no effect” determination is appropriate for Coastal-Puget Sound Bull trout critical habitat as the closest designated area is in Dabob Bay located on the west side of Toandos Peninsula. With implementation of Best Management Practices (BMPs), in-water work window, marine mammal and marbled murrelet monitoring, and noise attenuation, no significant impacts to biological resources are expected with implementation of the Preferred Alternative.

Under the Preferred Alternative, underwater noise would cause temporary harassment, but not injury of marine mammals.

For Alternative 2, there would be no impacts to ESA-listed marine mammals or marbled murrelet as only human activity and slight increase in noise from vessel and crane activity would occur. No pile driving is associated with Alternative 2. Alternative 2 would not result in any impacts to birds. Short-term water quality impacts during installation of the anchor clumps, which may cause fish to temporarily avoid the area, would likely result. However, work would be conducted within the allowable work window when juvenile salmonids are least likely to be present and adults would likely navigate by without delay. Therefore, no impacts to ESA-listed salmonids are expected. Temporary disturbance to water quality may affect EFH and installation of anchor clumps would displace unconsolidated sediment EFH potentially used by Pacific Coast groundfish. Installation of anchor clumps would disturb bottom substrates and may inadvertently destroy less mobile invertebrates within the footprint of the anchor clumps. Areas displaced are small in comparison to adjacent available EFH; thus, no significant impacts to EFH would result. With implementation of BMPs and project minimization measures, no significant impacts to biological resources are expected under Alternative 2.

No substantive long-term impacts to biological resources would result with implementation of either the Preferred Alternative or Alternative 2. The No-Action Alternative would not result in any changes to the environment and would have no impacts to biological resources.

Marine Traffic and Transportation

The Preferred Alternative and Alternative 2 would have some level of impacts to the marine traffic and land-based traffic, but limited to short-term impacts. The Preferred Alternative would have a higher level of impacts in comparison to Alternative 2 due to amount of construction materials required; however, they would not be significant adverse impacts.

The Preferred Alternative would not adversely affect existing recreational or commercial marine traffic as the existing security barrier currently restricts traffic up to 2,500 ft from the installation shoreline. During construction of the Preferred Alternative, additional marine traffic is estimated at approximately three construction barges per week, which would result in 30-minute cycles for the opening and closing of the Hood Canal Bridge. Each barge, accessing the installation via Hood Canal Bridge, would be scheduled to avoid morning and afternoon peak traffic periods (i.e., 6:00 to 8:30 a.m. and 3:30 to 6:00 p.m.). The construction barges would bring in material and remove demolition debris to ensure the least amount of trips required for construction. During construction, the Preferred Alternative would result in short-term increases in vehicular traffic on the surrounding road network and on base internal roadways. While the Preferred Alternative would cause some limited increase in construction vehicles, it would not result in significant impacts to the installation's land transportation network. Because of the relatively minor amount of marine traffic resulting from construction of the Preferred Alternative location, no significant adverse impact to marine traffic is expected. The existing assigned personnel would not change and there is not an anticipated increase in vehicular traffic after construction.

Alternative 2 would have similar impacts, with shorter-term vehicular construction traffic. This alternative, similar to the Preferred Alternative, would add up to three construction barge trips a week transiting the Hood Canal Bridge. For Alternative 2, the proposed location does not provide dockside access; there would be more daily Navy vessel traffic with boat trips to the barge for personnel and materials. However, these daily trips are within the Navy restricted area on the waterfront would not result in significant impacts to the marine transportation network.

No substantive long-term impacts to marine and land traffic would result with the implementation of either the Preferred Alternative or Alternative 2. There would be no impacts to land or marine traffic under the No-Action Alternative.

Socioeconomics and Environmental Justice

It is not anticipated that construction of the mooring location for the barge would lead to any appreciable change to population, racial composition, or socioeconomics in the area. The Proposed Action does not impact the economic baseline of employment at the installation or in Kitsap County. The Proposed Action would not disrupt adjacent communities during and after construction. The Preferred Alternative and Alternative 2 would be in compliance with Executive Order (EO) 12898 and EO 13045 as no low-income, children, or minority communities exist at the restricted-industrial project location or immediate vicinity, and there would not be a disproportionately high and adverse effect on schools, children, or local communities with implementation of either alternative.

No substantive long-term impacts to socioeconomics and environmental justice would result with the implementation of either the Preferred Alternative or Alternative 2. There would be no adverse impacts to socioeconomics and environmental justice under the No-Action Alternative.

Cultural and Historic Resources

There are archaeological and architectural resources in the general vicinity identified by past surveys in the Proposed Action area. The Navy conducted field reconnaissance archeological surveys of various tracts of land within the installation in 1992. The field effort involved intensive pedestrian survey of the entire coastline with subsurface inspections due to a high probability for precontact resources. Sampling was conducted along flat and gently sloping shoreline and along waterfront bluffs. The overall waterfront was included in the intensive sampling. This survey resulted in the identification of the 3 documented shell-midden sites. The shell middens were identified on the southern side of the Carlson spit, which is located south of the Preferred Alternative and north of the Alternative 2 project areas; however, the shell middens are upland and would not be impacted by either action alternative from in-water construction.

In addition past surveys identified an architectural resource, Building 7101 (Port Operations Building), upland from the proposed project area and associated with the Service Pier constructed in 2003. The Navy determined that the building was not eligible for inclusion in the National Register of Historic Properties (NRHP) in 2010 as it was constructed in the post-Cold War period. The building is upland from the Preferred Alternative and Alternative 2 and would not be impacted by either alternative.

Within the Area of Potential Effects (APE) there are no known or identified cultural or historical resources in the project area. The Navy determined that the Preferred Alternative would have no effect on historic properties and submitted an APE and the determination of no effects report for concurrence from the Washington State Historic Preservation Office (SHPO). The Washington SHPO concurred with the Navy's finding of no historic properties affected. There would be no adverse impacts to cultural resources under the No-Action Alternative.

American Indian Traditional Resources

Pursuant to Department of Defense and Navy instructions, the Navy engaged in government-to-government consultations with the Skokomish, Port Gamble S'Klallam, Jamestown S'Klallam, Lower Elwha Klallam, and the Suquamish tribes who have Usual and Accustomed (U&A) fishing grounds and stations that include the project area. These consultations were initiated in July 2012 and concluded in May 2013.

Under the Preferred Alternative and Alternative 2, access to the waterfront area would remain unchanged. Access to Bangor Beach (tribal fishing beach), commercial geoduck tracts located outside of the Naval Restricted Areas, and finfishing would not be impeded. The quantity of geoduck, finfish, and shellfish inventories would not be significantly impacted by direct impacts from project construction or indirect impacts from shading or increased turbidity and sediment transport within the project area drift cell. Accordingly, impacts to American Indian traditional resources and tribal treaty rights would not be significant. There would be no adverse impacts to Indian resources and tribal treaty rights under the No-Action Alternative.

Cumulative Impacts

Implementation of the Proposed Action would have direct impacts to the marine environment. The Proposed Action and other present and reasonably foreseeable future projects would include measures to avoid, minimize impacts, such as in-water construction windows to minimize impacts to salmonids, use of stormwater BMPs to minimize erosion and pollution, marine mammal and bird monitoring, and pile-driving shutdown zones. Additional project-specific impact minimization measures would be required for each project. Although some resources may be subject to potential cumulative significant adverse impacts, the Proposed Action would not appreciably contribute to those impacts.

PUBLIC INVOLVEMENT

NEPA requires that environmental information supporting a decision be made available to the public, agencies, and other stakeholders. The Navy's public involvement process for the Proposed Action is designed to inform stakeholders of the Navy's proposed action early in the NEPA process, to provide stakeholders with the opportunity to comment on the Navy's proposed action and assessment of the proposed action and to keep stakeholders informed throughout the NEPA process. This section of the EA summarizes this public involvement process. The Navy's public involvement plan for the proposed action included the following:

- Public Review of the Draft EA. The Draft EA was made available to the public for review and comment from February 5, 2013 to February 20, 2013 with a notice of availability (NOA) for comment posted in the local newspaper February 5, 6, and 7, 2013 (Appendix G). The Draft EA was posted on the internet for review and comment. The comment period ended on February 20, 2013 and the Navy received comments from the Port Gamble S'Klallam Tribe, the Point No Point Treaty Council, and a citizen. Comments contained in these letters were thoroughly analyzed and where appropriate changes have been incorporated into the Final EA. A summary of comments received, as well as the Navy's responses, is provided in Appendix G.
- Release of the Final EA and Decision Document. The Final EA and decision document are made available to the public. The NOA is posted in the local newspaper and the Final EA and decision document are posted on the internet.

CONCLUSION

As summarized above, implementation of the Preferred Alternative or Alternative 2 would not result in significant impacts to any resource area when considered individually in the context of NEPA, including direct, indirect, and cumulative impacts. Implementation of either action alternative, or the No-Action Alternative, would not constitute a "major Federal action significantly affecting the quality of the human environment" and therefore, this EA supports a Finding of No Significant Impact (FONSI) for the Preferred Alternative and the preparation of an Environmental Impact Statement (EIS) is not required.

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APPENDICES

CHAPTER 1.0 PURPOSE AND NEED FOR THE PROPOSED ACTION

1.1 INTRODUCTION

The United States (U.S.) Department of the Navy (Navy) has prepared this Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA) of 1969 (42 U.S. Code [USC] §4321-4370h), as implemented by the Council on Environmental Quality (CEQ) Regulations (40 Code of Federal Regulations [CFR] Parts 1500-1508); Navy procedures for implementing NEPA (32 CFR Part 775); and Chief of Naval Operations Instruction (OPNAVINST) 5090.1C CH-1, Environmental Readiness Program Manual. NEPA (42 USC 4321-4370d), requires federal agencies to take into consideration the potential environmental consequences of proposed actions in their decision-making process. The intent of NEPA is to protect, restore, or enhance the environment through well-informed federal decisions.

The Navy proposes to construct a mooring for a new research barge at Naval Base (NAVBASE) Kitsap Bangor, Silverdale, Washington, (Figure 1-1) within the waterfront restricted area in Hood Canal (Figure 1-2). NAVBASE Kitsap Bangor provides berthing and support services to Navy submarines and other fleet assets. The action proponent for the Proposed Action is NAVBASE Kitsap. The Proposed Action includes removal of an existing mooring dolphin, the relocation and addition of floating pier sections, and the installation of 16 steel piles ranging in size from 20 to 48 inches.

1.2 LOCATION

NAVBASE Kitsap Bangor is located in Kitsap County on Hood Canal, approximately 20 miles west of Seattle, Washington (Figure 1-1). The base encompasses approximately 7,186 acres with a mix of industrial, commercial support uses, residential, and undisturbed natural vegetation, with 4.5 miles of waterfront along the eastern shoreline of Hood Canal. The eastern shoreline of Hood Canal is within the Water Resource Inventory Area (WRIA) 15. The western and southern portion of Hood Canal is within the Skokomish-Dosewallips/South Shore Lower Hood Canal WRIA 16/14b.

The base is restricted from public access and portions are restricted for military only operations areas as classified by the U.S. Army Corps of Engineers (USACE). The two restricted areas are: Naval Restricted Areas 1 and 2 (33 CFR 334.1220) (Figure 1-2). Naval Restricted Area 1 covers the area to the north and south along Hood Canal encompassing the NAVBASE Kitsap Bangor waterfront. Naval Restricted Area 2 encompasses the waters of Hood Canal within a circle of 1,000 yards (3,000 feet [ft]) centered at the north end of NAVBASE Kitsap Bangor and partially overlapping Naval Restricted Area 1. Navigation within Naval Restricted Area 2 is not permitted during certain Navy exercises (33 CFR 334.1220).

1.3 BACKGROUND

Commander Submarine Development Group Five (CSDS-5), formerly known as Commander Submarine Development Group 1, is a tenant command at NAVBASE Kitsap Bangor. CSDS-5 is responsible for undersea research, development, test and evaluation (RDT&E) and the associated at-sea technology. CSDS-5 has had a presence at NAVBASE Kitsap Bangor since 1994 when the organization moved from Mare Island Shipyard in California as result of decisions made under the Base Realignment and Closure program. CSDS-5 currently conducts research operations from a barge that was built in 1940.

Figure 1-1. Vicinity Map

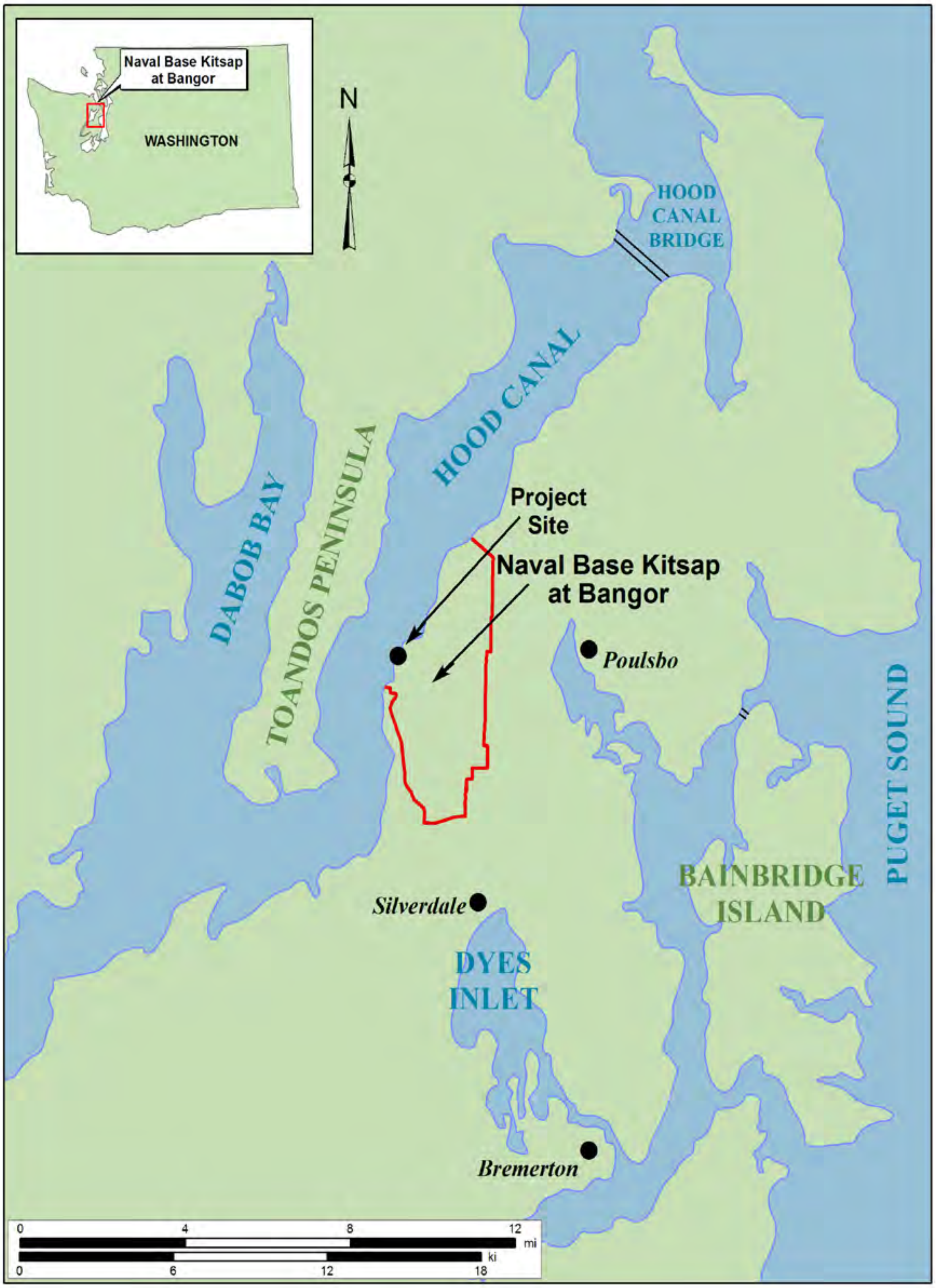
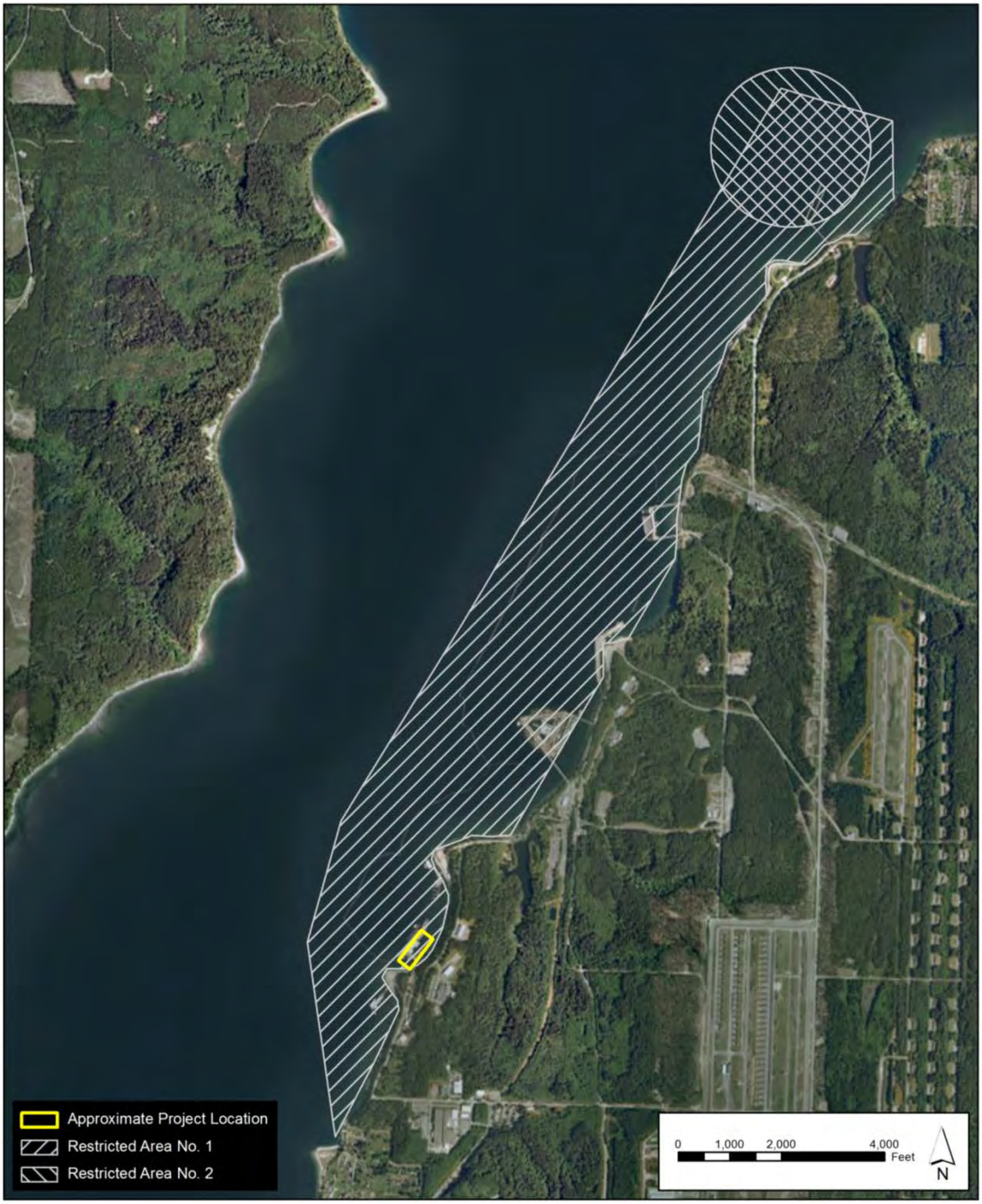


Figure 1-2. Restricted Areas 1 and 2



1.4 PURPOSE AND NEED FOR THE PROPOSED ACTION

The purpose of the Proposed Action is to provide a safe, secure mooring structure for a new barge in order to accommodate research equipment upgrades for CSDS-5.

The need for the Proposed Action is to support the evolution of the CSDS-5 in water-dependent research, development, testing and evaluation activities and continuing mission operations. New research, development, testing, and evaluation needs drive the requirements for new equipment. In turn, new equipment and methods require additional infrastructure to house the water-dependent equipment and associated operations. The specific need is that CSDS-5 requires a mooring location for a new research barge equipped with upgraded technology to continue their mission.

1.5 ENVIRONMENTAL REVIEW PROCESS

1.5.1 Other Relevant Laws and Regulations

As required under NEPA, various federal and state laws, ordinances, rules, regulations, and policies are pertinent to implementation of the Proposed Action. These include, but are not limited to, the following:

- CEQ Regulations for Implementing NEPA (40 CFR 1500-1508)
- Clean Air Act (CAA) (42 USC 7401 et seq.)
- Clean Water Act (CWA), Sections 401 and 404 (33 USC 1251 et seq.)
- Rivers and Harbors Act, Section 10 (33 USC 401 et seq.)
- National Historic Preservation Act (NHPA) (16 USC 470 et seq.)
- Archaeological Resources Protection Act of 1979 (ARPA) (16 U.S.C. § 470aa-mm)
- Native American Graves Protection and Repatriation Act (NAGPRA) (25 U.S.C. § 3001)
- Coastal Zone Management Act (CZMA) (16 USC 1451 et seq.)
- Migratory Bird Treaty Act (MBTA) (16 USC 703-712)
- Endangered Species Act (ESA) (16 USC 1531 et seq., as amended)
- Bald and Golden Eagle Protection Act (16 USC 668-668c)
- Marine Mammal Protection Act (MMPA) (16 USC 1361-1421h, as amended)
- Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 USC 1801-1882)
- Executive Order (EO) 12088, Federal Compliance with Pollution Control Standards
- EO 13148, Greening the Government through Leadership in Environmental Management
- EO 13175, Consultation and Coordination with Indian Tribal Governments
- EO 12898 Federal Actions to Address Environmental Justice (50 Federal Register 7629 [Sect. 1-101]
- EO 13045 Protection of Children from Environmental Risks and Safety Risks (62 Federal Register 1985)

A description of the Proposed Action's consistency with these policies and regulations is presented in Chapter 5.0 (Table 5-1).

1.5.2 Scope of the Environmental Assessment

This EA includes an evaluation and analysis of potential environmental impacts associated with two action alternatives and the No-Action Alternative. Operations of the existing barge were previously considered in the Construction of Supporting Shore and Waterfront Facilities for USS Parche Environmental Assessment (Navy 1994). Operations of the new barge would not change in tempo, types of activities performed, or personnel required to support the barge. Research, development, testing, and evaluation (RDT&E) activities are being further evaluated in the ongoing Environmental Impact Statement for NWTT (Northwest Training and Testing) and therefore, this EA does not include those activities.

The following resources were not carried forward for analysis in this EA as potential impacts were considered to be negligible or non-existent:

Land Use – The Proposed Action would be consistent with existing land uses. The land use on the Service Pier is industrial and is consistent with the surrounding industrial waterfront development. There would be no substantive upland or land use activity associated with the Proposed Action. Therefore, no impacts to land use with implementation of the Proposed Action are anticipated.

Aesthetics/Visual Resources –The piles and the barge would be consistent with the visual quality of adjacent NAVBASE Kitsap Bangor infrastructure and industrial waterfront development. In addition, the pier mooring piles and research barge are located on the east side and behind the existing Service Pier building and would not be visible to the public from boats on Hood Canal or the western shoreline. The Proposed Action would have no impacts to the aesthetic or visual environment associated with the surrounding industrial waterfront and would not impact view sheds from across Hood Canal. Therefore, no impacts to aesthetics or visual resources with implementation of the Proposed Action are anticipated.

Utilities – The Proposed Action would not require upgrades to existing utility service connections and power lines. Therefore, no impacts to utilities with implementation of the Proposed Action are anticipated.

Public Health - The Proposed Action would not affect public health because it would be located entirely within the Naval Restricted Area of an industrial waterfront where there is no public access. During construction and operation of the proposed action, applicable Navy regulations to protect the health and safety of military and civilian personnel would be strictly followed. Therefore, no impacts to public health and safety are anticipated.

Hazardous Materials and Waste - There are no known hazardous materials at the alternative locations, the Proposed Action is within an industrial restricted area, and hazardous materials use and hazardous waste generated from the project would be managed in accordance with federal and state regulations and base instructions. Therefore, there would be no impacts involving hazardous materials and waste.

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CHAPTER 2.0 PROPOSED ACTION AND ALTERNATIVES

2.1 PROPOSED ACTION

The Navy proposes to install piles and implement other improvements at the NAVBASE Kitsap Bangor Service Pier that would support the mooring of a new research barge. At the present time, CSDS-5 conducts its water-dependent research equipment operations from an existing 115 ft x 35 ft barge built in 1940, and currently moored adjacent to Building 7100 (Figure 2-1). A new barge measuring 260 ft x 85 ft would be used to accommodate new research equipment. The Proposed Action of mooring infrastructure with a 50 year design lifespan would provide a safe, secure location for the mooring of the new barge in order to continue to fulfill water-dependent mission requirements and accommodate new technology.

2.2 DEVELOPMENT OF REASONABLE ALTERNATIVES AND SELECTION CRITERIA

When evaluating potential action alternatives for the Proposed Action, the Navy's goal was to balance its mission and operational requirements while minimizing environmental impacts. All potential alternatives were evaluated against the following screening criteria:

1. Construction based on location and natural constraints (depth of water, wave and wind action);
2. Space availability on piers;
3. Obstruction of other Navy marine vessels movement and activities conducted on the waterfront;
4. Easy access to moving key equipment on and off the barge;
5. Location of close proximity to the Service Pier;
6. Maintain dockside access to fleet ships during assigned missions, 24 hours a day, 7 days a week;
7. Ability to adapt to and support future mission requirements; and,
8. Impacts to other missions at NAVBASE Kitsap Bangor.

2.3 ALTERNATIVES CARRIED FORWARD

2.3.1 No-Action Alternative

Under the No-Action Alternative, the new moorage would not be constructed and the new barge would not be moored at NAVBASE Kitsap Bangor. As required under NEPA, the No-Action Alternative is carried forward as a baseline for the analysis in this EA.

2.3.2 Alternative 1 – Service Pier Barge Mooring

Under Alternative 1, existing infrastructure at the Service Pier would be relocated or removed and 16 steel pipe piles would be installed in the southeast corner and interior of the Service Pier to accommodate mooring a new barge. The project consists of three components: the relocation and addition to the Port Operations Pier, the removal of existing infrastructure, and the installation of the new barge mooring piles. The following sections describe in more detail the specific components of this alternative.

Figure 2-1. Project Area

2.3.2.1 Relocated and New Infrastructure

In order to accommodate the new CSDS-5 research barge, some portions of the Port Operations floating pier would be relocated to the south side of the Service Pier access trestle[1]. This would require removing six 9 ft x 12 ft floating pier sections/modules running east-west on the north side of the trestle and placing them in a north-south orientation on the south side of the trestle. In addition, seven new modules (five added to the end of the relocated section and two installed in an east-west orientation) would be installed to complete the Port Operations infrastructure (Figure 2-2). Anchoring of the relocated and new floating pier modules would require the installation of three 24-inch diameter hollow steel pipe piles. Finally, a new 12 ft x 16 ft concrete transformer pad would be constructed and supported by four 20–inch diameter hollow steel pipe piles. The total area of relocated infrastructure would be 648 square feet (ft^2) and total area of new infrastructure would be 948 ft^2.

2.3.2.2 Pile Installation

The new mooring would be located at the east side of the Service Pier Building at approximately -20 ft to -30 ft mean lower low water (MLLW) (Figure 2-2). The new barge would be moored by five 36-inch diameter and four 48-inch diameter hollow steel pipe piles. Table 2-1 shows the maximum number of piles required to complete the entire project.

All piles would be installed at the eastern side of the service pier and would include:

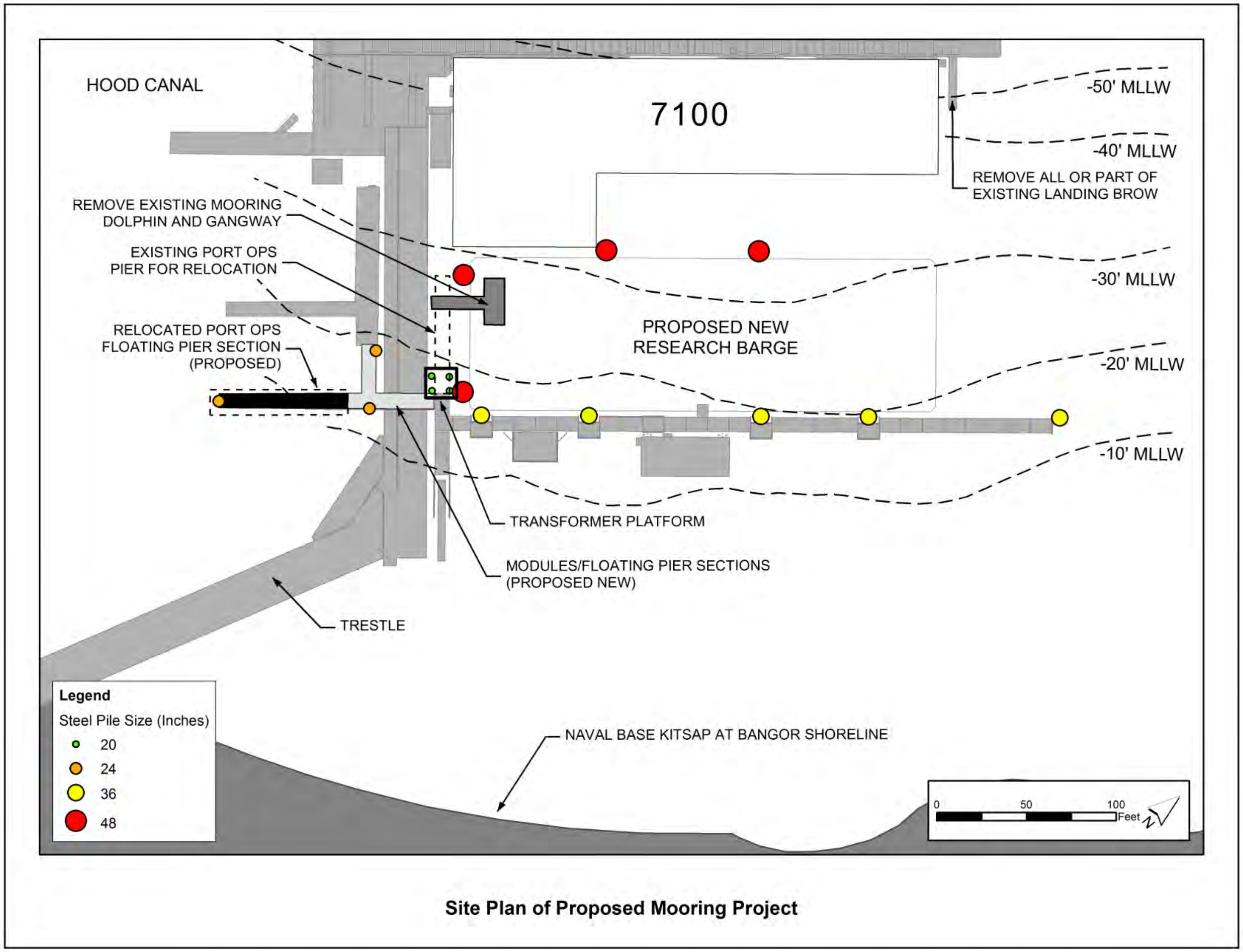
- Four 20-inch diameter steel pipe piles approximately 100 ft (30.48 meters) long would be driven to a depth of approximately 55 ft;
- Three 24-inch diameter steel pipe piles approximately 60 ft (18.29 meters) long would be driven to a depth of approximately 34 ft;
- Five 36-inch diameter steel pipe piles approximately 100 ft (30.48 meters) long would be driven to a depth of approximately 55 ft; and
- Four 48-inch diameter steel pipe piles approximately 115 ft (35.05 meters) long would be driven a the depth of approximately 70 ft. If any of the piles are out of engineering tolerance standards, they would be removed by cutting or pulling and reinstalled.

Table 2-1. Total Number of Piles Required

Pile Size	*Total Number Required*
20-inch diameter	4
24-inch diameter	3
36-inch diameter	5
48-inch diameter	4
Total piles	16
Total area	104 ft^2

[1] A trestle is a framework of vertical, slanted supports and horizontal crosspieces supporting a bridge or road.

Figure 2-2. Alternative 1 – Proposed Relocated and New Infrastructure for Barge Mooring Location



Site Plan of Proposed Mooring Project

2.3.2.3 Removed/Demolished Infrastructure

Existing infrastructure to be removed under this alternative encompasses at least 1,023 ft^2 of overwater coverage and 29 ft^2 of seafloor displaced by piles, and includes the following:

- Concrete mooring dolphin and pile cap located north of the proposed relocated floating pier modules and the gangway from the concrete mooring dolphin (totals 512 ft^2).
  - Concrete that makes up the dolphin would be carefully separated and removed from the pile dolphin.
- Eight steel piles including six 24-inch diameter steel batter piles and two 30-inch diameter steel vertical piles (totals 29 ft^2).
  - One 24-inch steel pile would be removed with the use of vibratory pile driving equipment.
  - The remaining piles would be removed by cutting them at the mudline with hydraulic shears or by a diver utilizing a thermal lance, followed by a crane lifting them out of the water for proper disposal.
- Fenders and two electrical pedestals located on existing Port Operations dock.
- At least 511 ft^2 of additional floats and brow infrastructure no longer required for existing barge. Removed infrastructure could include, but would not be limited to, the following:
  - Pedestrian brow (barge landing brow) - 4 ft x 45 ft (totals 180 ft^2).
  - Pedestrian brow floats – three 8 ft x 12 ft floats (totals 288 ft^2).
  - Maintenance platform float – 10 ft x 12 ft (totals 120 ft^2).
  - Other floats.

2.3.2.4 Physical Features of the Preferred Alternative

The relocation of six existing floating pier sections to the south side of the trestle would not result in additional overwater coverage. As discussed in Sections 2.3.2.1. and 2.3.2.2, new infrastructure and piles comprise an area of overwater coverage and sea floor area totaling 1,052 ft^2. As discussed in Section 2.3.2.3, removed/demolished infrastructure and piles comprise an area of overwater coverage and sea floor area totaling 1,052 ft^2. As such, implementation of the Preferred Alternative would result in no net change in overwater coverage and seafloor area displaced by piles (Table 2-2).

No new artificial lighting would be required for the Preferred Alternative.

2.3.2.5 Project Schedule

<u>*In-Water Work Window*</u>

In-water work for Alternative 1 would occur during the in-water work window for Tidal Reference Area 13, which occurs from July 16 through February 15 (USACE 2010). However, a condensed window would be adhered to (July 16 – September 30) in order to include conservation for forage fish and to avoid Steller sea lions. NAVBASE Kitsap Bangor fish surveys in the 1970s and 2005 – 2008 indicated that greater than 95 percent of the juvenile salmonids migration is complete prior to this window and forage fish are only present in very low numbers (Schreiner et al. 1977, Bax et al. 1978, Salo et al. 1980, Bax 1983, SAIC 2006, Bhuthimethee et al. 2009a).

Table 2-2. Physical Features of the Preferred Alternative

Feature	*Area/Quantity*
Existing Relocated Port Operations Float (-10 to -20 ft MLLW)	648 ft^2 [a]
New Port Operations Float Sections (-10 to -20 ft MLLW)	756 ft^2
New Transformer Platform	192 ft^2
Number of in-water piles to support barge mooring	13
Number of in-water piles to support Port Operations floating pier	3
Area of piles to be installed	104 ft^2
Area of gangway/mooring dolphin removed	(-512 ft^2)
Area of existing floats and landing brow removed	(-511 ft^2)[b]
Removal of piles associated with an existing mooring dolphin (-20 to -30 ft MLLW)	8
Area of piles removed	(-29 ft^2)
Total Area of New Overwater Coverage from relocated Port Operations and new Transformer Pad (-10 to -20 ft MLLW) 756 ft^2 +192 ft^2 - (512 ft^2) – (511 ft^2)	(-75 ft^2)
Total Area of Seafloor Displaced by Piles 104 ft^2 – (29) ft^2	75 ft^2
Net change in overwater coverage and seafloor area displacement	0 ft^2
Total Pile Driving Days	20 days
Total Days of In-Water Construction (July 16 – Sept 30)	40 days
Total Duration of In-Water Construction (July 16 – Sept 30)	76 days

a. Relocation of existing floats would not result in additional overwater coverage.

b. At least 511 ft^2 of the existing floats and landing brow would be removed to provide a net-zero change in overwater coverage and seafloor displacement.

<u>Project Duration</u>

Construction duration for the overall project is estimated to not exceed 76 days between July 16 and September 30. No more than 16 piles ranging in diameter from 20 to 48 inches would be installed following relocation and demolition of existing infrastructure. Based on the glacial till that the piles will be driven into, up to 4 additional piles could be installed to replace piles that do not meet engineering standards. Those piles failing engineering standards would be removed or cut-off and there would be no more than 16 piles in the final configuration. It is anticipated that 4 piles could be driven per day with an expected average of 450 strikes per pile, resulting in 1,800 pile strikes per day. Piles would primarily be installed using a vibratory pile driver[2]. Impact pile driving[3] would follow to reach required depth and to verify load-bearing capacity ("proofing"). It is anticipated that only 20 workdays would be required for pile driving and the in-water work could be completed in 8 weeks/40 workdays. As mentioned above, all

[2] Vibratory pile drivers use hydraulic-powered weights to vibrate a pile until the surrounding sediment liquefies; this enables the pile to be driven into the ground using the weight of the pile plus the pile driver.

[3] Impact hammer pile drivers use a rising and falling piston to repeatedly strike a pile and drive it into the substrate.

in-water work would begin on or shortly after July 16 with anticipated overall project completion by the end of September 2013.

2.3.3 Alternative 2 – Anchored Mooring

Under Alternative 2, an anchored mooring location would be created for the new barge south of the Service Pier and Carderock Pier, in a sheltered area at approximately -40 feet MLLW, south of Carlson Spit (Figure 2-4). The new anchor moorings clumps and buoys are essentially large screws. To install mooring clumps for the buoys, the anchor clumps would be rotated into the bottom sediment from a surface vessel using an extended shaft connected to each anchor and turning the anchors until they reach the required depth within the seafloor. This alternative would require installing approximately 8 anchor clumps and 4 buoys, spaced at each corner and is anticipated to take no longer than 10 days. No new artificial lighting would be required. Finally, alternative 2 would not require the three major components of Alternative 1 of relocating the Port Operations Pier, the removal of existing infrastructure, and the installation of the mooring piles.

Figure 2-3. Typical Buoy Anchor

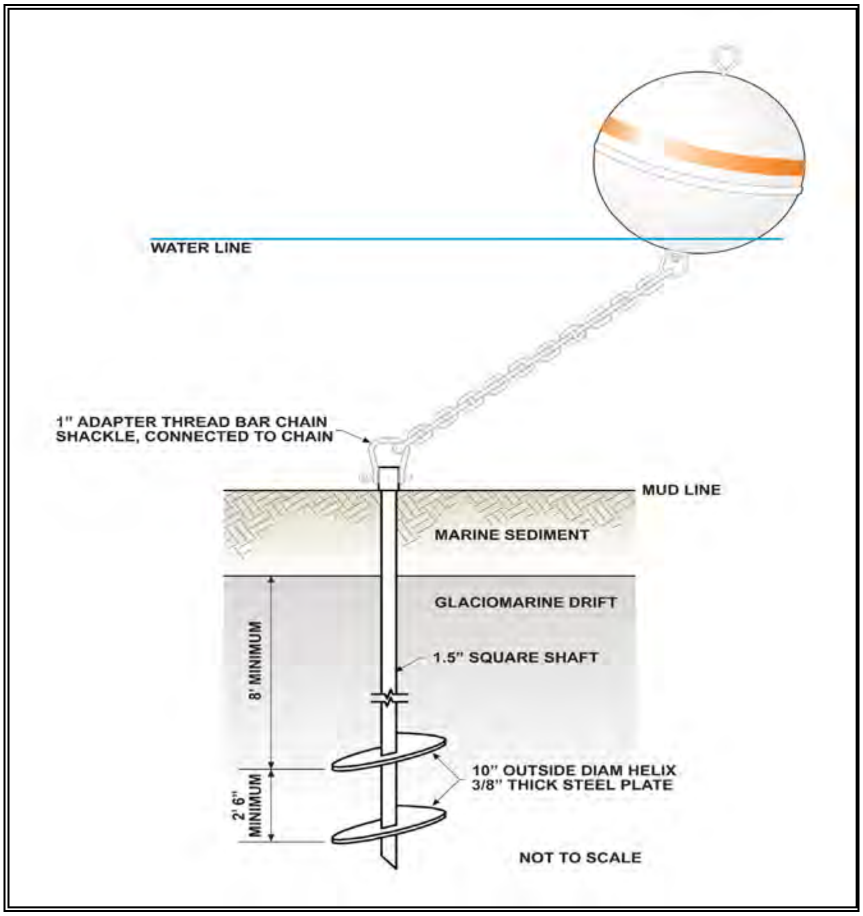


Figure 2-4. Alternative 2 – Proposed Anchored Mooring Location

2.3.4 Selection of Preferred Alternative

The Navy selected Alternative 1 as the Preferred Alternative as it fully meets all screening criteria and provides greater flexibility in adapting to any future change in CSDS-5 missions. Alternative 1 meets all 8 of the screening criteria listed in Section 2.2 while Alternative 2 meets 7 of the 8 screening criteria. Alternative 2 fails to fully meet the criteria of "easy access to moving key equipment on and off the barge" because this alternative is not located adjacent to an existing pier or wharf and moving equipment to and from the barge would require additional vessels and coordination. Additionally, Alternative 1 ranked higher than Alternative 2 in its capability to meet several key criteria:

- Location in close proximity to Service Pier - Alternative 1 is located at the Service Pier, while Alternative 2 is approximately 1/4 mile away.
- Construction based on location and natural constraints (including wave and wind) - Alternative 1 provides greater wind and wave protection than Alternative 2 due to the protection provided by the Service Pier.
- Ability to adapt to and support future mission requirements - Alternative 1 provides greater flexibility by providing direct utility connections if there is an increased demand in energy generation for research, direct linkage to bldg 7100 and CSDS-5 operations and activities at the Service Pier, and avoiding the potential for future obstructions of Navy vessel movement.

2.4 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM FURTHER ANALYSIS

Alternatives that were considered but eliminated from further analysis because they did not satisfy the selection criteria include:

1) Service Pier Mooring Dolphins;
2) Service Pier Outer Harbor Location; and,
3) Alternative Piers.

Each alternative and how they did not meet the screening criteria is described below.

2.4.1 Service Pier Mooring Dolphins

Under this alternative, mooring dolphins would be installed within the same general location where the existing barge is currently moored. Due to the size requirement of the new barge, the alternative was eliminated as the mooring dolphins would not support the new barge, and there is not enough physical space to support it.

2.4.2 Service Pier Outer Harbor Location

Under this alternative, a mooring location would be placed on the outer harbor (western) side of the Service Pier. However, pier space is limited and placing the barge on the western side would impact critical space for current missions on the Service Pier. This alternative would create obstructions for access and would require continual shifting of the research barge. In addition, wave-on-wave action on the western side was determined to be a safety concern and a detriment to the primary operational research mission of the barge. Revisions to the existing Port Security Barrier would be required, resulting in added cost and temporary bottom disturbance in the area of the Port Security Barrier anchors during construction.

2.4.3 Alternative Piers

Placement of a moorings location at the Delta Pier or other nearby piers was also considered. However, use of other existing piers would conflict with current missions carried out at NAVBASE Kitsap Bangor. The location needs to be within close proximity to submarines assigned to CSDS-5. Other piers in the vicinity were determined to have insufficient area to moor the barge.

2.5 BEST MANAGEMENT PRACTICES AND MINIMIZATION MEASURES

2.5.1 Best Management Practices

Implementation of the Proposed Action or alternatives would include incorporation of the following Best Management Practices (BMPs) to avoid or minimize any potential environmental impacts.

- 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 will be maintained and stored properly to prevent spills.
- All chemicals, liquid products, petroleum products, and other wastes present at the construction site would be covered, contained, and protected.
- Any spills would be handled according to Commander Navy Region Northwest (CNRNW) Instruction 5090.1, *Integrated Contingency Plan* and reported pursuant to Navy protocols.
- Maintenance of the barge mooring infrastructure would include routine inspections, repair, and replacement of facility components as required. Fouling organisms would be removed from piles. The installed piles are 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 the piles would not need replacement. Annual inspections of the piles would verify the integrity of the structure. In addition, maintenance would be performed on the protection system to ensure it continues to operate as designed. Maintenance would include, as necessary, repairing any damage to the coatings. BMPs would be used during these routine maintenance activities. Other actions would involve repairing the pile coating as it becomes worn.

2.5.2 Project Minimization Measures

Project minimization measures are used to reduce or minimize impacts that are unavoidable, for example, applying buffers around sensitive habitat types and habitat features that are important to sensitive species or by using a bubble curtain to reduce underwater sound from impact pile driving. The following minimization measures are proposed for this project:

- Where eelgrass is present in the vicinity of the project area, the Navy will provide the contractor with plan sheets showing eelgrass boundaries. The following restrictions would be enforced in areas designated as eelgrass:
    - No anchoring or line dragging would occur, and
    - Spuds would be used to elevate barges during low tides in order to avoid grounding or sediment scour.
- To minimize the number of fish exposed to underwater noise and other construction disturbance, in-water work would occur during an abbreviated in-water work window (July 16 through

September 30) when juvenile ESA-listed salmonids and forage fish are least likely to be present. Steller sea lions are not expected to be present within the project area during this time period.

- To minimize impacts to foraging marbled murrelets during their nesting season, impact pile driving would occur between 2 hours after sunrise and end 2 hours before sunset July 16 through September 23. The in-water work window would be adjusted between September 24 and September 30, with work occurring from sunrise and sunset.
- To the maximum extent practicable, a vibratory hammer would be used for the pile driving actions.
- To attenuate noise, a bubble curtain, or similar device, would be used during impact pile driving operations. The bubble curtain would be turned on prior to initiation of pile strikes in an effort to flush fish and marine mammals away from the injury zone near the pile. The bubble curtain would remain on during the entire active pile driving effort.
- A floating surface boom and silt curtains would be deployed during demolition and construction activities to contain and collect debris.
- Developed in coordination with the National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS) and approved by these agencies prior to initiation of in-water work, a Marine Mammal Monitoring Plan and Marbled Murrelet Monitoring Plan would be prepared and finalized. Implementation of these plans would prevent exposure to potentially injurious noise levels.
    - Monitoring would occur within pre-determined shutdown zones for purposes of avoiding injurious effects. Marine mammal monitoring would take place from 15 minutes prior to initiation through 15 minutes post-completion of pile driving. Marbled Murrelet monitoring would take place from 30 minutes prior to initiation through 30 minutes post-completion of impact pile driving. Should a marine mammal or marbled murrelet enter the shutdown zone, pile driving would be immediately halted until the marine mammal or marbled murrelet has left the area.

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CHAPTER 3.0 AFFECTED ENVIRONMENT & ENVIRONMENTAL CONSEQUENCES

Information presented in this chapter represents the baseline conditions of the affected environment. This chapter also presents an assessment of the potential impacts, or environmental consequences, of implementing the alternatives within the affected environment. To evaluate impacts, the analysis presented in this chapter overlay the components of the alternatives described in Chapter 2.0 onto baseline conditions within the region of influence (ROI). In compliance with NEPA, CEQ regulations, and Navy procedures for implementing NEPA, the description of the affected environment and environmental consequences focuses only on those resources potentially subject to impacts. Accordingly, the resources evaluated include air quality, noise, water quality and marine sediments, biological resources, marine traffic and transportation, socioeconomics and environmental justice, cultural resources, and American Indian traditional resources.

Table 3-18, located at the end of this chapter, summarizes environmental consequences by resource area, for each of the alternatives, to provide a comparison of potential impacts.

3.1 AIR QUALITY

For the purposes of this analysis, the ROI for air quality is defined as the Puget Sound Interstate Air Quality Control Region (AQCR) (40 CFR 81.32). This AQCR includes the Washington counties of King, Snohomish, Pierce, and Kitsap; NAVBASE Kitsap Bangor is located in Kitsap County. Air quality in Kitsap County is protected by federal regulations administered by the U.S. Environmental Protection Agency (EPA), state regulations administered by Ecology and the regional clean air agency, Puget Sound Clean Air Agency (PSCAA). PSCAA serves all of the Puget Sound Interstate AQCR (PSCAA 2011).

Air quality impacts would be significant if emissions exceed 250 tons/year for all criteria pollutants, or 25 tons/year cumulative emission of hazardous air pollutants (HAPs) (or 10 tons/year of any individual HAP). These impact thresholds are used as threshold for significance because if the action alternative pollutant emissions exceed the threshold it would be comparable to a major stationary source of air pollution and would have similar effects on ambient air quality (USEPA 2010e).

3.1.1 Regulatory Overview

Under the CAA, as amended, states are responsible for enforcing the established air quality regulations. As required by the CAA Amendments of 1990, Washington State has prepared a State Implementation Plan (SIP). The SIP is a compilation of goals, strategies, schedules, and enforcement actions that help lead a state into compliance with the National Ambient Air Quality Standards (NAAQS). Areas not in compliance with the NAAQS can be declared nonattainment areas by the EPA or by the appropriate state or local agency. Areas in compliance with the NAAQS are defined as being in attainment. Areas that have been reclassified from nonattainment to attainment are designated as attainment/maintenance areas. Areas that lack the monitoring data to demonstrate attainment or nonattainment status are designated as unclassified and are treated as attainment areas for regulatory purposes.

The PSCAA enforces air pollution regulations and sets guidelines, as contained in the Washington SIP, to attain and maintain the NAAQS and Washington State Ambient Air Quality Standards.

3.1.1.1 General Conformity Rule

As described in 40 CFR Part 51, *Determining Conformity of General Federal Actions to State or Federal Implementation Plans* (the "General Conformity Rule"), and all federal actions occurring in air basins designated in nonattainment or in a maintenance area must conform to an applicable implementation plan. Kitsap County is not designated as a non-attainment or maintenance area by the EPA (USEPA 2010b); therefore, a General Conformity Rule review would not be performed.

3.1.1.2 Hazardous Air Pollutants and Toxic Air Pollutants

In addition to the ambient air quality standards for criteria pollutants, national standards exist for HAPs. HAPs are pollutants that may cause cancer or other serious health effects and have adverse ecological or environmental effects. Examples of HAPs include benzene, which is found in gasoline, methylene chloride, which can be used as a solvent and paint stripper, and particulate matter released by diesel engines. The majority of HAPs are volatile organic compounds (VOCs) (USEPA 2009).

3.1.1.3 New Source Review and Prevention of Significant Deterioration Programs

As part of the CAA amendments of 1977, Congress established the New Source Review (NSR) program. This program is designed to ensure that air quality is not significantly degraded from the addition of new and modified factories, industrial-sized boilers, power plants, and other major industrial stationary sources. (USEPA 2010c).

The construction activities associated with the Proposed Action are temporary mobile sources and would not be evaluated with respect to Class I PSD areas. Further, no new major stationary emission sources are constructed as a result of the Proposed Action. Therefore, NSR requirements are not carried forward in the air quality analysis. However, NAVBASE Kitsap Bangor would be responsible for permitting any small stationary sources (e.g., boilers) if required by PSCAA regulations. The PSCAA is responsible for issuing Notice of Construction (NOC) permits for proposed stationary sources. The NOC permits are required for stationary air contaminant-generating equipment and air pollution control equipment. PSCAA Regulation I Section 6.03 discusses the specific type of equipment that would require permits. If a proposed project needs an NOC permit, a permit application must be filed with the PSCAA and approval from the agency must be obtained prior to construction of the stationary source. Notification and potential permitting is required for portable internal combustion engines in accordance with PSCAA regulation 1, Article 15. Exhaust emissions from construction equipment will comply with PSCAA visual emission (opacity) standards.

3.1.2 Affected Environment

Air pollutant emissions from NAVBASE Kitsap Bangor are primarily from stationary sources (i.e., external combustion boilers, fuel storage and transfer operations, etc.). The sources at the installation do not have aggregate potential emissions in excess of thresholds. NAVBASE Kitsap Bangor currently operates under a Synthetic Minor Air Permit. They are required by PSCAA to do a 12-month rolling average of criteria pollutant emissions and report these emissions to PSCAA. The NAVBASE Kitsap Bangor has consistently demonstrated compliance with these facility-wide emissions limits.

Air quality is defined as the ambient air concentrations of specific pollutants determined by the EPA, Ecology, and PSCAA to be of concern to the health and welfare of the general public. The specific pollutants include the criteria pollutants and HAPs. Further detail is provided in Appendix B.

The criteria pollutants include ozone, carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter less than 10 microns in diameter (PM_{10}), particulate matter less than 2.5 microns in diameter ($PM_{2.5}$), and lead. NAAQS have been established by the EPA for these criteria pollutants (USEPA 2010a). Further detail is provided in Appendix B.

3.1.3 Environmental Consequences

The pollutants considered in the impact analysis include the criteria pollutants and HAPs. In order to assess the air quality impacts of the Preferred Alternative or Alternative 2, emissions for each phase of construction were evaluated. Appendix B includes the detailed emission calculations used to quantitatively assess the air quality impacts of these two alternatives. For the purposes of the air quality analysis, the analysis is based upon worst case scenario that construction activities associated with the Preferred Alternative and Alternative 2 would occur for approximately three months.

The primary source of pollutant emissions is heavy marine construction equipment and associated construction vehicles. Particulate matter emissions, which are technically categorized into PM_{10} and $PM_{2.5}$, are evaluated as total particulate matter for this impact analysis. Project construction equipment would emit minor amounts of HAPs that could potentially impact public health. The main source of air emissions would occur in the form of diesel exhaust organic gases and particulates from the combustion of diesel fuel. Due to the mobile and intermittent operation of proposed diesel-powered construction equipment over a construction area and the lack of sensitive receptors in the immediate vicinity of the construction, this equipment would produce minimal ambient impacts to the localized area, and would not be expected to expose sensitive receptors to significant pollutant emissions.

Air emissions from the Proposed Action would primarily be due to the operation of heavy equipment and construction vehicles during construction activities. There would be no new long-term sources of air pollution after construction that would be introduced as part of the Proposed Action. No new stationary equipment would be used onsite during the construction activities. Therefore, the analysis is limited to mobile source emissions. The methodology and assumptions used in the air quality analysis are detailed in Appendix B.

3.1.3.1 No-Action Alternative

Under the No-Action Alternative, the construction and use of the barge mooring location for the proposed new research barge would not occur. Baseline air quality would remain unchanged. Therefore, no significant impacts to air quality would occur with implementation of the No-Action Alternative.

3.1.3.2 Preferred Alternative

Under the Preferred Alternative, emissions were calculated for the construction work period using a conservative scenario that encompasses at least 20 work days for pile driving as well as set up time. Total emissions generated were compared to the impact thresholds. As shown in Table 3-1, the estimated emissions that would result with implementation of the Preferred Alternative do not exceed impact thresholds. Therefore, no significant impact to air quality would occur with implementation of the Preferred Alternative.

Table 3-1. Estimated Emissions from Off-Road and On-Road Mobile Source Emissions under Preferred Alternative

	VOC (tons/yr)	*NOx (tons/yr)*	*CO (tons/yr)*	*SO_2 (tons/yr)*	*$PM_{(total)}$ (tons/yr)*
Preferred Alternative	0.10	0.74	3.75	0.09	0.24
Significant Impact Threshold	25	250	250	250	250
Exceed Threshold (Significant Impact)	No	No	No	No	No

3.1.3.3 Alternative 2

Alternative 2 is differentiated from the Preferred Alternative by location and by the number of mooring anchors/buoys, which would require a shorter installation period and less equipment. Emissions calculated for the construction for Alternative 2 were compared to the impact thresholds. As shown in Table 3-2., the estimated emissions that would result during the phases of Alternative 2 do not exceed impact thresholds. Therefore, no significant impacts to air quality would occur with implementation of Alternative 2.

Table 3-2. Estimated Emissions from Off-Road and On-Road Mobile Source Emissions under Alternative 2

	VOC (tons/yr)	*NOx (tons/yr)*	*CO (tons/yr)*	*SO_2 (tons/yr)*	*$PM_{(total)}$ (tons/yr)*
Alternative 2	0.003	0.01	0.05	0.005	0.14
Significant Impact Threshold	25	250	250	250	250
Exceed Threshold (Significant Impact)	No	No	No	No	No

3.2 NOISE

For this analysis, the ROI for noise is the upland portion of NAVBASE Kitsap Bangor industrial waterfront and the immediately adjacent nearshore region of the Hood Canal. Underwater noise is described in this section with impacts as they relate to fish and wildlife (including marine mammals and special-status species), are discussed in Section 3.4.3.

The threshold of significance for noise impacts would be exceedances of an applicable noise threshold at a sensitive receptor (e.g., residential land uses, nursing homes, hospitals, etc.). An example of noise threshold of significance would be construction activities exceeding 75 decibels (dB) for over an hour adjacent to a residence or hospital, which are defined as sensitive noise receptors. The noise impact analysis considers the peak noise generated at the source and then determines how this noise propagates or travels to the sensitive noise receptor including attenuation for distance and terrain. The received sound level at a sensitive noise receptor is compared to the applicable noise thresholds to determine the effects of noise.

Generally, noise is measured in units called decibels (dB); however, a number of factors affect how the human ear perceives sound: the actual level of noise, frequency, period of exposure, and fluctuations in noise levels during exposure. The dB system of measuring sound provides a simplified relationship between the physical intensity of sound and its perceived loudness to the human ear. The dB scale is logarithmic; therefore, sound intensity increases or decreases exponentially with each dB of change. For example, 10 dB yields a sound level 10 times more intense than 1 dB, while 20 dB is 100 times more intense, and 30 dB is 1,000 times more intense. Human speech is normally around the 60 dB level.

Sound levels are typically used to assess impacts to humans and thus are weighted (A-weighting) and expressed as dBA to correspond to the same frequency range that humans hear (approximately 20 hertz (Hz) to 20 kilohertz (kHz). A-weighting is typically applied to measuring noise for activities such as construction engine equipment and industrial ship yard activities. For low-frequency sounds that can cause vibrations, a C-weighting metric is used; denoted as dBC. Both metrics screen out very high and low sound frequencies that cannot be heard by humans. The perceived sound level changes as the subject's distance from the source increases. Therefore, the metrics are given in varying sound levels based on distance. Airborne noise levels are expressed in decibels relative to 20 micropascals and the units are listed as: (dB re 20 μPa).

Average noise exposure is often presented as a Community Noise Equivalent Level (CNEL). The CNEL is the energy-averaged sound level of all sound exposure values within a 24-hour period; with a 10 dB penalty assigned to noise events occurring between 10 p.m. and 7 a.m. to compensate for the increased annoyance associated with the occurrence of nighttime noise events. Most people are exposed to sound levels of 50–55 dB CNEL or higher on a daily basis. Studies conducted to determine noise impacts to various human activities have revealed that approximately 87 percent of the population is not significantly bothered by sound levels below 65 dB CNEL (FICON 1992).

3.2.1 Regulatory Overview

Section 4(b) of the Noise Control Act of 1972 (42 USC 4901 *et seq*.) directs federal agencies to comply with applicable federal, state, and local noise requirements with respect to the control and abatement of environmental noise. Washington State has standards and regulations to control and abate environmental noise. Washington Administrative Code (WAC) Chapter 173-60 updated December 2000 sets the requirements for Maximum Environmental Noise Levels. The rules are pursuant to the Noise Control Act of 1974. Vessels are exempt under WAC 173-60, but are regulated under the Washington code for recreational vessels. WAC 173-60 sets maximum permissible noise levels based on the type environmental designation for noise abatement (EDNA). There are three classes of EDNA:

- Class A: Lands where human beings reside and sleep.
- Class B: Lands involving uses requiring protection against noise interference with speech. Includes but is not limited to retail services, banks and office buildings, community services, and dining establishments.
- Class C: Lands involving economic activities of such a nature that higher noise levels are anticipated. Worker safety is protected under the Department of Labor and Industries health and safety programs. Includes but is not limited to warehouses, distribution facilities, industrial facilities, and agriculture.

The maximum permissible noise levels are shown below in Table 3-3.

WAC 173-60 lists sources exempt from the provisions of WAC 173-60 from the hours of 7:00 a.m. to 10:00 p.m. These sources are still required to meet requirements for Class A EDNAs listed in WAC 173-60 from 10:00 p.m. to 7:00 a.m. These sources include but are not limited to sounds originating from temporary construction sites as a result of construction activity and sound originating from forest harvesting.

Table 3-3. WAC 173-60 Maximum Permissible Environmental Noise Levels

EDNA of Noise Source	*EDNA of Receiving Property*		
	Class A	**Class B**	**Class C**
Class A	55 dBA 45 dBA (between 10:00 p.m. and 7:00 a.m.)	57 dBA 47 dBA (between 10:00 p.m. and 7:00 a.m.)	60 dBA 50 dBA (between 10:00 p.m. and 7:00 a.m.)
Class B	57 dBA	60 dBA	65 dBA
Class C	60 dBA	65 dBA	70 dBA

Source: WAC 173-60-040

Kitsap County also has codes related to noise. Kitsap County Code Chapter 10.28 Noise includes the codes related to noise control. Kitsap County follows a designation of EDNAs very similar to WAC 173-60 and has identical Maximum Permissible Environmental Noise Levels (see Table 3-3). Kitsap County Code also exempts sounds originating from temporary construction sites as a result of construction activity from complying with the Maximum Permissible Environmental Noise Levels between the hours of 7:00 a.m. and 10:00 p.m.

3.2.1.1 Noise Perception

Responses to noise vary widely not only according to the type of noise and the characteristics of the sound source, but also according to the sensitivity and expectations of the receptor, the time of day, and the distance between the noise source (e.g., aircraft) and the receptor (e.g., a person or animal). Noise impacts can result from perceptible changes in the overall noise environment that increase annoyance or affect human health. Annoyance is a subjective impression of noise wherein people apply both physical and emotional variables. To increase annoyance, the cumulative noise energy must increase measurably. Table 3-4 presents sound levels in dBA for typical sounds found in the environment and the reaction that might occur when a person (or receptor) is exposed to this noise.

Table 3-4. Examples of Typical Sound Levels in the Environment

Source (at a given distance)	*Sound Level (dBA)*	*Typical Reaction/Perception*
Civil Defense Air Siren (100 ft [30 m])	140	Pain
	130	
Impact Pile Driver (50 ft [15 m])	110	Maximum Vocal Effort
Vibratory Pile Driver (50 ft [15 m])	101	Very Annoying/ Discomfort
Jack Hammer (50 ft [15 m])	88	
Garbage Disposal (3 ft [0.9 m])	80	Intrusive
Alarm Clock		
Vacuum Cleaner (3 ft [0.9 m])	70	
Light Traffic (50 ft [15 m])	60	Able to Continue Normal Speech
Bird Calls (Distant)	40	Quiet
Soft whisper (5 ft [1.5 m])	30	
Human Breathing	20	Just Audible
	10	

Sources: Center for Hearing and Communication 2010; FHWA 2011b; WSDOT 2012

3.2.1.2 Effects of Noise

Prolonged exposure to very high levels of environmental noise can cause hearing loss. The EPA has established a protective level of 70 dBA, below which hearing is conserved for exposure over a 40-year period (USEPA 1981). Environmental noise indirectly affects human welfare by interfering with sleep, thought, and conversation. The Washington State Maximum Permissible Environmental Noise Levels are based on speech interference, which is a well-documented impact that is relatively reproducible in human response studies.

Noise sources occur in two forms:

- Point sources, such as stationary equipment or individual motor vehicles; and
- Line sources, such as a roadway with a large number of mobile point sources (motor vehicles).

Sound generated by a stationary point source typically diminishes (attenuates) at a rate of 6 dBA for each doubling of distance from the source to the receptor at acoustically "hard" sites, and at a rate of 7.5 dBA at acoustically "soft" sites (WSDOT 2012). A "hard" or reflective site does not provide any ground-effect attenuation and is characteristic of asphalt, concrete, water, and very hard packed soils. When ground cover or normal unpacked earth exists (i.e., vegetation) between the source and receptor, the ground becomes absorptive to noise energy and "soft" site conditions are present. Construction noise behaves as a point-source and propagates in a spherical manner, with distance attenuation as previously described. Sound levels also attenuate due to barriers such as terrain, buildings, or vegetation. Construction noise would vary depending on the construction process, type, and condition of equipment used, and layout of the construction site.

3.2.1.3 Underwater Noise

A number of sources of underwater noise exist in the vicinity of the project site. Ambient noise by definition is background noise and it has no single source or point. Ambient noise varies with location, season, time of day, and frequency. Ambient noise is continuous, but with much variability on time scales ranging from less than 1 second to 1 year (Richardson et al. 1995). Sources of ambient underwater noise are typically, naturally caused and include wind, waves, precipitation, and biological sources such as shrimp, fish, and cetaceans. Noise derived from biological organisms can be absent or dominant over narrow and broad frequency ranges. Precipitation can contribute up to 35 dB to the existing sound level, and increases in wind speed of 5 to 10 knots can cause a 5 dB increase in ambient ocean noise across most frequencies (Urick 1983). The highest noise levels occur in nearshore areas where the sound of surf can increase underwater noise levels by 20 dB or more within 600 ft from the surf zone in the 200 Hz to 2 kHz regime (Wilson et al. 1985).

In addition to noise in the air, underwater noise can be produced by human-induced noise such as vessel operations, aircraft, dredging, filling, pile driving, and general construction activities.

3.2.1.4 Affected Environment

NAVBASE Kitsap Bangor is an active military base located adjacent to Hood Canal. The sound environment is influenced by the natural environment such as wind, surf, and marine traffic. However, the primary source of sound in the environment is military activities such as waterfront operations, movement of people and military vehicles at the base, and the various industrial activities that occur at the shoreline facilities. The baseline airborne noise levels that occur at NAVBASE Kitsap Bangor on the waterfront range from 60 to 104 dBA, with an average of approximately 64 dBA (Navy 2010c). The majority of the daily ambient sound at the base that is considered noise is generated by human activities and is typical of an industrial area. The industrial area would be considered an EDNA Class C. Activities include movement of marine vessels and heavy trucks, operation of equipment (such as cranes, forklifts, and other mechanized equipment), various industrial activities occurring at the shoreline and upland facilities, and general traffic. Evening and nighttime levels ranged from 64 to 96 dBA, with an average level of approximately 64 dBA (Navy 2010c). Measured levels were comparable to estimated noise levels from literature. Per published literature, presuming multiple sources of noise may be present at one time; maximum combined levels may be as high as 99 dBA. This assumes that two similar sources combined together will increase noise levels by 3 dB over the level of a single piece of equipment by itself (WSDOT 2012). These maximum noise levels are intermittent in nature and not present at all times. Existing maximum baseline noise conditions at the waterfront during a typical work week are expected to be approximately 99 dBA due to typical truck, forklift, crane, and other industrial activities. Average baseline noise levels are expected to be in the 70-90 dBA range, consistent with urbanized or industrial environments where equipment is operating.

There are residences, which would be considered sensitive noise receptors (Class A EDNA), approximately 3,700 feet south of the Proposed Action area and that are somewhat blocked by Carlson Spit, an upland outcropping into Hood Canal. These residences would be considered sensitive receptors for noise analysis purposes.

Bangor Beach, the tribal shellfishing area located along the NAVBASE Kitsap Bangor waterfront, is located approximately 2,700 feet north of the Proposed Action area (as measured on a straight line north to Three Spits (also known as KB Point, located just north of KB Dock) and then immediately east to the middle of the Bangor Beach). Tribal members conducting shellfish harvesting or fishing at Bangor Beach would be considered Class B EDNA receptors. The beach is separated from the Proposed Action by a vegetated bluff that rises up from Three Spits to an elevation of 110 to 115 feet from the shoreline area.

3.2.2 Environmental Consequences

3.2.2.1 No-Action Alternative

Under the No-Action Alternative, the construction and use of the barge mooring location for the proposed new research barge would not occur. Baseline noise levels in the project area would remain unchanged. Therefore, there would be no changes in the noise environment with implementation of the No-Action Alternative.

3.2.2.2 Preferred Alternative

There are no sensitive receptors directly in the vicinity of the Preferred Alternative location (within 50 feet). The pile driving and all other construction and installation activities associated with this alternative would occur between 7:00 a.m. and 10:00 p.m., unless otherwise specified for impact minimization to nesting marbled murrelets (see Section 2.5.2). Construction related noise associated with the Preferred Alternative is exempt from WAC 173-60 and Kitsap County Noise codes, because construction would not occur between 10:00 p.m. and 7:00 a.m. Proposed activities would be short-term and would not exceed 8 weeks/40 workdays for the in-water work window with a projected 20 days for pile driving activity. In addition, only personnel directly associated with the project would be within a distance where appropriate ear protection would be required and used.

Proposed pile driving would result in increased airborne noise in the vicinity of the construction site. Maximum peak levels would be generated during impact pile driving, estimated to be 105 dBA re 20 µPa at a distance of 50 ft (15 m) from the pile. Other construction activities or equipment, such as cranes, diesel trucks, and generators would also cause noise; however, this noise level would be lower compared to noise produced by the impact pile driver (WSDOT 2012). In the absence of pile driving noise, maximum construction noise would be 94 dBA re 20 μPa at a distance of 50 ft (15 meters) from the activity, computed as the summation of noise of all equipment operating simultaneously (WSDOT 2012).

The closest Class A EDNA sensitive receptor is the residential neighborhood approximately 3,700 ft south of the proposed construction activity. Bangor Beach is approximately 2,700 feet to the north and on the other side of 110 foot hillside. Impact pile driving would generate the most noise disturbance to these sensitive noise receptors. This construction activity is considered a point source activity that would initially generate noise over a hard site (i.e., water) and move inland over a soft site (i.e. ground cover) to sensitive noise receptors. Using the attenuation rate described above (Section 3.2.1.2), sound generated by a stationary point source typically diminishes (attenuates) at a rate of 6 dBA for each doubling of distance from the source to the receptor at acoustically "hard" sites, and at a rate of 7.5 dBA at acoustically "soft" sites (Table 3-5). Additionally, vegetation and terrain can add another 10 dB of noise attenuation (WSDOT 2012). Therefore, impact pile driving noise would attenuate down to less than 69 dBA at the residential neighborhood. Impact driving noise received at Bangor Beach would attenuate down to a range of approximately 70 dBA to 60 dBA due to the increased natural attenuation of the vegetated hillside that screens the beach from the project area. Construction noise levels received at the residential neighborhood and Bangor Beach would be consistent with the EPA's established protective level (USEPA 1981).

Table 3-5. Estimated Received Airborne Sound Levels from Impact Pile Driving a 48-inch Steel Pile

Distance ft (m)	*Received Sound Level – Hard Site[1] (dBA)*	*Received Sound Level – Soft Site[2] (dBA)*
50 (15)	105	105
100 (30)	99	97.5
200 (61)	93	90
400 (122)	87	82.5
800 (244)	81	75
1,600 (488)	75	67.5
3,200 (975)	69	60

1. Hard sites include sites with the characteristics of asphalt, concrete, water, and very hard packed soils.
2. Soft sites include sites with the characteristics of ground cover or normal unpacked earth.

All installation activities associated with the Preferred Alternative would follow the general intent of Washington State noise regulations concerning Maximum Permissible Noise Levels. Construction activities associated with the Preferred Alternative would occur between the hours of 7:00 a.m. and 10:00 p.m. Monday through Saturday (except when otherwise noted for the protection of marbled murrelet foraging; see Section 3.4 - Biological Resources). Based on the short term nature of the construction and the construction activities occurring within the noise level exemption times of 7:00 a.m. to 10:00 p.m., no significant impacts to sensitive noise receptors from airborne noise would occur under the Preferred Alternative.

3.2.2.3 Alternative 2

Under Alternative 2, potential noise impacts would be substantially lower as pile driving activity would not be required. Noise generated would come from barges and cranes used to install the anchor clumps.

As with the Preferred Alternative, there are no sensitive receptors within 50 feet of the Alternative 2 location. Proposed construction activities would be short-term and in-water would not exceed 10 days. In addition, only personnel directly associated with the project would be within a distance where appropriate ear protection may be required and used. Construction activities would occur between the hours of 7:00 a.m. and 10:00 p.m. meeting the requirements for exemption from WAC 173-60 Maximum Permissible Environmental Noise Levels. Therefore, there would be no impacts to sensitive receptors from airborne noise with implementation of Alternative 2.

3.3 WATER QUALITY AND MARINE SEDIMENTS

The ROI for water quality and marine sediments is the eastern shoreline of Hood Canal, WRIA 15. Hood Canal is a saltwater inlet of Puget Sound with currents driven primarily by costal and inter-waterway tides, but is also affected by winds, freshwater inflow, and water density differences.

The threshold of significance of adverse effects on water quality and marine sediments are defined by the CWA, the Washington State Sediment Management Standards (SMS), and the Marine Sediment Quality Standard (SQS), (e.g., temperature, dissolved oxygen, turbidity, and pH). For marine sediment, identified chemical breakdown, grain size of sediments and level of turbidity (e.g., less than 5 nephelometric turbidity units) are applied in assessing marine sediment impacts.

3.3.1 Regulatory Overview

Water quality describes the chemical and physical composition of water as affected by natural conditions and human activities. The Federal Water Pollution Control Act Amendments of 1972, as amended in 1977 and 2002, and commonly known as the CWA, established the basic structure for regulating discharges of pollutants into waters of the United States. The CWA contains the requirements to set water quality standards for all contaminants in surface waters. The EPA is the designated regulatory authority to implement pollution control programs and other requirements of the CWA. However, EPA has delegated regulatory authority for the CWA to Ecology for the implementation of pollution control programs, as well as other CWA requirements.

The SMS (WAC 173-204) provides the framework for the long-term management of marine sediment quality. The purpose of the SMS is to reduce and ultimately eliminate adverse biological impacts and threats to human health from sediment contamination. The SMS establishes standards for the quality of sediments as the basis for management and reduction of pollutant discharges by providing a management and decision making process for contaminated sediments.

The Marine SQS (WAC 173-204) established by the SMS includes numeric criteria using bulk contaminant concentrations and biological impacts criteria based on sediment bioassays that define the lower limit of sediment quality expected to cause no adverse impacts to biological resources in Puget Sound. The SMS Cleanup Screening Levels (CSL) (WAC 173-204) consist of numeric chemical concentration and biological impacts criteria that represent cleanup thresholds. Bulk sediment concentrations between the SQS and CSL values require further investigation to determine whether actual adverse impacts exist at a site due to contaminated sediments.

3.3.2 Affected Environment

NAVBASE Kitsap Bangor includes two main watersheds. The smaller Clear Creek watershed drains the southeastern portion of the installation. All runoff from this watershed flows into Clear Creek, which discharges into Dyes Inlet approximately three miles downstream of the base. The larger Hood Canal watershed streams flow westward into several steep drainages that empty into Hood Canal (van Heeswijk and Smith 2002).

Freshwater inflow into Hood Canal consists of groundwater, stormwater outfalls, and creeks and rivers. Principal rivers discharging to Hood Canal are the Dosewallips and the Duckabush (south and southwest of NAVBASE Kitsap Bangor). Five small streams discharge to Hood Canal from the base, three of which flow through Cattail Lake, Hunter's Marsh and Devils Hole Lake. A series of stormwater outfalls discharge much of the overland flow from the western portion of the installation to Hood Canal.

Artesian seeps along the shore cliff faces of NAVBASE Kitsap Bangor provide additional freshwater input to Hood Canal. These seeps have a positive effect on water quality and tend to reduce salinity levels along the NAVBASE Kitsap Bangor shoreline (Kahle 1998).

3.3.2.1 Water Quality

Temperature

Monthly mean surface water temperatures along the NAVBASE Kitsap Bangor waterfront were measured between July 2005 and June 2006 (except the months of October to November) (Phillips et al. 2009). Temperatures for the nearshore locations (water depth ranging from 1 to 60 m) met extraordinary quality standards during the winter months (January to May 2006) and excellent quality standards during the summer months (July to September 2005 and June 2006).

Hood Canal was designated as an extraordinary quality water body by Ecology. Because of this designation, Ecology requires any action (federal, state, local, and/or private) to maintain the standards shown in Table 3-6.

Table 3-6. Hood Canal Water Quality Classification and Criteria

Water Quality Classification	***Water Quality Criteria***			
Aquatic Life	*Temperature*[1]	*Dissolved Oxygen*[2]	*Turbidity*[3]	*pH*
Extraordinary Quality[4]	13°C (55°F)	7.0 mg/L	+5 NTU or +10%[4]	7.0 – 8.5[6]
Excellent Quality [5]	16°C (61°F)	6.0 mg/L	+5 NTU or +10%[4]	7.0 – 8.5[7]
Good Quality [6]	19°C (66°F)	5.0 mg/L	+10 NTU or +20%[5]	7.0 – 8.5[7]
Fair Quality [7]	22°C (72°F)	4.0 mg/L	+10 NTU or +20%[5]	6.5 – 9.0[7]
Coliform Bacteria				
Shellfish Harvesting	Geometric mean not to exceed 14 MPN/100 mL fecal coliforms[8]			
Recreation				
Primary Contact	Geometric mean not to exceed 14 MPN/100 mL fecal coliforms[8]			
Secondary Contact	Geometric mean not to exceed 70 MPN/100 mL enterococci[9]			

Notes:

°C - degrees Celsius, °F - degrees Fahrenheit, mg/L - milligrams per liter, mL – milliliters, NTU - nephelometric turbidity units

1. 1-day maximum (°C). Temperature measurements should be taken to represent the dominant aquatic habitat of the monitoring site. Measurements should not be taken at the water's edge, the surface, or shallow stagnant backwater areas.
2. 1-day minimum (mg/L). When dissolved oxygen (DO) is lower than the criteria or within 0.2 mg/L, then human actions considered cumulatively may not cause the DO to decrease more than 0.2 mg/L. DO measurements should be taken to represent the dominant aquatic habitat of the monitoring site. Measurements should not be taken at the water's edge, the surface, or shallow stagnant backwater areas.
3. Measured in NTU; point of compliance for non-flowing marine waters — turbidity not to exceed criteria at a radius of 150 ft from activity causing the exceedances.

4. 5 NTU over background when the background is 50 NTU or less; or 10% increase in turbidity when background turbidity is more than 50 NTU.
5. 10 NTU over background when the background is 50 NTU or less; or 20% increase in turbidity when the background turbidity is more than 50 NTU.
6. Human-caused variations within range must be less than 0.2 units.
7. Human-caused variations within range must be less than 0.5 units.
8. No more than 10% of all samples used to calculate geometric mean may exceed 43 most probable number (MPN)/100 milliliters (mL); when averaging data, it is preferable to average by season and include five or more data collection events per period.
9. No more than 10% of all samples used to calculate geometric mean may exceed 208 MPN/100 mL; when averaging data, it is preferable to average by season and includes five or more data collection events per period.

Source: WAC 173-201A as amended in November 2006.

Dissolved Oxygen

Concentrations of dissolved oxygen (DO) in extraordinary quality marine surface waters, such as those in northern Hood Canal, should exceed 7.0 milligrams per liter (mg/L) of DO, allowing for only 0.2 mg/L reductions in the natural condition by human-caused activities (WAC 173-201A).

The 2008 CWA Section 303(d) list includes five segments within northern Hood Canal impaired by low DO levels. Two of these segments are located along the NAVBASE Kitsap Bangor waterfront. The low DO for both of those segments is believed to be due to or influenced by human actions (Ecology 2009). However, these stations are offshore in deep water and would not necessarily be representative of nearshore conditions at the NAVBASE Kitsap Bangor waterfront.

Although some waters along the NAVBASE Kitsap Bangor waterfront are on the 303(d) list, mean DO measurements during July 2005 through June 2006 indicate that nearshore stations at the waterfront consistently met extraordinary quality standards for DO. From July 2005 through June 2006 and January 2007 through April 2008, DO levels met the extraordinary standard for surface waters (0 to 20 ft in depth) year round and for deep water (66 to 197 ft in depth) most of the year. (Deeper waters can drop to only a fair standard for DO in late summer). However, in late summer-early fall, DO levels drop from typical ranges of approximately 6 to 10 mg/L to a range of 4.7 to 9.1 mg/L (Phillips et al. 2009). The variation in mean DO measurements for deeper waters (66 to 197 ft in depth) near the project site was consistent with DO patterns within the rest of Hood Canal. During the late summer and early fall period (July through September 2005), mean DO measurements met fair to excellent quality standards. At 66 to 197 ft in depth, these measurements are on the upper range of low DO conditions measured historically throughout Hood Canal during the late summer and fall periods. Mean DO measurements at 66 to 197 ft in depth from March through May 2006 met extraordinary quality standards (HCDOP 2011).

Turbidity

Washington State-designated extraordinary quality marine surface waters should have an average turbidity reading of less than 5 nephelometric turbidity units (NTU) (WAC 173-201A). Turbidity measurements were collected along the NAVBASE Kitsap Bangor waterfront, including the vicinity of the project site, from July 2005 through May 2006, except for October to December 2005 (Phillips et al. 2009). These mean monthly turbidity measurements for both nearshore and offshore waters ranged from 0.7 to 3 nephelometric turbidity units and were consistently within the Washington State standards for extraordinary quality.

3.3.2.2 Marine Sediments

Marine sediments at NAVBASE Kitsap Bangor may be derived from several sources, including the identified runoff from the above referenced five local streams at the base that discharge to Hood Canal, stormwater discharges, and erosion of shoreline areas not protected by bulkheads (URS Consultants, Inc. 1994). In-water structures (i.e., wharves, piers, floats, ramps, and groins) can alter long shore sediment transport by decreasing water velocity, resulting in sediment accumulation along one side of an obstruction. Offshore structures that alter wave energy (i.e., breakwaters, floats, and moored vessels) reduce erosion along the shore and allow drift sediment to accumulate. As natural wave and current action gradually move fine sediment from intertidal to subtidal elevations, the upper intertidal substrate gradually coarsens, and its slope steepens without new sources of sediment to replace the finer material (Downing 1983). This condition is present along portions of the NAVBASE Kitsap Bangor shoreline, where coarse gravel and cobble beaches occur throughout intertidal elevations and finer sands and silts occur within subtidal elevations.

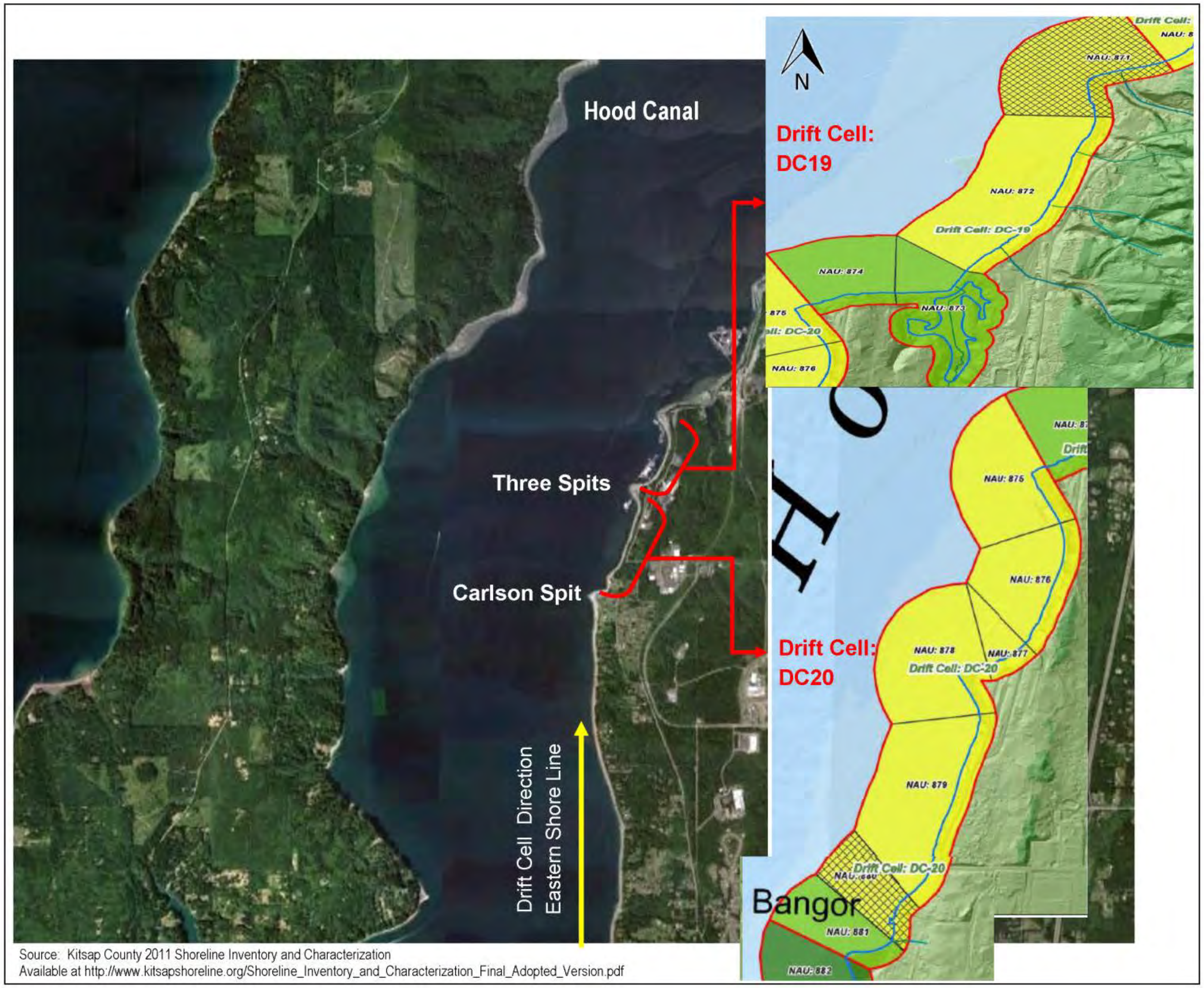
Information on existing sediment quality within the action area is based on grain size measurements and chemical analyses of sediments collected during sediment investigation studies during 2007. In general, marine sediments along the NAVBASE Kitsap Bangor shoreline are composed of gravelly sands with some cobbles in the intertidal zone, transitioning to silty sands in the subtidal zone (Hammermeister and Hafner 2009).

Marine Environment – Drift Cells

Recent studies by Ecology, Point No Point Treaty Council (PNPTC) biologist, and the recently adopted Kitsap County Shoreline Master Plan (Shoreline Characterizations) defined drift cells in Hood Canal and other areas (Kitsap County 2013). This is referred to as littoral drift or shore drift and is the process by which beach sediment is moved along the shoreline. Drift results primarily from the oblique approach of wind-generated waves and can therefore change in response to short-term (daily, weekly, or seasonally) shifts in wind direction. Over the long term, however, many shorelines exhibit a single direction of net shore drift within a defined Drift Cell.

1. Net shoreline sediment drift in the North Hood Canal sub-region and on the eastern shoreline is dominated by a south to north drift noted in Figure 3-1. (PNPTC 2008). However, as this is still an area of science that has some analysis gaps, there could be north to south drift directional sediment transport from cell to cell.
2. The project area is located within drift cell DC-20, which also includes Three Spits (shown on Figure 3-1) to the north and Carlson Spit to the south. The tribal shellfish harvest beach, Bangor Beach, is within a separate drift cell (DC-19), located just to the north of drift cell DC-20.
3. Both cells have an overall scoring of low to moderate for disturbance from armoring of shorelines, wave energy, and sediment transport impacts.
4. Due to the geography of a semi-protected shoreline, which curves into the shore between Three Spits to the north and Carlson Spit to the south, the sediment transport is lower in drift cell DC-20, with less adverse impact on the shorelines.

Figure 3-1. Summary of Drift Cell Direction



Source: Simenstad et al. 2008. Assessment of Intertidal Eelgrass Habitat Landscapes for Threatened Salmon in the Hood Canal and Eastern Strait of Juan de Fuca, Washington State. Technical Report 08-01, Point No Point Treaty Council.

Existing Marine Sediment Quality

Sediment parameters, such as total organic carbon (TOC), metals, and organic contaminants, were used to characterize sediment quality at NAVBASE Kitsap Bangor. TOC, which provide a measure of how much organic matter occurs in the sediments, was less than 1 percent near the project site. A range of 0.5 to 3 percent is typical for Puget Sound marine sediments, particularly those in the main basin and in the central portions of urban bays (PSWQST-PSEP 1997).

Concentrations of metals in sediments found near the project area are comparable to background levels for Puget Sound and below sediment quality guidelines (e.g., SQS and CSL values) (Hammermeister and Hafner 2009). In addition, concentrations of polycyclic aromatic hydrocarbons (PAHs) were below the corresponding SQS and CSL values.

Concentrations of other classes of organic contaminants, such as chlorinated aromatics, phthalate esters, phenols, and other miscellaneous extractable compounds, typically were at or below the analytical detection limits and consistently below the SQS and CSL values. Results from the 2007 sediment investigation confirm that, with a few exceptions, sediment quality at NAVBASE Kitsap Bangor is within SQS standards (Hammermeister and Hafner 2009).

3.3.2.3 Hazardous Materials in Marine Sediment

As related to water quality, hazardous materials can impact sediments and DoD developed the Installation Restoration (IR) Program in 1986 to identify, assess, characterize, and clean up or control contamination from past hazardous waste disposal operations and hazardous materials spills at Navy installations. Currently there are no known active IR Sites on NAVBASE Kitsap Bangor within the waterfront vicinity of the Proposed Action area. However, two known Superfund cleanup sites are located on NAVBASE Kitsap Bangor. The first site, Bangor Ordnance Disposal (USEPA ID# WA7170027265), is located approximately 5 miles northeast of the project area. The second Superfund site, NAVBASE Kitsap Bangor (USEPA ID# WA5170027291), is located approximately 3 miles southeast of the project area. Cleanup has been conducted at both sites and they have been classified as *Construction Complete*, meaning cleanup has been completed. Although human exposure hazards are completely remediated at both sites, on-going groundwater monitoring continues due to residual contamination (USEPA 2011a, b).

3.3.3 Environmental Consequences

3.3.3.1 No-Action Alternative

Under the No-Action Alternative, the construction and use of the barge mooring location for the proposed new research barge would not occur. Baseline conditions for water quality and marine sediments would remain unchanged. Therefore, no significant impacts to water quality and marine sediments would occur with the implementation of the No-Action Alternative.

3.3.3.2 Preferred Alternative

Construction-related impacts to water quality with implementation of the Preferred Alternative would be short-term, temporary, and localized changes associated with re-suspension of bottom sediments from pile installation and tug operations, such as anchoring and propeller wash, as well as accidental losses or spills of construction materials or fuel into Hood Canal. These changes would be spatially limited to the construction area, including areas potentially impacted by anchor drag and areas immediately adjacent to the Service Pier. Potential effects would be plumes of re-suspended bottom sediments that are not expected to violate applicable state or federal water quality standards.

During the vibratory and impact pile driving activities, BMPs (See Section 2.5) would be used to avoid and minimize deleterious materials from entering the water. NAVBASE Kitsap Bangor has an approved Spill Management Plan (Navy 2006) and a regional Integrated Spill Contingency Plan (Navy 2010a) currently in place. Accidental spills or discharges of deleterious materials would not be expected to significantly impact marine water and sediment quality in the project area with implementation of these plans.

Minor and localized sediment disturbance would occur and subsequently result in suspended sediments in the water column. However sediment suspension, which would be short-term and localized, would not adversely impact any drift cells to the south and north. The use of a vibratory hammer and impact hammer could cause the very fine, soft, sandy silt layers located above the hard glacial deposits to be susceptible to disturbance and suspension. The cutting of the existing piles at the mud line with a thermal lance or hydraulic shears would generate only limited localized sedimentation and turbidity. Overall, the sediments would likely settle back quickly to the bottom of the project area or be carried out with low-energy tidal flow and currents following conclusion of pile driving operations.

The pilings would be spaced approximately 50 to 80 feet apart on the seafloor surface. Given the piling spacing and the minimal combined surface area of the pilings at the seafloor surface, significant changes to sediment transport processes would be unlikely. There would not be significant scouring at the piles, due to the low wave energy within the project area drift cell.

Construction activities would not result in the release of wastes containing metals or otherwise alter the concentrations of trace metals in bottom sediments. Nor would construction activities result in the discharge of high levels of contaminants or otherwise alter the concentrations of organic contaminants in bottom sediments. However, because the magnitude of metal and organic compound concentrations in sediment can vary as a function of grain size (higher concentrations typically are associated with fine-grained sediments due to higher interior surface areas), small changes to grain size associated with construction-related disturbances to bottom sediments could result in minor changes in metal and organic compound concentrations. This would mainly occur during the placement of piles. These changes would not cause chemical constituents to violate SQS due to the small number of piles and the general lack of sediment contaminants in the project area. The construction activities would not result in persistent increases in turbidity levels or decreases in dissolved oxygen 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 to the pile placement area. Suspended sediments would disperse with tidal flow and currents and/or settle rapidly (within a period of minutes to hours after construction activities cease) within the construction area and the project area drift cell.

Since fine-grained sediments have a greater affinity for some metal and organic contaminants from both local and regional sources, the spatial distribution of contaminants in bottom sediments may change relative to existing distributions in the long-term. Specifically, the fine-grained sediments trapped by the mooring piles could have higher contaminant concentrations. However, these changes would only be expected immediately adjacent to the pile. The potential for sediment transport from the project area drift cell (DC-20) to the Bangor Beach drift cell (DC-19) is very low. Though the dominate, net drift direction is south to north, any sediment or turbidity generated during construction activities would most likely be captured by the southern edge of Three Spits.

Therefore, no significant impacts to marine water, sediment quality, or indirect effects to Bangor Beach would occur with the implementation of the Preferred Alternative.

3.3.3.3 Alternative 2

Installation of anchor clumps and buoys under Alternative 2 would result in minor suspension of bottom sediments. This suspension would be caused by placing of the mooring anchors and buoy anchors on the seafloor. Similar to the Preferred Alternative, the construction activities would not result in persistent increases in turbidity levels or decreases in dissolved oxygen. Suspended sediments would disperse with tidal flow and currents and would likely settle rapidly (within a period of minutes to hours after construction activities cease) within the construction area and the project area drift cell. Therefore, no significant impacts to marine water and sediment quality would occur with the implementation of Alternative 2.

3.4 BIOLOGICAL RESOURCES

The ROI for biological resources is specific to the nearshore marine environment of Hood Canal along NAVBASE Kitsap Bangor's waterfront. For aquatic mobile species, the ROI extends further based on the extent of underwater noise generated under the Preferred Alternative. In this case, the ROI extends to Toandos Peninsula, encompassing approximately 16.1 square kilometers (km^2) of Hood Canal (See Figure 3-2 for general vicinity and ROI).

The threshold of significance is defined as impacts to biological resources causing the loss of high value habitat for fish and wildlife and population of species, including injury or noise harassment impacts as the result of the Proposed Action.

