



Chapter 4

Environmental Consequences

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4.0 ENVIRONMENTAL CONSEQUENCES

When describing environmental effects from the action alternatives, different terms can be used to illustrate the level or intensity and duration of these effects. For consistency purposes, the following terms were used exclusively within Chapter 4 to allow the reader to compare effects within and among resources. Note below that some mandatory terms used under ESA, EFH, and NHPA may be the same for different effects described below. For these occurrences, the effects are slightly different, but the difference is not substantial enough to result in a different summary regulatory conclusion.

No Effect: There would be no change to existing conditions. The significance terms defined under various federal statutes equal to no effect are as follows: ESA–No effect; EFH–Will not adversely affect; NHPA, Migratory Bird Treaty Act, MMPA–No effect.

Negligible: Change would be so small that it would not be of any measurable or perceptible consequence. The effect would be slight and impacts would be well within natural fluctuations. Impacts would generally be short-term in nature, but could also be long-term where the effect over time would remain inconsequential. Mitigation would not be necessary. The significance terms defined under various federal statutes equal to negligible are as follows: ESA–No effect; EFH–Will not adversely affect; NHPA–No effect; Migratory Bird Treaty Act–No adverse effect; MMPA–Negligible impact.

Minor: The change would be measurable but small and of little consequence. The change would generally be short term in nature but could also be long term where the measurable effect over time would remain low. Mitigation would not be necessary. The significance terms defined under various federal statutes equal to minor are as follows: ESA–May affect, not likely to adversely affect; EFH–Will not adversely affect; NHPA–No effect; Migratory Bird Treaty Act–No adverse effect; MMPA–Negligible impact.

Moderate: The change would be measurable and of consequence. The impact could be either short term or long term in effect. However, the impact would be within required regulatory standards. Mitigation measures are necessary (possibly extensive) but would likely be successful. The significance terms defined under various federal statutes equal to moderate are as follows: ESA–May affect, not likely to adversely affect; EFH–Will not adversely affect; NHPA–May adversely affect; Migratory Bird Treaty Act–No adverse effect; MMPA–Negligible impact.

Major: The change would be measurable and of consequence. The impact would not meet required regulatory standards. Effects would be readily apparent, substantial, and noticeable. Impacts could be either short term or long term in effect. Extensive mitigation measures would be needed, and their success would not be guaranteed. The significance terms defined under various federal statutes equal to major are as follows: ESA–May affect, likely to adversely affect; EFH–May adversely affect; NHPA–May adversely affect; Migratory Bird Treaty Act–Significant adverse affect; MMPA–Level A or Level B harassment (take).

4.1 MARINE MAMMAL ALTERNATIVE

4.1.1 Marine Environment

4.1.1.1 Hydrography

Marine hydrography consists of tides, currents, circulation, and seasonal variations (e.g., temperature and salinity) through the water column. These characteristics can be affected by structures placed in the water and activities that change water flow patterns.

4.1.1.1.1 CONSTRUCTION

The marine mammal enclosures, floating dock, and anchors would be placed into the water by a crane operating from an existing pier; this would change water flow in the immediate vicinity of the enclosure and dock for a distance of up to approximately 100 feet. The enclosures, dock, and anchors would be placed in a shoreline area with a minimum water depth of 20 feet MLLW. Thus, the 12-foot deep enclosures would be from 8 to 20 feet above the sea floor at low tide. The overall effects on hydrography would be negligible; however, placement of any structure in or over navigable waters of the United States would require a Section 10 Rivers and Harbors Act permit, for which the Navy would apply through completion of a JARPA if this alternative is selected.