3.4.1 Regulatory Overview

The analysis of biological resources focuses on the potential impacts to fish and wildlife under the following regulatory laws:

- MBTA (16 USC 703-712);
- Bald and Golden Eagle Protection Act (16 USC 668-668d)
- ESA (16 USC 1531 et seq.);
- MSA (16 USC 1801-1882); and
- MMPA (16 USC 668-668c).

3.4.1.1 Migratory Bird Treaty Act

Migratory birds are any species or family of birds that live, reproduce or migrate within or across international borders at some point during their annual lifecycle. The MBTA was enacted in the United States in 1918 in order to establish federal protection for migratory birds. The MBTA prohibits the taking, killing, or possessing of migratory birds unless permitted. The list of bird species protected by the MBTA appears in 50 CFR 10.13. NAVBASE Kitsap Bangor is located in western Washington State which generally falls within the potential pathway of the Pacific Migratory flyway. Birds use this flyway primarily in fall and spring during their southward and northward migrations, respectively.

3.4.1.2 Bald and Golden Eagle Protection Act

The bald eagle is afforded continued federal protection by the Bald and Golden Eagle Protection Act even though it has been delisted from the ESA. This law prohibits anyone from taking, possessing, or transporting a bald eagle or golden eagle, or the parts, nests, or eggs of such birds without prior authorization. This includes inactive nests as well as active nests. "Take" means to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, destroy, or disturb. "Disturb" is further defined as to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle, (2) a decrease in its productivity, by substantially interfering with the normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior. Bald eagles regularly occur in Hood Canal.

3.4.1.3 Endangered Species Act

Federally threatened and endangered species are those listed for protection under the federal ESA. The USFWS and the NMFS jointly administer the ESA and are also responsible for the listing of species (i.e., the listing of a species as either threatened or endangered). The USFWS has the primary management responsibility for management of terrestrial and freshwater species, while NMFS has primary responsibility for marine species and anadromous fish species. As discussed in Section 3.4.2.3, ten ESA-listed species potentially occur within the vicinity of the project area.

The ESA also allows the designation of geographic areas as critical habitat for threatened and endangered species. The final rule designating critical habitat for 12 evolutionarily significant units (ESUs)/distinct populations segments (DPS) of salmonids in Washington, Oregon, and Idaho was published on September 2, 2005 (70 Federal Register [FR] 52630). Under this rule, NMFS identified six primary constituent elements (PCEs) to be essential for the conservation of these listed salmonids (including Puget Sound Chinook and Hood Canal summer-run chum). All lands identified as essential and designated as critical habitat contain one or more of the PCEs (see Appendix D, Section 7.4 for complete list). Although critical habitat occurs in Hood Canal waters adjacent to the base, NAVBASE Kitsap Bangor is excluded from critical habitat designation for ESA-listed Puget Sound Chinook salmon and Hood Canal summer-run chum salmon by federal law (70 FR 52630). The PCE defined as, *"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."* is the only PCE present within the closest designated critical habitat located immediately north and south of the NAVBASE Kitsap Bangor base boundary. If federal activities could potentially affect ESA-listed species and/or their designated critical habitat, agencies are required to consult with USFWS and/or NMFS.

3.4.1.4 Magnuson-Stevens Fishery Conservation and Management Act

The MSA, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), requires that the regional Fishery Management Councils (FMCs), through federal fishery management plans (FMPs), describe and identify Essential Fish Habitat (EFH) for each federally managed species; minimize, to the extent practicable, adverse effects on such habitat caused by fishing; and identify other actions to encourage the conservation and enhancement of such habitats. Congress defines EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (16 USC

1802[10]). The term "fish" is defined in the MSA as "finfish, mollusks, crustaceans, and all other forms of marine animals and plant life other than marine mammals and birds." The regulations for implementing EFH clarify that "waters" include all aquatic areas and their biological, chemical, and physical properties, while "substrate" includes the associated biological communities that make these areas suitable fish habitats (50 CFR 600.10). Habitats used at any time during a species' life cycle (i.e., during at least one of its life stages) must be accounted for when describing and identifying EFH (NMFS 2002).

Authority to implement the MSA is given to the Secretary of Commerce through the NMFS. The MSA requires that EFH be identified and described for each federally managed species. The MSA also requires federal agencies to consult with the NMFS on activities that may adversely affect EFH or when the NMFS independently learns of a federal activity that may adversely affect EFH. The MSA defines an adverse effect as "any impact that reduces quality and/or quantity of EFH. Adverse effects may include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality and/or quantity of EFH. Adverse effects to EFH may result from actions occurring within EFH or outside of EFH and may include site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions" (50 CFR 600.810).

Pursuant to the MSA, the Pacific Fishery Management Council (PFMC) has designated EFH for federally managed species within the waters of Washington, Oregon, and California. The waters of the greater Puget Sound are designated EFH for coastal pelagic, Pacific salmon, and groundfish species (PFMC 2011a, b, 2012).

3.4.1.5 Marine Mammal Protection Act

The MMPA of 1972 established, with limited exceptions, a moratorium on the "taking" of marine mammals in waters or on lands under United States jurisdiction. The term "take", as defined in Section 3 (16 USC 1362) of the MMPA, means "to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal. "Harassment" was further defined in the 1994 amendments to the MMPA, which provided two levels of "harassment," Level A (potential injury) and Level B (potential disturbance).

Section 101(a) (5) of the MMPA directs the Secretary of the Department of Commerce (the Secretary) to allow, upon request, the incidental (but not intentional) taking of marine mammals by United States citizens who engage in a specified activity (exclusive of commercial fishing), if certain findings are made and regulations are issued. Permission will be granted by the Secretary for the incidental take of marine mammals if the taking will have a negligible impact on the species stock and will not have an immitigable adverse impact on the availability of such species or stock for taking for substance uses.

3.4.2 Affected Environment

This section describes the terrestrial and aquatic species that occur within the location of the Proposed Action and in the ROI vicinity where potential direct or indirect impacts to biological resources may occur. For the purposes of this EA, biological resources are divided into four major categories: terrestrial wildlife, aquatic species, special-status species, and EFH. Because the Proposed Action occurs in water, the discussion of terrestrial wildlife species is restricted to birds (shorebirds, seabirds, and raptors). Aquatic species discussed include marine vegetation, benthic invertebrates, and marine fish. Special-status species include species listed as threatened or endangered by USFWS or NMFS under the ESA as well as species not listed but afforded federal protection under the MBTA, Bald and Golden Eagle Protection Act, or the MMPA. Lastly, EFH is summarized and analyzed as required under NEPA; however, a more detailed analysis, as required under the MSA, is included in Appendix D, *Biological Assessment and Essential Fish Habitat Assessment*.

3.4.2.1 Terrestrial Wildlife

A diverse population of birds composed of approximately 100 different species occurs at NAVBASE Kitsap Bangor. Resident and migratory birds are common within the Service Pier waterfront and the adjacent upland forested areas (Navy 2001). There are approximately 16 bird species comprising shorebirds, wading birds, waterfowl, seabirds/marine birds and raptors that were observed within or adjacent to the project area (Table 3-7). These are all protected under the MBTA. The bald eagle is afforded federal protection under the MBTA and Bald and Golden Eagle Protection Act and marbled murrelet is listed under the ESA. A more detailed discussion for these two species can be found in *Section 3.4.2.3, Special-Status Species*.

Surveys were conducted between March and September at NAVBASE Kitsap Bangor and therefore outside the wintering period of late fall and winter when species abundance is expected to be higher (Agnes and Tannenbaum 2009a). The closest documented nest to the project area was an osprey nest located approximately 0.5 mile northeast of the project area (WDFW 2010a).

Table 3-7. Marine Birds within Vicinity of Project Area (Mar-Sept)

Species	*Total Sighted*	*Months Sighted*
Great Blue Heron	1	April, May
Surf scoter	6	March, April
Common merganser	2	March, April
Common goldeneye	1	March, June
Barrow’s goldeneye	2	March, April
Eared grebe	1	March, April, May
Canada goose	2	June
Common loon	1	March
Pelagic cormorant	1	March
Glaucous-winged gull	131	March, April, May, August
Caspian tern	2	August
Pigeon guillemot	29	March, April, May, August
Marbled murrelet	8	April, May
Bald eagle	1	June, August
Belted kingfisher	3	August
Killdeer	5	March, April

Source: Agnes and Tannenbaum 2009a.

3.4.2.2 Aquatic Species

<u>*Marine Vegetation*</u>

The primary marine vegetation that occurs along the approximate 4.5 to 5 miles of NAVBASE Kitsap Bangor nearshore habitat includes eelgrass and macroalgae.

Eelgrass

Aquatic vegetation at the project site is composed of intertidal and subtidal species, as well as floating and attached species. Eelgrass is high quality aquatic habitat and is most abundant in low-energy areas. Eelgrass occurs in the lower intertidal and shallow subtidal photic zone where organic matter and nutrients are abundant (Johnson and O'Neil 2001). There is no eelgrass located within the project area. . There are two separate eelgrass beds outside the project area, which represent isolated beds interspersed between the waterfront facilities including one eelgrass bed just south of KB Dock and one located just north of Carlson Spit. The eelgrass bed near KB Dock covers 0.48 acres of seafloor in shallow waters. Both moderate and dense coverage was documented within this bed, but outside the primary vessel traffic area. The second eelgrass bed is approximately 60 ft wide and is located south of the Service Pier trestle, at the base of Carlson Spit, in depths less than -10 ft below MLLW (SAIC 2009).

Small and moderate size craft associated with floating security barrier maintenance and patrols regularly transit over this bed of eelgrass in order to access mooring facilities behind the service pier or the boat ramp at Carlson Spit. Showing no signs of impact related to existing vessel traffic, the densities within this southernmost bed range from sparse at the photocompensation depth at MLLW line to dense in the center of the bed and apex of Carlson Spit (SAIC 2009).

This small presence of eelgrass provides important habitat for waterfowl, raptors, migratory birds, and a variety of marine invertebrates and fishes, including salmonid species. These beds are not connected to the eelgrass beds that run north, with gaps, up to the northern boundary of the installation; however, they do provide a loosely connected area for fish to forage and prey fish.

Macroalgae

Three species of macroalgae occur within the NAVBASE Kitsap Bangor nearshore marine environment. These include brown algae, red algae, and green algae with dominant growth occurring from April through August. Macroalgae provides food for many species of sea birds, fish, mollusks and crustaceans. It also provides shelter for several species of perch, greenling, and crustaceans (Simenstad et al. 1991). The most dominant macroalgae species that occur within the project area include green (*Ulva*) and brown (*Laminaria* and *Gracilaria*). Dense coverage occurs within depths less than 15 ft below MLLW particularly within the vicinity of the pier structures (SAIC 2009). These species play an important role in marine trophic systems, linking primary production to higher trophic levels (Mauchline 1998; Sackmann 2000; Mumford 2007).

Benthic and Epibenthic Communities

The soft-bottom benthic community at the project site is dominated by polychaetes, crustaceans, and mollusks across tidal zones, although in the intertidal zone, other minor taxa (e.g., nemerteans, nematodes, oligochaetes) also may be numerically abundant (Weston Solutions, Inc. 2006; Ecology 2007). Species composition and abundance are variable along the NAVBASE Kitsap Bangor waterfront. A recent survey of four different areas along the waterfront found consistently greater benthic community development in the subtidal zone compared to the intertidal zone (waterfront piers and shoreline area) and variable community development within and among survey areas (Weston Solutions, Inc. 2006).

A study conducted in the late 1970s investigated the epibenthic community at two locations along the waterfront and an additional site directly across Hood Canal on the Toandos Peninsula (Simenstad et al. 1980). The study found that harpacticoid copepods were the numerically dominant organism in the epibenthic community, accounting for 56 to 67 percent of the total number of epibenthic organisms captured. Gammarid amphipods dominated the total biomass, representing 12 to 31 percent of the total epibenthic biomass.

Eelgrass beds along the NAVBASE Kitsap Bangor waterfront support species such as gammarid amphipods, brittle stars, and shore crabs (Pentec 2003). Eelgrass provides substrate for invertebrates, such as copepods, amphipods, and snails that might otherwise not be found on soft sediments (Mumford 2007). Two annelid species (*Exogene lourei* and *Galathowenia oculata*) are abundant in the nearshore area within the vicinity of the project (Ecology 2007). Hard shell clam (*Leukoma staminea*), and Dungeness crab (*Cancer magister*) are abundant in the subtidal areas just beyond the project area. There is evidence of some oyster beds along the shoreline and to the east of the dock area, specifically Pacific oyster (*Crassostrea gigas*) and Olympia oyster (*Ostrea lurida*) occur sporadically along the intertidal of the project area (SAIC 2009; WDFW 2010a). The oyster beds, similar to the eelgrass area would be protected by implementation of the BMP's (Section 2.5).

Geoduck (*Panopea generosa*) have not been found in the project area and their densities in this area are among the lowest of the Bangor waterfront, which may be due to sandy substrates (SAIC 2009). Two currently inactive[4] commercial geoduck harvesting tracts (21200 – 32 acres and 21150 – 116 acres) are located outside of the Naval Restricted Area in depths of 250 to 300 feet (WDFW 2013 and WDNR 2013). There is also a lower intertidal Geoduck tract to the north along the Bangor Beach, which is northeast and around KB Dock.

<u>Marine Fish</u>

Hood Canal has a diverse array of marine fish consisting of salmonids, forage fish, groundfish, and many species of game and non-game fish in general. Approximately 42 different species of marine fish were represented during beach seining surveys conducted along NAVBASE Kitsap Bangor waterfront (SAIC 2006; Bhuthimethee et al. 2009a). Of the 42 species, 22 of these were identified from site-specific data collected during surveys within the vicinity of the project area in 2006. The most abundant species collected were Pacific herring, chum salmon, Pacific sand lance, and shiner surfperch (Table 3-8).

Surveys showed peaks in salmon collection from April through late May with numbers drastically reduced in early June. This peak occurred within weeks following hatchery releases of Chinook, chum, pink, coho, and steelhead. Very few steelhead and cutthroat trout were collected during sampling in each year, but still spiked in numbers during the April and May timeframe. Bull trout were not collected during any of the surveys and only one sockeye was captured in 2006.

Like salmonids, forage fish (Pacific herring, surf smelt, and Pacific sand lance) were also the most abundant during the April and May timeframe (Bhuthimethee et al. 2009a). Forage fish are important prey for a large variety of other marine organisms, including birds, fish, marine mammals, and salmonids. Sand lance spawning habitat has been documented along the NAVBASE Kitsap Bangor waterfront (Figure 3-2). Although surf smelt spawning has not been documented along the waterfront, this species may likely use sand lance habitat. All three forage fish species may occur within the nearshore areas of the Proposed Action throughout the year.

[4] Inactive is defined as not currently being harvested in the current management season.

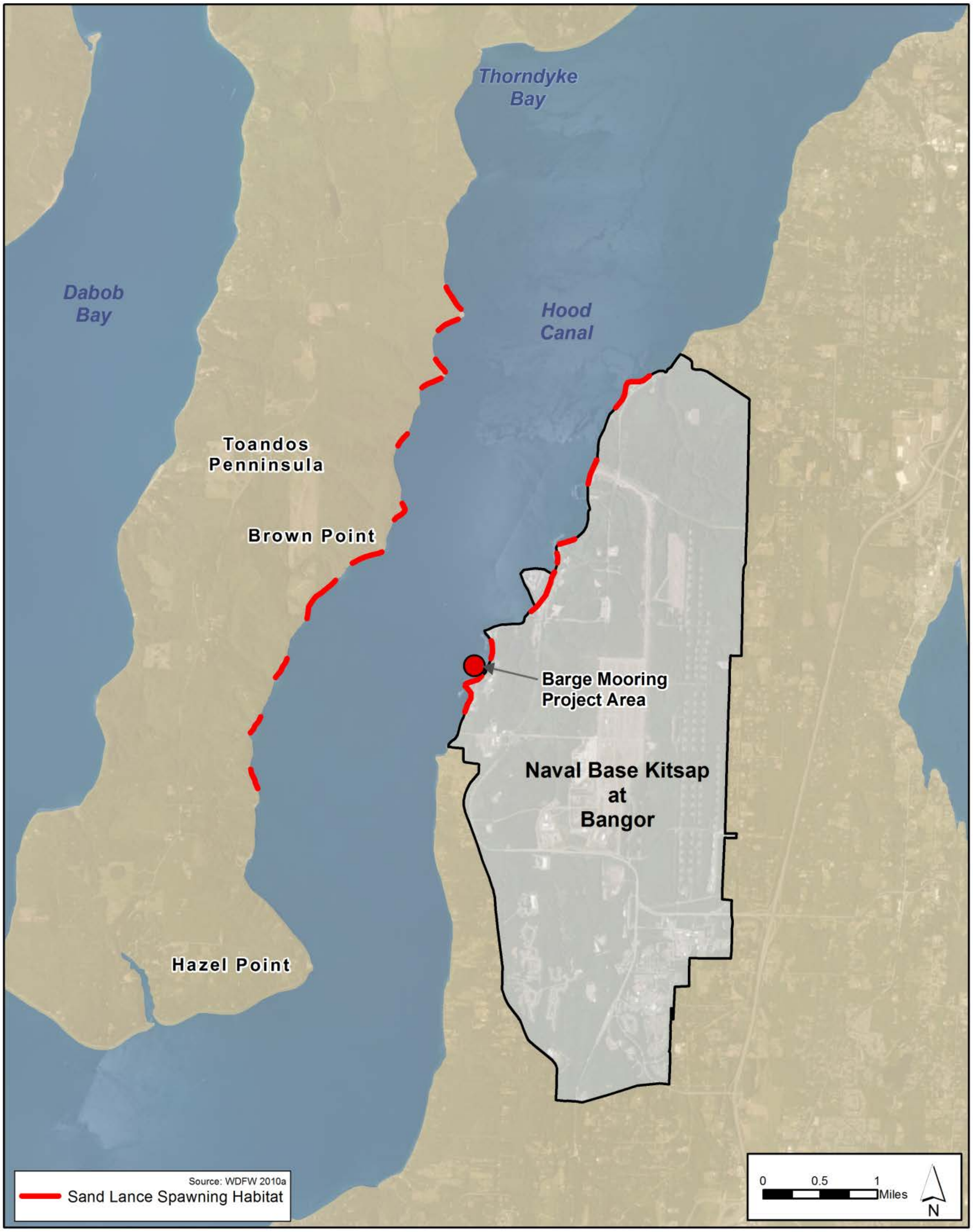
Table 3-8. Survey Total of All Fish Species Caught within the Vicinity of the Project Area

Species	*Percent of Catch*
Pacific Herring	74.1
Chum salmon	9.7
Pacific sand lance	8.4
Shiner surfperch	2.8
Coho salmon	2.0
Surf smelt	1.2
Pink salmon	0.7
Threespine stickleback	0.32
Chinook salmon	0.28
Greenling (juv)	0.16
Cutthroat trout	0.1
Pacific staghorn sculpin	<0.1
Bay pipefish	
Sculpin spp.	
Sockeye salmon	
Lingcod	
Rockfish (juv)	
Buffalo sculpin	
Gunnel	
Rex sole	
Tubesnout	
White spotted greenling	

Source: SAIC 2006

Note: Does not total 100 percent due to rounding.

Figure 3-2. Sand lance Spawning Habitat within the Vicinity of the Action Area



3.4.2.3 Special-Status Species

ESA-Listed Species and Critical Habitat

Ten ESA-listed species either occur or have the potential to occur in Hood Canal, within the vicinity of the NAVBASE Kitsap Bangor waterfront: four salmonid species, three rockfish species, two marine mammal species, and one marine bird species. Critical habitat occurs in Hood Canal waters, adjacent to the base, for ESA-listed Puget Sound Chinook salmon and Hood Canal summer-run chum salmon. However, NAVBASE Kitsap Bangor is excluded from critical habitat designation by federal law (70 FR 52630). The status of the species and presence of critical habitat (if designated) within the vicinity of the Proposed Action is provided in Table 3-9.

Additional information regarding all species distribution and likely presence within the vicinity of the Proposed Action is discussed in the following sections.

Table 3-9. ESA Species and Critical Habitat Potentially Present within Vicinity of Proposed Action

Common Name/ *Scientific Name*	***ESA Status (Source)***	***Presence in Hood Canal***	***Critical Habitat in Hood Canal***
Fish			
Puget Sound Chinook Salmon ESU/*Oncorhynchus tshawytscha*	T (NMFS 2005a) CH (NMFS 2005b)	Present	Designated along the shoreline to depth of -30 meters MLLW (-98 feet) except not along the NAVBASE Kitsap Bangor waterfront.
Puget Sound Steelhead DPS/ O. mykiss	T (NMFS 2007)	Present	Proposed (NMFS 2013)
Hood Canal Summer-run Chum Salmon ESU/*O. keta*	T (NMFS 1999) CH (NMFS 2005b)	Present	Designated along the shoreline to depth of -30 meters MLLW (-98 feet) except not along the NAVBASE Kitsap Bangor waterfront.
Bull Trout DPS/Salvelinus confluentus	T (USFWS 1999) CH (USFWS 2010)	Present along southwest shorelines of Hood Canal; not expected within the NAVBASE Kitsap Bangor waterfront.	Designated along the shoreline to depth of -10 meters MLLW (-33 feet). The closest critical habitat occurs along the western and northern shores of Dabob Bay beyond Hazel Point, at the southern tip of Toandos Peninsula, outside of the area affected by the Proposed Action.
Puget Sound/Georgia Basin Bocaccio Rockfish DPS/ Sebastes paucispinis	E (NMFS 2010)	Possible, but uncertain.	In development
Puget Sound/Georgia Basin Canary Rockfish DPS/ S. pinniger	T (NMFS 2010)	Possible, but uncertain.	In development
Puget Sound/Georgia Basin Yelloweye Rockfish DPS/ S. ruberrimus	T (NMFS 2010)	Possible, but uncertain.	In development
Marine Mammals			
Humpback Whale/Megaptera novaeangliae	E (NMFS 1970)	Possible, but rare.	Not designated
Eastern Steller Sea Lion DPS/ Eumetopias jubatus	T (NMFS 1990) CH (NMFS 1993)	Present at the NAVBASE Kitsap	Not present

Table 3-9. ESA Species and Critical Habitat Potentially Present within Vicinity of Proposed Action

Common Name/ *Scientific Name*	*ESA Status (Source)*	*Presence in Hood Canal*	*Critical Habitat in Hood Canal*
		Bangor waterfront in late fall through spring.	
Birds			
Marbled Murrelet/ Brachyrhamphus marmoratus	T (USFWS 1992) CH (USFWS 1996)	Present	Not present

Notes:
CH = critical habitat, DPS = Distinct Population Segment, E = endangered, ESU = Evolutionary Significant Unit,
T = threatened.

<u>Puget Sound Chinook Salmon ESU</u>

Puget Sound Chinook were federally listed as threatened under the ESA on March 24, 1999, with the threatened listing reaffirmed in 2005 (NMFS 2005a). The ESU is composed of both naturally spawning populations and a number of hatchery stocks. The boundary of the Puget Sound Chinook salmon ESU extends from the Nooksack River in the north to southern Puget Sound, including Hood Canal, and extends westerly out the Strait of Juan de Fuca to the Elwha River. There are currently 22 independent populations of Chinook salmon which is drastically reduced from a believed historical number of 30 to 37 independent populations prior to federal protection (Fresh 2006; NOAA 2007). The two populations likely occurring near NAVBASE Kitsap Bangor are the Skokomish and the Mid-Hood Canal populations. These populations typically enter Hood Canal in July. The age of return to the rivers for these two populations is between 2 and 5 years of age with a majority at age 4. These populations spawn in the Skokomish, Hamma Hamma, Dosewallips, and Duckabush River systems from September to October.

A final designation of Puget Sound Chinook salmon critical habitat was published on September 2, 2005, with an effective date of January 2, 2006 (NMFS 2005b). Nearshore marine waters within Hood Canal were included as part of this designation. Although critical habitat occurs in northern Hood Canal waters adjacent to the installation, NAVBASE Kitsap Bangor is excluded from critical habitat designation for ESA-listed Puget Sound Chinook salmon by federal law (70 FR 52630). As a result, no Puget Sound Chinook salmon critical habitat occurs in the immediate vicinity of the project area. The closest critical habitat occurs immediately beyond the northern and southern base boundaries as shown in Figure 3-3.

Very small numbers of Chinook were collected near the project area during fish surveys conducted between 2005 and 2008. Of those collected, peak presence was from late May to early July (SAIC 2006; Bhuthimethee et al. 2009a).

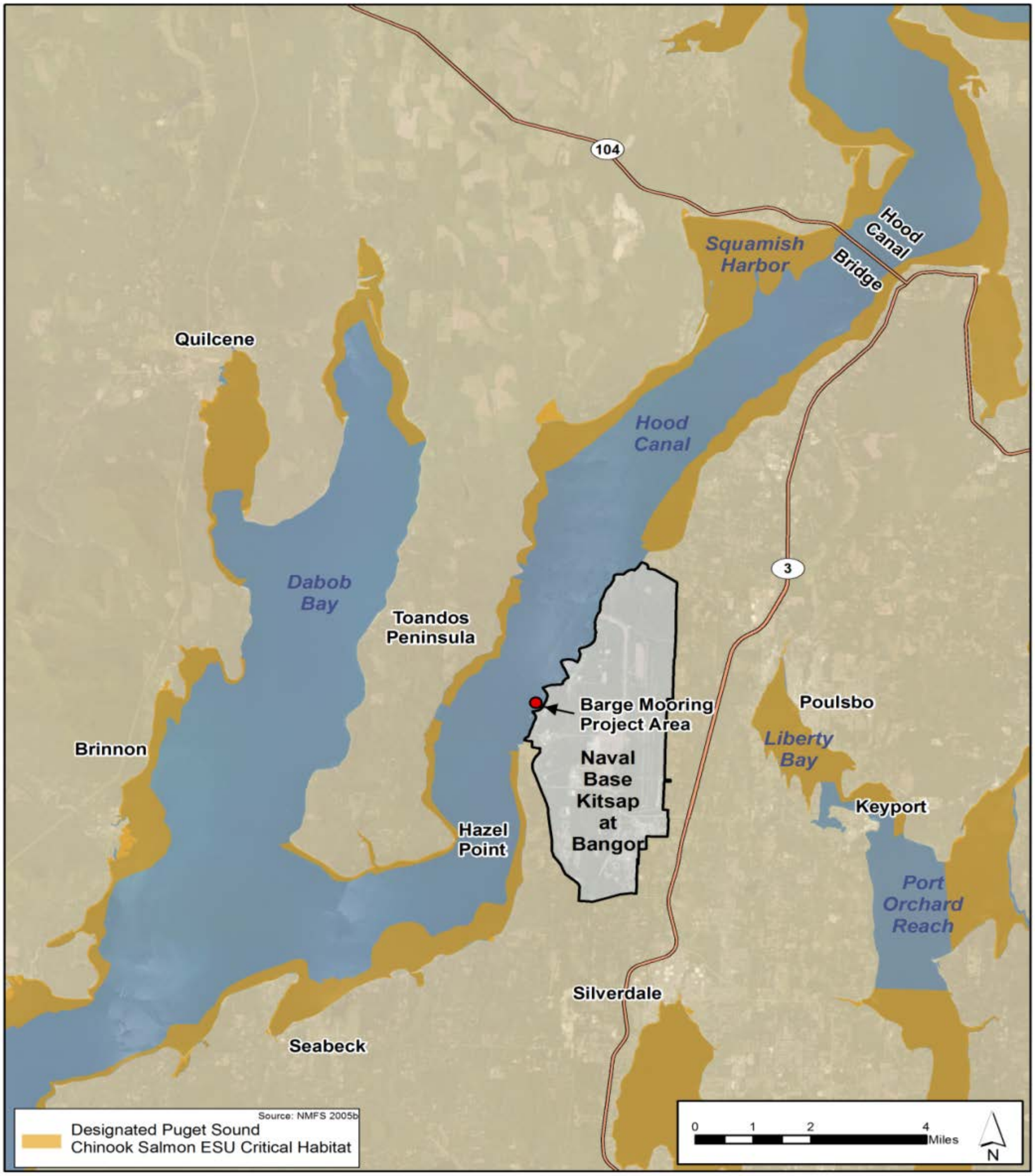
<u>Puget Sound Steelhead Trout (DPS)</u>

Puget Sound steelhead DPS was federally listed as threatened under the ESA on May 11, 2007 (NMFS 2007). The DPS includes mainly winter-run populations and to a lesser extent, summer-run populations. Winter-run are more predominant in Puget Sound than summer-run stocks as the summer-run stocks are small and occupy limited habitat (NMFS 2011). Some stocks of Puget Sound steelhead in Hood Canal (i.e., hatchery supplementation or hatchery releases to non-native streams) may not be considered part of the DPS (NMFS 2006).

No critical habitat for Puget Sound steelhead DPS has been designated, but it is currently proposed for the Hood Canal Subbasin including the following watersheds: Lower West Hood Canal Frontal, Hamma Hamma River, Duckabush River, Dosewallips River, Big Quilcene River, Upper West Hood Canal

Frontal, and West Kitsap (NMFS 2013). These proposed areas are not within the proposed action area. In addition, any streams on DoD lands have been excluded from proposed designation (NMFS 2013).

Figure 3-3. Chinook Salmon Critical Habitat within Vicinity of Project Area



There are eight stocks of winter-run steelhead in Hood Canal and these include the Dewatto, Dosewallips, Duckabush, Hamma Hamma, Quilcene, Skokomish, Tahuya, and Union. Adults enter freshwater December through April with spawning taking place March through June (Hard et al. 2007). Juvenile steelhead forage for 1 to 4 years before migrating to the sea as smolts, typically from April to mid-May. It is generally understood that smolts move quickly offshore, bypassing the extended estuary transition stage.

Steelheads do not occur in large numbers along the NAVBASE Kitsap Bangor waterfront. Very few steelhead were collected during fish surveys that took place along the waterfront from 2005 – 2008 and of the small numbers collected, peak catch was in late spring and summer months (SAIC 2006; Bhuthimethee et al. 2009a).

Hood Canal Summer-run Chum Salmon (ESU)

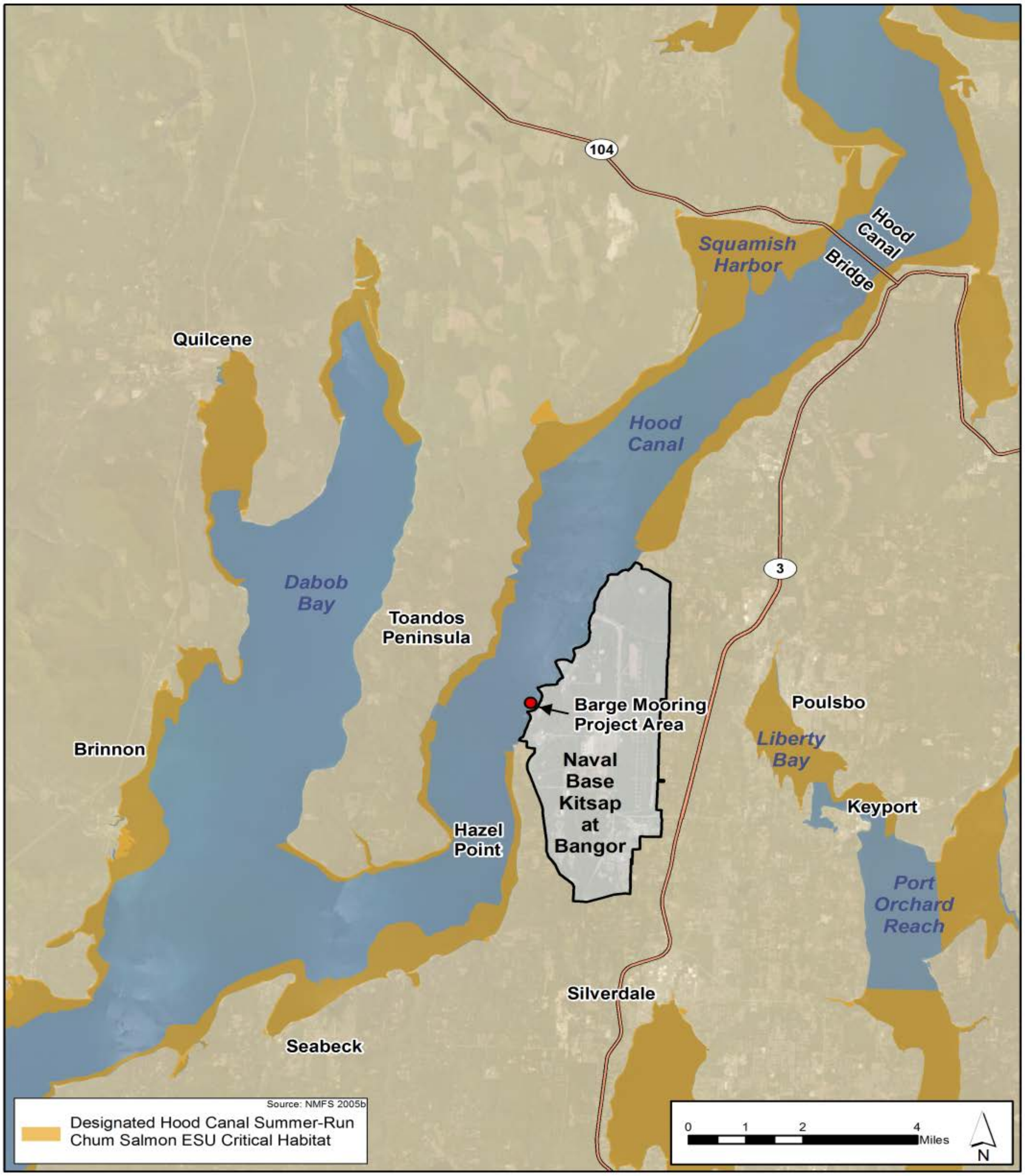
Hood Canal summer-run chum salmon were listed as threatened on March 25, 1999 (NMFS 1999) and the threatened listing was reaffirmed on June 28, 2005 (NMFS 2005b). The ESU includes all naturally spawned populations of summer-run chum salmon in Hood Canal and its tributaries. The only active fish hatchery that currently provides summer-run chum salmon to Hood Canal is the Quilcene National Fish Hatchery.

Historically, there were 16 stocks within the Hood Canal summer-run chum ESU, eight of which are extant (6 in Hood Canal and 2 in the eastern Strait of Juan de Fuca) with the remaining 8 extinct (71 FR 47180). The Hood Canal population spawns in Big and Little Quilcene, Dosewallips, Duckabush, Hamma Hamma, and Lilliwaup watersheds on the western side of Hood Canal and Union River as the only river on the eastern side of Hood Canal with a spawning population (Sands et al. 2009). Summer chum salmon enter rivers from mid-August through mid-October (Johnson et al. 1997). Spawning peaks from mid-September to mid-October with fry emergence beginning in January. Fish immediately migrate to the estuary where they rear for a few days or weeks.

A final designation of Hood Canal summer-run chum salmon critical habitat was published on September 2, 2005, with an effective date of January 2, 2006 (NMFS 2005b). Nearshore marine waters within Hood Canal were included as part of this designation. Although critical habitat occurs in northern Hood Canal waters adjacent to the base, NAVBASE Kitsap Bangor is excluded from critical habitat designation for ESA-listed Hood Canal summer-run chum salmon by federal law (70 FR 52630). As a result, no Hood Canal summer-run chum salmon critical habitat occurs in the immediate vicinity of the project area. The closest critical habitat occurs immediately beyond the northern and southern base boundaries as shown in Figure 3-4.

Fish surveys conducted along the NAVBASE Kitsap Bangor waterfront resulted in high numbers of juvenile chum (all populations) collected as compared to other salmonids collected during the surveys. Peak numbers were in March and April (SAIC 2006; Bhuthimethee et al. 2009b).

Figure 3-4. Hood Canal Summer-Run Chum Critical Habitat within Vicinity of Project Area



Coastal-Puget Sound Bull Trout (DPS)

Currently, all populations of bull trout in the lower 48 states are listed as threatened under the ESA. Bull trout are in the char subgroup of salmonids and have both resident and migratory life histories. The Coastal-Puget Sound bull trout DPS reportedly contains the only occurrence of anadromous bull trout in the contiguous United States (USFWS 1999); The Coastal-Puget Sound DPS is composed of two management units, the Puget Sound Management Unit and the Olympic Peninsula Management Unit. The Olympic Peninsula Management Unit includes all watersheds within the Olympic Peninsula and the nearshore marine water of the Pacific Ocean, Strait of Juan de Fuca, and Hood Canal (USFWS 2004).

Critical habitat was designated for bull trout on September 26, 2005 (70 FR 56212) with a final revision to this habitat published in 2010 (USFWS 2010). However, although both the original and revised final bull trout critical habitats occur in Hood Canal, neither designates waters north of Hazel Point, at the southeastern tip of Toandos Peninsula (Figure 3-5). Therefore, no bull trout critical habitat occurs at NAVBASE Kitsap Bangor.

All Hood Canal bull trout originate in the Skokomish River (WDFW 2004). They are not known to occur in any tributary systems at NAVBASE Kitsap Bangor (Bhuthimethee et al. 2009b). Further, no bull trout were collected during nearshore fish surveys conducted along the NAVBASE Kitsap Bangor waterfront in 2005 through 2008 (SAIC 2006; Bhuthimethee et al. 2009a). Bull trout require snow-fed glacial streams, and, since there are none on the Kitsap Peninsula, they would not be expected in any streams at NAVBASE Kitsap Bangor or in any other streams on the Kitsap Peninsula. Therefore, their occurrence within the vicinity of the project area is limited to the marine waters.

Figure 3-5. Bull Trout Critical Habitat within Vicinity of Project Area

Rockfish Species (DPS)

Three Puget Sound/Georgia Basin DPS populations of rockfish are listed under the ESA. These include Bocaccio (endangered status), canary rockfish (threatened status), and yelloweye rockfish (threatened status) (NMFS 2010). The designation area for these populations encompasses inland marine waters east of the central Strait of Juan de Fuca and south of the northern Strait of Georgia. A summary of life history and occurrence of each DPS within the vicinity of the project area is described below. A more comprehensive review for each species can be found in Appendix D. Critical habitat is not designated for any of these species at this time.

Puget Sound/Georgia Basin Bocaccio (DPS).

Bocaccio range from Punta Blanca, Baja California, to the Gulf of Alaska, Alaska (Love et al. 2002). They are believed to have commonly occurred along steep walls in most of Puget Sound prior to fishery exploitations, although they are currently very rare in these Puget Sound habitats (Love et al. 2002). Little is known about the habitat requirements of most rockfishes despite the years of research already performed. Even less is known about bocaccio in Puget Sound (Drake et al. 2008; Palsson et al. 2009). Much of the information presented below on bocaccio life history and habitat use is derived from other areas where bocaccios occur.

Adult bocaccio inhabit waters at depths ranging from approximately 40 to 1,570 ft, but are most common at depths of 160 to 820 ft (i.e., greater than the project depth). Although bocaccios are typically associated with hard substrate, they may wander into mud flats presumably because they can be located as much as 98 ft off the bottom. Bocaccio release larvae in January, continuing through April off the coast of Washington. Larval and pelagic juvenile bocaccios drift into the nearshore, near the water surface, and are associated with drifting kelp mats (Love et al. 2002). The young bocaccio settle the nearshore environment at 3 to 4 months of age, where the species prefer shallow waters over algae-covered rocks, or in sandy areas where eelgrass beds or drift algae are present (Love et al. 1991; Love et al. 2002). As juveniles, bocaccio rockfish inhabit relatively shallow water, compared to adults, and are often found in large schools (Eschemeyer et al. 1983). Young bocaccios are preyed upon by least terns, lingcod, other rockfish, Chinook salmon, and harbor seals (Love et al. 2002).

Bocaccios have never been observed during WDFW bottom trawl, video, or dive surveys in Puget Sound (Moulton and Miller 1987; Palsson et al. 2009). However, Palsson et al. (2009) investigated historic fish catch records and reported only 2 known instances of bocaccio captures in Hood Canal. It is important to note that recreational fishing records reflect observed frequencies, not observed densities. Although there have been no confirmed observations of bocaccio in Puget Sound for approximately 7 years (74 FR 18516), Drake et al. (2008) concluded that it is likely that bocaccio occur in low densities.

No more than four juvenile rockfish were captured per year over a 4-year fish survey study along NAVBASE Kitsap Bangor Waterfront (SAIC 2006; Bhuthimethee et al. 2009a). It is not known if they were juvenile bocaccio as those collected by seine were not identified to species.

Puget Sound/Georgia Basin Canary Rockfish (DPS).

Canary rockfish range from Punta Blanca, Baja California, to the Shelikof Strait of Alaska, and are abundant from British Columbia to central California. Canary rockfish were once considered fairly common in the greater Puget Sound area (Holmberg et al. 1967; Kincaid 1919); however, little is known about their habitat requirements in these waters (Drake et al. 2008; Palsson et al. 2009). Much of the information presented below on canary rockfish life history and habitat use is derived from research from other areas where canary rockfish are more abundant.

Adults release larvae between September and March with peaks in December and January off the Oregon and Washington coasts (Wyllie Echeverria 1987). Larvae and pelagic juveniles are found in the upper 330 ft of the water column from January until about March when they start to move into intertidal areas (tide pools, rocky reefs, kelp beds, cobble areas), although some juveniles remain pelagic in much deeper water until July (Love et al. 2002). Juveniles may occupy rock-sand interfaces near 50-65 ft during the day, and then move to sandy areas at night.

An approximate estimate of canary rockfish abundance in Puget Sound Proper was only 300 individuals during the 1980s (NMFS 2010). Drake et al. (2008) concluded that canary rockfish occur in low and decreasing abundances in Puget Sound.

As noted in the prior section, no more than 4 juvenile rockfish were captured per year over a 4-year fish survey study along NAVBASE Kitsap Bangor waterfront (SAIC 2006; Bhuthimethee et al. 2009a). It is not known if they were juvenile canary or bocaccio as those collected by seine were not identified to species.

Puget Sound/Georgia Basin Yelloweye Rockfish (DPS).

Yelloweye rockfish are found from Ensenada, Baja California, to the Aleutian Islands in Alaska. They are abundant from southeast Alaska to central California. Yelloweye rockfish are more common in northern Puget Sound compared with southern Puget Sound presumably because rockier habitat is available in northern Puget Sound. An approximate estimate of yelloweye rockfish abundance in Puget Sound Proper was only 1,200 individuals during the 1980s (NMFS 2010).

Yelloweye rockfish is a deep-water species that is relatively sedentary living in association with high relief rocky habitats and often near steep slopes (Palsson et al. 2009; Love et al. 2002; Wang 2005). Yelloweyes move into deeper water as they grow into adults, continuing to associate with caves and crevices and spending large amounts of time lying on the substratum, sometimes at the base of rocky pinnacles and boulder fields (Love et al. 2002). Adult yelloweye rockfish inhabit waters from 80-1,560 ft, but they are most common at depths of 300 to 590 ft (i.e., greater than the project depth). They are typically solitary, but sometimes form aggregations near rocky substrate.

Hood Canal has the greatest frequency of yelloweye rockfish observed in both trawl and scuba surveys conducted by WDFW (Palsson et al. 2009). Juvenile rockfish were captured during fish surveys conducted along NAVBASE Kitsap Bangor waterfront in 2005 through 2008. No more than 4 fish total per-year were collected (SAIC 2006; Bhuthimethee et al. 2009a). Although the specific species was not identified, these could have been yelloweye given the frequency of past WDFW surveys.

Humpback Whale

Humpback whales were listed as endangered under the Endangered Species Preservation Act of 1966 (35 FR 1222) due to commercial whaling and this protection threshold was transferred to the ESA in 1973. The recovery plan for humpback whales was finalized in November 1991 (NMFS 1991). The California/ Oregon/Washington Stock is defined to include humpback whales that feed off the west coast of the continental United States and individuals potentially occurring within the vicinity of the project area would belong to this stock. Critical habitat is not designated for this species.

Humpback whales were one of the most common large cetaceans in the inland waters of Washington in the early 1900s (Scheffer and Slipp 1948). Humpback whale sightings were infrequent in Puget Sound and the Georgia Basin through the late 1990s, and prior to 2003 the presence of only three individual humpback whales was confirmed (Falcone et al. 2005). However, in 2003 and 2004, 13 individuals were sighted in the inland waters of Washington, mainly during the fall (Falcone et al. 2005). Records available for April 2001 to February 2012 include observations in the Strait of Juan de Fuca, the Gulf Islands and the vicinity of Victoria, British Columbia, Admiralty Inlet, the San Juan Islands, Hood Canal, and Puget Sound (Orca Network 2012). For the areas listed above, Orca Network records shows humpback whale presence in one of the areas listed above in all months from May through November in 2009; in all months but January, March, April, May, and August in 2010; and from March through November in 2011.

In Hood Canal, humpback whale sightings occurred several times in January and February 2012 (Orca Network 2012). Review of the sightings information indicated they were of one individual (Calambokidis pers. comm. 2012). Prior to these sightings, there were no confirmed reports of humpback whales entering Hood Canal (Calambokidis pers. comm. 2012). No other reports of humpback whales in the Hood Canal were found in the Orca Network database, the scientific literature, or agency reports. Construction of the Hood Canal Bridge occurred in 1961 and could have contributed to the lack of historical sightings (Calambokidis pers. comm. 2010). Only a few records of humpback whales near Hood Canal (but north of the Hood Canal Bridge) are in the Orca Network database. Two were from the northern tip of Kitsap Peninsula (Foulwater Bluff/Point No Point) and a few others from Port Madison Bay in Puget Sound. Therefore, it is unlikely that humpback whales would occur within the vicinity of the project area during relatively short duration of the project activities.

Eastern Steller Sea Lion (DPS)

The Steller sea lion was federally listed as threatened on November 26, 1990 (NMFS 1990). In 1997, the NMFS reclassified the Steller sea lion into two DPSs based on demographics and genetics (NMFS 1997). The population was divided into two recognized management stocks (eastern and western), separated at 144º W longitude (Loughlin 1997). The western stock was listed as endangered on May 4, 1997, and the eastern stock retained the threatened classification. The eastern DPS includes the species distribution in southeast Alaska, Canada, Washington (including inland waters), Oregon, and California (NMFS 1997). Only the eastern stock is considered in this EA because the western stock occurs outside of the ROI. In addition, NMFS has recently proposed removing the Eastern DPS from the ESA (NOAA Fisheries 2012). However, until a final rule is issued, the Eastern DPS is still recognized as threatened and is addressed as a special-status species in this document.

Critical habitat was designated for this species as a 20 nautical mile buffer around all major haul-outs and rookeries in Alaska, California and Oregon, including associated terrestrial, air and aquatic zones, and three offshore foraging areas (NMFS 1993). Critical habitat did not include areas or waters in Washington.

A recovery plan released by NMFS for both the eastern and western DPS showed that the eastern DPS has actually been increasing in numbers approximately 3 percent each year since the 1970s with the current populations ranging from 58,334 to 72,223 (Allen and Angliss 2011). The highest breeding season Steller sea lion count at Washington haul-out sites was 847 individuals during the period from 1978 to 2001 (Pitcher et al. 2007). The closest breeding rookery to the project area is at Carmanah Point near the western entrance to the Strait of Juan de Fuca (Bigg 1985; Olesiuk 2008). Non-breeding season surveys of Washington haul-out sites reported as many as 1,458 individuals between 1980 and 2001 (NMFS 2008b). The nearest haulout to Bangor is at a rock near Marrowstone Island (NMFS 2010b)

Steller sea lions occur in Hood Canal October through May. The earliest arrival of Stellers was on September 30 when 5 individuals were observed at Delta Pier (less than 1 mile north of the project site). During 2011 monitoring activities for the Test Pile Program, Steller sea lions were documented arriving on October 8. Steller sea lions are not likely to be present within the vicinity of the Proposed Action during the time period of proposed construction activities (i.e., July-September).

Marbled Murrelet

The Washington, Oregon, and California population of the marbled murrelet was federally listed as threatened on October 1, 1992 (USFWS 1992). Marbled murrelets are seabirds that spend most of their life in the marine environment and nest in mature and old-growth forests (USFWS 1997). They use the marine environment in Hood Canal for courtship, loafing, and foraging. Murrelets can occur year-round in Puget Sound and Hood Canal, although their flock size, density, and distribution vary by season (Nysewander et al. 2005; Falxa et al. 2009).

Critical habitat for nesting marbled murrelets was designated in 1996 (USFWS 1996) and was proposed for revision in 2008 (USFWS 2008). Only critical habitat in Oregon and California was revised in the final rule (USFWS 2011). Designated critical habit in Washington remains unchanged from the 1996 ruling and hence, the project area is not within designated critical habitat (USFWS 1996, 2011). The closest designated critical habitat to Hood Canal includes forest lands west and south of Dabob Bay.

In Hood Canal, marbled murrelet breeding season is asynchronous (i.e., pairs do not nest at the same time) 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. Murrelets forage at all times of the day and in some cases at night (Strachan et al. 1995). During the pre-basic molt phase, flightless murrelets must select foraging sites that provide adequate prey resources within swimming distance (Carter and Stein 1995). During the non-breeding season, murrelets typically disperse and are found farther from shore (Strachan et al. 1995).

Murrelet presence in Hood Canal has been documented through a number of sources and survey efforts. The most accurate information comes from the consistent sampling used to estimate population size and trends under the Northwest Forest Plan Murrelet Effectiveness Monitoring Program (Raphael et al. 2007). Other survey data were generated through the Puget Sound Ambient Monitoring Program (PSAMP), conducted by the WDFW. Recent surveys showed a total of eight observations of marbled murrelet pairs during April and May. All were observed to be in breeding plumage and actively diving and foraging off of Carlson Spit (500 ft offshore) on four separate occasions. One specific instance was noted, at the end of May, where a murrelet was observed holding a fish cross-wise in its bill which indicates chick-rearing stage. At this stage, adult fish-holders do not typically return to the nest until night-fall (Agness and Tannenbaum 2009a). During surveys conducted in 2007, marbled murrelets were not sighted near pier structures but were detected in all nearshore scan areas with the exception of a survey area immediately south of Marginal Wharf (Agness and Tannenbaum 2009a).

In January 2009, the Navy conducted marbled murrelet monitoring during the installation of five steel piles for the Carderock Division Research Facility Wave Deflection System at the south side of Carlson

Spit, immediately south of the Proposed Action. During each of the five pile driving days, 1 to 8 marbled murrelets were frequently observed within a 1,000-m zone defined as the "area of potential behavioral effect," with intermittent sightings of 12 to 31 murrelets recorded. No marbled murrelet sightings occurred within the 300-m zone known as the "area of potential injury."

During recent fall 2011 repairs to the Explosives Handling Wharf (EHW) -1, no marbled murrelets were observed near EHW-1 during any pile driving activity (only vibratory pile driving occurred). Marbled murrelets were never observed within the restricted area at any time despite nearly daily observations over a four week period during October 2011 (Navy 2012a). Monitoring for marbled murrelets also occurred during the nearby Test Pile program in the summer and fall of 2011. No marbled murrelets were observed in the restricted area during any pile driving activity (impact and vibratory) at any time over the eight week observation period during the Test Pile Program (Navy 2012b).

Marbled murrelets were observed on several occasions during Hood Canal and Dabob Bay baseline surveys conducted during non-piling driving days during the Test Pile Program. There were 50 sightings over an eight week period, with the majority of the sightings (90 percent) occurring in late October (Navy 2012b). Most of the marbled murrelets sightings occurred at the southern tip of the Toandos Peninsula between Hazal Point and Dabob Bay with 78 percent of all observations at this location (Navy 2012b). On one occasion, a single pair of marbled murrelets was observed within 1,033 feet (315 meters) of the Carderock Pier, located approximately 0.2 kilometers south of the Service Pier (Navy 2012b).

Bald Eagle

Bald eagles are protected by both state and federal law. In July 2007, the bald eagle was removed from protection under the ESA but is still protected under the MBTA and Bald and Golden Eagle Protection Act. These laws provide protection to prevent harassment and provide buffer zones around nesting and roosting sites (WDFW 2010b). Bald eagles are regularly observed at NAVBASE Kitsap Bangor. They are likely to be present flying over the project area either to forage or to nesting sites. Bald eagle nesting period is from July 16 through August 15. The closest documented bald eagle nesting site is approximately 0.35 miles (560 m) north of the project area (Yasenak 2012).

Marine Mammals

All marine mammals are protected under the MMPA. The MMPA prohibits, with certain exceptions (i.e., tribal subsistence and permitted and authorized scientific research), the "take" of marine mammals in U.S. waters and by U.S. citizens on the high seas, and the importation of marine mammals and marine mammal products into the United States.

California sea lions, Steller sea lions, harbor seals, Dall's porpoise, harbor porpoise, humpback whale and transient killer whales may be present near the project area. Distribution and occurrence of pinnipeds (California sea lions and harbor seals), Dall's porpoise, and harbor porpoise as well as rare occurrences of transient killer whales are discussed below.

California Sea Lion

California sea lions breed on islands located in southern California, western Baja California, and the Gulf of California during the summertime. Large numbers of adult and sub adult male and juvenile sea lions migrate north post-breeding and winter from central California to Washington State (Jeffries et al. 2000).

California sea lions feed on a variety of fish and shellfish, including salmon, steelhead, herring, mackerel, and squid. It has been documented that salmon and steelhead comprise 10 to 30 percent of their diet in Washington State (WDFW 2010c). The U.S. population of California sea lions is considered to be near the highest level the environment can sustain (Carretta et al. 2011).

California sea lions are present in Hood Canal in fall, winter, and spring. Recent marine mammal surveys conducted along the NAVBASE Kitsap Bangor waterfront documented an abundance of California sea lions (Agness and Tannenbaum 2009b). A majority of the sea lions sighted were either hauled out or swimming near Delta pier located approximately 1 mile north of the Proposed Action (Figure 3-6).

Harbor Seal

Harbor seals inhabit coastal and estuarine waters off Baja California, north along the western coasts of the continental United States, British Columbia, and Southeast Alaska west through the Gulf of Alaska and Aleutian Islands (Carretta et al. 2011). They are generally non-migratory and remain local with changes in the tides, weather, season, reproduction, and food availability as the primary factors for movement. Harbor seals generally haul-out on rocks, reefs, and beaches during the day and forage in marine and estuarine waters during the morning and evenings. They haul out at low and high tide (in Hood Canal) to digest food, rest, give birth, or nurse young. Harbor seals eat crustaceans, squid, mollusks, and a variety of fish (Carretta et al. 2011). Pupping for harbor seals in Hood Canal takes place from July through September (Ecology 2011b).

Harbor seals have been observed hauled out on manmade structures (i.e., floating security fence, buoys, barges, marine vessels, and logs) along NAVBASE Kitsap Bangor's waterfront. The closest harbor seals have been observed near the project area approximately 0.25 mile north swimming in the nearshore areas (Figure 3-6). A majority of the sightings have been at Delta Pier and north of the Pier (Agness and Tannenbaum 2009b).

Figure 3-6. Pinniped Haul out Sites within Vicinity of Project Area

Dall's Porpoise

Dall's porpoise within the Pacific United States exclusive economic zone (EEZ) are divided into two discrete, noncontiguous areas: 1) waters off California, Oregon, and Washington, and 2) those in Alaskan waters (Carretta et al. 2011). Only individuals from the California, Oregon, or Washington stock may occur within the vicinity of the Proposed Action.

The Dall's porpoise is found from northern Baja California, Mexico, north to the northern Bering Sea and south to southern Japan (Jefferson et al. 1993). The species is only common between 32°N and 62°N in the eastern North Pacific (Morejohn 1979; Houck and Jefferson 1999). North-south movements in California, Oregon, and Washington have been suggested. Dall's porpoises shift their distribution southward during cooler-water periods (Forney and Barlow 1998). Seasonal movements have been noted off Oregon and Washington, where higher densities of Dall's porpoises were sighted offshore in winter and spring and inshore in summer and fall (Green et al. 1992).

In Washington, Dall's porpoise are year-round residents with distributions more abundant in offshore waters (Green et al. 1992). Dall's porpoise are observed throughout the year in the Puget Sound north of Seattle and are seen occasionally in southern Puget Sound. They can be opportunistic feeders but primarily consume schooling forage fish. Groups of Dall's porpoise generally include fewer than 10 individuals and are fluid, probably aggregating for feeding (Jefferson 1990, 1991; Houck and Jefferson 1999). Breeding and calving typically occurs in the spring and summer (Angell and Balcomb 1982). Resident Dall's porpoise breed in Puget Sound from August to September.

Dall's porpoises may occasionally occur in Hood Canal (Navy 2011b). Nearshore habitats used by Dall's porpoise could include the marine habitats found in the inland marine waters of Hood Canal. A Dall's porpoise was observed in the deeper water at NAVBASE Kitsap Bangor in summer 2008 (Agness and Tannenbaum 2009b).

Harbor Porpoise

There are eight stocks of harbor porpoise identified by NMFS in the Northeast Pacific Ocean. Only individuals from the Inland waters of Washington stock may occur in the project area. Harbor Porpoise are generally found in cool temperature to subarctic waters over the continental shelf in both the North Atlantic and North Pacific (Read 1999). This species is seldom found in waters warmer than 17°C (63°F) (Read 1999). Harbor porpoises can be found year-round primarily in the coastal shallow waters of harbors, bays, and river mouths (Green et al. 1992).

Harbor porpoise are non-social animals usually seen in small groups of 2 to 5 animals. Little is known about their social behavior. Harbor porpoise can be opportunistic feeders but primarily consume schooling forage fish (Osmek et al. 1996; Bowen and Siniff 1999; Reeves et al. 2008). Along the coast of Washington, harbor porpoise primarily feed on Pacific herring, market squid and smelts (Gearin et al., 1994). Females may give birth every year for several years in a row; calves are born in late spring (Read 1990; Read and Hohn 1995). Dall's and harbor porpoise appear to hybridize relatively frequently in the Puget Sound area (Willis et al. 2004).

Harbor porpoise are known to occur in Puget Sound year round (Carretta et al. 2011), and may occasionally occur in Hood Canal (Navy 2011b). Harbor porpoise observations in northern Hood Canal have increased in recent years (Navy 2011b). A harbor porpoise was seen in deeper water at NAVBASE Kitsap Bangor during 2010 field observations.

West Coast Transient Killer Whale

There are three distinct forms of killer whales, termed residents, transients, and offshores that are recognized in the northeastern Pacific Ocean. The transient population is further broken up into three stocks: 1) Gulf of Alaska, Aleutian Islands, and Bering Sea transients, 2) AT1 transients, and 3) West Coast transients (Carretta et al. 2011). The West Coast transient stock, which occurs from southern California to southeastern Alaska, may be present within the vicinity of the project area. The west coast stock spends a majority of their time along the outer coast, but has been observed coming into Hood Canal to feed on harbor seals between the months of January and July (London 2006).

In 2003, 11 transients from three separate pods spent almost two months in Hood Canal feeding on harbor seals primarily in the area between the Skokomish River and Quilcene Bay (London 2006). In 2005, six transient killer whales entered Hood Canal to prey upon harbor seals, remaining for 172 days between January and June. No other instances of this killer whale population in Hood Canal were found in the literature or the Orca Network (2012) database.

3.4.2.4 Essential Fish Habitat

The PFMC has designated EFH for each of the four primary fisheries that they manage within their FMPs: Pacific Coast groundfish, Pacific Coast salmon, coastal pelagic species, and West Coast highly migratory species (PFMC 2011a-c, 2012). Of these fisheries, only three (Pacific Coast groundfish, coastal pelagic species, and Pacific Coast Salmon) contain species for which EFH has been designated within Hood Canal or in the vicinity of NAVBASE Kitsap Bangor. The federally managed species, lifestages, and habitats, as indicated by PFMC FMPs are summarized for Hood Canal and the project vicinity in Table 3-10.

Essential Fish Habitat Designations

Pacific Coast Groundfish EFH is designated for species and lifestages and includes the following primary habitats:

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 boulders, 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 (PFMC 2011a).

The groundfish FMP provides habitat suitability maps indicating probability of occurrence of over 90 species in Puget Sound (PFMC 2005a, b; 2011a). This list was refined for evaluation of the project vicinity to a total of 26 groundfish species based on review of habitat suitability maps specific to Hood Canal. Those species with a habitat suitability probability percentage of less than one percent were not included for analysis as their presence within the habitat would be very rare and the Proposed Action resulting in adverse effects to their EFH would be unlikely.

Site-specific nearshore surveys at NAVBASE Kitsap Bangor confirmed occurrence of eight groundfish species (dover sole, English sole, kelp greenling, lingcod, Pacific sanddab, rex sole, sand sole, and starry flounder) as well as unidentified flatfishes/sole species, and unidentified juvenile rockfish (*Sebastes spp.)* (Bhuthimethee et al. 2009a). As indicated above, 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.

Coastal pelagic EFH consists of all estuarine and marine waters from the shoreline along the coasts of California, Oregon, and Washington offshore to the limits of the EEZ and above the thermocline where sea surface temperatures range from 10ºC to 20ºC (degrees Celsius) (PFMC 2011b). These boundaries include the waters of Hood Canal. The Coastal Pelagic FMP includes four finfish (Pacific sardine, Northern anchovy, Pacific [chub] mackerel, and jack mackerel). Also included are 1 invertebrate (market squid) and all euphausiid (krill) species that occur in the West Coast EEZ. The 4 finfish species are treated as a single species complex because of similarities in life histories and habitat requirements. Anchovy and market squid are expected to occur within Hood Canal (Table 3-10).

Northern anchovy (*Engraulis mordax*) 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 upon by a variety of predators, including salmon and numerous fishes. Northern anchovy were collected in the vicinity of the project site in low numbers in the 2007 surveys (19 individuals), confirming occurrence of this species in the nearshore zone.

Market squid (*Loligo opalescens*) are harvested near the surface, but they can occur at great depths as well. They prefer the salinity of the ocean and are rarely found in estuaries, bays, or river mouths. They feed on copepods as juveniles and feed 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. Eggs are attached to the substrate in capsules and take up to three months to hatch depending on water temperature. They are important as forage foods to many fish such as Chinook salmon, coho salmon, lingcod, and rockfish. Market squid are commonly seen by sport divers in Hood Canal. In addition, market squid egg masses trawled from Hood Canal waters have been used as a source for laboratory rearing (Mackie 2008). However, only one market squid was captured in the nearshore beach seine surveys from 2005 to 2009, suggesting their presence may be limited in the nearshore waters in the vicinity of the Proposed Action.

Pacific Coast salmon EFH includes all estuarine and marine environments extending from nearshore and tidal submerged environments within state territorial waters out to the full extent of the EEZ (200 nautical miles) offshore (PFMC 2012). In addition to the 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 including waters of NAVBASE Kitsap Bangor. Chinook, coho, and pink salmon are the salmon species with designated EFH. Although there are no streams within the project area that support spawning habitat for these three salmon species, the nearshore waters where they discharge to the estuarine nearshore environment is protected as EFH based on the functions they provide, including nutrient loads, terrestrial and aquatic prey, chemical buffering, salinity buffering, and habitat structure (e.g., large woody debris). The nearest discharge is located 0.7 mile north of the Service Pier.

Juvenile salmon were well-represented in the site-specific surveys, confirming substantial yearly use of the NAVBASE Kitsap Bangor shallow nearshore zone by juvenile Chinook, coho salmon, and pink salmon (Bhuthimethee et al. 2009a, b).

Table 3-10. Fish Species with Designated EFH in Hood Canal

Species	*Applicable Life Stages*	*Habitat*
Groundfish Species		
Arrowtooth flounder	E, L	Epipelagic zone.
Black rockfish	A, J	Vegetated bottom, hard bottom, Unconsolidated sediment.
Blue rockfish	A, L	Vegetated bottom, hard bottom, epipelagic zone.
Butter sole	A	Muddy or silty sediment.
Cabezon	A	Hard bottom.
California skate	E	Unconsolidated sediments.
China rockfish	J	Vegetated bottoms (kelp).
Dover sole	J	Epipelagic, muddy bottom.
English sole	A, J, L	Unconsolidated bottom, epipelagic zone.
Flathead sole	J	Unconsolidated sediments.
Kelp greenling	L	Epipelagic zone.
Lingcod	A, E, J	Unconsolidated sediments, epipelagic zone.
Longnose skate	A, E, J	Mixed sediments.
Pacific cod	E	Unconsolidated sediments.
Pacific Grenadier (formerly Pacific rattail)	E, L	Unconsolidated sediments, epipelagic zone.
Pacific Hake (formerly Pacific whiting)	A	Epipelagic zone.
Petrale sole	J	Unconsolidated sediments, epipelagic zone.
Quillback rockfish	A, J	Artificial structure, mixed bottom, vegetated bottom, epipelagic zone.
Rex sole	J	Unconsolidated sediments, 30 – 70 m deep.
Rock sole	A	Hard bottom.
Sablefish	A, E	Unconsolidated sediments, epipelagic zone.
Sand sole	A, J, L	Unconsolidated sediments, epipelagic zone.
Soupfin shark	A, J	Unconsolidated sediments, epipelagic zone.
Spiny dogfish	A, J	Unconsolidated sediments, epipelagic zone.
Splitnose rockfish	L	Epipelagic zone.
Starry flounder	A, J, E	Unconsolidated sediments, epipelagic zone.
Coastal Pelagic Species		
Anchovy	A, L, E	All estuarine waters above the thermocline and falling between 10 and 20 ºC.
Market squid		Same as above.
Pacific Salmonid Species		
Coho	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	A, J	Same as above.
Pink	A, J	Same as above.

Notes:
A = adult, E = eggs, J = juvenile, L = larvae, m = meters
Source: PFMC 2005a, b; 2011a, b; 2012

Habitat Areas of Particular Concern

In addition to EFH designations, areas called Habitat Areas of Particular Concern (HAPCs) are also designated by the regional FMCs. Designated HAPCs 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 would be, stressing the habitat type; and (4) rarity of the habitat type (NMFS 2002). Categorization as an HAPC does not confer additional protection or restriction to the designated area.

Out of the four fisheries managed by the PFMC, HAPCs have only been identified for groundfish. The four HAPCs designated for these species include sea grass, canopy kelp, rocky reef, and estuarine habitats along the Pacific coast, including Puget Sound. Two of these HAPCs, estuarine habitats and seagrass, are located within the vicinity of the Proposed Action.

3.4.3 Environmental Consequences

Impacts to biological resources would be considered significant if there was a loss of high value habitat for fish and wildlife and/or injury to special-status species would result from the Proposed Action.

The evaluation of impacts to biological resources and their habitats considers whether the species is listed under the ESA or afforded federal protection under other regulations (i.e., MMPA, Bald and Golden Eagle Protection Act, and MBTA). Also considered is whether the species has a particular sensitivity to stressors of the Proposed Action and/or a substantial or important component of the species' habitat would be lost as a result of the Proposed Action. A primary construction element of the Preferred Alternative would be installing 16 steel piles using both a vibratory and impact pile driver. There could be 4 additional steel piles to replace piles that do not meet engineering standards. Those piles failing engineering standards would be removed or cut-off and there would be no more than 16 in the final configuration. Before all environmental consequences of this alternative are discussed for biological resources, a summary of underwater noise and evaluation criteria for marine birds, fish, and marine mammals is introduced below. For specific noise definitions, please refer to *Appendix E, Fundamentals of Sound*.

<u>Noise level Criteria for Evaluation of Impacts</u>

In addition to human noise-sensitive receptors (discussed in Section 3.2), habitat for certain wildlife or aquatic species is also considered. It's important to understand the criteria currently in place for terrestrial and aquatic species before evaluating impacts from the Proposed Action.

Both airborne and underwater noise would be generated from pile driving activities. As described in *Section 3.2 Noise (Airborne)*, levels measured in the air are typically used to assess impacts on humans and are A-weighted to reduce the contribution of low and high frequencies and correspond to how humans hear. While noise pressures in air are weighted and measured in dB re 20 µPa (approximate threshold of human audibility), the reference pressure for water is 1 µPa. Noise levels underwater are not weighted and therefore measure unaltered frequency ranges that may extend above and below the audible range of many organisms (Caltrans 2009; WSDOT 2012).

<u>Fish</u>

The degree to which an individual fish exposed to underwater sound would be affected depends on a number of variables, including:

- species of fish;
- size of fish;
- presence of a swim bladder;

- physical condition of the fish;
- 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; and
- tidal currents.

Depending on these factors, effects on fish can range from changes in behavior to immediate mortality. There has been no documented injury or mortality resulting from the use of vibratory pile drivers; however, fish injury from impact hammers has been documented.

Three metrics are commonly used to evaluate noise impacts to fish (Caltrans 2009):

- *Peak Sound Pressure level (Lpeak)* – 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; pressure is unweighted and measured as dB re 1µPa;
- *Root Mean Square (rms)* – rms level is the square root of the energy divided by a defined time period; and
- *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.

The Fisheries Hydroacoustic Working Group (FHWG) is a multi-agency group that includes members from California Transportation Department (Caltrans), Oregon Department of Transportation, Ecology, Federal Highway Administration (FHWA), NMFS, USFWS, California Department of Fish and Wildlife, and USACE. This technical working group is responsible for generating underwater noise effects criteria for fish exposed to pile driving activities. The FHWG developed the Agreement in Principal for *Interim Criteria for Injury to Fish from Pile Driving Activities* that establishes a 206 dB-peak and 187 dB cumulative SEL for all listed fish except those that are less than 2 g. In that case, the criterion for the cumulative SEL is 183 dB (FHWG 2008).

Marine Mammals

The NMFS has used generic sound exposure thresholds to determine when an activity in the ocean that produces sound might result in impacts to a marine mammal such that a take by harassment might occur (70 FR 1871). These thresholds are used to determine compliance with the MMPA (16 USC § 1362 Sec. 3 (13)) and the ESA (7 USC § 36 and 16 USC § 1531 et seq.), but the effects determinations and language used to report exposure to harmful noise levels are different for the two statutes. As described in Section 3.4.1, the MMPA imposes a moratorium on the taking of marine mammals, where "take" means to harass, among other actions. The MMPA defines two levels of harassment, each of which has been assigned a noise exposure threshold:

- Cetaceans and pinnipeds exposed to impulsive sounds of 180 and 190 dB rms or above, respectively (i.e., injury threshold levels, and higher than impact or vibratory pile driving sounds), are considered to have been taken by injury (Level A harassment). Injury thresholds are applied to a situation where the noise has the potential to injure a marine mammal or marine mammal stock in the wild (16 USC §1362 Sec. 3 (18) (A) (i)).
- Marine mammals exposed to sounds at or above 160 dB rms for impulse sounds (e.g., impact pile driving) and 120 dB rms for continuous noise (e.g., vibratory pile driving), but below injurious thresholds are considered to have been taken by behavioral/disturbance (Level B harassment).
- Behavioral disturbance thresholds are applied to situations where the noise "has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of natural behavior patterns, including, but not limited to, migration, breathing, nursing, breeding, or sheltering (16 USC §1362 Sec. 3 (18)(A)(ii)). The application of the 120 dB rms threshold can sometimes be problematic because this threshold level can be either at or below the ambient noise level of certain locations. As a result, these levels are considered precautionary (74 FR 41684). NMFS is developing new science-based thresholds to improve and replace the current generic exposure level thresholds, but the criteria have not been finalized (Southall et al. 2007).

Marine Birds

Little is known about the general airborne hearing or underwater hearing capabilities of birds but research is ongoing. What has been determined is that there are three classes of potential effects identified for birds from noise (i.e., traffic or construction). These are:

1. physiological and behavioral effects;
2. damage to hearing from acoustic over-exposure; and
3. masking of important bioacoustics and communication signals (Dooling and Popper 2007).

Research has shown that birds hear between 1 and 5 kHz, with best sensitivity approaching 0 – 10 dB Sound Pressure Level (SPL) at the most sensitive frequency, which is the region of 2-4 kHz. This region is the spectral region of a bird's vocalization and where noise generated would have a greater masking effect on detection of communication signals than noise outside this range (Dooling and Popper 2007). Studies have not been specific to marine birds and these levels more reflect research done on other avian species (i.e., owls and songbirds) until recent guidance provided by the Marbled Murrelet Science Panels became available.

The first Marbled Murrelet Science panel evaluated injury from underwater noise impacts on foraging murrelets. An underwater auditory injury criterion of 202 dB SEL re 1µPa-sec cumulative was accepted by USFWS and only applies to impact pile driving (cumulative strikes over a 24-hour period). There is currently no threshold for vibratory installation of piles.

Airborne noise from pile driving can generate noise that could potentially result in masking of communication between foraging marbled murrelets when on the water. The second Marbled Murrelet Science Panel was convened to evaluate the onset of non-injurious threshold shift (TTS) in the marbled murrelet. After review of the relevant literature on marbled murrelet behavior and hearing in birds, the Panel identified communication during foraging as a critical hearing demand that could be affected by underwater pile driving. However, the sound levels at which this could occur is dependent upon site specific, temporally variable factors, ambient noise levels, and the source sound level. The panel's sample calculation of 168 meters was specific to the Bangor waterfront and a pile producing 94 dBA at 15 meters based on the Navy's Test Pile Project data. The USFWS has not applied a threshold and masking has not been calculated for other projects or sites to date. However, due to the close location and similarity of the Moorings project to what was calculated during the second Marbled Murrelet Science Panel, 168 meters was used as the distance from the pile at which masking could potentially occur. This distance is conservative because seven piles would be installed that are smaller in size, and thus quieter to install, than was calculated for the Test Pile Project. Therefore, this would reduce the area of the masking zone. A conservative approach was used to select source levels for analyzing impacts to species. Available information from various pile driving studies (vibratory and impact) was reviewed and the most relevant to the proposed project in terms of pile type and size, water depth, and substrate was used.

Airborne and underwater noise injury and disturbance thresholds for fish, marine mammals, and marbled murrelet are presented in Table 3-11.

Table 3-11. Airborne and Underwater Noise Injury and Disturbance Thresholds for Marine Mammals, Fish, and Marbled Murrelets

<table>
<tr><th colspan="2">Airborne Noise Thresholds (Impact and Vibratory Pile Driving) (dB re 20 µPa unweighted)</th><th colspan="2">Underwater Noise Thresholds for Vibratory Pile Driving (dB re 1 µPa)</th><th colspan="2">Underwater Noise Thresholds for Impact Pile Driving (dB re 1 µPa)</th></tr>
<tr><th>Hearing Group</th><th>Airborne Sound Pressure Level</th><th>Injury Threshold</th><th>Behavioral Harassment Threshold</th><th>Injury Threshold</th><th>Behavioral Harassment Threshold</th></tr>
<tr><td>Cetaceans (whales, dolphins, porpoises)</td><td>NA</td><td>180 dB rms</td><td>120 dB rms</td><td>180 dB rms</td><td>160 dB rms</td></tr>
<tr><td>Pinnipeds (sea lions)</td><td>100 dB rms</td><td rowspan="2">190 dB rms</td><td rowspan="2">120 dB rms</td><td rowspan="2">190 dB rms</td><td rowspan="2">160 dB rms</td></tr>
<tr><td>Harbor seal</td><td>90 dB rms</td></tr>
<tr><td>Fish ≥ 2 grams</td><td rowspan="3">NA</td><td rowspan="3">150 dB rms</td><td rowspan="3">150 dB rms</td><td>187 dB Cumulative SEL</td><td rowspan="3">150 dB rms</td></tr>
<tr><td>Fish < 2 grams</td><td>183 dB Cumulative SEL</td></tr>
<tr><td>Fish all sizes</td><td>Peak 206 dB</td></tr>
<tr><td>Foraging Marbled Murrelets</td><td>Masking: variable depending on spectrum level ambient levels.</td><td>NA</td><td>NA</td><td>202 dB SEL</td><td>150 dB rms (guideline)</td></tr>
</table>

Notes: NA = not applicable, no established threshold;
Source: FHWG 2008; WSDOT 2012.

Estimated Underwater Noise Levels

In order to estimate the SPLs which could potentially be generated by pile driving, data from previous pile driving efforts most relevant to the project in terms of location, pile type and size, pile driver type, substrate, and water depth were identified. Due to the project similarities, SPL measurements recorded during the Navy's Test Pile Program at the Bangor waterfront were used as source data for this analysis (Table 3-12). Using this data, it was determined that impact pile driving under the Proposed Action could generate peak sound levels of approximately 210 dB re 1 µPa, average SEL levels of 180 dB re 1 µPa and average rms levels of approximately 196 dB re 1 µPa all at a distance of 10 m, without the use of attenuation (Illingsworth and Rodkin 2012). Vibratory pile driving is expected to produce lower noise levels of approximately 172 db rms re 1 µPa at 33 feet (10 meters) (Illingsworth and Rodkin 2012).

Table 3-12 Summary of Sound Levels During the Test Pile Program

Installation Method	*Steel Pipe Pile Size*	*Peak dB[1]*	*dB rms[1]*	*Singe Strike SEL[2]*
Impact	24-inch	193	180	167
	36-inch	210	196	177
	48-inch	209	194	180
Vibratory	24-inch	-	160	-
	36-inch	-	169	-
	48-inch	-	172	-

Notes:
1 Measured at 10 m; referenced to 1 µPa.
2 Measured at 10 m; referenced to 1 µPa2*sec.
Source: Illingsworth and Rodkin 2012.

<u>*Sound Attenuation Techniques*</u>

A bubble curtain would be used to minimize the noise generated by impact pile driving. Bubble curtains emit a series of bubbles around a pile to introduce a high-impedance boundary through which pile driving noise is attenuated. Bubble curtains can be unconfined or confined. A confined bubble curtain uses a flexible or rigid shroud around the bubble curtain to hold air bubbles near the pile.

Noise reduction results from bubble curtains indicate a wide variance with very little measurable attenuation in some cases (less than 6 dB), and high attenuation (greater than 15 dB) in other cases (Caltrans 2009, WSDOT 2012). Caltrans observed that bubble curtain attenuation levels for 24-inch diameter or smaller steel or concrete piles generally reduced sound levels by 5 dB and attenuation levels for 24-inch to 48-inch diameter steel piles were generally reduced by 10 dB (Caltrans 2009). They noted noise reduction may be more difficult to achieve in harder substrates, which may transmit ground-borne noise and propagate it into the water column, while softer substrate may allow for a better seal of the curtain on the substrate (Caltrans 2009). WSDOT reported attenuation levels from unconfined bubble curtains ranged from 0 to 32 dB with a mean of 11.9 dB (standard deviation [s.d.] 8.7) (WSDOT 2012). Two recent Puget Sound projects at the Anacortes and Mukilteo Ferry Terminals, which drove 36-inch diameter steel piles, reported mean attenuation levels of 15 dB at approximately 33 feet (10 meters) (s.d. 10.6, range 7 to 22 dB) and 8 dB at approximately 33 feet (10 meters) (s.d. 3.10, range of 3 to 11), respectively (WSDOT 2012). At the Mukilteo site, substantial attenuation was noted to decrease with range from the pile resulting in a significant drop in attenuation by 3,608 feet (1,100 meters) (MacGillivray et al. 2007). Both of these projects were located in sand and silt substrates.

A bubble curtain would be used during impact pile driving. Based on the information above from Caltrans and WSDOT, an average SPL reduction of 8 dB measured at 33 feet (10 meters) was conservatively chosen as an achievable level of attenuation for the 24-inch to 48-inch diameter piles. For the 20-inch piles, an average peak SPL reduction of 5 dB measured at 33 feet (10 meters) was chosen.

3.4.3.1 No-Action Alternative

Under the No-Action Alternative, the construction and use of the barge mooring location or the proposed new research barge would not occur. Baseline biological resources would remain unchanged. Therefore, there would be no significant impacts to biological resources from implementation of the No-Action Alternative.

3.4.3.2 Preferred Alternative

Terrestrial Wildlife

As discussed in Section 3.2, the highest noise levels at the base are produced along the waterfront and at the ordnance handling areas with an estimated noise level range from 70 to 90 dBA and potentially peaking intermittently at 99 dBA. Proposed pile driving would result in increased airborne noise in the vicinity of the construction site. Maximum peak levels would be generated during impact pile driving using an impact hammer, estimated to be 105 dBA re 20 µPa at a distance of 50 feet (15 meters) from the pile, and 97 dB rms re 20 µPa at 524 feet (160 meters) (unweighted; Blackwell et al. 2004); vibratory pile driving would create noise levels of 95 dBA re 20 µPa at 50 feet (15 meters), and unweighted noise levels of 97 dB rms re 20 µPa at 40 feet (12 meters) (WSDOT 2012). Other construction activities or equipment, such as cranes, heavy trucks, and generators would also cause noise; however, this noise level would be much lower compared to noise produced by the impact hammer (WSDOT 2012). In the absence of pile driving noise, maximum construction noise would be 94 dBA re 20 µPa at a distance of 50 feet (15 meters) from the activity, computed as the summation of noise of all equipment operating simultaneously (WSDOT 2012). Terrestrial wildlife along Hood Canal adjacent to the project site would be affected by construction noise. Airborne noise due to impact pile driving would be the most noticeable to terrestrial wildlife. Noise impacts due to other construction activities would be minimal.

A majority of the birds were observed within the nearshore area of Carlson Spit at a distance of approximately 500 ft (150 meters) from proposed pile driving activities. Since noise levels decrease by approximately 6 dBA with each doubling of distance (WSDOT 2012), the average sound levels at a distance of 500 ft would be estimated at 95 dBA re 20 µPa for impact pile driving. Wildlife species occurring within the industrial areas of NAVBASE Kitsap Bangor waterfront have likely acclimated to the ambient noise levels that occur on a daily basis and are not expected to be impacted during pile driving operations, particularly marine birds occurring at Carlson Spit.

Construction noise can also deter many birds from nesting. Both an osprey and bald eagle nesting site are located approximately 0.5 miles from the project area. Following the 6 dBA per doubled distance decrease, noise would be expected to attenuate down to approximately 85 dBA which is within the range of baseline noise levels generated on a day-to-day basis. Therefore, no significant impacts to osprey or bald eagle nesting sites or nesting activity would result.

Construction would occur 6 days per week between July 16 and September 30, with restrictions on in-water work from July 16 to September 23 permitted between 2 hours after sunrise to 2 hours before sunset to minimize disturbance to foraging marbled murrelets. The in-water work window restriction would be adjusted from September 24th to September 30th to allow construction from sunrise to sunset. These timeframes would also coincide with the time in which migratory bird presence would be low by avoiding the wintering time period. Non-pile driving construction activities could last until 10:00 p.m. in accordance with the WAC noise guidelines. Pile driving activities would not exceed 20 days. Temporary and short-term noise disturbance to terrestrial birds would like occur but would not be significant as these species are likely acclimated to the elevated noise levels typically produced along the industrial waterfront on a daily basis. No significant impacts to terrestrial species would occur with implementation of the Preferred Alternative.

Aquatic Species

Marine Vegetation

Eelgrass is not present within the project area and therefore would not be directly impacted. Appropriate minimization measures would be implemented (see Section 2.5) in order to avoid any direct or indirect impacts to the small patch of eelgrass located approximately 175 ft south of the proposed relocated Port Operations float. Macroalgae (green and brown) are more abundant within the shallower depths of 15 ft and less where proposed pile driving activity would take place. Temporary and localized impacts are expected during construction as a reduction of light (shade from construction vessels) would lead to a temporary reduction in species abundance. Macroalgae are part of the forage fish diet and therefore a reduction in forage fish prey could lead, indirectly, to a temporary reduction in prey availability for adult salmon that feed primarily on forage fish. However, construction is anticipated to be completed within 8 weeks/40 workdays and these species of macroalgae are expected to return to unshaded areas following construction. Some of the existing steel piles would be cut off at the mudline and the macroalgae and benthic invertebrates (soft and hard) would be re-established in those areas within a relatively short term period. Taking into account the existing gangway and mooring dolphin that would be removed, the new float sections, and transformer pad there would be a net decrease of 75 ft^2 of new shaded area for new infrastructure. However, no significant impacts to macroalgae as a population are expected. Therefore, no significant impacts to marine vegetation and forage fish prey would be expected with implementation of the Preferred Alternative.

The project area encounters frequent boat and in-water operations activity and is not a high abundance area for invertebrates. No construction or staging would occur in the intertidal area so impacts to invertebrates in this area are not expected. Proposed in-water work would disturb bottom substrates during pile installation. No more than 16 steel piles would be placed at depths less than or equal to -30 ft MLLW. Benthic organisms within the footprint of the new piles would be lost. However, benthic organisms are very resilient to habitat disturbance and are likely to recover to pre-disturbance levels well within 2 years; additionally, due to the limited and temporary disturbance, benthic organisms would be expected to recover in much less time (Anchor Environmental, 2002). The area of disturbance is minor in comparison to the rest of NAVBASE Kitsap Bangor's nearshore environment and re-colonization following construction is anticipated. Therefore, no significant impacts to invertebrates would be expected with implementation of the Preferred Alternative.

Marine Fish

Construction activities associated with the Preferred Alternative would result in increased underwater noise levels in Hood Canal, due primarily to pile driving activity. Some noise would also be generated from support vessels and barge mounted equipment (i.e., generators). However, the most significant in-water noise potentially affecting marine fish would be from pile driving using an impact hammer pile driver. In some cases where difficult geological conditions are encountered, it may be necessary to use an impact hammer to drive certain piles for part of all of their required depth. It is anticipated that a maximum of 4 piles could be driven per day with an average of 450 strikes per pile, resulting in a maximum of 1,800 pile strikes per day. The total duration of in-water pile driving would be approximately 20 days. The use of thermal lance or hydraulic cutting of the existing piles at the mud line would below adverse waterborne noise thresholds; however there would be some level of localized turbidity. The turbidity would be minimal, retained within the boundaries of the project area drift cell

(DC-20), and not generate significant adverse impacts to the fish, marine mammals. The marine vegetation in the immediate area of the piles within (1 to 2 feet) would be disturbed, but would reestablish within one to two years.

The sequence of pile installation is unknown. However, if four 36-inch to 48-inch piles were impact driven in a day, this scenario would represent the worst-case for evaluating noise impacts. The maximum number of days this could occur would be up to three and half (five 36-inch piles and eight 48-inch piles for a total of 13 piles, which if driven at the rate of four piles per day, results in three days of impact pile driving for the loudest piles). If one or more of the 36-inch to 48-inch piles were driven on the same day as the 20-inch to 24-inch piles, the area of impact for the day would be less. And on days when only 24-inch and/or 20-inch piles were driven, the area of impact would also be smaller.

The calculated distances to the marine fish threshold criteria and the area affected for the impact and vibratory installation of 48, 36, 24, 20-inch diameter piles are provided in Table 3-13. Figure 3-7 and Figure 3-8 illustrate representative views of the area of effect for impact and vibratory driving of various pile sizes for each of the noise thresholds for marine fish.

A majority of the pile driving would be initially conducted using a vibratory pile driver. This method would be used until either the pile hits refusal and necessitates an impact hammer to reach required depth or depth is achieved with only impact proofing necessary. Since vibratory pile drivers typically generate noise levels from 10 to 20 dB lower than impact hammer pile driving, impacts on fish are typically not observed in association with vibratory pile driving (WSDOT 2012). Only behavioral disturbance from vibratory pile driving would be anticipated (Table 3-13).

Table 3-13. Maximum Range to Fish Sound Criteria Thresholds from Pile Driving

Type of Pile Driving and Pile Size	*Criteria Threshold per Pile Type and Pile Driving Method (all distances given in meters)*			
	206 dBPEAK (injury)	*187 dB Cumulative SEL for a fish>2g (injury)*	*183 dB Cumulative SEL for fish <2g (injury)*	*150 dB rms (behavioral)*
48-inch[1,2]				
Impact	5	148	273	3,415
Vibratory	N/A	N/A	N/A	293
36-inch[2]				
Impact	5	93	173	3,415
Vibratory	N/A	N/A	N/A	185
24-inch[1]				
Impact	0	20	37	293
Vibratory	N/A	N/A	N/A	46
20-inch[3]				
Impact	1	32	59	464
Vibratory	N/A	N/A	N/A	46

Notes: All sound pressure levels expressed in dB re 1 µPa; SEL are expressed in dB re 1 µPa^2*sec. 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).

1 Source levels based on measurements taken during the Test Pile Program and 8 dB of attenuation was applied for 48-24-inch piles.

2 The 36-inch peak and rms source level measurements were louder than the 48-inch measurements and were used for both piles sizes to provide a conservative estimate.

3 The 24-inch source level measurement during Test Pile Program was used for the 20-inch pile estimate and 5 dB of attenuation was applied.

Source levels from Table 3-12 were used to model noise threshold impacts to fish. The underwater noise threshold criterion for fish injury from a single impact hammer strike occurs at a SPL of 206 dBpeak re 1 μPa. The Navy anticipates that no more than 1,800 strikes of the impact hammer would occur per day. Assuming 50 strikes per minute, it is likely that maximum daily duration of impact pile driving each day would be approximately 35-40 min. This assumption is from industry standard for impact hammer, which range from 35 to 52 strikes per minute (min) (Hammer & Steel 2012). Due to the necessity of multiple strikes, the analytical approach for determining underwater sound effects from impact pile driving on fish requires using an accumulated SEL as the threshold; therefore, a single strike analysis does not apply. For the values selected for the analysis, (210 peak, 180 SEL, and 196 rms) and assuming a 8 and 5 dB reduction from a sound attenuation device, the distance to the injury threshold for 187 SEL is 485 feet (148 meters) from the pile and the distance to the injury 183 SEL is 895 feet (273 meters). Injury from peak levels would occur very close to the pile (within 5 meters) where the fish are not expected to be present due to human activity (Figure 3-6). Behavioral harassment was calculated to occur as far as 3.4 kilometers (2 miles) from the pile being driven (Figure 3-7).

Fish behave differently in their reaction to noise. Some fish are active swimmers and are likely to swim away from a disturbing noise source. Other fish that are resident to the area may not move away and thus would be exposed to the noise levels for the duration of the pile driving activity (Hastings and Popper 2005).

During impact pile driving, a bubble curtain would be used to attenuate noise. In addition, the bubble curtain would be turned on prior to initiation of pile strikes in an effort to flush fish away from the injury zone near the pile. All pile driving activities would be conducted during the allowable in-water work period to reduce potential impacts to juvenile salmon and forage fish. NAVBASE Kitsap Bangor fish surveys in the 1970s and 2005 to 2008 indicate that greater than 95 percent of the juvenile salmonids in this part of Hood Canal occur during the closure period and thus least likely to be present during the allowable in-water work period (Schreiner et al. 1977; Salo et al. 1980; Bax 1983; SAIC 2006; Bhuthimethee et al. 2009a/2009b).

Turbidity in the water column would occur during pile driving activities, creating temporary and localized disturbance to water quality (reduced DO concentrations and resuspension of sediments). Suspended sediments are anticipated to settle back down to the seafloor shortly after pile driving commences. Water quality impacts would be short-term and localized and would not result in significant long-term impacts to fish that may be present in the area at the time of construction.

With implementation of BMPs and minimization measures described in Section 2.5, no significant impacts to marine fish are anticipated with implementation of the Preferred Alternative.

Figure 3-7. Distance to Underwater Sound Thresholds for Fish during Impact Pile Driving (48-inch steel piles)

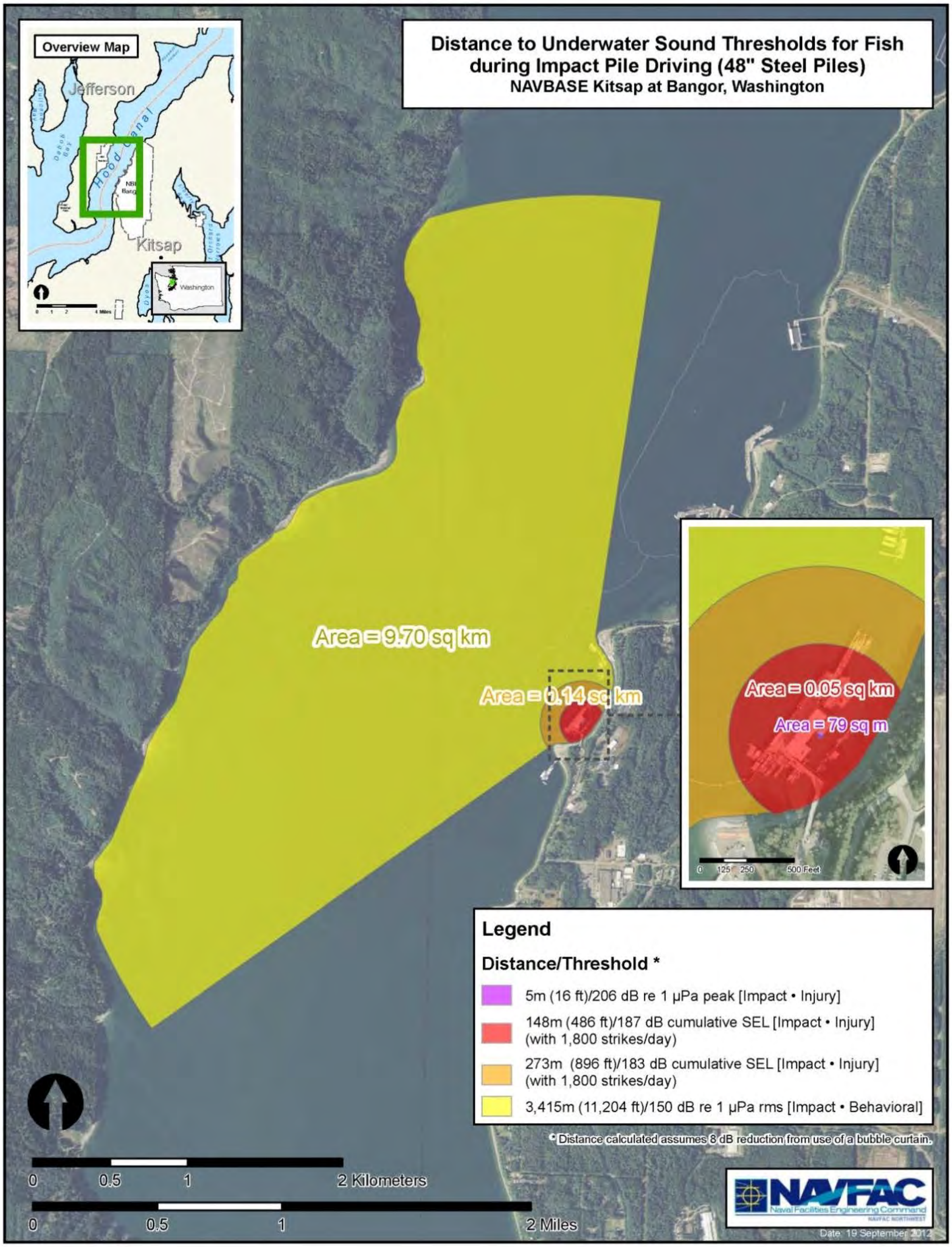
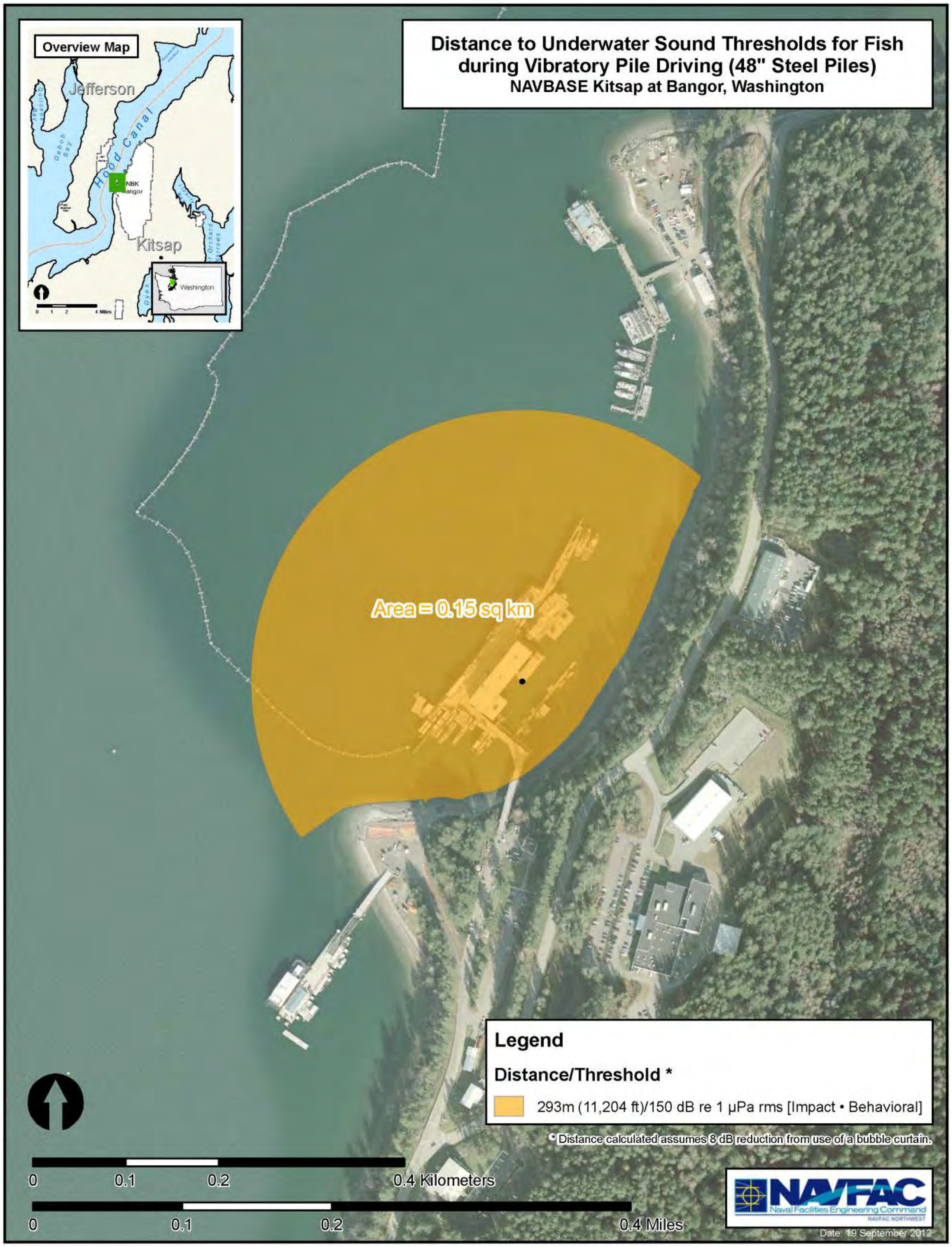


Figure 3-8. Distance to Underwater Sound Threshold for Fish during Vibratory Pile Driving (48-inch steel piles)



Special-Status Species

ESA-listed Species and Critical Habitat

Impacts summarized above and detailed in the Biological Assessment (Appendix D) for fish species would also apply to ESA-listed Puget Sound Chinook salmon, Hood Canal summer-run chum salmon, Puget Sound steelhead, bull trout and the Puget Sound/Georgia Basin DPSs of bocaccio, canary, and yelloweye rockfish. Pile driving would increase underwater noise above established thresholds for fish. However, pile driving would occur during the in-water work window when juvenile salmonids are least likely to be present and adult salmonids would likely avoid the area temporarily or use it primarily as a migration corridor. As discussed in *Section 3.4.2.3 - Rockfish*, little is known about actual population densities of ESA-listed rockfish species within the project area. Juvenile rockfish have been captured during fish surveys along the NAVBASE Kitsap Bangor waterfront so it is possible these ESA-listed rockfish species could be present. The small marine vegetated areas within and adjacent to the project area provide habitat for juvenile canary and bocaccio rockfish and thus a few of these juveniles may be present within the project area during construction. It is also possible that a few larval yelloweye rockfish, canary rockfish, and bocaccio occur within the water column of the project area or adjacent to and would be injured or killed by the effects of pile driving, but these numbers would be very low. The closest adult ESA-listed rockfish are likely several thousand feet away within waters deeper than 120 ft, and are not expected to be affected by project activities due to the distance of the project and attenuation of sound.

The project would be very short in duration and timing constrained (July 16 to Sept 30) to ensure that very few individuals of ESA-listed salmonids and rockfish would be exposed to effects of the Proposed Action. Daily pile driving activities would be separated by overnight rest periods when migration can precede uninhibited. Adult in-migration of Chinook and chum salmon would not be significantly delayed.

In summary, impacts from sediment disturbance, underwater noise, and general changes to water quality would be temporary, localized, and short-term and therefore not significant with implementation of the Preferred Alternative. The Navy concludes that the appropriate ESA effects determination for Puget Sound Chinook salmon, Hood Canal summer-run chum salmon, Puget Sound steelhead trout, bull trout, and Puget Sound/Georgia Basin bocaccio, canary, and yelloweye rockfish is "may affect, not likely to adversely affect."

Only Puget Sound Chinook and Hood Canal Summer-run chum salmon have critical habitat known to occur within the vicinity of the project area. However, NAVBASE Kitsap Bangor is excluded from critical habitat designation for these two species by federal law (70 FR 52630). As a result, no Puget Sound Chinook salmon or Hood Canal summer-run chum salmon critical habitat occurs in the immediate vicinity of the project area. However, the closest critical habitat occurs on the west side of Hood Canal (approximately 2,500 meters from the project area), to the north of the base boundary (approximately 4,600 m), and to the south of the base boundary (approximately 1,100 m) where noise generated from impact pile driving (most noise-producing activity) may cause temporary behavioral disturbance to these species using those critical habitat areas. Because the in-water work would be conducted when these ESA-listed species are least likely to be present, the Navy concludes that an effects determination of "may affect, not likely to adversely affect" Puget Sound Chinook salmon and Hood Canal summer-run chum salmon critical habitat is appropriate. A "no effect" determination is appropriate for Coastal-Puget Sound Bull trout critical habitat as the closest designated area is in Dabob Bay located on the west side of Toandos Peninsula.

NMFS Northwest Regional office and USFWS Washington office concurred with the Navy's determination of effects on ESA-listed fish species and associated critical habitat in letters dated January 11, 2013 and January 28, 2013, respectively.

Humpback Whale

Table 3-14 presents the calculated distance to and areas encompassed by the underwater marine mammal thresholds during pile driving 48-inch piles under the Preferred Alternative. The predicted area exceeding the threshold assumes a field free of obstruction, which is unrealistic, however, because Hood Canal does not represent open water conditions (free field) and therefore, sounds would attenuate as they encountered land masses or bends in the canal. As a result, some of the distances and areas of impact calculated cannot actually be attained at the project area. The actual distance to the behavioral disturbance thresholds for pile driving may be shorter than the calculated distance due to the irregular contour of the waterfront, the narrowness of the canal, and the maximum fetch (furthest distance sound waves travel without obstruction [i.e., line of site]) at the project area. These distances are presented in Table 3-14. Figure 3-9 and Figure 3-10 graphically depict the representative areas of each underwater sound threshold for sound threshold for marine mammals (cetaceans, such as Humpback whales, and pinnipeds in the vicinity of the project area.

Table 3-14. Distance to Marine Mammal Exposure Thresholds

Pile Size	***Type of Pile Driving***	***Marine Mammals (meters)***			
		Injury Pinnipeds	***Injury Cetaceans***	***Behavioral Disturbance from Impulse Noise***	***Behavioral Disturbance from Continuous Noise***
		190 dB rms	***180 dB rms***	***160 dB rms***	***120 dB rms***
48-inch	Impact	7	34	736	N/A
	Vibratory	1	3	N/A	29,286*

Notes:
All sound levels expressed in dB re 1 μPa rms.
Practical spreading loss (15 log, or 4.5 dB per doubling of distanced) used for calculations.
Sound pressure levels used for calculations were: 196 dB rms re 1 μPa @ 10m for impact and 172 dB rms re1 μPa @ 10 meters for vibratory.
8 db of attenuation was applied to source sound pressure levels.
*Range calculated is greater than what would be realistic. Hood Canal average width at site is 2.4 km, and is fetch limited from N to S at 20.3 km.

Humpback whales are very rare in Hood Canal. Although several sightings of a humpback whale occurred in January and February of 2012, it turned out to be the same individual whale each time (Calambokidis pers. comm. 2012). Prior to these sightings, there were no confirmed reports of humpback whales entering Hood Canal (Calambokidis pers. comm. 2012). No other reports of humpback whales in the Hood Canal were found in the Orca Network database, the scientific literature, or agency reports. Construction of the Hood Canal Bridge occurred in 1961 and could have contributed to the lack of historical sightings (Calambokidis pers. comm. 2010). Due to the absence of any regular occurrence of humpbacks adjacent to or within the vicinity of the project site, no more than 20 days estimated for pile driving, and implementation of marine mammal monitoring, no impacts to humpback whales are anticipated with implementation of the Preferred Alternative. The Navy concludes that the appropriate ESA effects determination for humpback whale is "may affect, not likely to adversely affect." NMFS Northwest office concurred with the Navy's determination of effects in a letter dated January 11, 2013.

Figure 3-9. Area Exceeding Underwater Sound Thresholds for Marine Mammals during Impact Pile Driving (48-inch steel piles)

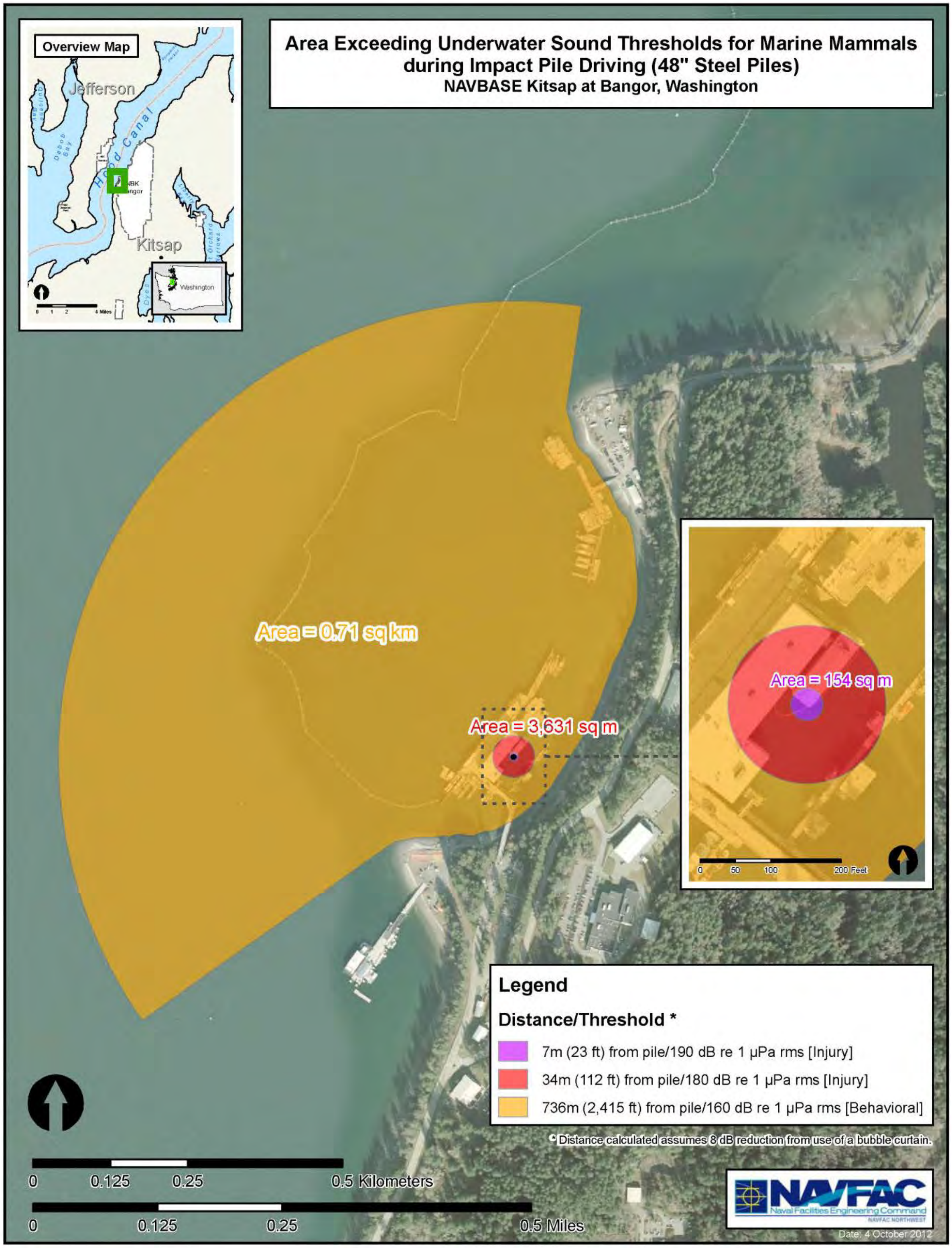
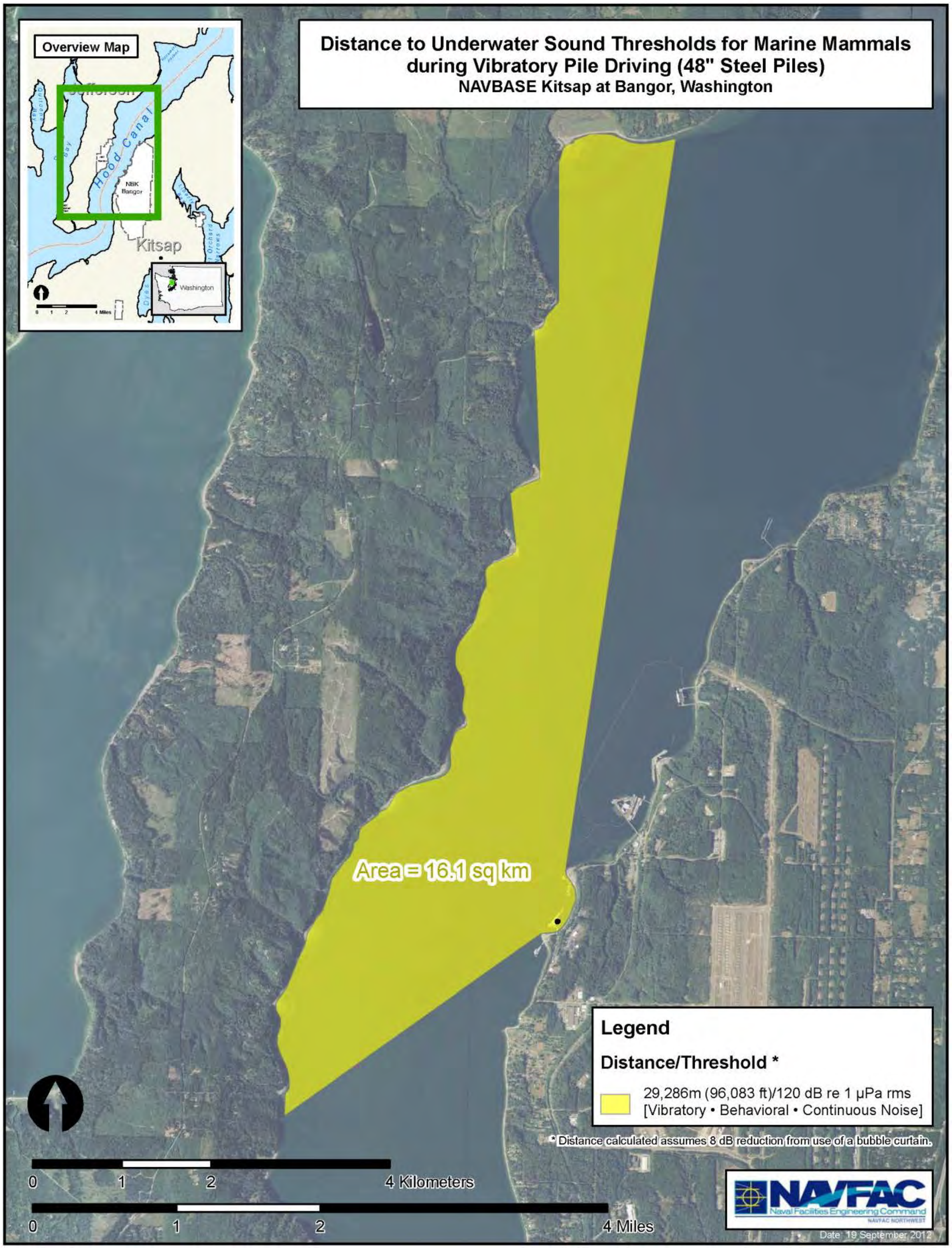


Figure 3-10. Distance to Underwater Sound Thresholds for Marine Mammals during Vibratory Pile Driving (48-inch steel piles)



Steller Sea Lion

Steller sea lions are present in the Hood Canal, but are only expected in the project area during October through May. The earliest documented occurrence of Steller sea lions along NAVBASE Kitsap Bangor occurred on September 30, 2010 when 5 individuals were observed at Delta Pier during daily surveys. During 2011 monitoring activities for the Test Pile Program, Steller sea lions were documented arriving on October 8 and were seen during surveys every day of the remaining 12 days of the project. Up to 4 individuals were sighted either hauled out at the submarines docked at Delta Pier or swimming in the waters just adjacent to the base.

The proposed project would occur between July 16 and September 30. It is anticipated that pile driving would begin July 16, or shortly thereafter, be limited to 20 actual days of pile driving, and be completed by September 30. Since Steller sea lions are not likely to be present in the project area during this time, no significant impacts to Steller sea lions would result with implementation of the Preferred Alternative.

The Navy concludes that an effects determination of "may affect, not likely to adversely affect" for Steller sea lions is appropriate. NMFS Northwest office concurred with the Navy's determination of effects in a letter dated January 11, 2013.

Marbled Murrelet

Marbled murrelet have been observed foraging and resting within 450 feet (tip of Carlson Spit) of the project area and out to 500 ft offshore. The underwater injury criterion for the marbled murrelet only applies 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 distances were calculated based on an assumption of 1,800 pile strikes per day. However, this number is the worst-case scenario and it is unlikely this number of strikes would occur each day of the 20 days of pile driving, if at all. In order to be conservative, the Navy carried out the noise exposure analysis assuming that all pile driving days could require the maximum number of pile driving strikes (e.g., 1,800) per day.

Based on the above analysis, it is estimated that marbled murrelets could be exposed to injurious sound pressure levels if they were within 50 feet (15 meters) of a 48-inch pile during impact pile driving. Since the cumulative SEL formula takes into account all impact pile strikes within a 24-hour period, the areas shown in Table 3-15 and depicted in Figure 3-11 are 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 50 feet (15 meters) after all strikes have been completed.

It is expected marbled murrelets would not be exposed to injurious underwater sound pressure levels under the Preferred Alternative. Based on 1,800 strikes per day, it is likely that the impact pile driving that would only occur for 35-40 min per day. The project location is located between the east side of the Service Pier and the shoreline, with the deepest pile driving occurring at approximately -30 MLLW. Numerous piles and structures, including a wave screen, are located between the shoreline and deeper waters. Additionally, the Service Pier is a location that experiences activities such as marine traffic, equipment use, and other human activities that could deter marbled murrelet presence in the area. Construction activities would occur outside of the forage fish spawning season which would contribute to a lower potential occurrence of foraging marbled murrelets in the injury zone. All pile driving would 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 would occur with the use of a bubble curtain to attenuate sound and, when turned on, could startle birds causing them to leave the area. Additionally, the Navy intends to monitor for marbled murrelets during impact pile driving in order to ensure no exposures to injurious sound pressure levels occur. The duration of monitoring would take place from 15 min prior to initiation through 15 min post-completion of pile driving to ensure marbled murrelet are absent from the area. Should a marbled murrelet enter the shutdown zone, pile driving would be immediately halted until the murrelet has left the area.

Table 3-15. Distance from Piles Where Underwater Noise for Impact Pile Driving Exceeds Marbled Murrelet Threshold

202 dB Cumulative SEL Underwater Injury Threshold Distances by Pile Size	
Pile Size	***Distance (m)***
48-inch[1,2]	15
36-inch[2]	9
24-inch[3]	2
20-inch[3]	3

Notes:

Cumulative SEL calculated as Single Strike SEL + 10 * log (# of pile strikes) and expressed in dB re 1 µPa2*sec.

1 Source levels based on measurements taken during the Test Pile Program and 8 dB of attenuation was applied for 48-24-inch piles.

2 The 36-inch peak and rms source level measurements were louder than the 48-inch measurements and were used for both piles sizes to provide a conservative estimate.

3 The 24-inch source level measurement during Test Pile Program was used for the 20-inch pile estimate and 5 dB of attenuation was applied.

Pile driving can generate airborne noise that could potentially result in disturbance to marbled murrelets. The USFWS has not issued a threshold for marbled murrelet communication masking as a result of pile driving. The distance to which masking may occur at the Bangor waterfront was calculated during the second Marbled Murrelet Science Panel using the Test Pile Program data. Since the Proposed Action is located near the Test Pile Program location and would be driving the same sized piles under the Preferred Alternative, the distance to the masking threshold is expected to be the same as that calculated by the panel. The distance to the marbled murrelet airborne threshold was estimated at 551 feet (168 meters) for pile driving 36-inch piles at the Bangor waterfront. All other construction noise associated with the project is not expected to exceed the masking zone. Figure 3-12 shows the distance graphically depicted on the landscape.

Masking of marbled murrelet vocalizations due to in-air pile driving noise has the potential to affect foraging behavior and efficiency because murrelets forage in pairs (Navy 2012c). However, it is likely that marbled murrelets would continue foraging, even if masking occurs (USFWS 2011); therefore, measureable effects to foraging due to potential masking effects are not anticipated. It is likely that marbled murrelets, like other marine birds, have habituated to the ambient noise levels of NAVBASE Kitsap Bangor's waterfront that occur on a daily basis. The masking zone will be monitored and shutdown will occur if marbled murrelets are sighted within the 168-meter shutdown zone. Therefore, no significant impacts to marbled murrelets from airborne noise are expected.

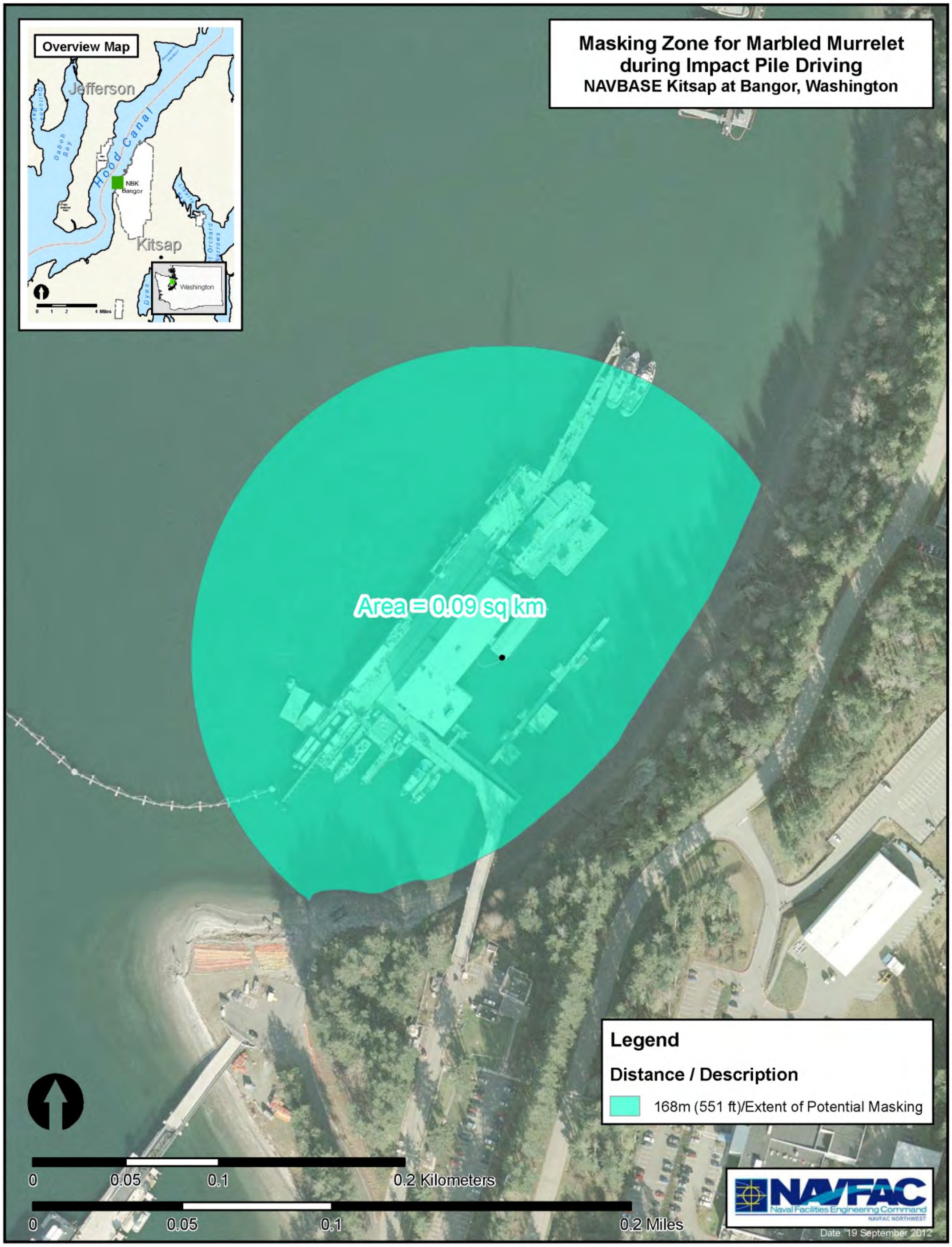
Although murrelets are present year round in Hood Canal, densities of murrelets are anticipated to be reduced during the in-water work window. For marbled murrelet monitoring, there would be implementation of a noise attenuation device for the limited impact pile driving conducted between 2 hours after sunrise to 2 hours before sunset from July 16 to September 23 with the in-water work window restrictions. The in-water work window hours from September 24 to September 30 would be revised to occur from sunrise to sunset. The duration of monitoring would take place from 15 min prior to initiation through 15 min post-completion of pile driving to ensure marbled murrelet are absent from the area. Should a marbled murrelet enter the shutdown zone, pile driving would be immediately halted until the marbled murrelet has left the area. With such BMPs and the short duration of in-water work anticipated (20 days), potential disturbance to marbled murrelets would be reduced and thus no significant impacts to marbled murrelets with implementation of the Preferred Alternative are anticipated. The Navy concludes that an effects determination of “may affect, not likely to adversely affect” marbled murrelet is appropriate. USFWS Washington office concurred with the Navy’s determination of effects in a letter dated January 28, 2013.

Bald Eagle

Although bald eagles are regularly observed at NAVBASE Kitsap Bangor and more specifically at Carlson Spit, they are not likely to be disturbed by pile driving. Airborne noise levels generated during pile driving would be much higher than ambient noise levels that occur along the waterfront on a daily basis. However, pile driving noise is expected to attenuate down to approximately 85 dBA (see Table 3-5) at the bald eagle nesting site located approximately 0.35 miles (560 m) north of project area. The time of construction would coincide with bald eagle nesting season (July 15 through August 15). The baseline airborne noise levels that occur at NAVBASE Kitsap Bangor on the waterfront range from 70 to 90 dBA (Navy 2010c) and hence, the expected attenuation level of 85 dBA falls within baseline noise levels at the base. Nesting activity is not expected to be effected by the construction as annual nesting has likely occurred uninterrupted and undisturbed at these noise levels in years past. With the expected attenuation level of noise at the nesting location and short duration of construction (40 days of in-water work, 20 pile driving days), no significant impacts to bald eagles would occur with the implementation of the Preferred Alternative.

Figure 3-11. Distance to Underwater Sound Thresholds for Marbled Murrelet during Impact Pile Driving (36" and 48" Steel Piles)

Figure 3-12. Masking Zone for Marbled Murrelet during Impact Pile Driving



Marine Mammals (Non ESA-Listed Marine Mammals)

California Sea Lion

California sea lions are abundant at NAVBASE Kitsap Bangor's waterfront and would likely be present during the in-water work window. Given the limited amount of structures within the project area for California sea lions to haul out on and the majority of sightings of hauled-out sea lions have been on and surround Delta Pier located approximately a mile north of the project area, airborne noise from pile driving is not anticipated to have significant impacts to hauled-out sea lions (Table 3-16, Figure 3-13, and Figure 3-14). There is potential for sea lions to come in to the nearshore portion of the project area to forage and thus be exposed to injurious threshold levels (Table 3-14, Figure 3-9). Noise from pile driving could potentially cause disturbance or injury if sea lions are present within the project area. However, the time of which pile-driving would occur would be when primary prey (i.e., salmonids) are not likely to be present in large numbers. With implementation of a noise attenuation device, marine mammal monitoring and shutdown zones, and the short duration of in-water work anticipated, no significant impacts to California sea lions are expected with implementation of the Preferred Alternative.

Harbor Seal

Harbor seals are present year-round and may be occurring in or very near the project area during in-water work. Takes are a possibility as noise generated would cause harbor seals to avoid the area and be temporarily displaced. With implementation of a noise attenuation device, marine mammal monitoring and shutdown zones, and the short duration of in-water work anticipated, potential takes by disturbance would have negligible short-term effects on individual harbor seals and would not result in population-level impacts. Therefore, no significant impacts to harbor seals would result with implementation of the Preferred Alternative.

Table 3-16. Calculated Distances to and the Area(s) Encompassed by the Non-ESA listed Marine Mammal Noise Thresholds In-Air from Pile Driving Steel Piles

Species	***Threshold***	***Airborne Behavioral Disturbance***		
		Distance (m)	***Distance (km)***	***Area (km^2)***
Pinnipeds (except harbor seal)	100 dB rms (impact disturbance)	42	0.042	0.005542
Harbor seal	90 dB rms (impact disturbance)	134	0.134	0.05641
Pinnipeds (except harbor seal)	100 dB rms (vibratory disturbance)	19	0.019	0.001134
Harbor seal	90 dB rms (vibratory disturbance)	60	0.06	0.01131

Notes:

All sound pressure levels are reported re 20 µPa rms (unweighted). Airborne ranges based on a spherical spreading model

m = meters

Figure 3-13. Area Exceeding Airborne Sound Thresholds for Pinnipeds during Impact Pile Driving (48" Steel Piles)

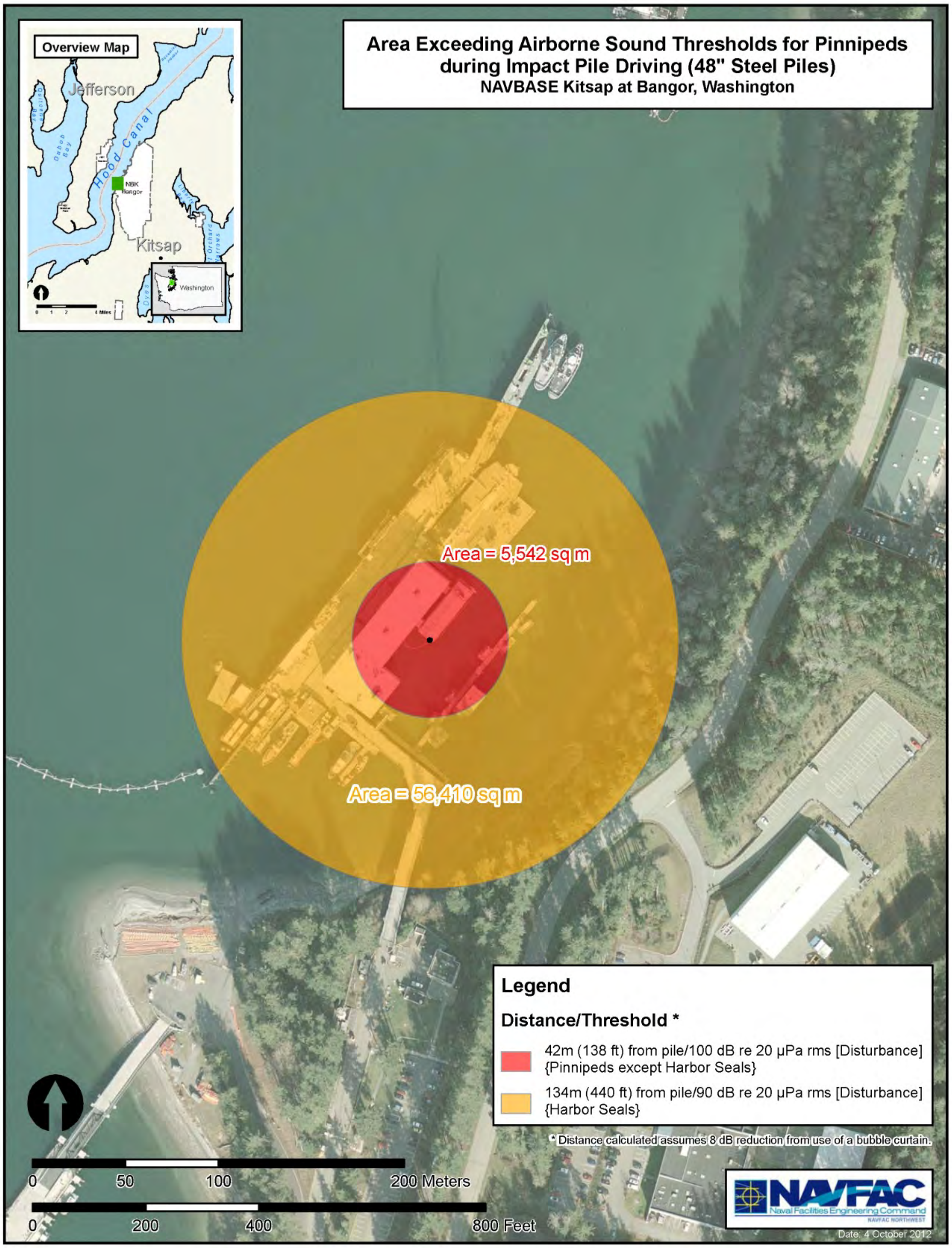
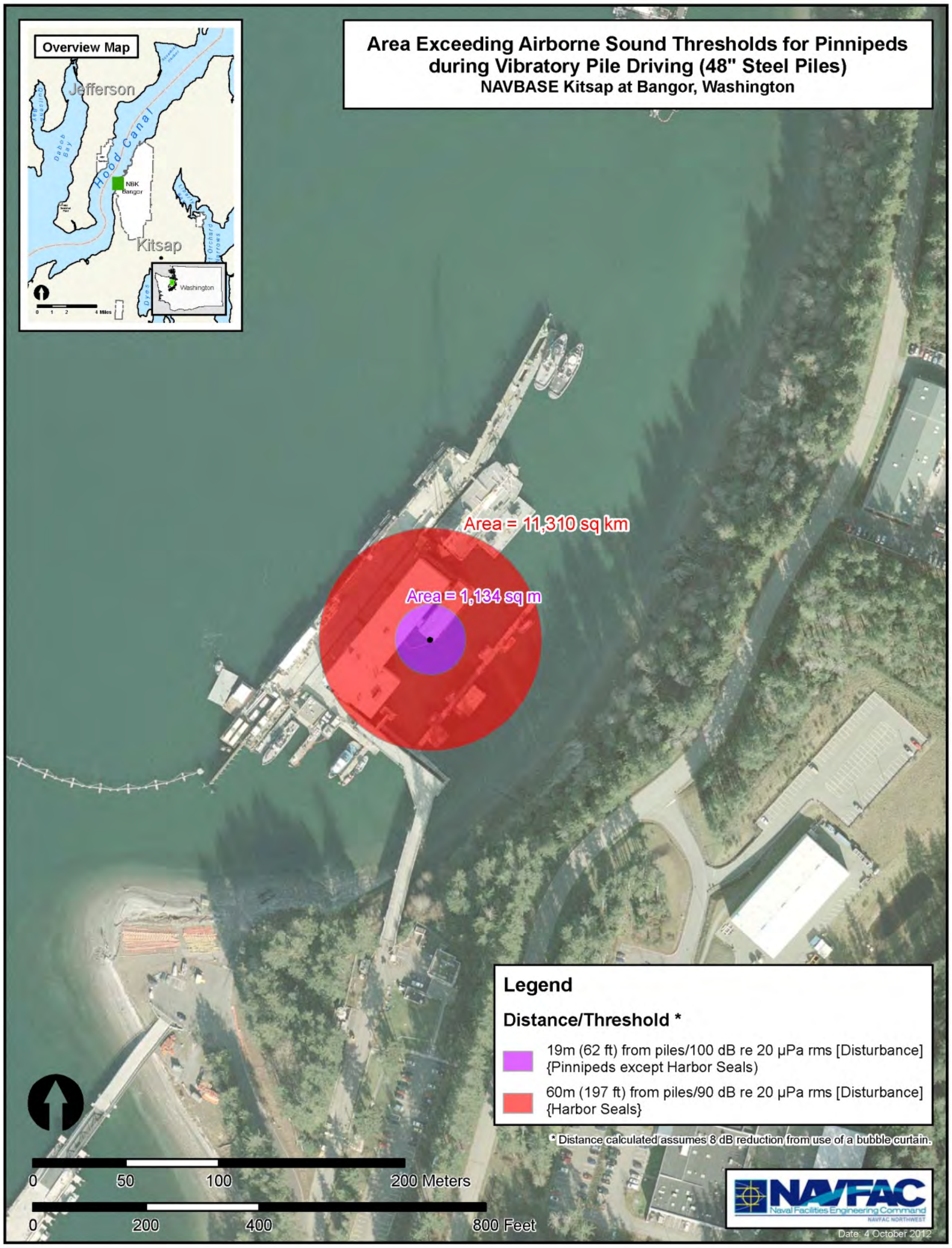


Figure 3-14. Area Exceeding Airborne Sound Thresholds for Pinnipeds during Vibratory Pile Driving (48" Steel Pile)



Dall's Porpoise and Harbor Porpoise

Dall's porpoise have historically occurred in Hood Canal and may be present year-round, although they have not been documented since 2009 (Tannenbaum et al. 2011). However, with implementation of a marine mammal monitoring plan and shutdown procedures, no exposure of marine mammals, including Dall's porpoise, to injurious sound pressure levels are expected. Furthermore, due to the absence of regular occurrence of Dall's porpoise adjacent to or within the vicinity of the project site and no more than 20 days estimated for pile driving, it is highly unlikely that Dall's porpoise would be present within the shutdown zone or exposed to underwater sound pressure levels that would qualify as disturbance. Therefore, no impacts to Dall's porpoise are anticipated with the implementation of the Preferred Alternative.

Harbor porpoise are not expected within injurious exposure distances to pile driving but may be exposed to behavioral noise disturbance thresholds (Figure 3-10). It is estimated that only a small number of this porpoise species may be affected as compared to the size of the entire stock. With implementation of a noise attenuation device, marine mammal monitoring and shut down zones, and the short duration of in-water work (20 days of pile driving activity), no significant impacts to harbor porpoise would result with implementation of the Preferred Alternative.

West Coast Transient Killer Whale

Transient killer whales are uncommon visitors but have been observed within Hood Canal between January and July (London 2006) feeding on harbor seals. As occurrences of transient killer whales in Hood Canal are infrequent, they would be considered rare during the timeframe of when the in-water work would take place. Should transient killer whales happen to be present during pile driving, take involving disturbance would likely happen as the whales would move further away from the nearshore areas for noise avoidance and potentially impacting their foraging behavior. With implementation of a noise attenuation device, marine mammal monitoring and shutdown zones, and the short duration of in-water work anticipated (20 days of pile driving activity), potential takes by disturbance would have negligible short-term effects on individual transient killer whale and would not result in population-level impacts. Therefore, no significant impacts to West Coast transient killer whales would result with implementation of the Preferred Alternative.

Essential Fish Habitat

The potential effects of the Preferred Alternative activities to fish and EFH in the context of the MSA were analyzed. To help identify Navy activities falling within the adverse effect definition for EFH and determination of affect, the EFH Final Rule (NMFS 2002) and 50 CFR § 600.910(a) were used as guidance.

Effects on EFH would be the same habitat effects as those described for listed salmonids and rockfish that occur within the nearshore areas as described under the ESA-Listed Species and Critical Habitat section. In summary, the project would affect fish habitat during in-water pile driving activities through bottom disturbance, localized increases in turbidity, a slight reduction in water quality, and temporary elevated noise levels. These effects would be minimized by implementing conservation measures designed to protect ESA-regulated species that would similarly protect and conserve Pacific Coast groundfish EFH, coastal pelagic species EFH, and Pacific Coast salmon EFH.

There would be no long-term impacts to the ecological function provided by existing eelgrass HAPC located adjacent to the project area and potentially used by juvenile and larval groundfish as minimization measures (Section 2.5) would be implemented to protect it. In addition, the Navy would use an attenuation device (e.g., bubble curtain) during all impact pile driving operations to reduce the transmission of increased sound through the water column.

Because of short-term duration of impacts to water quality, vegetation, water column, and sediment, no significant impacts to EFH would result with implementation of the Preferred Alternative. Due to these temporary impacts, however, the Navy concludes that an EFH effects determination of “may adversely affect” Pacific Coast groundfish, Pacific Coast salmon, and coastal pelagics EFH is appropriate. NMFS Northwest office concurred with the Navy’s determination of effects in a letter dated January 11, 2013.

3.4.3.3 Alternative 2

Terrestrial Wildlife

The distance from where a majority of marine birds were observed to the Alternative 2 location is approximately 900 ft. Impacts to marine birds with implementation of Alternative 2 would be insignificant as pile driving would not be required and construction noise generated would not differ significantly from baseline conditions along the NAVBASE Kitsap Bangor waterfront.

Aquatic Species

Marine Vegetation

There would be no impacts to eelgrass as it is not present within the Alternative 2 location. Other marine flora and fauna may be effected during installation of the anchor clumps; however, given the small area affected in comparison to the habitat available along the waterfront in general, no significant impacts to marine vegetation would occur with implementation of Alternative 2.

Benthic Invertebrates

Installation of anchor clumps would disturb bottom substrates and may inadvertently destroy less mobile invertebrates within the footprint of the anchor clumps. Hard shell subtidal clam occur within the project location but only a small localized area would be disturbed and would have no significant impacts to the rest of the hard shell clam populations occurring within the area. Filter feeding organisms adjacent to anchor clump installation may be affected by turbidity from bottom sediment disturbance. This would be temporary as the sediments would settle back down shortly after the clumps are secured.

Marine Fish

Noise would not be a concern as piles would not be driven under Alternative 2. There would be some noise from the construction barge and equipment over the water but would not be expected to exceed ambient underwater noise levels of 114 dB re 1 μPa (Slater 2009).

Special-Status Species

The location of Alternative 2 would be at a depth (-40 ft MLLW) deeper than where out-migrating juvenile salmon would normally occur and during a timeframe when juvenile presence is at its lowest for the area (July 16 – October 14). Steller sea lions have been documented at NAVBASE Kitsap Bangor from October through May. There may be some minor disturbance to California sea lions and harbor seals foraging in the nearshore environment but the time at which the project would be implemented would be during a time of low abundance for both species. Noise would also not be a factor to special-status species in general as noise generated from installing anchor clumps is not anticipated to exceed ambient underwater noise levels. Therefore, no significant impacts to special status species would occur with the implementation of Alternative 2.

Essential Fish Habitat

Placement of the overwater structure would prevent light penetration and thus impede or prevent growth of vegetation and leading to reduced prey availability. In addition, anchor clump installation would displace unconsolidated sediment EFH potentially used by Pacific Coast groundfish. The area impacted is very small in comparison to the EFH available immediately adjacent to the Alternative 2 location and the remainder of the waterfront in general. Installation of the anchor clumps may cause some turbidity but the action would be brief and temporary. The Navy concludes that implementation of Alternative 2 would have "no adverse effect" to Pacific Coast groundfish, coastal pelagic species, and Pacific Coast salmon EFH.

3.5 MARINE TRAFFIC AND TRANSPORTATION

3.5.1 Regulatory Overview

Several DoD directives apply to transportation planning and implementation at military bases, including:

- DoD Directive 4500.9 Transportation and Traffic Management;
- DoD Directive 4510.11 Transportation Engineering; and
- DoD 4500.9-R Defense Transportation Regulation.

For maritime traffic, the Protection of Naval Vessels rule (33 CFR 165.2010) issued under the authority in 14 USC 91 provides protective measures for both vessels and bases. This regulation establishes naval vessel protection zones surrounding Navy vessels in navigable waters of the U.S. Within a Naval Vessel Protection Zone, no vessel or person is allowed within 100 yards of a Navy vessel unless authorized by the U.S. Coast Guard or the Navy officer in command.

3.5.2 Affected Environment

For purposes of this analysis, the ROI for marine traffic and transportation is defined within Northern portion of Hood Canal and primarily on the eastern shoreline. The land based traffic ROI is the internal roadway system at NAVBASE Kitsap Bangor, and the surrounding street network adjacent to the base. The transportation resources include the various modes of transportation to, from, and within NAVBASE Kitsap Bangor, such as vehicles (e.g., cars and trucks), marine vessels, and public transit. Primary terrestrial transport is by automobile (including private passenger vehicles and taxis), although bus service to the base is available from some parts of Kitsap County. Primary access to the installation is via the primary roads of NW Luoto Road and NW Trigger Avenue which have a daily average traffic volume of 23, 721 vehicles and projected increase to daily average of 26,069 by 2016 (Navy. 2011a). The traffic volumes are existing volumes in 2008 with projected increases by 2016, which include existing and future traffic from base activities.

Existing civilian marine traffic on Hood Canal is recreational and commercial in nature, and involves vessels of various sizes. The majority of the recreational and commercial boating is seasonal, with the highest concentrations during spring and summer months. Commercial marine traffic includes fishing vessels, barges, tugboats, cargo vessels and other types of boats and ships.

Any support boat or barge used during in-water construction activities would generally be located in NAVBASE Kitsap Bangor restricted areas, away from normal navigational activities. Standard U.S. Coast Guard safety precautions would be used by all contractors.

Transportation impacts would be considered significant if the Proposed Action would cause a substantial increase in marine traffic that would impede Navy operations, other government marine traffic or civilian recreational marine traffic. For land-based traffic, the Proposed Action would cause a significant impact if additional traffic generated by the project would result in substantial traffic congestion at streets and intersections in the ROI. This would include increased congestion on the NAVBASE Kitsap Bangor street network, or on adjacent roadways located off the base.

3.5.3 Environmental Consequences

3.5.3.1 No-Action Alternatives

Under the No-Action Alternative, the construction and use of the barge mooring location for the proposed new research barge would not occur. Baseline transportation resources would remain unchanged. Therefore, there would be no significant impacts to land or marine transportation from implementation of the No-Action Alternative.

3.5.3.2 Preferred Alternative

During construction, weekly traffic from the Proposed Action would include: one pile driving barge, tugboats, small craft for construction observation and management, and up to 3 supply barges through the Hood Canal Bridge to transport construction materials to the project area and demolished materials from the project area. Additionally, other marine supply deliveries would take place using small craft during the 75 day construction period. This level of vessel traffic is not expected to adversely impact vessel transit routes in Hood Canal or Puget Sound. Whenever practicable, construction barges and other construction related vessels would be moored within the waterfront restricted area during non-active periods, to avoid creating navigational hazards to recreational or commercial boats within Hood Canal. The limited movement of construction related vessels in the unrestricted areas of Hood Canal is not expected to limit commercial or tribal fishing boat access to fishing and harvest areas. Because of the short duration and relatively minor amount of marine traffic resulting from implementation of the Preferred Alternative, no significant adverse impacts to commercial and recreational marine traffic, or indirect impacts to tribal treaty rights, are expected from project related marine traffic and transportation.

Because they would be scheduled to avoid peak weekday commute periods, the three additional weekly barge trips and associated bridge openings would result in negligible delays (on average 30 min per opening for a total of 90 min per week) for motorists traveling on State Route 104. The increase in weekly barge trips and associated bridge openings would not appreciably increase vessel traffic levels in the project area. Based on a review of data on Hood Canal Bridge openings, the bridge typically opens 400 to 450 times per year for an average opening of just over once per day. June through October represents the period with the majority of openings due to an increase in pleasure boat traffic. As discussed above, impacts to motorists would be minimized by avoiding barge trips through the Hood Canal Bridge opening during peak commute hours of 6:00 a.m. to 8:30 a.m. and 3:30 p.m. to 6:00 p.m., Monday through Friday.

There would be some limited truck traffic associated with the construction supplies and workers to the barge mooring location; this is not anticipated to exceed more than 10 trips daily and would not affect the baseline traffic volumes at NAVBASE Kitsap Bangor or the surrounding area. The primary access roads of NW Luoto and NW Trigger operate at acceptable levels of service and have capacity for the future level of traffic without reducing the existing level of service on these roadways. Further, because construction activities are often scheduled before typical peak commute hours, the impacts associated with construction vehicles are expected to be negligible. Therefore, no significant impacts to land transportation would occur with the implementation of the Preferred Alternative.

3.5.3.3 Alternative 2

Alternative 2 would result in similar marine and land based transportation impacts as the Preferred Alternative. Unlike the Preferred Alternative, Alternative 2 would involve daily government marine traffic, estimated at 12 inter-tidal area marine vessel trips per day, from the waterfront to the barge for the personnel working on the barge. This inter-tidal marine traffic would be within the restricted security zone and not affect recreational or commercial boating in Hood Canal. Therefore, similar to the Preferred Alternative, no significant impacts to transportation would occur with the implementation of Alternative 2.

3.6 SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

The ROI for socioeconomics and Environmental Justice is Kitsap County, the installation, and the restricted project area. Kitsap County demographics, which include unincorporated Silverdale and the cities of Bremerton and Poulsbo, are analyzed and compared to Washington State demographics in framing existing conditions for the socioeconomic and Environmental Justice analyses.

The threshold of significance is defined by identification of "disproportionately high and adverse" effects on minority and low-income populations from implementation of a proposed federal action.

3.6.1 Regulatory Overview

In 1994, the President issued EO 12898, *Federal Actions to Address Environmental Justice and Minority Populations and Low-income Populations*. The EO requires NEPA environmental documentation to include an examination of the demographics of project areas to identify and avoid "disproportionately high and adverse" effects on minority and low-income populations from implementation of a proposed federal action.

Another applicable regulation is EO 13045, Protection *of Children from Environmental Health Risks and Safety Risks.* The project areas are in a restricted area and not within any populated area. Due to the project location, this regulation is not discussed further in this discussion, as there are no schools or family housing areas, or other facilities for children located within the restricted areas of the NAVBASE Kitsap Bangor. All schools and attending children are off-base with the closest school Cougar Valley Elementary School, 3.26 miles from the industrial area and Proposed Action project site.

3.6.2 Affected Environment

NAVBASE Kitsap Bangor is located in Kitsap County with a population of 251,133 (US Census Bureau 2010) Within Kitsap County; the installation is bracketed by three communities:

- Silverdale, an unincorporated community, located south and adjacent to the installation with a population of 19,204;
- City of Poulsbo, located north of the installation with a population of 9,200; and
- City of Bremerton, located south of the installation with a population 37,729.

NAVBASE Kitsap Bangor employs 11,500 military personnel and 14,900 DoD civilians (Kitsap Economic Development Alliance 2010).

Outside of NAVBASE Kitsap Bangor, in Kitsap County, there is a total work force of approximately 127,418, the federal government and Navy are the primary employers with 15,615 active duty personnel and 11,490 DoD civilian between Puget Sound Naval Shipyard Bremerton and Naval Undersea Warfare Center Keyport (WAESD 2011).

The median household income in 2010 for Kitsap County was $59,549.00, higher than the Washington State median of $58,081.00. Home ownership and owner-occupied housing was higher in Kitsap County at 68.4 percent than the Washington State rate of 62.8 percent. Kitsap County has a lower percentage of persons living below poverty level at 9.4 percent compared to Washington State at 13.9 percent (U.S. Census Bureau 2010).

The racial profile of Washington, Kitsap County, including Silverdale, Poulsbo, and Bremerton are summarized below from U.S. Census estimates and other sources in Table 3-17.

Table 3-17. Racial Profiles for Washington State, Kitsap County, and Key Cities

Race	*Washington*	*Kitsap County*	*Silverdale*	*Poulsbo*	*Bremerton*
Caucasian	72.5%	79.6%	72.3%	78.3%	69.5%
Hispanic	11.2%	6.2%	6.3%	9.2%	9.6%
Two or More Races	3.7%	4.8%	5.7%	4.5%	6.2%
Asian	7.1%	4.8%	10.8%	5.6%	5.4%
Black	3.9%	2.5%	3.1%	1.1%	6.3%
American Indian	1.3%	1.4%	0.8%	0.9%	1.6%
Pacific Islander[1]	0.6%	0.9%	0.9%	0.3%	1.2%
Other Races	0.2%	0.2%	0.1%	0.3%	0.2%

Notes:[1] Native Hawaiian and other Pacific Islanders *Sources*: U.S. Census Bureau 2010 DP-1 Fact Finder

On average, Kitsap County had a similar racial profile when compared to Washington State with a lower percentage of Hispanic, Asian, and Black. There were slightly higher percentage, but not considered significant, in the Asian, American Indian, the Hawaiian and Pacific Islanders and two or more races populations as defined by the U.S. Census Bureau.

3.6.3 Environmental Consequences

3.6.3.1 No-Action Alternative

Under the No-Action Alternative, the construction and use of the barge mooring location for the proposed new research barge would not occur. Baseline socioeconomic conditions would remain unchanged. Therefore, no significant impacts to socioeconomics or environmental justice would occur with implementation of the No-Action Alternative.

3.6.3.2 Preferred Alternative

The Preferred Alternative is located in a restricted area and not within any populated area. The construction workforce would be predominantly from local sources, which would result in a short-term beneficial socioeconomic benefit for the regional economy. It is not anticipated that construction of the barge mooring location or the continued operation of the barge for research purposes would lead to any appreciable change to employment, population, racial composition, or socioeconomics in the area. Implementation of the Preferred Alternative would occur entirely on restricted Navy areas.

As discussed in preceding sections, the Preferred Alternative would not result in any significant air quality, water quality, transportation, public health and safety, or socioeconomic impacts. Further, there are no low-income or minority communities within the Proposed Action project area, and the ROI has a higher median household income and lower concentration of minorities than the state as a whole. Therefore, there would not be a disproportionately high and adverse effect on these communities with implementation of the Preferred Alternative.

3.6.3.3 Alternative 2

Alternative 2 is within the same general project area and is in the same affected environment as the Preferred Alternative. There are no air quality, water quality, transportation, public health and safety, or socioeconomic impacts identified that would disproportionately affect low-income or minority populations in Kitsap County and the surrounding communities. Implementation of Alternative 2 would comply with EO 12898, as no low-income or minority communities exist at the project location or vicinity, and there would not be a disproportionately high and adverse effect on these communities with implementation Alternative 2.

3.7 CULTURAL RESOURCES

For purposes of this analysis, the Area of Potential Effects (APE) is a focused area on the east side of the Hood Canal within the NAVBASE Kitsap Bangor waterfront. The submerged portion of the project would take place in areas already disturbed and therefore is not considered for further analysis. The Navy initiated Section 106 consultation with the Tribes; comments and input are noted in correspondence in Appendix A. The Navy determined that the Proposed Action would have no effect on historic properties and submitted an APE and the determination of no effects report for concurrence to the Washington State Historic Preservation Office (SHPO). The Washington SHPO concurred with the Navy's finding of no historic properties affected.

Cultural resources consist of prehistoric and historic districts, sites, buildings, landscapes, structures, artifacts, or any other physical evidence of human activity considered important to a culture, subculture, or community for scientific, traditional, religious, or other reasons. Cultural resources can be divided into three major categories: archaeological resources, architectural resources, and traditional cultural properties.

Archaeological resources (prehistoric and historic), are locations where human activity measurably altered the earth or left deposits of physical remains (e.g., stone flakes, arrowheads, or bottles). Archaeological resources can include campsites, trails, dumps, habitation sites, logging camps, cooking hearths, tool fragments, trash middens, and a variety of other features.

Architectural resources include standing buildings, dams, canals, bridges, cemeteries, landscapes, and other built-environment resources of historic or aesthetic significance.

Traditional cultural properties can include archaeological resources, buildings, neighborhoods, prominent topographic features, habitats, plants, animals, and minerals that Native Americans and other groups consider essential for the continuance of traditional cultures. Traditional cultural properties are discussed in section 3.8.

3.7.1 Regulatory Overview

Cultural resources on federal lands are managed in accordance with the National Historic Preservation Act (NHPA) of 1966, as amended. The threshold of significance of cultural resources is evaluated in the context of specific criteria established by the National Register of Historic Properties (NRHP). Under the NHPA, as amended, only significant cultural resources, known or unknown, warrant consideration with regard to adverse impacts from a proposed action. Architectural resources generally must be more than 50 years old to be considered for protection under the NHPA. However, more recent structures, such as Cold War-era military buildings, may warrant protection if they are "exceptionally important." To be considered a historic property, archaeological or architectural resources must meet one or more criteria as defined in 36 CFR 60.4 for inclusion on the National Register of Historic Places (NRHP). These criteria include association with an important event, association with a famous person, properties that embody the distinctive characteristics of a type, period, or method of construction, or that have yielded, or may be likely to yield, information important in prehistory or history. Resources must also possess integrity (i.e., their important historic features must still be present and recognizable).

Section 106 of the NHPA requires that, when a federal agency proposed an undertaking, it must: (1) identify historic properties (cultural resources) that could be affected; (2) evaluate what the effect on historic properties would be; and (3) in consultation with the State Historic Preservation Officer (SHPO), avoid, minimize, or mitigate any adverse effects on historic properties. The undertaking would be to install mooring at the Service Pier under the Preferred Alternative; and, placement of an anchored mooring location in-water and south of Carderock Pier under Alternative 2. Indirect effect takes into consideration the effect impacts on historic properties and the addition of a new element within the view shed of neighboring historic properties may have on that property (ies).

3.7.2 Affected Environment

3.7.2.1 Archeological Resources

The Navy conducted a field reconnaissance survey of various tracts of land within the installation in 1992 to create a probabilistic model of cultural resources within NAVBASE Kitsap Bangor boundaries (Lewarch et al. 1993). The field effort involved intensive pedestrian survey of the entire coastline with subsurface inspection conducted at every 10 to 20 m, due to a high probability for precontact resources. Areal sampling was conducted along flat and gently sloping shoreline and every 25 m along waterfront bluffs. The overall waterfront was included in the intensive sampling. This survey resulted in the identification of shell-midden sites within the NAVBASE Kitsap Bangor (Lewarch et al. 1993), including one 45KP108 located within 1,312 feet (400 meters) of the Service Pier.

Prior survey reports mentioned that shell midden deposits had been observed on sand spits and stream mouths during Navy construction. The staff concluded that these areas, and the sites within them, had likely undergone much disturbance with leveling, filling, and general construction occurring along the shore (Lewarch et al. 1993).

The shell middens identified in the 1992-3 surveys were further evaluated in 1997. Of the shell middens further evaluated, the Navy determined that only (45KP108); the Carlson Spit Shell Midden was eligible for listing in the NRHP (Lewarch et al. 1997). As the submerged portion of the shoreline was previously disturbed it was not further analyzed.

In 2005, the proposed construction of a new pier (Carderock) near the Carlson Spit Shell Midden led to further delineation of the shell midden to confirm that the pier project was outside of the area of potential effect. While the midden remained outside of the project boundaries, further investigations determined that the site extended beyond the previously known boundary (Butler and Bowden 2005). The Preferred Alternative site is located on the north side of Carlson Spit 1,198 feet (365 meters), but not on the Carlson Spit. Alternative 2 is in the water and south of Carlson Spit 1,132 feet (345 meters) and is also not on Carlson Spit.

3.7.2.2 Architectural Resources

Previous cultural resource surveys conducted by the Navy inventoried Building 7100 (Service Pier) and Building 7101 (Port Operations building). The Service Pier was constructed in 1981 and has had numerous modifications. The Port Operations building is upland from the proposed project area and was constructed in 2003. In 2011 the SHPO concurred with the Navy's determination that the Service Pier was not eligible for inclusion in the NRHP because the facility lacked exceptional importance. In 2012 the Navy determined that Building 7101 was not eligible for listing in the NRHP because it was constructed in the post-Cold War period. Other structures in this area were also constructed in the post-Cold War period.

3.7.3 Environmental Consequences

3.7.3.1 No-Action Alternative

Under the No-Action Alternative, the construction and use of the barge mooring location for the proposed new research barge would not occur. Baseline cultural resources would remain unchanged. Therefore, no significant impacts to cultural resources would occur with implementation of the No-Action Alternative.

3.7.3.2 Preferred Alternative

The shell midden site (45KP108) is the closest NRHP eligible property to the Preferred Alternative and is 1,198 feet (365 meters) away; therefore, construction of the barge mooring would not have a direct or indirect impact to cultural resources. As such, no significant impacts to cultural resources would occur with implementation of the Preferred Alternative.

3.7.3.3 Alternative 2

The shell midden site (45KP108) is the closest NRHP eligible property to Alternative 2 and is 1,132 feet (345 meters) away; therefore, construction of the barge mooring would not have a direct or indirect impact to cultural resources. As such, no significant impacts to cultural resources would occur with implementation of Alternative 2.

3.7.3.4 Inadvertent Discovery Protocols

In the unlikely event historic properties or cultural materials such as archaeological deposits or human remains are encountered during construction, ground disturbing activities in the vicinity of the find will immediately cease and the Navy will initiate consultation with the SHPO and affected tribes, as appropriate.

3.8 AMERICAN INDIAN TRADITIONAL RESOURCES

Traditional cultural property is a property that has association with the cultural practices and beliefs that are (1) rooted in the history of a community, and (2) are important to maintaining the continuity of that community's traditional beliefs and practices. These can be evaluated for NRHP eligibility. However, even if a traditional cultural property is determined to be not eligible for the NRHP, it may still be significant to a Native American tribe and protected under other laws and regulations. The significance of a traditional cultural property is usually determined by consulting with the appropriate entity.

3.8.1 Regulatory Overview

Several other federal laws and regulations have been established to manage cultural resources, including the Archaeological and Historic Resources Preservation Act, the American Indian Religious Freedom Act (1978), the Archaeological Resources Protection Act, and the Native American Graves Protection and Repatriation Act (NAGPRA). Indian Sacred Sites; EO 13175, Consultation and Coordination with Indian Tribal Governments; the presidential memorandum dated November 5, 2009, emphasizing agencies' need to comply with EO 13175.

3.8.1.1 Native American Tribal Treaty Rights and Resources

The Navy has implemented a policy for consultation with federally recognized Indian Tribes, on actions with the potential to impact protected tribal resources, tribal rights, or Indian lands. This policy, included in Secretary of the Navy Instruction 11010.14A (Navy 2005) and Commander, Navy Region Northwest Instruction 11010.14 (Navy 2009), describes the Navy's process and responsibilities during consultation. Federally recognized American Indian Tribes that have adjudicated tribal treaty rights in Hood Canal that include the project area are: Skokomish, Port Gamble S'Klallam, Jamestown S'Klallam, Lower Elwha Klallam, and Suquamish Tribes.

3.8.1.2 Usual and Accustomed Fishing Grounds and Stations

A federal court ruling in United States v. Washington (aka the Boldt Decision) established that Western Washington tribes who were parties to various treaties with the United States have a right of access to their "usual and accustomed fishing grounds and stations" and up to 50 percent of the fin and shellfish in the treaty area. The Skokomish have primary U&A rights in the project area. Under the Hood Canal Agreement between the Skokomish and S'Klallam tribes, the S'Klallam tribes also have fishing rights in the Hood Canal that include the project area. The Suquamish Tribe has secondary U&A in the project area. Secondary U&A means that the tribe cannot exercise their tribal treaty rights south of the Hood Canal Bridge (that includes the project area) without the express permission of the Skokomish Tribe. To date, that permission has not been granted.

3.8.1.3 Government to Government Consultation

In accordance with Executive Order 13287 and DOD and Navy instructions, the Navy initiated government-to-government consultation regarding the Proposed Action and potential impacts to tribal treaty rights with the Skokomish, Port Gamble S'Klallam, Jamestown S'Klallam, Lower Elwha Klallam, and Suquamish Tribes in July 2012. The Port Gamble S'Klallam Tribe and the Point No Point Treaty Council provided comments and concerns regarding the Proposed Action during the public comment period (summarized in Appendix G). The Navy conducted government-to-government consultation with the tribes from August 2012 to May 2013. During the consultation the Navy addressed the written concerns of the Port Gamble S'Klallam Tribe concerning the project. Consultation with the tribes was completed in May 2013.

3.8.2 Affected Environment

The Tribes have identified shellfish as resources located at Bangor that are of particular traditional importance. In a cooperative agreement of 1997, signed between the Navy and the Skokomish, Port Gamble S'Klallam, Jamestown S'Klallam, Lower Elwha Klallam Tribes, the parties agreed the signatory Tribes would have exclusive access to one Bangor beach for the purposes of shellfishing and the Navy would have the other beaches. This tribal beach (also known as Bangor Beach) is located approximately 2,700 feet northeast of the project area, and is separated from the project area by a 110 to 115 foot bluff. Four local tribes have an agreement with the Navy regarding access to, and use of, the beach. There are two commercial geoduck tracts located outside of the Naval Restricted Area in Hood Canal to the west of the Service Pier and north to KB Dock, located at depths of 250 to 300 feet. The geoduck tracts along the portions of the waterfront and west of Bangor Beach are currently listed as inactive by the Department of Fish and Wildlife. Inactive is only an indication that the tracts are not being harvested in the current management year. Known fishing and shellfish harvest seasons within Hood Canal, as of March 2013, include:

- Dungeness Crab – Late July and March
- Commercial Geoduck – Mid-July through March
- Ling Cod – May through September

No tribal finfishing is permitted within the Naval Restricted Area.

3.8.3 Environmental Consequences

3.8.3.1 No-Action Alternative

Under the No-Action Alternative, the construction and use of the barge mooring location for the proposed new research barge would not occur. Baseline Native American Indian resources and Indian use of Bangor would remain unchanged. Therefore, no significant impacts to Indian resources or treaties rights would occur with implementation of the No-Action Alternative.

3.8.3.2 Preferred Alternative

Under the Preferred Alternative, access to the waterfront area would remain unchanged. Access to Bangor Beach (tribal fishing beach), commercial geoduck tracts located outside of the Naval Restricted Areas, and Dungeness crab fishing and finfishing would not be impeded. The quantity of geoduck, finfish, and shellfish inventories would not be significantly impacted by direct impacts from project construction or indirect impacts from shading or increased turbidity and sediment transport within the project area drift cell. Accordingly, impacts to American Indian traditional resources and tribal treaty rights would not be significant.

3.8.3.3 Alternative 2

Any impacts associated with implementation of Alternative 2 would be the same as those previously described under the Preferred Alternative.

3.9 SUMMARY OF ENVIRONMENTAL CONSEQUENCES

As summarized in Table 3-18, implementation of the Preferred Alternative 1, Alternative 2, or the No-Action Alternative would not result in significant impacts to any resource area when considered individually in the context of NEPA, including both direct and indirect impacts.

Table 3-18. Summary of Potential Environmental Consequences by Resource

Resource	*Alternative 1(Preferred)*	*Alternative 2*	*No Action Alternative*
Air Quality	Based on the level of emissions from the construction vehicles, this alternative would not exceed EPA, Ecology, or PSCAA thresholds or GHG reporting thresholds. This Alternative would not result in significant impacts to air quality.	Based on the level of emissions from the construction vehicles, this alternative would have less impacts then the Preferred Alternative with less construction vehicle activity. This alternative would not exceed EPA, Ecology, PSCAA thresholds or GHG reporting thresholds. This Alternative would not result in significant impacts to air quality.	No Impact
Noise	Short-term (40 days) of increased airborne noise (20 days associated with pile driving) above ambient noise levels at NAVBASE Kitsap Bangor. This alternative would not result in significant impacts to sensitive noise receptors (e.g., residences to the south and shellfish harvest beach to the north) as attenuation to ambient levels of 70 dBA to 60 dBA would be achieved before noise would reach these receptors. See Biological Resources for evaluation of underwater noise. Exempt from meeting Maximum Permissible Environmental Noise Levels as required by WAC 173-60 as long as construction occurs from 7:00 a.m. to 10:00 p.m. This alternative would not result in significant impacts from noise.	Short-term (10 days) of increased barge and crane activity would generate noise impacts; however, sensitive noise receptors would not be impacted as noise would be localized and attenuate long before reaching sensitive noise receptors. Exempt from meeting Maximum Permissible Environmental Noise Levels as required by WAC 173-60 as long as construction occurs from 7:00 a.m. to 10:00 p.m. This alternative would not result in significant impacts from noise.	No Impact
Water Quality and Marine Sediment	Short term sedimentation disturbance would occur. There would be some sediment transport during the construction activity; however, the resulting turbidity would settle in the project area drift cell in a short term (within hours). The sediment would not be transported in any significant amount to the drift cell to the north, but captured on the south side of Three Spits. This would be a short term impact and not result in significant impacts to water quality and marine sediments.	Short term sedimentation disturbance would occur, during the installation of anchor buoy. However, the turbidity would be less the Preferred Alternative and the turbidity would settle within hours. This disturbance is short term and this alternative would not result in significant impacts to water quality and marine sediments.	No Impact
Biological Resources	There would be temporary (20 days) noise disturbance (airborne and underwater) that could potentially expose ESA-listed species to injurious noise levels from impact pile driving. Resident and migratory birds that occur at NAVBASE Kitsap Bangor waterfront have likely acclimated to existing baseline noise levels that are not much lower than anticipated airborne noise from pile driving. Eelgrass is present to the south of the project area and would be avoided during construction. Some macroalgae and benthic	There would be no impacts to terrestrial wildlife (birds). Short-term water quality impacts would occur during installation of the anchor clumps that may cause fish to temporarily avoid the area. However, work would be conducted within allowable work window when juvenile salmonids are least likely to be present and adults would likely navigate by without delay. Therefore, no impacts to ESA-listed salmonids are expected. There would be no significant impacts to marine mammals or marbled murrelet. Temporary disturbance to water quality may	No Impact

Table 3-18. Summary of Potential Environmental Consequences by Resource

Resource	*Alternative 1(Preferred)*	*Alternative 2*	*No Action Alternative*
	invertebrates may inadvertently be destroyed by piles and overwater shade but no long-term impacts to the population along the waterfront are expected. Fish would likely avoid the area during pile driving and work would be conducted within the in-water work window when juvenile salmonids are not expected. Whales and porpoises are not documented in the construction areas and not anticipated to be exposed to injurious noise threshold exposure. Pinnipeds (California sea lions and harbor seals) could be exposed to injurious or behavioral noise thresholds due to their common occurrence at the installation. Steller sea lions are not expected during the construction period. Temporary and localized disturbance to water quality during pile driving and new overwater shade would result in a small reduction of macroalgae, but no long-term impacts to EFH are expected. With implementation of BMPs, in-water work window, marine mammal and marbled murrelet monitoring, and noise attenuation, no significant impacts to biological resources are expected.	affect EFH and installation of anchor clumps would displace unconsolidated sediment EFH potentially used by Pacific Coast groundfish. Areas displaced are small in comparison to adjacent available EFH and no significant impacts to habitat (EFH) would result. With implementation of BMPs and project minimization measures, no significant impacts to biological resources are expected.	
Marine Traffic and Transportation	The Preferred Alternative would not adversely affect existing recreational or commercial marine traffic as the existing security barrier currently restricts traffic up to 2,500 ft from the installation shoreline. The additional marine traffic associated with the Preferred Alternative is estimated at three construction barges per week (materials import/demolition material export), which would result in 30-minute cycles for the opening and closing of the Hood Canal Bridge. Each barge, accessing the installation via Hood Canal Bridge, would be scheduled to avoid morning and afternoon peak traffic periods (i.e., 6:00 to 8:30 a.m. and 3:30 to 6:00 p.m.). During construction, the Preferred Alternative would result in short-term increases in vehicular traffic on the surrounding road network and on base internal roadways. There is no change in the existing operations; therefore, there is no	Alternative 2 would have similar impacts, with shorter-term vehicular construction traffic. This alternative, similar to the Preferred Alternative, would add up to three construction barge trips a week transiting the Hood Canal Bridge. From a transportation perspective, there would be more daily Navy vessel traffic moving personnel and materials to and from barge location. However, these daily trips would not result in significant impacts to the marine transportation network because that marine traffic would be contained within the restricted area.	No Impact

Table 3-18. Summary of Potential Environmental Consequences by Resource

Resource	*Alternative 1(Preferred)*	*Alternative 2*	*No Action Alternative*
	anticipated increase in vehicular or marine traffic for future operations. While the Preferred Alternative would cause some limited increase in construction vehicles, it would not result in significant impacts to the installation's land transportation network or the adjacent Hood Canal marine transportation network during construction.		
Socioeconomics and Environmental Justice	Review of the census data and the demographics in the area determined there would be no disproportionate impacts to minority, low income, schools or children with the implementation of this alternative. There would be no environmental justice impacts from the Proposed Action.	Review of the census data and the demographics in the area determined there would be no disproportionate impacts to minority, low income, schools or children with the implementation of this alternative. There would be no environmental justice impacts from the Proposed Action.	No Impact
Cultural Resources	The shell midden site (45KP108) is the closest NRHP eligible property to the Preferred Alternative and is 1198 feet (365 meters) away; therefore, construction of the barge mooring would not have a direct or indirect impact to cultural resources. As such, no significant impacts to cultural resources would occur with implementation of the Preferred Alternative.	The shell midden site (45KP108) is the closest NRHP eligible property to Alternative 2 and is 1132 feet (345 meters) away; therefore, construction of the barge mooring would not have a direct or indirect impact to cultural resources. As such, no significant impacts to cultural resources would occur with implementation of Alternative 2.	No Impact
American Indian Traditional Resources	Under the Preferred Alternative, access to the waterfront area would remain unchanged. Access to Bangor Beach (tribal fishing beach), commercial geoduck tracts located outside of the Naval Restricted Areas, and Dungeness crab fishing and finfishing would not be impeded. The quantity of geoduck, finfish, and shellfish inventories would not be significantly impacted by direct impacts from project construction or indirect impacts from shading or increased turbidity and sediment transport within the project area drift cell. Accordingly, the impacts to Indian resources and tribal treaty rights would not be significant.	Under the Alternative 2, access to the waterfront area would remain unchanged. Access to Bangor Beach (tribal fishing beach), commercial geoduck tracts located outside of the Naval Restricted Areas, and Dungeness crab fishing and finfishing would not be impeded. The quantity of geoduck, finfish, and shellfish inventories would not be significantly impacted by direct impacts from project construction or indirect impacts from shading or increased turbidity and sediment transport within the project area drift cell. Accordingly, the impacts to Indian resources and tribal treaty rights would be less than significant.	No Impact

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CHAPTER 4.0 CUMULATIVE IMPACTS

CEQ regulations implementing the procedural provisions of NEPA define cumulative impacts as:

> "…the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time." (40 CFR 1508.7).

Each resource, ecosystem, and human community must be analyzed in terms of its ability to accommodate additional effects, based on its own time and space parameters. Therefore, cumulative effects analysis normally would encompass a ROI or geographic boundaries beyond the immediate area of the Proposed Action, and a time frame including past actions and foreseeable future actions, to capture these additional effects.

For the Proposed Action to have a cumulatively significant impact to an environmental resource, two conditions must be met. First, the combined effects of all identified past, present, and reasonably foreseeable projects, activities, and processes on a resource, including the effects of the Proposed Action, must be significant. Second, if there is a significant cumulative impact, the Proposed Action must make an appreciable contribution to that significant cumulative impact. In order to analyze cumulative effects, an ROI must be identified for which effects of the Proposed Action and other past, present, and reasonably foreseeable actions would occur.

4.1 PAST, PRESENT, AND REASONABLY FORESEEABLE PROJECTS

For purposes of the cumulative effects analysis, the ROI is NAVBASE Kitsap Bangor for all resources except water resources (which use the watershed basin WRIA 15 as the ROI) and air quality (which uses Kitsap County as the ROI). NAVBASE Kitsap Bangor is restricted from public access. The impacts associated with the Proposed Action are localized and would generally only contribute to cumulative impacts in the immediate vicinity of the project.

The Proposed Action consists of in-water work. Although nearby actions with only terrestrial impacts are noted in the past, present, future projects, they are included to establish the general baseline and are not discussed in the resource sections, as there is no cumulative effect related to the Proposed Action.

This cumulative impacts analysis depends on the availability of data and the relevance of effects of past, present, and future actions. Although certain data may be available for extensive periods in the past, other data (e.g., water quality) may be available for much shorter periods. Because specific information and data on past projects and action are usually scarce, the analysis of past effects is often qualitative (CEQ 1997).

Past, present, and reasonably foreseeable future actions in the ROI are briefly described in Table 4-1.

Table 4-1. Past, Present, and Reasonably Foreseeable Future Projects at NAVBASE Kitsap Bangor and the ROI

Project	*Project Description*	*Project Timeframe*		
		Past	*Present*	*Future*
Road Improvement	Road clearing and grading are continuous. Potential loss of vegetation and habitat can be expected from road improvements, including those for the D5 Road and Transfer Facilities and Missile Haul Road.	X	X	X
Mission Support Facilities	Mission support facilities may include activities or projects such as the addition of power booms, installation of emergency power generation capability, and other activities to support facilities or operations.	X	X	X
Navy Surface Warfare Center Carderock Division Detachment Bremerton Command Consolidation	Construction of in-water facilities included a new access pier (8,800 ft^2), pontoon (21,600 ft^2), vessel overwater footprint (13,623 ft^2) and associated pier mooring components and 102 new steel piles. Project tasks also included road improvements to Carlson Spit Access Road, a 23,000 ft^2 building, and the addition of 100 workers. The Pier provides location support to the Carderock Division for its missions.	X		
Waterfront Restricted Area and Security Barriers	This project includes construction of enclave fencing for the entire NAVBASE Kitsap Bangor Waterfront Restricted Area and an associated parking lot. Project entails the removal of 55 acres of forest stands, 9 acres of non-forest vegetation, fill 1.8 acres of wetlands, and create 23 acres of impervious surfaces. Mitigation action would restore tidal influence to Cattail Lake, thereby increasing intertidal habitat and providing a benefit to the natural environment.		X	X
Electromagnetic Measurement Range	The proposed project includes installation of sensor equipment, including an underwater instrument array, data/power cables, a pile-supported platform, an on shore navigation aid, and an upland monitoring system.			X
Service Pier Extension	Homeporting of Two Additional Seawolf-class Submarines at Bangor. Construction of an extension to the Service Pier at (33,000 ft^2), a new Pier Services and Compressor Building (2,100 ft^2) on the existing pier, upland Maintenance Support Facility (50,000 ft), and a 421-car parking lot with associated outdoor storage (4,000 ft^2). The project will be addressed in an EIS.			X
Explosive Handling Wharf 1 (EHW-1) Maintenance	Maintenance over multiple years to replace deteriorated piles; the most recent phase proposes to install 29 30-inch steel piles. Phased repair of this structure is expected to continue until 2024.		X	X
Explosives Handling Wharf (EHW-2)	Construction and operation of a second EHW adjacent to the existing EHW. The main wharf would lie approximately 600 ft offshore with piles at a depth of 60-100 ft and would include an operations support building and facility support equipment such as heavy duty cranes, power utility booms, six lightning protection towers, and camels. Pile supported entrance and exit trestles connecting the wharf to shore would also be constructed. The Navy prepared an EIS for this action; the Record of Decision was signed in May 2012.		X	X

Table 4-1. Past, Present, and Reasonably Foreseeable Future Projects at NAVBASE Kitsap Bangor and the ROI

Project	*Project Description*	*Project Timeframe*		
		Past	*Present*	*Future*
	EHW-2 Mitigation To compensate for unavoidable impacts to aquatic resources and ensure no net loss of these resources, the Navy purchased credits from the Hood Canal In-Lieu Fee Program. To restore construction areas, the Navy will implement a re-vegetation plan for construction laydown areas and temporarily disturbed areas. To improve scientific understanding of marine species, the Navy will fund research studies on: 1) ocean acidification, and 2) Hood Canal chum salmon. To improve salmon production and harvest in Hood Canal, the Navy will fund improvements at three existing fish hatcheries on Hood Canal and replacement of one finfish spawning facility on Hood Canal. To improve shellfish production and harvest, the Navy will fund: 1) improvements to beach substrate and 3 years of shellfish seeding on 24 acres of beach; 2) 5 years of shellfish seeding on priority shellfish enhancement areas in Hood Canal and adjacent Admiralty Inlet; 3) construction of a shellfish wet lab, education, and training building at Port Gamble; 4) construction of a floating shellfish nursery at Port Gamble; and 5) geoduck surveys and a geoduck pilot research study. In addition, the Navy will fund acquisition and preservation of upland habitat at Port Gamble.			
Force Protection and Weapons Security Measures	Installation and operation of security measures including: construction of an Auxiliary Reaction Force Facility (14,000 ft^2), an Armored Fighting Vehicle Operational Storage Facility (16,146 ft^2), altering two buildings for a new armory (2,500 ft^2), and replacing an Alert Force Garage (2,530 ft^2) with new paved access road.		X	X
Transit Protection System	Construction of pier and shore facilities at KB Dock to support vessels and personnel that protect Navy submarines transiting to and from the Bangor waterfront.			X
Waterfront Restricted Area Land-Water Interface	Objective is to provide security upgrades for the Waterfront Restricted Area by constructing two Waterfront Restricted Area Land-Water Interface barriers, which would connect both ends of the Waterfront Restricted Area enclave to the existing floating barriers. The Land-Water Interface barriers would extend from the high water mark to the terminations of the Port Security Barriers. This project will be addressed in an EIS.			X
Pile Repair and Replacement Program	Under the Pile Repair and Replacement Program, the Navy plans to repair or replace structurally unsound piles at various Navy installations in the Puget Sound areas over a five-year period beginning October 2013. At NAVBASE Kitsap Bangor up to 143 piles would be replaced/repaired under planned repair and replacement projects at KB Dock and EHW-1, as well as emergent repair projects over the five year project. Though there		X	X

Table 4-1. Past, Present, and Reasonably Foreseeable Future Projects at NAVBASE Kitsap Bangor and the ROI

Project	***Project Description***	***Project Timeframe***		
		Past	***Present***	***Future***
	are no planned repairs at the Service Pier, emergent repairs may be conducted as they arise over the five year period.			
Northwest Training Range Complex	A wide variety of military training activities are conducted in the W-237 operating area west of Washington, including training exercises in anti-air, anti-surface, and anti-submarine warfare; electronic combat exercises; mine countermeasures training; naval special warfare training; and various support operations. The Navy has developed policies and procedures to avoid harm and to minimize the effects of Navy training on terrestrial and marine species and habitats. This action involves activities at Floral Point, which is within the ROI for this cumulative analysis. The Navy prepared an EIS for this action; the Record of Decision was signed in October 2011.	X	X	X
Swimmer Net System Project	The Navy Strategic Systems Program (SSP) proposes to conduct in-water tests of a Swimmer Defense System one at NAVBASE Kitsap, Bangor, Washington. The system is designed to deter, detect, and localize swimmer or diver intrusion into a protected area. The system consists of barrier panels attached to an existing pier structure. The panels would be stabilized at the seafloor using steel plate anchors. The system would be installed in November 2013, as a pilot project in place for up to a year. The system would be removed at the conclusion of the test.			X
Northwest Training and Testing (NWTT)	The Navy's Proposed Action is to conduct training and testing activities primarily within existing range complexes, operating areas, testing ranges and select Navy pier side locations in the Pacific Northwest. The Proposed Action includes pier side sonar testing conducted as part of overhaul, modernization, maintenance and repair activities at Puget Sound Naval Shipyard in Bremerton, NAVBASE Kitsap Bangor and Naval Station Everett. Action will also reassess the environmental analyses of Navy at-sea training and testing activities contained in two previous EISs/OEISs and various environmental planning documents, and consolidate these analyses into a single environmental planning document. This reassessment will support reauthorization of permits under the Marine Mammal Protection Act and the Endangered Species Act. The two EIS/OEIS documents being consolidated are: • Northwest Training Range Complex EIS/OEIS, completed with community input in 2010 • Naval Sea Systems Command Naval Undersea Warfare Center Keyport Range Complex Extension EIS/OEIS, completed with community input in 2010			X

In addition to these identified projects, non-Navy shoreline development along Hood Canal over the last 20 years has been relatively intense. The area is primarily residential, with some scattered commercial uses. Future general development in the Hood Canal watershed would increase impervious surface and affect vegetation and soils, with potential impacts to water quality of streams and Hood Canal. Non-Navy projects including Hood Canal Bridge – East Half Replacement, Olympic View Marina, Kitsap Memorial State Park, Pleasant Harbor Marina and Golf Resort, and Misery Point Boat Launch were considered but eliminated from the cumulative impacts analysis because they are outside of the ROI.

4.2 ASSESSMENT OF CUMULATIVE IMPACTS BY RESOURCE

4.2.1 Air Quality

The ROI for air quality impacts is the Puget Sound AQCR which includes Kitsap County (40 CFR 81.32). As discussed in Section 3.1, Kitsap County is not designated as a non-attainment or maintenance area by the EPA, so a conformity review would not be performed (USEPA 2001). Past development and subsequent operation of emission sources in Kitsap County have not contributed to exceedances of the NAAQS and the region is in attainment for all applicable air quality standards. Likewise, planned future development in Kitsap County is consistent or below the emissions estimates contained in the SIP.

Several of the projects included in Table 4-1 have available estimates of potential air quality impact and can be analyzed cumulatively within the ROI.

Table 4-2 compares the 2005 emissions in Kitsap County to known present and future actions. Emissions estimated for the Pile Repair and Replacement Program, EHW-1 Maintenance, EHW-2, and NWTT activities at NAVBASE Kitsap Bangor are quantitatively compared to the regional emissions. The Northwest Training Range Complex has detailed emissions estimates; however the quantitative emissions estimates are aggregated for a region substantially larger than the ROI and are not available at the base or installation level; however the results indicated no significant impacts to air quality as a result of the proposed actions in any of the regions. The remaining future proposed activities do not have air quality information available at this time, but qualitative review indicates the projects would include short term construction emissions that would not be reasonably expected to impact regional air quality.

Table 4-2. Estimated Cumulative Air Emissions Using Representative Future Projects

	VOC (tons/yr)	*NOx (tons/yr)*	*CO (tons/yr)*	*SO_2 (tons/yr)*	*$PM_{(total)}$ (tons/yr)*
Kitsap County Air Quality (2005 Emissions Inventory)	20,669	8,217	67,668	1,111	1,318
Predicted Emissions for Future Projects (Worst Case Alternative Assumed)	1.71	18.19	15.15	1.17	1.27
Predicted Emissions for Future Projects with **Preferred Alternative** Added	1.80	18.80	18.22	1.25	1.35
Preferred Alternative Percent Contribution to cumulative increase in emissions in Kitsap County	0.009%	0.228%	0.027%	0.112%	0.102%
Predicted Emissions for Future Projects with Alternative 2 Added	1.74	18.42	16.34	1.19	1.3
Alternative 2 Percent Contribution to cumulative increase in emissions in Kitsap County	0.008%	0.224%	0.024%	0.107%	0.099%

As shown in Table 4-2, the Proposed Action and emissions estimates from known future actions contributes less than 1% of total emissions for all criteria pollutants. Therefore, the implementation of the

Proposed Action combined with the past, present, and reasonably foreseeable future projects, would not result in significant cumulative impacts to air quality.

The potential effects of proposed GHG emissions are by nature global and cumulative impacts, as individual sources of GHG emissions are not large enough to have an appreciable effect on climate change. Therefore, an appreciable impact on global climate change would only occur when proposed GHG emissions combine with GHG emissions from other man-made activities on a global scale.

Currently, there are no formally adopted or published NEPA thresholds of significance for GHG emissions. Formulating such thresholds is problematic, as it is difficult to determine what level of proposed emissions would substantially contribute to global climate change. In the absence of an adopted or science-based NEPA significance threshold for GHGs, this EA compares GHG emissions that would occur due to implementation of the proposed action to the permitting threshold identified in the Greenhouse Gas Mandatory Reporting Rule (40 CFR Part 98).

An appreciable impact on global climate change would, if currently accepted predictions are accurate, only occur when proposed GHG emissions combine with other GHG emissions from other man-made activities on a global scale. However, individual sources of GHG emissions related to the proposed actions or nearby projects are not large enough to have an appreciable effect on climate change.

Emissions of GHGs from the proposed action alone would not cause appreciable global warming that would lead to climate changes. However, these emissions would increase the atmosphere's concentration of GHGs, and, in combination with past and future emissions from all other sources, contribute incrementally to the global warming that produces the adverse effects of climate change. At present, no methodology exists that would enable estimating the specific impacts (if any) that this increment of warming would produce locally or globally.

4.2.2 Noise

NAVBASE Kitsap Bangor is surrounded by rural residential land uses. Completed past actions (e.g. Navy Surface Warfare Center Carderock Division Detachment Bremerton Command Consolidation) would not contribute cumulatively to the noise environment within the ROI. The current and reasonably foreseeable future projects would contribute to the noise environment primarily during construction, and secondarily during operations.

Construction noise would come primarily from pile driving activities, as well as supporting equipment (e.g., cranes, truck traffic). Airborne noise tends to extend over limited distances, while underwater noise travels for longer distances. The Service Pier Extension, EHW-1 Maintenance, EHW-2, pile repair and replacement program, and other construction projects would all have noise impacts similar to the Proposed Action. The range of noise impacts during construction from EHW-2 and the Service Pier, which are the closet future projects, would still not exceed the 70 dBA, or lower, and avoid direct noise impacts to Bangor Beach (tribal shellfish harvest area). After construction, operations at these facilities would be similar to existing operations, and no significant change to current airborne and underwater sound is anticipated. The Preferred Alternative would generate some underwater noise levels, but for a short duration with limited range of impacts. Alternative 2 would generate less underwater noise with the placement of the anchor clumps and buoys.

Overall, the proposed construction activities for either alternative combined with known present and future projects would be short term, would be limited to daytime hours, and would be exempt from WAC

173-60-040 noise limits due to their temporary nature. Due to the limited duration of construction activities and anticipated consistency with current operations, the Proposed Action in combined with known past, present, and future actions would not have a significant adverse noise impact. See Section 4.2.5 for a discussion of the project's cumulative impacts to biological resources resulting from airborne and underwater noise emissions.

4.2.3 Water Quality

Water quality in Hood Canal and its tributaries has been and is being impacted by past and present upland actions. Upland development has caused localized deterioration in the water quality, mainly from uncontrolled stormwater runoff, failing septic systems, and mismanagement of animal wastes. Stormwater runoff can carry contaminants, such as heavy metals and oils from hard surfaces such as roads, and nitrogen and phosphorus from lawn fertilizers into streams that empty into Hood Canal. While irregular in nature, stormwater-related inputs to water quality may be relatively intense during storm events. Contaminants in the stormwater runoff can adversely impact DO, temperature, pH, and other water quality parameters in localized areas. Past, present, and reasonably future events have impacted and will impact water quality in the ROI, as described above. However, due to the temporary and localized extent of the Proposed Action, including implementation of BMPs to avoid or minimize any potential water quality impacts, it would not make an appreciable contribution to cumulative adverse impacts to water quality.

4.2.4 Marine Sediments

The Proposed Action would result in short-term localized increases in total suspended solids and turbidity as bottom sediments are disturbed during construction. The Hood Canal is a low-wave energy water body, which equates to lower sediment transport from project-related construction activities. Therefore, the sediment transport along the waterfront would be localized within the drift cells with limited impacts along the eastern shoreline of Hood Canal. These disturbances would be limited in space and time, and sediments would settle upon completion of the construction for either alternative.

Projects with future in-water construction elements include the Waterfront Restricted Area and Security Barriers, Electromagnetic Measurement Range, Service Pier Extension, EHW-1 Maintenance, EHW-2, Transit Protection System, NWTT, Waterfront Restricted Area Land-Water Interface, and the Pile Repair and Replacement Program. All of these projects would have impacts to marine sediments similar to those discussed for the Proposed Action, and all would implement sediment controlling BMPs. With implementation of BMPs, any disturbance to marine sediments would be local and temporary. Therefore, implementation of the Preferred Alternative or Alternative 2 combined with the past, present, and reasonably foreseeable future projects, would not result in significant cumulative impacts to marine sediments.

4.2.5 Biological Resources

4.2.5.1 Marine Vegetation

Marine vegetation in Hood Canal has been or is currently disturbed by past and present placement of in-water structures such as piles and anchors, dredging, underwater fills, and construction of overwater structures. These impacts include temporary and/or permanent loss of marine vegetation, reduced productivity, and changes in type, abundance, or vegetation species. Important marine habitat, such as eelgrass, has decreased over time in Hood Canal as indicated by recent trend data: eelgrass coverage in Hood Canal declined between 8 and 15 percent in every year between 2001/2 and 2004/5 (PSAT 2007a).

EHW-2 and EMMR projects would have some impact on eelgrass, macro algae and some benthic invertebrates; however, the Navy is also implementing mitigation measures, programs, and participating in Hood Canal Coordinating Council In-Lieu-Fee mitigation program to ensure no net loss of eelgrass due to these projects

Although dense to moderate densities of eelgrass occur approximately 175 ft south of the project area (SAIC 2009), eelgrass is not present within the project impact area itself. Since there would be no net increase in overwater coverage, the Preferred Alternative or Alternative 2 would not have a long-term impact to macroalgae. Therefore, implementation of the Preferred Alternative or Alternative 2 would not make an appreciable contribution to cumulative adverse impacts to marine vegetation.

4.2.5.2 Benthic Invertebrates

Past and present Navy and non-Navy actions, including marinas, residential docks, boat ramps, and piers involving placement of pilings and anchors have resulted in the direct loss of the natural benthic soft-bottom habitat, which has further reduced the invertebrate population. This habitat is replaced by the hard surfaces of piles and anchors, and as a result, the types of benthic organisms have changed and are changing in these localized areas. Hard surfaces create sites for colonization by species adapted to these surfaces such as mussels and sea anemones. Thus, the impact of in-water structures has been to replace native soft-bottom habitat with hard-surface habitat over time. This has adversely impacted some species (including prey species for juvenile salmonids), while benefiting others. It is estimated that approximately 2.4 acres of benthic soft-bottom habitat has been lost and converted to hard-surface habitat due to placement of in-water structures along the NAVBASE Kitsap Bangor waterfront.

Projects with in-water construction elements include the Navy Surface Warfare Center Carderock Division Detachment Bremerton Command Consolidation, Waterfront Restricted Area and Security Barriers, Electromagnetic Measurement Range, Service Pier Extension, EHW-1 Maintenance, EHW-2, Transit Protection System, Waterfront Restricted Area Land-Water Interface, and Pile Repair and Replacement Program. These projects would all result in localized disturbance of benthic invertebrates, including a loss of sessile or slow moving benthic invertebrates. Many of the projects in the area, including the Proposed Action occur within existing developed areas.

The Navy’s future in-water structures would result in a direct loss of soft-bottom habitat and it is estimated that approximately 2.5 acres of soft-bottom habitat would be replaced with hard surfaces, based on the number of piles. The overwater portions of the proposed future actions can increase shading and nighttime lighting impacts on benthic organisms. Shading can impact the abundance of some benthic organisms and lighting can increase predation rates. Shading and loss/alteration of soft bottom habitat has impacted the type and abundance of benthic organisms that occur in the vicinity of these structures. In addition, in-water structures have resulted in accretion of sediments in some areas and possibly erosion in others. Any areas of erosion would result in adverse impacts to sediment-dwelling species.

The Navy’s EHW-2 project includes several measures to mitigate for impacts to benthic species. To improve shellfish production and harvest opportunities, the Navy will fund: improvements to beach substrate and 3 years of shellfish seeding on 24 acres of beach; 5 years of shellfish seeding on priority shellfish enhancement areas in Hood Canal and adjacent Admiralty Inlet; construction of a shellfish wet lab, education, and training building at Port Gamble; construction of a floating shellfish nursery at Port Gamble; and surveys of geoduck and a geoduck pilot research study.

Proposed in-water work would disturb bottom substrates during pile installation or anchor clumps and buoys installation. However, the area of disturbance is small, re-colonization following construction is anticipated, and no long-term loss is anticipated. Further, no adverse impacts geoduck are expected. Therefore, the Preferred Alternative or Alternative 2 would not make an appreciable contribution to cumulative adverse impacts to benthic invertebrates.

4.2.5.3 Fish

Past actions have adversely impacted populations of salmonids (salmon, steelhead, and trout, including threatened and endangered species) in Hood Canal and tributaries through loss of foraging and refuge habitat in shallow areas, reduced function of migratory corridors, loss and degradation of spawning habitat in streams, interfering with migration, adverse impacts to forage fish habitat and spawning, contamination of water and sediments, and depletion of DO. Ongoing fish harvest has resulted in adverse impacts to salmonid abundance and the impact has been greatest on native stocks. Practically all chum salmon, most Chinook, and all sockeye salmon spawning in Hood Canal stream systems are derived from naturalized hatchery stock. Populations of pink salmon, coho salmon, bull trout, and steelhead are also in decline. The net result is that several Hood Canal salmonid species have been listed under the ESA.

The State of the Sound Report (PSAT 2007b) describes several trends that may be indicative of cumulative impacts to the growth and development of salmonids. There is an increasing trend for toxics to be concentrated in the tissues of Puget Sound Chinook and coho salmon. These salmon have been found to have 2 to 6 times the PCBs and 5 to 17 times the polybrominated diphenyl ethers in their bodies compared to other West Coast salmon populations. Wild salmon stocks have declined from 93 to 81 healthy stocks from 1992 to 2002, and during that same period seven stocks have become extinct.

Prior to the 1980s, in-water construction of docks, piers, and boat ramps in Hood Canal impacted fish species presence and abundance, particularly when it was not yet recognized that in-water construction work should not occur during spawning of forage fish species such as sand lance, Pacific herring, and surf smelt. For example, underwater noise from pile driving is intense and can cause fish mortality, as well as changes in fish behavior. Even so, underwater construction noise continues and can adversely impact the abundance and occurrence of some fish species close to the construction activities.

Existing Navy structures have affected salmonid and forage fish habitat, and have potentially impeded and continue to impede juvenile salmon migration to some degree. The placement of in-water structures by the Navy and from non-Navy actions has changed and would continue to change fish habitat in and around these structures. In-water structures can impact fish in several ways, including:

- Increasing the presence of predators that prey on juvenile fish;
- Posing a barrier to fish movement, particularly juvenile fish;
- Causing direct loss of marine vegetation such as eelgrass, which is important habitat for forage fish and other species; and
- Creating shade that reduces the productivity of aquatic vegetation and benthic organisms, which are preyed on by fish.

Water quality has been and is being impacted by past and present actions and could be impacted by potential future development; for example, depleted DO has resulted in fish kills. Many of the other types of past and ongoing impacts described above for salmonids also apply to other marine species. Trend data have shown a decrease in some fish species such as rockfish, spiny dogfish, Pacific cod, and hake, as well as increased toxics in the tissues of some species such as Chinook salmon (PSAT 2007a).

Currently, efforts are being made to reverse the decline of fish populations by regulating development and restoring fish habitat. Numerous salmon preservation and restoration groups have proposed and constructed habitat restoration projects in Hood Canal. Most of these projects are on the east and south sides of the canal, where most of the salmonid-bearing river systems are found. Efforts to reduce construction impacts to salmonids and other fish have resulted in a schedule of in-water work periods that all projects must adhere to if authorized by state (WDFW) or federal regulatory (USACE) authorities. The in-water work windows help minimize adverse impacts to fish.

Current and future waterfront projects at NAVBASE Kitsap Bangor would be designed and implemented to minimize impacts to salmonids and other fish habitat and migration. The protective measures taken to minimize impacts during construction activities, and the design elements that reduce long-term impacts to nearby habitats is expected to reduce impacts to fish populations. In addition, many regional habitat restoration projects would benefit all fish species.

Impacts from in-water construction projects may include startle responses from fish during initial stages of construction; fish would likely avoid the immediate project vicinity during construction activities. For projects requiring pile driving (e.g. the Proposed Action, EHW-1 Maintenance, and EHW-2), a vibratory hammer would be used whenever possible to drive piles to minimize underwater noise. Construction sites would further minimize noise impacts by using noise attenuation measures (e.g., a bubble curtain, which has been shown to reduce noise levels by approximately 10 dBA). All in-water construction activities for Hood Canal projects would be conducted during the allowable in-water work period, July 16th to February 15th to reduce potential impacts to fish.

Past, present, and future development projects have had, currently have, and would continue to have the potential to result in many of the impacts to marine fish described above, and add to declining population trends. However, there are ongoing and future actions and plans intended to improve conditions for salmonids in Hood Canal as described above. Efforts to reduce construction impacts to salmonids and other fish have resulted in a schedule of in-water work periods that all projects must adhere to if authorized by the WDFW or USACE. The in-water work windows help minimize adverse impacts to migrating, spawning, and juvenile fish. Future Navy actions would be designed and implemented to minimize impacts to salmonids. Design aspects of nearshore infrastructure could include large spacing (e.g., 10 feet [3.1 m]) between piles, increased structure height-over-water in nearshore waters, and building materials (e.g., grating) that allow the transmission of light.

The Navy's EHW-2 project includes several measures to mitigate for impacts to salmonids. To improve scientific understanding, the Navy will provide funding for research studies on: 1) ocean acidification and 2) Hood Canal chum salmon. To improve salmon production and harvest opportunities in Hood Canal, the Navy will fund improvements at three existing fish hatcheries on Hood Canal and replacement of one finfish spawning facility on Hood Canal.

Due to the temporary and localized extent of the Proposed Action, including measures to avoid and minimize impacts to salmonids and other marine fish, it would not make an appreciable contribution to cumulative adverse impacts to marine fish.

4.2.5.4 Marine Mammals

Past and present Navy and non-Navy actions, including marinas, residential docks, boat ramps, and piers have resulted in increased human presence, underwater and airborne noise, boat movement, and other activities, and have likely impacted some water-dependent wildlife (e.g., marine mammals) in the area. Increased anthropogenic noise in the marine environment has the potential to cause behavioral reactions in marine mammals including avoidance of certain areas. However, the abundance and coexistence of marine mammals with existing anthropogenic activities suggests that cumulative effects have not been significant. Population trend data for Hood Canal indicate that most of the marine mammal species expected to be in the project area are either stable or increasing in recent years based on NMFS stock assessment reports despite past and present actions (Allen and Angliss 2010, Carretta et al. 2011). The MMPA regulatory process ensures that each project that could affect marine mammals is assessed in light of the status of the species and other actions affecting it in the same region.

Future Navy and non-Navy waterfront projects may have similar impacts to past and present actions including increased anthropogenic sound (both airborne and underwater), increased human presence, increased boat movements and other associated activities. These actions could result in behavioral impacts to local populations of marine mammals, such as temporary avoidance of habitat, decreased time spent foraging, increased or decreased time spent hauled out (depending on the activity), and other minor behavioral impacts. All impacts would likely be short-term and temporary in nature and unlikely to affect the overall fitness of the animals. Additionally, the projects identified in Table 4-1 are within an existing, largely developed installation waterfront. These areas already have industrial uses with higher than normal activity and noise levels. Thus, there is little loss of habitat for marine mammals, and the marine mammals in the area may be habituated to these higher levels of ongoing activity and less impacted by ongoing waterfront development.

The primary impact of in-water construction projects, including the Proposed Action, to marine mammals is behavioral disturbance from underwater sound due to pile driving. Any marine mammals that are behaviorally disturbed may change their normal behavior patterns (i.e., swimming speed, foraging habits, etc.) or be temporarily displaced from the area of construction. Any exposures would likely have only a minor effect and temporary impact on individuals.

The Northwest Training and Range Complex program has several procedures and mitigation measures in place and will evaluate other mitigation measures to reduce impacts to marine mammals. The current procedures of monitoring, safety zones and level of sonar transmissions, and working with NMFS and local resources groups reduce the cumulative effects of the various exercise and training activities covered under this program.

As discussed in 3.4.2, cetaceans (whales, dolphins, and porpoises) also use the Hood Canal. The use by cetaceans other than transient killer whales is very rare; use by transient killer whales in Hood Canal is infrequent, and considered rare during the timeframe of when the in-water work would take place.

Three species of pinnipeds, California sea lions, Steller sea lions, and harbor seals, are abundant in Hood Canal and at the NAVBASE Kitsap Bangor waterfront in particular. The seals would likely be present during work for all of the in-water construction projects identified in Table 4-1, as well as the Proposed Action. Given the limited amount of structures within the project area for California sea lions and harbor seals to haul out on and the majority of sightings of hauled-out sea lions have been on and surround Delta Pier located within the vicinity of the project area, airborne noise from construction is not anticipated to have significant impacts to hauled-out pinnipeds, with some exceptions. Project activities at, or immediately adjacent to the Delta Pier, such as the Waterfront Security Enclave project, could potentially disturb hauled-out seals. However, this impact was determined not significant because Delta Pier seals have grown accustomed to frequent 70 to 90 dBA noise levels associated with existing Delta Pier operations. Pile driving is the loudest construction noise source anticipated within the ROI, and no pile driving is anticipated within 50 ft of the Delta Pier. Over 50 ft away from pile driving activities, sound attenuates to below 94 dBA, a level to which the seals have shown to be accustomed (WSDOT 2012).

Cumulative impacts to marine mammals have the greatest potential to occur during simultaneous pile driving exposure events from the Proposed Action and other present and future projects in the vicinity. However, implementation of avoidance and minimization measures including use of bubble curtain to reduce pile-driving noise, marine mammal monitoring and pile-driving shutdown zones, cumulative impacts to marine mammals would not be significant.

4.2.5.5 Birds

Construction and operation of past and present Navy and non-Navy actions have resulted in increased human presence, underwater and airborne noise, boat movement, and other activities that have likely deterred some water-dependent wildlife such as marine birds from these areas. Marine birds typically avoid areas with continuous activity or that produce periodic impacts such as loud noises. Birds will often return to these areas when human presence is lower or there is less activity. Some birds may use these in-water structures for roosting or nesting.

Marine bird populations within the ROI are affected by direct and indirect impacts to breeding and foraging locations on the coastal mainland and inshore areas. The single greatest concern is the loss of suitable habitat for nesting and roosting seabirds throughout coastal northwest due to land development and human encroachment. Historically, seabird populations have sustained numerous impacts from pollution and human activities within the Pacific Northwest from a variety of sources, including the discharge of hazardous chemicals and sewage.

As discussed in Section 3.5, marbled murrelets have been observed foraging and resting within 450 ft of the project area and out to 500 ft offshore. As discussed under terrestrial wildlife, the average airborne sound levels at a distance of 450 ft would be estimated at 84 dBA during impact pile driving.

Underwater noise from pile driving can cause injury and behavioral disturbance to diving marine birds, including marbled murrelets. Since the project would not impact upland bird habitat or bald eagles, it will not make any contribution to cumulative adverse impacts to upland birds or bald eagles. Cumulative impacts to marine birds have the greatest potential to occur during simultaneous construction activities. However, with implementation of avoidance and minimization measures including use of bubble curtain to reduce pile-driving noise, marine bird monitoring and pile-driving shutdown zones, cumulative impacts to marine birds from the Proposed Action and past, present, and reasonably foreseeable future actions would not be significant.

4.2.6 Marine Traffic and Transportation

For either alternative, there would be up to three construction barge trips a week, which would occur during non-peak hours to avoid disruption to vehicular traffic with openings of the Hood Canal Bridge. The approximately 10 truck trips per day for construction equipment estimated for the Preferred Alternative are within the regular anticipated traffic conditions. Similarly, the in-water traffic anticipated by Alternative 2, up to 12 inter-tidal area marine vessel trips per day, would be within the security borders of NAVBASE Kitsap Bangor and thus would not impact marine traffic within Hood Canal.

The cumulative effect of construction barges for Electromagnetic Measurement Range, Service Pier Extension, EHW-1 Maintenance, EHW-2, and Pile Repair and Replacement Program, would have some limited impact on the Hood Canal bridge openings. Similar to the Proposed Action, construction barge traffic for these projects would also be limited to off-peak hours when passing through the Hood Canal Bridge to minimize traffic delays caused by bridge openings.

- The EMMR would have construction barges and crane barges for its primary construction activity.
- The EHW-2 would have up to three (3) construction barges per week for materials and support.
- The Service Pier Extension, EHW-1 Maintenance, and Pile Repair and Replacement Program would not have construction activity until after construction of the Proposed Action is completed.

The cumulative increase in the level of construction vessel traffic is not expected to adversely impact vessel transit routes in Hood Canal or Puget Sound. The limited movement of construction related vessels in the unrestricted areas of Hood Canal is not expected to limit commercial or tribal fishing boat access to fishing and harvest areas.

There would be a short term increases in land based traffic volumes in truck traffic from construction of the Waterfront Restricted Area and Security Barriers, Electromagnetic Measurement Range, Service Pier Extension, EHW-1 Maintenance, EHW-2, and Waterfront Restricted Area Land-Water Interface, and Pile Repair and Replacement Program. However, these construction activities would not occur all at the same time and the number of trips would not have a significant impact on existing traffic volumes with the existing capacity of the installation roads and access points to the public road system. Therefore, no significant cumulative impacts to marine traffic and land based transportation are anticipated from the Proposed Action when combined with past, present, and reasonably foreseeable projects in the ROI.

4.2.7 Socioeconomics and Environmental Justice

The Proposed Action, combined with present, and reasonably foreseeable projects could result in a short-term beneficial impact to the regional economy during construction. After construction is completed, there would be a small increase in personnel required to operate EHW-2, which could increase employment opportunities in Kitsap County. Therefore, the Proposed Action, in combination with present and reasonably foreseeable projects would not have a cumulative adverse impact to socioeconomics.

There are no air quality, water quality, transportation, or socioeconomic impacts identified that would disproportionately affect minority, low impact populations in Kitsap County and the surrounding communities. Therefore, no significant adverse cumulative impacts to socioeconomics or to environmental justice are anticipated from the Proposed Action when combined with past, present, and reasonably foreseeable projects in the ROI.

4.2.8 Cultural Resources

Prior to implementation of past and present actions, the Navy reviewed potential cultural resources in and adjacent to the project area and addressed potential adverse impacts as required under the NHPA. The proposed Waterfront Enclave conducted full cultural resource surveys, and identified three resource sites, none of which are considered eligible for NRHP listing. The EHW-1 and Delta Piers are both eligible for inclusion in the National Register of Historic Places due to their Cold War context, and repairs to EHW-1 are being completed with that historical context in mind. The future projects, including the Electromagnetic Measurement Range and the Land Water Interface are currently in their early assessment stages, and the cultural resources are not yet known.

The Proposed Action is adjacent to the Carlson Spit Shell Midden cultural site; however, as discussed in Section 3.7.3, the Preferred Alternative is unlikely to directly or indirectly impact that site. Thus, the Proposed Action would not contribute to cumulative adverse impacts to cultural resources.

4.2.9 American Indian Traditional Resources

Regionally, tribes have expressed a concern over the loss of access to traditional fishing and foraging areas in Puget Sound, especially as a result of incremental habitat loss through construction of piers, bulkheads and docks. The Tribes have also expressed concern over lost fishing opportunity, including time and gear lost due to increased vessel traffic in their usual and accustomed areas. The Navy acknowledges its obligation to continue to consult with the tribes regarding future Navy projects which may have the singular potential to significantly affect tribal treaty rights and resources of the environment, as well as any potential cumulative effects. With respect to these issues, the Tribes concurred that the Barge Mooring Proposed Action may move forward as agreed to between the Parties, and did express concerns regarding project impact to usual and accustomed fishing areas, tribal treaty rights, and the Navy methodology in analyzing aggregate impacts of Navy projects on these resources. The Proposed Action would not contribute to sediment or turbidity impacts on the designated tribal shellfish harvest beach (Bangor Beach) to the north of the project area. The Proposed Action combined with past, present and reasonably foreseeable future actions would not adversely impact American Indian resources and would therefore not contribute to cumulative adverse impacts to American Indian traditional resources.

4.3 CONCLUSION

Implementation of the Proposed Action would have direct impacts to the marine environment as described in Chapter 3. The Proposed Action and other present and reasonably foreseeable future projects would include measures to avoid, minimize impacts, such as in-water construction windows to minimize impacts to salmonids, use of stormwater BMPs to minimize erosion and pollution, marine mammal and bird monitoring, and pile-driving shutdown zones. Additional project-specific impact minimization measures would be required for each project. Although some resources may be subject to potential cumulative significant adverse impacts, the Proposed Action would not appreciably contribute to those impacts.

CHAPTER 5.0 OTHER CONSIDERATIONS REQUIRED BY NEPA

5.1 POSSIBLE CONFLICTS BETWEEN THE PROPOSED ACTION AND THE OBJECTIVES OF FEDERAL, STATE, LOCAL, AND REGIONAL LAND USE PLANS, POLICIES, AND CONTROLS

Implementation of the Proposed Action would comply with existing federal regulations and state, regional, and local policies and programs. Table 5-1 summarizes how the Proposed Action would be in compliance or avoid conflicts with federal, state, and local plans and policies.

Table 5-1. Principal Federal and State Laws Applicable to the Proposed Action

Federal, State, Local, and Regional Land Use Plans, Policies, and Controls	*Status of Compliance*
National Environmental Policy Act (NEPA) (42 USC §4321 et seq.); Navy procedures for Implementing NEPA ((32 CFR Part 775 and OPNAVINST 5090.1C CH-1)	Preparation of this EA has been conducted in compliance with NEPA and in accordance with CEQ regulations and the Navy's NEPA procedures.
Clean Air Act CAA (42 USC §7401 et seq.)	The EPA has established NAAQS for seven pollutants (ozone, CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$, and lead) with Washington State establishing more stringent requirements for SO_2. NAVBASE Kitsap Bangor is located in Kitsap County which is an attainment area. A formal conformity determination is not required for CO. Estimated emissions for both alternatives were calculated and deemed not significant. As a result, the project would comply with the requirements of the CAA, as amended. For a more detailed discussion of potential impacts to air quality, refer to *Section 3.1 - Air Quality*.
Clean Water Act CWA (Sections 401 and 404, 33 USC 1251 et seq. /CWA 313, 33 U.S.C. § 1323.)	Under the CWA, there are water quality standards which set site-specific allowable pollutant levels for individual water bodies, such as rivers, lakes, streams and wetlands. The installation of the piles, below the Ordinary High Water mark of the Puget Sound (U.S. Waters), is not expected to require a Section 404 or 401 permit, as this project has limited impacts with the removal of a mooring dolphin and installation of piles. However, should Section 404 and 401 permits be required, the Navy would obtain these permits prior to construction of the barge moorings project. All chemicals, liquid products, petroleum products, and other wastes present at the construction site would be covered, contained, and protected. Any spills would be handled according to CNRNW Instruction 5090.1, *Integrated Contingency Plan* and reported pursuant to Navy protocols. For more detailed discussion of potential impacts to water quality, refer to *Section 3.4 - Water Quality*.
Rivers and Harbors Act (33 U.S.C. 401 et seq.)	A permit under Section 10 of the Rivers and Harbors Act is required. The Navy would obtain a USACE permit as required under Section 10 of the Rivers and Harbors Act prior to construction of the barge moorings project. The Navy would comply with any conditions applied to the project during the coordination process between the Navy and the USACE.
Coastal Zone Management Act CZMA (16 USC 1451 et seq.)	Washington is a coastal state and has an approved CZMA program. CZMA requires federal development activities such as the Proposed Action to be consistent to the maximum extent practicable with the enforceable policies of the Washington Coastal Zone Management Program and to consider the potential effect on coastal resources. The Navy has prepared a Coastal Consistency Determination with a conclusion of compliance and submitted it to

Table 5-1. Principal Federal and State Laws Applicable to the Proposed Action

Federal, State, Local, and Regional Land Use Plans, Policies, and Controls	*Status of Compliance*
	Ecology for concurrence (Appendix C). Ecology did not reply within the stipulated timeframe (15 CFR Part 930.41) and the Navy presumes concurrence that the Proposed Action is consistent with the Washington State Coastal Zone Management Program.
National Historic Preservation Act NHPA (Section106, 16 USC 470 et seq.)	The NHPA requires federal agencies to identify, evaluate, inventory, and protect NRHP resources (or resources that are potentially eligible for listing in the NRHP on properties that they control (16 USC 470h-2). In accordance with Section 106 of the NHPA, the Navy determined that the Proposed Action would have no effect on historic properties and submitted an Area of Potential Effect (APE) and the determination of no effects report for concurrence to the Washington State Historic Preservation Office (SHPO). The Washington SHPO concurred with the Navy's finding of no historic properties affected. In the unlikely event historic properties or cultural materials such as archaeological deposits or human remains are encountered during construction, ground disturbing activities in the vicinity of the find will immediately cease and the Navy will initiate consultation with the SHPO and affected tribes, as appropriate.
Native American Graves Protection Act NAGPRA (25 U.S.C. § 3001)	No Native American resources that qualify for NAGPRA have been identified in the area of potential effects. If such resources are discovered, the Navy will comply with NAGPRA.
Endangered Species Act ESA (16 USC 1531 et seq.)	In accordance with ESA Section 7 requirements, the Navy also prepared a Biological Assessment (BA) and consulted informally with USFWS and NMFS regarding potential effects to ESA-listed species and critical habitat. The Navy received Letters of Concurrence from NMFS and USFWS, concluding informal consultation.
Marine Mammal Protection Act MMPA (16 USC 1361-1421h, as amended)	Based on potential impacts to marine mammals, the Navy prepared an Incidental Harassment Authorization (IHA) application to request take for level "B" harassment (Appendix F). The IHA was submitted to NMFS for review and public comment. At the conclusion of the consultation, NMFS would issue an incidental take permit.
Magnuson-Stevens Fishery Conservation and Management Act MSA (16 USC 1801-1882)	The Navy prepared an EFH Assessment and submitted it to NMFS with the BA (Appendix D). The Navy received a Letter of Concurrence from NMFS concluding informal consultation.
Migratory Bird Treaty Act MBTA (16 USC 703-712)	The Proposed Action is not likely to adversely affect migratory bird populations and would be in compliance with the MBTA.
Bald and Golden Eagle Protection Act (16 USC 668-668d)	The Proposed Action is not likely to have a measureable negative effect on eagle populations and would be in compliance with the Bald and Golden Eagle Protection Act.
Federal Actions to Address Environmental Justice in Minority and Low-income Populations (EO 12898)	No disproportionately high and adverse impacts to minority and low-income populations would be expected with implementation of the Preferred Alternative or Alternative 2.

Table 5-1. Principal Federal and State Laws Applicable to the Proposed Action

Federal, State, Local, and Regional Land Use Plans, Policies, and Controls	*Status of Compliance*
Protection of Children From Environmental Health Risks and Safety Risks (EO 13045)	Children would not be disproportionately exposed to environmental health and safety risks with implementation of the Preferred Alternative or Alternative 2.
Consultation and Coordination with Indian Tribal Governments (EO 13175)	As required under Secretary of the Navy Instruction 11010.14A, *Department of the Navy Policy for Consultation with Federally Recognized Tribes*; DoD Instruction 4710.02, *DoD Interactions with Federally Recognized Tribes*; and DoD Policy, *American Indian and Alaska Native Policy Alaska Implementation Guidance,* the Navy initiated consultation with the Skokomish, Port Gamble S'Klallam, Jamestown S'Klallam, Lower Elwha Klallam, and Suquamish Tribes regarding potential impacts to Tribal U&A fishing grounds and stations in July 2012. Consultations with the Tribes were concluded in May 2013.
Federal Compliance with Pollution Control Standards (EO 12088)	EO 12088 requires federal facilities to comply with all applicable pollution control standards. The Proposed Action would contribute only minor amounts of pollution, primarily during the construction phase and during maintenance activities. Moreover, only minimal amounts of solid waste requiring disposal would be generated during construction and operations and would be disposed of in an environmentally safe manner. Implementation of the Preferred Alternative or Alternative 2 would be consistent with this EO.
Greening the Government through Leadership in Environmental Management (EO 13148)	This EO requires the federal government to improve its energy management for the purpose of saving taxpayer dollars and reducing emissions that contribute to air pollutions and global climate change. Federal agencies are required to: reduce GHG emissions; reduce energy consumption per square foot of facility; strive to expand use of renewable energy; reduce the use of petroleum within its facilities; and reduce water consumption. The NAVBASE Kitsap Bangor is working toward energy efficiency in their equipment, support vehicles, power generation and water conservation. This project will include new engines that have reduced GHG emission and reduce energy consumption, which would meet the general intent of this EO.

5.2 IRREVERSIBLE OR IRRETRIEVABLE COMMITMENT OF NATURAL OR DEPLETABLE RESOURCES

Resources that are irreversibly or irretrievably committed to a project are those that are used on a long-term or permanent basis. This includes the use of non-renewable resources such as metal and fuel, and other natural or cultural resources. These resources are irretrievable in that they would be used for this project when they could have been used for other purposes. Human labor is also considered an irretrievable resource. Another impact that falls under this category is the unavoidable destruction of natural resources that could limit the range of potential uses of that particular environment.

Implementation of the Preferred Alternative or Alternative 2 would involve the consumption of fuel, oil, and lubricants for construction vehicles, barge, and pile driver. Human energy invested in construction would be irretrievably lost. Since the reuse of these resources may not be possible, they would be irreversibly and irretrievably committed as part of the Proposed Action.

5.3 Relationship Between Local Short-Term Use of the Human Environment and Maintenance and Enhancement of Long-Term Natural Resource Productivity

The NEPA process requires an analysis of the relationship between a project's short-term impacts on the environment and the effects that these impacts may have on the maintenance and enhancement of the long-term productivity of the affected environment. Impacts that narrow the range of beneficial uses of the environment are of particular concern. This refers to the possibility that choosing one development option reduces future flexibility in pursuing other options, or that giving over a parcel of land or other resources to a certain use often eliminates the possibility of other uses being performed at that site.

In the short-term, effects to the human environment with implementation of the Preferred Alternative or Alternative 2 would primarily relate to the in-water construction activity itself. Air quality, water quality and marine sediment, and noise would all expect to be impacted in the short-term. In the long-term, productivity of the area would remain the same, as the moorings locations are supporting the replacement of an existing barge and that would not change the overall productivity of the area. The Preferred Alternative or Alternative 2 would not result in any impacts that would reduce environmental productivity or permanently narrow the range of beneficial uses of the environment.

5.4 Means to Mitigate and/or Monitor Adverse Environmental Impacts

The construction and installation of the barge mooring locations as described under the Preferred Alternative and Alternative 2 would not result in any significant adverse environmental impacts with implementation of the BMPs and design minimization measures described in Section 2.5. These measures are summarized below.

- All pollutants, including waste materials, would be handled and disposed of in a manner that does not cause contamination of stormwater. Construction activities would comply with Navy Stormwater Pollution Prevention Plan and CNRNW Instruction 5090.1, *Integrated Contingency Plan.*
- In-water work would only be conducted during an abbreviated in-water work window (July 16 through September 30) when juvenile ESA-listed salmonids and forage fish are least likely to be present.
- Pile driving activities would occur up to 6 days per week within the in-water work window and impact pile driving would occur between 2 hours after sunrise and 2 hours before sunset (July 16 through September 23) to protect foraging marbled murrelets. The in-water work window would be adjusted between September 24 and September 30, with work occurring from sunrise and sunset.
- To the maximum extent practicable, a vibratory hammer would be used for the majority of pile driving actions.
- A noise attenuating device (bubble curtain) would be used during impact pile driving operations.
- Developed in coordination with the NMFS and USFWS and approved by these agencies prior to initiation of in-water work, a Marine Mammal Monitoring Plan and a Marbled Murrelet Monitoring Plan would be prepared and finalized. Monitoring specific to marbled murrelets would adhere to the current USFWS protocol (USFWS 2012). Monitoring for marine mammals and marbled murrelets would occur within pre-determined shutdown zones for purposes of avoiding injurious effects. Marine mammal monitoring would take place from 15 minutes prior to

initiation through 15 minutes post-completion of pile driving. Marbled Murrelet monitoring would take place from 30 minutes prior to initiation through 30 minutes post-completion of impact pile driving.

- If a marbled murrelet or marine mammal approaches/enters the shutdown zone, prior to the start of, or during the course of, pile driving operations, pile driving will be halted and delayed until either the animal has voluntarily left and been visually confirmed beyond the shutdown zone, or 30 minutes have passed without re-detection of the animal.

5.5 ANY PROBABLE ADVERSE ENVIRONMENTAL EFFECTS THAT CANNOT BE AVOIDED AND ARE NOT AMENABLE TO MITIGATION

With implementation of BMPs and design minimization measures described in Section 2.5, implementation of the Preferred Alternative or Alternative 2 would not result in adverse environmental effects and therefore mitigation measures are not necessary.

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Jennifer Weitkamp, Biological Resources
B.S., Fisheries

Pete Heltzel, Water Quality and Marine Sediments
M.S., Marine Science

Julie Werner PE, Air/Noise,
B.S., Civil Engineering

Teresa Rudolph, Cultural Resources and American Indian Cultural Resources,
M.A., Anthropology

Erica Mignone Boulanger, Cumulative Impacts
B.S., Environmental Science

Jason Harshman, GIS and Graphic Design
B.A., Geography

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APPENDIX A
AGENCY CORRESPONDENCE

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

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

March 13, 2013

Capt. P. M. Dawson
Commanding Officer
Naval Base Kitsap
120 South Dewey St.
Bremerton, WA 98314-5020

In future correspondence please refer to:
Log: 031313-11-USN
Property: Installation of New Barge Mooring Facility
Re: No Historic Properties Affected

Dear Capt. Dawson:

Thank you for contacting the Washington State Department of Archaeology and Historic Preservation (DAHP). The above referenced project has been reviewed on behalf of the State Historic Preservation Officer under provisions of Section 106 of the National Historic Preservation Act of 1966 (as amended) and 36 CFR Part 800. My review is based upon documentation contained in your communication.

We concur that no historic properties will be affected by the current project as proposed. If additional information on the project becomes available, or if any archaeological resources are uncovered during construction, please halt work in the area of discovery and contact the appropriate Native American Tribes and DAHP for further consultation.

Thank you for the opportunity to review and comment. Should you have any questions, please contact me.

Sincerely,

Russell Holter

Russell Holter
Project Compliance Reviewer
(360) 586-3533
russell.holter@dahp.wa.gov

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

5090
Ser PRB4/00468
8 Mar 13

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

Dear Dr. Brooks:

SUBJECT: REQUEST FOR A NATIONAL HISTORIC PRESERVATION ACT SECTION 106 CONSULTATION ON THE DEFINITION OF THE AREA OF POTENTIAL EFFECTS, DETERMINATIONS OF ELIGIBILITY, AND A DETERMINATION OF NO HISTORIC PROPERTIES AFFECTED BY INSTALLATION OF BARGE MOORING AT NAVAL BASE KITSAP BANGOR

Naval Base Kitsap is initiating consultation in accordance with Section 106 of the National Historic Preservation Act as amended and 36 Code of Federal Regulations (CFR) Part 800 for installation of a barge mooring at the Service Pier at Naval Base (NAVBASE) Kitsap Bangor. This letter is to request concurrence on our definition of the Area of Potential Effects (APE), determinations of eligibility, and findings of effects.

The site of the proposed undertaking is along the eastern shore of Hood Canal towards NAVBASE Kitsap Bangor's southern border (Enclosure 1). The project would install four 48-inch diameter steel pipe piles, five 36-inch diameter steel pipe piles, and four 20-inch steel pipe piles to support a new barge and a new transformer pad. The project also includes relocating existing floats, which are currently moored at the site where the new barge will be located, to the south side of the Service Pier. To accommodate the relocated floats, three 24-inch diameter steel pipe piles would be installed (Enclosure 3).

The APE consists of the areas of direct and indirect impacts (Enclosure 2). Direct impacts consist of the construction necessary for the project and its direct effect on the existing facilities, the service pier. Indirect effect takes into consideration the effect on a historic property within the viewshed of the property.

The closest known historic property is a shell midden (45KP108) on the shore south of Carlson Spit approximately 1,000 feet south of the project site.

SUBJECT: REQUEST FOR A NATIONAL HISTORIC PRESERVATION ACT SECTION 106 CONSULTATION ON THE DEFINITION OF THE AREA OF POTENTIAL EFFECTS, DETERMINATIONS OF ELIGIBILITY, AND A DETERMINATION OF NO HISTORIC PROPERTIES AFFECTED BY INSTALLATION OF BARGE MOORING AT NAVAL BASE KITSAP BANGOR

The Service Pier has been determined not eligible for inclusion in the National Register of Historic Places (NRHP) with concurrence from the State Historic Preservation Officer and with the exception of Facility 7132 and Facility 7133, all buildings and structures within the viewshed have been determined not eligible for inclusion in the NRHP per DAHP log number 030911-62-USN. Both Facility 7132 (Carderock Pier and Trestle) and Facility 7133 (Ship Storage) were constructed in 2009. These post-date the Cold War Era and have not achieved exceptional importance as required by Criteria Consideration G for properties that are less than 50 years of age.

No in-water surveys specific to this undertaking were conducted. However, no historic properties or anomalies have been encountered by divers, remotely operated vehicles, or remote sensing surveys associated with previous planning or construction in the vicinity of the APE. Because of the extent of modern marine activity and its nature, it is unlikely that unrecorded submerged historic resources exist along the shoreline of Bangor. NOAA charts show no submerged ships or shipwrecks in the vicinity (NOAA 2007). A records search using the Washington DAHP website was conducted in September 2012, and no recorded submerged resources were found to exist in the APE. The Navy has determined that the proposed undertaking will not affect submerged historic properties.

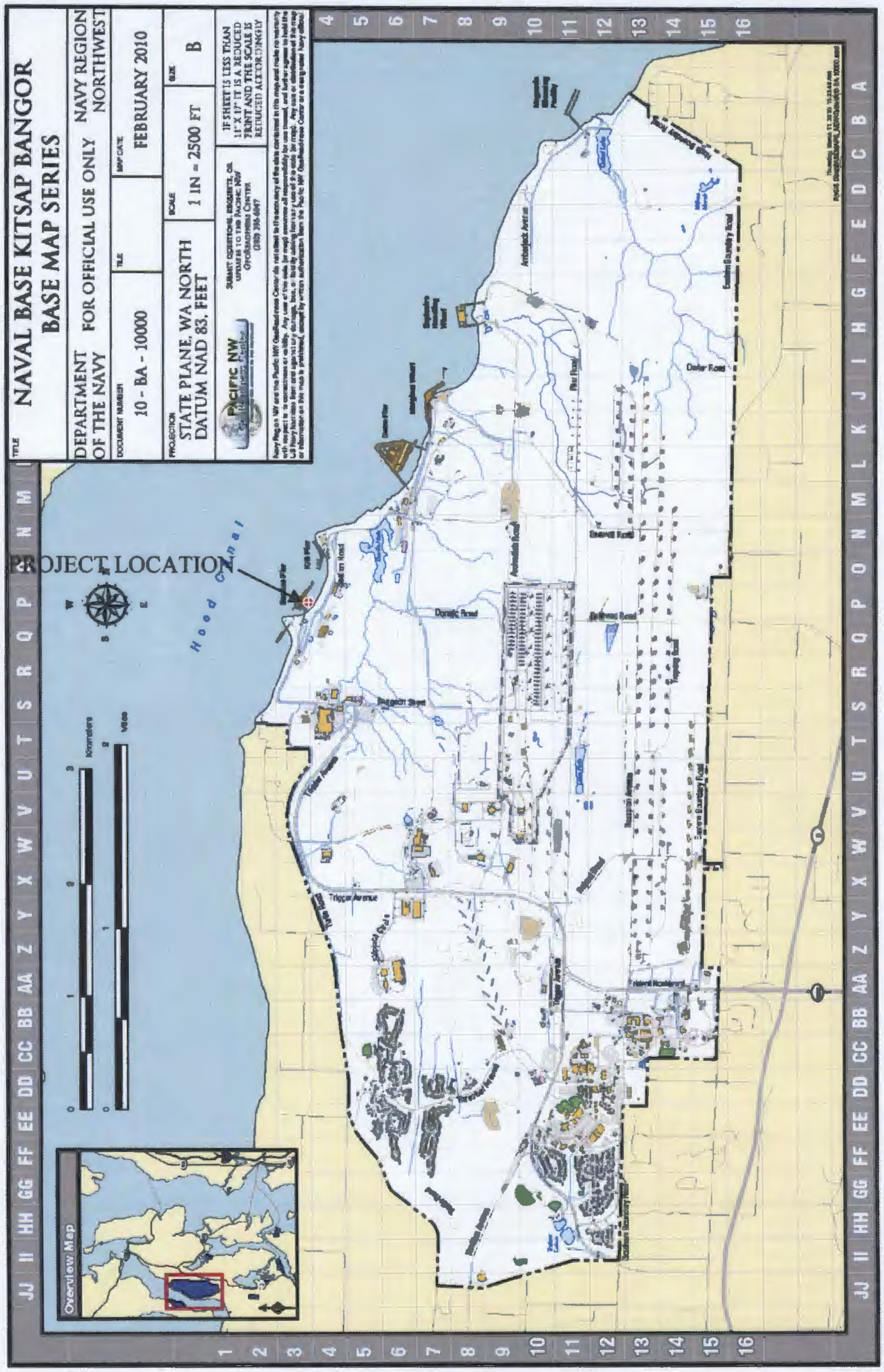
The Navy requests your comments on our defining of the APE, the determinations of eligibilities for Facilities 7132 and 7133, and the finding of No Historic Properties Affected within 30 days of receipt of this letter. If you require further information or have any questions, please contact Mr. Dave Grant. He can be reached at (360) 396-0919 or at dave.m.grant@navy.mil.

Sincerely,

P. M. DAWSON
Captain, U.S. Navy
Commanding Officer

Enclosures:
1. Site Location Map
2. APE for Barge Mooring
3. Project Diagram

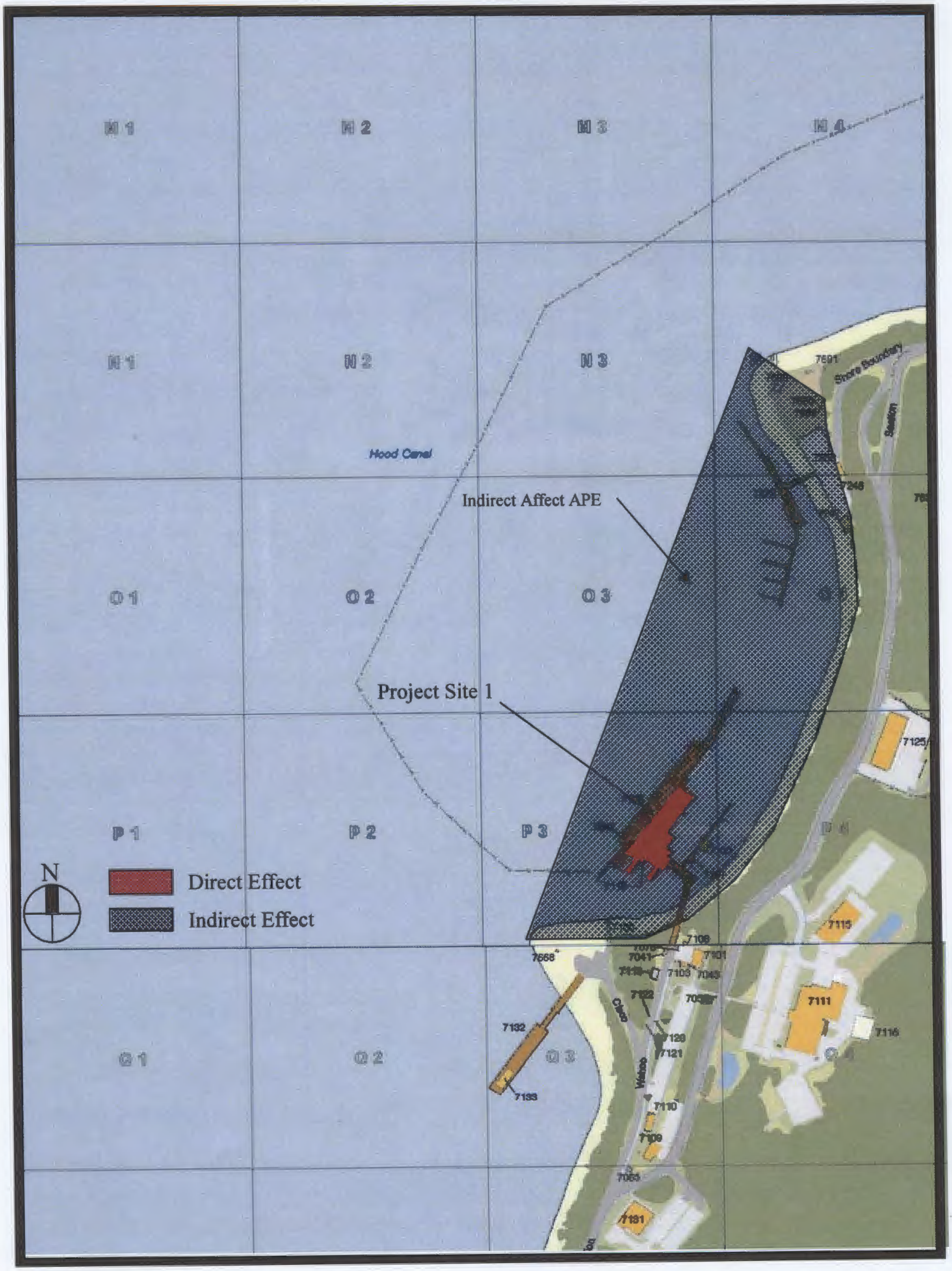
SUBJECT: REQUEST FOR A NATIONAL HISTORIC PRESERVATION ACT SECTION 106 CONSULTATION ON THE DEFINITION OF THE AREA OF POTENTIAL EFFECTS, DETERMINATIONS OF ELIGIBILITY, AND A DETERMINATION OF NO HISTORIC PROPERTIES AFFECTED BY INSTALLATION OF BARGE MOORING AT NAVAL BASE KITSAP BANGOR



Site Location Map

Enclosure 1

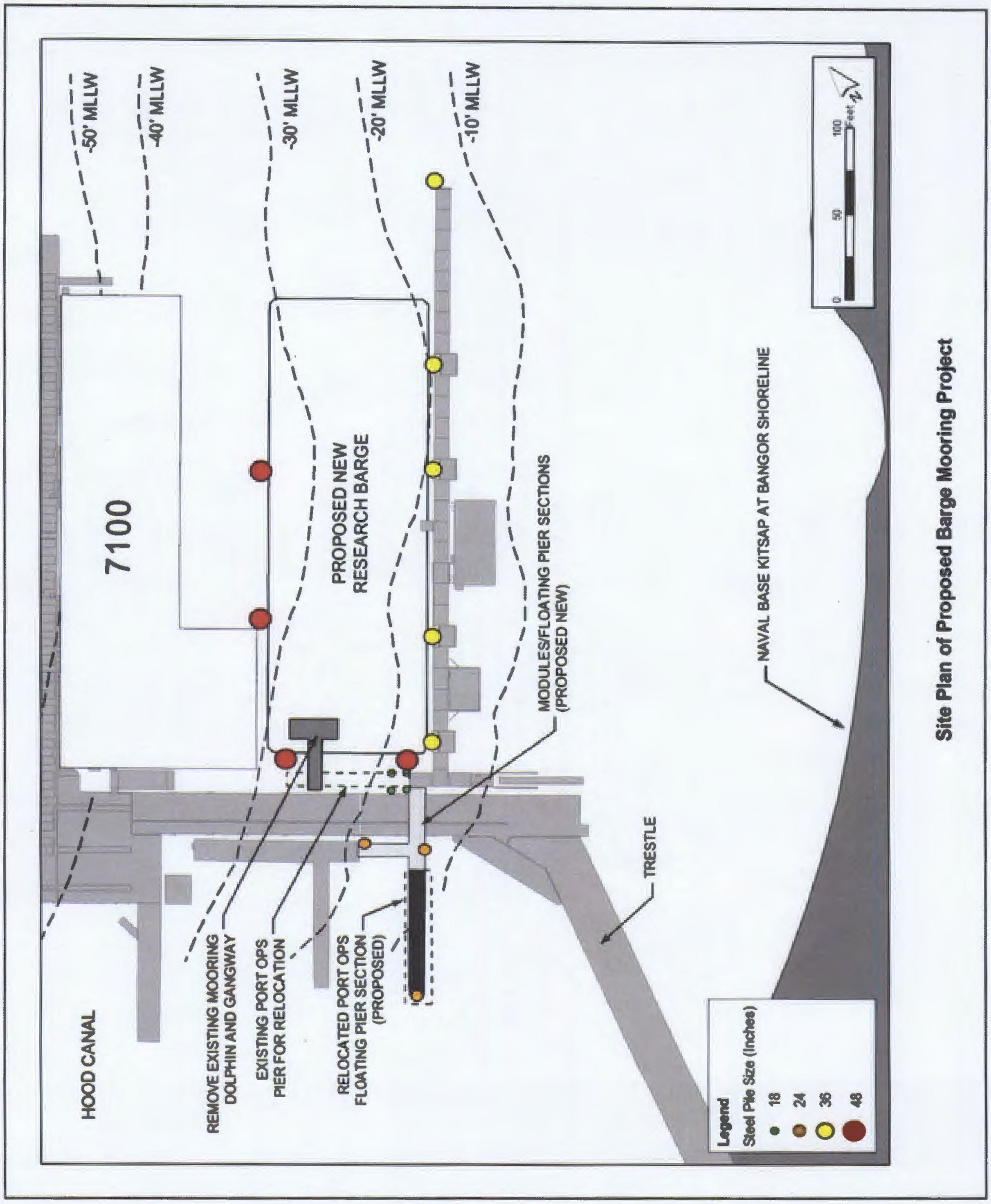
SUBJECT: REQUEST FOR A NATIONAL HISTORIC PRESERVATION ACT SECTION 106 CONSULTATION ON THE DEFINITION OF THE AREA OF POTENTIAL EFFECTS, DETERMINATIONS OF ELIGIBILITY, AND A DETERMINATION OF NO HISTORIC PROPERTIES AFFECTED BY INSTALLATION OF BARGE MOORING AT NAVAL BASE KITSAP BANGOR



APE for Barge Mooring

Enclosure 2

SUBJECT: REQUEST FOR A NATIONAL HISTORIC PRESERVATION ACT SECTION 106 CONSULTATION ON THE DEFINITION OF THE AREA OF POTENTIAL EFFECTS, DETERMINATIONS OF ELIGIBILITY, AND A DETERMINATION OF NO HISTORIC PROPERTIES AFFECTED BY INSTALLATION OF BARGE MOORING AT NAVAL BASE KITSAP BANGOR



Site Plan of Proposed Barge Mooring Project

PORT GAMBLE S'KLALLAM TRIBE
nəxʷq'iyt nəxʷsƛa'y'əm
NATURAL RESOURCES DEPARTMENT
TRIBAL HISTORIC PRESERVATION OFFICE

To: Captain Dawson
Captain US Navy Commanding Officer
Navy Base Kitsap at Bangor
1101 Tautog Circle Silverdale, WA 98315

February 8th 2013

RE: Section 106 Consultation on the Determination of APE and Historic Properties Affected by Instillation of Barge Mooring at Naval Base Kitsap Bangor

Thank you for contacting the Port Gamble S'Klallam Tribal Historic Preservation Office regarding your proposed undertaking to install a barge mooring at Naval Base Kitsap Bangor's southern border. This undertaking is located in the Port Gamble S'Klallam Tribes Adjudicated Usual and Accustomed Area and is within the Port Gamble S'Klallam Cultural Landscape, which predates the development of Navy Base Kitsap, Bangor.

Port Gamble S'Klallam Tribal members use and maintain traditional, cultural and historic harvest sites and areas including submerged, near shore, intertidal, and upland settings throughout the lower Hood Canal Port Gamble S'Klallam cultural landscape encompassing the area for this proposed undertaking.

Each of these sites has different and unique cultural and historical distinctiveness for Port Gamble S'Klallam tribal members. Some sites have distinct and clear associations with important aspects of tribal history. Other sites have specific associations with particular Port Gamble S'Klallam families and significant associations with historic individuals significant in Port Gamble S'Klallam history. Yet other significant harvest sites may appear to lack individual distinction but are an integral part of an entity of traditional cultural importance. These associations render them eligible for consideration for the National Register of Historic Properties, as both individual Traditional Cultural Properties and as part of broader Native American Cultural Landscape.

This project has potential impacts to the broader Port Gamble S'Klallam Cultural Landscape, which has not yet been considered in this Section 106 evaluation. The letter received by the Port Gamble S'Klallam Tribe did not provide analysis of the cumulative impacts or those that may be further removed from the ground disturbing components of the project, or may result from the use of the proposed barge mooring.

Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended (16U.S.C. §§ 470 *et. seq.*) requires federal agencies to identify historic properties

31912 Little Boston Rd. NE – Kingston, WA 98346
Phone: (360) 297-4792 Fax: (360) 297-4791

(which include archeological sites and traditional cultural properties, and Native American Cultural Landscapes) within a proposed project's Area of Potential Effect (APE). 36 C.F.R. § 800.4(a) states that an APE is to be determined in consultation with the SHPO/THPO. An APE is defined in § 800.16(d) as: "The geographic area, or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The area of potential effects is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking." The Advisory Council on Historic Preservation (ACHP)[1] offers further clarification of the definition of an APE stating that

> In developing the APE for an undertaking, consideration must be given to those effects that will occur immediately and directly as well as those that are reasonably foreseeable and may occur later in time, be farther removed in distance or be cumulative, but still resulting from the undertaking.
>
> The APE is not static but should be adjusted as a federal agency further develops the details of the undertaking and learns more about potential historic properties, and how they may be affected. The input of the consulting parties is crucial to this informed revision and refinement of the APE throughout Section 106 review[2].

The APE as defined in this letter does not take into account, as directed by the ACHP those impacts that may occur later in time be farther removed in distance but still resulting from this undertaking. This includes the use of the proposed facility and its potential impacts on cultural resources including Traditional Cultural Properties (TCPs) and Native American Cultural Landscapes.

Many Native American Cultural Landscapes and TCPs are natural objects, or appear to have had little or no visible modification by humans. Yet a natural object, a traditional salmon set net site, shellfish beds, a yew tree, a kelp bed, or an underwater rock outcropping may be eligible for the National Historic Register. *The National Register Bulletin for Evaluating Traditional Cultural Properties* (Parker and King 1998) states that the integrity of TCPs are grounded in the relationship a community maintains with a site, feature, object or district. It is the identified property that is evaluated for its eligibility to the National Register, not the cultural

---

[1] The ACHP is an independent federal agency that promotes the preservation, enhancement, and productive use of our nation's resources when their actions affect historic properties. The ACHP is the only legal entity with the responsibility to encourage federal agencies to factor historic preservation into federal project requirements.

[2] www.achp.gov/archguide

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practice. Yet, it is the relationship that a community maintains with the identified property that gives a potential property its integrity that qualifies it for the National Register of Historic Properties. It is the active engagement with a property by a community that gives the property its cultural integrity.

Impacts from the proposed undertaking of installing a barge mooring extend beyond the footprint of the proposed moorage structure but should include analysis of how the use of this facility will potentially impact cultural resources including TCPs and Native American Cultural Landscapes. These types of impacts to the integrity of the broader Port Gamble S'Klallam Lowe Hood Canal Cultural Landscape have not yet been evaluated.

The Tribe does concur with the Navy's determinations of not eligible regarding the Service Pier and the buildings within the view shed of the proposed undertaking. 45KP108 should not experience adverse impacts from the proposed undertaking. If in the event of the inadvertent discovery of cultural resource deposits, including ancestral remains stop all work, fence of the work area and contract the Port Gamble S'Klallam Tribal Historic Preservation Office.

The APE as currently defined for the Barge Moorage Buoy at Naval Base Kitsap does not include the analysis of the proposed undertaking potential impact on TCPS, Native American Cultural Landscapes or Sacred Sites.

The Port Gamble S'Klallam Tribal Historic Preservation Office would like the Navy's analysis and their definition of the APE for this proposed undertaking to include this analysis.

The Tribe is willing to work with the Navy in their evaluation of these impacts in order to assist them in meeting their legal obligation to the Section 106 cultural resource evaluation and the protection of Tribal Cultural Resources.

I look forward to continuing to work with the Navy

Sincerely Josh Wisniewski

Josh W

Dr. Josh Wisniewski
Anthropologist/Archeologist
Tribal Historic Preservation Officer
Natural Resource Department
Port Gamble S'Klallam Tribe
360-633-1899
joshw@pgst.nsn.us

CC:

Jeromy Sullivan, Chairman, Port Gamble S'Klallam Tribe
Roma Call, Environmental Coordinator, Port Gamble S'Klallam Tribe
Allyson Brooks, SHPO Washington State Dept of Archeology and Historic Preservation

LOWER ELWHA KLALLAM TRIBE

ʔəʔɬx̣ʷə nəxʷsƛ̓ay̓əm "Strong People"

2851 Lower Elwha Road (360) 452-8471
Port Angeles, WA 98363 Fax: (360) 452-3428

January 30, 2013

P.M. Dawson
Captain, U.S. Navy
Commanding Officer
Department of the Navy
Naval Base Kitsap
120 South Dewey Street
Bremerton, WA 98314-5020

Re: Request for Section 106 Consultation on the Installation of a Barge Mooring at Naval Base Kitsap Bangor, Silverdale, WA

Dear Captain Dawson:

Thank you for your recent inquiry requesting Lower Elwha Klallam concurrence with the Navy's definition of the APE and determination of "no historic properties affected" under the National Historic Preservation Act of 1966 as amended and in acknowledging our interest in the installation of a Barge Mooring at Naval Base Kitsap Bangor. The proposed action lies outside of the ancestral lands of the Lower Elwha Klallam Tribe we therefore respectfully defer to the Suquamish Tribe and Skokomish Tribes as primary tribes in the project area for comment concerning cultural resources. Klallam tribes along the Strait of Juan de Fuca are in fact three separate Klallam Tribes identified as Port Gamble S'Klallam, Jamestown S'Klallam, and Lower Elwha Klallam under the Treaty of Point No Point. The Lower Elwha Klallam Tribe is in receipt of your letter of January 25, 2013 and is pleased to provide you our comments regarding consultation under the National Historic Preservation Act as amended. Thank you again for the opportunity to provide comment on the proposed project.

Sincerely,

William S. White
Tribal Archaeologist, MA
Cultural Resources
Lower Elwha Klallam Tribe

cc: Frances Charles, Tribal Chairwoman, Lower Elwha Klallam Tribe
Business Committee
Sonya Tetnowski, Chief Executive Officer
File

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

5090
Ser PRB4/00077
25 Jan 13

The Suquamish Tribe
Mr. Dennis Lewarch
P.O. Box 498
Suquamish, WA 98392

Dear Mr. Lewarch:

SUBJECT: REQUEST FOR A NATIONAL HISTORIC PRESERVATION ACT SECTION 106 CONSULTATION ON THE DEFINITION OF THE AREA OF POTENTIAL EFFECTS, DETERMINATIONS OF ELIGIBILITY, AND A DETERMINATION OF NO HISTORIC PROPERTIES AFFECTED BY INSTALLATION OF BARGE MOORING AT NAVAL BASE KITSAP BANGOR

Naval Base Kitsap is initiating consultation in accordance with Section 106 of the National Historic Preservation Act as amended and 36 Code of Federal Regulations (CFR) Part 800 for installation of a barge mooring at the Service Pier at Naval Base (NAVBASE) Kitsap Bangor. This letter is to request comments on our definition of the Area of Potential Effects (APE), determinations of eligibility, and findings of effects.

The site of the proposed undertaking is along the eastern shore of Hood Canal towards NAVBASE Kitsap Bangor's southern border (Enclosure 1). The project would install four 48-inch diameter steel pipe piles, five 36-inch diameter steel pipe piles, and four 20-inch steel pipe piles to support a new barge and a new transformer pad. The project also includes relocating existing floats, which are currently moored at the site where the new barge will be located, to the south side of the Service Pier. To accommodate the relocated floats, three 24-inch diameter steel pipe piles would be installed (Enclosure 3).

The APE consists of the areas of direct and indirect impacts (Enclosure 2). Direct impacts consist of the construction necessary for the project and its direct effect on the existing facilities, the service pier. Indirect effect takes into consideration the effect on a historic property within the viewshed of the property.

The closest known historic property is a shell midden (45KP108) on the shore south of Carlson Spit approximately 1,000 feet south of the project site.

The Service Pier has been determined not eligible for inclusion in the National Register of Historic Places (NRHP) with

concurrence from the State Historic Preservation Officer and with the exception of Facility 7132 and Facility 7133, all buildings and structures within the viewshed have been determined not eligible for inclusion in the NRHP per DAHP log number 030911-62-USN. Both Facility 7132 (Carderock Pier and Trestle) and Facility 7133 (Ship Storage) were constructed in 2009. These post-date the Cold War Era and have not achieved exceptional importance as required by Criteria Consideration G for properties that are less than 50 years of age.

No in-water surveys specific to this undertaking were conducted. However, no historic properties or anomalies have been encountered by divers, remotely operated vehicles, or remote sensing surveys associated with previous planning or construction in the vicinity of the APE. Because of the extent of modern marine activity and its nature, it is unlikely that unrecorded submerged historic resources exist along the shoreline of Bangor. NOAA charts show no submerged ships or shipwrecks in the vicinity (NOAA 2007). A records search using the Washington DAHP website was conducted in September 2012, and no recorded submerged resources were found to exist in the APE. The Navy has determined that the proposed undertaking will not affect submerged historic properties.

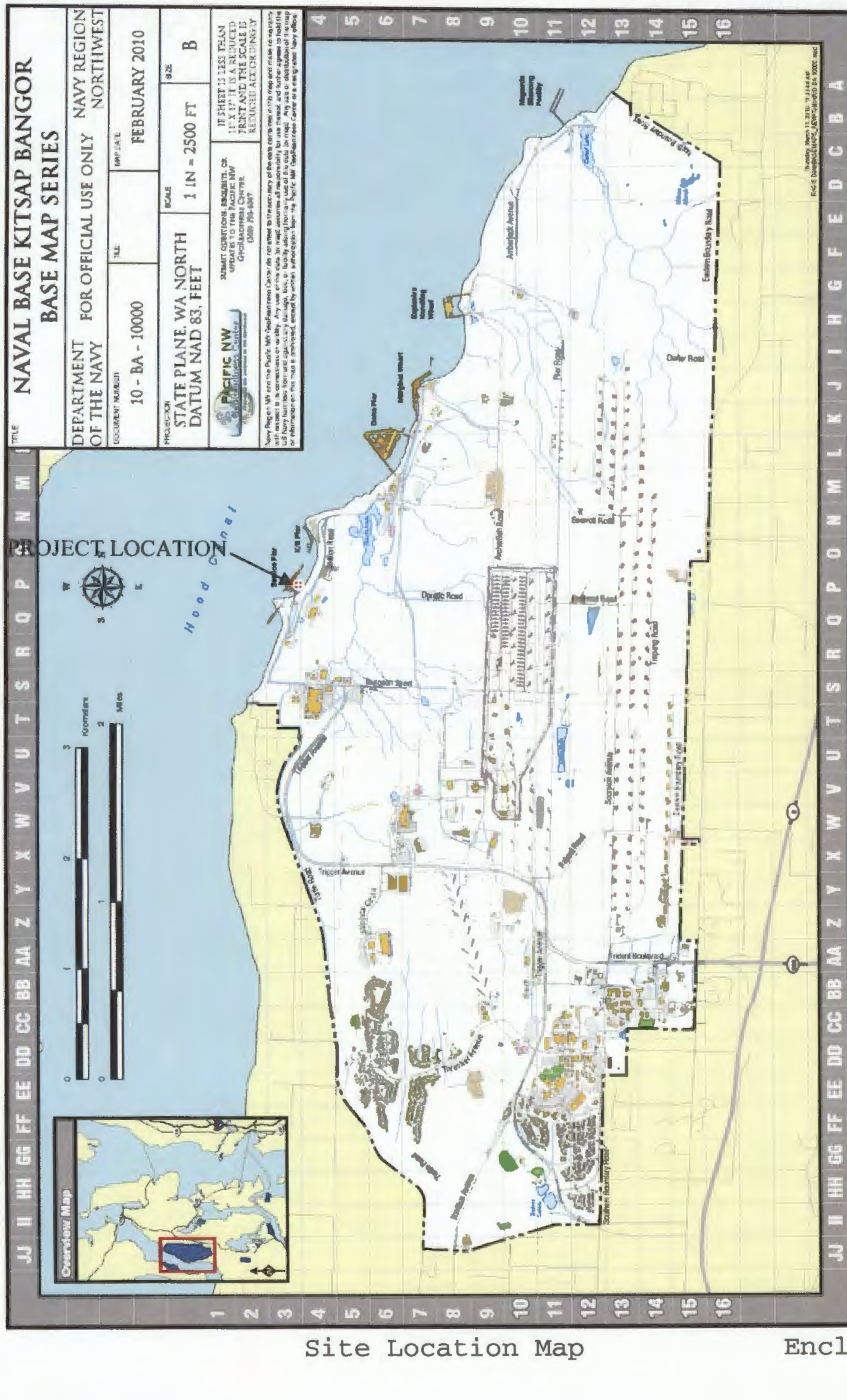
The Navy requests your comments on our defining of the APE, the determinations of eligibilities for Facilities 7132 and 7133, and the finding of No Historic Properties Affected within 30 days of receipt of this letter. If you require further information or have any questions, please contact Mr. Dave Grant. He can be reached at (360) 396-0919 or at dave.m.grant@navy.mil.

Sincerely,

P. M. DAWSON
Captain, U.S. Navy
Commanding Officer

Enclosures:
1. Site Location Map
2. APE for Barge Mooring
3. Project Diagram

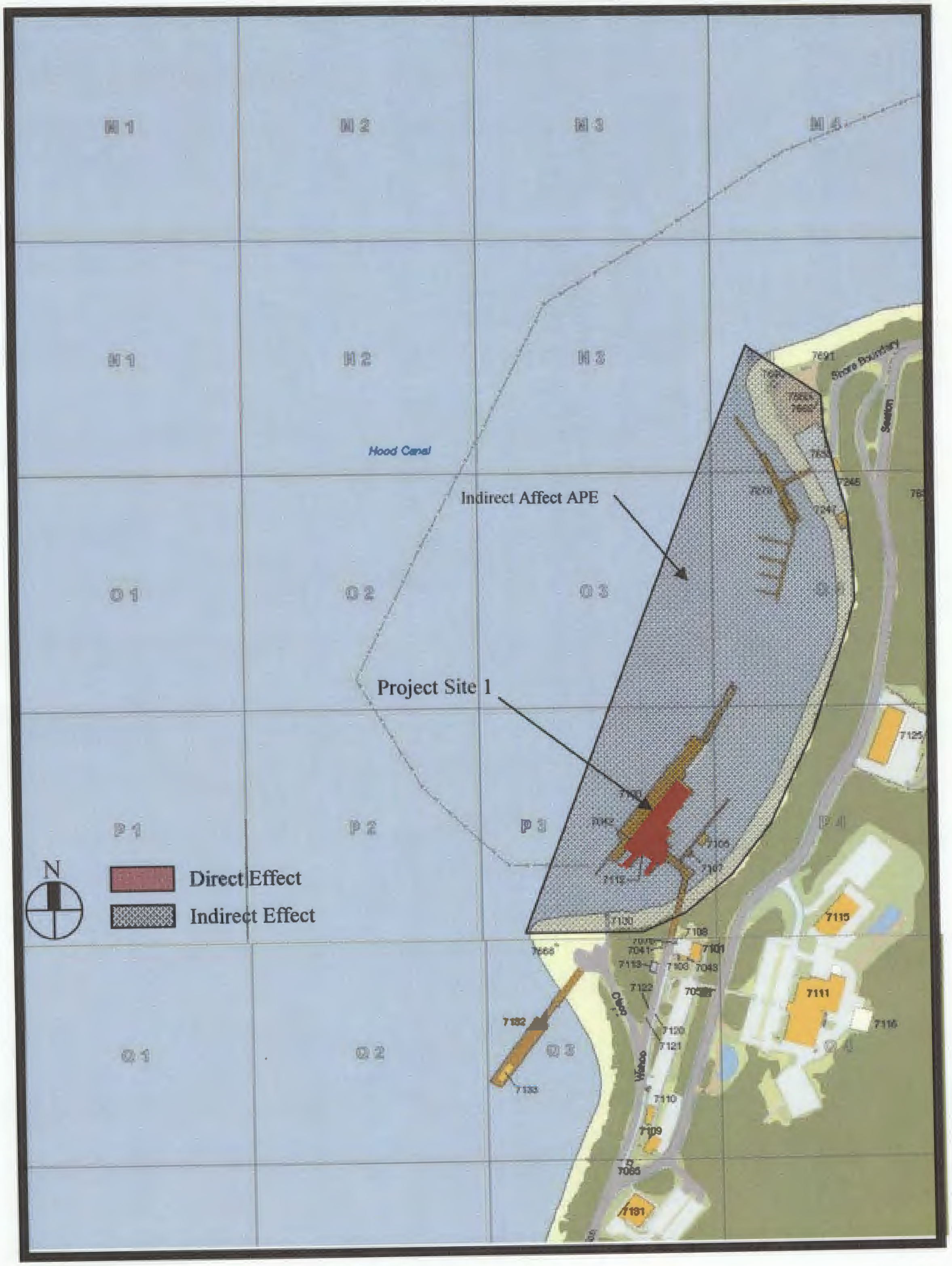
SUBJECT: REQUEST FOR A NATIONAL HISTORIC PRESERVATION ACT SECTION 106 CONSULTATION ON THE DEFINITION OF THE AREA OF POTENTIAL EFFECTS, DETERMINATIONS OF ELIGIBILITY, AND A DETERMINATION OF NO HISTORIC PROPERTIES AFFECTED BY INSTALLATION OF BARGE MOORING AT NAVAL BASE KITSAP BANGOR



Site Location Map

Enclosure 1

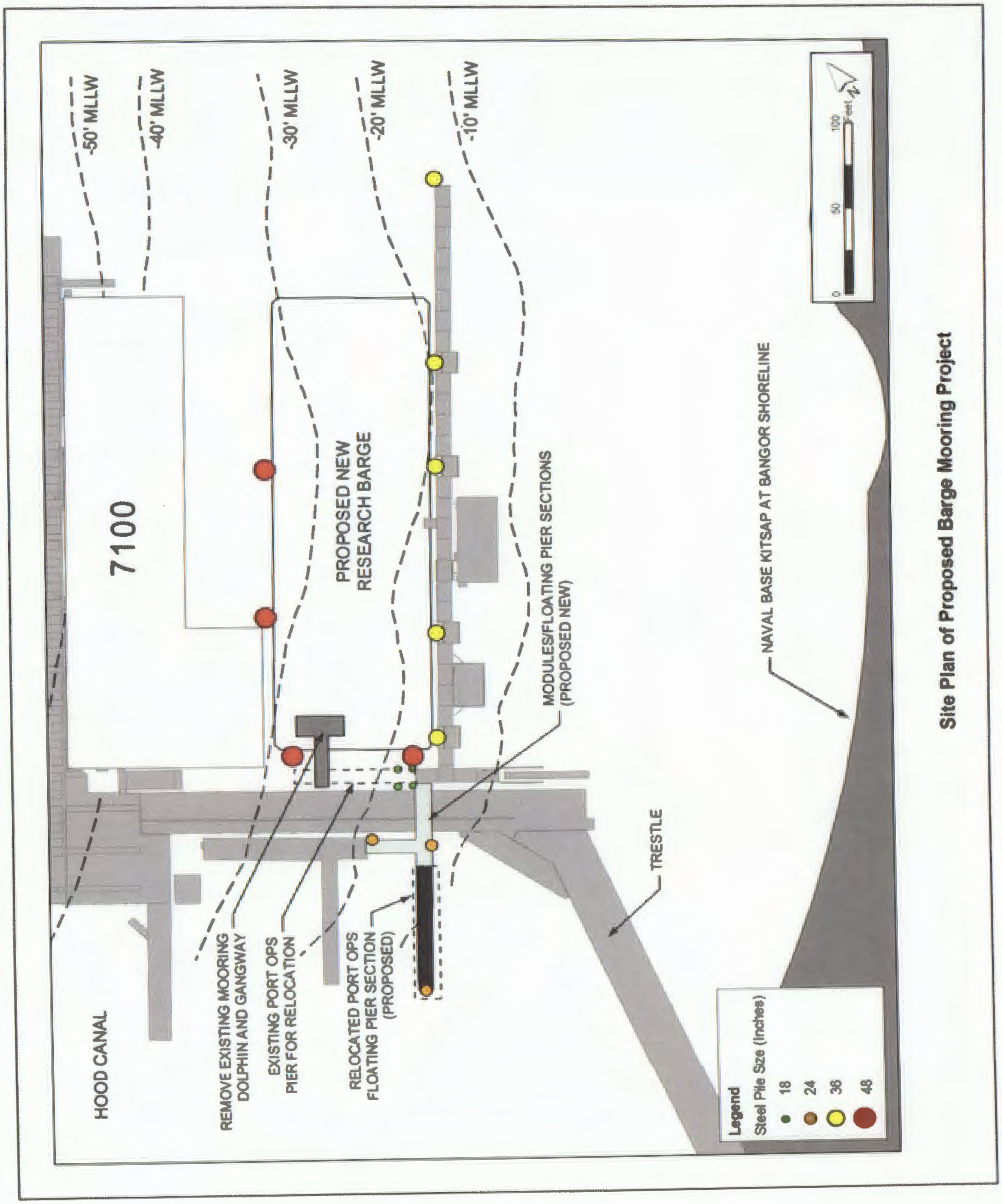
SUBJECT: REQUEST FOR A NATIONAL HISTORIC PRESERVATION ACT SECTION 106 CONSULTATION ON THE DEFINITION OF THE AREA OF POTENTIAL EFFECTS, DETERMINATIONS OF ELIGIBILITY, AND A DETERMINATION OF NO HISTORIC PROPERTIES AFFECTED BY INSTALLATION OF BARGE MOORING AT NAVAL BASE KITSAP BANGOR



APE for Barge Mooring

Enclosure 2

SUBJECT: REQUEST FOR A NATIONAL HISTORIC PRESERVATION ACT SECTION 106 CONSULTATION ON THE DEFINITION OF THE AREA OF POTENTIAL EFFECTS, DETERMINATIONS OF ELIGIBILITY, AND A DETERMINATION OF NO HISTORIC PROPERTIES AFFECTED BY INSTALLATION OF BARGE MOORING AT NAVAL BASE KITSAP BANGOR



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

5090
Ser PRB4/00074
25 Jan 13

Skokomish Tribal Nation
Ms. Kris Miller
North 80 Tribal Center Road
Skokomish, WA 98584

Dear Ms. Miller:

SUBJECT: REQUEST FOR A NATIONAL HISTORIC PRESERVATION ACT SECTION 106 CONSULTATION ON THE DEFINITION OF THE AREA OF POTENTIAL EFFECTS, DETERMINATIONS OF ELIGIBILITY, AND A DETERMINATION OF NO HISTORIC PROPERTIES AFFECTED BY INSTALLATION OF BARGE MOORING AT NAVAL BASE KITSAP BANGOR

Naval Base Kitsap is initiating consultation in accordance with Section 106 of the National Historic Preservation Act as amended and 36 Code of Federal Regulations (CFR) Part 800 for installation of a barge mooring at the Service Pier at Naval Base (NAVBASE) Kitsap Bangor. This letter is to request comments on our definition of the Area of Potential Effects (APE), determinations of eligibility, and findings of effects.

The site of the proposed undertaking is along the eastern shore of Hood Canal towards NAVBASE Kitsap Bangor's southern border (Enclosure 1). The project would install four 48-inch diameter steel pipe piles, five 36-inch diameter steel pipe piles, and four 20-inch steel pipe piles to support a new barge and a new transformer pad. The project also includes relocating existing floats, which are currently moored at the site where the new barge will be located, to the south side of the Service Pier. To accommodate the relocated floats, three 24-inch diameter steel pipe piles would be installed (Enclosure 3).

The APE consists of the areas of direct and indirect impacts (Enclosure 2). Direct impacts consist of the construction necessary for the project and its direct effect on the existing facilities, the service pier. Indirect effect takes into consideration the effect on a historic property within the viewshed of the property.

The closest known historic property is a shell midden (45KP108) on the shore south of Carlson Spit approximately 1,000 feet south of the project site.

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The Navy requests your comments on our defining of the APE, the determinations of eligibilities for Facilities 7132 and 7133, and the finding of No Historic Properties Affected within 30 days of receipt of this letter. If you require further information or have any questions, please contact Mr. Dave Grant. He can be reached at (360) 396-0919 or at dave.m.grant@navy.mil.

Sincerely,

P. M. DAWSON
Captain, U.S. Navy
Commanding Officer

Enclosures:
1. Site Location Map
2. APE for Barge Mooring
3. Project Diagram

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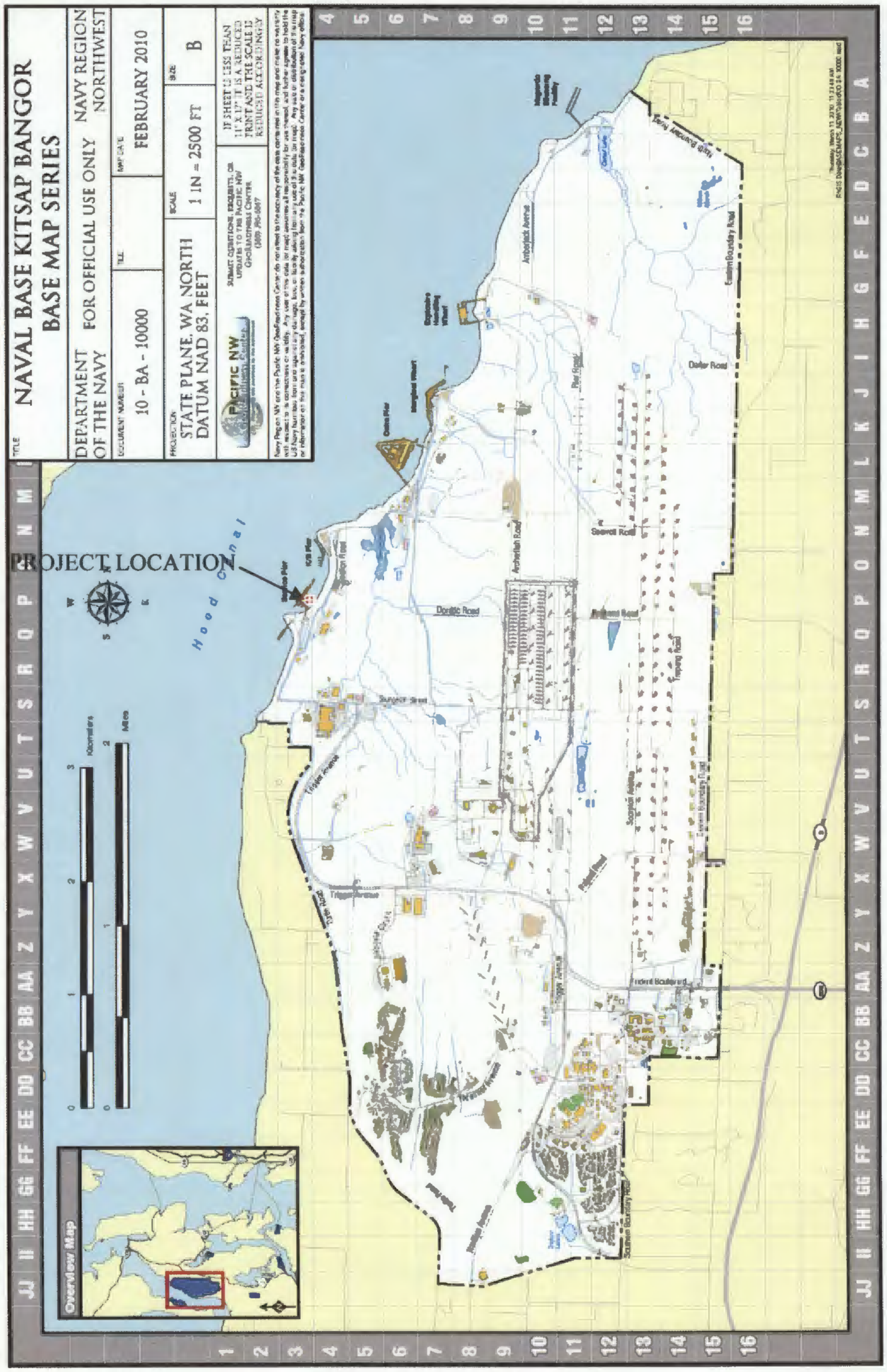
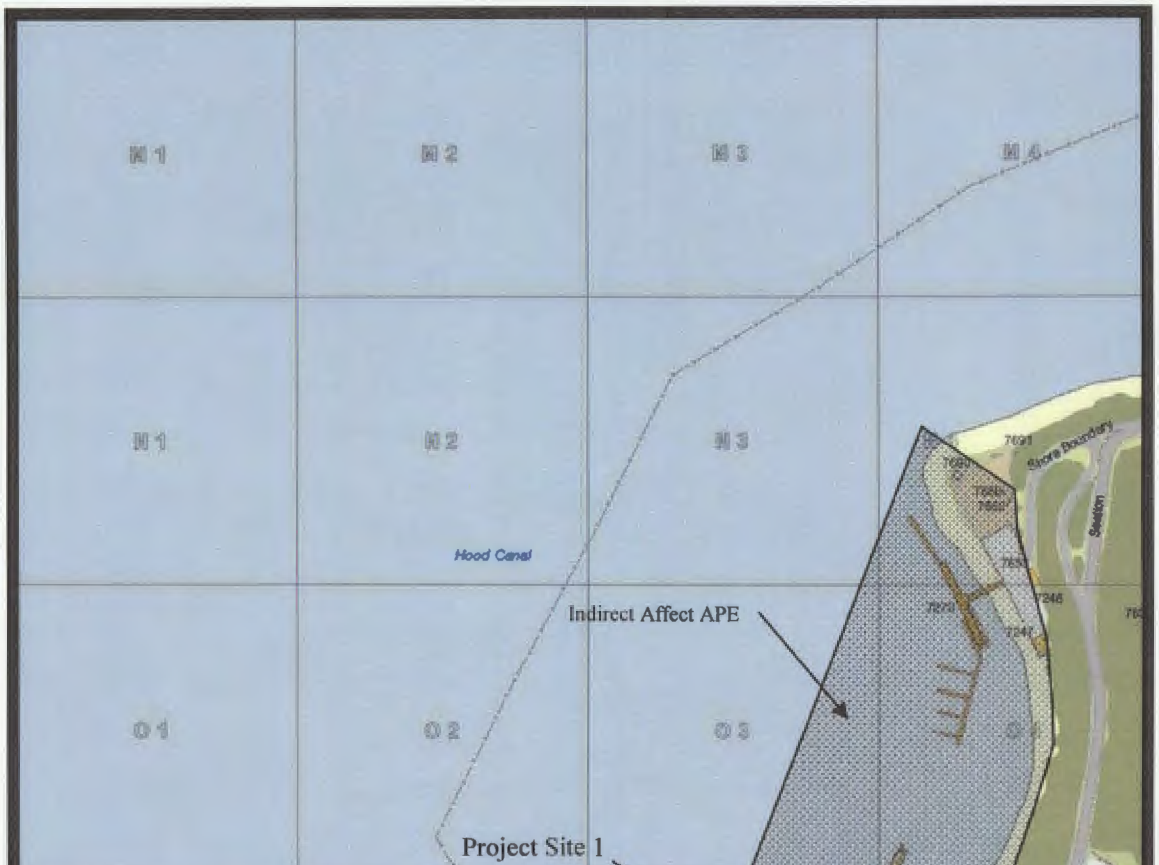


Site Location Map Enclosure 1

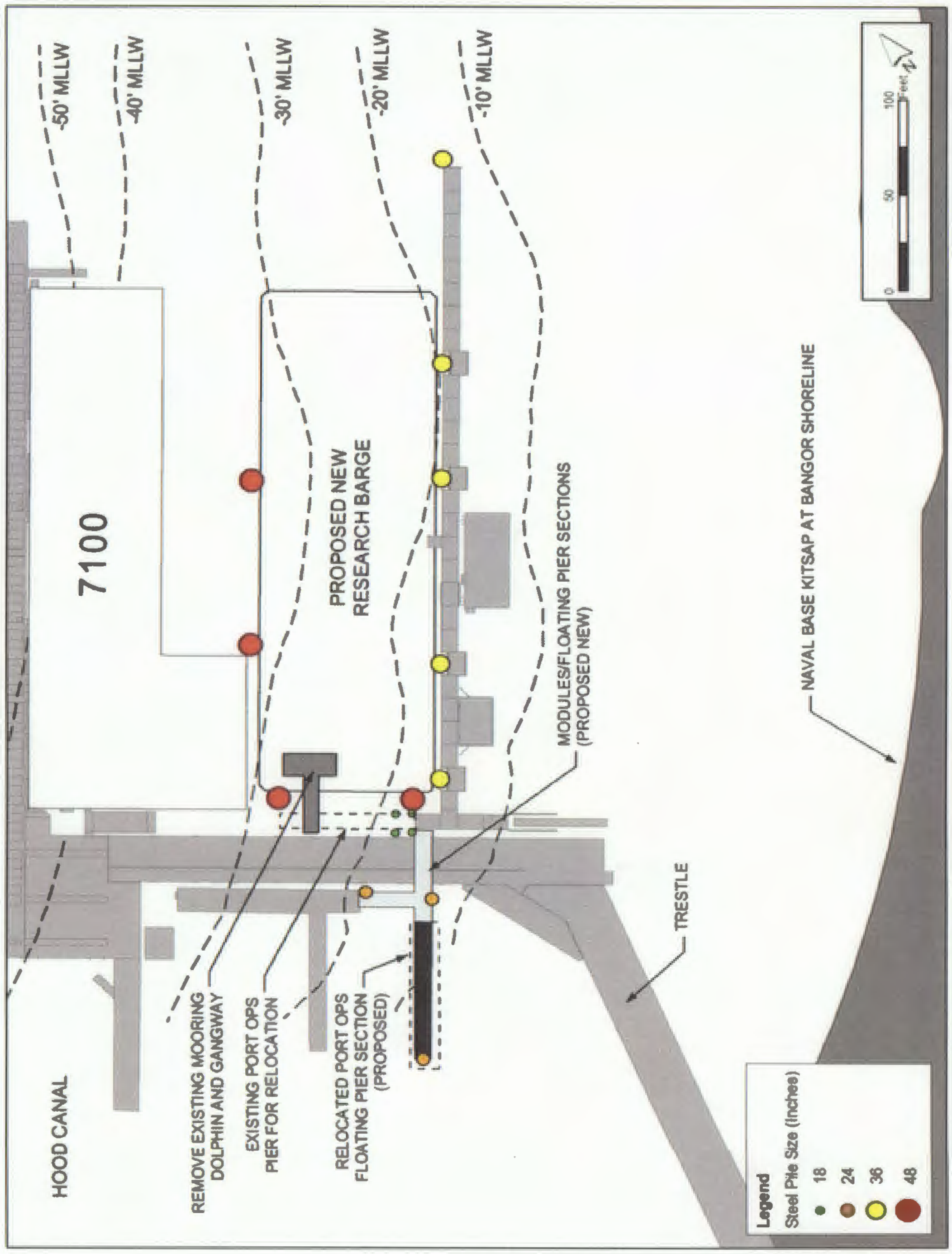
SUBJECT: REQUEST FOR A NATIONAL HISTORIC PRESERVATION ACT SECTION 106 CONSULTATION ON THE DEFINITION OF THE AREA OF POTENTIAL EFFECTS, DETERMINATIONS OF ELIGIBILITY, AND A DETERMINATION OF NO HISTORIC PROPERTIES AFFECTED BY INSTALLATION OF BARGE MOORING AT NAVAL BASE KITSAP BANGOR



APE for Barge Mooring

Enclosure 2

SUBJECT: REQUEST FOR A NATIONAL HISTORIC PRESERVATION ACT SECTION 106 CONSULTATION ON THE DEFINITION OF THE AREA OF POTENTIAL EFFECTS, DETERMINATIONS OF ELIGIBILITY, AND A DETERMINATION OF NO HISTORIC PROPERTIES AFFECTED BY INSTALLATION OF BARGE MOORING AT NAVAL BASE KITSAP BANGOR



Site Plan of Proposed Barge Mooring Project

Project Diagram Enclosure 3

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

5090
Ser PRB4/00076
25 Jan 13

The Port Gamble S'Klallam Tribe
Dr. Josh Wisnewski
31912 Little Boston Road NE
Kingston, WA 98346

Dear Dr. Wisnewski:

SUBJECT: REQUEST FOR A NATIONAL HISTORIC PRESERVATION ACT SECTION 106 CONSULTATION ON THE DEFINITION OF THE AREA OF POTENTIAL EFFECTS, DETERMINATIONS OF ELIGIBILITY, AND A DETERMINATION OF NO HISTORIC PROPERTIES AFFECTED BY INSTALLATION OF BARGE MOORING AT NAVAL BASE KITSAP BANGOR

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The APE consists of the areas of direct and indirect impacts (Enclosure 2). Direct impacts consist of the construction necessary for the project and its direct effect on the existing facilities, the service pier. Indirect effect takes into consideration the effect on a historic property within the viewshed of the property.

The closest known historic property is a shell midden (45KP108) on the shore south of Carlson Spit approximately 1,000 feet south of the project site.

The Service Pier has been determined not eligible for inclusion in the National Register of Historic Places (NRHP) with

concurrence from the State Historic Preservation Officer and with the exception of Facility 7132 and Facility 7133, all buildings and structures within the viewshed have been determined not eligible for inclusion in the NRHP per DAHP log number 030911-62-USN. Both Facility 7132 (Carderock Pier and Trestle) and Facility 7133 (Ship Storage) were constructed in 2009. These post-date the Cold War Era and have not achieved exceptional importance as required by Criteria Consideration G for properties that are less than 50 years of age.

No in-water surveys specific to this undertaking were conducted. However, no historic properties or anomalies have been encountered by divers, remotely operated vehicles, or remote sensing surveys associated with previous planning or construction in the vicinity of the APE. Because of the extent of modern marine activity and its nature, it is unlikely that unrecorded submerged historic resources exist along the shoreline of Bangor. NOAA charts show no submerged ships or shipwrecks in the vicinity (NOAA 2007). A records search using the Washington DAHP website was conducted in September 2012, and no recorded submerged resources were found to exist in the APE. The Navy has determined that the proposed undertaking will not affect submerged historic properties.

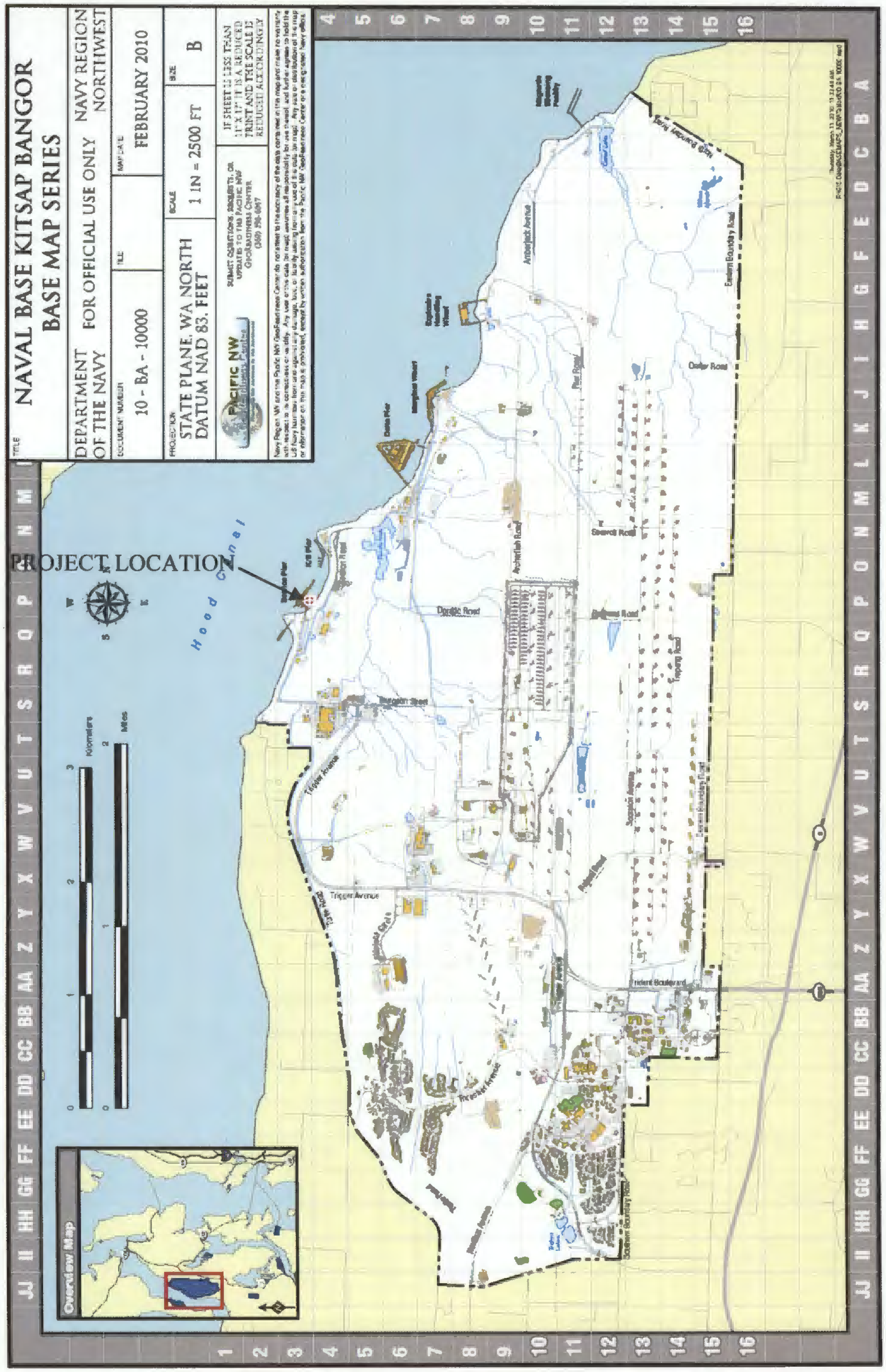
The Navy requests your comments on our defining of the APE, the determinations of eligibilities for Facilities 7132 and 7133, and the finding of No Historic Properties Affected within 30 days of receipt of this letter. If you require further information or have any questions, please contact Mr. Dave Grant. He can be reached at (360) 396-0919 or at dave.m.grant@navy.mil.

Sincerely,

P. M. DAWSON
Captain, U.S. Navy
Commanding Officer

Enclosures: 1. Site Location Map
2. APE for Barge Mooring
3. Project Diagram

SUBJECT: REQUEST FOR A NATIONAL HISTORIC PRESERVATION ACT SECTION 106 CONSULTATION ON THE DEFINITION OF THE AREA OF POTENTIAL EFFECTS, DETERMINATIONS OF ELIGIBILITY, AND A DETERMINATION OF NO HISTORIC PROPERTIES AFFECTED BY INSTALLATION OF BARGE MOORING AT NAVAL BASE KITSAP BANGOR



Site Location Map Enclosure 1

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APE for Barge Mooring

Enclosure 2

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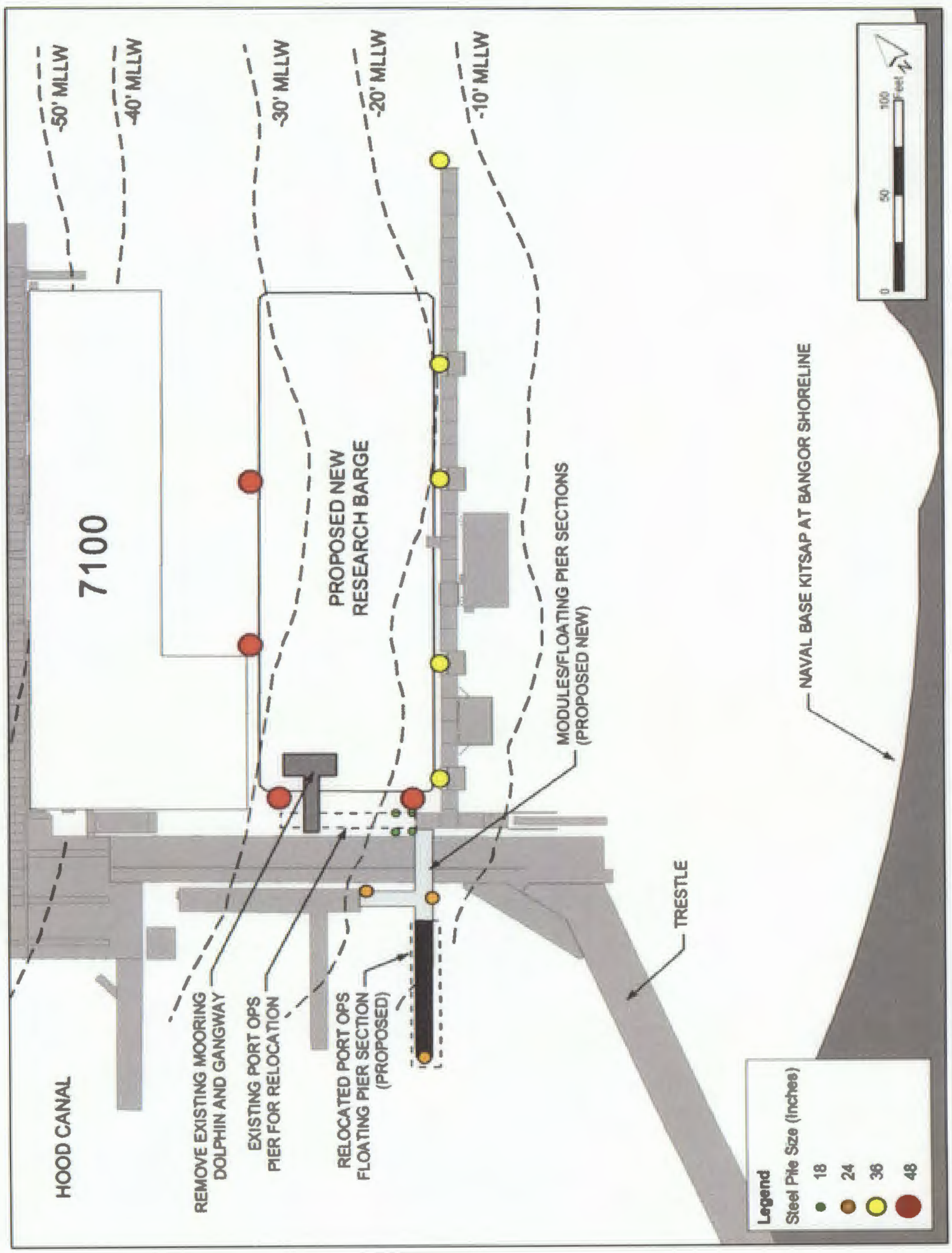

Site Plan of Proposed Barge Mooring Project

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

5090
Ser PRB4/00075
25 Jan 13

The Lower Elwha Tribe
Mr. Bill White
2851 Lower Elwha Road
Port Angeles WA 98362

Dear Mr. White:

SUBJECT: REQUEST FOR A NATIONAL HISTORIC PRESERVATION ACT SECTION 106 CONSULTATION ON THE DEFINITION OF THE AREA OF POTENTIAL EFFECTS, DETERMINATIONS OF ELIGIBILITY, AND A DETERMINATION OF NO HISTORIC PROPERTIES AFFECTED BY INSTALLATION OF BARGE MOORING AT NAVAL BASE KITSAP BANGOR

Naval Base Kitsap is initiating consultation in accordance with Section 106 of the National Historic Preservation Act as amended and 36 Code of Federal Regulations (CFR) Part 800 for installation of a barge mooring at the Service Pier at Naval Base (NAVBASE) Kitsap Bangor. This letter is to request comments on our definition of the Area of Potential Effects (APE), determinations of eligibility, and findings of effects.

The site of the proposed undertaking is along the eastern shore of Hood Canal towards NAVBASE Kitsap Bangor's southern border (Enclosure 1). The project would install four 48-inch diameter steel pipe piles, five 36-inch diameter steel pipe piles, and four 20-inch steel pipe piles to support a new barge and a new transformer pad. The project also includes relocating existing floats, which are currently moored at the site where the new barge will be located, to the south side of the Service Pier. To accommodate the relocated floats, three 24-inch diameter steel pipe piles would be installed (Enclosure 3).

The APE consists of the areas of direct and indirect impacts (Enclosure 2). Direct impacts consist of the construction necessary for the project and its direct effect on the existing facilities, the service pier. Indirect effect takes into consideration the effect on a historic property within the viewshed of the property.

The closest known historic property is a shell midden (45KP108) on the shore south of Carlson Spit approximately 1,000 feet south of the project site.

The Service Pier has been determined not eligible for inclusion in the National Register of Historic Places (NRHP) with

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No in-water surveys specific to this undertaking were conducted. However, no historic properties or anomalies have been encountered by divers, remotely operated vehicles, or remote sensing surveys associated with previous planning or construction in the vicinity of the APE. Because of the extent of modern marine activity and its nature, it is unlikely that unrecorded submerged historic resources exist along the shoreline of Bangor. NOAA charts show no submerged ships or shipwrecks in the vicinity (NOAA 2007). A records search using the Washington DAHP website was conducted in September 2012, and no recorded submerged resources were found to exist in the APE. The Navy has determined that the proposed undertaking will not affect submerged historic properties.

The Navy requests your comments on our defining of the APE, the determinations of eligibilities for Facilities 7132 and 7133, and the finding of No Historic Properties Affected within 30 days of receipt of this letter. If you require further information or have any questions, please contact Mr. Dave Grant. He can be reached at (360) 396-0919 or at dave.m.grant@navy.mil.

Sincerely,

P. M. DAWSON
Captain, U.S. Navy
Commanding Officer

Enclosures:
1. Site Location Map
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3. Project Diagram

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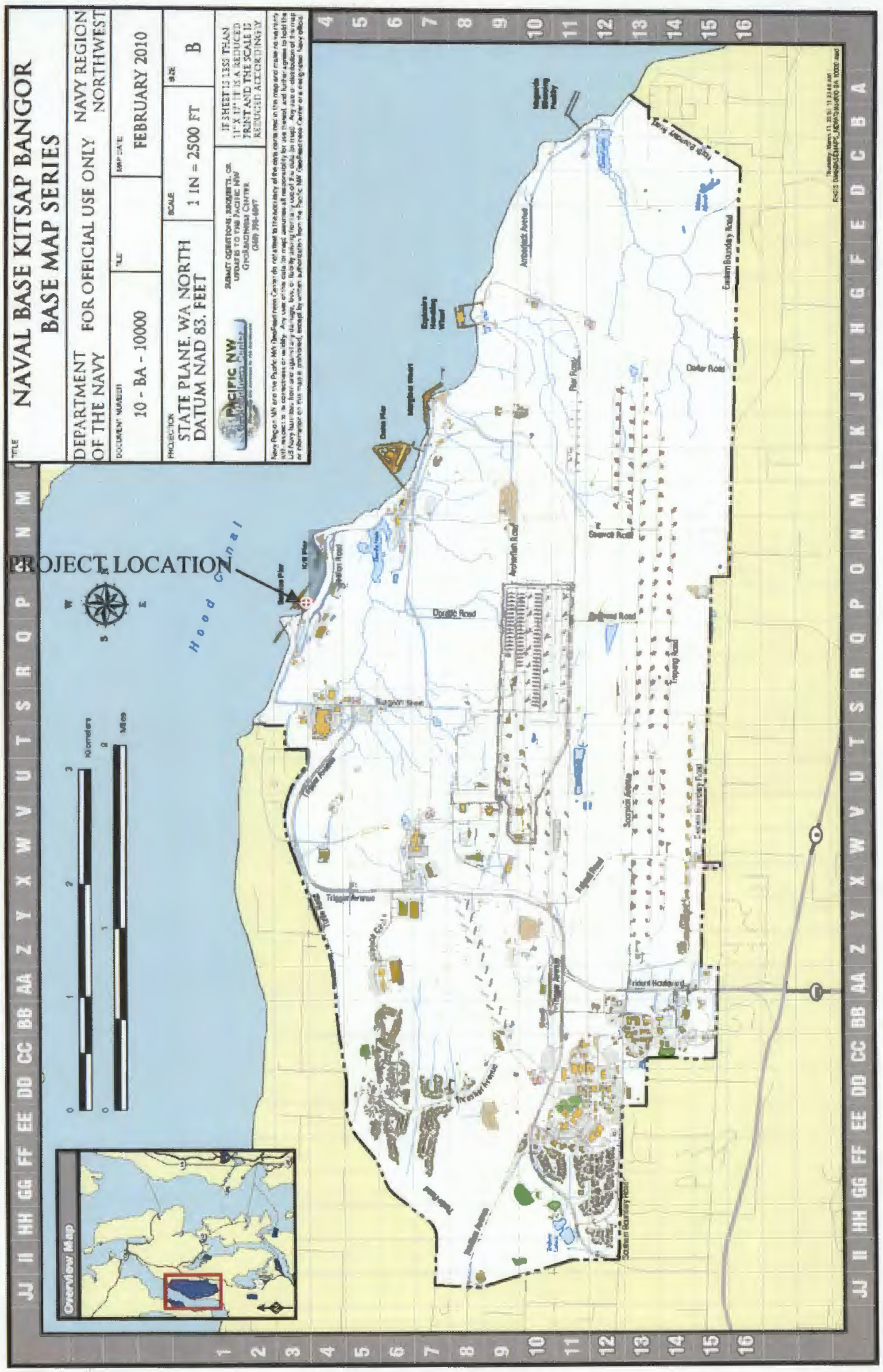


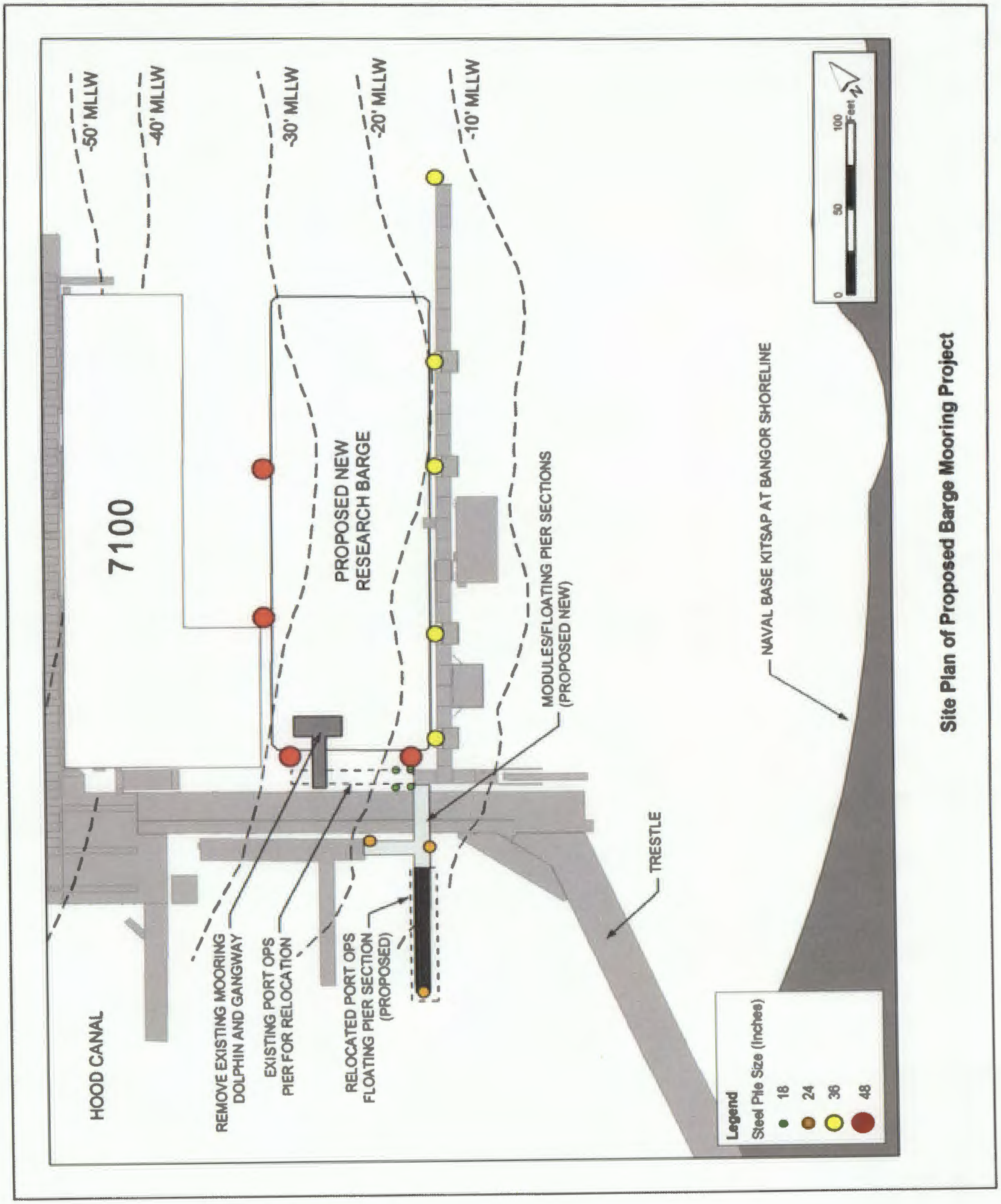
Site Location Map Enclosure 1

SUBJECT: REQUEST FOR A NATIONAL HISTORIC PRESERVATION ACT SECTION 106 CONSULTATION ON THE DEFINITION OF THE AREA OF POTENTIAL EFFECTS, DETERMINATIONS OF ELIGIBILITY, AND A DETERMINATION OF NO HISTORIC PROPERTIES AFFECTED BY INSTALLATION OF BARGE MOORING AT NAVAL BASE KITSAP BANGOR

APE for Barge Mooring

Enclosure 2

SUBJECT: REQUEST FOR A NATIONAL HISTORIC PRESERVATION ACT SECTION 106 CONSULTATION ON THE DEFINITION OF THE AREA OF POTENTIAL EFFECTS, DETERMINATIONS OF ELIGIBILITY, AND A DETERMINATION OF NO HISTORIC PROPERTIES AFFECTED BY INSTALLATION OF BARGE MOORING AT NAVAL BASE KITSAP BANGOR



Project Diagram

Enclosure 3

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

5090
Ser PRB4/00078
25 Jan 13

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

Dear Mr. Cauffman:

SUBJECT: REQUEST FOR A NATIONAL HISTORIC PRESERVATION ACT SECTION 106 CONSULTATION ON THE DEFINITION OF THE AREA OF POTENTIAL EFFECTS, DETERMINATIONS OF ELIGIBILITY, AND A DETERMINATION OF NO HISTORIC PROPERTIES AFFECTED BY INSTALLATION OF BARGE MOORING AT NAVAL BASE KITSAP BANGOR

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Sincerely,

P. M. DAWSON
Captain, U.S. Navy
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Enclosures: 1. Site Location Map
2. APE for Barge Mooring
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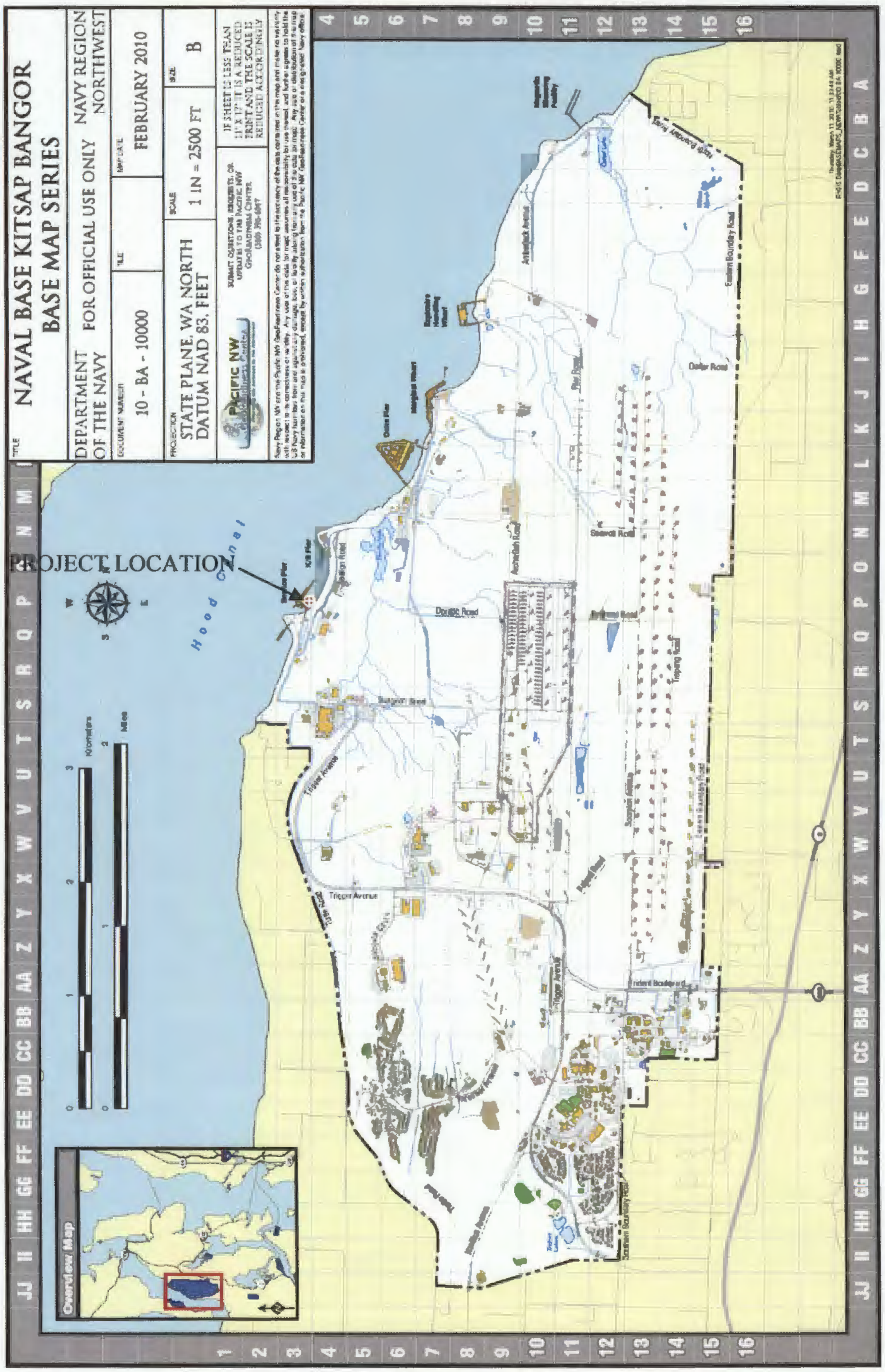

Site Location Map Enclosure 1

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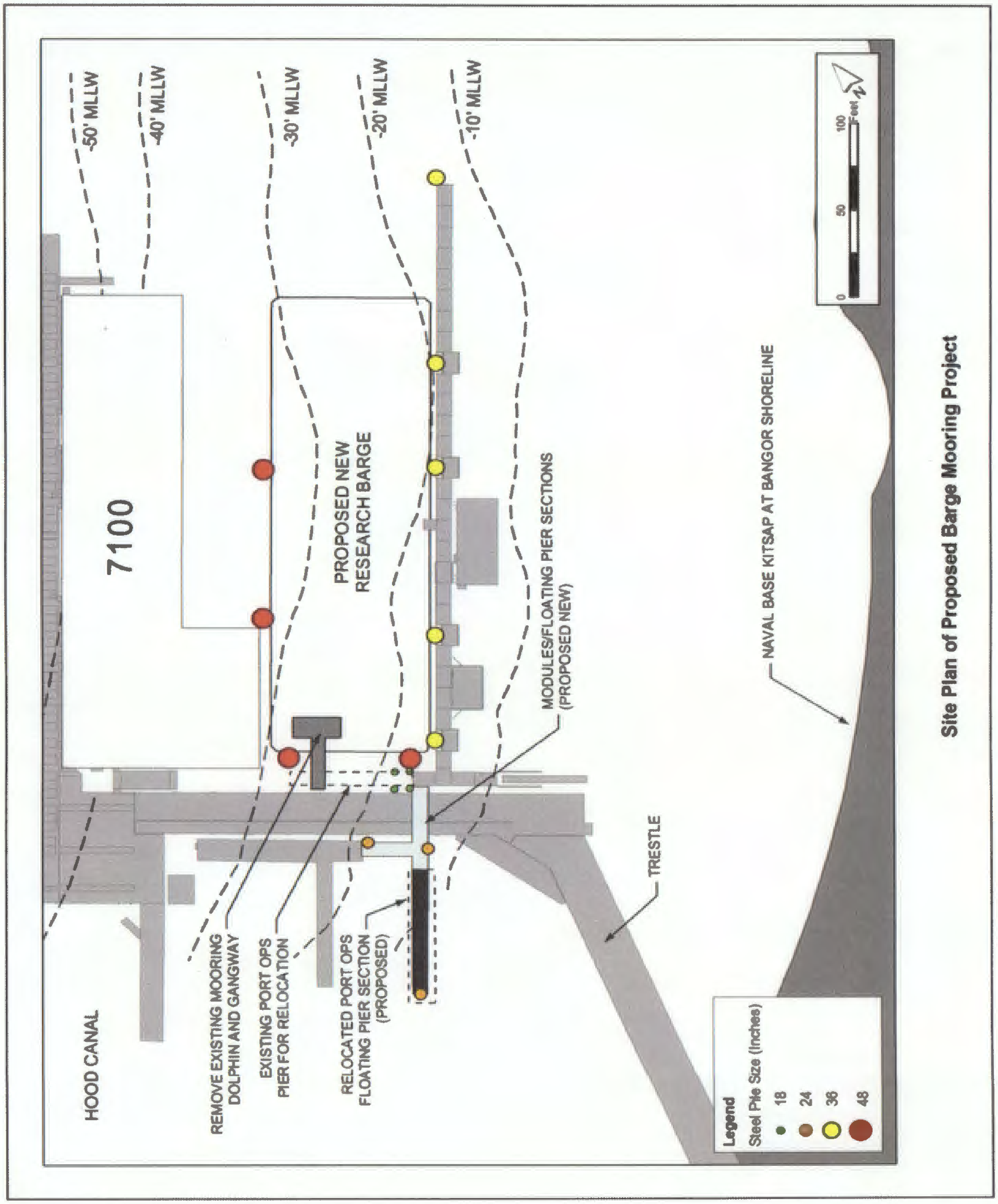
APE for Barge Mooring Enclosure 2

SUBJECT: REQUEST FOR A NATIONAL HISTORIC PRESERVATION ACT SECTION 106 CONSULTATION ON THE DEFINITION OF THE AREA OF POTENTIAL EFFECTS, DETERMINATIONS OF ELIGIBILITY, AND A DETERMINATION OF NO HISTORIC PROPERTIES AFFECTED BY INSTALLATION OF BARGE MOORING AT NAVAL BASE KITSAP BANGOR



Site Plan of Proposed Barge Mooring Project

Project Diagram Enclosure 3

APPENDIX B
AIR QUALITY CRITERIA AND CALCULATIONS

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Air Quality Pollutants – EPA and Ecology Criteria

The NAAQS provide definitions of the maximum concentrations of the criteria pollutants that are considered safe, with an additional adequate margin of safety, to protect human health and welfare. Short-term standards (1-, 8-, and 24-hour periods) are established for pollutants contributing to acute health effects. Long-term standards (quarterly and annual averages) are established for pollutants contributing to chronic health effects. AQCRs exist to assist in planning and monitoring to prevent air quality deterioration and achieve attainment status with all NAAQS.

Maximum concentrations may not be exceeded more than once per year. Washington State has adopted the NAAQS for all criteria pollutants except for SO_2, for which the state has adopted slightly more stringent requirements (Washington Administrative Code [WAC] 173-474). Table B-1 lists the NAAQS as well as applicable state air quality standards.

Table B-1. National and Washington State Ambient Air Quality Standards

Pollutant	*Averaging Time*	*Washington Standards*	*National Standards*	
			Primary	*Secondary*
Carbon Monoxide (CO)	8-hour	9 ppm	9 ppm	None
	1-hour	35 ppm	35 ppm	None
Lead	Quarterly Average	None	1.5 $\mu g/m^3$	1.5 $\mu g/m^3$
	Rolling 3-month Average	None	0.15 $\mu g/m^3$	0.15 $\mu g/m^3$
Nitrogen Dioxide (NO_2)	Annual Average	0.05 ppm	0.053 ppm	0.053 ppm
	1-hour	None	0.100 ppm	0.053 ppm
Particulate Matter (PM_{10})	Annual Arithmetic Mean	50 $\mu g/m^3$	None	None
	24-hour	150 $\mu g/m^3$	150 $\mu g/m^3$	150 $\mu g/m^3$
Particulate Matter ($PM_{2.5}$)	Annual Arithmetic Average	None	15.0 $\mu g/m^3$	15.0 $\mu g/m^3$
	24-hour	None	35 $\mu g/m^3$	35 $\mu g/m^3$
Ozone	8-hour (2008 standard)[(a)]	None	0.075 ppm	0.075 ppm
	8-hour (1997 standard)[(a)]	None	0.08 ppm	0.08 ppm
Sulfur Dioxide (SO_2)	Annual Average	0.02 ppm	0.03 ppm	None
	24-hour	0.10 ppm	0.14 ppm	None
	3-hour	None	None	0.50 ppm
	1-hour	0.40 ppm[(b)]	0.075 ppm[(c)]	None
Total Suspended Particulates	Annual Geometric Mean	60 $\mu g/m^3$	None	None
	24-hour average	150 $\mu g/m^3$	None	None

Notes:

$\mu g/m^3$= micrograms per cubic meter

ppm = parts per million

a 8-hour ozone standard went into effect on September 16, 1997, but implementation is limited. The 1997 standard and the implementation rules for that standard would remain in place for implementation purposes as EPA undertakes rulemaking to address the transition from the 1997 to the 2008 ozone standard.

b Volume average for 1-hour period more than once per 1-year period and 0.25 ppm not to be exceeded more than two times in any 7 consecutive days.

c Final rule signed June 2, 2010. To attain this standard, the 3-year average of the 99th percentile of the daily maximum 1-hour average at each monitoring station within an area must not exceed 75 parts per billion. EPA also revoked the annual and 24-hour primary standards when enacting the 1-hour standard.

Sources: EPA 2010a, Ecology 2011a.

EMISSIONS CALCULATIONS METHODOLOGY

Non-road diesel engine emissions were calculated as follows:

$$Engine\ Emissions\ (Total)(grams) = EF\ \times hp \times LF \times n \times h \times t$$

Where EF = Emission Factor (g/hp-hr)

hp = engine horse power (hp)

LF = engine load factor (e.g. 79 %)

n = number of vehicles

h = hours operated per day

t = number of day of operation

NONROAD 2008 model was used to extract emissions factors from baseline documents. Those documents include:

- Construction equipment emission factors were derived from EPA Report No. NR-009c, Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling—Compression-Ignition, April 2004.
- Construction equipment SOx emission factors were derived from EPA 460/3-91-02, Nonroad Engine and Vehicle Emission Study--Report, November 1991.
- Construction equipment VOC emission factors were derived from EPA Report No. NR-002b Conversion Factors for Hydrocarbon Emission Components, April 2004 based on emission factors from EPA Report No. NR-009c.

Work-days and project duration are estimated using R.S. Means Building Construction Cost Data daily output values as well as project defined values. All materials and equipment deliveries would occur prior to the beginning of heavy construction. A diesel-powered work boat would be present on site during all in-water site work

Construction equipment load factors were derived from EPA Report No. NR-005c, *Median Life, Annual Activity, and Load Factor Values for Nonroad Engine Emissions Modeling (NR-005d)*, July 2010. A conservative approach was taken, and the minimal emissions controls were assumed to be in use for the heavy equipment. This equates to assuming older Tier 1 engines (model year 1996 to 2000 depending on engine horsepower) are in used, but in actuality the equipment may be much newer and have better emissions reduction. However, this analysis using Tier 1 engines does not exempt contractors from following all applicable emission standard for diesel vehicles, including required upgrades.

On-road engine emissions were calculated as follows:

$$Engine\ Emissions\ (Total)(pounds) = EF \times n \times t \times d$$

Where EF = Emission Factor (pound/mile)

n = number of vehicles

t = number of days

d = distance traveled (in miles)

The EPA's Motor Vehicle Emission Simulator (MOVES) 2010 model was used to extract emissions factors from baseline documents for on-road equipment including passenger cars and light duty trucks. The number of days of operation is based on project specific construction estimates. Distance traveled is assumed to be approximately 5 miles on base. Distance traveled for construction workers does not include distance from their home to the worksite as the worker is assumed to be traveling regardless of the status of the Proposed Action.

Preferred Alternative Construction Emissions Estimates

Mooring Dolphin Construction/Demolition 54 days /year on-site maximum 407 **CY**

Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	**VOC** g/hp-hr	**CO** g/hp-hr	**NOx** g/hp-hr	**SO_2** g/hp-hr	**PM** g/hp-hr	**CO_2** g/hp-hr	**VOC** lb	**CO** lb	**NOx** lb	**SO2** lb	**PM** lb	**CO_2** lb
Crane (Pile Driving/Demo Equipment)	2	6	30	120	0.43	0.3384	0.8667	5.6523	0.93	0.2799	530	14	35	231	38	11	3,673
Tug Boat - Main	1	8	30	2000	0.6	0.21	1.9	9.7	0.14	0.22	530	132	1,186	6,163	89	142	70,210
Tug Boat - Auxiliary	1	8	30	50	0.4	0.21	1.4	7.3	0.16	0.30	536	2	14	77	2	3	1,183
Work Boat (Diesel)	2	8	30	200	0.4	0.21	1.4	7.3	0.14	0.30	530	18	115	614	12	25	4,681
Concrete truck (9 CY)	1	5	10	250	0.21	0.68	2.7	8.38	0.89	0.402	536	4	16	48	5	2	2,109
Dump truck	4	2	15	275	0.21	0.68	2.7	8.38	0.89	0.402	536	10	41	128	14	6	1,392
Delivery truck	10	1	25	180	0.21	0.68	2.7	8.38	0.89	0.402	536	14	56	175	19	8	759
Small diesel engines	2	4	35	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	587	2	11	14	2	1	594
											Total lb/year	197	1476	7450	180	200	84,601

Fugitive Dust Emissions

(From general vehicular traffic)

	PM tons/acre/mo	acres	days of disturbance	**PM** Total (tons)
2013	0.42	0.1	100	0.1

POV Emissions from Construction Workers
Assume 5 miles per day per vehicle (one vehicle per worker)

	Operating Parameters			Emission Factors						Calculated Emissions					
				VOC	NOx	CO	SO_2	PM	CO_2	VOC	NOx	CO	SO_2	PM	CO_2
	# vehicles	# days	mi/day	lb/mi	lb/mi	lb/mi	lb/mi	lb/mi	lb/mi	lb	lb	lb	lb	lb	lb
Construction Workers	5	54	5	1.9E-03	1.8E-03	3.9E-02	1.8E-05	5.5E-05	9.1E-01	3	2	53	0.02	0.1	1,232

Emission Totals: Preferred Alternative	VOC	NOx	CO	SO_2	PM	CO_2
lbs	199	1,478	7,503	180	480	85,833
tons	0.10	0.74	3.75	0.09	0.24	-
Metric tonnes	-	-	-	-	-	39

Alternative 2 Construction Emissions Estimates

Anchor Mooring Construction 25 days /year on-site maximum 19 **CY**

Equipment	*Number*	*Hr/day*	*# days*	*Hp*	*LF*	**VOC** g/hp-hr	**CO** g/hp-hr	**NOx** g/hp-hr	**SO_2** g/hp-hr	**PM** g/hp-hr	**CO_2** g/hp-hr	**VOC** lb	**CO** lb	**NOx** lb	**SO2** lb	**PM** lb	**CO_2** lb
Crane	1	6	8	120	0.43	0.3384	0.8667	5.6523	0.93	0.2799	530	2	5	31	5	2	979
Dump truck	1	2	10	275	0.21	0.68	2.7	8.38	0.89	0.402	536	2	7	21	2	1	928
Delivery truck	1	1	10	180	0.21	0.68	2.7	8.38	0.89	0.402	536	1	2	7	1	0	304
Small diesel engines	2	4	25	10	0.43	0.7628	4.1127	5.2298	0.93	0.4474	587	1	8	10	2	1	424
											Subtotal	6	22	69	10	4	2,636

Fugitive Dust Emissions

(From general vehicular traffic)		**PM** tons/acre/mo	acres	days of disturbance	**PM** Total (tons)
	2013	0.42	0.1	100	0.1

POV Emissions from Construction Workers
Assume 5 miles per day per vehicle (one vehicle per worker)

	Operating Parameters			Emission Factors						Calculated Emissions					
	# vehicles	# days	mi/day	VOC lb/mi	NOx lb/mi	CO lb/mi	SO_2 lb/mi	PM lb/mi	CO_2 lb/mi	VOC lb	NOx lb	CO lb	SO_2 lb	PM lb	CO_2 lb
Construction Workers	5	25	5	1.9E-03	1.8E-03	3.9E-02	1.8E-05	5.5E-05	9.1E-01	1	1	24	0	0	570

Emission Totals: Alternative 2		VOC	NOx	CO	SO_2	PM	CO_2
	lbs	5	18	63	5	282	2,227
	tons	0.00	0.01	0.03	0.00	0.14	-
	metric tonnes	-	-	-	-	-	1

APPENDIX C
COASTAL CONSISTENCY DETERMINATION

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

5090
Ser PRB4/01048
30 Nov 12

RECEIVED

DEC 04 2012

DEPT OF ECOLOGY

Washington Department of Ecology
Northwest Regional Office
Attn: Ms. Rebekah Padgett
3190 160th Avenue SE
Bellevue, WA 98008

Dear Ms. Padgett:

SUBJECT: FEDERAL COASTAL CONSISTENCY DETERMINATION FOR THE BARGE MOORING PROJECT AT NAVAL BASE KITSAP BANGOR, WASHINGTON

In accordance with the Coastal Zone Management Act (CZMA), Naval Base Kitsap is submitting the attached Coastal Zone Consistency Determination (CCD) for a proposed action to construct a barge mooring at the Service Pier along the Naval Base Kitsap Bangor waterfront.

The project would install mooring for a new research barge at the Naval Base Kitsap Bangor Service Pier using up to 20 steel piles ranging in size from 18-inch diameter to 48-inch diameter. These piles will also support the relocation of existing Port Operations mooring floats to the south side of the Service Pier trestle. Construction is planned to begin on approximately 16 July 2013 and is planned to be completed by approximately 30 September 2013. Piles would be primarily installed using a vibratory pile driver, and installation may need to be completed using an impact hammer.

Pursuant to Section 307 of the CZMA, the Navy has determined that implementing the Barge Mooring Project is consistent to the maximum extent practicable with Washington's Coastal Zone Management Program.

If you require further information or have any questions, please contact Mr. Greg Leicht. He can be reached at (360)315-5411 or at gregory.leicht@navy.mil.

Sincerely,

P. M. DAWSON
Captain, U.S. Navy
Commanding Officer

Enclosure: 1. Coastal Consistency Determination

COASTAL CONSISTENCY DETERMINATION FOR THE NAVY'S BARGE MOORING PROJECT CONDUCTED AT NAVAL BASE KITSAP BANGOR

1 Introduction

This document provides the State of Washington with the U.S. Department of Navy's (Navy) Consistency Determination under Section 307 (c)(1) of the federal Coastal Zone Management Act (CZMA) of 1972, as amended, to install moorings and docks on the Navy's existing Service Pier for a new larger research barge. The new barge will include upgraded technology for deep sea research.

2 CZMA Program Background

The CZMA, enacted in 1972, created the National Coastal Management Program (CMP) for management and control of the uses of and impacts on coastal zone resources (16 USC 1451-1465). The program is implemented through federally approved state CMPs. The Washington State Department of Ecology's (Ecology) Shorelines and Environmental Assistance Program is responsible for implementing Washington's Program.

Federal approval of a state CMP triggers the CZMA Section 307 federal consistency determination requirement. Section 307 mandates that federal actions within a state's coastal zone be consistent to the maximum extent practicable with the enforceable policies of the state CMP. The CZMA applies to lands within the coastal zone, which includes Hood Canal.

The CZMA excludes "...lands the use of which is by law subject solely to the discretion of or which is held in trust by the Federal Government, its officers or agents" (16 USC 1453 definition of coastal zone). A consistency determination for these federal properties is conducted to determine if project-related impacts to the neighboring properties would be consistent under CZMA regulations.

Washington's Coastal Zone Management Program (CZMP) defines Washington State's coastal zone to include the 15 counties with marine shorelines: Clallam, Grays Harbor, Island, Jefferson, King, Kitsap, Mason, Pacific, Pierce, San Juan, Skagit, Snohomish, Thurston, Wahkiakum, and Whatcom. The CZMP applies to activities within the 15 counties, as well as activities outside these counties, which may impact Washington's coastal resources. Most, but not all, activities and development outside the coastal zone are presumed to not influence coastal resources.

Under the program, activities that impact any land use, water use, or natural resource of a coastal zone must comply with six laws, or "enforceable policies". These include:

- Shoreline Management Act;
- State Environmental Policy Act (SEPA) (WAC 197-11-610);
- Clean Air Act (CAA) (42 USC 7401 *et seq*);
- Clean Water Act (CWA), Sections 401 and 404 (33 USC 1251 *et seq.*/CWA 313, 3.3 U.S.C. § 1323)
- Ocean Resources Management Act (ORMA) (43.143 RCW) ; and,
- Energy Facility Site Evaluation Council (EFSEC) (Title 463 WAC)

2.1 Project Location

Naval Base (NAVBASE) Kitsap Bangor is located on Hood Canal, approximately 20 miles west of Seattle, Washington in Kitsap County (Figure 1). The base encompasses approximately 7,186 acres with a mix of industrial, commercial support uses, residential, and undisturbed natural vegetation, with 4.5 miles of waterfront along the eastern shoreline of Hood Canal. NAVBASE Kitsap Bangor provides berthing and support services to Navy submarines and other Fleet assets. The base is restricted from public access and its waterfront has been classified as a Navy restricted area by the U.S. Army Corps of Engineers (USACE) (33 CFR 334). NAVBASE Kitsap Bangor includes various piers and docks.

2.2 Proposed Federal Action

The Navy currently conducts its research equipment operations from an existing barge at Service Pier that was constructed in 1940, which now cannot accommodate the new larger research equipment. The Proposed Action will provide a safe, secure structure for the mooring of a new and larger research barge in order to accommodate research equipment upgrades (Figures 2 and 3).

The Proposed Action includes:

- Moving and reconfiguring sections of an existing Port Operations floating pier from the north side of the Service Pier (the future location of the new larger research barge) to the south side and installing new float sections. Anchoring of the relocated and new floating pier modules would require the installation of four 18–inch diameter and three 24-inch diameter hollow steel pipe piles.
- Removing an existing mooring dolphin and concrete pile cap in order to accommodate the new barge.
- Installing mooring on the north side of the Service Pier for the new larger research barge using five 36-inch diameter and up to eight 48-inch diameter hollow steel pipe piles.

Construction is planned to begin on approximately 16 July 2013 and is planned to be completed by approximately 30 September 2013. Piles would be primarily installed using a vibratory pile driver, and installation may need to be completed using an impact hammer. Total days of pile driving would be limited to 10, while the number of in-water work days would not exceed 40.

3 Consistency With Enforceable Policies

3.1 Shoreline Management Act – Chapter 90.58 Revised Code of Washington (RCW)

The project site is located within Kitsap County. Kitsap County has adopted the County of Kitsap Shoreline Management Master Program (SMMP), consistent with the Washington State Shoreline Management Act and approved by the Washington Department of Ecology. The Kitsap County SMMP does not apply to lands owned by the federal government, and Kitsap County considers NAVBASE Kitsap Bangor as non-designated (Kitsap County Code Title 22). The shoreline areas adjacent to the base are designated "rural."

The Navy reviewed all policies and regulations within the Kitsap County SMMP to determine if project-related impacts to neighboring coastal properties or to mobile coastal resources (e.g., fish, marine mammals, and marine birds) would be consistent under CZMA regulations. Only the applicable policies and regulations are addressed below; regulations that are not applicable or relevant to the Proposed Action are not included in this Determination.

22.24.010 Principles and Development Guidelines

Due to the location of the proposed Barge Mooring Project in Hood Canal, policies from the Kitsap County SMMP, Chapter 2.24 Shorelines of State-Wide Significance, Section 010, Principles and Development Guidelines, were reviewed. Two resource policies under the Hood Canal Shoreline of Statewide Significance Policies (Section 010, Part J) are discussed below.

Resource Policy 1. Proposals for development within the shoreline jurisdiction of Hood Canal should be required to assess potential for adverse impacts to the following resources: water quality, sediment quality, shellfish, finfish, wildlife, boating, recreational and commercial fishing, public access, scenic vistas, and wetlands. Proposals that significantly interfere with recreational opportunities or significantly degrade the resources of Hood Canal should be prohibited.

The potential environmental impacts of the Barge Mooring Project are described in detail in the Environmental Assessment (EA) for this project, which was prepared in compliance with the National Environmental Policy Act (NEPA), and the Biological Assessment (BA) for this project, which was prepared in compliance with the Endangered Species Act. The marine water and biological impacts are summarized below under Resource Policy 2. The Barge Mooring Project would be located at the existing Service Pier, which is entirely within the within the NAVBASE Kitsap Bangor Naval Restricted Area. No person or vessel shall enter this area without permission from the Commander, Naval Submarine Base Bangor, or his/her authorized representative. As such, the Proposed Action would not interfere with boating, recreational and commercial fishing, tribal or public access, scenic vistas, and wetlands. Marine traffic for the project would have a minimal effect on vessel transportation in Hood Canal. The visual character of the Proposed Action is consistent with the existing Service Pier and Bangor waterfront area. There would be no impacts to scenic viewsheds as the Barge Mooring Project is located on the east side of the Service Pier and would be screened by the Service Pier Building (Bldg. 7100). The project would not affect wetlands.

Resource Policy 2. Developments within the shorelines of Hood Canal which would significantly degrade water or sediment quality, shellfish, finfish, or wildlife habitat, critical habitat, native vegetation, or natural features of the shoreline should be prohibited.

The Barge Mooring Project would not significantly degrade water or sediment quality, shellfish, or wildlife habitat, native vegetation, or natural features of the shoreline. Construction would result in temporary and localized turbidity and related water quality effects, but water quality would not be significantly degraded and any effects would not extend beyond the immediate project site or to the properties adjacent to the base. To minimize impacts to sediment and water quality a floating surface boom and silt curtains would be deployed during demolition and construction activities to contain debris and sediment. No significant degradation of shellfish, finfish and wildlife habitat is expected due to the short duration of project construction (i.e. 10 days of pile driving and 40 days of in-water work), limited construction footprint (no more than 20 steel piles would be placed at depths less than or equal to -30 ft mean lower low water) and construction timing (all in-water work restricted to July 16 to September 30 to coincide with the in-water work window when juvenile salmonids are not expected). There is no eelgrass or designated critical habitat within the project footprint.

22.28.190 Piers and Floating Docks

The following policies are from the Kitsap County SMMP, Chapter 22.28, Use Activities, Section 190, Piers and Floating Docks, Part 2, Policies. This section evaluates the design of the Barge Mooring Project as part of assessing its potential for impacts to coastal resources outside the base. Piers and floating docks may be permitted under the Kitsap County SMMP accessory to industrial development, provided that the following policies are adhered to:

d. Size and length of piers and docks should be the minimum which provides the required service.

The size and number of pilings used for the Barge Mooring Project would be the minimum required to securely moor the new larger research barge and reconfigured Port Operations floating pier.

e. Piers and docks should be designed and located to minimize interference with navigation and the public's use of the shoreline.

The Barge Mooring Project would be located entirely within the Navy restricted area on NAVBASE Kitsap Bangor where general navigation is prohibited. The entirety of the base, including the land areas and adjacent water areas in Hood Canal, are restricted from general public access. Therefore, the Proposed Action would not interfere with navigation or the public's use of the shoreline.

j. The proposed size of the structure and intensity of use or uses of any dock, pier, and/or float should be compatible with the surrounding environment and land and water uses.

As discussed under Policies d and e above, the design of the Barge Mooring Project would be the minimum size needed for its proposed use. The project would be compatible with the industrial waterfront on NAVBASE Kitsap Bangor where the surrounding shoreline is already modified by manmade features.

3.2 State Environmental Policy Act

The Proposed Action is a Federal action subject to the NEPA and is exempt from SEPA. The Navy evaluated potential environmental impacts in an EA.

3.3 Clean Water Act

No dredging or wetland fill is proposed. However, some short-term sedimentation disturbance would occur during pile driving. A floating surface boom and silt curtains would be deployed during demolition and construction activities to contain debris and sediment. There is no eelgrass within the project footprint. The Proposed Action would occur in the marine waters and would not affect freshwater wetlands. The Navy will obtain a permit from the USACE under Section 10 of the Rivers and Harbors Act.

3.4 Clean Air Act

The Proposed Action has been analyzed in accordance with the federal CAA and will comply with the criteria in Section 176(c) regarding General Conformity. Kitsap County is in attainment for all National Ambient Air Quality Standards and no conformity determination is required.

3.5 Ocean Resource Management Act

The Proposed Action does not affect ocean uses involving renewable and/or nonrenewable resources that occur on Washington's coastal waters.

3.6 Washington State Energy Facility Site Evaluation Council

The Proposed Action does not include the construction of any energy-generating facilities.

4 Conclusion

The Proposed Action will be consistent to the maximum extent practicable with the enforceable policies of Washington's approved coastal zone management program.

Figure 1

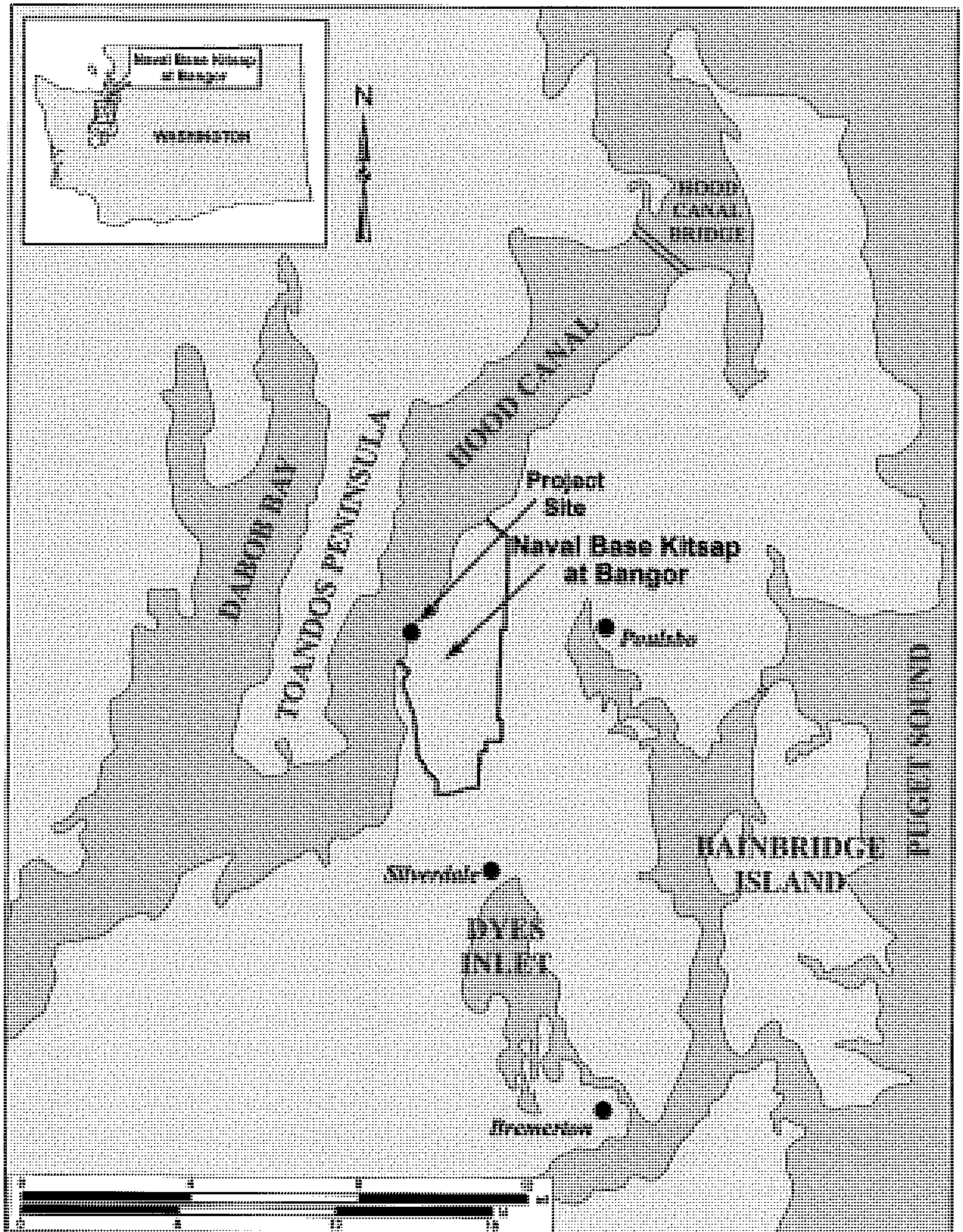

Naval Base Kitsap at Bangor
WASHINGTON
N
HOOD CANAL BRIDGE
HOOD CANAL
DABOB BAY
TOANDOS PENINSULA
Project Site
Naval Base Kitsap at Bangor
Poulsbo
PUGET SOUND
BAINBRIDGE ISLAND
Silverdale
DYES INLET
Bremerton

Figure 2

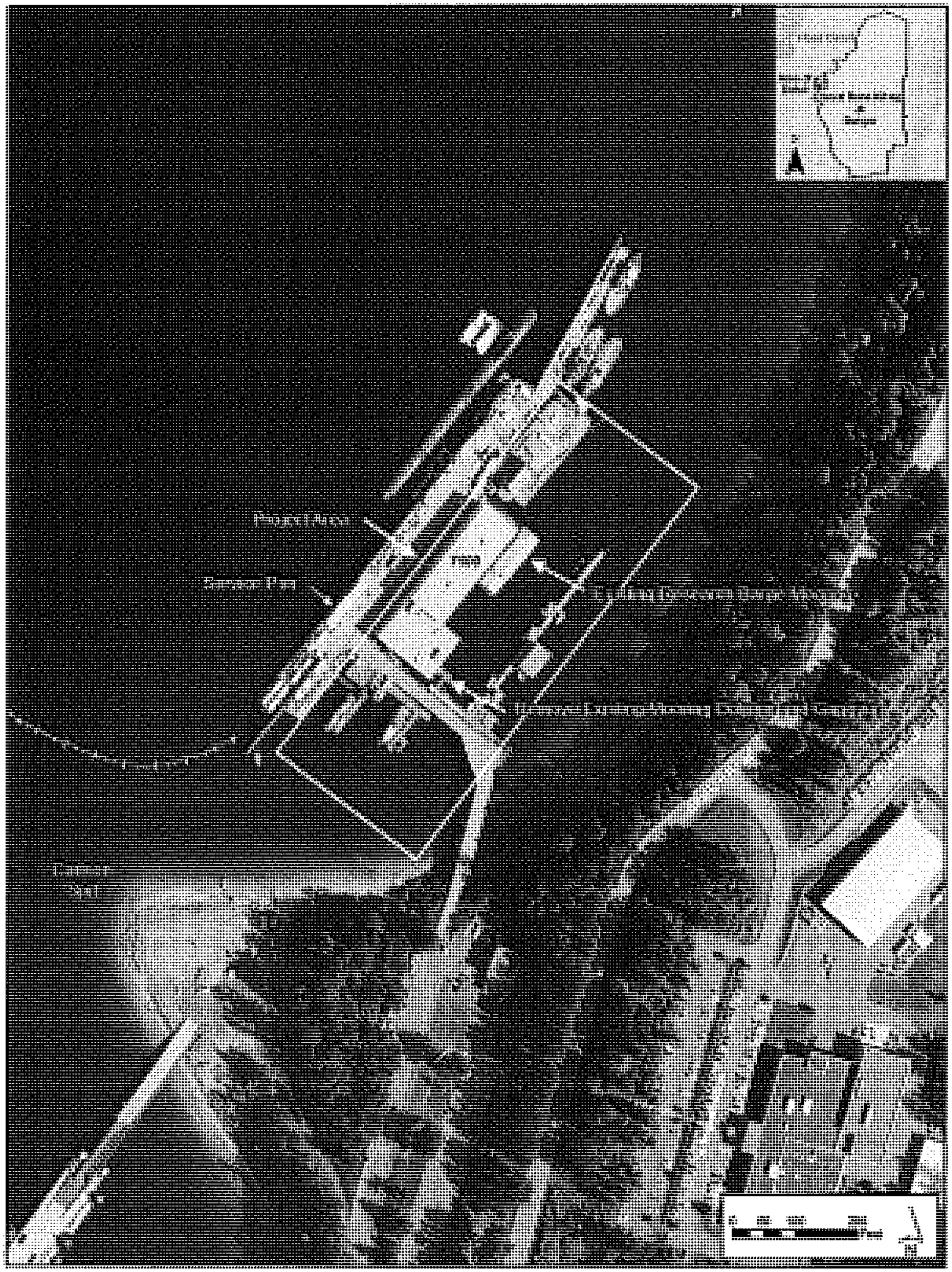
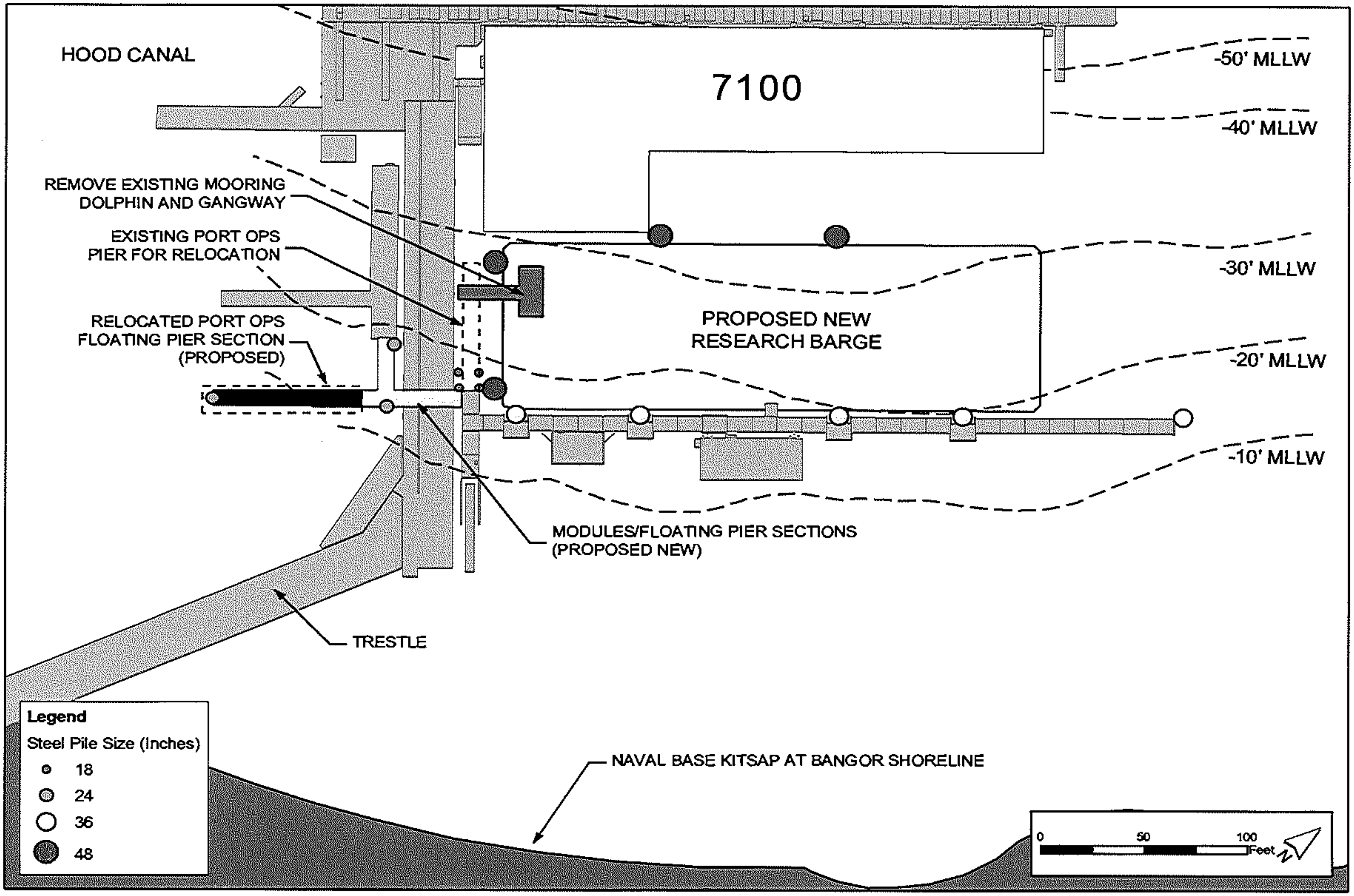


Figure 3


HOOD CANAL
7100
-50' MLLW
-40' MLLW
-30' MLLW
-20' MLLW
-10' MLLW
REMOVE EXISTING MOORING DOLPHIN AND GANGWAY
EXISTING PORT OPS PIER FOR RELOCATION
RELOCATED PORT OPS FLOATING PIER SECTION (PROPOSED)
PROPOSED NEW RESEARCH BARGE
MODULES/FLOATING PIER SECTIONS (PROPOSED NEW)
TRESTLE
Legend
Steel Pile Size (Inches)
18
24
36
48
NAVAL BASE KITSAP AT BANGOR SHORELINE
0
50
100
Feet

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APPENDIX D
BIOLOGICAL ASSESSMENT AND ESSENTIAL FISH HABITAT ASSESSMENT

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BIOLOGICAL ASSESSMENT

and

ESSENTIAL FISH HABITAT ASSESSMENT

for the

Barge Mooring Project, Naval Base Kitsap at Bangor

October 2012

Submitted to:

National Marine Fisheries Service
and

U.S. Fish and Wildlife Service

Prepared for:

U.S. Department of the Navy
Commander Submarine Development Squadron FIVE

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Abbreviations and Acronyms

BA	Biological Assessment
BMPs	Best Management Practices
BSS	Beaufort Sea State
Caltrans	California Department of Transportation
CFR	Code of Federal Regulations
cm	centimeter
CSDS-5	Commander Submarine Development Squadron Five
CSL	Cleanup screening level
CWA	Clean Water Act
dB	decibel
dBA	A-weighted decibel
dB re 1µPa	decibel referenced 1 microPascal
DO	dissolved oxygen
DPS	Distinct Population Segment
EFH	Essential Fish Habitat
ESA	Endangered Species Act
ESU	Evolutionarily Significant Unit
FMC	Fishery Management Council
FMP	Fishery Management Plan
ft	foot/feet
ft^2	square foot/feet
g	gram
HAPC	Habitat Area of Particular Concern
HUD	Pacific Habitat Use Relational Database
Hz	hertz
kHz	kilohertz
km	kilometer
km^2	square kilometer
m	meter
min	minute
mg/L	milligram per liter
MHHW	mean higher high water
MLLW	mean lower low water
MMO	Marine Mammal Observer
MMPA	Marine Mammal Protection Act
MSA	Magnuson-Stevens Fishery Conservation and Management Act
NMFS	National Marine Fisheries Service
NTU	nephelometric turbidity unit
PCE	primary constituent element
PFC	properly functioning conditions
PFMC	Pacific Fishery Management Council
PNPTT	Point No Point Treaty Tribes
PSAT	Puget Sound Action Team

PSU	practical salinity unit
PTS	permanent threshold shift
RMS	root-mean-square
SAIC	Science Applications International Corporation
sec	second
SEL	sound exposure level
SPL	sound pressure level
SQS	sediment quality standard
SWPPP	Stormwater Pollution Prevention Plan
TTS	temporary threshold shift
µg/kg	microgram per kilogram
U.S.	United States
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WDOE	Washington Department of Ecology
WSDOT	Washington State Department of Transportation
ZOI	Zone of Influence

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Executive Summary

Naval Base Kitsap proposes to install mooring for a new research barge at the Naval Base Kitsap at Bangor Service Pier using piles. Commander Submarine Development Squadron Five is the (CSDS-5) U.S. Department of the Navy (Navy's) working repository for deep ocean technology and the operational, at-sea application of that technology, Up to 20 steel piles ranging in size from 18-inch diameter to 48-inch diameter would be required to efficiently moor a new larger research barge equipped with upgraded technology necessary for CSDS-5 to continue their mission. These piles would also support the relocation of existing Port Operations mooring floats to the south side of the Service Pier trestle. These actions will collectively be referred to as the Barge Mooring Project for purposes of impact analysis presented in this Biological Assessment and Essential Fish Habitat Assessment.

The purpose of this Biological Assessment is to determine whether the Navy's Barge Mooring Project would affect species and designated critical habitat listed under the Endangered Species Act. The Biological Assessment identifies the potential project effects, including direct and indirect actions, and states conservation measures planned to mitigate potential impacts. Table ES-1 provides a list of species and critical habitat analyzed for effects and the effects determinations.

Pile driving noise could potentially result in behavioral disturbance of Endangered Species Act-listed fish (salmonids and rockfish), humpback whale, Steller sea lion, and marbled murrelet. There is also a potential for injury to fish species from pile driving activities. Short-term and long-term impacts (shading, seafloor displacement by piles, and water quality effects) to the benthic community, could affect Endangered Species Act-listed fish species directly and all species indirectly through effects on habitat and prey resources. To minimize impacts to salmonids and forage fish, the project would be completed within the in-water work window for salmon species and forage fish species of July 16-October 14, with a total pile driving duration of 10 working days and remaining construction completed by the end of September. Piles would be primarily installed using a vibratory pile driver, and installation may need to be completed using an impact hammer. Marine mammal and marbled murrelet monitoring will be conducted during pile driving, and work will shut down when animals come within distances where injury could potentially occur. Bubble curtain technology will be used for impact pile driving to attenuate noise level and reduce potential impacts on listed species.

The purpose of this Essential Fish Habitat Assessment is to determine whether the Navy's Barge Mooring Project would affect Essential Fish Habitat managed under the Magnuson-Stevens Fishery Conservation and Management Act. The Essential Fish Habitat Assessment is contained in Chapter 9 of this document. The Navy has determined that the project may adversely affect Pacific Groundfish, Pacific Coast Salmon, and Coastal Pelagics Essential Fish Habitats (Table ES-2), however due to the duration of activities and with implementation of conservation and minimization measures, the effects are anticipated to be temporary and minimal.

Table ES-1. Endangered Species Act Effects Determination

Species Common name *Scientific name*	ESA Status	Critical Habitat Status	Effect Determination for Species	Effect Determination for Critical Habitat
Puget Sound Chinook Salmon *Oncorhynchus tshawytscha*	T	Designated – within Action Area	May affect, not likely to adversely affect	May affect, not likely to adversely affect
Puget Sound Steelhead *O. mykiss*	T	Under development	May affect, not likely to adversely affect	n/a
Hood Canal Summer-run Chum *O. keta*	T	Designated – within Action Area	May affect, not likely to adversely affect	May affect, not likely to adversely affect
Bull Trout *Salvelinus confluentus*	T	Designated – outside Action Area	May affect, not likely to adversely affect	No effect
Bocaccio Rockfish *Sebastes paucispinis*	E	Not designated	May affect, not likely to adversely affect	n/a
Canary Rockfish *S. pinniger*	T	Not designated	May affect, not likely to adversely affect	n/a
Yelloweye Rockfish *S. ruberrimus*	T	Not designated	May affect, not likely to adversely affect	n/a
Humpback whale *Megaptera novaeangliae*	E	Not designated	May affect, not likely to adversely affect	n/a
Steller Sea Lion *Eumetopias jubatus*	T	Designated – outside Action Area	May affect, not likely to adversely affect	No effect
Marbled Murrelet *Brachyramphus marmoratus*	T	Designated – outside Action Area	May affect, not likely to adversely affect	No effect

Notes:
E = endangered;
n/a = Not applicable: critical habitat has not been designated for the species;
T = threatened;

Table ES-2. Essential Fish Habitat Effects Determination

Essential Fish Habitat	Effect Determination
Groundfish EFH	May adversely effect
Salmon EFH	May adversely effect
Coastal Pelagics EFH	May adversely effect

1.0 Introduction

The purpose of this Biological Assessment (BA) and Essential Fish Habitat (EFH) Assessment is to determine whether the U.S. Department of the Navy's (Navy) proposed Barge Mooring Project would affect species and habitats listed under the Endangered Species Act (ESA) and the Magnuson-Stevens Fishery Conservation and Management Act (MSA). The BA describes the proposed project, identifies potential project effects and conservation measures implemented to mitigate potential impacts, and analyzes whether the project is likely to affect species listed under the ESA and EFH.

Section 7(a) of the Endangered Species Act (ESA) of 1973, as amended, requires federal agencies to consult with the Secretary of the Interior (United States [U.S.] Fish and Wildlife Service [USFWS]) and the Secretary of Commerce (National Marine Fisheries Service [NMFS]) to insure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of designated critical habitat of such species. Section 7(c) of the ESA, as amended, requires federal agencies to prepare a Biological Assessment (BA) for the purpose of complying with Section 7(a) by identifying any threatened or endangered species, designated critical habitat, or species or habitat proposed as such, which are likely to be affected by the proposed action.

Section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) requires federal agencies to consult with the Secretary of Commerce (NMFS) on all actions authorized, funded, or undertaken by such agency that may adversely affect EFH. The EFH Assessment for the Barge Mooring project is provided in Section 9.

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2.0 Project Location

Naval Base (NAVBASE) Kitsap at Bangor, Washington, is located on Hood Canal approximately 20 miles due west of Seattle, Washington (Figure 2–1). NAVBASE Kitsap at Bangor provides berthing and support services to Navy submarines and other fleet assets. The entirety of the base, including the land areas and adjacent water areas in Hood Canal, is restricted from general public access. The project site is within the Hood Canal hydrologic unit code 17110018 and the Water Resource Inventory Area 15 (Kitsap).

2.1 Project Area

The "project area" is defined as all areas where project activities will occur (NMFS 2004).

The proposed location for the Barge Mooring Project is on the eastern side of the NAVBASE Kitsap at Bangor Service Pier (herein referred to as Service Pier) where the existing research barge is moored (Figure 2-2). Two restricted areas are associated with NAVBASE Kitsap at Bangor: Naval Restricted Areas 1 and 2 (33 Code of Federal Regulations [CFR] 334.1220) (Figure 2-3). Naval Restricted Area 1 covers the area north and south along the Hood Canal encompassing the NAVBASE Kitsap at Bangor waterfront. The regulations associated with Naval Restricted Area 1 state that no person or vessel shall enter this area without permission from the Commander, Naval Submarine Base Bangor, or his/her authorized representative. Naval Restricted Area 2 encompasses the waters of Hood Canal within a circle of 1,000 yards diameter.

Figure 2-1. Vicinity Map

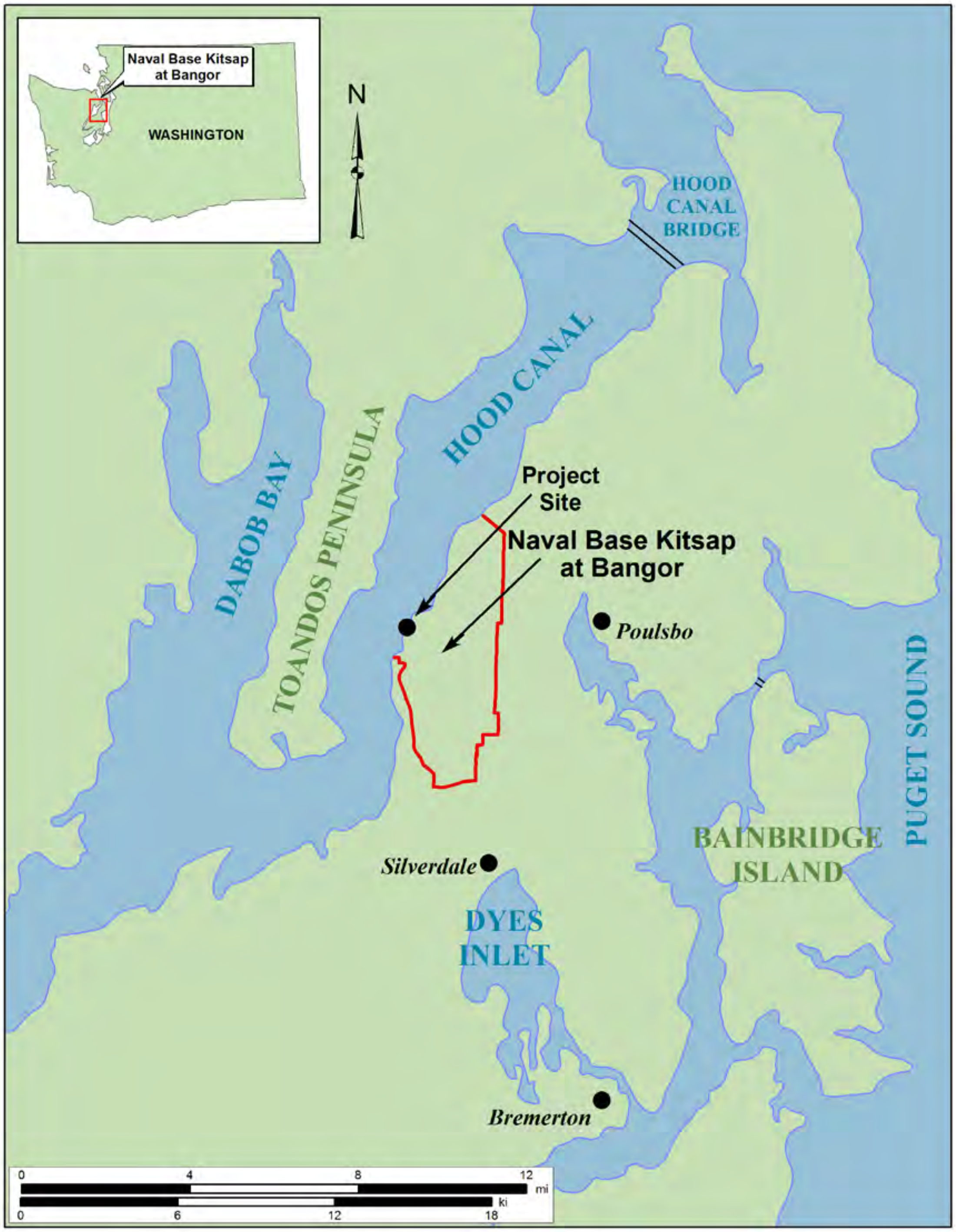


Figure 2-2. Project Area

Figure 2-3. NAVBASE Kitsap at Bangor Restricted Areas

3.0 Project Description

The Navy proposes to construct mooring for a new, larger research barge on the shore side of the existing Service Pier at NAVBASE Kitsap at Bangor waterfront (Figure 3-1). The barge would be operated by Commander Submarine Development Squadron Five (CSDS-5) who is the working repository for deep ocean technology and the operational, at-sea application of that technology. Research equipment upgrades are needed to provide the level and type of mission support required by tasks assigned to CSDS-5 at NAVBASE Kitsap at Bangor. At the present time, CSDS-5 conducts their research equipment operations from an existing 115-foot (ft) x 35-ft barge with a 4-ft draft that was constructed in 1940 and cannot accommodate the new research equipment. A new larger barge measuring 260 ft x 85 ft with a 10-ft draft would replace the existing barge. The Proposed Action will provide a safe, secure structure for the mooring of the new larger research barge in order to continue mission requirements and accommodate new technology.

3.1 Proposed Action

The project consists of three components: the relocation and addition to the Port Operations pier, the removal of existing infrastructure, and the installation of the CSDS-5 research barge mooring piles. Each element is described below.

3.1.1 Relocation of Port Operations

In order to accommodate the new, larger research barge, some portions of the Port Operations floating pier would be relocated to the south side of the Service Pier trestle[1]. This would require removing six 9 ft x 2 ft floating pier sections/modules running east-west on the north side of the trestle and placing them in a north-south orientation on the south side of the trestle. In addition, seven new modules (five added to the end of the relocated section and two installed in an east-west orientation) would be installed to complete the Port Operations infrastructure (Figure 3-1). Anchoring of the relocated and new floating pier modules would require the installation four 18–inch diameter and three 24-inch diameter hollow steel pipe piles.

3.1.2 Removal of Existing Infrastructure

Existing infrastructure to be removed in order to accommodate the new barge includes the following (Figure 3-1):

- Mooring dolphin and concrete pile cap (Figure 3-2) located north of the proposed relocated floating pier modules. This includes the removal of four 24-inch diameter steel batter piles and four 30-inch diameter steel vertical piles;
  - The concrete pile cap would be carefully separated and removed from the pile dolphin.
  - One 24-inch steel pile would be removed with the use of vibratory pile driving equipment
  - The remaining piles would be removed by cutting them down at the mudline with hydraulic shears or by a diver utilizing a thermal lance, and lifting them out of the water for proper disposal.
- Gangway from the mooring dolphin (planned for removal) that crosses over the proposed relocated floating pier models.

[1] A trestle is a framework of vertical, slanted supports and horizontal crosspieces supporting a bridge or road.

- Fenders and two electrical pedestals located on existing Port Operations dock.

3.1.3 Installation of the Mooring and Barge

The new 260 ft x 85 ft research barge will be located at the east side of the Service Pier at approximately -20 to -30 ft mean lower low water (MLLW) (Figure 3-1). The barge will be moored by five 36-inch diameter and up to eight 48-inch diameter hollow steel pipe piles. This is a conservative estimate of the number of piles that will be needed to ensure some flexibility is maintained for the final design. Figure 3-1 shows the current design plan for barge mooring, which includes only four 48-inch steel piles. Table 3-1 shows the maximum number of piles that could be required to complete the entire project.

Figure 3-1. Site Plan of Proposed Barge Mooring Project

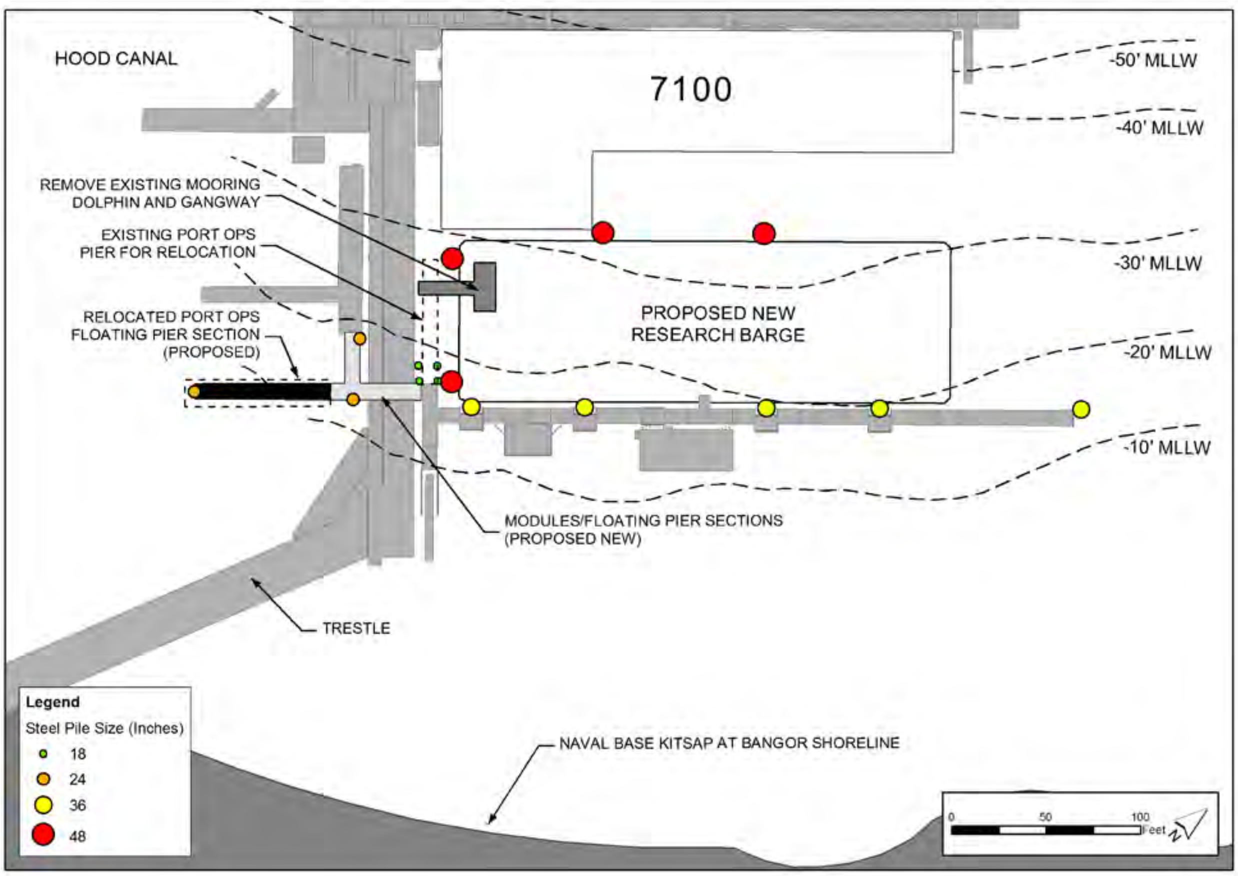


Figure 3-2. Mooring Dolphin with Concrete Pile Cap and Gangway Planned for Removal

Table 3-1. Total Number of Piles Required to Complete the Barge Mooring Project

Pile Size	Total Number of Piles Required to be Installed
18-inch diameter	4
24-inch diameter	3
36-inch diameter	5
48-inch diameter	8*
Total piles	20

*The current design requires only 16 piles; however, the effects of driving 20 piles (up to four additional 48-inch diameter piles) are analyzed to allow for changes in the final design.

3.2 Description of Pile Installation

All piles will be installed/removed at the eastern side of the Service Pier and will include:

- Four 18-inch diameter steel pipe piles approximately 100 feet (30.48 meters) long will be driven to depth of 55 feet,
- Three 24 inch diameter steel pipe piles approximately 60 feet (18.29 meters) long will be driven to depth of 34 feet,
- Five 36-inch diameter steel pipe piles approximately 100 feet (30.48 meters) long will be driven to depth of 55 feet, and
- Eight 48-inch diameter steel pipe piles approximately 115 feet (35.05 meters) long will be driven to depth of 70 feet.
- One 24-inch diameter steel pipe will be removed using vibratory pile driving equipment.

It is anticipated that up to four piles can be driven per day. The total days of in-water work is not likely to exceed 40 work days. In-water work will begin on or shortly after July 16 with anticipated overall project completion by September 30.

Piles will be installed using mainly vibratory pile driving. 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.

During pile installation, some piles may be driven (proofed[2]) the final few feet with an impact hammer if substrate conditions do not allow the pile to reach the specified tip elevation with a vibratory driver. An impact hammer uses a rising and falling piston to repeatedly strike a pile and drive it into the ground. The total days of impact and vibratory pile driving is not anticipated to exceed 10 work days total (during the 40 day in-water work duration), and no more than four piles will be proofed in a given day. It is expected that 450 strikes will be necessary per pile, resulting in approximately 1,800 strikes per day. All piles driven with an impact hammer will be surrounded by a bubble curtain or other sound attenuation device over the full water column to minimize in-water noise. The Navy will monitor the presence of marbled murrelets during impact pile driving and marine mammals during impact and vibratory installation and vibratory removal[3] of piles. Section 3.4 provides the details proposed to reduce or mitigate the potential project impacts.

3.2.1 Overwater Coverage

Currently the CSDS-5 conducts its research equipment operations from an existing 115 x 35-ft barge resulting in 4,025 ft^2 of overwater coverage. The new larger barge would be 260 ft x 85 ft with 22,100 ft^2 of overwater coverage, resulting in an increase of 18,075 ft^2 of overwater coverage. This coverage would be located over a depth of -20 to -30 ft mean lower low water (MLLW) (Table 5-1 and Figure 5-1).

[2] "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.

[3] The vibratory removal and impact and vibratory installation of piles is collectively referred to as pile driving throughout this document.

The relocation of six 9 x 2 ft (108 ft^2) floating pier sections to the south side of the trestle would not result in additional overwater coverage. However, a total of seven new floating pier sections required to complete the Port Operations infrastructure would create 126 ft^2 of new overwater coverage.

Table 3-2. Physical Features of the Barge Mooring Project

Facility Feature	Quantity
New Research Barge (-20 to -30 ft MLLW)	Area = 22,100 ft^2
Relocated Port Operations floating pier sections (-10 to -20 ft MLLW)	Area = 108 ft^2
New Port Operations floating pier sections/modules (-10 to -20 ft MLLW)	Area = 126 ft^2
Number of in-water piles to support barge mooring	16
Number of in-water piles to support Port Operations floating pier	4
Removal of piles associated with an existing mooring dolphin (-20 to -30 ft MLLW)	8
Total number of in-water piles installed at ≥ -30 ft MLLW	2
Total area of seafloor displaced by piles	60.44 ft^2
Total area of new overwater coverage (-20 to -30 ft MLLW)	18,075 ft^2
Total area of new overwater coverage (-10 to -20 ft MLLW)	126 ft^2
Total duration of in-water construction	8 weeks

3.3 Schedule

3.3.1 Dates of Construction

The proposed action will occur between July 16 and September 30, 2013. This timeframe is within the July 16 - February 15 in-water work window protective of ESA listed fish. Additionally, the project will occur during the forage fish in-water work window of July 16-October 14. In-water construction will likely begin on July 16 or shortly after, and will last approximately 8 weeks and not more than 40 workdays.

3.3.2 Duration of Activities

No work will begin on the proposed action until all required permits and approvals are in place. All in-water construction, including vibratory pile installation, proofing, structural removal, and float relocation and installation will occur July 16 through September 30, 2013, a potential duration of 76 days.

Construction activities will occur 5 days per week, between 2 hours after sunrise and 2 hours before sunset to protect foraging marbled murrelets. There will be approximately 10 work days of pile-driving, which may or may not occur consecutively, at maximum rate of four piles driven per day. For each pile installed, the driving time is expected to be 15 minutes per pile for the vibratory portion of the project.

3.4 Measures to Avoid, Reduce, or Mitigate Effects

Several measures have been identified to avoid, reduce, or mitigate the potential effects from this action. These measures have been incorporated into the proposed action and are factored into the effects analysis presented in Section 7.0.

Marine Habitat Protection/Avoidance: The pile driving/construction barge will remain in waters that have a minimum depth of 6 ft to avoid grounding and potentially impacting the inter-tidal zone and the nearshore environment. Vessel operators will also be instructed to avoid existing eelgrass (*Zostera marina*) habitat located approximately 175 ft south of the proposed Port Operations float location. Eelgrass is not present within the barge mooring construction area. Contractors will submit a mooring and anchoring plan that identifies measures to be taken to avoid or minimize impacts to bottom habitats from line or anchor drag in areas identified on the construction drawings.

Spill Prevention Control: The existing facility response plans for the NAVBASE Kitsap at Bangor waterfront (Commander Navy Region Northwest Instruction 5090.1, Integrated Contingency Plan, Annex G) provide guidance that will be used in a spill response, such as response procedures, notification, and communication plan; roles and responsibilities; and response equipment inventories. In the event of an accidental spill, response measures will be implemented immediately to minimize potential impacts to the surrounding environment.

- Spill kits will be readily available.
- The contractor and crew will be trained in spill prevention and containment techniques.
- Spill prevention will be implemented daily by maintaining awareness in the construction crew and monitoring the activities.
- Clean and well-maintained equipment and tools will be used.
- Construction contractors will be required to retrieve and clean up any accidental spills.

In addition, during in-water construction activities, an oil containment boom will be placed around the construction area to contain accidental oil or hazardous materials spills to ensure that potential impacts to the marine environment are minimized to the maximum extent practicable.

Best Management Practices (BMPs)

BMPs are required to ensure compliance with the U.S. Environmental Protection Agency (USEPA) general permit for stormwater discharges from construction sites. They can be used singly or in combination, as appropriate, in a particular situation.

3.4.1 Measures to Minimize Project Effects

Minimization measures are most frequently used to reduce or minimize impacts that are unavoidable, for example, applying buffers around sensitive habitat types and habitat features that are important to sensitive species or by using a bubble curtain to reduce underwater sound from impact pile driving. The following minimization measures will be incorporated into this project.

1. Vibratory pile driving equipment will be used for the majority of the the pile installations and impact equipment will only be used to proof piles. .
2. *Pile Driving Shutdown*. The shutdown zones shall include all areas where the underwater sound pressure levels (SPLs) are anticipated to equal or exceed injury levels for marine mammals and marbled murrelets. Although only ESA-listed species are covered under minimization measures in this BA, the same noise criteria and

mitigation/minimization measures will be implemented in order to comply with the Marine Mammal Protection Act (MMPA). Thus, the shutdown zones will apply to all marine mammals observed in the noise injury zone. For marine mammals, the injury zone criteria are the 180 dB rms isopleth for cetaceans and the 190 dB rms isopleth for pinnipeds. For marbled murrelets, the injury zone criterion for impact pile driving is the 202 dB cumulative sound exposure level (SEL) isopleth.

3. *Visual Monitoring* - A detailed monitoring plan is in development for both marine mammals and the marbled murrelet in coordination with NMFS and USFWS. The plans will be finalized prior to commencement of pile driving activities; however, at a minimum it will include the following:
    a. The establishment of a shutdown zone to avoid marine mammal and marbled murrelet injury, as described above.
    b. The zone of behavioral disturbance for cetaceans and pinnipeds will be monitored during pile driving to document marine mammal presence and behavior.
    c. During impact pile driving, the Navy will conduct monitoring for marbled murrelets. All marbled murrelet observers must be certified by USFWS to perform monitoring in accordance with the USFWS Marbled Murrelet Monitoring Protocol. Certified observers 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 and implement shutdown/delay procedures, when applicable, by notifying the monitoring coordinator.
    d. The marbled murrelet shutdown zone will be monitored for 30 minutes prior to the start of impact pile driving in order to ensure marbled murrelets are not present. Pile driving will only commence once observers have declared the shutdown zone clear. Pile driving will be allowed to proceed once the animals have moved outside the shutdown zone, but their behavior will continue to be monitored and documented.
    e. Prior to the start of pile driving, the marine mammal shutdown zone will be monitored for 15 minutes to ensure marine mammals are not present. Pile driving will only commence once observers have declared the shutdown zone clear. Pile driving will be allowed to proceed once the animals have moved outside the shutdown zone, but their behavior will continue to be monitored and documented.
    f. If a marbled murrelet or marine mammal approaches/enters the shutdown zone during the course of pile driving operations, pile driving will be halted and delayed until either the animal has voluntarily left and been visually confirmed beyond the shutdown zone, or 30 minutes or 15 minutes have passed without re-detection of a marbled murrelet or marine mammal, respectively.
4. *Noise Attenuating Devices*. A noise attenuating device (bubble curtain) will be utilized during all impact pile driving operations. The bubble curtain will commence prior to pile driving in an effort to deter fish and marine mammals away from the pile, and bubbles will continue until impact driving has ceased.

5. *Timing Restrictions*. In-water work will only be conducted during the in-water work window (July 16 through October 14) for Puget Sound Tidal Reference Area 13 when juvenile ESA-listed salmonids and forage fish are least likely to be present (USACE 2010).
6. *Daylight Construction*. Impact pile driving will begin 2 hours after sunrise and cease 2 hours before sunset to reduce minimize effects of disturbance to foraging marbled murrelets.

3.4.2 Mitigation Effectiveness

It should be recognized that although marine mammals and marbled murrelets will be protected from injury by the utilization of a bubble curtain and observers will be monitoring the near-field injury zones, monitoring may not be completely effective at all times in locating marine mammals or marbled murrelets. The efficacy of visual detection depends on the size of the area, the observer's ability to detect the animal, the environmental conditions (visibility and sea state), and monitoring platforms.

All observers participating in monitoring activities will be experienced biologists with training or certification in the identification of marine mammals, marbled murrelets, and their behaviors. With specialized training, the Navy expects that visual monitoring will be highly effective. Trained observers will have specific knowledge of marine mammal and marbled murrelet physiology, behavior, and life history, that should improve their ability to detect individuals and help determine if observed animals are exhibiting adverse behavioral reactions to construction activities.

The Puget Sound region, including Hood Canal, only infrequently experiences winds with velocities in excess of 25 knots (Morris et al. 2008). The typically light winds afforded by the surrounding highlands coupled with the fetch-limited environment of Hood Canal result in relatively calm wind and sea conditions throughout most of the year. Visual detection conditions are considered best in BSSs of 2 or less. In accordance with the USFWS monitoring protocol, impact pile driving and associated monitoring will cease if conditions exceed a BSS 2.

4.0 Action Area

The action area is defined as the geographic extent (in both aquatic and terrestrial environments) of the physical, chemical, and biological effects resulting from the proposed action, including direct and indirect effects, as well as effects of interrelated and interdependent activities. The action area should also be based on how far all effects of the action reach, not simply how far the impacts related to project equipment extend (Washington State Department of Transportation [WSDOT] 2011).

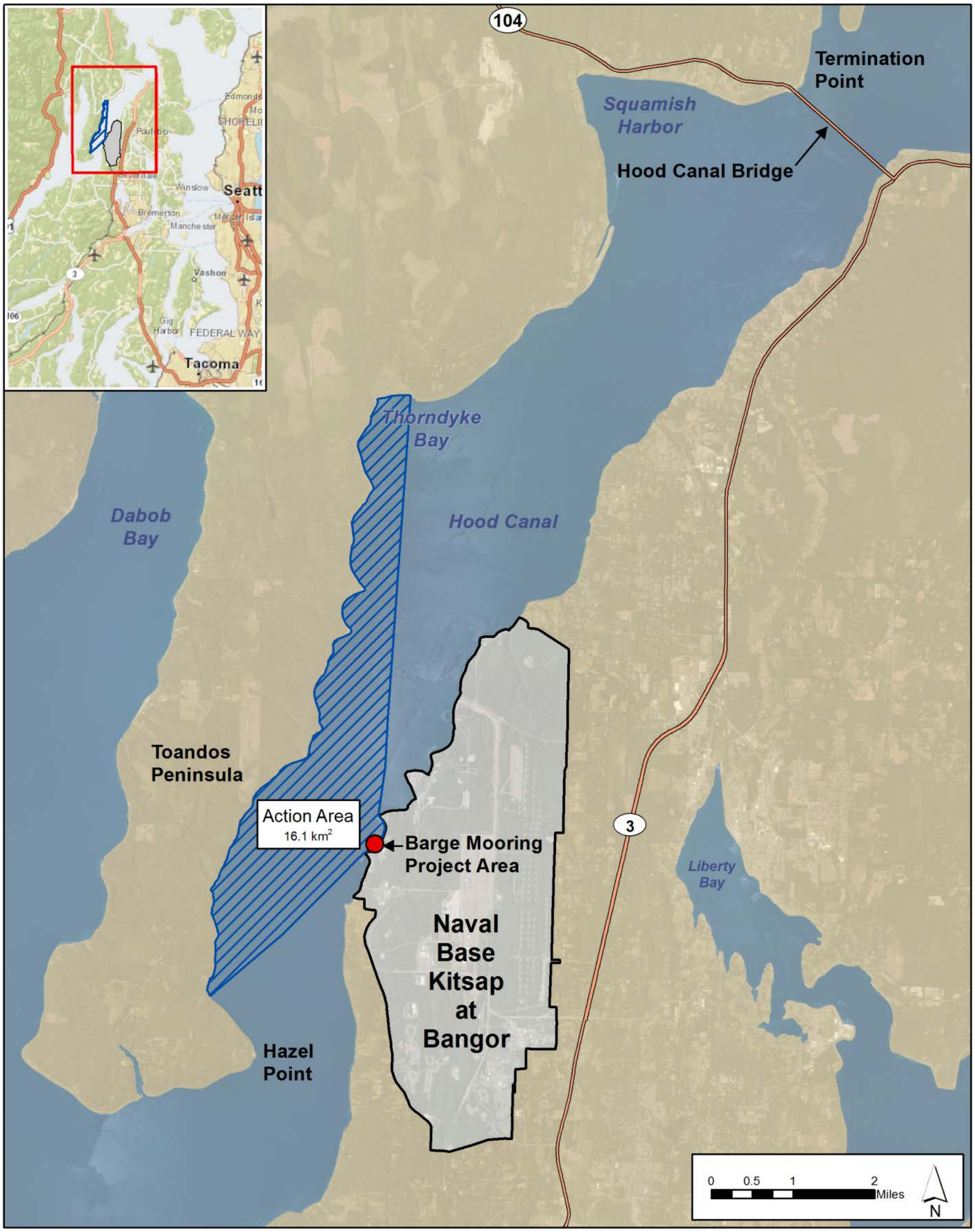
The Barge Mooring Action Area includes, but is not limited to, all project components including equipment staging, roads used by the project, water bodies affected by the project, and uplands affected by the project. Effects from each project component and action are overlaid on the landscape to determine which action has the greatest geographical effect above baseline conditions. Of all the potential impacts of the Barge Mooring Project, underwater noise resulting from vibratory pile driving extends over the greatest distance. Therefore, vibratory pile driving noise defines the Action Area for the project.

The Barge Mooring project would generate both airborne and underwater sound from vibratory and impact pile driving. To determine which effect extended the furthest, sound propagation during both impact and vibratory installation was modeled and compared to ambient levels. Ambient noise levels can vary with the season and time of day and therefore it is preferable that measurements be taken during the same months of the year that the action would take place. The ambient noise levels at NAVBASE Kitsap at Bangor were measured in September 2011. Previous measurements were taken in the summer of 2007 (Slater 2009). In this case, the Barge Mooring Project is proposed to begin on July 16 with pile-driving concluded by the end of September. Therefore, the baseline measurements taken in July, August and September are comparable.

Underwater ambient noise measurements were taken approximately 1.85 miles from the project area at the Explosives Handling Wharf during the recent Test Pile Program ranged from 112.4 decibels (dB) rms at mid depth to 114.3 dB rms at deep depth (Illingworth & Rodkin 2012). In 2009, the average broadband underwater ambient noise levels near the project site were measured at 114 decibels (dB) referenced 1 microPascal (dB re 1 μPa) between 100 hertz (Hz) and 20 kilohertz (kHz). Airborne noise levels at the NAVBASE Kitsap at Bangor waterfront in the daytime ranged between 60 and 104 A-weighted dB (dBA) and averaged 64 dBA; night levels ranged between 64 and 96 dBA, averaging 64 dBA, consistent with other urbanized or industrial environments where equipment is operating (Navy 2010).

A practical spreading loss analysis was conducted for sound generated during for the Barge Mooring project and is described in Section 7.2.1.3. It was determined that underwater sound from proposed vibratory pile driving was identified to have the furthest geographic distribution. Airborne sound generated through pile driving activities and underwater sound resulting from impact pile driving would attenuate to background levels at shorter distances than would underwater noise resulting from vibratory pile driving. Sound generated from vibratory pile driving will intersect land masses (e.g., Toandos Peninsula) prior to attenuating to measured background sound levels. As such, the geographic boundary of the Action Area was defined by the line-of-sight intersection of land and water and is shown on Figure 4–1.

Figure 4-1. Barge Mooring Action Area



5.0 Existing Environmental Conditions

5.1 Puget Sound

Puget Sound is a semi-enclosed glacial fjord that connects to the Strait of Juan de Fuca and the Pacific Ocean via two waterways: Admiralty Inlet and Deception Pass (Figure 5–1). All sea vessels must pass through Admiralty Inlet to enter or leave Puget Sound, except those small enough to use Deception Pass. A relatively shallow sill at Admiralty Inlet separates the waters of the Strait of Juan de Fuca from the waters of Puget Sound proper. Admiralty Inlet is generally considered to be the northern boundary of Puget Sound proper, which consists of four interconnected basins: Main Basin, Southern Basin, Whidbey Basin, and Hood Canal Basin (Puget Sound Action Team [PSAT] 2007).

5.2 Hood Canal

Hood Canal is the smallest of the four Puget Sound basins in terms of area. This long, narrow channel branches from the Main Basin south of Admiralty Inlet and extends about 80 miles south, between the Olympic Mountains and the Kitsap Peninsula. The NAVBASE Kitsap at Bangor waterfront occupies approximately 4.3 miles of the approximately 67-mile long eastern shoreline of Hood Canal. The width of Hood Canal is approximately 1.5 miles at NAVBASE Kitsap at Bangor.

Hood Canal includes intertidal and subtidal areas with extensive areas of eelgrass that provide breeding sites for many fish species and habitat for amphipods, copepods, and other aquatic invertebrates. Copepods and other zooplankton represent the major food base for Puget Sound, specifically for small and juvenile fish (Simenstad et al. 1979; Mauchline 1998), including Pacific herring, sand lance, surf smelt, and salmonids. These species play an important role in marine trophic systems, linking primary production to higher trophic levels (Simenstad et al. 1979; Mauchline 1998; Sackmann 2000, as cited in (Navy 2011a).

Both estuaries and nearshore areas, located within a transition zone between land and sea, are incredibly dynamic environments influenced by constantly changing physical, chemical, and biological processes. The marine nearshore is important to many species and provides a number of critical functions for salmonids. Some of these functions include prey production, migratory corridors, refuge for juveniles from predators, and juvenile rearing. In addition, salmon transport marine-derived nutrients back into freshwater streams as they spawn, thus linking the functions of the nearshore ecosystem to the health of the entire watershed.

Generally, nearshore habitats are defined by a variety of complex interactions between physical, geological, chemical, and biological components. As an ecotone between terrestrial and aquatic ecosystems, the nearshore performs a number of distinctive ecological functions, including the generation, accumulation, and decomposition of detritus that can be an important part of the estuarine and terrestrial food webs (Day et al. 1989; Polis and Hurd 1996; Colombini and Chelazzi 2003; Dugan et al. 2003; Rice 2006) and as foraging, spawning, rearing, and migration habitats for forage fish (Bargmann 1998). Long-term effects of similar nearshore structures have been found to result in sediment dynamics alterations where the substrate can coarsen, the beach slope steepen, and the structural complexity and organic debris accumulation decline (Macdonald et al. 1994; Williams and Thom 2001; Rice 2006).

Figure 5-1. Puget Sound

5.3 Pathways and Indicators Matrix for Marine Habitats

Ideally, reliable scientific information will exist for all populations of listed species that will allow the effects of an action to be quantified in terms of population impacts (NMFS 1999a). However, as stated in the Habitat Approach[4], in the absence of population-specific information, an assessment must define the biological requirements of a listed fish species in terms of properly functioning conditions (PFCs). PFCs are described as the sustained presence of natural habitat-forming processes necessary for the long-term survival of the species through the full range of environmental variation (NMFS 1999a). PFC indicators are typically identified as being one of the following:

1 *Properly Functioning*. This indicator can support healthy fish populations.

2 *At Risk.* Functionality is maintained but there is a likelihood that further degradation will result in a negative response by fish populations.

3 *Not Properly Functioning*. There are known limitations to those parameters necessary to support healthy salmonid populations.

Indicators of PFCs vary in different landscapes based on unique physiological and geologic features. Since aquatic habitats are inherently dynamic, PFC indicators are defined by the persistence of natural processes that maintain habitat productivity at a level sufficient to ensure long-term survival, and are not necessarily defined by absolute thresholds and parameters (NMFS 1999a).

NMFS, USFWS, and the Pacific Fishery Management Council (PFMC) have prepared guidance on the evaluation of PFC indicators for salmonids in freshwater systems. Although a matrix of pathways and indicators has only been constructed for freshwater and not for marine systems, marine and estuarine habitat requirements for juvenile and adult salmonids have been described by many authors (Fresh et al. 1981; Shepard 1981; Healey 1982; Levy and Northcote 1982; Weitkamp et al. 2000). Table 5-1, adapted from the Navy (2005) and PFMC (2000), summarizes indicators for PFCs from the available literature, providing the basis for an assessment of the proposed action on marine habitats used by salmonids. The text following the table provides the existing environmental baseline in Hood Canal for these pathways and indicators, if known. Although these PFC indicators were specifically developed to determine project-related effects on important marine resources utilized by salmonids, many of these are important to a range of other marine species. As a result, the PFC indicators summarized in Table 6-1 with respect to salmonid habitat use in marine environments will also be used as a guide to determine effects of the proposed project, where applicable, on marine resources also used by listed marine birds and mammals.

[4] The Habitat Approach is an August 1999 supplement to the NOAA Fisheries 1996 guidance document Making Endangered Species Act Determinations of Effects for Individual or Grouped Action at the Watershed Scale designed to facilitate and standardize determinations of effect for ESA conferencing, consultations, and permits focusing on anadromous salmonids (NMFS 1996, Matrix of Pathways and Indicators).

Table 5-1. Properly Functioning Conditions for Pathways and Indicators for Marine Habitats

Indicators	Summary	Supporting Documents	Existing Conditions in the Action Area
Water Quality			
Turbidity	Maximum 1-day turbidity increases exceed 5 NTU above background when the background is below 50 NTU for at-risk conditions. Maximum 1-day turbidity increases exceed 10 NTU above background when the background is below 50 NTU for not properly functioning conditions.	Beauchamp et al. 1983; Healey 1991; Sandercock 1991; Nightingale and Simenstad 2001a,b	Properly functioning
Dissolved Oxygen (DO)	DO concentrations between 4.0 and 7.0 mg/L constitute at-risk habitat. Concentrations below 4.0 mg/L are not properly functioning.	Reiser and Bjornn 1979; Beauchamp et al. 1983; WAC 173-201A	At risk (in late summer/early fall)
Other Water Quality Parameters	Localized waters where temperature, pH, or other parameters exceed conditions in adjacent surrounding waters are considered at risk. Section 303(d) of the CWA listed water bodies are defined as not properly functioning for the purpose of this assessment.	Washington Department of Ecology (WDOE) 2009	Properly functioning
Sediment Quality	Sediment contaminant concentrations established by WDOE are determined to be at risk. Contaminants at or above toxic levels are not properly functioning.	WDOE 1990; WAC 173-204	Properly functioning
Physical Habitat			
Substrate/ Armoring	Shorelines with minor armoring by riprap and low density shoreline development are considered at risk. Shoreline areas containing extensive armoring are not properly functioning.	Prinslow et al. 1980; Fresh et al. 1981; Thom et al. 1994; Nightingale and Simenstad 2001a, b; King County Department of Natural Resources 2001; Williams and Thom 2001	At risk
Depth/Slope	Habitats that have been altered by wharves, bulkheads, and nearshore dredging to have steep side slopes, drop-offs, and nearshore deep-water habitats are considered not properly functioning.	King County Department of Natural Resources 2001	Properly functioning
Tideland Condition	Nearshore habitats with tidelands fragmented by development are at risk. Habitat that has experienced loss of tidal areas through filling is considered not properly functioning.	Shepard 1981; Beechie and Wasserman 1994; Williams and Thom 2001	At risk

Table 5-1. Properly Functioning Conditions for Pathways and Indicators for Marine Habitats

Indicators	Summary	Supporting Documents	Existing Conditions in the Action Area
Marsh Prevalence and Complexity	Habitats where marshes are fragmented by development are at risk. Habitat containing historical marshland that has been lost by filling and/or degradation is considered not properly functioning.	Shepard 1981; Simenstad et al. 1982; Healey 1991	Properly functioning
Refugia	At-risk habitat consists of the presence of refugia insufficient in size, number, and connectivity. A not properly functioning habitat condition arises when adequate habitat refugia do not exist.	NMFS 1996	At risk
Biological Habitat			
Physical Barriers	An at-risk habitat is considered to contain minimum sized and a minimal amount of overwater structures. A not properly functioning habitat is defined as habitat that contains a large number of structures along a shoreline that are likely a serious barrier to juvenile salmon.	Weitkamp et al. 2000; Nightingale and Simenstad 2001a	At risk
Current Patterns	Areas with slight alterations are determined to be at risk. Areas where shoreline modifications and/or dredging are prevalent are determined to be not properly functioning.	Nightingale and Simenstad 2001b	Properly functioning
Salt/Fresh Water Mixing Patterns and Locations	An altered condition that changes the natural surface hydrology is at-risk habitat. A not properly functioning habitat contains substantial impervious surface or a high level of modification of estuarine habitat.	Navy 2002	Properly functioning
Benthic Prey Availability	Sediments containing a benthic community that was altered from its natural state are considered at risk. Sediments that have an impaired ability to support benthic invertebrates are not properly functioning.	Bax et al. 1978; Fresh et al. 1981; Kjelson et al. 1982; Healey 1991	At risk
Forage Fish Community	An at-risk habitat has limited forage fish resources or habitat. A not properly functioning habitat has depleted forage fish resources or habitat.	Bargmann 1998; USFWS 1998; Rice 2006; Penttila 2007; Rossell and Dinnel 2007	At risk

Table 5-1. Properly Functioning Conditions for Pathways and Indicators for Marine Habitats

Indicators	Summary	Supporting Documents	Existing Conditions in the Action Area
Aquatic Vegetation	If an area historically contained vegetation but the vegetation is degraded by disturbance, then the habitat is considered at risk. Habitat without previously occurring vegetation as a result of shoreline development is considered not properly functioning.	Simenstad and Cordell 2000; Nightingale and Simenstad 2001a, b; Garono and Robinson 2002; Shafer 2002	At risk
Exotic Species	If exotic species are present, but do not cause any adverse impacts to salmonids, an at-risk condition is assumed. A habitat containing exotics that may compete with, or prey on, salmonids, is considered not properly functioning.	Cohen and Carlton 1998; Elton 2000; USEPA 2001a, b; Marvier et al. 2004; Simberloff 2004	At risk
Underwater Noise			
Underwater Noise	At-risk habitats are those that experience underwater noise levels elevated above background, natural levels but remain insufficient to alter fish behavior or cause injury. Not properly functioning habitats include those that are, with regularity, exposed to underwater noise sufficient to alter fish behavior or injury.	Hastings 2002; Hastings and Popper 2005; Popper et al. 2006; WSDOT 2012	At risk

Notes
mg/L = milligrams per liter;
NTU = nephelometric turbidity unit;
WAC = Washington Administrative Code.

5.3.1 Water Quality

5.3.1.1 Turbidity

Washington State-designated extraordinary quality marine surface waters should have an average turbidity reading of less than 5 nephelometric turbidity units (NTUs) (Washington Administrative Code [WAC] 173-201A). Turbidity measurements were collected along the NAVBASE Kitsap at Bangor waterfront, including the vicinity of the project site, from July 2005 through May 2006, except for October to December 2005 (Phillips et al. 2009). These mean monthly turbidity measurements for both nearshore and offshore waters ranged from 0.7 to 3 NTU and were consistently within the Washington State standards for extraordinary water quality. Similarly, mean turbidity values measured during 2007 and 2008 ranged between 0 and 13 NTU (Hafner and Dolan 2009). Therefore, turbidity is considered properly functioning (Table 6-1).

5.3.1.2 Dissolved Oxygen (DO)

Concentrations of DO in extraordinary quality marine surface waters, such as those in northern Hood Canal, should exceed 7.0 milligrams per liter (mg/L) of DO, allowing for only 0.2 mg/L reductions in the natural condition by human-caused activities (WAC 173-201A). DO levels meet the extraordinary standard for surface waters (3 to 20 ft in depth) year round and for deep water (66 to 197 ft in depth) most of the year, although deeper waters can drop to a fair standard in late summer. In 2007, DO concentrations along the NAVBASE Kitsap at Bangor waterfront were above 8 mg/L during all but one survey when a minimum concentration of 3.9 mg/L occurred at one location (Hafner and Dolan 2009). However, at offshore stations, the ratings ranged from fair to extraordinary quality standards during 2005–2006, whereas all DO concentrations measured at deep-water locations in 2007 were above 8 mg/L (Hafner and Dolan 2009). Due to the decreased levels of DO in late summer-early fall, the existing condition for the DO PFC indicator in Table 5-1 is considered at risk.

5.3.1.3 Other Water Quality Parameters

Temperature, pH, and other water quality parameters meet water quality standards and there is no known water contamination at the Barge Mooring Project site (Hafner and Dolan 2009; Phillips et al. 2009). Thus, the water contamination PFC indicator is considered properly functioning (Table 5-1).

5.3.1.4 Sediment Quality

Marine sediments at the project site are composed of gravelly sands with some cobbles in the intertidal zone, transitioning to silty sands in the subtidal zone (Hammermeister and Hafner 2009).

Sediment parameters, such as total organic carbon, metals, and organic contaminants, were used to characterize sediment quality. Total organic carbon, which provides a measure of how much organic matter occurs in the sediments, was less than 1% at the project site. A range of 0.5 to 3% is typical for Puget Sound marine sediments, particularly those in the main basin and in the central portions of urban bays (Puget Sound Water Quality Action Team and Puget Sound Estuary Program 1997).

The primary source of organotin (butyltin) compounds in marine sediments is residues from anti-fouling paints applied to vessel hulls (Danish Environmental Protection Agency 1999). Use of organotins in anti-fouling paints for ships less than 82 ft in length and non-aluminum hulls was banned in 1988 by the Organotin Anti-Fouling Paint Control Act. Organotin concentrations within the sediments at the project site contain tributyltin concentrations up to 37 micrograms per kilogram (µg/kg). However, there is no existing sediment quality standard (SQS) for organotins.

Concentrations of metals in sediments at the project site are comparable to background levels for Puget Sound and below sediment quality guidelines (e.g., SQS and cleanup screening level [CSL] values). In addition, concentrations of polycyclic aromatic hydrocarbons were below the corresponding SQS and CSL values. Concentrations of other classes of organic contaminants, such as chlorinated aromatics, phthalate esters, phenols, and other miscellaneous extractable compounds, typically were at or below the analytical detection limits and consistently below the SQS and CSL values. Results from the 2007 sediment investigation confirm that sediment quality at NAVBASE Kitsap at Bangor is within SQS standards (Hammermeister and Hafner

2009). Therefore, the sediment quality PFC indicator is considered properly functioning (Table 5–1).

5.3.2 Physical Habitat

5.3.2.1 Substrate Armoring

The substrate armoring PFC indicator, as it relates to salmonids, is most important in the nearshore intertidal and shallow subtidal (30 ft below MLLW to 12 ft above MLLW) habitat used by juvenile salmon as a migratory pathway. Shoreline armoring occurring over 12 ft above MLLW will have little or no impact to the migratory pathway for fish. Within the Action Area, there is a small amount of shoreline armoring near the Service Pier Access Trestle. Therefore, the Action Area results in an at risk PFC indicator for substrate armoring, as it relates to salmonids (Table 5–1).

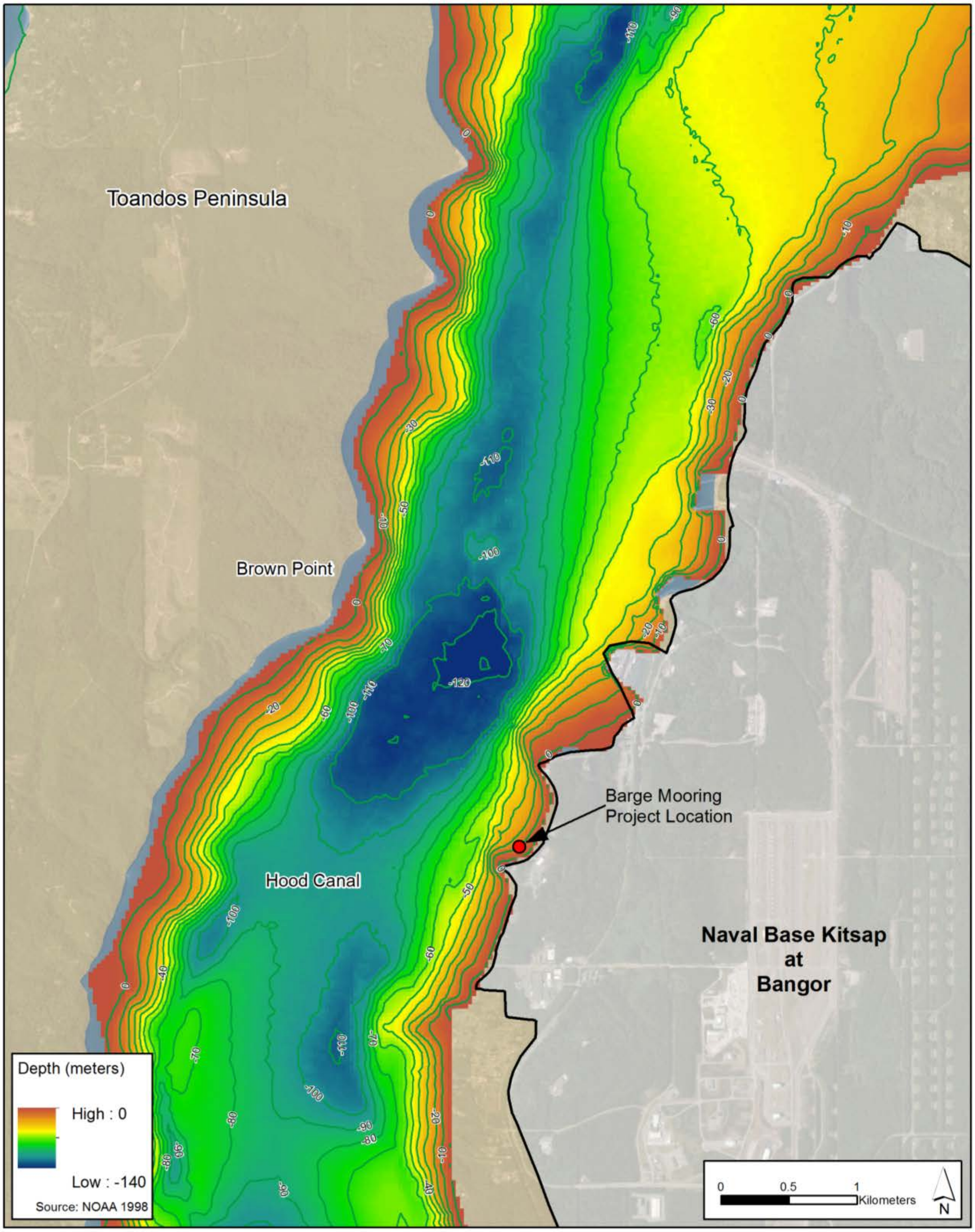
5.3.2.2 Depth/Slope

Depths along the axis (center line) of Hood Canal, west of the NAVBASE Kitsap at Bangor waterfront, range from 200 to 400 ft. The canal exhibits bathymetrical features typical of a fjord estuary, including steep sloping walls near the shore. The sea floor along the outer boundary of the waterfront is relatively flat, ranging from 200 to 250 ft. Though the upland habitat is steeply sloped, the shoreline in the immediate vicinity of the proposed project gently slopes through intertidal waters, then increases steeply in slope through the subtidal waters (Figure 5–2). The gentle slope in the nearshore waters provides for relatively shallow water in the juvenile salmon migratory pathway. No dredging or other armament has altered the depth or slope in these waters. Although there are multiple structures along the NAVBASE Kitsap at Bangor shoreline and some bulkheading, most of the shoreline is similar to undisturbed Hood Canal nearshore habitats. As a result, the depth/slope PFC indicator for this location is considered to be at properly functioning (Table 5–1).

5.3.2.3 Tideland Condition

As with substrate armoring, the tideland condition pertinent to salmonid habitat is most important in the nearshore intertidal and shallow subtidal (30 ft below MLLW to 12 ft above MLLW) areas used by juvenile salmon as a migratory pathway. No NAVBASE Kitsap at Bangor tidelands have been filled for riprap placement or shoreline development in recent years. However, the NAVBASE Kitsap at Bangor shoreline currently includes seven large docks, wharves, or piers along the shoreline. The presence of the structures along the shoreline has resulted in fragmentation of tideland habitats. Therefore, the PFC indicator for tideland condition along the NAVBASE Kitsap at Bangor waterfront is considered at risk (Table 5–1).

Figure 5-2. NAVBASE Kitsap at Bangor Bathymetry and Topographic Relief



5.3.2.4 Refugia

The shoreline along NAVBASE Kitsap at Bangor varies in composition from one dominated by sand, oyster shells, and cobble to one containing shoreline armoring. The shoreline along the Barge Mooring Project site is predominantly sand, oyster shells, and cobble. Eelgrass is absent from the northside of the trestle and is only moderately present on the south side of the trestle in depths less than 10 ft below MLLW (SAIC 2009). This narrow band of eelgrass offers foraging and refuge opportunities for juvenile salmonids. Due to the presence of seven large nearshore in-water structures along the NAVBASE Kitsap at Bangor waterfront, and the impacts of these structures on nearshore physical (benthic community) and biological functions (eelgrass shading), refugia habitat is limited in the immediate vicinity of these structures and is considered at risk (Table 5–1).

5.3.2.5 Physical Barriers

The existing in-water structures along the waterfront likely act as migrational barriers to shoreline-migrating juvenile salmon. The Service Pier that runs north-south along the west side of the Barge Mooring Project site and the trestle that runs east-west out to the service pier are the structures in the Action Area that could create a barrier. However, fish surveys have captured large numbers of salmonids nearshore of these structures (SAIC 2006; Bhuthimethee et al. 2009a), suggesting juvenile salmonids are able to migrate around, or through, these structures. Due to the presence of seven nearshore in-water structures along the NAVBASE Kitsap at Bangor waterfront, the physical barrier PFC indicator is considered at risk (Table 5-1).

5.3.2.6 Current Patterns

The tides in Hood Canal are mixed, diurnal-semidiurnal with an approximate range of 8 to 16 ft, depending upon the phase and alignment of the lunar and solar gravitational influences on the regional tides. Tidal currents are the dominant force for water circulation near the waterfront. Current flow (speed and direction) along the NAVBASE Kitsap at Bangor waterfront is primarily a function of tidal action based on the phase and range of each tide within the mixed diurnal-semidiurnal regime, and current velocities in the shallower water areas (less than 50 ft) around pier and dock structures are variable and complex. The magnitude or instantaneous velocity of these fluctuating water column currents ranges from 0 to 0.88 ft/sec within the -30 to -65 ft water depth interval. However, current flow in any one direction is short-lived and inconsistent in magnitude, with relatively few periods of time when sufficient energy (0.67 ft/sec) exists to exceed the threshold for resuspending deposits of unconsolidated material on the seafloor (Boggs 1995). Statistical summaries show that time-averaged net flow is within the 0.07 to 0.10 ft/sec range in the upper water column and less than 0.03 ft/sec near the seafloor.

Water column currents (between -13 and -59 ft depth) near the project site appeared to be variable in direction and magnitude of flow within the mid and upper water column throughout each tidal phase, while flow in the lower water column appeared to be more consistent (Morris et al. 2008). Although variability was observed in both the magnitude and direction of water column currents, a general trend of north-northeast and south-southwest flow could be resolved. Maximum flow rates in excess of 0.7 ft/sec were documented in the upper (13 ft), mid (36 ft), and lower (59 ft) water column, and generally corresponded to the time of high tide (maximum water level). Current velocities were elevated at the time of low tide (minimum water level) as well, but at speeds that typically ranged between 0.3 and 0.5 ft/sec. The PFC indicator for current patterns at the Barge Mooring Project site is considered properly functioning (Table 5–1).

5.3.2.7 Salt/Freshwater Mixing

The waters of Hood Canal surrounding the project site and along the NAVBASE Kitsap at Bangor waterfront reflect a stratified water column with less saline surface water overlying cooler saline water with depth. The salinity of the upper water layer is sensitive to the amount of freshwater input and may become more diluted during heavy precipitation (URS Consultants, Inc. 1994). Between June 2005 and July 2006, surface water salinity levels along the waterfront ranged from 26 to 35 practical salinity units (PSUs) (Phillips et al. 2009). During the winter to spring months of 2007 and 2008, the salinity of nearshore waters ranged from 18 to 32 PSUs and from 27 to 33 PSUs, respectively (Hafner and Dolan 2009). Specific water quality standards for salinity are not available, but the range of salinity along the waterfront is typical for marine waters in Puget Sound (Newton et al. 1998, 2002). The PFC indicator for salt/fresh water mixing patterns at the Barge Mooring Project site is considered properly functioning (Table 5-1).

5.3.3 Biological Habitat

5.3.3.1 Benthic Prey/Communities

The soft-bottom benthic community at the project site is dominated by polychaetes, crustaceans, and mollusks across tide zones, although in the intertidal zone other minor taxa (e.g., nemerteans, nematodes, oligochaetes) also may be numerically abundant (Weston Solutions, Inc. 2006; WDOE 2007). Species composition and abundance are variable along the NAVBASE Kitsap at Bangor waterfront. A recent survey of four different areas along the waterfront found consistently greater benthic community development in the subtidal zone compared to the intertidal zone and variable community development within and among survey areas (Weston Solutions, Inc. 2006).

A study conducted in the late 1970s investigated the epibenthic community at two locations along the waterfront and an additional site directly across Hood Canal on the Toandos Peninsula (Simenstad et al. 1980). The study found that harpacticoid copepods were the numerically dominant organism in the epibenthic community, accounting for 56-67% of the total number of epibenthic organisms captured. Gammarid amphipods dominated the total biomass, representing 12-31% of the total epibenthic biomass.

Eelgrass beds along the NAVBASE Kitsap at Bangor waterfront support species such as gammarid amphipods, brittle stars, and shore crabs (Pentec 2003). Eelgrass provides substrate for invertebrates, such as copepods, amphipods, and snails that might otherwise not be found on soft sediments (Mumford 2007). Two annelid species (*Exogene lourei* and *Galathowenia oculata*) are abundant in the nearshore area within the vicinity of the project (WDOE 2007). Hard shell clam (*Leukoma staminea*), geoduck (*Panopea generosa*), and Dungeness crab (*Cancer magister*) are abundant in the subtidal areas just beyond the project area. Pacific oyster (*Crassostrea gigas*) and Olympia oyster (*Ostrea lurida*) occur sporadically along the intertidal of the project area (SAIC 2009; WDFW 2010a).

However, the seven nearshore docks, piers, or wharves that occur along the NAVBASE Kitsap at Bangor waterfront include piles and overhead shading of benthic habitat. The presence of the piles results in a direct habitat change from soft-bottom benthic habitat to hard substrate (e.g., concrete). In addition, the overwater trestles and decking result in direct shading and reduced productivity of benthic habitat in the immediate vicinity of these structures. As a result, the productivity of these habitats is reduced from their pre-development condition. Therefore, due to this reduction in benthic habitat quality in the Action Area, the PFC indicator for benthic prey availability is considered at risk (Table 5–1).

5.3.3.2 Forage Fish Community

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. As salmonids mature, their diet shifts from benthic amphipods, euphausiids, pteropods, and copepods in estuarine waters to small fish and squid in marine waters (Salo 1991). The majority of salmonids mature once they are in marine waters and feed on the most common forage fish within Puget Sound: 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.

These small, schooling fishes form a critical link between the marine zooplankton community and larger predatory fish, seabirds, and marine mammals in the marine food web (Penttila 2007; PSAT 2007). They feed mainly on zooplankton and reside in the upper levels of the water column and nearshore areas (PSAT 2007). Forage fish species occupy every marine/estuary nearshore habitat in Puget Sound (Penttila 2007). The vitality of the aggregate forage fish resource is also a valuable indicator of the health and productivity of Puget Sound.

Within Puget Sound, each species appears to use approximately 10% of the shoreline as spawning habitat. Some species tend to use the same beaches annually. All three species use nearshore habitats as nursery grounds. Populations of surf smelt and sand lance have not been monitored throughout Puget Sound, and therefore there are no available annual abundance estimates or trends over time (Penttila 2007). Monitoring for herring provides a sense of abundance, trends over time, and stock status. An important characteristic that forage fish populations have in common is a tendency for rapid change. Forage fish populations vary considerably, primarily due to environmental conditions (Bargmann 1998).

5.3.3.2.1 Pacific Herring

Pacific herring are small schooling fish distributed along the Pacific coast from Baja California, Mexico, to the Bering Sea and northeast to the Beaufort Sea, Alaska. Adult herring feed primarily on planktonic crustaceans, and juveniles demonstrate a preference for crab and shrimp larvae. Herring are also an important food resource for other species in Puget Sound waters. The majority of herring spawning 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, larval, juvenile, and adult herring may be present.

Based on recent surveys along the waterfront, Pacific herring have been detected in small numbers during late winter months and in larger numbers during early summer months at NAVBASE Kitsap at Bangor (SAIC 2006; Bhuthimethee et al. 2009a). However, no herring were captured near the project site (Bhuthimethee et al. 2009a).

5.3.3.2.2 Surf Smelt

Surf smelt (*Hypomesus pretiosus*) are small schooling fish distributed along the Pacific coast from Long Beach, California, to Chignik Lagoon, Alaska, and are most abundant at NAVBASE Kitsap at Bangor in late spring through summer (SAIC 2006; Bhuthimethee et al. 2009a). During the 2005 through 2006 beach seine surveys, surf smelt were second in abundance for all forage fish captured (20% of the forage fish catch) (SAIC 2006).

Adult surf smelt feed primarily on planktonic organisms and have shown a preference for euphausiids. As with herring, these fish are an important component in Puget Sound, both as a food resource in the marine food web and as part of the commercial fishing industry.

In surveys conducted from May 1996 through June 1997, Penttila (1997) found no surf smelt spawning grounds at NAVBASE Kitsap at Bangor; however, juvenile surf smelt have been found to rear in nearshore waters (Bargmann 1998) and were detected along the shoreline near the project site from January through the mid-summer months (SAIC 2006; Bhuthimethee et al. 2009a). Surf smelt are believed to spawn throughout the year with the heaviest spawn occurring from mid-October through December. There are no documented surf smelt spawning areas within the Action Area (WDFW 2010a); however, adult, juvenile, and larval surf smelt may be present year round.

5.3.3.2.3 Pacific Sand Lance

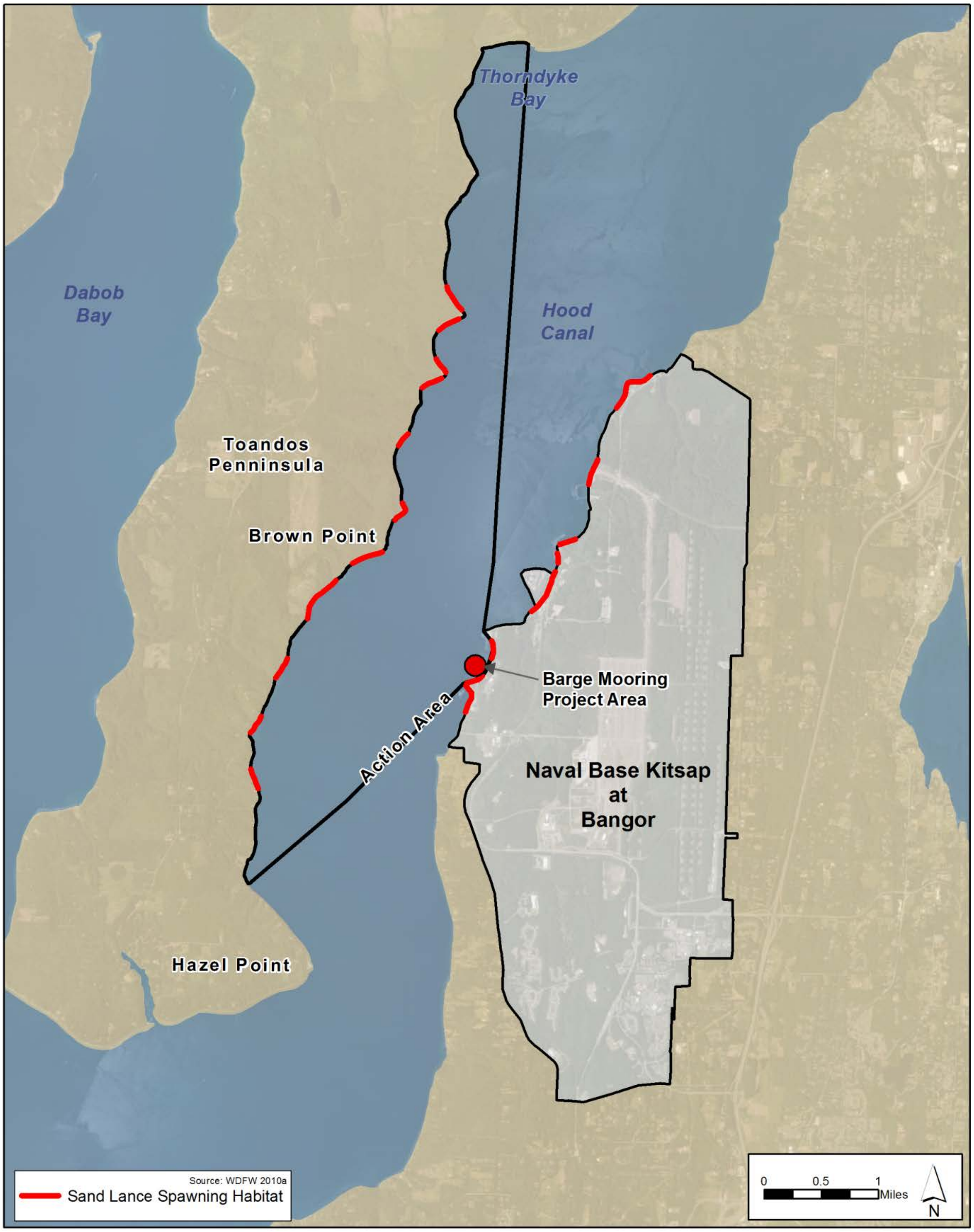
The Pacific sand lance (*Ammodytes hexapterus*), another small schooling fish, occurs throughout the coastal northern Pacific Ocean between the Sea of Japan and southern California, across Arctic Canada, and throughout the Puget Sound region. All life stages of sand lance feed on planktonic organisms, primarily crustaceans, with juveniles showing a preference for copepods. 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. 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.

Pacific sand lance are the third most abundant forage fish at NAVBASE Kitsap at Bangor comprising 7% of the forage fish catch (SAIC 2006). Excellent documented spawning substrate and nearly pristine backshore (Long et al. 2005) in the vicinity justifies conservation efforts to preserve spawning habitat. Sand lance spawning activity occurs annually from early November through mid-February. Sand lance deposit eggs on a range of nearshore substrates, from soft, pure, fine sand beaches to beaches armored with gravel up to 1.2 inch diameter; however, most spawning appears to occur on the finer-grained substrates (Bargmann 1998). Spawning occurs at tidal elevations ranging from 5 ft above MLLW to about the mean higher high water (MHHW) line (12 ft above MLLW). Similar to juvenile surf smelt, juvenile sand lance have been detected near the project site from January through the mid-summer months (SAIC 2006; Bhuthimethee et al. 2009a). Most of these juveniles were captured in sheltered cove-like areas of the nearshore and were in schools mixed with surf smelt and larval sand lance. Sand lance spawning habitat in the Action Area is shown in Figure 5-3. Adult, juvenile, and larval sand lance are expected to be present in the Action Area throughout the year.

Forage Fish PFC Conclusion

In surveys conducted from May 1996 through June 1997, Penttila (1997) found no surf smelt spawning grounds along the NAVBASE Kitsap at Bangor waterfront. Stout et al. (2001) showed that Pacific herring spawn in waters north and south of the base but indicate that no spawning occurs along the NAVBASE Kitsap at Bangor shoreline. Documented Pacific sand lance spawning areas have been identified along Carlson spit, less than 200 ft from the proposed Port Operations float construction and nearshore of the proposed barge mooring construction (WDFW 2010a). Although, there is no documented surf smelt spawning within the Action Area, the documented sand lance spawning areas are also considered potential spawning areas for surf smelt (WDFW 2010a). It is possible, if not likely, that more suitable forage fish spawning habitat would have been present prior to the nearshore construction of the seven docks, piers, or wharves that occur at NAVBASE Kitsap at Bangor. In addition, these same structures likely present a barrier effect on the nearshore migration of forage fish species. As a result, the PFC indicator for forage fish is considered at risk (Table 5-1).

Figure 5-3. Sand Lance Spawning Habitat within the Vicinity of the Action Area



5.3.3.3 Aquatic Vegetation

Aquatic vegetation at the project site is composed of intertidal and subtidal species, as well as floating and attached species. Eelgrass is high quality aquatic habitat and is most abundant in low-energy areas. Eelgrass occurs in the lower intertidal and shallow subtidal photic zone where organic matter and nutrients are abundant (Johnson and O'Neil 2001). Within the Action Area, eelgrass is absent from the north side of the trestle and an approximate 60-ft wide bed is present on the south side of the trestle, at the base of Carlson Spit, in depths less than 10 ft below MLLW (SAIC 2009). This small presence of eelgrass provides important habitat for waterfowl, raptors, migratory birds, and a variety of marine invertebrates and fishes, including salmonid species.

Three species of macroalgae occur along the NAVBASE Kitsap at Bangor nearshore marine environment. These include brown algae, red algae, and green algae with dominant growth occurring from April through August. Macroalgae provides food for many species of sea birds, fish, mollusks, and crustaceans. It also provides shelter for several species of perch, greenling, and crustaceans (Simenstad et al. 1991). The most dominant macroalgae species that occur within the project area include green (*Ulva*) and brown (*Laminaria* and *Gracilaria*). Dense coverage occurs within depths less than 15 ft below MLLW, particularly within the vicinity of the pier structures (SAIC 2009). These aquatic vegetation species play an important role in marine trophic systems, linking primary production to higher trophic levels (Mauchline 1998; Sackmann 2000; Mumford 2007).

However, as more aquatic vegetation habitat likely would have been present prior to the existing nearshore piers or wharves, it can be assumed that, at a minimum, the direct displacement and reduction in light attenuation due to the presence of these overwater structures has reduced the abundance and distribution of nearshore aquatic vegetation in the Action Area. As a result, the aquatic vegetation PFC indicator is characterized as at risk (Table 5–1).

5.3.3.4 Exotic Species

Nonindigenous marine species are becoming more abundant in Puget Sound waters. Some of these species are intentionally introduced whereas others are invasive. One of the most prolific exotic organisms is the Pacific oyster, which is one of the most economically important commercial marine species in Hood Canal. An intertidal band of Pacific oysters occurs along much of the NAVBASE Kitsap at Bangor waterfront. A non-native eelgrass species, *Zostera japonica*, and the invasive kelp, *S. muticum*, have been identified along the waterfront (SAIC 2009). Invasive tunicates and purple varnish clam (*Nuttalia obscurata*) have been observed in Hood Canal (WDFW 2012) and likely occur along the NAVBASE Kitsap and Bangor shoreline. No exotic marsh grasses, sedges, or rushes were detected in the immediate vicinity of the project site, even though the invasive cord grass (*Spartina patens*) has been observed in southern Hood Canal. Other exotic species likely occur in northern Hood Canal waters but have not yet been detected. Although the Pacific oyster is an exotic species, it occurs throughout Hood Canal waters and has not been determined as a species that reduces the suitability of marine habitats used by juvenile salmonids. Further, *Z. japonica* does not appear to be abundant or to have limited the prevalence of native eelgrass along the NAVBASE Kitsap at Bangor shoreline (SAIC 2009). However, due to the presence of multiple nonindigenous aquatic organisms along the waterfront, the PFC indicator for exotic species is considered at risk (Table 5–1).

5.3.4 Noise

5.3.4.1 Underwater Noise

A number of sources of underwater noise exist in the vicinity of the project site. Sources of naturally caused underwater noise include wind, waves, precipitation, and biological sources such as shrimp, fish, and cetaceans. Noise derived from biological organisms can be absent or dominant over narrow and broad frequency ranges. Precipitation can contribute up to 35 dB to the existing sound level, and increases in wind speed of 5 to 10 knots can cause a 5 dB increase in ambient ocean noise across most frequencies (Urick 1983). The highest noise levels occur in nearshore areas where the sound of surf can increase underwater noise levels by 20 dB or more within 600 ft from the surf zone in the 200 Hz to 2 kHz regime (Wilson et al. 1985). In addition, wakes from boat traffic cause breaking waves in the surf zone.

Ambient noise by definition is background noise and it has no single source or point. Ambient noise varies with location, season, time of day, and frequency. Ambient noise is continuous, but with much variability on time scales ranging from less than 1 sec to 1 year (Richardson et al. 1995).

Ambient underwater sound at the Bangor waterfront was measured during the Test pile Program in 2011. Average underwater sound levels approximately 1.85 miles from the Barge Mooring project site ranged from 112.4 dB rms at mid depth to 114.3 dB rms at deep depth (Illingworth & Rodkin 2012). Underwater sound measurements were also conducted at two locations in the vicinity of the project site in the summer of 2007(Slater 2009). Average broadband ambient noise levels near the project site were measured at 114 dB re 1μPa between 100 Hz and 20 kHz. Peak spectral noise from industrial activity was noted below the 300 Hz frequency, with maximum levels of 110 dB noted in the 125 Hz band. In the 300 Hz to 5 kHz range, average levels ranged between 83 and 99 dB re 1μPa. Wind-driven wave noise dominated the background noise environment at approximately 5 kHz and above, and ambient noise levels flattened above 10 kHz. The primary source of noise was due to industrial activity along the waterfront (such as at docks, piers, and wharves), small boat traffic, and wind-driven wave noise. No substantial precipitation was noted during the study period, although this noise would undoubtedly be present during seasonal periods.

Carlson et al. (2005) measured the underwater baseline noise at Hood Canal Bridge and found that underwater noise levels ranged from 115 to 135 dB re 1μPa. WSDOT summarized underwater noise at ferry terminals with no construction activity as ranging from 135 dB rms at Mukilteo ferry terminal, 131 to 136 dB peak at Friday Harbor, and 151 dB peak at the Bainbridge Island terminal (WSDOT 2012). In a study conducted in Haro Strait, San Juan Islands, data showed that the ambient half-hourly SPL in Haro Strait ranged from 95 dB to 130 dB (Veirs and Veirs 2005), which demonstrates the range over which localized human-generated noise can vary by specific locations and time periods. Average underwater broadband noise levels measured at the project site between 100 Hz and 20 kHz, inclusive of existing human activities but in the absence of construction activities, fell within the minimum and maximum range of measurements taken at similar environments within Puget Sound.

Because the average underwater noise levels measured along the NAVBASE Kitsap at Bangor waterfront are elevated over ambient conditions due to waterfront operations (Slater 2009), but are within the minimum and maximum range of measurements taken at similar environments within Puget Sound, the PFC indicator for underwater noise is considered at risk (Table 5–1).

5.3.4.2 Airborne Noise

Because the PFC table (Table 5–1) was adapted for marine fish based on the original NMFS (1996) freshwater Matrix of Pathways and Indicators criteria for determining the effects on in-water projects on salmonids, no airborne noise PFC indicator element was derived for fish. However, since this assessment includes an impact analysis for marine mammals and birds, some characterization of baseline and project-related airborne noise was required to determine potential effects of the proposed action on these species. In general, noise levels decrease with distance from the noise source; thus, the loudest areas at the base will be near the shoreline where most of the activity is taking place, such as at the Service Pier.

Maximum noise levels are produced by common industrial equipment, including trucks, cranes, compressors, generators, pumps, and other equipment that might typically be employed along NAVBASE Kitsap at Bangor's industrial waterfront and at the ordnance handling areas. Airborne noise measurements were taken during a 2-day period in October 2010 within the waterfront industrial area near the project site (Navy 2010). During this period, daytime noise levels ranged from 60 dBA to 104 dBA, with average values of approximately 64 dBA. Evening and nighttime levels ranged from 64 to 96 dBA, with an average level of approximately 64 dBA. Thus, daytime maximum levels were higher than nighttime maximum levels, but average nighttime and daytime levels were similar. These higher noise levels are produced by a combination of sound sources, including heavy trucks, forklifts, cranes, marine vessels, mechanized tools and equipment, and other sound-generating industrial/military activities. Measured levels were comparable to estimated noise levels from literature. Per published literature, presuming multiple sources of noise may be present at one time, maximum combined levels may be as high as 99 dBA. This assumes that two similar sources combined together will increase noise levels by 3 dB over the level of a single piece of equipment by itself (WSDOT 2012). These maximum noise levels are intermittent in nature and not present at all times. Existing maximum baseline noise conditions at the waterfront during a typical work week are expected to be approximately 99 dBA due to typical truck, forklift, crane, and other industrial activities. Average baseline noise levels are expected to be in the 70-90 dBA range, consistent with urbanized or industrial environments where equipment is operating.

6.0 ESA Species and Critical Habitat information

Ten ESA-listed species either occur or have the potential to occur in the Action Area: four salmonid species, three rockfish species, two species of marine mammals, and one marine bird species. The status of the species and presence of critical habitat (if designated) in the Action Area is provided in Table 6–1.

Table 6-1. ESA Species and Critical Habitat Potentially Present within the Action Area

Common Name/ *Scientific Name*	**ESA Status (Source)**	**Critical Habitat in Action Area**
Puget Sound Chinook Salmon ESU/*Oncorhynchus tshawytscha*	T (NMFS 2005a) CH (NMFS 2005b)	Present in Action Area along the shoreline to depth of 30 m, but not along the NAVBASE Kitsap at Bangor waterfront.
Puget Sound Steelhead DPS/ *O. mykiss*	T (NMFS 2007)	In Development
Hood Canal Summer-run Chum Salmon ESU/*O. keta*	T (NMFS 1999b) CH (NMFS 2005b)	Present in Action Area along the shoreline to depth of 30 m, but not along the NAVBASE Kitsap at Bangor waterfront.
Bull Trout DPS/*Salvelinus confluentus*	T (USFWS 1999) CH (USFWS 2010a)	Not present
Puget Sound/Georgia Basin Bocaccio Rockfish DPS/ *Sebastes paucispinis*	E (NMFS 2010a)	In Development
Puget Sound/Georgia Basin Canary Rockfish DPS/ *S. pinniger*	T (NMFS 2010a)	In Development
Puget Sound/Georgia Basin Yelloweye Rockfish DPS/ *S. ruberrimus*	T (NMFS 2010a)	In Development
Humpback Whale/ *Megaptera novaeangliae*	E (NMFS)	NA
Eastern Steller Sea Lion DPS/ *Eumetopias jubatus*	T (NMFS 1990) CH (NMFS 1993)	Not present
Marbled Murrelet/ *Brachyrhamphus marmoratus*	T (USFWS 1992) CH (USFWS 1996)	Not present

Notes:
CH = critical habitat;
DPS = Distinct Population Segment;
E = endangered;
ESU = Evolutionary Significant Unit;
T = threatened.

Additional information regarding species distribution and presence in the Action Area is discussed in the following sections.

6.1 Puget Sound Chinook Salmon

6.1.1 Status

The Puget Sound ESU of Chinook salmon was listed as threatened on March 24, 1999 with the threatened listing reaffirmed in 2005 (NMFS 2005b).

6.1.2 Critical Habitat in Action Area

Critical habitat was initially designated for Puget Sound Chinook on February 16, 2000 and was revised on September 2, 2005 (NMFS 2005c). Critical habitat consists of the water, substrate, and the adjacent riparian zone of accessible estuarine and riverine reaches and extends to a depth of 30 m below MLLW. Critical habitat for Puget Sound Chinook salmon occurs within the Action Area along portions of the shorelines in Hood Canal both north and south of the project site. The closest critical habitat occurs immediately beyond the northern and southern base boundaries (Figure 6-1).

6.1.3 Populations in Action Area

The Puget Sound Technical Recovery Team has identified 22 independent populations of Chinook within the Puget Sound Chinook ESU. The Mid Hood Canal Chinook Population, comprised of the Dosewallips, Duckabush and Hamma Hamma sub-populations, is one of the two genetically distinct Chinook populations that historically and currently exist within the Hood Canal area of the Puget Sound Chinook salmon ESU, the other being the Skokomish Chinook population (Puget Sound Shared Strategy (PSSS) 2007).

Chinook spawn in the lower reaches of all three of the Mid Hood Canal rivers: the Hamma Hamma to river mile (RM) 2.5, the Duckabush to RM 7 and the Dosewallips to RM14 (Puget Sound Shared Strategy 2007). In the Skokomish river basin, presently about 16 miles of stream habitat is being used by natural spawners, which occur mostly in the lower North Fork and in the mainstem downstream of the confluence of the North and South forks (Skokomish Tribe and WDFW 2007).

Emergent Chinook fry, like fry of other Pacific salmonids, depend on shaded, nearshore habitat, with slow-moving currents, where they forage on drift organisms, including insects and zooplankton (Healey 1991). Smolts (juveniles that have transitioned from fresh water to salt water) usually migrate to estuarine areas within the first year, approximately 3 months after emergence from spawning gravel (in general, April through July with population variability).

Juvenile Chinook are most likely associated with eelgrass beds and other shallow vegetated nearshore habitats. Schools of juvenile Chinook outmigrate along the nearshore areas prior to moving further offshore (Nightingale and Simenstad 2001a). Past and recent surveys have found that Chinook salmon migrating from southern Hood Canal streams and hatcheries occur most frequently along the NAVBASE Kitsap at Bangor waterfront from late May to early July (Schreiner et al. 1977; Prinslow et al. 1980; Bax 1983; Salo 1991; SAIC 2006; Bhuthimethee et al. 2009a). Figure 6-2 depicts the number of salmonids, including Chinook captured during surveys conducted at NAVBASE Kitsap at Bangor during 2005-2008 surveys.

Table 6-2 provides a compilation of information regarding the in-migration and spawn timing of adult Puget Sound Chinook past NAVBASE Kitsap at Bangor, and within the greater Hood Canal region. For the NAVBASE Kitsap at Bangor waterfront, peak adult in-migration occurs from August to October.

Figure 6-1. Designated Puget Sound Chinook Salmon ESU Critical Habitat within the Vicinity of the Action Area

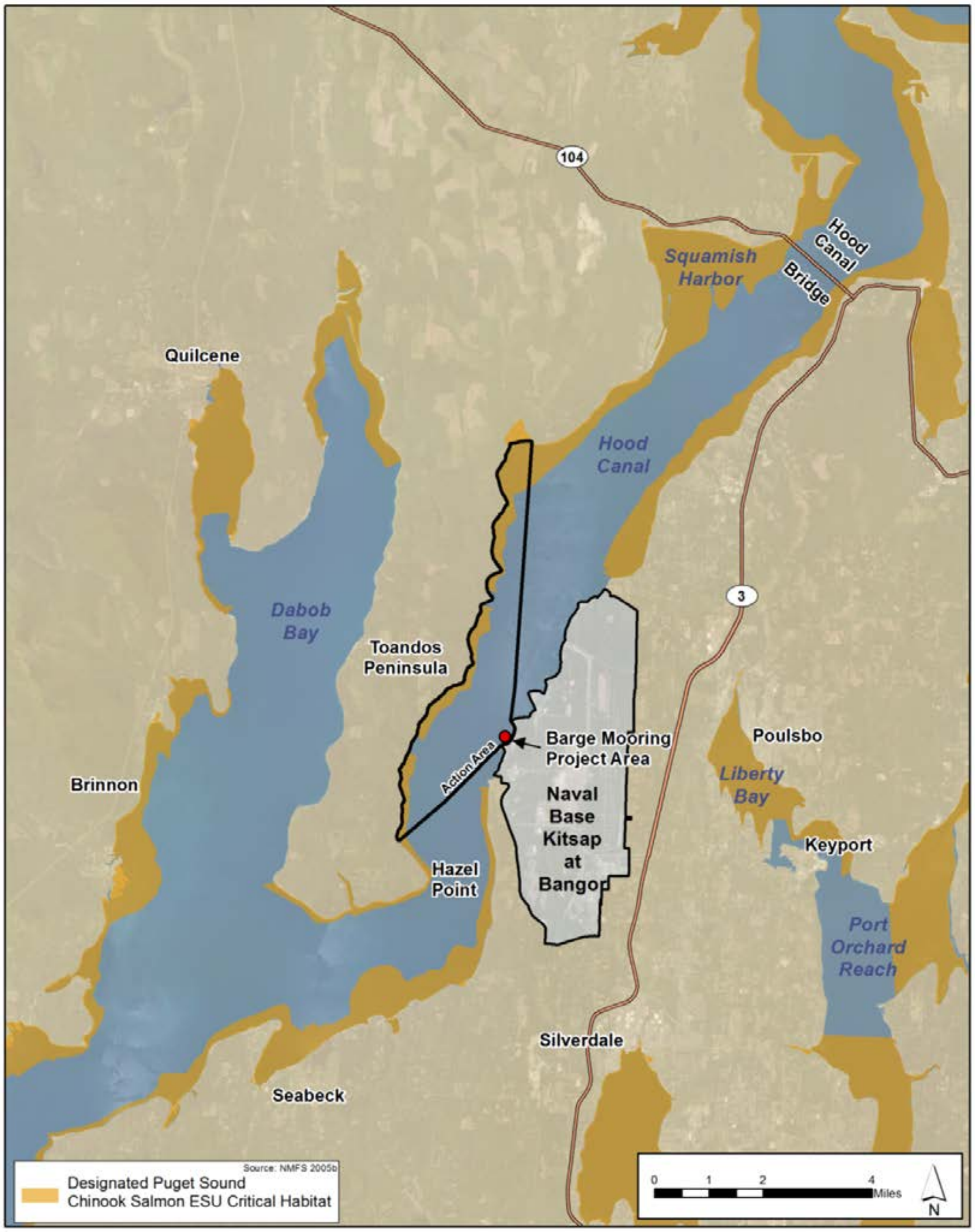


Figure 6-2. Salmonids, in Order of Abundance, Captured during 2005-2008 NAVBASE Kitsap at Bangor Beach Seine Surveys

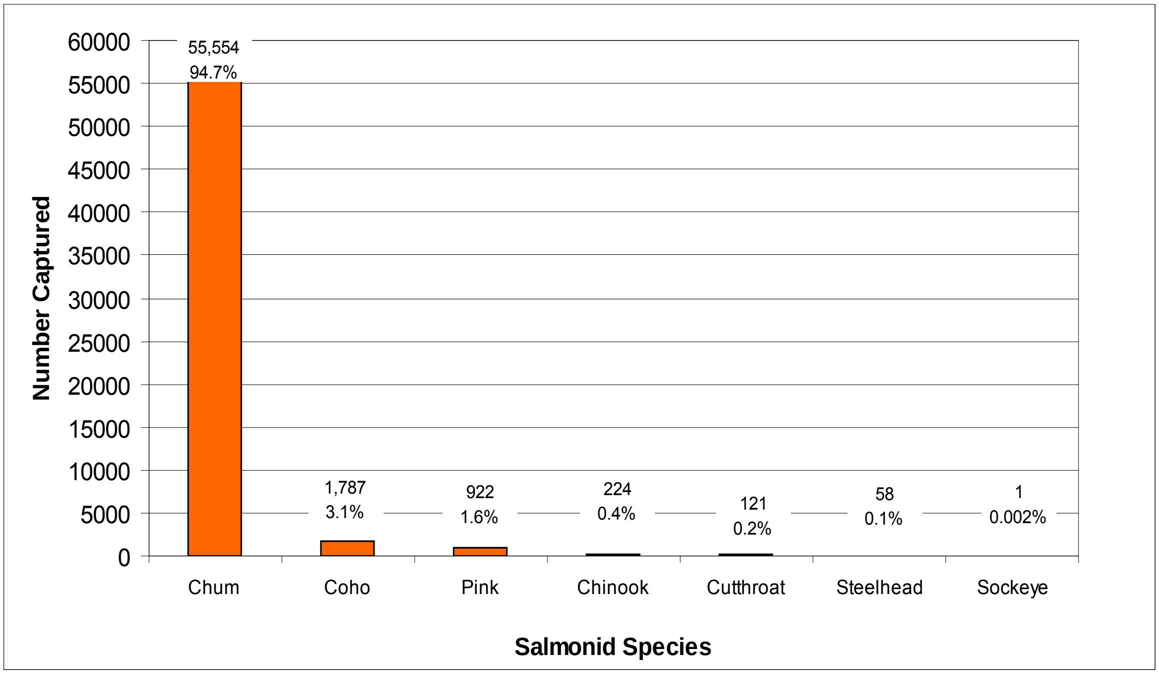


Table 6-2. Spawn Period Timing and Peak of Adult Hood Canal Stocks of Puget Sound Chinook

Stock	Time Period Detected in Hood Canal	Spawn Time Period	Spawn Peak
Skokomish stock	Late-August to Oct	Mid-September to October	Mid-October
Mid-Hood Canal stock	Mid-August to late October	Early Sep to late October	October

Source: Healey 1991.

6.2 Puget Sound Steelhead

Steelhead exhibit the most complex life history of any species of Pacific salmonid. Steelhead can be anadromous (referred to as steelhead) or freshwater residents (referred to as rainbow trout), and, under some circumstances, can yield offspring of the alternate life history form (NMFS 2007). Anadromous forms can spend up to 7 years in fresh water prior to smoltification and then spend up to 3 years in salt water prior to migrating back to their natal streams to spawn (Busby et al. 1996). In addition, steelhead may spawn more than once during their life span, whereas other Pacific salmon species generally spawn once and die.

6.2.1 Status

The Puget Sound DPS of steelhead was listed as threatened on May 11, 2007 (NMFS 2007). The DPS includes all naturally spawned anadromous winter and summer run populations in the Strait of Juan de Fuca, Puget Sound and Hood Canal. In Hood Canal, the Hamma Hamma winter-run steelhead hatchery stock was also included in the ESA listing. Stocks of the Puget Sound steelhead DPS are mainly winter-run, but includes several stocks of summer-run steelhead, usually in subbasins of large river systems and above seasonal hydrologic barriers.

6.2.2 Critical Habitat in Action Area

No critical habitat for Puget Sound steelhead has been designated, but it is currently under development (NMFS 2007). Therefore, no steelhead critical habitat occurs at NAVBASE Kitsap at Bangor or within the Action Area.

6.2.3 Populations in Action Area

WDFW has indentified over 50 historical steelhead stocks in Puget Sound. The Puget Sound Steelhead Technical Recovery Team (PSSTRT) has preliminarily determined the population structure for the Puget Sound Steelhead consists of 32 Demographically Independent Populations (NMFS 2011). The definition of individual populations of steelhead within the DPS is being developed by the PSSTRT.

Eight stocks of winter-run and three stocks of summer-run Puget Sound steelhead occur in Hood Canal. The origin and production type of all stocks of Puget Sound steelhead occurring in Hood Canal remain unresolved by the state and tribes (WDFW 2002). The 1996 status review (Busby et al. 1996) and more recent 2007 NMFS review for Puget Sound steelhead (Hard et al. 2007) included only three stocks of winter-run steelhead that occur in Hood Canal as native populations: (1) Tahuya winter steelhead, (2) Dewatto winter steelhead, and (3) Skokomish winter steelhead.

In general, abundance of winter-run steelhead stocks in Hood Canal is low, with most stocks averaging less than 100 adult spawners per year (Hard et al. 2007). Winter-run populations in the Hamma Hamma River (Hood Canal) appear to be growing rapidly with recent increases in the abundance of natural spawners. The recent abundance in the Hamma Hamma River likely reflects supplementation from the Hamma Hamma hatchery program. No abundance data series exists for most of the 16 summer-run steelhead populations in the Puget Sound DPS, although all appear to be small, averaging fewer than 200 spawners annually (NMFS 2006a).

In 2005, a study tracked 50 tagged hatchery-raised steelhead smolts released in the Hamma Hamma River on May 23, 2005 (Berejikian and Tezak 2006). Of those tagged, 44% of the smolts reached the north end of Hood Canal, for a mean resident time in the canal of 12.4 days, and 12% were recorded migrating through the Straits of Juan de Fuca (Kintama Research Corporation 2005, as cited in Navy 2011). In a study conducted in Hood Canal in 2006 and 2007, acoustically tagged steelhead smolts from four Hood Canal rivers emigrated from their respective natal river mouth to the Hood Canal Bridge over an average of 15 to 17 days (Moore et al 2010).

Adult spawn timing for winter-run steelhead occurs from mid-February to early June (Table 6-3). WDFW suggests that juvenile out-migration of steelhead stocks in Hood Canal occurs from March through June, with peak out-migration during April and May (Johnson 2006 as cited in Navy 2011). Spawn timing of summer-run steelhead in Hood Canal is not fully understood; however, spawning is believed to occur from February through April (WDFW 2002).

Table 6-3. Migration, Spawning Period, and Peak of Winter-run Stocks of Puget Sound Steelhead in Hood Canal

Stock	Time Period Detected in Hood Canal(1)	Spawn Time Period(2)	Peak Spawning
Tahuya winter-run	January through June	Early March to early June	May
Skokomish winter-run	January through mid-July	Mid-February to mid-June	May
Dewatto winter-run	January through June	Mid-February to early June	May
Union winter-run	Not identified	Mid-February to early June	Not identified
Hamma Hamma winter-run	Not identified	Mid-February to early June	Not identified
Duckabush winter-run	Not identified	Mid-February to early June	Not identified
Quilcene/Dabob Bay winter-run	Not identified	Mid-February to early June	Not identified
Dosewallips winter-run	Not identified	Mid-February to early June	Not identified

Notes
1. Busby et al. (1996).
2. WDFW (2002).

6.3 Hood Canal Summer-run chum Salmon

6.3.1 Status

Hood Canal summer-run chum ESU were listed as threatened on March 25, 1999 (NMFS 1999b) and the threatened listing was reaffirmed on June 28, 2005 (NMFS 2005b). The ESU includes all naturally spawned populations of summer-run chum salmon in Hood Canal and its tributaries.

6.3.2 Critical Habitat in Action Area

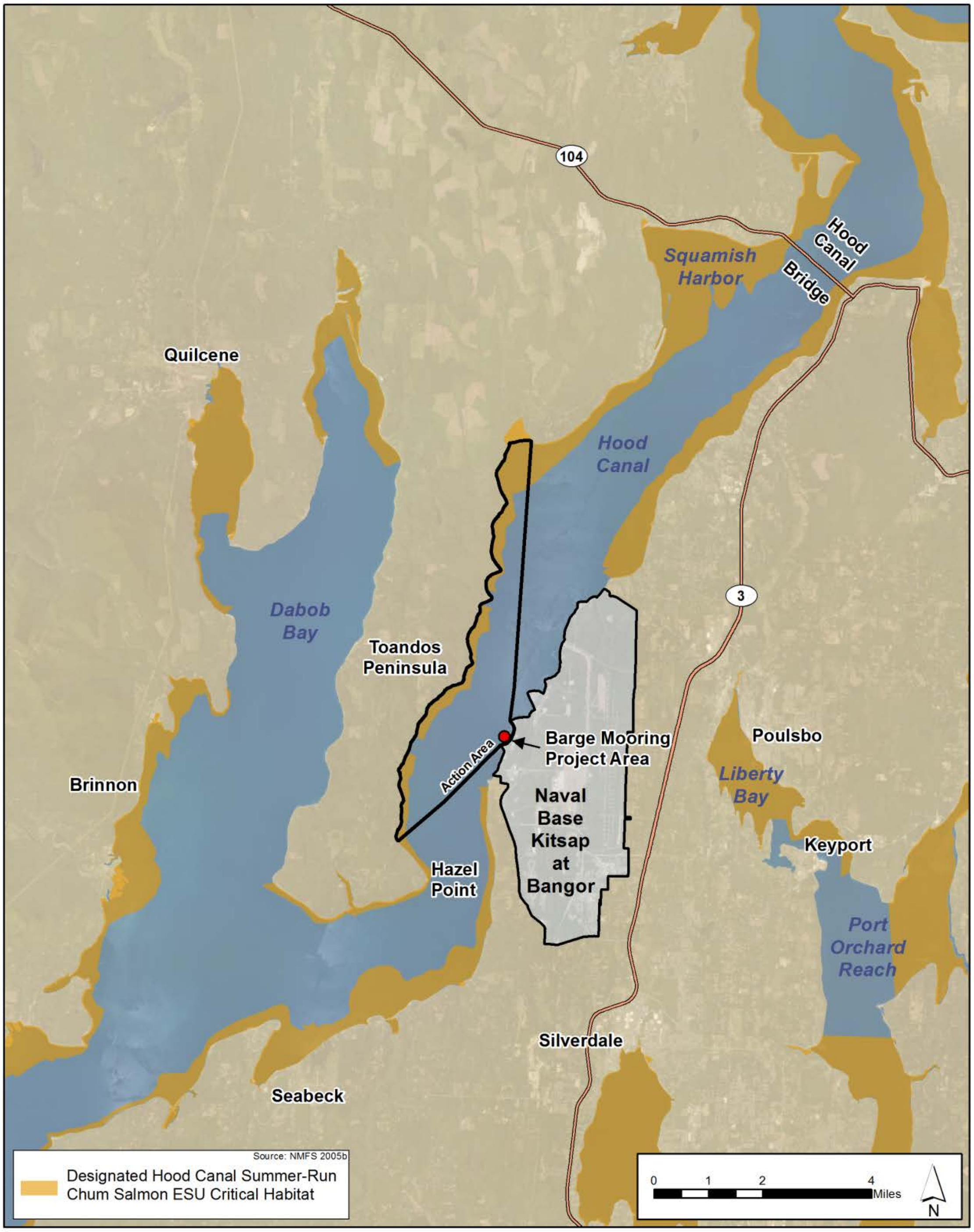
Critical habitat was designated for Hood Canal summer-run chum ESU on September 2, 2005 (NMFS 2005b). Critical habitat extends from extreme high tide to a depth of 30 m relative to MLLW (i.e., habitat typically within the photic zone that is important for rearing, migrating, and maturing salmon and their prey (primary constituent elements [PCEs]). Critical habitat for Hood Canal summer-run chum salmon occurs within the Action Area along portions of the shorelines in Hood Canal both north and south of the project site. The closest critical habitat occurs immediately beyond the northern and southern base boundaries (Figure 6-3).

6.3.3 Populations in Action Area

Sixteen historic populations comprise the Hood Canal summer chum ESU, eight of which currently have existing runs. Stocks in the Hood Canal aggregation include stocks originating in the Union River, Lilliwaup Creek, Hamma Hamma River, Duckabush River, Dosewallips River, and Big/Little Quilcene River (PSSS 2007). Additional stocks are supplemented in Big Beef Creek and the Tahuya River. Long-term trends suggest a decline in most populations of Hood Canal summer run-chum, although some populations have shown short-term productivity increases possibly due to supplementation programs and recent ocean conditions (PSSS 2007).

Hood Canal summer-run chum migrate through the intertidal and nearshore waters of NAVBASE Kitsap at Bangor; however, spawning has not been observed in base streams (Volkhardt et al. 2000; Bhuthimethee et al. 2009b). Most summer-run chum juveniles originate from streams on the western shore of Hood Canal and cross Hood Canal following surface freshwater flows from the tip of Toandos Peninsula to the NAVBASE Kitsap at Bangor waterfront (Salo et al. 1980).

Figure 6-3. Designated Hood Canal Summer-Run Chum Salmon ESU Critical Habitat within the Vicinity of the Action Area



During out-migration, fry stay in the nearshore corridor and move into and out of sub-estuaries with the tides, most likely to search for food resources (Hirschi et al. 2003). At an average migration rate of 7.1 kilometers (km) per day, the majority of chum emigrants from southern Hood Canal exit the canal to the north within 14 days after their initial emergence in seawater (WDFW and Point No Point Treaty Tribes [PNPTT] 2000). Beach seine surveys conducted along the shoreline of the base in 2005 through 2008 captured large numbers of chum salmon juveniles along the NAVBASE Kitsap at Bangor shoreline (Figure 6-2). Although juvenile chum salmon have been captured from January through June, a large proportion of the fish captured are the result of the greater than 10 million hatchery fall-run chum salmon released annually from southern Hood Canal hatcheries (Bhuthimethee et al. 2009a). Juvenile summer-run chum are expected to occur at NAVBASE Kitsap at Bangor from January through early April, with a peak in late March (Prinslow et al. 1980; Salo et al. 1980; Bax 1983; WDFW and PNPTT 2000; SAIC 2006; Bhuthimethee et al. 2009a).

Approximately 1 month separates peak spawn timing of the early (summer) and later (fall) runs of adult chum salmon in Hood Canal (Johnson et al. 1997). Summer-run chum adults return to Hood Canal from early August through the first week in October (Table 6-4) and may mill in front of their stream of origin for up to ten to twelve days before entering freshwater (Washington Department of Fisheries et al. 1993; WDFW and PNPTT 2000).

Table 6-4. Spawning Period, Peak, and 90-% Spawn Timing of Adult Stocks of Hood Canal Summer-Run Chum

Stock	Time Period Detected in Hood Canal	Spawn Time Period and Peak	90% of Spawning Complete
Big/Little Quilcene	Early Sep to Mid-Oct	Mid-Sep to Mid-Oct	Oct 1-5
Lilliwaup Creek	Early Sep to Mid-Oct	Mid-Sep to Mid-Oct	Oct 10
Hamma Hamma	Early Sep to Mid-Oct	Mid-Sep to Mid-Oct	Oct 8-10
Duckabush	Early Sep to Mid-Oct	Mid-Sep to Mid-Oct	Oct 11
Dosewallips	Early Sep to Mid-Oct	Mid-Sep to Mid-Oct	Oct 9
Union	Mid-Aug to Early Oct	Early Sep to Early Oct	Sep 29-30

Sources: WDFW and PNPTT 2000; WDFW 2002, 2010b.

Summer-run chum salmon enter rivers from mid-August through mid-October (Johnson et al. 1997). Spawning typically occurs soon after river entry and migration to spawning grounds that are typically in the lower reaches. Emergence of fry from spawning gravel typically begins in January and these fish immediately migrate to the estuary where they rear for a few days or weeks.

In the estuary and in Puget Sound, chum fry inhabit shallow nearshore areas often within 6 in of the surface (Johnson et al. 1997; WDFW 2010b). Surface orientation likely enables chum salmon to occupy the freshwater lens while acclimating to seawater, whereas movement along the nearshore may reduce predation from marine fishes and enhance bioenergetic efficiency in areas of warmer water.

At lengths of 45–50 millimeters, chum salmon begin to move into slightly deeper water (WDFW and PNPTT 2000). Chum salmon actively migrate along the shoreline at a rate of approximately 7-14 km/day (Tynan 1997 as cited in WDFW and PNPTT 2000). Juvenile summer-run chum salmon may be present in Hood Canal from January through at least mid-April. Most summer-run chum salmon spend two or three winters at sea and return at age 3 or 4.

6.4 Bull Trout

6.4.1 Status

Currently, all populations of bull trout in the lower 48 states are listed as threatened under the ESA. Bull trout are in the char subgroup of salmonids and have both resident and migratory life histories. The Coastal-Puget Sound bull trout DPS contains the only occurrence of anadromous bull trout in the contiguous United States (USFWS 1999); Hood Canal is one of five geographically distinct regions within this DPS. All Hood Canal bull trout originate in the Skokomish River (WDFW 2004).

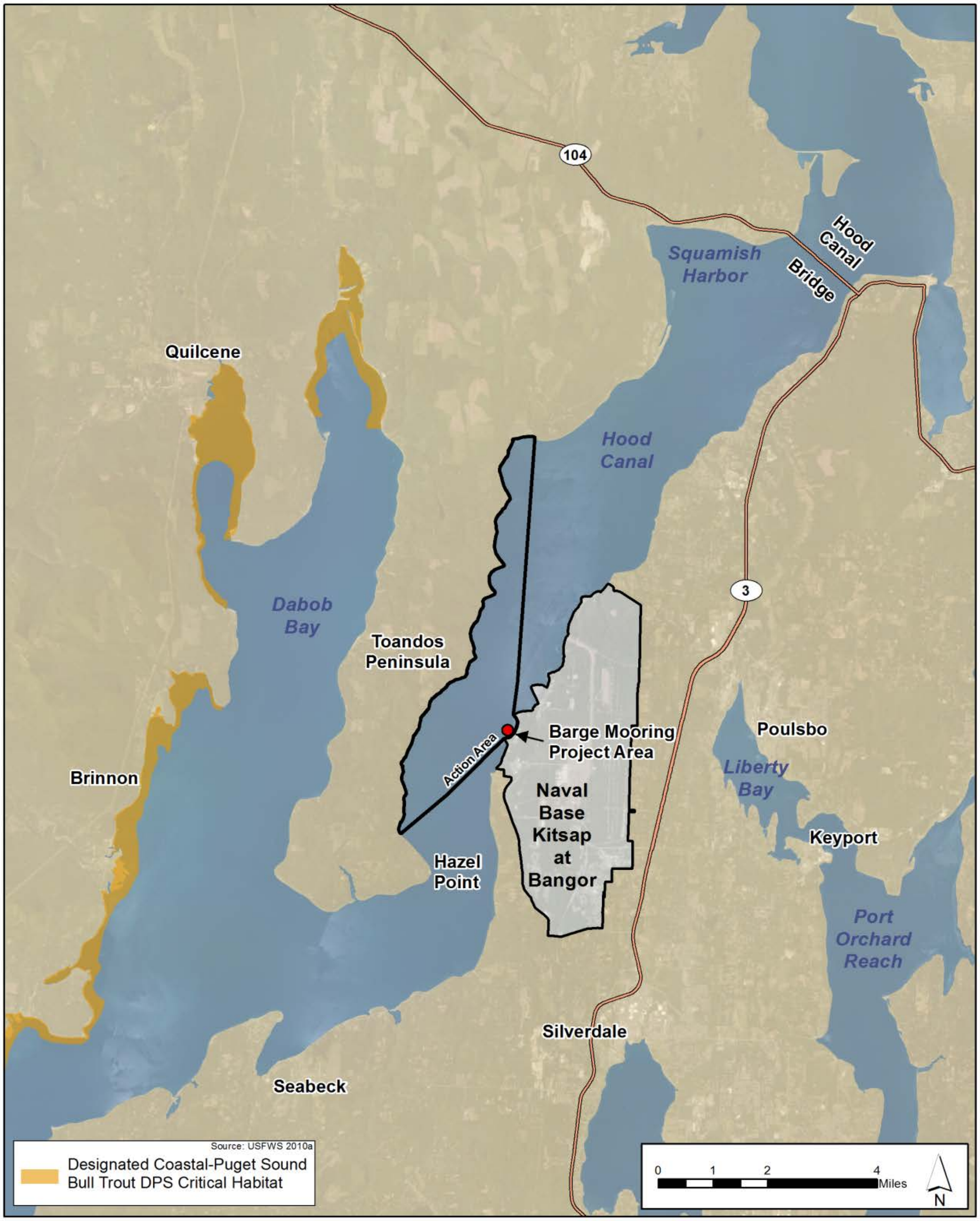
6.4.2 Critical Habitat in Action Area

Critical habitat was originally designated for bull trout in 2005 (70 FR 56212) with a final revision to this habitat published in 2010 (75 FR 63898). However, although both the original and revised final bull trout critical habitats occur in Hood Canal, neither designates waters north of Hazel Point, at the southeastern tip of Toandos Peninsula (Figure 7-4). Therefore, no bull trout critical habitat occurs at NAVBASE Kitsap at Bangor, or within the Action Area.

6.4.3 Occurrence in Action Area

Bull trout are known to occur within many of the drainages within the greater Puget Sound area, including the Skokomish River in Hood Canal, but do not occur in any tributary systems at NAVBASE Kitsap at Bangor (Bhuthimethee et al. 2009b). Bull trout require snow-fed glacial streams, and, since there are none on the Kitsap Peninsula, they would not be expected in any streams at NAVBASE Kitsap at Bangor or in any other streams on the Kitsap Peninsula. Therefore, their occurrence in the Action Area is limited to the marine waters.

Figure 6-4. Designated Coastal-Puget Sound Bull Trout DPS Critical Habitat within the Vicinity of the Action Area



Bull trout prey upon sand lance, surf smelt, and herring, as well as other species. Sand lance are known to spawn along the NAVBASE Kitsap at Bangor shoreline, so it is possible that a foraging bull trout may be present along the nearshore areas of the base to take advantage of this food source. However, bull trout occurrence at NAVBASE Kitsap at Bangor and within the Action Area is anticipated to be occasional and rare, if it occurs at all (Navy 2005; USFWS 2010a). The closest known population of bull trout is in the Skokomish River, approximately 35 miles south of the project area. Based on recent tagging information, bull trout in the South Fork Skokomish River appear to be largely fluvial there is currently no documentation of anadromy based on tagged fish) (USFWS 2011b). Cushman Dam currently blocks all upstream access and most downstream access to the marine environment for bull trout in the North Fork Skokomish River. There are no records of bull trout in the Hood Canal marine environment or freshwater systems on the Kitsap Peninsula and USFWS anticipates their presence at Naval Base Kitsap at Bangor is discountable (USFWS 2011b).

6.5 Puget Sound/Georgia Basin Bocaccio Rockfish

6.5.1 Status

The Puget Sound/Georgia Basin bocaccio DPS has been listed as endangered throughout all of their range (NMFS 2010a). The designation area of Puget Sound/Georgia Basin encompasses the inland marine waters east of the central Strait of Juan de Fuca and south of the northern Strait of Georgia.

6.5.2 Critical Habitat in Action Area

Critical habitat has not been designated.

6.5.3 Populations in Action Area

Bocaccio range from Punta Blanca, Baja California to the Gulf of Alaska. They are believed to have commonly occurred along steep walls in most of Puget Sound prior to fishery exploitations, although they are currently very rare in these Puget Sound habitats (Love et al. 2002). Little is known about the habitat requirements of most rockfishes despite the years of research already performed. Even less is known about bocaccio in Puget Sound (Drake et al. 2009; Palsson et al. 2009). Much of the information presented below on bocaccio life history and habitat use is derived from other areas where bocaccio are more abundant.

Adult bocaccio inhabit waters approximately 40–1,570 ft in depth but are most common at depths of 160–820 ft (i.e., greater than the project depth). Although bocaccio are typically associated with hard substrate, they may occur over mud flats where they can be located as much as 96 ft off the bottom (Palsson et al. 2009).

Bocaccio mature at 4 years of age with 100% maturity occurring at 56 centimeters (cm) (3 years) for males and 61 cm (8 years) for females (Wyllie-Echeverria 1987). Bocaccio can live up to 50 years, growing to 91 cm in size (Palsson et al. 2009). Young bocaccio are preyed upon by least terns, lingcod, other rockfish, Chinook salmon, and harbor seals (Love et al. 2002).

Bocaccio release larvae in January, continuing through April off the coast of Washington. Larval and pelagic juvenile bocaccio drift into nearshore surface waters associated with drifting kelp mats (Love et al. 2002).

The young bocaccio settle in nearshore habitats at 3–4 months of age (approximately 3.8 cm in size), where the species prefer shallow waters over algae-covered rocks, or in sandy areas where eelgrass beds or drift algae are present (Love et al. 1991, 2002). As juveniles, bocaccio rockfish inhabit relatively shallow water, compared to adults, and are often found in large schools (Eschmeyer et al. 1983). Reviews of rockfish habitat utilization in Puget Sound indicate that nearshore vegetated habitats are particularly important for some species of rockfish and serve as nursery areas for juveniles (Palsson et al. 2009; Bargmann et al. 2010). Palsson et al. (2009) indicate that in Puget Sound waters recruitment habitats may include nearshore vegetated habitats, or deep-water habitats consisting of soft and low relief rocky substrates.

As bocaccio grow older, they move into deeper waters with adults found over high relief boulder fields and rocks. They can occur well off the bottom (over 100 ft above the substrata) or as deep as 900 ft (Love et al. 2002).

Larval bocaccio feed upon microplankton, but juveniles are more opportunistic feeders (e.g., fish larvae, copepods, krill) (Phillips 1964; Sumida and Moser 1984; Love et al. 2002). Adult bocaccio are piscivorous, whereas juveniles consume smaller fishes and zooplankton. Larger juveniles and adults feed upon other rockfishes, hake, sablefish, northern anchovies, lanternfish, and squid (Phillips 1964; Eschmeyer et al. 1983; Sumida and Moser 1984).

Historically in Puget Sound, most bocaccio were reportedly found near Point Defiance and Tacoma Narrows. Although bocaccio have always been rare in northern Puget Sound, an approximate estimate of bocaccio abundance in Puget Sound proper (Whidbey Island and south, including the project area) was only 100 individuals during the 1980s (NMFS 2009).

Palsson et al. (2009) reviewed historical data on Puget Sound fish species distributions and relative number of occurrences through the mid-1970s from literature, fish collections, unpublished log records, and other sources. Though in a documentation of historical records of rockfish in Puget Sound, Palsson et al. (2009) note bocaccio were only recorded 110 times; most records were associated with sport catch from the 1970s in Tacoma Narrows and Appletree Cove (near Kingston). Only two records occurred for Hood Canal, both in the 1960s. Currently both sport and commercial fishing for rockfish in Hood Canal is prohibited. In addition, bocaccio have never been observed during WDFW bottom trawl, video, or dive surveys in Puget Sound (Moulton and Miller 1987; Palsson et al. 2009). Although there have been no confirmed observations of bocaccio in Puget Sound for approximately 7 years (NMFS 2009), Drake et al. (2009) concluded that it is likely that bocaccio occur in low abundances and therefore have the potential to occur in the Action Area.

6.6 Puget Sound/Georgia Basin Canary Rockfish

6.6.1 Status

The Puget Sound/Georgia Basin canary rockfish DPS has been listed as threatened under the ESA (NMFS 2010a) throughout all of their range. This designation encompasses the inland marine waters east of the central Strait of Juan de Fuca and south of the northern Strait of Georgia.

6.6.2 Critical Habitat in Action Area

Critical habitat has not been designated.

6.6.3 Populations in Action Area

Canary rockfish range from Punta Blanca, Baja California, to the Shelikof Strait of Alaska, and are abundant from British Columbia to central California. Canary rockfish were once considered fairly common in the greater Puget Sound area (Kincaid 1919; Holmberg et al. 1967); however, little is known about their habitat requirements in these waters (Drake et al. 2009; Palsson et al. 2009). Much of the information presented below on canary rockfish life history and habitat use is derived from research in other areas where canary rockfish are more abundant.

Adult canary rockfish can live to be 84 years old (Cailliet et al. 2000) and have been measured at 76 cm in size (Palsson et al 2009). Canary rockfish have been recorded to reach maturity at 7-9 years old (41-46 cm) in females and 7-12 years (41 cm) in males (Love et al. 2002; Palsson et al. 2009).

Adults release larvae (0.25-0.50 cm) between September and March with peaks in December and January off the Oregon and Washington coasts (Wyllie-Echeverria 1987; Barss 1989). Larvae and pelagic juveniles (1.3-2.0 cm) are found in the upper 330 ft of the water column from January until about March when they start to move into intertidal areas (tide pools, rocky reefs, kelp beds, cobble areas), although some juveniles remain pelagic in much deeper water until July (Love et al. 2002). Juveniles may occupy rock-sand interfaces near 50–65 ft during the day and then move to sandy areas at night.

As discussed above for bocaccio, recent reviews of rockfish habitat utilization in Puget Sound indicate that nearshore vegetated habitats are particularly important for some species of rockfish and serve as nursery areas for juveniles (Palsson et al. 2009; Bargmann et al. 2010). However, these reviews discuss habitat use by listed rockfish in general terms with little or no distinction between the species. Palsson et al. (2009) indicate that in Puget Sound waters recruitment habitats may include nearshore vegetated habitats, or deep-water habitats consisting of soft and low relief rocky substrates.

Diets of juvenile canary rockfish consist of open-water and benthic prey, including copepods, amphipods, and krill eggs and larvae. Juvenile canary rockfish emerge to become long and thin-bodied with large heads, growing into adult fish that are primarily orange on a white background (Phillips 1964; Love et al. 2002).

Adults and sub-adults feed on krill, gelatinous zooplankton, small lanternfishes, anchovies, sanddabs, and adult shortbelly rockfish (Phillips 1964). Some juvenile canary rockfish predators include marine birds and mammals, lingcod, other rockfish, Chinook salmon, and other fishes (Love et al. 2002).

Adult canary rockfish typically inhabit waters from 160–820 ft but some may occur at 1,400 ft (i.e., greater than the project depth). Larger fish tend to occur in deeper water. Although canary rockfish are sedentary, some have been reported to migrate 700 km over several years.

Canary rockfish were once considered fairly common in the greater Puget Sound area (Kincaid 1919; Holmberg et al. 1967); however, little is known about their habitat requirements in these waters (Drake et al. 2009; Palsson et al. 2009). Palsson et al. (2009) reviewed historical data on Puget Sound fish species distributions and relative number of occurrences through the mid-1970s from literature, fish collections, unpublished log records, and other sources. In this historical records review, Palsson et al. (2009) noted 114 records of canary rockfish prior to the mid-1970s, with most records attributed to sport catch from the 1960s to 1970s in Tacoma Narrows, Hood Canal, San Juan Islands, Bellingham, and Appletree Cove. Within Hood Canal, 14 records occurred: 1 in the 1930s and at least 13 in the 1960s (Miller and Borton 1980). As mentioned for bocaccio, there is a moratorium on both sport and commercial fishing for rockfish in Hood Canal. With the absence of associated catch records, and limited scientific surveys of these waters, the prevalence of rockfish in waters adjacent to NAVBASE Kitsap at Bangor remains unknown. Drake et al. (2009) concluded that canary rockfish occur in low and decreasing abundances in Puget Sound. Therefore, canary rockfish have the potential to occur within the Action Area.

6.7 Puget Sound/Georgia Basin Yelloweye Rockfish

6.7.1 Status

The Puget Sound/Georgia Basin yelloweye rockfish DPS has been listed as threatened under the ESA (NMFS 2010a) throughout all of their range. The designation area of Puget Sound/Georgia Basin encompasses the inland marine waters east of the central Strait of Juan de Fuca and south of the northern Strait of Georgia.

6.7.2 Critical Habitat in Action Area

Critical habitat has not been designated.

6.7.3 Populations in Action Area

Yelloweye rockfish are found from Ensenada, Baja California, to the Aleutian Islands in Alaska. They are abundant from southeast Alaska to central California. Yelloweye rockfish are more common in northern Puget Sound compared with southern Puget Sound presumably because more rocky habitat is available in northern Puget Sound. An approximate estimate of yelloweye rockfish abundance in Puget Sound Proper was only 1,200 individuals during the 1980s (Drake et al. 2009). Hood Canal has the greatest frequency of yelloweye rockfish observed in both trawl and scuba surveys conducted by WDFW (Palsson et al. 2009).

Yelloweye rockfish is a deep-water species that is relatively sedentary living in association with high relief rocky habitats and often near steep slopes (Love et al. 2002; Wang 2005; Palsson et al. 2009). Yelloweye rockfish move into deeper water as they grow into adults, continuing to associate with caves and crevices and spending large amounts of time lying on the substratum, sometimes at the base of rocky pinnacles and boulder fields (Love et al. 2002).

Yelloweye become mature at 19–22 years of age, growing up to 91 cm in size. The mean maximum age is 118 years of age. Yelloweye release larvae from April to September with a hiatus in June and July (Palsson et al. 2009). Larvae and juveniles remain pelagic for up to 2 months, settling to shallow, high relief zones, crevices, and sponge gardens (Love et al. 2002).

As discussed above for bocaccio, recent reviews of rockfish habitat utilization in Puget Sound indicate that nearshore vegetated habitats are particularly important for some species of rockfish and serve as nursery areas for juveniles (Palsson et al. 2009; Bargmann et al. 2010). However, these reviews discuss habitat use by listed rockfish in general terms with little or no distinction between the species. Palsson et al. (2009) indicates that in Puget Sound waters recruitment habitats may include nearshore vegetated habitats, or deep-water habitats consisting of soft and low relief rocky substrates.

Yelloweye larvae and juveniles are opportunistic feeders, preying upon fish larvae, copepods, amphipods, krill eggs, and larvae. Adult diets consist of rockfishes, herring, sand lance, flatfishes, shrimps, crabs, and lingcod eggs (Love et al. 2002). In South Sound, yelloweye rockfish are known to feed on fish, especially walleye pollock (*Theragra chalcogramma*), cottids, poachers, and Pacific cod (*Gadus macrocephalus*) (Washington et al. 1978).

Adult yelloweye rockfish inhabit waters from 80–1,560 ft, but they are most common at depths of 300–590 ft (i.e., greater than the project depth). They are typically solitary but sometimes form aggregations near rocky substrate. Juveniles occur in shallower waters compared with larger adults. Approximately 50% of the fish reach maturity at age 6 (approximately 41 cm). Their home range is typically relatively small, but adult rockfish have the potential to move long distances.

Palsson et al. (2009) reviewed historical data on Puget Sound fish species distributions and relative number of occurrences through the mid-1970s from literature, fish collections, unpublished log records, and other sources. In this historical records review, Palsson et al. (2009) noted 113 documented yelloweye rockfish records from Puget Sound associated with sport catch. Of these records, 14 occurred in Hood Canal waters: 1 in the 1930s and 13 in the 1960s (Miller and Borton 1980). Kincaid (1919) reported yelloweye rockfish used to be relatively common in the deep waters of Puget Sound. Due to the moratorium on both sport and commercial fishing for rockfish in Hood Canal, the absence of associated recent catch records, and no recent scientific surveys of these waters, the prevalence of yelloweye rockfish in these waters remains unknown. Although little is known about their habitat requirements or use in Puget Sound waters (Drake et al. 2009; Palsson et al. 2009), yelloweye rockfish have the potential to occur in the Action Area, and are therefore included in the analysis.

6.8 Humpback Whale

6.8.1 Status

Humpback whales were listed as endangered under the Endangered Species Preservation Act of 1966 (35 FR 1222) due to commercial whaling. This protection was transferred to the ESA in 1973. The recovery plan for humpback whales was finalized in November 1991 (NMFS 1991). The CA, OR, WA stock is defined to include humpback whales that feed off the west coast of the continental U.S. and individuals potentially occurring within the Action Area would belong to this stock.

6.8.2 Critical Habitat in Action Area

Critical habitat has not been designated for this species.

6.8.3 Populations in Action Area

Humpback whales were one of the most common large cetaceans in the inland waters of Washington in the early 1900s (Scheffer and Slipp 1948). Humpback whale sightings were infrequent in Puget Sound and the Georgia Basin through the late 1990s, and prior to 2003 the presence of only three individual humpback whales was confirmed (Falcone et al. 2005). However, in 2003 and 2004, 13 individuals were sighted in the inland waters of Washington, mainly during the fall (Falcone et al. 2005). Records available for April 2001 to February 2012 include observations in the Strait of Juan de Fuca, the Gulf Islands and the vicinity of Victoria, British Columbia, Admiralty Inlet, the San Juan Islands, Hood Canal, and Puget Sound (Orca Network 2012). For the areas listed above, Orca Network records shows humpback whale presence in one of the areas listed above in all months from May through November in 2009; in all months but January, March, April , May, and August in 2010; and from March through November in 2011.

In Hood Canal, humpback whale sightings occurred several times in January and February 2012 (Orca Network 2012). Review of the sightings information indicated they were of one individual (Calambokidis pers. comm. 2012). Prior to these sightings, there were no confirmed reports of humpback whales entering Hood Canal (Calambokidis pers. comm. 2012). No other reports of humpback whales in the Hood Canal were found in the Orca Network database, the scientific literature, or agency reports. Construction of the Hood Canal Bridge occurred in 1961 and could have contributed to the lack of historical sightings (Calambokidis pers. comm. 2010). Only a few records of humpback whales near Hood Canal (but north of the Hood Canal Bridge) are in the Orca Network database. Two were from the northern tip of Kitsap Peninsula (Foulwater Bluff/Point No Point) and a few others from Port Madison Bay in Puget Sound. Therefore, it is unlikely that humpback whales would occur in the Action Area during relatively short duration of the project activities.

6.9 Eastern Steller Sea Lion

6.9.1 Status

The Steller sea lion was federally listed as threatened on November 26, 1990 (NMFS 1990). In 1997, NMFS reclassified the Steller sea lion into two DPSs based on demographics and genetics (NMFS 1997). The population was divided into two recognized management stocks (eastern and western), separated at 144º W longitude (Loughlin 1997). The western stock was listed as endangered on May 4, 1997, and the eastern stock retained the threatened classification. The eastern DPS includes the species distribution in southeast Alaska, Canada, Washington (including inland waters), Oregon, and California (NMFS 1997). Only the eastern stock is considered in this BA because the western stock occurs outside of the geographic area under consideration.

6.9.2 Critical Habitat in Action Area

On August 27, 1993, NMFS published a final rule designating critical habitat for the Steller sea lion (NMFS 1993). Steller sea lion critical habitat includes haul-out sites and rookeries within Alaska, California, and Oregon, and special aquatic foraging areas in Alaska. There is no Steller sea lion critical habitat in Washington State.

6.9.3 Populations in Action Area

The eastern DPS has continuously increased at an annual rate of 3% since the 1970s, with the current population ranging from 45,095 to 55,832 (Allen and Angliss 2010). The highest breeding season Steller sea lion count at Washington haul-out sites was 847 individuals during the period from 1978 to 2001 (Pitcher et al. 2007). Non-breeding season surveys of Washington haul-out sites reported as many as 1,458 individuals between 1980 and 2001 (NMFS 2008).

Eastern DPS Steller sea lions are born primarily at 13 major rookeries in southeastern Alaska, northern British Columbia, and southern Oregon (Pitcher et al. 2007). No rookeries exist in Washington State. Both sexes are found in Washington waters; these animals are most likely immature or non-breeding adults from rookeries located on the Oregon and British Columbia coasts (Jeffries et al. 2000; NMFS 2008). Steller sea lions haul out to rest at a much larger number of coastal sites throughout their range year-round. In Washington, Steller sea lions primarily occur at haul-out sites along the outer coast from the Columbia River to Cape Flattery, as well as in British Columbia along the Vancouver Island coastline in the Strait of Juan de Fuca (Jeffries et al. 2000; Committee on the Status of Endangered Wildlife in Canada 2003; Olesiuk 2008).

Steller sea lions are generally seasonally present in Puget Sound and haulout at NAVBASE Kitsap at Bangor. The next nearest haulout is at and a rock near Marrowstone Island (NMFS 2010b). Steller sea lions are present in Puget Sound from late fall through May and are increasing in number (Steiger and Calambokidis 1986; Jeffries et al. 2000; Jeffries 2010 as cited in Navy 2011). Haul-out sites include manmade structures such as jetties and navigation buoys, offshore rocks, and coastal islands.

Historically, NMFS (1997) stated that fewer than ten Steller sea lions occurred in Hood Canal, but did not identify any haul-out areas. No reference was given for these sightings in Hood Canal and no other citations were found in the literature that refer to the presence of Steller sea lions in Hood Canal. Boat-based opportunistic sightings along portions of the NAVBASE Kitsap at Bangor waterfront during the course of fish surveys during spring/summer of 2007 did not detect any Steller sea lions (Agness and Tannenbaum 2009a), nor did boat-based protocol marine wildlife surveys conducted during summer/fall 2008 and winter/spring 2009/2010 (Tannenbaum et al. 2009a; SAIC staff, unpublished data/field observations).

However, Navy personnel have observed Steller sea lions hauled out on submarines at Delta Pier, approximately 0.85 miles north of the project area, on several occasions from 2008 through 2011 from the end of September through May (Bhuthimethee 2008, personal communication; HDR 2012). In November 2008, four Steller sea lions were observed hauled out on a submarine at Delta Pier. An independent observation reported four Steller sea lions at the same location on a different day in November 2008 (Bhuthimethee 2008 as cited in Navy 2011a).

During monitoring during the Test Pile Program, Steller sea lions were documented arriving on October 8, 2011 and were seen during surveys every day of the remaining 12 days of the project. Up to four individuals were sighted either hauled out at the submarines docked at Delta Pier or swimming in the waters just adjacent to the base.

The time period of the sightings at Bangor coincides with the time when Steller sea lions are frequently observed in Puget Sound. By May, most Steller sea lions have left inland waters and returned to their rookeries to mate. Occasionally, sub-adult individuals (immature or pre-breeding animals) will remain in Puget Sound over the summer. However, at NAVBASE Kitsap at Bangor, Steller sea lions have only been observed from September 30 through May 22 by installation personnel and not during the summer months. Thus, Steller sea lions are not likely to be present within the Action Area during the time period of proposed construction activities for the Barge Mooring Project (i.e., July-September).

6.9.4 Behavior and Ecology

Steller sea lions are gregarious animals that often travel or haul out in large groups of up to 45 individuals (Keple 2002). At sea, groups usually consist of female and subadult males; adult males are usually solitary while at sea (Loughlin 2002). In the Pacific Northwest, breeding rookeries are located in British Columbia, Oregon, and northern California. Steller sea lions form large rookeries during late spring when adult males arrive and establish territories (Pitcher and Calkins 1981). Large males aggressively defend territories while non-breeding males remain at peripheral sites or haul-outs. Females arrive soon after and give birth. Most births occur from mid-May through mid-July, and breeding takes place shortly thereafter. Most pups are weaned within a year. Non-breeding individuals may not return to rookeries during the breeding season but remain at other coastal haul-outs (Scordino 2006).

Steller sea lions are opportunistic predators, feeding primarily on fish and cephalopods, and their diet varies geographically and seasonally (Bigg 1985; Merrick and Loughlin 1997; Bredesen et al. 2006; Guenette et al. 2006). Foraging habitat is primarily shallow, nearshore and continental shelf waters; some Steller sea lions feed in freshwater rivers (Reeves et al. 1992; Scordino 2010). They also are known to feed in deep waters past the continental shelf break (Jefferson 2005, as cited in Navy 2011a). Their prey in inland Washington waters is not well documented but their expected prey, based on studies in British Columbia and Alaska, includes schooling fish such as herring, hake, sand lance, salmon, flounder, rockfish, squid, and octopus (Bigg 1985; Merrick and Loughlin 1997). Foraging habitats in Hood Canal likely include nearshore and deeper waters.

6.10 Marbled Murrelet

6.10.1 Status

The Washington, Oregon, and California DPS of the marbled murrelet was federally listed as threatened on October 1, 1992 (USFWS 1992).

6.10.2 Critical Habitat in Action Area

Critical habitat for nesting marbled murrelets was designated in 1996 (USFWS 1996) and was proposed for revision in 2008 (USFWS 2008). Only critical habitat in Oregon and California was revised in the final rule (USFWS 2011a). Designated critical habit in Washington remains unchanged from the 1996 ruling and hence, the Action Area is not within designated critical habitat (USFWS 1996, 2011a). The closest designated critical habitat to Hood Canal and the Action Area includes forest lands west and south of Dabob Bay.

6.10.3 Populations in Action Area

Marbled murrelets are seabirds that spend most of their life in the marine environment and nest in mature and old-growth forests (USFWS 1997). Murrelets can occur year-round in Puget Sound and Hood Canal, although their flock size, density, and distribution vary by season (Nysewander et al. 2005; Falxa et al. 2008). Murrelet presence in Hood Canal has been documented through a number of sources and survey efforts. The most comprehensive information comes from the consistent sampling used to estimate population size and trends under the Northwest Forest Plan Murrelet Effectiveness Monitoring Program (Raphael et al. 2007). Other survey data were generated through the Puget Sound Ambient Monitoring Program, conducted by WDFW (Nysewander et al. 2005).

Additional surveys specific to marbled murrelet presence at NAVBASE Kitsap at Bangor have been conducted. Marbled murrelets were observed in nearshore and deeper water surveys conducted during 2007 to 2010 (Agness and Tannenbaum 2009b; Tannenbaum et al. 2009b). The Kitsap Audubon Society reported marbled murrelets in three annual Christmas Bird Count surveys from the shoreline south of the NAVBASE Kitsap at Bangor waterfront between 2001 and 2007 (Kitsap Audubon Society 2008).

Marine bird observations in nearshore waters were recorded from March to September 2007 for a total of 22 days of observations (Agness and Tannenbaum 2009b). These observations were conducted opportunistically along the waterfront by boat in conjunction with fish and sediment surveys, and by foot in conjunction with wildlife habitat surveys. Survey locations and sampling frequency were determined by the sampling design for the fish and sediment surveys, and not all survey locations were scanned in each sampling day.

During these observations, eight sightings of marbled murrelet pairs were recorded during April and May 2007. No single birds were observed. In all instances, marbled murrelets sighted were in breeding plumage. The breeding season (nesting to fledging) extends from April 1 to September 23, but is asynchronous (i.e., pairs do not start nesting at the same time).

Marbled murrelets were observed actively diving and foraging off of Carlson Spit on four occasions. Murrelets were observed eating a fish at the water surface and holding a fish cross-wise in the bill, a behavior called fish-holding that is indicative of the chick-rearing stage of breeding. Adult fish-holders stage on the water and generally wait until night-fall before returning to the nest to deliver the fish to the chick (Strachan et al. 1995). During the 2007 surveys, marbled murrelets were not sighted near pier structures but were detected in all nearshore scan areas with the exception of a survey area immediately south of Marginal Wharf (Agness and Tannenbaum 2009b).

In January 2009, the Navy conducted marbled murrelet monitoring during the installation of five steel piles for the Carderock Division Research Facility Wave Deflection System at the south side of Carlson Spit, immediately south of the Barge Mooring Project area. During each of the five pile driving days, one to eight marbled murrelets were frequently observed within the 1,000-m zone known as the “area of potential behavioral effect,” with intermittent sightings of 12 to 31 murrelets recorded. No marbled murrelet sightings occurred within the 300-m zone known as the “area of potential injury.”

During recent fall 2011 repairs to the Explosives Handling Wharf (EHW-1), no marbled murrelets were observed near EHW-1 during any pile driving activity (only vibratory pile driving occurred). Marbled murrelets were never observed within the restricted area at any time despite nearly daily observations over a 4-week period during October 2011 (Navy 2012a). Monitoring for marbled murrelets also occurred during the nearby Test Pile program in the summer and fall of 2011. No marbled murrelets were observed in the restricted area during any pile driving activity (impact and vibratory) at any time over the 8-week observation period during the Test Pile Program (Navy 2012b).

Marbled murrelets were observered on several occasions during Hood Canal and Dabob Bay baseline surveys conducted during non-piling driving days during the Test Pile Program. There were 50 sightings over an eight week period, with the majority of the sightings (90 percent) occurring in late October (Navy 2012b). Most of the marbled murrelets sightings occurred at the southern tip of the Toandos Peninsula between Hazal Point and Dabob Bay with 78% of all observations at this location (Navy 2012b). On one occasion a single pair of marbled murrelets was observed within 315 m of the Carderock Pier, located approximately 0.2 kilometers south of the Service Pier (Navy 2012b).

6.10.4 Behavior and Ecology

Murrelets use the marine environment in Hood Canal for courtship, loafing, and foraging (USFWS 2010b). In this area, their nesting season is asynchronous between April 1 and September 23. During the breeding season, murrelets tend to forage in well-defined areas along the shoreline in relatively shallow marine waters. Throughout their range, marbled murrelets are opportunistic feeders and utilize prey of diverse sizes and species. They feed primarily on fish and invertebrates in coastal and nearshore marine waters. Generally, large pelagic crustaceans and small schooling fish forage fish) are the main prey items for marbled murrelets. 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). Winter flock size is typically four birds (USFWS 2010b).

The species' decline has largely been caused by extensive removal of late-successional and old-growth coastal forests, which serve as nesting habitat for murrelets. Marbled murrelets nest solitarily in trees with features typical of coniferous old-growth (stand age from 200 to 250 years old, trees with multi-layered canopy). Although old-growth forest is the preferred habitat for nesting, marbled murrelets are known to nest in mature second growth forest with trees as young as 180 years old (Hamer and Nelson 1995). WDFW Priority Habitat Species maps do not indicate the presence of marbled murrelet nesting areas in the upland areas including areas adjacent to NAVBASE Kitsap at Bangor (WDFW 2010a).

Although forest stand inventories at NAVBASE Kitsap at Bangor indicate that stands are typically less than 110 years old, mature trees having old-growth characteristics can be found in a variety of locations at the base. A small stand of potential "old-growth" habitat is located at the northern portion of the base (International Forestry 2001 as cited in Navy 2011a). The Navy will conduct additional delineations and surveys to determine old-growth characteristics and to determine if this stand could provide "suitable" habitat for marbled murrelets.

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7.0 ESA Effects Analysis

7.1 Effects on NMFS Matrix Indicators

Existing environmental conditions within the northern Hood Canal Action Area were evaluated according to the criteria established in the definition of properly functioning conditions for pathways and indicators outlined in Table 5-1. A rating of "properly functioning", "at risk", or "not properly functioning" is assigned to each pathway and indicator (Table 7-1). The principal pathways likely to be affected by this project are water quality, physical habitat, biological habitat, and underwater noise.

Of the 17 salmonid PFC indicators evaluated, five could potentially be degraded due to proposed construction activities while the remaining 11 indicators would be maintained (Table 7-1). Indicators that could be degraded as a result of the project are:

- Turbidity
- Benthic Prey Availability
- Forage Fish Community
- Aquatic Vegetation
- Underwater Noise

It was determined that there could be a temporary increase in turbidity during pile driving, benthic prey availability could be reduced due to the placement of pile, the availability of forage fish near pile driving locations could be temporarily reduced during in-water work, kelp and macroalgae could be reduced at the project site due to the effects shading, and underwater ambient conditions could be degraded by adding disturbance and injury sound pressure levels to the water column.

Table 7-1. Potential Effects of the Proposed Action on Habitat Conditions for Fish

Pathways and Indicators	Environmental Baseline			Effect of Construction			Effect of Operations		
	Properly Functioning	At Risk	Not Properly Functioning	Restore	Maintain	Degrade	Restore	Maintain	Degrade
Water and Sediment Quality									
Turbidity	X					X		X	
Dissolved Oxygen		X			X			X	
Other Water Quality Parameters	X				X			X	
Sediment Quality	X				X			X	
Physical Habitat									
Substrate/Armoring		X			X			X	
Depth/Slope		X			X			X	
Tideland Condition		X			X			X	
Marsh Prevalence and Complexity			X		X			X	
Refugia		X			X			X	
Physical Barriers		X			X			X	
Current Patterns	X				X			X	
Salt/Fresh Water Mixing Patterns & Locations	X				X			X	
Biological Habitat									
Benthic Prey Availability		X				X		X	
Forage Fish Community		X				X		X	
Aquatic Vegetation		X				X		X	
Exotic Species		X			X			X	
Underwater Noise		**X**				**X**		**X**	

7.2 Direct Effects

Direct effects are defined as the direct or immediate effects of the project on the species or its habitat. Direct effects include those resulting from interdependent or interrelated actions (NMFS 2004).

Interdependent actions are those that have no independent utility apart from the action under consideration (50 CFR §402-02). Interdependent actions are typically "because of" the proposed action.

Interrelated actions are those that are part of a larger action and depend on the larger action for their justification (50 CFR §402-02). Interrelated actions are typically "associated with" the proposed action.

The following section addresses the direct effects of the project on ESA listed species. The project activities as outlined in Section 3.0 Project Description, have the potential to adversely affect fish, marine mammals, and marbled murrelets, primarily through elevated underwater sound pressure levels. Mitigation measures proposed in Section 3.0 greatly reduce the chance for injury for all species in the Action Area. Other potential direct effects resulting from construction activities include, increased in-air noise, increased turbidity and reduced prey availability. However, these effects are expected to be temporary and insignificant..

7.2.1 Noise Effects

7.2.1.1 Sound Exposure Criteria/Thresholds

Since 1997, NMFS has used generic sound exposure thresholds to determine when an activity in the ocean that produces sound might result in impacts to a marine mammal such that a take by harassment might occur (70 FR 1871). The criteria for establishing underwater SELs for marine mammals have been reviewed by NMFS in an EIS (NMFS 2005a; 70 FR 1871-1875). NMFS is developing new science-based thresholds to improve and replace the current generic exposure level thresholds, but the criteria have not been finalized (Southall et al. 2007). Until formal guidance is available, NMFS uses conservative thresholds of sound pressure levels from broadband sounds that cause behavioral disturbance (160 dB re 1µPa rms for impulse sound and 120 dB re 1µPa rms for continuous sound) and injury (180 dB re 1µPa rms for whales and 190 dB re 1µPa rms for pinnipeds) (70 FR 1871). NMFS also uses two airborne thresholds as guidelines for pinnipeds who may be exposed to airborne sounds.

For fish, NMFS has been using sound level thresholds since 2005. In 2008, the fish criteria were reviewed and revised following a multi-agency (including NMFS, USFWS) agreement in the summer and fall of 2008 (FHWG 2008) and are now referred to as the "Interim Criteria." However, the underwater noise threshold criteria for behavioral effects remain at a level of 150 dB re 1µPa rms.

A multi-disciplinary science panel for establishing an interim marbled murrelet underwater noise injury threshold was held in July, 2011. The panel was convened by the Navy and USFWS to develop recommended interim criteria for evaluating onset of injury to the marbled murrelet from underwater sounds resulting from pile driving. The panelists concluded that a threshold shift of 40 dB or more indicated a high likelihood of injury, based on existing animal data, and recommended two thresholds for the onset of injury to marbled murrelets: the recommended auditory injury threshold is 202 dB SEL and the recommended non-auditory injury threshold is 208 dB SEL (Navy 2011b).

The Navy and USFWS convened a second science panel in March 2012, to recommend criteria for evaluating the onset of non-injurious threshold shift (TTS) in the marbled murrelet due to underwater pile driving sound that may affect murrelet behavior. Actions that result in significant disruption of normal behavior patterns, for example acts that interrupt foraging behavior or interfere with predator detection, may increase the likelihood of injury and are considered harassment under the ESA. During the second science panel, it was determined that the critical hearing demands of marbled murrelets included communication between foraging pairs at sea and predator detection. The panelists concluded that during pile driving, TTS less than 40 dB (the onset of injury) was irrelevant because it was less than the ambient masking threshold (Navy 2012c). Masking of marbled murrelet vocalizations due to in-air pile driving noise has the potential to affect foraging behavior because it is assumed that foraging murrelets must be able to detect their partner’s calls within some distance (Navy 2012c). Calculating masking threshold is based on ambient conditions and the threshold would vary based on site specific conditions, therefore a non-site specific masking threshold was not determined by the panel.

Table 7-2 provides the current thresholds for airborne and underwater noise levels by species or taxonomic group.

Table 7-2. Airborne and Underwater Criteria

Functional Hearing Group	Airborne Sounds (e.g. marine construction activities, blasting) (re 20 ìPa)		Underwater Pulsed Sounds (e.g. impact pile driving, seismic) (re 1 ìPa)		Underwater Non-Pulsed (Continuous) Sounds (e.g. vibratory pile driving, dredging) (re 1 ìPa)	
	Injury Threshold	**Disturbance Threshold**	**Injury Threshold**	**Disturbance Threshold**	**Injury Threshold**	**Disturbance Threshold**
Marbled Murrelets	NA	Distance to masking threshold is dependent on site specific spectrum levels from ambient and pile driving noise[1]	202 dB cumulative SEL auditory (injury threshold), 208 dB cumulative SEL (non-auditory injury threshold)	NA[2]	NA	NA
Cetaceans (whales, dolphins, porpoises)	NA	N/A	180 dB rms	160 dB rms	180 dB rms	120 dB rms
Pinnipeds (seals, sea lions, walrus)	NA	100 dB rms (unweighted) for all pinnipeds except harbor seals. 90 dB rms (unweighted) for harbor seals[3]	190 dB rms	160 dB rms	190 dB rms	120 dB rms
Fish > 2 grams	NA	NA	187 dB (re: 1ìPa2sec) (cumulative SEL) "	150 dB rms	NA	150 dB rms
Fish < 2 grams	NA	NA	183 dB (re: 1ìPa2sec) (cumulative SEL) "			
Fish all sizes	NA	NA	206 dB peak			

[1] Threshold represents best available data as determined by the Marbled Murrelet Science Panel. A threshold has not been provided by USFWS. [2] Encompassed with masking zone. [3]Sound level at which pinniped haulout disturbance has been documented. Not officially a threshold, but used as a guideline.

7.2.1.2 Limitations of Existing Criteria

With regard to marbled murrelets, the thresholds were derived from the marbled murrelet science panels. While USFWS is currently using 202 dB SEL as the threshold for injury due to underwater noise resulting from impact pile driving, they have not released guidance for in-air thresholds. The masking zone used in this analysis was calculated during the second Marbled Murrelet science panel and is specific to impact driving 36” steel piles at the Bangor waterfront and represents the best available science.

There is no evidence that pinnipeds will react to continuous sounds at the 120 dB re 1μ Pa rms level and more research is needed (Hollingshead pers. comm. 2008). The 120 dB rms threshold level for continuous noise originated from research conducted by Malme et al. 1984 for California gray whale response to industrial sounds (Hollingshead pers. comm. 2008). This 120 dB *continuous* sound threshold should not be confused with the 120 dB *pulsed* sound criterion established for migrating bowhead whales in the Arctic as a result of research in the Beaufort Sea by Miller et al. 1999.

To date, there is no research or data supporting a response by pinnipeds or odontocetes to continuous sounds from vibratory pile driving as low as the 120 dB threshold. However, to the contrary, there are data that suggest that ringed seals (a phocinid or true seal like the harbor seal), are tolerant or not responsive to continuous sounds from vibratory pile driving and other continuous industrial noise levels as high as 157 dB re 1 μPa peak and 151 dB re 1 μPa rms (Blackwell et al. 2004). In addition, Moulton et al. 2005 concluded that ringed seal densities were not significantly reduced by intense construction activities at the study site (Northstar). Ringed seal hearing in water (Terhune and Ronald 1975) and presumably in air is probably similar to that of other phocinid seals (e.g. harbor seals) (Richardson et al. 1995). Finally, Southall et al. 2007 reviewed studies conducted to document behavioral responses of harbor seals and northern elephant seals to continuous sounds under various conditions, and concluded that those limited studies suggest that exposures between 90 dB and 140 dB re 1 μPa rms generally do not appear to induce strong behavioral responses. There has been considerable work done for effects of noise on fish compared to other species such as the marbled murrelet. As such, the criteria for injury were recently revised and the thresholds in place at present represent the best available science.

7.2.1.3 Transmission Loss

Underwater noise will be generated by pile driving, vessel and boat traffic, and construction equipment at the Barge Mooring Project site. Noise generated from construction support vessels, small boat traffic, and barge-mounted equipment such as cranes and generators will typically not exceed underwater noise levels from existing waterfront operations in the vicinity of the construction site, encompassing the Service Pier. The greatest sound levels will be produced by impact driving 48-in diameter hollow steel piles, which could generate underwater noise that potentially could result in disturbance to marine mammals, diving marbled murrelets, and fish swimming by the Barge Mooring project site.

Transmission loss (TL) underwater is the decrease in acoustic energy as an acoustic pressure wave propagates out from a source. TL parameters vary with frequency, temperature, sea conditions, current, source and receiver depth, water depth, water chemistry, and bottom composition and topography. The formula for transmission loss is:

$TL = B * \log_{10}(R) + C * R$, where
B = logarithmic (predominantly spreading) loss
C = linear (scattering and absorption) loss
R = range from source in meters

Logarithmic spreading loss (B) is typically between 10 dB (cylindrical spreading) and 20 dB (spherical spreading) although in some circumstances it can rise to 40 dB (Greeneridge 2008). Cylindrical spreading occurs when sound energy spreads outward in a cylindrical fashion bounded by the bottom sediment and water surface, such as shallow water. This results in 3 dB per doubling of distance. Spherical spreading occurs when the source encounters little to no refraction or reflection from boundaries (e.g., bottom, surface), such as in deep water. This results in 6 dB reduction per doubling of distance. Practical spreading is often used for mid-level depths resulting in a 4.5 dB reduction per doubling of distance.

Linear loss (C) has several physical components, including absorption in seawater, absorption in the sub-bottom, scattering from changes in the water column and from surface and bottom roughness, and temporal pulse-spreading (Greeneridge 2008).

For all underwater calculations in this assessment, linear loss (C) was not used (i.e. C=0) and transmission loss was calculated using only logarithmic spreading. Therefore, using practical spreading (B=15), the revised formula for transmission loss is $TL = 15 \log_{10}(R)$.

The distances to the thresholds were calculated using received levels at 10 meters for the appropriate pile size, water depth, and installation technique from in-situ recordings during another construction project at the Bangor waterfront. The calculations were performed using the formula above for practical spreading. Calculations were also performed using noise reduction measures for pile driving.

7.2.1.4 Estimated Underwater Noise Levels

In order to estimate the SPLs which could potentially be generated by pile driving during the Barge Mooring project, data from previous pile driving efforts most relevant to the project in terms of location, pile type and size, pile driver type, and water depth were identified. Due to the project similarities, SPL measurements recorded during the Navy's Test Pile Program at the Bangor waterfront were used as source data for this analysis (Table 7-3). Using this data, it was determined impact pile driving during the Barge Mooring project could generate peak sound levels of approximately 210 dB re 1 μPa, average SEL levels of 180 dB re 1 μPa and average rms levels of approximately 196 dB re 1 μPa all at a distance of 10 m, without the use of attenuation (Illingsworth and Rodkin 2012). Vibratory pile driving is expected to produce lower noise levels of approximately 172 db rms re 1 μPa at 10 m (Illingsworth and Rodkin 2012).

Table 7-3. Summary of Sound Levels During the Test Pile Program

Installation Method	Steel Pipe Pile Size	Peak dB[1]	RMS dB[1]	Singe Strike SEL[2]
Impact	24-inch	193	180	167
	36-inch	210	196	177
	48-inch	209	194	180
Vibratory	24-inch	-	160	-
	36-inch	-	169	-
	48-inch	-	172	-

[1]Measured at 10 m; referenced to 1 μPa. [2]Measured at 10 m; referenced to 1 μPa^2*sec.Source: Illingsworth and Rodkin 2012.

7.2.1.5 Discussion on Sound Reduction Techniques

A bubble curtain will be used to minimize the noise generated by impact pile driving. Bubble curtains emit a series of bubbles around a pile to introduce a high-impedance boundary through which pile driving noise is attenuated and can be unconfined or confined. A confined bubble curtain uses a flexible or rigid shroud around the bubble curtain to hold air bubbles near the pile.

Noise reduction results from bubble curtains indicate a wide variance with very little measurable attenuation in some cases (less than 6 dB), and high attenuation (greater than 15 dB) in other cases (Caltrans 2009; WSDOT 2012). Caltrans observed that bubble curtain attenuation levels for 24-inch diameter or smaller steel or concrete piles generally reduced sound levels by 5 dB and attenuation levels for 24-inch to 48-inch diameter steel piles were generally reduced by 10 dB (Caltrans 2009). They noted noise reduction may be more difficult to achieve in harder substrates, which may transmit ground-borne noise and propagate it into the water column, while softer substrate may allow for a better seal of the curtain on the substrate (Caltrans 2009). WSDOT reported attenuation levels from unconfined bubble curtains ranged from 0 to 32 dB with a mean of 11.9 dB (s.d. 8.7) (WSDOT 2012). Two recent Puget Sound projects at the Anacortes and Mukilteo Ferry Terminals, which drove 36-inch diameter steel piles, reported mean attenuation levels of 15 dB at approximately 10 meters (s.d. 10.6, range 7 to 22 dB) and 8 dB at approximately 10 meters (s.d. 3.10, range of 3 to 11), respectively (WSDOT 2012). At the Mukilteo site, attenuation was noted to decrease with range from the pile resulting in a significant drop in attenuation by 1100 meters (MacGillivray et al. 2007). Both of these projects were located in sand and silt substrates.

A bubble curtain will be used during impact pile driving of steel pile for the Barge Mooring project. Based on the information above from Caltrans and WSDOT, an average SPL reduction of 8 dB measured at 10 meters was conservatively chosen as an achievable level of attenuation for the 24-inch to 48-inch diameter piles. For the 18-inch piles, an average peak SPL reduction of 5 dB measured at 10 meters was chosen.

7.2.1.6 Distance to Underwater Sound Thresholds

Underwater noise levels from pile driving will exceed the behavior thresholds for marine mammals, fish, and marbled murrelets for impact and vibratory pile driving and exceed the injury thresholds for impact driving. As discussed above, the greatest underwater noise will be generated during impact pile driving activities. The majority of the pile driving, however, will use vibratory methods. In some cases where difficult geological conditions are encountered, it may be necessary to use an impact hammer to drive certain piles for part of all of their required depth. It is anticipated that a maximum of 4 piles could be driven per day with 450 strikes per pile, resulting in a maximum of 1,800 pile strikes per day. The total duration of in-water pile driving will be approximately 10 days.

The sequence of pile installation is unknown. However, if four 36-inch to 48-inch piles were impact driven in a day, this scenario would represent the worst-case for evaluating noise impacts. The maximum number of days this could occur would be three (five 36-inch piles and 8 48-inch piles = 13 piles, which if driven at the rate of four piles per day, results in three days of impact pile driving for the loudest piles). If one or more of the 36-inch to 48-inch piles were driven on the same day as the 18-inch to 24-inch piles, the area of impact for the day would be less. And on days when only 24-inch and/or 18-inch piles were driven, the area of impact would also be smaller.

The calculated distances to the threshold criteria and the area affected for the impact and vibratory installation of 48, 36, 24, 18-inch diameter piles are provided in Table 7-4 and Figures 7-1 through 7-6 depict representative views of the area of effect for impact and vibratory driving of various pile sizes for each of the noise thresholds by species.

Table 7-4.
Distances from Piles where Underwater Noise Exceeds Underwater Thresholds

Type of Pile Driving	Pile Size	Fish (meters)				Marbled Murrelet (meters)	Humpback Whale (meters)		
		Injury			Potential Behavioral Disturbance	Injury	Injury	Behavioral Disturbance from Impulse Noise	Behavioral Disturbance from Continuous Noise
		206 dB peak	187 cumulative SEL (with 1,800 strikes/day)	183 cumulative SEL (with 1,800 strikes/day)	150 dB rms	202 dB cumulative SEL	180 dB rms	160 dB rms	120 dB rms
Impact Pile Driving with Attenuation	18-inch[3]	1	32	59	464	3	5	100	N/A
	24-inch[1]	0	20	37	293	2	3	63	N/A
	36-inch[1]	5	93	173	3,415	9	34	736	N/A
	48-inch[1,2]	5	148	273	3,415	15	34	736	N/A
Vibratory Pile Driving	18-inch[3] and 24-inch[1]	N/A	N/A	N/A	46	N/A	N/A	N/A	4,642[4]
	36-inch[1]	N/A	N/A	N/A	185	N/A	N/A	N/A	18,478[4]
	48-inch[1,2]	N/A	N/A	N/A	293	N/A	N/A	N/A	29,286[4]

All sound pressure levels expressed in dB re 1 μPa; SEL are expressed in dB re 1 μPa^2*sec. 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). [1]Source levels based on measurements taken during the Test Pile Program and 8 dB of attenuation was applied for 48-24-inch piles. [2]The 36 -inch peak and rms source level measurements were louder than the 48-inch measurements and was used for both pile sizes to provide a conservative estimate. [3]The 24-inch source level measurement during Test Pile Program was used for the 18 inch pile estimate and 5 dB of attenuation was applied [4]Range calculated is greater than what would be realistic. Hood Canal average width at site is 2.4km, and is fetch limited from N to S at 8.4 km.

For vibratory driving, the distances noise is above the behavioral threshold levels for continuous noise are extensive and exceed the width of Hood Canal (average width of Hood Canal is [2400 meters [1.5 miles]) for the marine mammal 120 dB rms behavioral threshold. The calculations assume a sound field that is free of obstructions. However, because the Hood Canal does not represent open water conditions (free field), the sound would attenuate as it encountered land masses or bends in the canal. Therefore, the area of effect was calculated from a line-of-site footprint from the furthest shore pile location, providing a more realistic estimate of impact. However, the 120 dB rms threshold level can be either at or below ambient sound levels (see Section 5.3.4), making it problematic to determine an area of effect. Figure 7-5 graphically depicts a representative area where noise is calculated to exceed the 120 dB marine mammal behavioral threshold levels. This figure represents a worst case scenario as it assumes ambient sound levels are always below 120 dB rms. However, prior measurements have demonstrated the ambient sound level can be above this threshold level (Illingsworth and Rodkin 2012).

After installation of the proposed piles associated with this project, underwater noise levels would return to baseline or existing conditions as operations would be similar to those currently conducted at the Service Pier in support of CSDS-5.

Figure 7-1. Representative Distances to Fish Thresholds during Impact Pile Driving

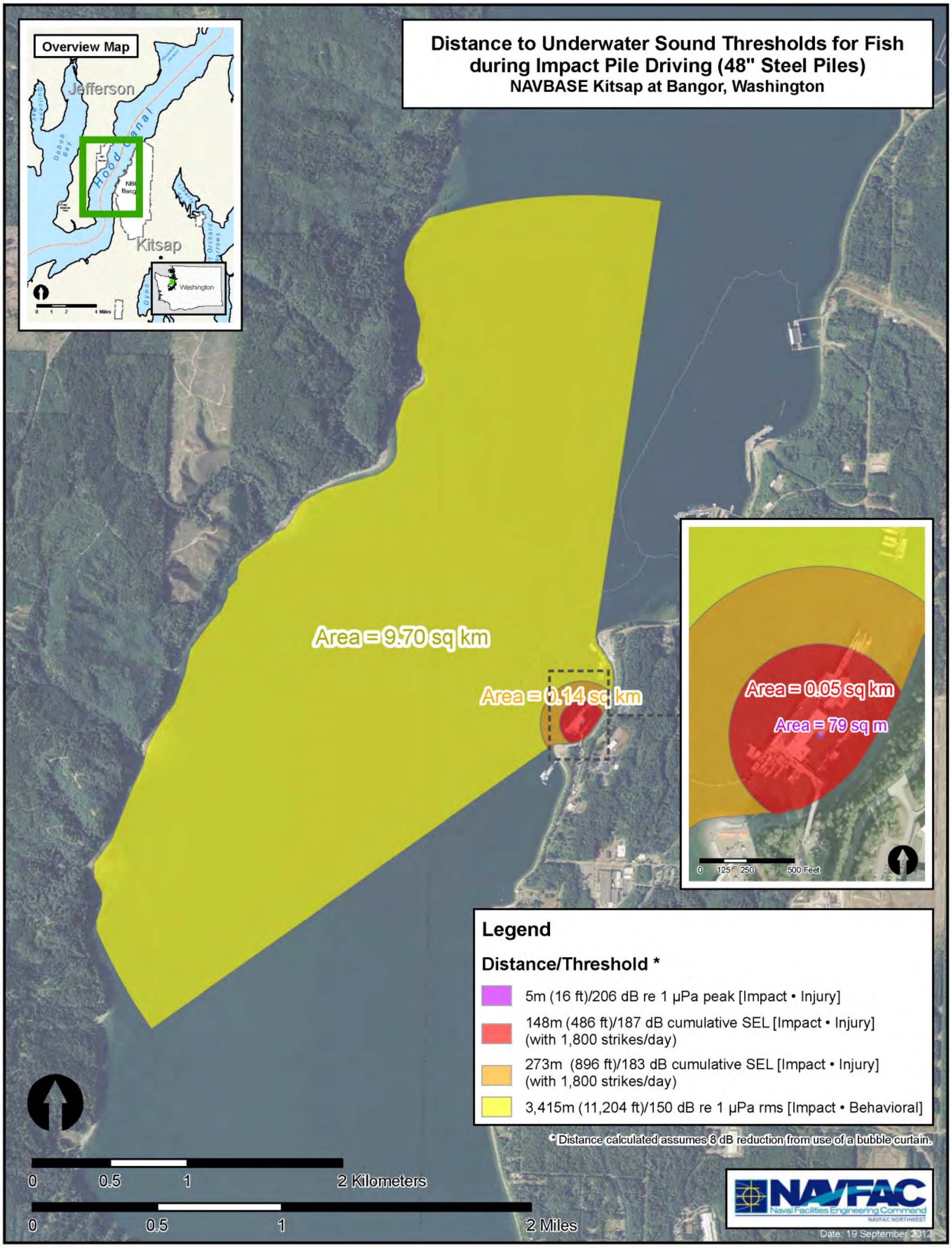


Figure 7-2. Representative Distances to Fish Threshold during Impact Vibratory Driving

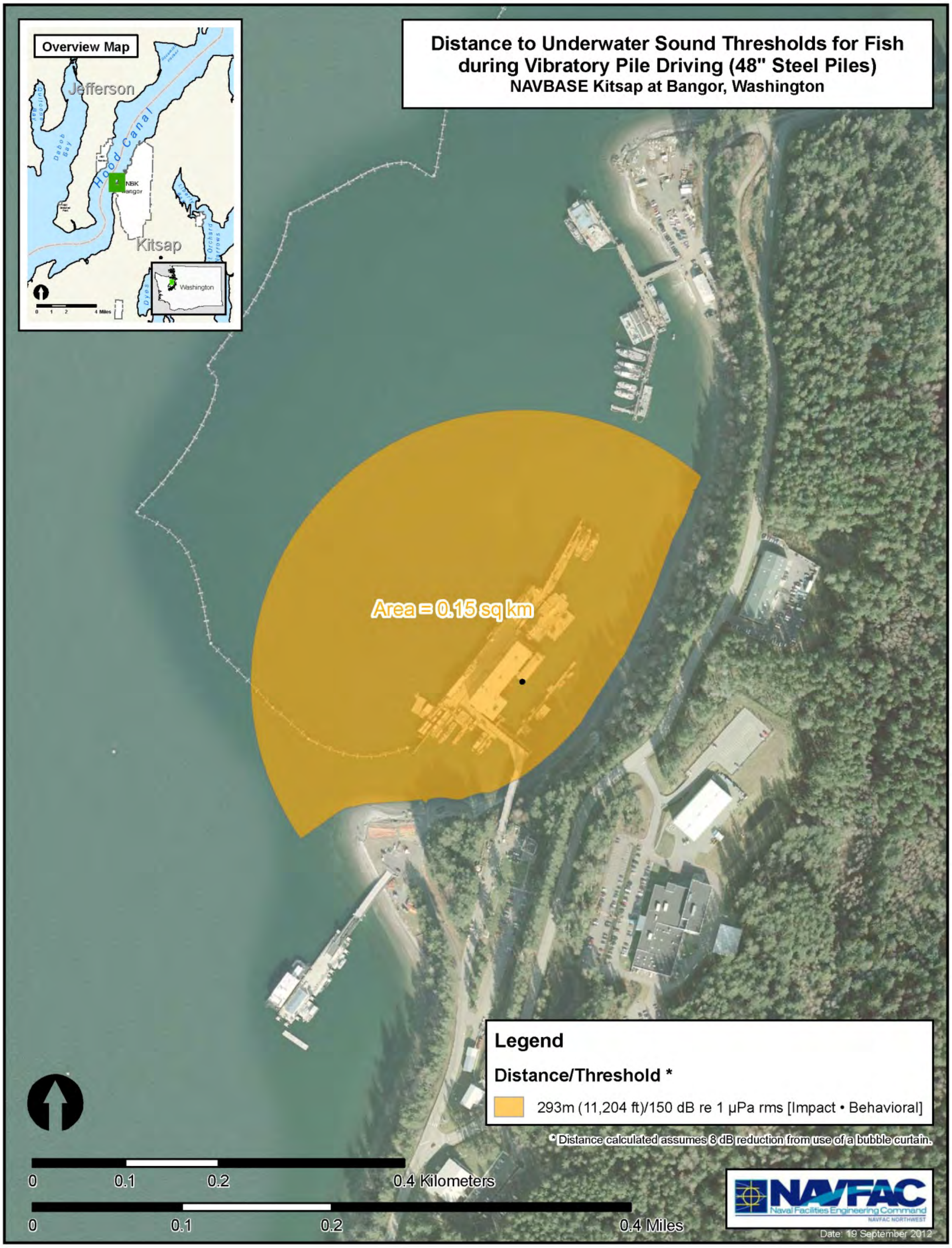


Figure 7-3. Representative Distances to Marbled Murrelet Underwater Sound Thresholds During Impact Pile Driving

Figure 7-4. Representative Distances to Cetacean Underwater Sound Thresholds during Impact Pile Driving

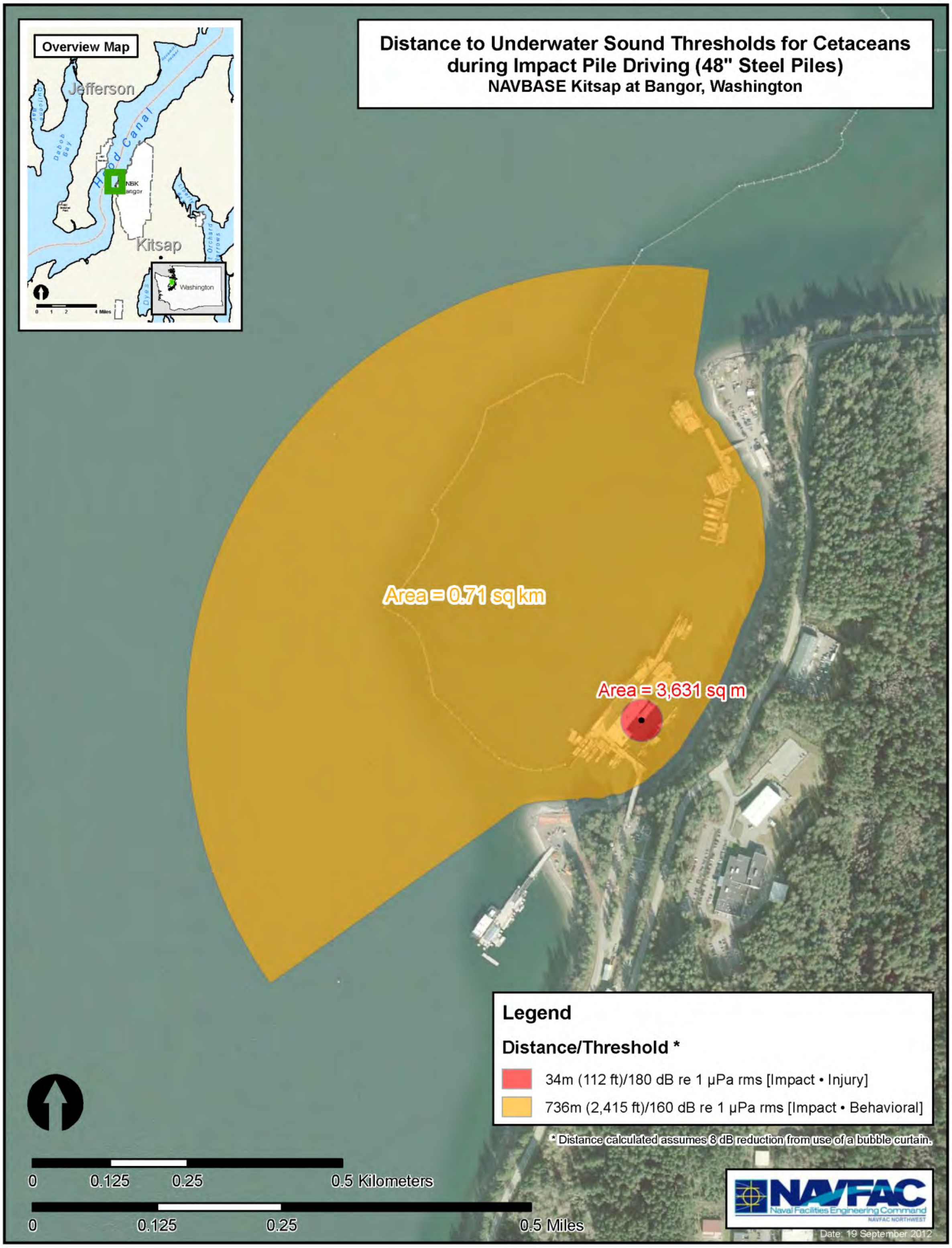
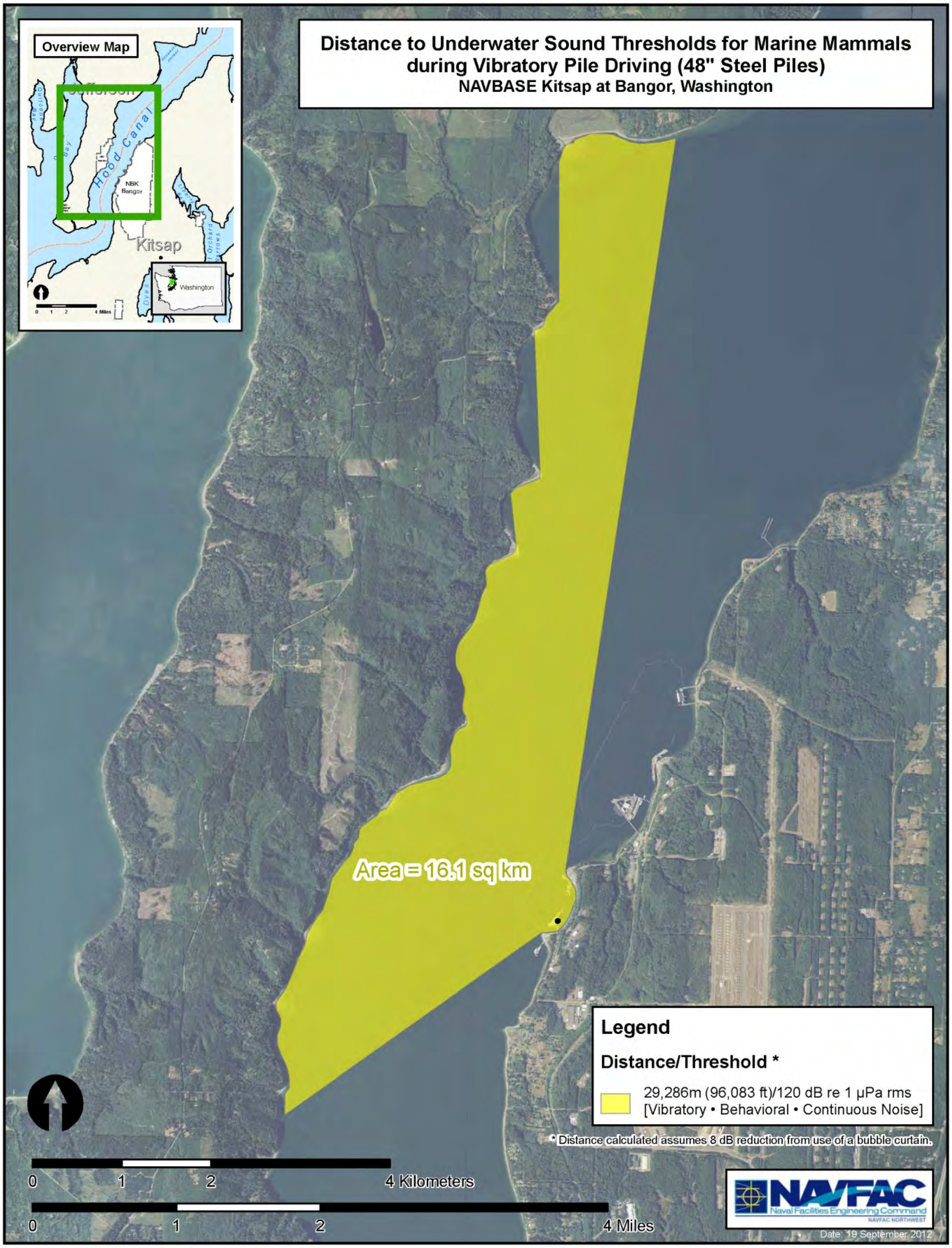


Figure 7-5. Representative Distance to Marine Mammal Underwater Sound Threshold during Vibratory Pile Driving



7.2.1.7 Effects to Fish

All in-water work will occur during the in-water work window, however some fish are still likely to be present. Salmonids and marine fish are not likely to remain in the immediate vicinity of the pile being driven due to the disturbance from vessels, the pile entering the water, and, for impact pile driving, turning on the bubble curtain prior to the start of impact pile driving.

Vibratory pile driving does not produce noise levels that are above the injury threshold for fish. Vibratory driving is expected to occur for short durations at a time (up to 15 minutes per pile) and for a maximum of 1 hour per day over a maximum duration of ten days. Therefore, impacts from vibratory driving are expected to be insignificant.

For any impact pile driving that may occur, a bubble curtain will be used to reduce injurious sound pressure levels. In addition, fish are expected to leave the area surrounding a pile prior to initiation of any impact pile driving due to startup of the bubble curtain. Therefore, the risk of fish remaining in the injury zone during impact pile driving is minimized.

The Navy anticipates that no more than 1800 strikes of the impact hammer would occur per day. Assuming 50 strikes per minute, it is likely that maximum daily duration of impact pile driving each day would be approximately 35-40 minutes. This assumption is from industry standard for impact hammer, which range from 35 to 52 strikes per minute (Hammer & Steel 2012). For the values selected for the analysis, (210 peak, 180 SEL, and 196 rms) and assuming a 8 and 5 dB reduction from a sound attenuation device, the distance to the injury threshold for 187 SEL is 148 meters (485 feet) from the pile and the distance to the injury 183 SEL is 273 meters (895 feet). Injury from peak levels would occur very close to the pile (within 5 meters) where the fish are not expected to be present from all the activity. Behavioral harassment was calculated to occur as far as 3.4 kilometers (2 miles) from the pile being driven.

During the Barge Mooring Project, juvenile Chinook salmon, steelhead, and Hood Canal summer-run chum are not expected to occur in the Action Area due to the project timing (mid July- late September). Adults may be present in the Action Area; however they will most likely use this section of the Action Area only as a migratory corridor. Individual fish will move through the Action Area at varying rates, but are not expected to remain stationary for extended periods during the project. The closest adult ESA-listed rockfish are likely several thousand feet away within waters deeper than 120 feet, and are not expected to be affected by project activities due to the distance of the project and attenuation of sound. The Action Area may provide some small areas of habitat (kelp) for juvenile canary rockfish and bocaccio; a few of these juveniles may be present in the Action Area during construction activities, until they move to deeper waters during the fall and winter months. It is possible that a few larval yelloweye rockfish, canary rockfish and bocaccio occur within the water column of the Action Area, and would be injured or killed by the effects of pile driving, but these numbers would be very low. The project is very short in duration and timing is constrained (July 16 to October 1) to ensure that very few individuals of Chinook salmon, steelhead, Hood Canal summer-run chum, and ESA-listed rockfish will be exposed to the effects of the proposed action. Daily pile driving activities will be separated by overnight rest periods when migration can precede uninhibited. Adult in-migration of Chinook salmon and chum is not expected to be significantly delayed.

7.2.1.8 Effects to the Marbled Murrelet

7.2.1.8.1 Underwater Noise Effects

USFWS is currently using 202 dB SEL as the threshold for the onset of injury, defined as the loss of cochlear hair cells, due to underwater noise resulting from impact pile driving. During the Marbled Murrelet Science Panel (Navy 2011b), the panelists developed criteria for two general forms of injury: (1) auditory injury (generally damage to sensory hair cells of the ear), and (2) non-auditory injury (trauma to non-auditory body tissues/organs). Based on guidance from USFWS, the panel defined the onset of auditory injury 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. Based on their review of the best available data, the panel recommended two thresholds for the onset of injury to marbled murrelets: (1) an auditory injury threshold of 202 dB SEL re 1µPa^2-sec cumulative of all impact hammer strikes within a 24-hour period, and (2) a non-auditory injury threshold of 208 dB SEL re 1µPa^2-sec cumulative of all impact hammer strikes within a 24-hour period. Since the underwater criterion for auditory injury was the lower of the two thresholds, this was the panel's recommended interim criterion for assessing injurious impacts to the marbled murrelet from impact pile driving.

The underwater injury criterion for the marbled murrelet only applies 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 distances were calculated based on an assumption of 1800 pile strikes per day. However this number is the worst-case scenario and it is unlikely this number of strikes would occur each day of the 10 days of pile driving, if at all. In order to be conservative, the Navy carried out the noise exposure analysis assuming that all pile driving days could require the maximum number of pile driving strikes (e.g., 1800) per day.

Based on the above analysis, it is estimated that marbled murrelets could be exposed to injurious sound pressure levels if they were within 15 meters of a 48-inch pile during impact pile driving. Since the cumulative SEL formula takes into account all impact pile strikes within a 24-hour period, the areas shown in Table 7-4 and depicted in Figure 7-3 are 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 15 meters after all strikes have been completed.

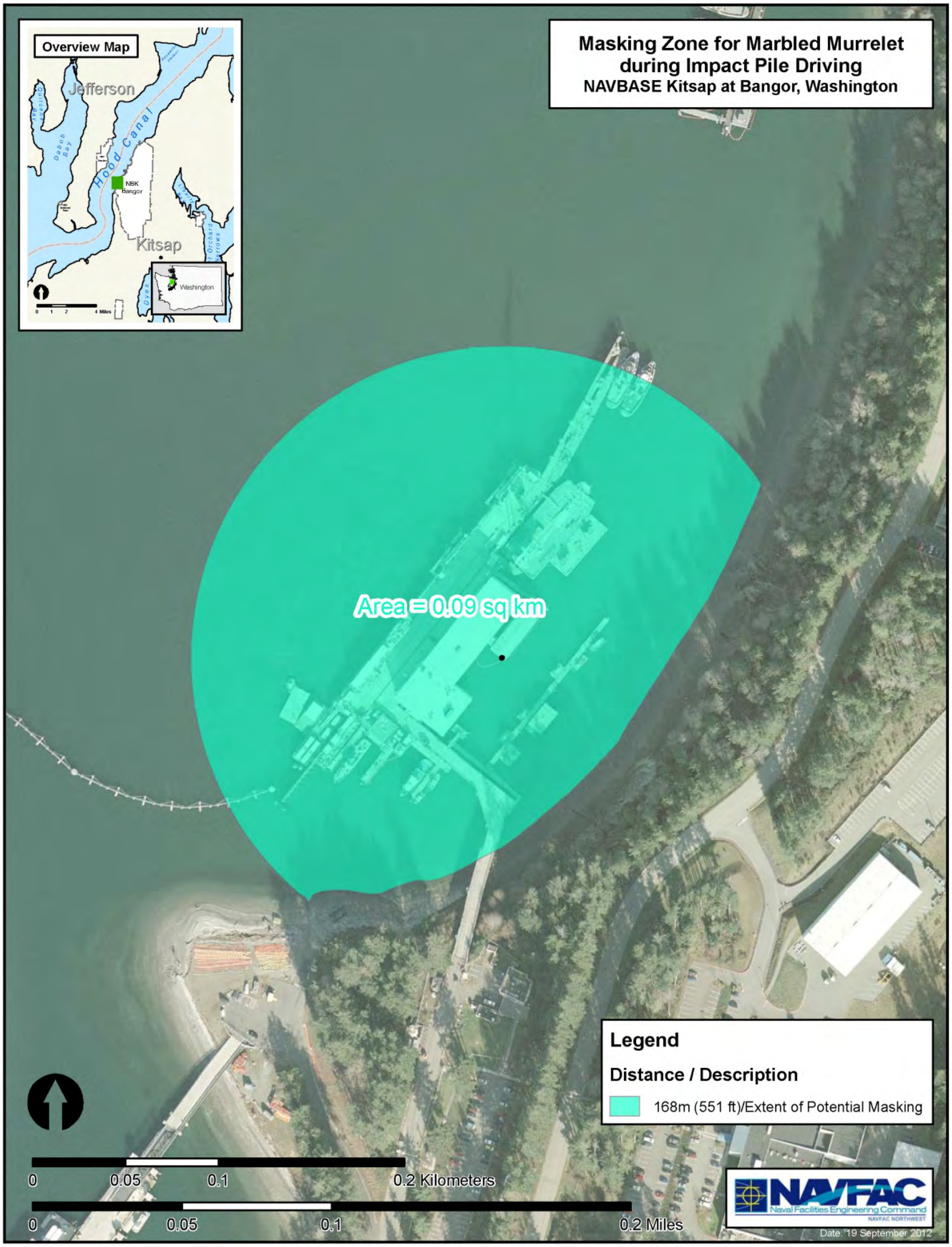
It is expected marbled murrelets will not be exposed to injurious underwater sound pressure levels during the Barge Mooring project. Based on 1800 strikes per day, it is likely that the impact pile driving that would only occur for 35-40 minutes per day. The project location is located between the east side of the Service Pier and the shoreline, with the deepest pile driving occurring at approximately -30 MLLW. Numerous piles and structures, including a wave screen, are located between the shoreline and deeper waters. Additionally, and the Service Pier is a location that experiences activities such as marine traffic, equipment use, and other human activities could deter marbled murrelet presence in the area. Construction activities will occur outside of the forage fish spawning season which would contribute to a lower potential occurrence of foraging marbled murrelets in the injury zone. All pile driving will begin two hours after sunrise and cease two 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 bubble curtain which when turned on, could startle birds causing them to leave the area. Additionally, the Navy intends to monitor for marbled murrelets during impact pile driving in order to ensure no exposures to injurious sound pressure levels occur. Should marbled murrelets occur in the injury zone, all impact pile driving would cease until they have left the area. A monitoring plan is currently being prepared and will be submitted to USFWS for their approval prior to the start of construction.

7.2.1.8.2 Airborne Noise

Pile driving can generate airborne noise that could potentially result in disturbance to marbled murrelets. The USFWS has not issued a threshold for marbled murrelet communication masking as a result of pile driving. The distance to which masking may occur at the Bangor waterfront was calculated during the second Marbled Murrelet Science Panel using the Test Pile Program data. Since the Barge Mooring project is located near the Test Pile Program location and will be driving the same sized piles, the distance to the masking threshold is expected to be the same as that calculated by the panel. The distance to the marbled murrelet airborne threshold was estimated at 168 meters (551 feet) for impact pile driving 36-inch piles at the Bangor waterfront. All other construction noise associated with the project is not expected to exceed the masking zone. Figure 7-6 shows the distance graphically depicted on the landscape.

Masking of marbled murrelet vocalizations due to in-air pile driving noise has the potential to affect foraging behavior and efficiency because murrelets forage in pairs (Navy 2012c). However it is likely that marbled murrelets will continue foraging, even if masking occurs (USFWS 2011b); therefore, measureable effects to foraging due to potential masking effects are not anticipated.

Figure 7-6. Representative Distance to Marbled Murrelet Masking Zone during Impact Pile Driving



7.2.2 Turbidity

Pile installation will re-suspend bottom sediments within the immediate area of each pile, resulting in temporary and localized increases in turbidity levels. The suspended sediment / turbidity plumes will be generated periodically during active pile driving over a duration of 10 days.

The amount of bottom sediments that will be re-suspended into the water column during pile driving and the duration and extent of the resulting plume will reflect the composition of the sediments. Surface sediments beneath the -10 -30 ft MLLW depth at the project site are composed of fine to coarse sand with gravel and occasional shell fragments (GeoEngineers 2005). In general, the coarse grained sediments will settle more rapidly than the fine grained sand. Higher settling rates will result in a shorter water column residence time and a smaller horizontal displacement by local currents (Herbich and Brahme 1991;Herbich 2000).

All piles will be driven in depths less than -30 ft MLLW. Assuming that bottom sediments are disturbed during construction, and re-suspended by two-thirds of the water column (a conservative estimate of 20 ft), the maximum water column residence of sand sized particles will be approximately 2 minutes following cessation of pile driving activity. A sand particle settles through the water column at a velocity of approximately 0.3 ft/sec. The water column residence time will be proportionately shorter in shallow waters with a current velocity of 1 ft/sec.

During impact pile driving, a bubble curtain will be used to minimize in-water noise. Bubble curtains involve the use of pressurized air being injected from small holes in aluminum or PVC pipe from an air compressor located on the pile driving barge. Since the bottom ring is located on the substrate, it is likely that the bubbling action would increase turbidity in the vicinity. Overall, construction activities will not result in persistent increases in turbidity levels. Pile driving resulting in an increase in turbidity will be short-term (occurring periodically over 10 days) and suspended sediments will disperse and/or settle rapidly (within a period of minutes to hours after pile driving activities cease).

Studies investigating impacts to steelhead and coho salmon from large scale sediment dredging operations have shown that increased turbidity levels from these activities were insufficient to cause salmonid gill damage, although other adverse effects were evident (Redding et al. 1987; Servizi and Martens 1991). Redding et al. (1987) found that coho and steelhead were more susceptible to bacterial infection and displayed reduced feeding rates when exposed to elevated turbidity levels. Servizi and Martens (1991) found that coho were more susceptible to viral infections when exposed to elevated turbidity, and postulated that other impacts include reduced tolerance to environmental changes. These findings suggest salmonids in the immediate project vicinity would not be expected to experience gill tissue damage due to increased turbidity associated with in-water work, but may experience a reduction in fitness. However, these studies are from large scale sediment operations. As stated above, sediment plumes generated by the Barge Mooring project are expected to be temporary and localized. Additionally, the use of a bubble curtain would likely deter fish from being within the vicinity of the sediment plume. Therefore, effects to salmonids are expected to be insignificant.

Limited information is available on the effects of turbidity on rockfish. However, the effects on rockfish would likely be similar to those described above for salmonids. Although construction activities will temporarily increase suspended solids, the levels will be insufficient to cause severe gill irritation or result in fish loss through mortality, and will return to existing conditions following the completion of in-water construction. If rockfish should encounter turbidity plumes with high levels of suspended sediment during construction activities, they would likely avoid these small plumes. Therefore, effects to rockfish resulting from increases in turbidity are considered to be insignificant.

Marbled murrelets are expected to avoid the immediate construction area due to increased vessel traffic, noise, and human activity. Therefore, effects to marbled murrelets due to potential short-term, localized elevated turbidity during construction are discountable.

7.2.3 Benthic Prey Availability

The Barge Mooring Project will result in localized reductions of the benthic community during pile placement. During the construction period (estimated first 10 days of in-water construction season), juvenile salmonids and other fish species will experience loss of available benthic prey at the project site due to the disturbance from pile installation, and barge use of spuds and anchors. Adult salmonids generally prefer forage fish as a prey resource and will experience little or no direct effect due to localized changes in benthic prey availability. Construction activities will also result in localized increases in total suspended solids (Section 7.2.2). The settling out of fine-grained solids could bury nearby benthic organisms and result in the loss or reduction of localized benthic productivity. During construction activities there will be some disturbance and temporary reduction of benthic community productivity in the immediate project vicinity.

7.2.4 Interdependent/Interrelated Actions

Interdependent and Interrelated actions are part of direct effects. Interdependent actions are those that have no independent utility apart from the action under consideration (50 CFR §402-02). Interdependent actions are typically “because of” the proposed action. Interrelated actions are those that are part of a larger action and depend on the larger action for their justification (50 CFR §402-02). Interrelated actions are typically “associated with” the proposed action.

The Barge Mooring Project is a complete and independent action and is not dependent on any other action for its utility, nor is any other action dependent on the Barge Mooring Project for its utility. Therefore, the Barge Mooring Project has no other interdependent or interrelated actions whose effects on ESA species need to be addressed in this BA.

7.3 Indirect Effects

Indirect effects are those that are caused by or will result from the proposed action and are later in time, but still reasonably certain to occur (50 CFR §402-02).

7.3.1 Forage Fish Community

There are documented sand lance spawning sites and potential surf smelt spawning sites along the nearshore areas of the Action Area (Figure 5-3). Sand lance do not spawn until November, hence in-water activity and the overall project construction would be complete prior to sand lance spawning season. Although some surf smelt may be spawning during pile driving activity, the majority of surf smelt spawning (should they utilize sand lance spawning sites) would not occur until October when all construction is anticipated to be completed. Therefore, no significant impacts to spawning forage fish are anticipated.

Placement of the piles and associated staging activities (i.e., support vessels, construction barge) would cause a loss to benthic prey either existing within the mooring/pile footprint or disturbance from turbidity which may impact forage fish use of existing prey. In addition, a small patch of eelgrass exists approximately 175 ft south of the proposed relocated Port Operations float in depths less than -10 ft MLLW. Forage fish may be utilizing the eelgrass habitat as refuge during construction activity and given the distance of the eelgrass from the project area, it is unlikely that forage fish would be disturbed by turbidity associated with pile driving.

Noise generated from pile driving activities will reach levels that could injure or disturb fish occurring within the impact threshold zones during the period of construction (Section 7.2.1). Salmonids and marbled murrelets utilize juvenile and adult forage fish as a major component of their prey base and any reduction in the local abundance of forage fish decreases the localized prey availability for these species. However, it is anticipated that the number of forage fish impacted is not expected to reach a level or degree that would reduce the overall prey availability to ESA listed species.

7.3.1.1 Aquatic Vegetation

Construction activities will not impact eelgrass. A small patch of eelgrass is present within the Action Area but located approximately 175 ft south of the proposed relocated Port Operations float and associated pile driving activities. Conservations measures are in place to avoid disturbing the existing eelgrass (see Section 3.4). Eelgrass is not present on the north side of the trestle. Green and brown macroalgae occur within the project area and are most abundant within depths greater than -15 ft MLLW where construction would occur. Temporary short-term impacts are expected during construction as a reduction in light (shade from construction vessels) would lead to a temporary reduction in species abundance. Macroalgae is part of forage fish diet and therefore a reduction in forage fish prey could lead, indirectly, to a temporary reduction in prey availability for ESA listed species that feed primarily on forage fish. However, construction is anticipated to be completed within 8 weeks and these species of macroalgae are expected to return to un-shaded areas following construction. Shade from mooring the new research barge would cause a long-term reduction in these macroalgae species within the project area. The new barge and new float sections will create approximately 18,075 ft^2 and 126 ft^2 respectively, of new overshaded area. However, the effects of shading are expected to be localized and not expected to have a measurable effect on the macroalgae population in the Action Area or to ESA listed species.

7.4 Effects on Critical Habitat

This section discusses fish critical habitat known to occur in the Action Area. The only two fish species for which critical habitat occurs in the Action Area are Puget Sound Chinook salmon ESU and Hood Canal summer-run chum salmon ESU. Critical habitat for these two species occurs within the Action Area along portions of the shorelines in Hood Canal both north and south of the project site (Figures 6-1 and 6-3). NAVBASE Kitsap at Bangor was excluded from critical habitat designation and outside of this exclusion zone, estuarine and nearshore marine critical habitat includes areas contiguous with the shoreline from the line of extreme high water out to a depth no greater than 30 m relative to MLLW (NMFS 2005b).

The only stressor that will extend beyond these areas is underwater noise, although, based on the modeling above, the sound levels at these distances will be greatly reduced and approaching background levels. A more complete summary, including that of PCEs occurs below.

In the final rule designating critical habitat for 12 ESU/DPS of salmonids in Washington, Oregon, and Idaho, published on September 2, 2005 (NMFS 2005b), NMFS defined the six PCEs to be essential for the conservation of these listed salmonids (including Puget Sound Chinook and Hood Canal summer-run chum). All waters identified as essential and designated as critical habitat contains one or more of the PCEs. The project site is not located in an area designated as critical habitat due to NAVBASE Kitsap at Bangor being excluded from this designation (NMFS 2005b). However, certain projects may have activities of sufficient nature to impact critical habitat outside of the base boundaries, and therefore it is important to assess the potential for the project's activities to impact these PCEs.

Within these areas, the PCEs essential for the conservation of these ESUs are those sites and habitat components that support one or more life stages, including:

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, water quantity, and salinity conditions supporting juvenile and adult physiological transitions between fresh water and salt water; (ii) natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and 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.
6 Offshore marine areas with water quality conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation.

The Barge Mooring Project will have no effect on PCEs 1, 2, 3, 4, and 6. The only project-related stressor that will impact critical habitat is increased underwater noise in the water column during construction. The nearshore marine areas (PCE 5) will experience temporary (maximum of 10 days pile driving) increases in underwater noise levels during impact pile driving. Underwater noise within designated critical habitat would not be sufficient to cause fish injury but would be sufficient to potentially affect fish behavior. This habitat is important for juvenile salmonids and returning adults. However, the received underwater noise levels within designated critical habitat over 2 km from the project area will not rise to the level that would preclude migration or force juveniles into deeper water where predation is more likely.

Therefore, the effects meet the criteria for insignificant and discountable and support the *may affect, not likely to adversely affect* determination.

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8.0 Determination of Effects

Under ESA, a **no effect** determination means there is no effect whatsoever to the species or critical habitat. A "**may affect, 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, likely to adversely affect**" determination means that the effects do rise to the level of take for one or more individuals of the species.

Under MSA and for EFH, "**would not adversely affect**" means that only temporary or minimal impacts would result as determined by the Navy.

This section summarizes the analysis in tabular form and provides a recommended determination of effect for each species and critical habitat occurring or potentially occurring within the Action Area as well as designated EFH (Tables 10-1 and 10-2). The determination takes into account the following: preparation of the NMFS matrix of pathways and indicators, review of project design including minimization and mitigation measures, the existing conditions within the Action Area, species and habitat presence and use of the Action Area, literature review, and information obtained from federal and state agencies.

Table 8-1. ESA Effects Determination for Listed Species and Critical Habitat

Species	ESA Effects Determination	Critical Habitat Determination
Puget Sound Chinook Salmon ESU	NLAA	NLAA
Puget Sound Steelhead DPS	NLAA	n/a
Hood Canal summer-run Chum ESU	NLAA	NLAA
Bull Trout	NLAA	NE
Puget Sound/Georgia Basin Bocaccio Rockfish	NLAA	n/a
Puget Sound/Georgia Basin Canary Rockfish	NLAA	n/a
Puget Sound/Georgia Basin Yelloweye Rockfish	NLAA	n/a
Eastern Steller Sea Lion DPS	NLAA	NE
Marbled Murrelet	NLAA	NE

Notes
n/a = Not applicable: critical habitat has not been designated for the species.
NE = No effect.
NLAA = May affect, not likely to adversely affect.

8.1 Determination of Effect on Fish

8.1.1 Puget Sound Chinook Salmon ESU

The Barge Mooring Project may result in 10 days of impacts to water quality, benthic prey availability, and aquatic vegetation loss at the project site. However, these impacts would be temporary, and localized to the area directly around each pile installed or removed. Pile driving activities will temporarily increase underwater noise above NMFS-established thresholds for fish. Because the Barge Mooring Project will occur between July 16 and September 30 when Chinook salmon are least abundant, these impacts will be minimized due to the low risk of exposure. It unlikely that individuals would be in close enough proximity to the construction activities for long enough periods of time to result in harmful sound pressure levels. Underwater noise will exceed established thresholds for fish behavioral disturbance but only for approximately one hour per day for 10 days within the in-water work window when salmonids are not expected within the Action Area. Therefore, the effect determination for the Barge Mooring Project is **may affect, likely to adversely affect** the Puget Sound Chinook salmon ESU within the Action Area.

8.1.2 Puget Sound Steelhead DPS

All impacts to steelhead from the Barge Mooring Project will be similar to those described above for Puget Sound Chinook salmon. Construction will occur between July 16 and September 30 when salmonids are least abundant and impacts to steelhead will be minimized due to their infrequent occurrence along the shoreline and the short duration of potential effects, the effect determination is **may affect, not likely to adversely affect** for the Puget Sound steelhead DPS within the Action Area.

8.1.3 Hood Canal Summer-run Chum Salmon ESU

Construction-related impacts to chum salmon and their habitat will be similar to those described above for Chinook salmon. Construction timing (July 16-September 30) will minimize potential construction impacts to fry and juvenile Hood Canal summer-run chum salmon because their presence is discountable during this time. Any adult summer-run chum present would be migrating through the area would not be expected to stay within close enough proximity to pile driving long enough to be exposed to harmful sound pressure levels. Additionally, the use of a bubble curtain will likely have a startle effect on any fish near the piles and further increase the likelihood they would exit the zone at which injury would occur. Therefore the effect determination is **may affect, not likely to adversely affect** for the Hood Canal summer-run chum salmon ESU within the Action Area.

8.1.4 Bull Trout

Impacts to habitats potentially used by bull trout from construction and operation at the Barge Mooring Project site will be similar to those described above for Puget Sound Chinook. The USFWS (2010a) expects that bull trout prevalence in the vicinity of NAVBASE Kitsap at Bangor is very low. Because bull trout are not expected in the Action Area, the project will be conducted during summer months when bull trout are least likely to be present, and the duration of the project is less than ten days, exposure of bull trout to potential project effects is considered discountable. The effect determination for the proposed project is **may affect, not likely to adversely affect** for bull trout within the Action Area.

8.1.4.1 Bocaccio, Canary, and Yelloweye Rockfish

Adult and juvenile rockfish may be present within the Action Area although their occurrence is expected to be very rare due to both their infrequency and the relative scarcity of nearby suitable habitat. Rockfish inhabiting the Action Area would likely be found near benthic areas with steep slopes, rock or kelp beds and not within the area where they would experience injurious effects of the project. Therefore, exposure is expected to be discountable and the effect determination is **may affect, not likely to adversely affect** for the Puget Sound/Georgia Basin bocaccio, canary rockfish and yelloweye rockfish within the Action Area.

8.1.5 Critical Habitat

Critical habitat for Chinook salmon and Hood Canal summer-run chum occur within the Action Area, but outside of the boundaries of NAVBASE Kitsap at Bangor. The only stressor that will reach these areas is underwater noise. Based on the modeling above, the sound levels will be greatly reduced beyond the boundaries of NAVBASE Kitsap at Bangor and would not be sufficient to cause fish injury. However, underwater noise in the nearshore marine (PCE 5) water column will exceed established thresholds for fish behavioral disturbance but only for approximately one hour per day for 10 days within the in-water work window when juvenile salmonids are not expected within the Action Area. Therefore, the effect determination for the proposed project **is may affect, not likely to adversely affect** for designated Puget Sound Chinook salmon and Hood Canal summer-run chum critical habitat within the Action Area.

8.2 Determination of Effects on Marine Mammals

8.2.1 Humpback Whale

Humpback whale sightings are extremely rare in Hood Canal. One individual humpback whale was sighted several times in January and February 2012 (Orca Network 2012, Calambokidis pers. comm. 2012). However prior to these sightings, there were no confirmed reports of humpback whales entering Hood Canal (Calambokidis pers. comm. 2012). No other reports of humpback whales in the Hood Canal were found in the Orca Network database, the scientific literature, or agency reports. Therefore, it is unlikely that humpback whales would occur in the Action Area during relatively short duration of the project activities and a **may affect, not likely to adversely affect** determination is warranted for the humpback whale within the Action Area.

8.2.2 Eastern Steller Sea Lion DPS

Underwater and airborne sound levels from pile driving have the potential to harm or harass Steller sea lions that may occur within the vicinity of the Barge Mooring Project area. However, Steller sea lions have only been documented at NAVBASE Kitsap at Bangor from October through May, which is outside of the project timeframe. Additionally, mitigation measures including marine mammal monitoring conducted under the Marine Mammal Protection Act will make exposure to potential harmful effects of the project discountable. A **may affect, not likely to adversely affect** determination is warranted for the Eastern Steller sea lion DPS within the Action Area.

8.3 Determination of Effects on Marbled Murrelet

Underwater and airborne sound levels from pile driving have the potential to harm or harass (as defined by the ESA) marbled murrelets foraging and resting in the vicinity of the Barge Mooring Project site. However, it is expected marbled murrelets will not be exposed to injurious underwater sound pressure levels during the Barge Mooring project due to the location and configuration of the Service Pier, the small impact injury zone, and the mitigations proposed by the Navy (i.e., primarily vibratory installation method, daily timing restrictions, bubble curtain use, and monitoring).

Nearshore waters in the vicinity provide foraging habitat and prey species, and marbled murrelets have been observed in the area during the proposed in-water construction window.

Masking of marbled murrelet vocalizations due to in-air pile driving noise has the potential to affect foraging behavior and efficiency, however measureable effects to foraging due to potential masking effects are not anticipated. Construction activities may temporarily affect the presence of this species, such as water quality changes (turbidity) in nearshore habitat and dislocation of prey populations (benthic community and forage fish), however, these effects would be temporary and negligible. Therefore, an effect determination of **may affect, not likely to adversely affect i**s warranted for marbled murrelets within the Action Area.

9.0 Essential Fish Habitat Assessment

The BA sections of this document address federally listed species under the ESA, which include the following fish species: Chinook salmon, steelhead, chum salmon, bull trout, bocaccio rockfish, canary rockfish, and yelloweye rockfish. Of these species, Chinook salmon, bocaccio, canary, and yelloweye rockfish are also federally managed species for which EFH has been designated. The EFH evaluation requires consultation on the habitat for the species indicated in this assessment (i.e., Chinook, coho, and pink salmon; coastal pelagic species; and groundfish species).

9.1 EFH Background

The MSA, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), requires that the regional Fishery Management Councils (FMCs), through federal fishery management plans (FMPs), describe and identify EFH for each federally managed species; minimize, to the extent practicable, adverse effects on such habitat caused by fishing; and identify other actions to encourage the conservation and enhancement of such habitats. Congress defines EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (16 United States Code [USC] 1802[10]). The term "fish" is defined in the MSA as "finfish, mollusks, crustaceans, and all other forms of marine animals and plant life other than marine mammals and birds." The regulations for implementing EFH clarify that "waters" include all aquatic areas and their biological, chemical, and physical properties, while "substrate" includes the associated biological communities that make these areas suitable fish habitats (50 CFR 600.10). Habitats used at any time during a species' life cycle (i.e., during at least one of its lifestages) must be accounted for when describing and identifying EFH (NMFS 2002).

Authority to implement the MSA is given to the Secretary of Commerce through the NMFS. The MSA requires that EFH be identified and described for each federally managed species. The MSA also requires federal agencies to consult with the NMFS on activities that may adversely affect EFH or when the NMFS independently learns of a federal activity that may adversely affect EFH. The MSA defines an adverse effect as "any impact that reduces quality and/or quantity of EFH. Adverse effects may include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality and/or quantity of EFH. Adverse effects to EFH may result from actions occurring within EFH or outside of EFH and may include 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 of the greater Puget Sound are designated EFH for coastal pelagic, Pacific salmon, and groundfish species (PFMC 1998, 2003, 2008). This EFH Assessment analyzes the potential effects of Navy activities to fish and EFH in the context of the MSA. The Navy has determined an action may reduce the quantity or quality of EFH if it could be meaningfully measured or observed individually or cumulatively (regardless of duration or scale), or is likely to occur. Therefore even temporary and minimal effects result in a ***may adversely affect*** determination for EFH.

9.2 EFH Designations

EFH has been designated within Hood Canal or in the vicinity of NAVBASE Kitsap at Bangor for coastal pelagic, Pacific salmon, and Pacific coast groundfish species. A summary for each is described below.

9.2.1 Coastal Pelagic Species

EFH for 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. Though extremely rare over the past 30 years in nearshore surveys at NAVBASE Kitsap at Bangor (Schreiner et al. 1977; Prinslow et al. 1980; Bax 1983; SAIC 2006; Bhuthimethee et al. 2009a), two of these coastal pelagic species are known to occur in Hood Canal waters: northern anchovy and market squid. A table of these species/lifestages and their designated habitat is contained within the Appendix of this 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 (PFMC 1998). EFH for these species includes all estuarine and marine waters above the thermocline where sea surface temperatures range from 10 to 20ºC. These boundaries include the waters of NAVBASE Kitsap at Bangor.

Coastal pelagic species have value to commercial Pacific fisheries, and are also important as food for other fish, marine mammals, and birds. 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 at the Barge Mooring Project site.

Northern anchovy (*Engraulis mordax*) 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 upon by a variety of predators, including salmon and numerous fishes. Northern anchovy were collected in the vicinity of the project site in low numbers in the 2007 surveys (19 individuals), confirming occurrence of this species in the nearshore zone.

Market squid (*Loligo opalescens*) are harvested near the surface, but they can occur at great depths as well. They prefer the salinity of the ocean and are rarely found in estuaries, bays, or river mouths. They feed on copepods as juveniles and feed 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. Eggs are attached to the substrate in capsules and take up to three months to hatch depending on water temperature. They are important as forage foods to many fish such as Chinook salmon, coho salmon, lingcod, and rockfish. Market squid are commonly seen by sport divers in Hood Canal. In addition, market squid egg masses trawled from Hood Canal waters have been utilized as a source for laboratory rearing (Mackie 2008). However, only one market squid was captured in the nearshore beach seine surveys from 2005 to 2009, suggesting their presence may be limited in the nearshore waters in the vicinity of the Barge Mooring Project site.

9.2.2 Salmon

The Pacific salmon management unit includes Chinook, coho, and pink salmon. All three species use the marine nearshore environment for rearing as juveniles and migration for both adults and juveniles. The EFH designation for the Pacific 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 nautical miles) offshore (PFMC 2003). In addition to the 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 2003), including the waters of NAVBASE Kitsap at Bangor. Although there are no streams within the Barge Mooring Project area that support spawning habitat for these three salmon species, the nearshore waters where they discharge to the estuarine nearshore environment is protected as EFH based on the functions they provide, including nutrient loads, terrestrial and aquatic prey, chemical buffering, salinity buffering, and habitat structure (e.g., large woody debris). The nearest discharge is located 0.7 mile north of the Barge Mooring Project area.

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 2003). The most abundant Hood Canal forage fish species for salmonids include Pacific herring, surf smelt, and Pacific sand lance.

The current salmon FMP was adopted in 1999 and includes 14 subsequent amendments; amendment 14 addresses EFH and non-fishing impacts for salmon (PFMC 2003). The discussion of salmon EFH in the following subsections consists of information from this plan (and other sources as cited) that is relevant for consideration of impacts from construction and operation at the Barge Mooring Project site.

Juvenile salmon were present in the site-specific surveys, confirming yearly use of the NAVBASE Kitsap at Bangor shallow nearshore zone by juvenile Chinook and coho salmon, and even-year use by juvenile pink salmon (Bhuthimethee et al 2009a, b).

9.2.3 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 2008). PFMC (2008) 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 3,500 m (11,500 ft) to 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 during the period of average annual low flow.” Furthermore, the PFMC has also designated EFH for each individual groundfish species by lifestage (PFMC 2008). These designations are contained within Appendix B of the FMP. Using the Pacific Habitat Use Relational Database (HUD) developed by the PFMC, it was determined which groundfish species and lifestages have been EFH designated within the vicinity of the Barge

Mooring Project site. A table of these species/lifestages in Hood Canal waters is contained within the Appendix of this document. The management unit in the Pacific Coast Groundfish FMP includes 83 groundfish species (PFMC 2008). Of these, 32 were identified through the analysis of the HUD as having EFH designated in the vicinity of NAVBASE Kitsap at Bangor.

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 surveys at NAVBASE Kitsap at Bangor confirmed occurrence of eight groundfish species (dover sole, english sole, kelp greenling, lingcod, Pacific sanddab, rex sole, sand sole, and starry flounder) as well as unidentified flatfishes/sole species, and unidentified juvenile rockfish (*Sebastes spp.)* (Bhuthimethee et al 2009a). As indicated in above, 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.

9.3 Habitat Areas of Particular Concern (HAPCs)

In addition to EFH designations, areas called HAPCs are also designated by the regional FMCs. Designated HAPCs 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 (NMFS 2002). Categorization as an HAPC does not confer additional protection or restriction to the designated area.

9.3.1 Coastal Pelagic Species

No HAPCs have been formally designated for coastal pelagic species.

9.3.2 Salmon

Marine and freshwater EFH for salmon have been determined in the northwest, including landward limits of migration and spawning on freshwater streams. However, there is not sufficient quantity or resolution of data for formal HAPC designations for Chinook, coho, and pink salmon. According to the FMP, the focus of data compilation and habitat assessment efforts would generally be on identification, protection, and/or restoration of suitable spawning conditions in riffle and pool complexes in freshwater streams. However, off-channel rearing habitats in freshwater spawning streams, estuarine, and nearshore marine areas are considered vulnerable habitats in need of protection and restoration for each of the three salmonids protected by the EFH provisions of the MSA.

9.3.3 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 near the Barge Mooring Project site. Therefore, seagrass and estuarine habitats HAPC occur at the Barge Mooring Project site.

9.4 Description of Habitats

A detailed description of existing conditions for EFH designated habitats that occur in the vicinity of the Barge Mooring Project site is provided in Section 5 of this BA.

9.5 Assessment of Impacts

9.5.1 Impact to EFH

Section 7 provides a detailed discussion of the effects of the Barge Mooring Project on habitat conditions for fish. A brief summary of impacts with relevance for this EFH Assessment is provided below.

9.5.1.1 Construction and Operations Impacts

Construction will impact marine habitats used by fish through water column effects (underwater noise, water quality effects, and presence of physical barriers), and substrate effects (shading, physical disruption caused by pile-driving and anchoring), which will affect both non-vegetated and vegetated substrates. The greatest impact during construction will occur during pile driving. Pile driving will exceed the underwater noise thresholds for fish, established for both behavior and injury, and result in the greatest potential for adverse impacts to EFH. Positioning and anchoring the construction barge and pile driving units will locally increase turbidity, disturb benthic habitats and forage fish, and shade marine vegetation in the immediate project vicinity. Construction impacts to juvenile Chinook, coho, and pink salmon will be minimized by adhering to the in-water work period designated for northern Hood Canal waters (July 16-October 14), when juveniles of these species are least likely to occur in NAVBASE Kitsap at Bangor nearshore waters (SAIC 2006; Bhuthimethee et al. 2009a). This work period will provide protection for sensitive life stages of many of the relevant groundfish and coastal pelagic species as well.

9.5.1.1.1 ***Turbidity.***

Construction-related impacts to turbidity will be limited to short-term and localized changes associated with resuspension of bottom sediments during pile installation and placement and removal of barge anchors. Use of a bubble curtain to attenuate noise during pile-driving could result in increased, localized turbidity.

Nearshore habitat disturbance and localized turbidity increases could also affect the eggs and larvae of EFH species. Some species (e.g. market squid, Pacific sand lance) 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. While larvae of Pacific herring may benefit from increased feeding at moderately elevated levels of turbidity (Boehlert and Morgan 1985), other species may experience a decreased feeding rate under similar conditions (De Robertis et al. 2003). Although turbidity can improve the recruitment and 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). Although project-related changes in turbidity will be relatively small scale and localized, species for which EFH has been designated will be expected to experience different effects due to varying life histories.

Based on these analyses, any construction-generated turbidity effects will be spatially limited to the nearshore areas between -10 ft and -30 ft MLLW. Construction-related impacts will not violate applicable state or federal water quality standards. However, pile driving, anchor and spud placement, and vessel propeller wash will result in a reduction of the quality of water column EFH through the generation of small-scale and temporary increases in suspended sediments throughout the duration of construction activities.

9.5.1.1.2 Sediment

Construction activities will not have any effects on sediment quality, based on the uncontaminated nature of the existing sediment at the project site and lack of contributions of contaminants to the waterway from construction activities. Localized changes in grain size and organic content from sediment re-suspension during pile driving and anchor placement/removal will be negligible based on low organic content and coarse grain size of the sediments in the project area. Construction-related impacts to sediment quality will be limited to localized changes associated with disturbances of bottom sediments from pile installation and setting spuds and anchors for the barges. No long-term impacts to sediment quality are anticipated with operations at the Barge Mooring Project site.

9.5.1.1.3 Physical Barriers

The installed piles to support the relocated and new sections of the Port Operations float and new research barge may act as physical barriers within the habitat that serve as migratory pathways for salmonids. As 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 they encounter nearshore activities, adult salmonids could migrate around this activity with little or no overall delay in their movement. Nightingale and Simenstad (2001b) 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 2 in) migrate along the shoreline in waters less than 3 ft in depth (Schreiner 1977; Bax 1982; 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 1 to 3 inches long), which includes the intertidal zone to approximately -6 feet MLLW.” The Barge Mooring project construction will occur between -10 ft and -30 ft MLLW. As juvenile salmonids, notably coho, become larger they move further offshore into deeper waters (Bax et al. 1980).

Based on a conservative (i.e., broad) definition of the primary juvenile salmonid migratory pathway (12 ft above MLLW to -30 ft MLLW), construction disturbance will be minimal with up to 20 piles installed between -10 ft and -30 ft MLLW. Construction impacts in this zone that could constitute a barrier to salmonids, as well as other EFH species, include vessel shading, barge anchoring and spud/anchor dragging, pile driving, underwater noise, and turbidity plumes. Adherence to the time-of-year restriction specified to be protective of juvenile salmon will minimize concerns with barriers to migration during the peak juvenile migration period.

Long-term impacts would result in terms of physical barriers with placement of the piles. However, the total area created by the piles would be negligible in comparison to larger barriers that juvenile and adult salmon migrate around regularly.

9.5.1.1.4 Marine Vegetation

Construction effects on aquatic vegetation include direct physical disruption from pile driving, anchors/spuds scouring, and indirect effects from turbidity, sedimentation and shading. Procedures are in place as described in Section 5.4 to avoid the approximately 60 ft wide area of eelgrass located approximately 175 ft south of the proposed Port Operations float construction. A short-term reduction in light penetration from the barge and support vessels would temporarily reduce macroalgae occurring in the area. At the completion of the project and removal of shade-causing vessels, it is anticipated that macroalage would likely return to those areas. However, populations that occur within the footprint of each new pile, new research barge, and the Port Operations float would not return as the project will result in 18,201 ft^2 of new overwater shading.

9.5.1.1.5 Benthic Community Effects and Prey Availability

As described in Section 8.1.3.1, construction will result in localized reductions of benthic communities during construction. In the long-term, new overwater structures (research barge and float section) will create 18,201 ft^2 of shade that will likely reduce prey. Placement of the piles will also displace approximately 60 ft^2 of benthic habitat.

Fish species attempting to forage in the project area will experience a loss of available benthic prey at the project site due to these disturbances. Previous studies of dredged and other disturbed sites show that benthic and epibenthic invertebrates recolonize disturbed bottom areas well within 2 years of disturbance (CH2M Hill 1995; Parametrix 1994, 1999; Anchor Environmental 2002; Romberg 2005). Although a long-term loss of benthic prey would occur as a result of the shading and pile displacement, fish are likely to successful find prey adjacent to these areas.

9.5.1.1.6 Underwater Noise

Pile driving will result in increased noise levels in Hood Canal. Some noise will also be generated with support vessels, small boat traffic, and barge-mounted equipment, such as generators. However, the most significant in-water noise potentially affecting the quality of water column EFH will be created while driving piles using an impact hammer. As discussed in Section 7.2.1.7 and indicated in Table 7-2 and Figure 7-1, pile driving noise levels will be sufficient to cause fish injury over a distance of approximately 148 m for fish $\geq$2 g and a distance of 273 m for fish <2 g. Behavioral disturbance for fish of all sizes would carry out to a distance of approximately 3.4 km. Impacts to juvenile salmon will be minimized by conducting the work during the in-water work window when juveniles are less likely to be present. However, rockfish may be present at any time of the year and while studies have not been done on noise effects to rockfish or other groundfish species, it is safe to assume that impacts would not be different than those encountered by salmonids. In order to reduce noise impacts, a bubble curtain would be used during the short duration of the pile driving phase of the project (maximum of 10 days). Upon completion of the in-water construction activities, underwater noise will return to baseline levels, with no further impacts to EFH.

9.5.2 Potential Adverse Effects on Salmon EFH

The EFH designation for the Pacific salmon includes nearshore and tidal submerged environments and locations of freshwater discharges in the nearshore zone. 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 2003). Construction and operation at Barge Mooring Project site will not affect spawning habitats for Pacific salmon. Juveniles are known to migrate around piles regularly and as such no significant impacts are likely. Water quality may be reduced during pile installation but any effects are expected to be localized. Presence of the new larger barge would increase overwater coverage by 18,075 sq ft, however this change is anticipated to be insignificant because the barge is not located where it would impact salmon outmigration. Noise will be the main impact to fish during the construction period. Adhering to the regional work window designed to protect migrating juvenile Chinook, coho, and pink salmon and the use of a bubble curtain will minimize construction impacts to designated EFH. Adult salmon may be migrating through the action area, however they are not expected to remain in the area. The Barge Mooring Project **may adversely affect** EFH for Pacific salmon species, however any impacts will be short-term.

9.5.3 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 10-20°C. These boundaries include the waters of NAVBASE Kitsap at Bangor. 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 will be considered rare in the environments at NAVBASE Kitsap at Bangor, although presence in the nearshore zone has been documented with site-specific surveys (Bhuthimethee et al 2009a). Northern anchovy use estuarine habitats such as the intertidal zone, eelgrass, kelp, and macroalgae, and could therefore be affected by the impacts to designated EFH described in Section 9.2. However, northern anchovy spawn year-round and do not spawn on Puget Sound beaches (Penttila 2007) but rather in the water column.

Construction and operation at the Barge Mooring Project site will not cause an increase in fishing or entrainment through water intakes. Implementation of suitable BMPs, 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 at the Barge Mooring Project site.

Underwater noise, water column turbidity, shading effects, and physical disruption from pile driving activities, pile driving barge, and spud/anchoring systems during construction will create short-term (10 days maximum) disturbances in habitats used by coastal pelagic species. Permanent impacts to coastal pelagic EFH from installation of piles, and direct and indirect effects to macroalgae will be the same as described above for salmon EFH.

The presence of nearshore structures, consisting of piles and shading from the new research barge and Port Operations float, will not affect occasional transient occurrence of market squid or northern anchovy in the project vicinity. Therefore, construction and operation at the Barge

Mooring Project site **may adversely affect** habitats vital for the continuation of for coastal pelagic species, specifically northern anchovy, however any long-term effects are expected to be negligible.

9.5.4 Potential Adverse Effects on Groundfish EFH

Designated groundfish EFH includes all estuarine and marine waters from the mean higher high water 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, including 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 utilization of these habitat types, larval and juvenile groundfish (notably rockfish) are dependent on a variety of habitat factors, including suitable current patterns for larval transport to suitable recruitment habitat (i.e., kelp, eelgrass), good water quality, and abundant food resources.

Impacts to Pacific groundfish EFH from construction and operations at the Barge Mooring Project site will be similar to those described above for coastal pelagic and salmonid species. Therefore, construction and operations at the Barge Mooring Project site **may adversely affect** habitats vital for the continuation of Pacific groundfish species but any potential effects are expected to be short-term.

9.6 EFH Conservation Measures

Conservation measures that will be implemented to protect salmon would also be beneficial in protecting EFH and are discussed in detail in Section3.4. These measures would help to avoid or minimize adverse effects on designated EFH and include:

- All in-water work conducted within the condensed in-water work window (July 16 to October 14),
- Use of a vibratory pile driver instead of an impact pile driver, when possible to minimize harmful sound levels.
- Use of noise attenuation (bubble curtain) during impact pile driving activities, and
- Avoiding disturbance to the approximately 60 ft wide section of eelgrass located immediately south of and outside the project area.

9.7 Conclusion

Effects on EFH would be the same as those described for listed salmonids and rockfish that occur within the nearshore and marine areas as described in Sections 7.2.1.7. In summary, the project would affect fish habitat during the 10-day in-water pile driving activity through bottom disturbance, limited increases in turbidity, a slight reduction in water quality, and elevated noise levels. These effects would be minimized by implementing conservation measures designed to protect ESA-regulated species that would similarly protect and conserve coastal pelagic species EFH, Pacific salmon EFH, and groundfish EFH.

Table 9-1. EFH Effects Determination

EFH	EFH Effect Determination
Groundfish EFH	May adversely effect
Salmon EFH	May adversely effect
Coastal Pelagics EFH	May adversely effect

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Appendix

Species and Lifestages Belonging to the Pacific Coast Groundfish Management Unit with EFH Designated in the Vicinity of Hood Canal and NBK Bangor

Table A-1. Species and Lifestages Belonging to the Pacific Coast Groundfish Management Unit with EFH Designated in the Vicinity of Hood Canal and NBK Bangor

Species	Lifestage	Habitats Designated for Inland Seas (Puget Sound)		
		Level 2	Level 3	Level 4
Sharks, Rays, & Skates				
Big skate (*Raja binoculata*)	Adults	Benthos	Unconsolidated	Mixed mud/sand
				Mud
				Sand
	Eggs	Benthos	Unconsolidated	Unknown
	Juveniles	Benthos	Unconsolidated	Unknown
Longnose skate (*Raja rhina*)	Adults	Benthos	Unconsolidated	Unknown
Spiny dogfish (*Squalus acanthias*)	Adults	Benthos	Unconsolidated	Mud
		Intertidal Benthos	Unconsolidated	Mud
		Water Column	Epipelagic Zone	Unknown
	Juveniles	Benthos	Unconsolidated	Mud
		Intertidal Benthos	Unconsolidated	Mud
		Water Column	Epipelagic Zone	Unknown
Ratfish				
Spotted ratfish (*Hydrolagus colliei*)	Adults	Benthos	Hard Bottom	Bedrock
				Cobble
			Unconsolidated	Mud
	Eggs	Benthos	Hard Bottom	Bedrock
				Gravel/Cobble
			Unconsolidated	Sand
	Juveniles	Benthos	Hard Bottom	Bedrock
				Gravel/Cobble
			Unconsolidated	Mud
Roundfish				
Cabezon (*Scorpaenichthys marmoratus*)	Adults	Benthos	Hard Bottom	Bedrock
				Cobble
				Unknown
			Unconsolidated	Sand
			Vegetated Bottom	Algal Beds/Macro
				Rooted Vascular
		Intertidal Benthos	Tide Pool	Unknown
	Eggs	Benthos	Hard Bottom	Unknown
			Vegetated Bottom	Algal Beds/Macro
	Juveniles	Benthos	Hard Bottom	Bedrock
			Vegetated Bottom	Algal Beds/Macro

Table A-1. Species and Lifestages Belonging to the Pacific Coast Groundfish Management Unit with EFH Designated in the Vicinity of Hood Canal and NBK Bangor (continued).

Species	Lifestage	Habitats Designated for Inland Seas (Puget Sound)		
		Level 2	Level 3	Level 4
Roundfish (continued)				
Cabezon (*Scorpaenichthys marmoratus*)	Juveniles	Intertidal Benthos	Tide Pool	Unknown
		Water Column	Epipelagic Zone	Unknown
	Larvae	Water Column	Epipelagic Zone	Unknown
Kelp greenling (*Hexagrammos decagrammus*)	Adults	Benthos	Hard Bottom	Bedrock
				Unknown
			Vegetated Bottom	Algal Beds/Macro
	Eggs	Benthos	Hard Bottom	Unknown
			Vegetated Bottom	Algal Beds/Macro
	Juveniles	Benthos	Hard Bottom	Bedrock
			Vegetated Bottom	Algal Beds/Macro
		Water Column	Epipelagic Zone	Unknown
	Larvae	Water Column	Epipelagic Zone	Unknown
Lingcod (*Ophiodon elongatus*)	Adults	Benthos	Hard Bottom	Bedrock
				Boulder
			Vegetated Bottom	Algal Beds/Macro
				Rooted Vascular
	Eggs	Benthos	Hard Bottom	Bedrock
	Juveniles	Benthos	Unconsolidated	Gravel
				Mud
				Sand
	Larvae	Water Column	Epipelagic Zone	Unknown
Pacific whiting/hake (*Merluccius productus*)	Adults	Water Column	Epipelagic Zone	Unknown
	Juveniles	Water Column	Epipelagic Zone	Unknown
Sablefish (*Anoplopoma fimbria*)	Adults	Benthos	Unconsolidated	Mud
	Eggs	Water Column	Epipelagic Zone	Unknown
	Juveniles	Water Column	Epipelagic Zone	Unknown
	Larvae	Water Column	Epipelagic Zone	Unknown
Rockfish				
Black rockfish (*Sebastes melanops*)	Adults	Benthos	Artificial Structure	Artifical Reef
			Hard Bottom	Bedrock
				Boulder
			Vegetated Bottom	Algal Beds/Macro
				Rooted Vascular

Table A-1. Species and Lifestages belonging to the Pacific Coast Groundfish Management Unit with EFH Designated in the Vicinity of Hood Canal and NBK Bangor (continued).

Species	Lifestage	Habitats Designated for Inland Seas (Puget Sound)		
		Level 2	Level 3	Level 4
Rockfish (continued)				
Black rockfish (*Sebastes melanops*)	Adults	Water Column	Epipelagic Zone	Macrophyte Canopy
				Unknown
	Juveniles	Benthos	Artificial Structure	Artifical Reef
			Hard Bottom	Bedrock
				Boulder
			Tide Pool	Unknown
			Vegetated Bottom	Algal Beds/Macro
				Rooted Vascular
		Water Column	Epipelagic Zone	Macrophyte Canopy
				Unknown
Blue rockfish (*Sebastes mystinus*)	Adults	Benthos	Hard Bottom	Bedrock
			Vegetated Bottom	Algal Beds/Macro
		Water Column	Epipelagic Zone	Macrophyte Canopy
				Unknown
	Juveniles	Benthos	Hard Bottom	Bedrock
		Water Column	Epipelagic Zone	Macrophyte Canopy
				Unknown
	Larvae	Water Column	Epipelagic Zone	Unknown
Bocaccio (*Sebastes paucispinis*)	Juveniles	Benthos	Hard Bottom	Bedrock
		Water Column	Epipelagic Zone	Macrophyte Canopy
				Unknown
	Larvae	Water Column	Epipelagic Zone	Unknown
Brown rockfish (*Sebastes auriculatus*)	Adults	Benthos	Artificial Structure	Artifical Reef
			Hard Bottom	Bedrock
				Boulder
			Mixed Bottom	Sand/Rock
			Vegetated Bottom	Rooted Vascular
	Juveniles	Benthos	Hard Bottom	Bedrock
				Boulder
				Cobble
			Vegetated Bottom	Algal Beds/Macro
				Rooted Vascular
		Water Column	Epipelagic Zone	Unknown

Table A-1. Species and Lifestages Belonging to the Pacific Coast Groundfish Management Unit with EFH Designated in the Vicinity of Hood Canal and NBK Bangor (continued).

Species	Lifestage	Habitats Designated for Inland Seas (Puget Sound)		
		Level 2	Level 3	Level 4
Rockfish (continued)				
China rockfish (*Sebastes nebulosus*)	Adults	Benthos	Hard Bottom	Bedrock
				Boulder
				Cobble
			Vegetated Bottom	Algal Beds/Macro
		Unknown	Unknown	Unknown
	Juveniles	Benthos	Hard Bottom	Unknown
			Vegetated Bottom	Algal Beds/Macro
		Water Column	Epipelagic Zone	Unknown
Copper rockfish (*Sebastes caurinus*)	Adults	Benthos	Artificial Structure	Artifical Reef
			Hard Bottom	Bedrock
				Boulder
			Mixed Bottom	Sand/Rock
			Vegetated Bottom	Algal Beds/Macro
	Juveniles	Benthos	Hard Bottom	Bedrock
				Cobble
			Mixed Bottom	Sand/Rock
			Vegetated Bottom	Algal Beds/Macro
		Water Column	Epipelagic Zone	Drift Algae
				Macrophyte Canopy
				Unknown
Quillback rockfish (*Sebastes maliger*)	Adults	Benthos	Artificial Structure	Artifical Reef
			Mixed Bottom	Mud/Cobble
			Vegetated Bottom	Algal Beds/Macro
	Juveniles	Benthos	Biogenic	Sponges
			Hard Bottom	Unknown
			Mixed Bottom	Sand/Rock
			Vegetated Bottom	Algal Beds/Macro
				Drift Algae
				Rooted Vascular
	Larvae	Water Column	Epipelagic Zone	Unknown
Redstripe rockfish (*Sebastes proriger*)	Adults	Benthos	Hard Bottom	Unknown
		Water Column	Epipelagic Zone	Unknown
	Juveniles	Benthos	Hard Bottom	Unknown
			Mixed Bottom	Sand/Rock

Table A-1. Species and Lifestages Belonging to the Pacific Coast Groundfish Management Unit with EFH Designated in the Vicinity of Hood Canal and NBK Bangor (continued).

Species	Lifestage	Habitats Designated for Inland Seas (Puget Sound)		
		Level 2	Level 3	Level 4
Rockfish (continued)				
Redstripe rockfish (*Sebastes proriger*)	Juveniles	Water Column	Epipelagic Zone	Unknown
	Larvae	Water Column	Epipelagic Zone	Unknown
Silvergray rockfish (*Sebastes brevispinis*)	Adults	Benthos	Hard Bottom	Bedrock
				Boulder
Splitnose rockfish (*Sebastes diploproa*)	Juveniles	Water Column	Epipelagic Zone	Drift Algae
				Macrophyte Canopy
				Unknown
	Larvae	Water Column	Epipelagic Zone	Unknown
Tiger rockfish (*Sebastes nigrocinctus*)	Adults	Benthos	Hard Bottom	Bedrock
				Boulder
		Water Column	Epipelagic Zone	Unknown
	Juveniles	Benthos	Hard Bottom	Bedrock
		Water Column	Epipelagic Zone	Drift Algae
				Unknown
	Larvae	Water Column	Epipelagic Zone	Unknown
Widow rockfish (*Sebastes entomelas*)	Adults	Benthos	Hard Bottom	Bedrock
			Mixed Bottom	Mud/Rock
		Water Column	Epipelagic Zone	Unknown
	Juveniles	Benthos	Hard Bottom	Bedrock
			Unconsolidated	Unknown
			Vegetated Bottom	Algal Beds/Macro
		Water Column	Epipelagic Zone	Macrophyte Canopy
				Unknown
	Larvae	Water Column	Epipelagic Zone	Unknown
Yelloweye rockfish (*Sebastes ruberimus*)	Adults	Benthos	Hard Bottom	Bedrock
				Boulder
			Mixed Bottom	Mud/Boulders
	Juveniles	Benthos	Biogenic	Sponges
			Hard Bottom	Bedrock
	Larvae	Water Column	Epipelagic Zone	Unknown
Yellowtail rockfish (*Sebastes flavidus*)	Adults	Benthos	Hard Bottom	Bedrock
			Unconsolidated	Sand
			Vegetated Bottom	Algal Beds/Macro

Table A-1. Species and Lifestages Belonging to the Pacific Coast Groundfish Management Unit with EFH Designated in the Vicinity of Hood Canal and NBK Bangor (continued).

Species	Lifestage	Habitats Designated for Inland Seas (Puget Sound)		
		Level 2	Level 3	Level 4
Rockfish (continued)				
Yellowtail rockfish (*Sebastes flavidus*)	Juveniles	Benthos	Hard Bottom	Bedrock
			Unconsolidated	Sand
			Vegetated Bottom	Algal Beds/Macro
		Water Column	Epipelagic Zone	Unknown
Flatfish				
Butter sole (*Isopsetta isolepis*)	Adults	Benthos	Unconsolidated	Mud
				Sand
	Eggs	Water Column	Epipelagic Zone	Unknown
	Juveniles	Benthos	Unconsolidated	Mud
				Sand
	Larvae	Water Column	Epipelagic Zone	Unknown
English sole (*Parophrys vetulus*)	Adults	Benthos	Unconsolidated	Mixed mud/sand
				Mud
				Sand
	Eggs	Water Column	Epipelagic Zone	Unknown
	Juveniles	Benthos	Unconsolidated	Mixed mud/sand
				Mud
				Sand
Flathead sole (*Hippoglossoides elassodon*)	Adults	Benthos	Unconsolidated	Mixed mud/sand
				Mud
				Sand
	Juveniles	Benthos	Unconsolidated	Mixed mud/sand
				Mud
				Sand
Pacific sanddab (*Citharichthys sordidus*)	Adults	Benthos	Mixed Bottom	Sand/Gravel
				Sand/Rock
			Unconsolidated	Mud
				Sand
	Eggs	Water Column	Epipelagic Zone	Unknown
	Juveniles	Benthos	Mixed Bottom	Silt/Sand
			Unconsolidated	Sand
	Larvae	Water Column	Epipelagic Zone	Unknown
Petrale sole (*Eopsetta jordani*)	Adults	Benthos	Unconsolidated	Mixed mud/sand
				Mud
				Sand

Table A-1. Species and Lifestages Belonging to the Pacific Coast Groundfish Management Unit with EFH Designated in the Vicinity of Hood Canal and NBK Bangor (continued).

Species	Lifestage	Habitats Designated for Inland Seas (Puget Sound)		
		Level 2	Level 3	Level 4
Flatfish (continued)				
Petrale sole (*Eopsetta jordani*)	Juveniles	Benthos	Unconsolidated	Mixed mud/sand
				Mud
				Sand
Rex sole (*Glyptocephalus zachirus*)	Adults	Benthos	Unconsolidated	Mixed mud/sand
				Mud
				Sand
	Juveniles	Benthos	Unconsolidated	Mixed mud/sand
				Mud
				Sand
Rock sole (*Lepidopsetta bilineata*)	Adults	Benthos	Unconsolidated	Gravel
				Mixed mud/sand
				Sand
	Eggs	Benthos	Unconsolidated	Sand
	Juveniles	Benthos	Mixed Bottom	Sand/Gravel
			Unconsolidated	Gravel
				Mixed mud/sand
				Sand
	Larvae	Water Column	Epipelagic Zone	Unknown
Sand sole (*Psettichthys melanostictus*)	Adults	Benthos	Unconsolidated	Mixed mud/sand
				Mud
				Sand
	Eggs	Water Column	Epipelagic Zone	Unknown
	Juveniles	Benthos	Unconsolidated	Mixed mud/sand
				Mud
				Sand
		Water Column	Epipelagic Zone	Unknown
	Larvae	Water Column	Epipelagic Zone	Unknown
Starry flounder (*Platichthys stellatus*)	Adults	Benthos	Unconsolidated	Gravel
				Mixed mud/sand
				Mud
				Sand
	Eggs	Water Column	Epipelagic Zone	Sea water surface
	Juveniles	Benthos	Unconsolidated	Mixed mud/sand
				Mud
				Sand
	Larvae	Water Column	Epipelagic Zone	Unknown

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

NMFS Tracking No:
NWR-2012-9374

January 11, 2013

Captain PM Dawson
Department of the Navy
Naval Base Kitsap
120 South Dewey St
Bremerton, Washington 98314-5020

Re: Endangered Species Act section 7 informal consultation and Magnuson-Stevens Fishery Conservation and Management Act essential fish habitat consultation for the barge mooring project at Naval Base Kitsap, Bangor, Kitsap County, Washington (HUC 1711001808, Hood Canal Frontal; WRIA 15, Kitsap).

Attn: Tiffany Nabors

Dear Captain Dawson:

On November 8, 2012, the National Marine Fisheries Service (NMFS) received your request for written concurrence that the US Navy's (Navy) proposed action is not likely to adversely affect (NLAA) species listed as threatened or endangered or critical habitats designated under the Endangered Species Act (ESA). This response to your request was prepared by NMFS pursuant to section 7(a)(2) of the ESA, implementing regulations at 50 CFR 402, and agency guidance for preparation of letters of concurrence.[1]

NMFS also reviewed the proposed action for potential effects on essential fish habitat (EFH) designated under the Magnuson-Stevens Act (MSA), including conservation measures and any determination that you made regarding the potential effects of the action. This review was pursuant to section 305(b) of the MSA, implementing regulations at 50 CFR 600.920, and agency guidance for use of the ESA consultation process to compete EFH consultation.[2]

This letter is in compliance with section 515 of the Treasury and General Government Appropriations Act of 2001 (Data Quality Act) (44 U.S.C. 3504(d)(1) and 3516), and underwent pre-dissemination review using standards for utility, integrity, and objectivity.

[1] Memorandum from D. Robert Lohn, Regional Administrator, to ESA consultation biologists (guidance on informal consultation and preparation of letters of concurrence) (January 30, 2006).
[2] Memorandum from William T. Hogarth, Acting Administrator for Fisheries, to Regional Administrators (national finding for use of Endangered Species Act section 7 consultation process to complete essential fish habitat consultations) (February 28, 2001).

Consultation History

On November 8, 2012, NMFS received your request for concurrence with your determination that the project may affect, but would not adversely affect Puget Sound (PS) Chinook salmon (*Oncorhynchus tshawytscha*); Hood Canal summer-run (HCSR) chum salmon (*O. keta*); PS steelhead (*O. mykiss*); humpback whales (*Megaptera novaengliae*); Steller sea lions (*Eumetopias jubatus*); and the Puget Sound/Georgia Basin (PS/GB) distinct population segments (DPS) of yelloweye rockfish (*Sebastes ruberrimus*), canary rockfish (*S. pinniger*), and bocaccio (*S. paucispinis*). With the request for concurrence, NMFS received a biological assessment (BA) describing the proposed action and likely effects of the action.

On November 15, 2012, NMFS requested additional information about the manner in which the Navy proposed to minimize or mitigate the effects of the project on ESA-listed species, including the details of the proposed marine mammal monitoring plan. The Navy responded on November 19, 2012, via electronic mail stating that the Navy does not propose to mitigate the project and is not providing a marine mammal monitoring plan due to the extremely low likelihood of occurrence of marine mammals in the action area during project activities.

On November 26, 2012, the Navy confirmed via electronic mail that the Port Operations floats to be installed in this project would not be grated to allow even partial transmission of natural light to the nearshore marine waters and that the new barge will result in 22,100 square feet of overwater coverage in the nearshore. The barge will replace a 4,025 square-foot barge. The size and effects of the new barge (18,075 square feet of new overwater coverage in the nearshore marine area) are the same as that originally described in the BA.

On December 17, 2012, the Navy re-characterized the effects of the project by describing in an electronic mail that the barge is a transient vessel that should not be analyzed as nearshore overwater coverage, but as a normal vessel that will only sometimes occupy the mooring facility. Likewise, the barge replaces a similar vessel and will conduct the same activities as the previous vessel. Therefore, the scope of the project is the installation of mooring facilities. In a telephone conversation with Tiffany Nabors, the Navy's project manager, the Navy indicated that it would not describe the proportion of time the vessel would spend in the project area or away from the project area. The barge is intended to support ongoing research endeavors that require individual section 7 consultations under the ESA if they may affect ESA-listed species or their habitats, so the NMFS does not need to expand the project area to include the research operations of this barge. The same electronic mail quantified the area of structural components to be removed and installed during the proposed activities: a 510 square-foot gangway and eight piles totaling 41 square feet will be removed. The seven new floats to be installed are six times larger than described in the BA: each are 108 square feet each (12 feet wide), totaling 756 square feet of new floating piers. In addition, new piles totaling 60 square feet will be installed for a 543 square-foot net increase of overwater coverage.

A January 7, 2013, electronic mail from Tiffany Nabors detailed changes to the project design, including corrections to information provided in the BA as follows: (1) the project will require a total of twenty days of pile driving with up to 2,000 pile strikes per day; (2) removal of eight piles will total 29 square feet of pilings removed, a smaller area than originally estimated due to a greater abundance of smaller piles; (3) a 192-square foot platform will support an electrical transformer and will be supported by four 20-inch diameter steel piles; (4) four 48-inch diameter piles will support the barge; (5) the existing pile cap proposed for removal is 512 square feet in area; (6) the net amount of overwater coverage resulting from this project is 511 square feet, which includes the installation of 1,052 square feet of fixed overwater coverage and the removal of 541 square feet of fixed overwater coverage.

NMFS initiated informal consultation on the barge mooring project on December 17, 2012.

On January 10, 2013, the Navy notified NMFS via electronic mail that the Navy fully commits to cease or not begin pile driving if any ESA-listed marine mammals are observed within the project area. This email also noted the Navy's plan to mitigate this project via "in-lieu fee" mitigation credits in the Hood Canal. The Navy has not determined the amount of credits applicable to this project, so NMFS cannot consider the proposed mitigation.

Description of the Proposed Action and the Action Area

According to the BA, the Navy proposes to install mooring infrastructure for a research barge at the Naval Base Kitsap Bangor Service Pier using up to 20 steel piles ranging in size between 18 and 48 inches diameter. The piles will support new and relocated floating piers providing mooring for a barge. The relocated floats will remain at approximately the same distance from the shoreline and will sit over approximately the same depths as they do in the environmental baseline; the floats will simply be moved from the north side of the existing service pier to the south side; the shoreline is along a north-south orientation. Installation of seven new floats, each 108 square feet, will occur in the approximate location of the existing floats on the north side of the pier within an existing U-shaped overwater structure.

Piles installed to support the floats and barge will range from 20 to 48 inches in diameter. The Navy plans to drive up to four 18-inch piles, three 24-inch piles, five 36-inch piles, and eight 48-inch piles using, to the extent practical, a vibratory hammer and completing the installation with an impact hammer striking steel piles a maximum of 2,000 strikes per day (pile sizes refer to diameters). At this rate, the Navy will install and proof up to four piles per day over a period of up to 20 days.

The Navy will remove a mooring dolphin comprised of four 24-inch steel piles, four 30-inch piles, and a small gangway and concrete cap atop the mooring dolphin totaling 512 square feet. Any piles not fully extracted will be cut below the mud-line.

The Navy proposes to conduct all construction activities for this project between July 16 and September 30, 2013, to avoid effects of the project on juveniles of ESA-listed salmonids and ESA-listed marine mammals. The Navy commits to cease or not begin pile driving if any ESA-listed marine mammals are observed within the project area.

Action Area

The project area is approximately 5.5 acres of nearshore marine habitat. The nearest location of active work is approximately 220 feet horizontal distance waterward of the high tide line. The highest astronomical tide in the action area is approximately 1.8 feet above the mean higher high water. The date of the next highest astronomical tide is estimated by NMFS to be Jan 4, 2014.

The project area is a nearshore marine area containing a U-shaped Navy service pier with a long ramp connecting the pier to the land. The long ramp is significant because it is a critical design element that locates the floating infrastructure away from the shallow portion of nearshore marine habitats where juvenile Chinook salmon and juvenile HCSR chum preferentially migrate. Depths under the pier are 20 to 30 feet below low tide.

The action area includes the project area and all marine waters extending in a line of sight across Hood Canal to the Toandos Peninsula because this is the area in which vibratory pile driving will elevate inwater sounds to a level that may affect ESA-listed marine mammals. All other effects of the project on ESA-listed species, including expanded overwater coverage, elevated inwater sounds from impact pile driving and temporary impacts to water quality via elevated turbidity would be contained within that 4,480-acre action area. The action area is a wedge-shaped area between 221 degrees and 8 degrees from true north extending westward from the shoreline of the embayment that contains the project area to the highest astronomical tide line on the Toandos Peninsula.

Juvenile PS Chinook salmon and juvenile HCSR chum salmon use shallow nearshore habitat in the action area for rearing and migration, whereas adults of these species occupy deeper waters and primarily use the action are for migration and forage. Puget Sound steelhead migrate rapidly through the action area. The entire action area is designated as EFH for the Pacific Coast Salmon, Coastal Pelagic, and Pacific Coast Groundfish fishery management plans and is an estuarine Habitat Area of Particular Concern (HAPC).

ENDANGERED SPECIES ACT

Effects of the Action

For the purposes of the ESA, "effects of the action" means the direct and indirect effects of an action on the listed species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action (50 CFR 402.02). The applicable standard to find that a proposed action is NLAA on the listed species or critical habitat is that all of the effects of the action are expected to be discountable, insignificant, or completely beneficial.[3] Beneficial effects are contemporaneous positive effects without any adverse effects on the species. Insignificant effects relate to the size of the impact and should never reach the scale at which take occurs. Discountable effects are those effects that are extremely unlikely to occur.

[3] U.S. Fish and Wildlife Service and National Marine Fisheries Service. 1998. Endangered Species Act Consultation Handbook: Procedures for Conducting Section 7 Consultations and Conferences. March, 1998. Final. p. 3-12.

The proposed action is reasonably likely to include temporary direct effects on water quality from pile removal and pile driving activities resulting in (1) temporarily elevated turbidity in the nearshore marine environment, and (2) temporarily elevated inwater sounds throughout the action area and indirect effects on habitat structure in the nearshore marine environment resulting in an (3) expansion of anthropogenic overwater structures that will shade nearshore marine habitat for the life of the structures.

Puget Sound Chinook Salmon
Hood Canal Summer-Run Chum Salmon
Puget Sound Steelhead

The NMFS analyzed the potential effects of the project on PS Chinook salmon, HCSR chum salmon, and PS steelhead and determined the likely effects will be discountable or insignificant.

The direct effects of the project on ESA-listed salmonids in the action area will be discountable because inwater activities will occur during an approved work window between July 16 and September 30. The work window is a time when ESA-listed salmonids in the action area, if any, would be extremely low in numbers, and those present would be sufficiently mature to occupy deeper waters beyond the nearshore marine project area where project effects will be concentrated. Juveniles of these species would not occur in the action area during the work window. By working during this window, NMFS expects direct effects on ESA-listed salmon will be avoided.

The direct effects of the proposed project on ESA-listed salmonids will also be discountable because the project will elevate sounds that may injure fish over an extremely localized area for a short duration through impact pile driving during the work window. Underwater sound pressure levels and peak sounds resulting from pile removal and installation will be minimized through the use of a vibratory hammer as much as practical and the use of a sound-attenuating bubble curtain. Vibratory hammers are not known to produce sounds harmful to salmonids. If any adult individuals of ESA-listed fish occur in the action area during project activities, they are not likely to occur within the 190-foot radius ‘zone of potential harm’ where impact pile driving would elevate sounds to a level that could injure an adult fish. Approximately 45 percent of that zone is covered by existing Navy infrastructure and the entire zone is located waterward of the shallowest nearshore marine areas where juveniles would be concentrated at other times of year. The existing U-shaped infrastructure also serves as a floating perimeter around that zone, which encourages fish to occupy either the shallowest portions of the nearshore marine zone or to move out to deeper waters. Either direction they swim, salmonids would typically not occupy the zone of potential harm due to the orientation of existing infrastructure.

The direct effects of the proposed project on ESA-listed salmonids in the action area will be insignificant because the effects of construction will be extremely localized, minor in intensity, and short-term in duration. Sediments disturbed by pile removal and by pile installation will result in localized minor pulses of suspended sediments in the water column over a short duration. Because the intensity of sediment suspension is expected to be minor and localized, the project is not expected to result in sufficient turbidity to reduce dissolved oxygen, breathing efficiency, or predator avoidance. The maximum duration of inwater project activities is expected to be 40 days within the 76-day work window. The actual generation of turbidity is likely to occur during a small portion of each workday. Turbidity will return to baseline conditions shortly after construction.

The indirect effects of the project on ESA-listed salmonids are likely to be insignificant and would occur through moderate expansion of overwater coverage in a marine area where salmonids are already unlikely to occur due to the abundance and orientation of existing infrastructure. The existing floats form a U-shaped area within which the proposed floats would be located. Salmonids are likely to migrate around the U-shaped floats in the same manner after the proposed installation as they do in the current conditions. Therefore, while increasing overwater coverage in nearshore marine areas commonly results in hard shadows that alter salmonid migratory routes and, in turn, enhance the risk of predation on migrating juvenile salmonids, the specific location of the proposed floats tucked among existing floats minimizes the opportunity for the proposed floats to impact salmonids migration.

Based on the reasons described above, the NMFS concurs with your determination that the effects of the action may affect, but are not likely to adversely affect—NLAA—PS Chinook salmon, HCSR chum salmon, and PS steelhead.

Puget Sound/Georgia Basin Yelloweye Rockfish
Puget Sound/Georgia Basin Canary Rockfish
Puget Sound/Georgia Basin Bocaccio

The NMFS listed the PS/Georgia Basin DPSs of yelloweye rockfish and canary rockfish as threatened and bocaccio as endangered under the ESA on April 27, 2010 (75 FR 22276).

Rockfish fertilize their eggs internally and the young are extruded as larvae. Rockfish larvae are pelagic, often occupying the upper portion of the water column, under floating algae, detached seagrass, and kelp. Juvenile bocaccio and canary rockfish settle onto shallow nearshore waters in rocky or cobble substrate that support kelp growth at 3 to 6 months of age, and move to progressively deeper waters as they grow (Love et al., 1991, Love et al., 2002). Juvenile yelloweye rockfish do not typically occupy intertidal waters and shallow habitats (Love et al., 1991). Adult yelloweye rockfish, canary rockfish and bocaccio typically occupy waters deeper than 120 feet (Love et al., 2002).

The direct effects of the project on adults of ESA-listed rockfish are likely to be discountable. The distance over which impact pile driving may elevate inwater sounds to a level that could affect adult rockfish is approximately 190 feet. Within this area, shallow depths prevent occurrence of adult rockfish. The small area in which the project may elevate turbidity by disturbance of benthic sediments during pile removal and pile driving is also unlikely to affect deeper water habitats where adult rockfish may occur. Adults of ESA-listed rockfish could occur in deeper waters of the action area where the only effect of the project will be elevated inwater sounds from vibratory pile driving. Vibratory pile driving does not produce sound pressure levels or peak sound levels known to affect rockfishes.

The direct effects of the project on juveniles of ESA-listed rockfish are also likely to be discountable because they are also unlikely to occur within the zone of potential harm from pile driving. Juvenile rockfish may be affected by sound pressure levels or peak sounds generated by impact pile driving at a greater distance from the pile than the adults. Impact pile driving will elevate sounds to a level that may affect juveniles of ESA-listed rockfish within approximately 350 feet of the project. Juveniles are typically concentrated around eelgrass or floating kelps if they have not moved to deeper waters. While eelgrass occurs within 350 feet of the project area, the eelgrass bed is sheltered from the project area by Carlson Point, a small projection that would physically block the sounds generated by pile driving from reaching the existing eelgrass bed. Therefore, juveniles of ESA-listed rockfish that occur in the nearby eelgrass bed would not be exposed to the injurious sounds generated by impact pile driving.

The direct effects of the project on larvae of ESA-listed rockfish are likely to be insignificant because so few individual larvae will be exposed to the injurious sounds of pile driving that the effects would equate to a risk of exposure for much less than one adult-equivalent based on estimated densities of larval rockfish in Puget Sound waters and on their approximate survival rates between larval stages and maturity.

The direct effects of the project on all life stages of ESA-listed rockfish are likely to be insignificant because the project will temporarily elevate turbidity, but otherwise would not alter the habitat structure for rockfish in the action area. Although extreme levels of suspended sediments can essentially eliminate oxygen from the water column affecting all fish, moderately elevated turbidity is not a known stressor for ESA-listed rockfish. The project may elevate turbidity over a small area for a short duration, but this effect is not expected to be sufficiently intense as to reduce dissolved oxygen levels in the action area or in the project area.

Based on the reasons described above, the NMFS concurs with your determination that the effects of the action may affect, but are not likely to adversely affect—NLAA—PS/GB yelloweye rockfish, PS/GB canary rockfish, or PS/GB bocaccio.

Humpback Whale

The NMFS listed humpback whales as endangered throughout its range under the Endangered Species Conservation Act in 1970. In 1973, the ESA replaced the ESCA, and NMFS continued to list humpbacks as endangered. The ESA listing rule from 1970 is available at 35 FR 18319 and a draft recovery plan was completed in 1991 (55 FR 29646).

Ongoing threats to humpback whales result from subsistence hunting, interactions with fishing gear, collisions with ships, acoustic disturbance, habitat degradation, and competition with humans for resources. The major sources of acoustical disturbance that may affect humpback whales are offshore oil, gas or mineral exploration and exploitation because these activities produce loud sounds for seismic profiling in areas used by whales. Coastal development may be an ongoing threat to humpback whales in areas commonly used by the whales, such as Hawaiian coastlines and the coast of southern Baja California, a primary wintering ground for humpbacks of the Central California feeding aggregation.

The direct effects of the project on humpback whales are discountable because it is extremely unlikely that individuals of ESA-listed humpback whales will occur in the action area during project activities. Sightings of only one individual humpback whale in Hood Canal are recorded. This individual spent multiple months in or near the action area. Otherwise, humpback whale occurrences in Hood Canal are considered extremely unlikely to occur. Sightings reports do not account for observer effort, but likely provide a reliable estimation of humpback whale occurrence because the general public often reports whale sightings and because Hood Canal is a confined water body that provides a high detection probability for a large species like humpback whales, even without controlled observer effort. The Navy commits to cease or not begin pile driving if any ESA-listed marine mammals are observed within the project area.
In the extremely unlikely event that a humpback does occur in the action area during project activities and is not observed in the project area, the sounds from vibratory pile driving have the potential to disrupt foraging, navigation, or communication behaviors. However, the likelihood of exposure is discountable due to only one historical occurrence in the action area.

The indirect effects of the project on humpback whales are discountable and insignificant because the effects of shoreline development are not known to affect humpback whales in areas that are not commonly used by humpback whales.

Based on the reasons described above, the NMFS concurs with your determination that the effects of the action may affect, but are not likely to adversely affect—NLAA—humpback whales.

Eastern Distinct Population Segment of Steller Sea lions

The NMFS listed the Eastern distinct population segment (DPS) of Steller sea lions in 1990 (55 FR 49204) and proposed their delisting in 2012 (77 FR 23209).

The direct effects of the project on the Eastern DPS of Steller sea lions are discountable because it is extremely unlikely that individuals of this DPS will occur in the action area during project activities. The Navy has detailed records of Steller sea lion occurrence along the shoreline of the Naval Base Kitsap Bangor that demonstrate their occurrence in the action area is extremely unlikely during the work window. In fact, based on that data, the end of the work window was selected to avoid exposure of Steller sea lions to the direct effects of the project. Pile removal and pile driving—the project activities that may affect the Eastern DPS of Steller sea lions if individuals are exposed to the direct effects of construction—are planned to occur in the early portion of the work window to ensure the chance of exposure is extremely low. The Navy commits to cease or not begin pile driving if any ESA-listed marine mammals are observed within the project area. In the extremely unlikely event that a Steller sea lion does occur in the action area during project activities, the sounds from vibratory pile driving have the potential to disrupt foraging or navigation behaviors.

The indirect effects of the project on the Eastern DPS of Steller sea lions are likely to be insignificant because the project will not alter the habitat structure or prey resources in a manner that would change the likelihood or ability for Steller sea lions to use the habitat in the action area. The small addition of overwater coverage within the overall footprint of existing overwater coverage will not be significant to Steller sea lions.

Based on the reasons described above, the NMFS concurs with your determination that the effects of the action may affect, but are not likely to adversely affect—NLAA—the Eastern DPS of Steller sea lions.

Conclusion

Based on this analysis, NMFS concludes that all effects of the proposed action are NLAA the subject ESA-listed species.

Reinitiation of Consultation

Reinitiation of consultation is required and shall be requested by the Navy**,** or by NMFS, where discretionary Federal involvement or control over the action has been retained or is authorized by law and (1) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (2) the identified action is subsequently modified in a manner that causes an effect on the listed species or critical habitat that was not considered in this concurrence letter; or if (3) an additional species is listed or critical habitat designated that may be affected by the identified action (50 CFR 402.16). This concludes the ESA portion of this consultation.

MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT

For purposes of the MSA, EFH means "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity", and includes the associated physical, chemical, and biological properties that are used by fish (50 CFR 600.10), and "adverse effect" means any impact which reduces either the quality or quantity of EFH (50 CFR 600.910(a). Adverse effects may include direct, indirect, site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.

Effects of the Action

The NMFS determined the proposed action would adversely affect EFH by expanding the anthropogenic cover over nearshore marine habitats as a result of installing additional floats at the existing Service Pier at Naval Base Kitsap Bangor. The floats will interfere with light transmission to the nearshore marine habitat. Hard transitions from light to dark may alter the habitat suitability to a minor degree for certain fish species that use this EFH. Unlike natural cover of overhanging trees and undercut banks, the proposed floats will shade nearshore marine areas in waters 20 to 30 feet deep and several hundred feet offshore.

EFH Conservation Recommendations

NMFS determined that the following conservation recommendations are necessary to avoid, mitigate, or offset the impact of the proposed action on EFH.

(1) Install grating or other transparent materials into the surface of the floats to transmit natural light through the pier to the nearshore marine habitat.
(2) Remove an equal area of existing overwater structure as the new overwater structure to offset the effects of increased anthropogenic structures in the nearshore marine habitat.
(3) Purchase mitigation credits from the Hood Canal In-Lieu Fee mitigation program equal to three times the discounted-service-acre-years of the habitat impact to ensure the subsequent habitat enhancement project fully mitigates the effects of proposed action. On the occasion that a single mitigation project fails to fully provide the intended ecological functions, the three-to-one mitigation ratio is expected to provide adequate ecological function at the landscape level.

Implementation either of the first two conservation recommendations would enhance the habitat value of the three acres of estuarine HAPC directly within the project area by enhancing the light regimes of this habitat to a functional condition for numerous fish species. Implementation of the third conservation recommendation would enhance the habitat value of degraded habitat in Hood Canal equivalent to the habitat impacts of this project on the three acres of estuarine HAPC directly within the project area.

Statutory Response Requirement

Within 30 days after receiving these recommendations, you must provide NMFS with a detailed written response, 50 CFR 600.920(k)(1). If your response is inconsistent with the EFH conservation recommendations, you must explain why the recommendations will not be followed, including the scientific justification for any disagreements over the anticipated effects of the action and the measures needed to avoid, minimize, mitigate, or offset such effects.

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

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 conservation recommendations, 50 CFR 600.920(l).

Please direct questions regarding this letter to Marty Acker at the Washington State Habitat Office at (360) 534-9336 or via electronic mail at Marty.Acker@noaa.gov.

Sincerely,

William W. Stelle, Jr.
Regional Administrator

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

5090
PRB4/00268
15 Feb 13

Mr. Steve Landino
Attention: Marty Acker
National Marine Fisheries Service
510 Desmond Dr. SE, Suite 103
Lacey, WA 98503

Dear Mr. Landino:

SUBJECT: ESSENTIAL FISH HABITAT CONSERVATION RECOMMENDATIONS FOR THE BARGE MOORING PROJECT AT NAVAL BASE KITSAP BANGOR, SILVERDALE, WASHINGTON

On January 18, 2013, Naval Base (NAVBASE) Kitsap received your Essential Fish Habitat(EFH) Conservation Recommendations for the Barge Mooring project at NAVBASE Kitsap Bangor in Silverdale, WA (NMFS Tracking No: NWR-2012-9374). The following conservation recommendations were provided by the National Marine Fisheries Service (NMFS) for the Navy's project:

a. Install grating or other transparent materials into the surface of the floats to transmit natural light through the pier to the nearshore marine habitat.

b. Remove an equal area of existing overwater structure as the new overwater structure to offset the effects of increased anthropogenic structures in the nearshore marine habitat.

c. Purchase mitigation credits from the Hood Canal In-Lieu Fee (ILF) mitigation program (Hood Canal Coordinating Council ILF program) equal to three times the discounted-service-acre-years of the habitat impact to ensure the subsequent habitat enhancement project fully mitigates the effects of proposed action. On the occasion that a single mitigation project fails to fully provide the intended ecological functions, the three-to-one mitigation ratio is expected to provide adequate ecological function at the landscape level.

d. Pursuant to section 305(b)(4)(B) of the Magnuson-Stevens Fishery Conservation Management Act (MSA), the Navy is required to respond to your Conservation Recommendations within 30 days of receipt. The purpose of this letter is to provide the Navy's response in accordance with the MSA.

e. The Navy has given full consideration to the Conservation Recommendations provided by NMFS and will be implementing recommendation number (2). Recommendation numbers (1) and (3) will not be implemented. Below is a detailed response to each conservation recommendation which provides justification for the Navy's decision.

(1) Install grating or other transparent materials into the surface of the floats to transmit natural light through the pier to the nearshore marine habitat.

f. The project will be unable to incorporate this recommendation as requested by NMFS. The floats are standard pre-constructed items matched with the existing floats. Installing a grate would require redesigning all the floats in a manner that would support the dimensions and the weight of a grate. This is the only way that structural integrity could be maintained. The Navy has determined that changing the design and construction of these standard items would result in additional overwater cover for the same load design.

(2) Remove an equal area of existing overwater structure as the new overwater structure to offset the effects of increased anthropogenic structures in the nearshore marine habitat.

g. After reviewing the project design and a conducting a site visit, it was determined that some of the infrastructure currently supporting the existing barge would no longer be needed due to the planned reconfiguration of the Port Operation floats. The Navy will remove at least 511 sq ft of additional overwater structures at the Service Pier to offset the new overwater covering resulting from the Barge Mooring project. Infrastructure to be removed could include, but would not be limited to, the pedestrian brow, pedestrian brow floats, and the existing maintenance platform float. These structures would be removed after the new barge mooring location and floats are in service.

SUBJECT: ESSENTIAL FISH HABITAT CONSERVATION RECOMMENDATIONS FOR THE BARGE MOORING PROJECT AT NAVAL BASE KITSAP BANGOR, SILVERDALE, WASHINGTON

(3) Purchase mitigation credits from the Hood Canal ILF mitigation program (Hood Canal Coordinating Council ILF program) equal to three times the discounted-service-acre-years of the habitat impact to ensure the subsequent habitat enhancement project fully mitigates the effects of proposed action. On the occasion that a single mitigation project fails to fully provide the intended ecological functions, the three-to-one mitigation ratio is expected to provide adequate ecological function at the landscape level.

h. As NMFS stated in their letter regarding Endangered Species Act Section 7 informal consultation and MSA EFH consultation for the project, the Navy initially intended to purchase credits from the Hood Canal Coordinating Council (HCCC) ILF program in order to compensate for aquatic resources damaged by additional overwater coverage. However, as described under Recommendation 2 above, the Navy now intends to remove an equivalent square footage from an existing overwater structure so that there is no net increase in the area of overwater coverage. Therefore, compensatory mitigation for damages to aquatic resources through the ILF program will not be required.

i. The primary goal of the ILF program is to replace functions and values of aquatic resources and associated habitats that have been degraded or destroyed as a result of activities conducted in compliance with or in violation of Section 404 of the Clean Water Act of 1972 and/or Section 10 of the Rivers and Harbors Act of 1899. With respect to the 3:1 Mitigation Ratio, the ILF program is designed to provide full mitigation for damages to aquatic resources. The ILF price structure reflects full-cost accounting for the establishment and management of mitigation sites and that includes contingencies

j. The Navy recognizes that light transmission to the nearshore marine habitat is an important component of nearshore habitat and strives to protect the overall health of the nearshore. The Navy will continue to include conservation measures in its projects that will minimize or avoid impacts to nearshore habitat.

SUBJECT: ESSENTIAL FISH HABITAT CONSERVATION RECOMMENDATIONS FOR THE BARGE MOORING PROJECT AT NAVAL BASE KITSAP BANGOR, SILVERDALE, WASHINGTON

The Navy appreciates the NMFS Northwest Regional office's review and input on the Barge Mooring project. If you have any further questions please contact Ms. Tiffany Nabors at (360)315-2531 or tiffany.nabors@navy.mil.

Sincerely,

P. M. DAWSON
Captain, U. S. Navy
Commanding Officer

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Washington Fish and Wildlife Office
510 Desmond Dr. SE, Suite 102
Lacey, Washington 98503

JAN 28 2013

In Reply Refer To:
01EWFW00-2013-I-0043

Captain P. M. Dawson
Department of the Navy
Naval Base Kitsap Bangor
ATTN: Tiffany Nabors
120 South Dewey St.
Bremerton, Washington 98314

Dear Captain Dawson:

Subject: Barge Mooring Project at Naval Base Kitsap Bangor

This is in response to your November 5, 2012, letter requesting our concurrence with your determination that the proposed action in Hood Canal, Kitsap County, Washington, would "not likely adversely affect" federally listed species. Photocopies from your transmittal document(s) and email describing the proposed action are enclosed.

Specifically, you requested informal consultation pursuant to section 7(a)(2) of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) for the federally listed species identified below (only those species that have been checked are addressed in this consultation request (See Enclosure).

☒ Bull trout (*Salvelinus confluentus*)

☒ Marbled murrelet (*Brachyramphus marmoratus*)

Based on the information provided in and/or with your cover letter and any additional information, we have concluded that effects of the proposed action to the above-identified federally listed resources would be insignificant and/or discountable. Therefore, for the reasons identified in the enclosures to this letter, we concur with your determination that the proposed action is "not likely to adversely affect" the above-identified federally listed resources. This letter and its enclosures constitute a complete response of the U.S. Fish and Wildlife Service to your request for informal consultation.

This concludes consultation pursuant to the regulations implementing the Endangered Species Act (50 CFR 402.13). This project should be re-analyzed if new information reveals effects of the action that may affect listed species or critical habitat in a manner, or to an extent, not considered in this consultation. The project should also be re-analyzed if the action is subsequently modified in a manner that causes an effect to a listed species or critical habitat that was not considered in this consultation, and/or a new species is listed or critical habitat is designated that may be affected by this project.

Our review and concurrence with your effect determination is based on the implementation of the project as described. It is the responsibility of the Federal action agency to ensure that projects that they authorize or carry out are in compliance with the regulatory permit and/or the ESA, respectively. If a permittee or the Federal action agency deviates from the measures outlined in a permit or project description, the Federal action agency has the obligation to reinitiate consultation and comply with section 7(d).

If you have any questions about this letter or our joint responsibilities under the Endangered Species Act, please contact the consultation biologist identified below, of this office.

U.S. Fish and Wildlife Service Consultation Biologist(s):

☒ Nancy Brennan-Dubbs (360 / 753-5835)

Sincerely,

Martha L. Jensen

for Ken S. Berg, Manager
Washington Fish and Wildlife Office

Enclosures
Appendix 1 Checklist(s)

☒ WDOE, Bellevue, WA (R. Padgett)

U.S. FISH AND WILDLIFE SERVICE
WASHINGTON FISH AND WILDLIFE OFFICE

BULL TROUT
ENDANGERED SPECIES ACT
SECTION 7 INFORMAL CONSULTATION CONCURRENCE RATIONALE

Project Name: Barge Mooring Project at Naval Base Kitsap Bangor

DIRECT EFFECTS

1. Bull trout are not expected to be in the action area either because of the location of the action or because the action would occur during the recommended work window when bull trout are not anticipated to occur in the project area. Therefore, direct effects to bull trout from the proposed project would be discountable because of the following:

   ☒ The action area of the proposed project is located in or adjacent to the Kitsap Peninsula, including the eastern shore of Hood Canal, as well as Vashon and Bainbridge Islands, where, at the present time, bull trout occurrence in marine waters and their freshwater tributaries is very rare.

INDIRECT EFFECTS

1. Bull trout are not expected to be in the action area; therefore, indirect effects from operation of the proposed action and use of the facility after construction (if applicable) would be discountable because of the following:[1]

   ☒ The action area of the proposed project is located in or adjacent to the Kitsap Peninsula, including the eastern shore of Hood Canal, as well as Vashon and Bainbridge Islands, where, at the present time, bull trout occurrence in marine waters and their freshwater tributaries are very rare. Therefore, exposure of bull trout to the indirect effects of the proposed action is extremely unlikely.

2. Bull trout may or may not occur in the action area; however, effects to bull trout via their prey resources would be insignificant because of the following:

   ☒ The proposed action would not impact a documented or potential forage fish spawning area and would occur during the recommended work window for the project area (July 16 to September 30) when bull trout prey species are not likely to be affected to any appreciable degree (i.e., some fish may be affected). Therefore, effects to bull trout via reduced forage fish abundance are not expected to be measurable.

---

[1] Many areas of Puget Sound contain high-value spawning habitat for bull trout prey resources such as surf smelt (*Hypomesus pretiosus*), sand lance (*Ammodytes hexapterus*), and Pacific herring (*Clupea harengus*). This determination may not be appropriate for projects that would have significant, long-term negative effects to bull trout prey resources.

Consulting Biologist:	Nancy Brennan-Dubbs FWS Project Biologist	Date: January 22, 2013
Concurrence approved by:	Matthew L. Jensen Federal Activities Branch Supervisor	Date: 1/28/13

Note: The rationale expressed in this informal section 7 concurrence rationale checklist represents our current understanding of the effects of some commonly permitted federal actions to bull trout. This document does not express all possible rationale for insignificant or discountable effects to bull trout. This document is subject to change at any time due to the collection of new information or the need to clarify our rationale. However, any future changes to this concurrence rationale document would not be expected to necessitate reinitiation on previously completed consultations. Please see the "reinitiation" paragraph of the cover letter for a discussion of reinitiation triggers.

U.S. FISH AND WILDLIFE SERVICE
WASHINGTON FISH AND WILDLIFE OFFICE

MARBLED MURRELET AND MARBLED MURRELET CRITICAL HABITAT
ENDANGERED SPECIES ACT
SECTION 7 INFORMAL CONSULTATION CONCURRENCE RATIONALE

Project Name: Barge Mooring Project at Naval Base Kitsap Bangor

MARBLED MURRELET CRITICAL HABITAT

☒ The proposed project, including indirect effects, will not occur within marbled murrelet critical habitat.

DIRECT EFFECTS

Nesting Marbled Murrelets

The project will not result in the destruction or modification of suitable marbled murrelet nesting habitat and

☒ The project is more than 0.25 mile from suitable marbled murrelet nesting habitat and does not include blasting, low-elevation (< 500 ft) aircraft operations, impact pile driving, or other activities that could produce sound above 92 dB SEL. Thus, nesting marbled murrelets and their young are extremely unlikely to be exposed to project stressors (sound and visual disturbance) while on the nest or in the nest stand. Therefore, the effects of the proposed action to nesting marbled murrelets would be insignificant and discountable.

Foraging

☒ The proposed project is not expected to result in sound pressure levels that would measurably affect marbled murrelets. Therefore, effects to marbled murrelets would be insignificant.

☒ Other: Marbled murrelets may be present during the proposed action. The applicant proposes to implement marbled murrelet surveys to protocol during impact pile driving. With implementation of the surveys to protocol, the likelihood of marbled murrelets being exposed to sound pressures that may result in injury or masking is extremely unlikely. Therefore, the effects to marbled murrelets due to impact pile driving are considered discountable. Additionally, the Navy will not commence in-water work until a marbled murrelet survey protocol has been approved by the U.S. Fish and Wildlife Service.

Turbidity and Other Environmental Contaminants

- ☒ The proposed project is not expected to release or introduce environmental contaminants into or adjacent to the aquatic environment. Therefore, effects to marbled murrelets via direct exposure or uptake of contaminants will not occur.

- ☒ Project activities will cause temporary periods of elevated turbidity. Marbled murrelets are diving seabirds that rely on eyesight when hunting fish underwater. Because foraging efficiencies are appreciably reduced by high levels of turbidity, it is likely that marbled murrelets will avoid the area during dredging/construction. However, the area of impact is relatively small/or isolated (within proximity of the pile) and/or there are ample foraging opportunities adjacent to the project site and effects to foraging marbled murrelets are not expected to be measurable. Therefore, effects to marbled murrelets are considered insignificant.

INDIRECT EFFECTS

Disturbance (Foraging)

- ☒ The indirect effects associated with operation of the completed action and use of the facility are not expected to result in sound pressure levels above background; therefore, disturbance of marbled murrelets is not anticipated to be measurable. Thus, effects to marbled murrelets would be insignificant.

Prey Resources[1]

- ☒ The proposed project is not located in a documented or potential forage fish spawning area. Construction and operation of the completed action and use of the facility will not appreciably affect forage fish populations. Therefore, effects to marbled murrelets via their prey resources are considered discountable.

Contaminants

- ☒ Operation of the proposed action and use of the facility are not expected to release or introduce environmental contaminants into or adjacent to the aquatic environment. Therefore, effects to marbled murrelets via exposure and/or uptake of contaminants will not occur.

- ☒ Operation of the proposed project and use of the facility is expected to re-suspend minor amounts of suspended sediments for a short time period; however, due to the low levels of turbidity and/or duration of exposure, the effects to marbled murrelets via their prey will not be measurable. Therefore, effects to marbled murrelets via exposure to suspended sediments are expected to be insignificant.

[1] Many areas of Puget Sound contain high-value spawning habitat for marbled murrelet prey resources such as surf smelt (*Hypomesus pretiosus*), sand lance (*Ammodytes hexapterus*), and Pacific herring (*Clupea harengus*). This determination may not be appropriate for projects that would have significant, long-term negative effects to marbled murrelet prey resources.

Consulting Biologist: Nancy Brennan-Dubbs
FWS Project Biologist
Date: January 22, 2013

Concurrence approved by: Martha L. Jensen
Federal Activities Branch Supervisor
Date: 1/28/13

Note: The rationale expressed in this informal section 7 checklist represents our current understanding of the effects of some commonly permitted federal actions to marbled murrelet. This document does not express all possible rationale for insignificant or discountable effects to marbled murrelet. This document is subject to change at any time due to the collection of new information or the need to clarify our rationale. However, any future changes to this concurrence rationale document would not be expected to necessitate reinitiation on previously completed consultations. Please see the "reinitiation" paragraph of the cover letter for a discussion of reinitiation triggers.

Executive Summary

Naval Base Kitsap proposes to install mooring for a new research barge at the Naval Base Kitsap at Bangor Service Pier using piles. Commander Submarine Development Squadron Five is the (CSDS-5) U.S. Department of the Navy (Navy's) working repository for deep ocean technology and the operational, at-sea application of that technology, Up to 20 steel piles ranging in size from 18-inch diameter to 48-inch diameter would be required to efficiently moor a new larger research barge equipped with upgraded technology necessary for CSDS-5 to continue their mission. These piles would also support the relocation of existing Port Operations mooring floats to the south side of the Service Pier trestle. These actions will collectively be referred to as the Barge Mooring Project for purposes of impact analysis presented in this Biological Assessment and Essential Fish Habitat Assessment.

The purpose of this Biological Assessment is to determine whether the Navy's Barge Mooring Project would affect species and designated critical habitat listed under the Endangered Species Act. The Biological Assessment identifies the potential project effects, including direct and indirect actions, and states conservation measures planned to mitigate potential impacts. Table ES-1 provides a list of species and critical habitat analyzed for effects and the effects determinations.

Pile driving noise could potentially result in behavioral disturbance of Endangered Species Act-listed fish (salmonids and rockfish), humpback whale, Steller sea lion, and marbled murrelet. There is also a potential for injury to fish species from pile driving activities. Short-term and long-term impacts (shading, seafloor displacement by piles, and water quality effects) to the benthic community, could affect Endangered Species Act-listed fish species directly and all species indirectly through effects on habitat and prey resources. To minimize impacts to salmonids and forage fish, the project would be completed within the in-water work window for salmon species and forage fish species of July 16-October 14, with a total pile driving duration of 10 working days and remaining construction completed by the end of September. Piles would be primarily installed using a vibratory pile driver, and installation may need to be completed using an impact hammer. Marine mammal and marbled murrelet monitoring will be conducted during pile driving, and work will shut down when animals come within distances where injury could potentially occur. Bubble curtain technology will be used for impact pile driving to attenuate noise level and reduce potential impacts on listed species.

The purpose of this Essential Fish Habitat Assessment is to determine whether the Navy's Barge Mooring Project would affect Essential Fish Habitat managed under the Magnuson-Stevens Fishery Conservation and Management Act. The Essential Fish Habitat Assessment is contained in Chapter 9 of this document. The Navy has determined that the project may adversely affect Pacific Groundfish, Pacific Coast Salmon, and Coastal Pelagics Essential Fish Habitats (Table ES-2), however due to the duration of activities and with implementation of conservation and minimization measures, the effects are anticipated to be temporary and minimal.

BISON CONNECT

RE: Barge Mooring Murrelet consultation

Nabors, Tiffany L CIV NAVFAC NW, EV1 <tiffany.nabors@navy.mil> Tue, Jan 15, 2013 at 3:14 PM
To: "BrennanDubbs, Nancy" <nancy_brennandubbs@fws.gov>

Nancy,

In-water construction will not occur until the USFWS had approved the mamu monitoring plan.

Thanks,
Tiffany

-----Original Message-----
From: BrennanDubbs, Nancy [mailto:nancy_brennandubbs@fws.gov]
Sent: Tuesday, January 15, 2013 14:55
To: Nabors, Tiffany L CIV NAVFAC NW, EV1
Subject: Re: Barge Mooring Murrelet consultation

Tiffany, please indicate that in-water construction will not occur until the USFWS had approved the mamu monitoring plan. Thanks, Nancy

Nancy Brennan-Dubbs
Fish and Wildlife Biologist
Consultation and Conservation Planning Division
US Fish and Wildlife Service
510 Desmond Dr. SE Suite 102
Lacey, Washington 98503
360-753-5835
nancy_brennandubbs@fws.gov

On Tue, Jan 15, 2013 at 2:53 PM, Nabors, Tiffany L CIV NAVFAC NW, EV1 <tiffany.nabors@navy.mil> wrote:

Hi Nancy,

One more detail regarding monitoring- Construction will not begin until a monitoring plan has been developed in coordination with USFWS.

Thanks,
Tiffany

-----Original Message-----
From: Nabors, Tiffany L CIV NAVFAC NW, EV1
Sent: Tuesday, January 15, 2013 13:55
To: 'BrennanDubbs, Nancy'
Subject: RE: Barge Mooring Murrelet consultation

Hi Nancy,

I met with the project team today regarding the Barge Mooring project. As I've mentioned previously, they have stated 20 days would be necessary for pile installation during the project. However, based on sediment data for the project location, they are anticipating 20 days would be the maximum amount of time necessary for vibratory installation. They don't expect to have to impact drive all of the piles and therefore anticipate they could complete the impact portion of the project with less days. So, we would like to modify the proposed action to state that a maximum of 13 days of impact pile driving would occur, with 1800 strikes per day, and 30 minutes per day. All pile driving will be completed by September 30. Monitoring of the masking zone would occur according to protocol.

Based on your email below and our discussions, this would reduce the probability of marbled murrelet masking exposure in your calculations to an extremely low likelihood. While I understand that you may need additional information as you write your LOC, I would greatly appreciate it if you could please confirm that these project changes provide you with a low enough exposure probability that we can proceed with the ESA consultation informally.

In order to complete the NEPA process with enough to time to begin the project on schedule and complete construction by the September 30 date, it is critical that we complete ESA consultation as soon as possible. As we discussed previously, we would like to complete consultation by Feb 1. I know this is a short timeframe, so if you need any additional project information, please don't hesitate to ask. I'm available all week to discuss any details, such as monitoring.

Thanks Nancy, and I look forward to talking with you at your earliest convenience.

Thanks,
Tiffany

Tiffany Nabors
Naval Facilities Engineering Command, NW
1101 Tautog Circle, Suite 203
Silverdale, WA 98315-1101
tiffany.nabors@navy.mil
(360)315-2531

-----Original Message-----
From: BrennanDubbs, Nancy [mailto:nancy_brennandubbs@fws.gov]
Sent: Wednesday, December 19, 2012 11:24
To: Nabors, Tiffany L CIV NAVFAC NW, EV1
Cc: Schwinn, Michael A CIV NAVFAC NW, OP3E22; Keasler, Ben CIV NAVFAC NW
Subject: Re: Barge Mooring Murrelet consultation

Tiffany, I made a few changes - they are in red. Please let me know if you have any questions or comments.
Sincerely, Nancy

On Mon, Dec 17, 2012 at 4:17 PM, Nabors, Tiffany L CIV NAVFAC NW, EV1 <tiffany.nabors@navy.mil> wrote:

Hi Nancy,

I wanted to follow up our discussion today regarding the Barge Mooring project. Please let me know if I am correctly summarizing what you said today concerning the marbled murrelet consultation.

Assuming 10 days of impact pile driving and 1800 strikes per day, USFWS would concur with a NLAA for the injury zone as long as monitoring was performed according to USFWS protocol. No hydroacoustic monitoring would be required.

Our effect determination in the BA was NLAA for masking based on the duration of pile driving and the low likelihood of murrelets foraging at the project site due to the site specific conditions. However, you stated that USFWS will consider any exposure to masking an adverse effect, regardless of the duration of the exposure. Based on your calculations using 10 days of pile driving, you stated the project would result in a formal consultation. We also discussed monitoring the masking zone and you stated that monitoring would not reduce the likelihood of exposure to such a degree as to result in us considering it "discountable" that marbled murrelets would not be exposed to the proposed action. Monitoring for this project will minimize the exposure, but not preclude it.

You mentioned you were going to re-run your probability calculations so I just wanted to make sure that this is correct. Also, it would be helpful for us to know what number of days pile driving could occur and still result in a NLAA concurrence. Less days may not be feasible but I would like to provide this information to the project team just in case.

As stated in my phone call yesterday afternoon, I can run the calculations based on different assumptions, including number of days of impact pile driving and duration of pile driving per day. These calculations go into different calculators. Currently, for the duration per day, I am assuming 50 strikes per minute. Therefore, 1,800 strikes will take approximately 36 minutes (1800/50) per day. Only 4 piles per day are anticipated to be installed, so each pile would receive about 450 strikes based on this assumption.

Based on 30 min a day impact pile driving duration and fully implementing a marbled murrelet monitoring survey protocol, impact pile driving could occur for up to 13 days if completed by Sept 30 and have an extremely low likelihood of exposing a marbled murrelet to masking effects. Please let me know if the Navy would like to modify the proposed action.

As we discussed, I'm on leave until the 31st. Ben Keasler, the NEPA project manager, or my supervisor Mike Schwinn, cc'd, may be able to answer questions while I'm gone.

Thanks,
Tiffany

Tiffany Nabors
Naval Facilities Engineering Command, NW
1101 Tautog Circle, Suite 203
Silverdale, WA 98315-1101
tiffany.nabors@navy.mil
(360)315-2531

-

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APPENDIX E: NOISE DEFINITIONS, FUNDAMENTALS OF SOUND

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APPENDIX E

FUNDAMENTALS OF SOUND

Sound is a physical phenomenon consisting of minute vibrations that travel through a medium, such as air or water. Sound is generally characterized by several factors, including frequency and intensity. Frequency describes the sound's pitch and is measured in hertz (Hz), while intensity describes the sound's loudness. Due to the wide range of pressure and intensity encountered during measurements of sound, a logarithmic scale is used. In acoustics, the word "level" denotes a sound measurement in dBs. A decibel (dB) expresses the logarithmic strength of a signal relative to a reference. Because the decibel is a logarithmic measure, each increase of 20 dB reflects a ten-fold increase in signal amplitude (whether expressed in terms of pressure or particle motion), i.e., 20 dB means ten times the amplitude, 40 dB means one hundred times the amplitude, 60 dB means one thousand times the amplitude, and so on. Because the decibel is a relative measure, any value expressed in decibels is meaningless without an accompanying reference. In describing underwater sound pressure, the reference amplitude is usually 1 microPascal (μPa, or 10^{-6} Pascals), and is expressed as "dB re 1 μPa." For in-air sound pressure, the reference amplitude is usually 20 μPa and is expressed as "dB re 20 μPa."

The method commonly used to quantify airborne sounds consists of evaluating all frequencies of a sound according to a weighting system that reflects that human hearing is less sensitive at low frequencies and extremely high frequencies than at mid-range frequencies. This is called A-weighting, and the decibel level measured is called the A-weighted sound level (dBA). A filtering method that reflects hearing of marine mammals has not yet been developed. Therefore, underwater sound levels are not weighted and measure the entire frequency range of interest. In the case of marine construction work, the frequency range of interest is 10 to 10,000 Hz.

Table E-1 summarizes commonly used terms to describe underwater sounds. Two common descriptors are the peak sound pressure level (SPL) and the root mean square (rms) SPL (dB rms) during the pulse or over a defined averaging period. The peak pressure is the maximum absolute value of the instantaneous pressure observed during each pulse or sound event and is presented in Pascals (Pa) or dB referenced to a pressure of one microPascal (dB re 1 μPa). The rms level is the square root of the energy divided by a defined time period. All underwater sound levels throughout the remainder of this application are presented in dB re 1 μPa unless otherwise noted.

Table E-1. Definitions of Acoustical Terms

Term	Definition
Decibel, dB	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure. The reference pressure for water is 1 microPascal (µPa) and for air is 20 µPa (approximate threshold of human audibility).
Sound Pressure Level, SPL	Sound pressure is the force per unit area, usually expressed in microPascals (or 20 micro Newtons per square meter), where 1 Pascal is the pressure resulting from a force of 1 Newton exerted over an area of 1 square meter. The sound pressure level is expressed in decibels as 20 times the logarithm to the base 10 of the ratio between the pressures exerted by the sound to a reference sound pressure. Sound pressure level is the quantity that is directly measured by a sound level meter.
Frequency, Hz	Frequency is expressed in terms of oscillations, or cycles, per second. Cycles per second are commonly referred to as hertz (Hz). Typical human hearing ranges from 20 Hz to 20,000 Hz.
Peak Sound Pressure (unweighted), dB re 1 µPa	Peak sound pressure level is based on the largest absolute value of the instantaneous sound pressure over the frequency range from 20 Hz to 20,000 Hz. This pressure is expressed in this application as dB re 1 µPa.
Root-Mean-Square (rms), dB re 1 µPa	The rms level is the square root of the energy divided by a defined time period. For pulses, the rms has been defined as the average of the squared pressures over the time that comprise that portion of waveform containing 90 percent of the sound energy for one impact pile driving impulse.[5]
Sound Exposure Level (SEL) dB re 1 μPa^2 sec	Sound exposure level is a measure of energy. Specifically, it is the dB level of the time integral of the squared-instantaneous sound pressure, normalized to a 1-second period. It can be an extremely useful metric for assessing cumulative exposure because it enables sounds of differing duration, to be compared in terms of total energy.
Waveforms, µPa over time	A graphical plot illustrating the time history of positive and negative sound pressure of individual pile strikes shown as a plot of µPa over time (i.e., seconds).
Frequency Spectra, dB over frequency range	A graphical plot illustrating the 6 to 12 Hz band-center frequency sound pressure over a frequency range (e.g., 10 to 5,000 Hz in this application).
A-Weighting Sound Level, dBA	The sound pressure level in decibels as measured on a sound level meter using the A- or C-weighting filter network. The A-weighting filter de-emphasizes the low and high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective human reactions to noise.
Ambient Noise Level	The background sound level, which is a composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.

[5] Underwater sound measurement results obtained by Illingworth & Rodkin (2001) for the Pile Installation Demonstration Project in San Francisco Bay indicated that most impact pile driving impulses occurred over a 50 to 100 millisecond (ms) period. Most of the energy was contained in the first 30 to 50 ms. Analyses of that underwater acoustic data for various pile strikes at various distances demonstrated that the acoustic signal measured using the standard "impulse exponential time-weighting" on the sound level meter (35-ms rise time) correlated to the rms level measured over the duration of the pulse.

DESCRIPTION OF NOISE SOURCES

Underwater sound levels are comprised of multiple sources, including physical noise, biological noise, and anthropogenic noise. Physical noise includes waves at the surface, earthquakes, ice, and atmospheric noise. Biological noise includes sounds produced by marine mammals, fish, and invertebrates. Anthropogenic noise consists of vessels (small and large), dredging, aircraft over flights, and construction noise. Known noise levels and frequency ranges associated with anthropogenic sources similar to those that would be used for this project are summarized in Table E-2. Details of each of the sources are described in the following text.

Table E-2. Representative Noise Levels of Anthropogenic Sources

Noise Source	*Frequency Range (Hz)*	*Underwater Noise Level (dB re 1 µPa)*	*Reference*
Small vessels	250 – 1,000	151 dB rms at 1 meter (m)	Richardson et al. 1995
Tug docking gravel barge	200 – 1,000	149 dB rms at 100 m	Blackwell and Greene 2002
Vibratory driving of 30-inch Steel Pipe pile	10 – 1,500	~168 dB rms at 10m	WSDOT 2010a, 2010b
Impact driving of 30-inch Steel Pipe pile	10 – 1,500	~193 dB rms at 10m	WSDOT 2005, 2008; Caltrans 2007; Reyff 2005

In-water construction activities associated with the Project would include the use of a vibratory pile driver and a pneumatic chipping hammer. The sounds produced by construction equipment fall into one of two sound types: pulsed and non-pulsed (defined below). Impact pile driving produces pulsed sounds, while vibratory pile driving and pneumatic chippers produce non-pulsed (or continuous) sounds. The distinction between these two general sound types is important because they have differing potential to cause physical effects, particularly with regard to hearing (e.g., Ward 1997 as cited in Southall et al. 2007).

Pulsed sounds (e.g., explosions, gunshots, sonic booms, seismic airgun pulses, and impact pile driving) are brief, broadband, atonal transients (ANSI 1986; Harris 1998) and occur either as isolated events or repeated in some succession (Southall et al. 2007). Pulsed sounds are all characterized by a relatively rapid rise from ambient pressure to a maximal pressure value followed by a decay period that may include a period of diminishing, oscillating maximal and minimal pressures (Southall et al. 2007). Pulsed sounds generally have an increased capacity to induce physical injury as compared with sounds that lack these features (Southall et al. 2007).

Non-pulse (intermittent or continuous sounds) can be tonal, broadband, or both (Southall et al. 2007). Some of these non-pulse sounds can be transient signals of short duration but without the essential properties of pulses (e.g. rapid rise time) (Southall et al. 2007). Examples of non-pulse sounds include vessels, aircraft, machinery operations such as drilling or dredging, vibratory pile driving, pneumatic chipping, and active sonar systems (Southall et al. 2007). The duration of such sounds, as received at a distance, can be greatly extended in highly reverberant environments (Southall et al. 2007).

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APPENDIX F
INCIDENTAL HARASSMENT AUTHORIZATION

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Documentation will be included in this Appendix once consultations are concluded.

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APPENDIX G
PUBLIC INVOLVEMENT

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AFFIDAVIT OF PUBLICATION

Account #585486 AD# 20131201
STATE OF WASHINGTON
COUNTY OF KITSAP

I, Rolene Buswell, being first duly sworn on oath, deposes and says: That she is now, and at all times embraced in the publication herein mentioned was the principal clerk of the printers and publishers of KITSAP SUN; that said newspaper has been approved as a legal newspaper by order of the Superior Court of the County of Kitsap, in which County it is published and is now and has been for more than six months prior to the date of the publication hereinafter referred to, published in the English language continually as a daily newspaper in Bremerton, Kitsap County, Washington, a weekly newspaper in Kitsap County, Washington and is now and during all of said time, was printed in an office maintained in the aforesaid place of publication of said newspaper; that the following is a true text of an advertisement as it was published in regular issues (and not in supplement form) of said newspaper on the following date, to wit: And on February 5, 6, 7, 2013 such newspaper was regularly distributed to its subscribers during all of said period. The full amount of the fee charged for the foregoing publication is the sum of $566.88. This amount has been paid in full.

(Signature of Principal Clerk)

Subscribed and sworn to before me this day of February 14, 2013

Notary Public in and for the State of Washington, Kitsap County.

CASSANDRA A. CAPAS
Notary Public
State of Washington
My Commission Expires
February 04, 2014

DEPARTMENT OF
DEFENSE
DEPARTMENT
OF THE NAVY

NOTICE OF AVAILABILITY FOR PUBLIC REVIEW
ON A BARGE
MOORING PROJECT
IN WATERS OF HOOD CANAL AT
NAVAL BASE KITSAP BANGOR, SILVERDALE, WASHINGTON

The U.S. Navy invites the public to comment on a draft Environmental Assessment for a Barge Mooring Project proposed in Hood Canal at Naval Base (NAVBASE) Kitsap Bangor.

NAVBASE Kitsap is proposing to install a mooring for a new research barge equipped with upgraded technology necessary for Commander, Submarine Development Squadron FIVE (CSDS-5), to continue their mission. CSDS-5 is a tenant command at NAVBASE Kitsap Bangor and is the working repository for deep ocean technology and the operational, at-sea application of that technology.

The purpose of the Proposed Action is to provide moorage for the new barge.

The moorage would be located at the Service Pier at NAVBASE Kitsap Bangor and consists of the following three components: moving sections of an existing floating pier from the north side of the Service Pier to the south side and installing new float sections; removing an existing mooring dolphin and concrete pile cap; and installing a mooring on the north side of the Service Pier for the new barge. Sixteen steel piles, ranging in size from 20 inches to 48 inches in diameter, would be installed primarily using a vibratory pile driver; installation may need to be completed using an impact hammer. Construction is planned to begin in the summer of 2013 and is planned to be completed in the fall of 2013.

The Navy is accepting written comments on the Barge Mooring Project draft Environmental Assessment from February 5 through February 20, 2013. All written comments must be received by February 20, 2013 to be considered during the public review period.

Please address written comments to:
Commanding Officer
Naval Facilities
Engineering Command
Northwest
1101 Tautog Circle, Silverdale, WA 98315
ATTN: Mr. Ben Keasler, NEPA Project Manager

For media queries, please contact Ms. Leslie Yuenger at
leslie.yuenger@
navy.mil
A copy of this Environmental Assessment is available at:

https://portal.navfac.
navy.mil/portal/page/
portal/navfac/navfac_
ww_pp/navfac_efanw_pp/tab33522:tab
34368
Feb 5, 6, 7, 2013
Ad# 20131201

NAVY RESPONSE TO PUBLIC COMMENTS ON THE BARGE MOORING DRAFT ENVIRONMENTAL ASSESSMENT (EA)

Navy received three comment letters during the draft EA public review period. Two letters were submitted via email: one from the Port Gamble S'Klallam Tribe and one from the Point-No-Point Treaty Council. One letter was submitted by a private citizen via the U. S. mail. Comments contained in these letters were thoroughly analyzed and where appropriate changes have been incorporated into the Final EA. A summary of comments received, as well as the Navy's responses, is provided below.

Comment 1.

An EIS should be prepared because of the project's significant impacts and the degree to which these effects are likely to be highly controversial.

Response: Per 40 CFR 1508.27(b)(4), Navy would prepare an EIS if the EA determined there were significant impacts or if "effects on the quality of the human environment are likely to be highly controversial". The EA prepared by the Navy provides a detailed and comprehensive analysis of the impacts of the Proposed Action and Alternatives. The EA found that the Proposed Action and Alternatives would not result in significant impacts. The Navy also informally consulted with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service for impacts to threatened and endangered species and essential fish habitat and these agencies concurred that these impacts would not be significant.

Additionally, the potential environmental effects of this action are typical of those associated with any in-water construction project. The effects from removing and modifying in-water piers and installing pilings are known; the Navy's assessment of the project's effects is based on current science and assessment methods. Therefore, the effects would not be considered highly controversial.

Comment 2.

The Navy's approach has rushed government-to-government consultation and negotiations, omitted known impacts, and hurried the environmental planning and review process with the tribes.

Response: The Navy formally invited the Tribes to participate in government-to-government consultation on July 23, 2012 and has been meeting with the Tribes since that date to understand Tribal concerns and, where feasible, incorporate changes into the project to address these concerns. A key outcome of these consultations has been the additional removal of existing overwater structures to ensure no additional overwater coverage and seafloor displacement. These modifications developed as part of the tribal consultation have been fully integrated into the project and the Final EA. The Final EA provides a full disclosure of all known, relevant impacts of the Proposed Action and Alternatives.

Comment 3.

At 178 pages, the EA was too long, per CEQ 40 Questions, and the 2-week review period, too short.

Response: The length of the Barge mooring EA is appropriate to provide a thorough analysis of the potential impacts of the Proposed Action and Alternatives and to ensure decision makers and the public are fully informed of all potential effects of the Action.

Regarding review time for the EA, there is no requirement that an EA of this nature be circulated for public review at all. Tribes were notified weeks in advance of the pending public review and were directly emailed electronic copies of the EA to facilitate review. The Tribes were also briefed on the project and provided opportunities to ask questions.

Comment 4.

The Project Action should include the new barge and the EA should analyze the impacts of the barge, including operations of the barge and overwater coverage of the barge.

Response: As noted in Section 1.5 of the Final EA operations of the new research barge are not changing in type or tempo from existing operations which were evaluated in the USS Parche EA in 1994. Research, development, testing and evaluation (RDT&E) conducted aboard the barge are being evaluated in the NWTT EIS are not subject to evaluation in the Barge Mooring EA. Finally, the barge is a Navy vessel that will not be permanently moored at the Service Pier.

Comment 5.

Purpose and need is too narrowly defined and limits the range of alternatives to be considered. Additional alternatives that reduce impacts should have been considered.

Response: The purpose and need has been clarified to note that the action is water-dependent. As such, alternatives for operations on land do not meet the purpose and need. The Navy evaluated a wide range of alternatives. Two action alternatives and the no-action alternative were carried forward for analysis in the EA. Three other alternatives were considered, but eliminated from detailed analysis due to feasibility and other impacts including size and spatial constraints, safety, and mission conflict.

Comment 6.

Identify the lifespan of the project. Identify maintenance and repair activities associated with the project throughout its lifespan and incorporate potentially significant impacts in the review.

Response: The design lifespan has been clarified in the EA to be 50 years. Maintenance and repair activities have been added to Section 2.5 of the Final EA. Best management practices have been proposed to minimize impacts from these activities and no significant impacts are expected.

Comment 7.

EA should analyze noise impacts to sensitive receptors fishing and harvesting at Bangor Beach. Distance to Bangor Beach listed in the EA is incorrect.

Response: Further information was added to the Final EA to analyze noise impacts at Bangor Beach. Distance to Bangor Beach was confirmed to be 2,700 ft and the methodology for calculating the distance is provided in the Final EA. Noise impacts to Bangor Beach were evaluated and it was determined that noise from impact pile driving would attenuate down to a range of 60 dBA to 70 dBA, due to distance and the large, vegetated bluff that obstructs Bangor Beach from the Proposed Action.

Comment 8.

EA should assess impacts of cutting existing piles at the mudline with a thermal lance and compare these impacts with other pile removal methods. Clarify types of piles that will remain in the sediment. Assumption that cutting of pilings will replace the footprint of new pilings and structures, resulting in a zero net change in overwater structure and seafloor area displacement is not correct.

Response: An analysis of the impacts from cutting the piles at the mudline has been added to the Final EA. The EA states that the piles to be removed are steel piles. Analysis in the EA concludes that macroalgae and benthic invertebrates (soft and hard) would be re-established in the areas where piles are cut in one to two years.

Comment 9.

Identify location of Alternative 2 and fully describe it to allow for full evaluation of impacts. Assess whether Alternative 2 would have adverse effects on eelgrass.

Response: The location of Alternative 2 is shown on Figure 2-4 of the Final EA and described in Section 2.3.3 of the Final EA. Adverse effects to eelgrass from Alternative 2 were analyzed in Section 3.4.3.3 of the Final EA and found to be less than significant.

Comment 10.

The Navy should include a complete analysis of the differences in overwater structures between the two alternatives.

Response: Overwater structures for both alternatives are analyzed in the EA. Table 2-2 of the Final EA details that the Preferred Alternative would have a net change in overwater coverage of -75 sq. ft. Overwater coverage from Alternative 2 is negligible and limited to the 4 buoys floating on the surface. As discussed in the response to comment 4, analysis of the overwater coverage of the Barge is not part of this EA.

Comment 11.

EA should include a comprehensive comparative analysis of the alternatives to fully disclose risks of each alternative to resource areas.

Response: Table 3-18 of the Final EA provides a comprehensive and comparative analysis of potential impacts to resource areas for each alternative. The Executive Summary also provides a comparative analysis of potential impacts to resource areas for each alternative.

Comment 12.

Concerned that the Navy's proposed action, including increased overwater coverage, will infringe upon ability to exercise treaty rights, including the right to a share of harvest to meet tribal moderate living needs, and the right to protection of fish habitat. Conclusion that the Proposed Action will not have a significant effect on tribal resources and treaty rights is incorrect.

Response: Additional analysis was added to the EA to more thoroughly evaluate direct and indirect effect to treaty rights. Section 3.8 of the Final EA analyzes direct and indirect impacts of the Proposed Action and Alternative 2 on tribal treaty rights. The analysis concludes that "…access to the waterfront area would remain unchanged. Access to Bangor Beach (tribal fishing beach), commercial geoduck tracts located outside of the Naval Restricted Areas, and Dungeness crab fishing and finfishing would not be impeded. The quantity of geoduck, finfish, and shellfish inventories would not be significantly impacted by direct impacts from project construction or indirect impacts from shading or increased turbidity and sediment transport within the project area drift cell. Accordingly, impacts to American Indian traditional resources and tribal treaty rights would be less than significant."

Comment 13.

EA does not adequately address direct and indirect impacts of the project on resource areas, including marine sediments, ecological processes, noise, species and habitats, habitat fragmentation, shellfish and benthic communities, aquatic vegetation, and tribal treaty rights.

Response: Chapter 3 of the EA thoroughly analyzes all relevant, potential adverse impacts of the Preferred Alternative and Alternative 2. Additional analysis has been added to the Final EA to address: marine sediments, ecological processes and turbidity in the drift cells at, and adjacent to, the Proposed Action; noise impacts at Bangor Beach; and, pile removal impacts to benthic and aquatic communities.

Comment 14.

Provide description and analysis of artificial light that will be installed under the Proposed Action.

Response: Further information was added to Section 2.3 of the Final EA to clarify that no new artificial lighting would be required for the Preferred Alternative or Alternative 2. Artificial lighting is not evaluated in the EA.

Comment 15.

Evaluate the potential impacts of altered migration and predator-prey relationships to tribal fishing activities, which occur in the Hood Canal.

Response: The effects of project construction and overwater shading from new infrastructure (e.g. port ops floats) on migration pathways and species were evaluated in the EA and determined to be less than significant. Further information has been added to the Final EA addressing the health and potential fragmentation of habitats on, and adjacent to, the Proposed Action. Impacts were determined to be less than significant because the project would not result in an increase in overwater coverage and any impacts to marine vegetation and benthic communities from cutting and installation of piles would be short term and isolated within the drift cell.

Comment 16.

The marine traffic analysis should clarify the number of construction barges and vessels, and their activities within the project area and Hood Canal. Use consistent comparative analysis to determine marine traffic impacts for both alternatives. Assess impacts of marine traffic on treaty rights.

Response: Further information has been added to Section 3.5 of the Final EA to clarify the number of vessels and barges expected during construction of the Proposed Action. All construction activities would take place within the existing Naval Restricted Area and would not restrict the Tribe's existing access to finfishing and shellfish harvesting. Construction vessel traffic through the Hood Canal is also discussed in Section 3.5 and the limited increase in construction vessel traffic in the unrestricted waters of the Hood Canal is not expected to limit commercial or tribal fishing access to fishing and harvest areas.

Comment 17.

The Navy's analysis of cumulative impacts, including marine traffic, construction noise, biological resources and tribal treaty rights is incomplete and does not give full consideration of the incremental effects of the proposed action and other projects within the Hood Canal on tribal treaty rights, including tribal fishing and harvesting. Conclusion that the Proposed Action will not result in significant cumulative effects on tribal resources and treaty rights is incorrect.

Response: Further information and analysis has been added to address marine traffic, construction noise, and biological resources and cumulative impacts on tribal treaty rights.

Comment 18.

Concerned that the cumulative effects of the Project will effectively extend the Security Zones at Bangor Beach and at the proposed Electromagnetic Measurement Ranging System project in Hood Canal.

Response: Construction of the Proposed Action would occur entirely within the existing Restricted Areas and will not alter or extend the existing Naval Restricted Areas.

Comment 19.

Cumulative effects of increased industrialization in Hood Canal and research activities associated with new Barge Moorage project should be evaluated.

Response: The Preferred Alternative of the Barge Mooring Project is located at the existing Service Pier and would not cause increased industrialization along the Naval Base Kitsap Bangor waterfront. The Proposed Action is consistent with existing land uses at the Service Pier. As discussed in Section 2.3 of the Final EA, the project would not result in an increase in overwater coverage from additional infrastructure. Finally, the project would not change the existing operational tempo at the Service Pier.

As discussed in Section 1.5 of the Final EA, operations including research activities associated with the new barge are not changing in type or intensity. Research, Development, Testing and Evaluation (RDT&E) activities conducted aboard the barge are being evaluated in the Northwest Training and Testing (NWTT) EIS and are not subject to evaluation in this EA.

Comment 20.

Clarify cumulative impacts significance criteria. Additional federal and non-federal projects should be included in the cumulative impacts analysis.

Response: The cumulative impacts significance criteria in Section 4.0 of the Final EA have been clarified. The criteria in the Final EA states: "For the Proposed Action to have a cumulatively significant impact to an environmental resource, two conditions must be met. First, the combined effects of all identified past, present, and reasonably foreseeable projects, activities, and processes on a resource, including the effects of the Proposed Action, must be significant. Second, if there is a significant cumulative impact, the Proposed Action must make an *appreciable* contribution to that significant cumulative impact."

Further information has been added to the cumulative analysis in the EA. Specifically, the following additional actions were analyzed and addressed: Swimmer Net System, EHW-2 Mitigation, and NWTT. The following actions were considered but not included in the analysis because they are outside of the cumulative region of influence (ROI): Hood Canal Bridge – East Half Replacement, Olympic View Marina, Kitsap Memorial State Park, Pleasant Harbor Marina and Golf Resort, and Misery Point Boat Launch projects.

Comment 21.

We do not need another dock or wharf in the Hood Canal for the Navy. How does it make sense to create more naval presence in this area that is so fragile already? This is a precious resource for everyone, not just the Navy. Once we start using the Hood Canal it will become like Puget Sound Naval Shipyard or Newport News.

Response: The Proposed Project would not create a new dock or wharf. Comment noted.

Finding of No Significant Impact
on Issuance of an Incidental Harassment Authorization to the U.S. Navy for
Take of Marine Mammals Incidental to a Barge Mooring Project

National Marine Fisheries Service

National Oceanic and Atmospheric Administration Administrative Order (NAO) 216-6 (May 20, 1999) contains criteria for determining the significance of the impacts of a proposed action. In addition, the Council on Environmental Quality (CEQ) regulations at 40 CFR 1508.27 state that the significance of an action should be analyzed both in terms of 'context' and 'intensity'. Each criterion listed below is relevant to making a finding of no significant impact and has been considered individually, as well as in combination with the others. The U.S. Navy has finalized an Environmental Assessment (*Environmental Assessment for the Barge Mooring Project Conducted at Naval Base Kitsap Bangor, Silverdale, WA*), which we have subsequently adopted. We incorporate that document here by reference. The significance of this action is analyzed based on the NAO 216-6 criteria and CEQ's context and intensity criteria. These include:

1. *Can the proposed action reasonably be expected to cause substantial damage to the ocean and coastal habitats and/or essential fish habitat (EFH) as defined under the Magnuson-Stevens Act and identified in FMPs?*

The barge mooring project is of short-term duration and will involve pile extraction and installation. Installation of a maximum of twenty steel piles will be accomplished primarily by vibratory pile driver. Certain piles may be finished with an impact pile driver to ensure load-bearing capacity or if difficult substrate conditions are encountered. Pile extraction will be accomplished largely by mechanical means, although at least one pile is scheduled for extraction by vibratory hammer.

Within the action area, EFH has been designated for the Pacific Coast Salmon, Pacific Groundfish, and Coastal Pelagics Fishery Management Plans. The Navy engaged in an EFH consultation with NMFS' Northwest Regional Office, pursuant to section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA), and was provided conservation recommendations to avoid, minimize, or otherwise offset potential adverse effects on EFH. The effects of the Navy's action will primarily be from increased levels of sound resulting from pile installation, which will temporarily reduce the quality of water column EFH; these effects are temporary and will result in no long-term impacts to the environment. Pile installation would also locally increase turbidity and disturb benthic habitats and forage fish in the immediate project vicinity. The water column may experience increased sedimentation and turbidity during operational periods. However, due to the relatively low levels of organic contaminants and metals contained within the sediments at Naval Base Kitsap Bangor (NBKB), there will be only temporary and minimal degradation of the water column, with little to no impact on dissolved oxygen levels in the vicinity of the proposed project area. While some disruption to marine vegetation and benthic communities is unavoidable as a result of the activity, these impacts will be temporary in duration, with a minimal and localized zone of influence; additionally, the project involves rehabilitation of an existing structure, so much of the work will occur in areas that are previously shaded and do not support aquatic vegetation. Areas of disruption are expected to recover to pre-disruption levels within a single growing season. Any behavioral avoidance by fish of the disturbed area would still leave significantly large areas of fish and marine mammal foraging habitat in the Hood Canal and nearby vicinity. Pile driving-related impacts to salmonid populations, which include ESA-listed species, would be minimized by adhering to the in-water work period designated for northern Hood Canal waters, when less than five percent of all salmonids that occur in NBKB nearshore waters are expected to be present.

The above information pertains to the Navy's pile driving activity. The NMFS proposed action, which is the authorization of marine mammal take incidental to the barge mooring project, will result in no damage to ocean and coastal habitats or EFH.

2. *Can the proposed action be expected to have a substantial impact on biodiversity and/or ecosystem function within the affected area (e.g., benthic productivity, predator-prey relationships, etc.)?*

The authorization of marine mammal take incidental to the Navy's barge mooring project will not have a substantial impact on biodiversity or ecosystem function. The Navy's barge mooring project may temporarily impact ecosystem function by i) temporarily creating elevated levels of underwater sound, thereby disturbing forage fish; ii) degrading water quality as a result of resuspension of bottom sediments from pile driving and barge and tug operations; and iii) directly damaging the benthos through pile driving and anchoring. Bottom disturbance would be temporary over a short-term project period and sediments would settle back in the general vicinity from which they rose, or would be dissipated by the strong tidal currents in the area. The temporary increase in turbidity, as well as direct impact to the benthos, is expected to decrease the light available for marine vegetation and to impact benthic invertebrates; however, these impacts would be minor and temporary in nature. Benthic organisms are very resilient to habitat disturbance and are likely to recover to pre-disturbance levels well within two years; however, due to the limited and temporary disturbance benthic organisms may recover even more quickly.

3. *Can the proposed action reasonably be expected to have a substantial adverse impact on public health or safety?*

The proposed action is not expected to result in any impacts related to public health and safety. Construction activities are not likely to release hazardous materials into the environment. Construction crews would follow applicable state and federal laws to ensure a safe working environment. The airborne noise associated with the Navy's proposed action would be no higher than 60 dB during construction, which is consistent with the Washington Noise Regulations under the Washington Administrative Code. The proposed action would not result in significant adverse impacts to health and safety.

4. *Can the proposed action reasonably be expected to adversely affect endangered or threatened species, their critical habitat, marine mammals, or other non-target species?*

Endangered or threatened fish and marine mammal species occur in the vicinity of the Navy's barge mooring project. The proposed action – NMFS' authorization of incidental marine mammal take – is not expected to have a significant adverse impact on endangered or threatened species. Steller sea lions belonging to the eastern Distinct Population Segment, currently listed as threatened under the Endangered Species Act (ESA), may be found in the action area from October through April. The proposed action is scheduled to occur from July 16 through September 30, and is unlikely to affect this species. Therefore, no incidental take of Steller sea lions is authorized under the Marine Mammal Protection Act or exempted under the ESA.

5. *Are significant social or economic impacts interrelated with natural or physical environmental effects?*

The proposed action will not have any significant social or environmental impacts. The impacts resulting from NMFS' authorization of marine mammal take incidental to the Navy's barge mooring project will be limited to, at most, temporary behavioral harassment of small numbers of marine mammals. No social or economic impacts will be associated with this authorization.

6. *Are the effects on the quality of the human environment likely to be highly controversial?*

NMFS' issuance of an incidental harassment authorization (IHA) will not have effects on the human environment that are likely to be highly controversial. There is not substantial debate over the proposed action's size, nature, or effect, nor is there such debate over the underlying action (the Navy's barge mooring project). Due to the limited duration and intensity of the project, and the implementation of appropriate mitigation and monitoring measures, there will not be significant impacts to natural resources in the project area. During the public comment period in the proposed IHA, NMFS only received comments from the Marine Mammal Commission, which did not indicate that any aspects of NMFS' action or its effects on the environment were likely to be highly controversial.

7. *Can the proposed action reasonably be expected to result in substantial impacts to unique areas, such as historic or cultural resources, park land, prime farmlands, wetlands, wild and scenic rivers, essential fish habitat, or ecologically critical areas?*

Access to NBKB, including the project site, is controlled by the Navy and is restricted to authorized military personnel, civilians, contractors, and local tribes. Tribal access is restricted to the beach south of Delta Pier, which is not in the vicinity of the project. Since no public recreational uses occur at the project site, the proposed action would have no direct impact to recreational uses or access in the surrounding community. In addition, the Washington State Historic Preservation Office concurred with the Navy's finding of "no historic properties affected", and no submerged archaeological sites are expected to occur in the vicinity of the proposed action. Traditional resources would not be impacted. The barge mooring project will occur in a shoreline area that already contains multiple built structures, and will not significantly degrade the existing environment. No other unique characteristics of the geographic area are known. NMFS' issuance of an IHA would not result in substantial impacts to any such places.

8. *Are the proposed action's effects on the human environment likely to be highly uncertain or involve unique or unknown risks?*

The effects of the Navy's proposed action are primarily related to the input of sound, resulting from pile driving, into the environment. Pile driving is a relatively well-studied action, and wildlife and the environment in the Hood Canal are relatively well understood. The implementation of mitigation and monitoring measures included in NMFS' IHA will ensure that no marine mammals are injured or killed, and that impacts to marine mammals are limited to, at most, temporary behavioral harassment. Monitoring of marine mammals that are behaviorally harassed, as well as numerous documented accounts of marine mammal behavior before, during, and after behavioral harassment, demonstrates that behavioral harassment of limited duration will not result in any permanent changes to the manner in which marine mammals utilize the vicinity of the Navy's barge mooring project. While NMFS' judgments on impact thresholds are based on somewhat limited data, enough is known for NMFS and the regulated entity (here the Navy) to develop precautionary monitoring and mitigation measures to minimize the potential for significant impacts on biological resources. As such, the effects of NMFS' issuance of an IHA are not highly uncertain, and the action does not involve unique or unknown risks.

9. *Is the proposed action related to other actions with individually insignificant, but cumulatively significant impacts?*

NMFS' issuance of an IHA is not related to other actions that may have cumulatively significant impacts. The Navy has requested the issuance of an IHA for a second, related action; however, NMFS has analyzed the potential cumulative impacts of these two projects and determined that potential impacts from these two projects are not cumulatively significant. Both actions are of limited scope and duration, and will have, at most, temporary behavioral effects on marine mammals. The Navy's barge mooring project may overlap somewhat, temporally and spatially, with the Navy's proposed second year of construction of a second Explosives Handling Wharf (EHW-2). The two actions are located approximately 2.5 km apart on the Hood Canal waterfront, but are shielded from each other by land, thereby limiting the overlap of the sound fields resulting from the two projects. Cumulative impacts from these two projects together were considered and found not significant. Additionally, mitigation measures specifically designed to reduce cumulative impacts from the two projects will be implemented as conditions in NMFS' IHAs.

10. *Is the proposed action likely to adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources?*

No structures eligible for the NRHP will be affected by the proposed action. No submerged archaeological sites are expected to occur in the project area, since most historical activity was associated with resource harvesting, such as logging that occurred primarily along the shoreline and upland areas. Traditional resources would not be impacted. The proposed action would not alter or impact the current access granted to the tribes.

11. *Can the proposed action reasonably be expected to result in the introduction or spread of a nonindigenous species?*

Neither the proposed action nor the underlying Navy action is expected to result in the spread of any nonindigenous species. Sufficient precautionary measures will be taken by the Navy to ensure that no introduction or spread of such species occurs.

12. Is the proposed action likely to establish a precedent for future actions with significant effects or represent a decision in principle about a future consideration?

The Navy is planning other projects in the Hood Canal that involve pile driving, including the second year of construction for a second EHW. However, subsequent applications for incidental take authorizations will be independently analyzed on the basis of the best scientific information available. A finding of no significant impact for the barge mooring project, and for NMFS' issuance of an IHA, may inform the environmental review for future projects but would not establish a precedent or represent a decision in principle about a future consideration.

13. Can the proposed action reasonably be expected to threaten a violation of Federal, state, or local law or requirements imposed for the protection of the environment?

The proposed action – NMFS' issuance of an IHA – is conducted in conformance with the MMPA. NMFS has made all appropriate determinations under other applicable statutes, and NMFS' action will not violate any laws or requirements. The Navy's barge mooring project requires issuance of multiple permits. The Navy is pursuing all required permits; each agency will review the Navy action as appropriate to ensure that no federal, state, or local laws or requirements will be violated.

14. Can the proposed action reasonably be expected to result in cumulative adverse effects that could have a substantial effect on the target species or non-target species?

NMFS' issuance of an IHA is specifically designed to reduce the effects of the Navy's barge mooring project to the least practicable impact to marine mammals, through the inclusion of appropriate mitigation and monitoring measures. Despite temporal overlap and the potential for limited spatial overlap, the cumulative effects of NMFS authorizations – or of the Navy's barge mooring project and proposed EHW-2 – would not be considered cumulatively significant because the impacts of the barge mooring project will be of limited intensity and duration. The barge mooring project involves installation only of a relatively small number of piles over the course of approximately twenty workdays, and will produce relatively low levels of sound. Other than these two projects, there are no other concurrent actions known. The Cumulative Impacts section of Environmental Assessment (EA) addresses this topic in greater detail. Implementation of the proposed action, in conjunction with other past, present, and reasonably foreseeable future actions, would not be expected to result in significant cumulative impacts to the environment. As such, the proposed action will not result in cumulative adverse effects that could have a substantial effect on species in the action area.

DETERMINATION

In view of the information presented in this document and the analysis contained in the supporting EA prepared for the Navy's barge mooring project and application for an IHA, it is hereby determined that NMFS' issuance of an IHA will not significantly impact the quality of the human environment as described above and in the supporting documents. The proposed IHA was published in the *Federal Register*, and all public comments were considered and addressed. These public comments presented no new information that affects this determination. In addition, all beneficial and adverse impacts of the proposed action have been addressed to reach the conclusion of no significant impacts. Accordingly, preparation of an environmental impact statement for this action is not necessary.

Donna S. Wieting

Donna S. Wieting, Director
Office of Protected Resources

JUL 03 2013

Date