4.1.1.1.2 OPERATION

Existing nearshore currents and circulation patterns along the NBK–Bangor shoreline fluctuate in response to eddies that form during flood and ebb tides around local bathymetry features and existing pier structures. The marine mammal enclosures and associated floating docks would be installed at an existing pier at NBK–Bangor that has already affected movement of the water mass immediately below the pier. During operation of the enclosures and floating docks, water movement along the NBK–Bangor waterfront in general would not be affected. Tides and currents would circulate around the enclosures. This change in circulation (estimated to be within 100 feet of the dock and enclosures) would not affect marine water outside the immediate vicinity of the enclosures. Marine water would also flow over the anchors with no overall change in flow patterns.

Each week it is expected that approximately 1,200 gallons of water from each marine mammal enclosure would be used to back flush each of the enclosure water filters into the base's sanitary sewer system. To replace water lost to the sanitary sewer system, adjacent seawater would be pumped into each enclosure to replace the filter back flush water. This 8,400-gallon volume of water represents a very small fraction (0.00000028 percent) of the estimated $13.0 \times 10^8 \text{ m}^3$ (3.43×10^{11} gallon) flow volume that circulates within the proposed SISS development area on an average tide day (24 hours and 50 minutes). Therefore, the uptake of ambient seawater within the multiple enclosure water circulation system on a weekly basis would have a negligible impact on water flow and the physical characteristics of the water column.

The Marine Mammal Alternative would also include the operation of small boats. These boats would have outboard engines with shallow propeller depths (up to 3 feet), and would normally operate in water at least 30 feet deep. Near the marine mammal enclosures, the boats would operate in water as shallow as 20 feet MLLW, but at very low engine RPM. When in operation,

the propeller wash from these boats would create small, localized movement of surface water that would dissipate rapidly. The resulting effect on marine hydrography would be negligible.

4.1.1.2 Water Quality

Marine water quality is evaluated using several parameters, including temperature, salinity, nutrients, DO, bacteria, pH, and turbidity. These parameters can be affected by various types of discharges to the water, including marine mammal waste, in-water structures, and debris. The potential for fuel discharges and boat operations to affect water quality is also discussed below.

4.1.1.2.1 CONSTRUCTION

During construction, measures would be taken to prevent the discharge of debris into the water. For the SISS, the Navy would adhere to the existing NBK–Bangor fuel spill and response plan to minimize the likelihood of effects from fuel spills during use of construction equipment. The marine mammal enclosures would be constructed on shore and placed into the water by cranes, thereby minimizing the discharge of construction debris into the water. Although initial placement of the anchors would cause disturbance of bottom sediments and resuspension of these particulates into the water column, this effect would be localized and temporary. The anchors would be required to stabilize the docks, resulting in anchor plumes rising an estimated 3 vertical meters (10 feet) in the water column and persisting no more than 1 hour due to the changing tides and currents. The coarser particulates of resuspended sediments would settle on the sea floor within 30 minutes (Jiménez and Madsen 2003), and the finer particulates would be dispersed by currents. Oxidation of organic matter within the plume would cause a small reduction in DO on a localized and temporary basis. Effects on nutrient levels in site waters would be negligible. The structures would have a negligible effect on water flow, and their presence would not affect temperature, salinity, or stratification of marine waters at NBK–Bangor. Placement of the enclosures and floating docks would have an overall negligible effect on water quality.

4.1.1.2.2 OPERATION

One aspect of the operation of this alternative with the potential for water quality effects would be the release of waste products (urine and feces) from the Navy marine mammals. The Navy mammals would be in the enclosures at all times, except during patrolling, training, or maintenance of enclosures (see Section 2.2.2.2.1, Waterfront Facilities). When the Navy mammals are aboard boats during patrols and training, their solid wastes would be collected and disposed on shore, either by discharge to the sanitary sewer system, or would be bagged and placed in a solid waste dumpster. Liquid waste (urine from both species, and fecal material from dolphins, typically) would be washed from the boats into Hood Canal. Fresh water may be utilized to wash the boats. Fuel, lubricant, and chemical compounds would not be discharged to marine waters. It is estimated that no more than 10 percent of the Navy mammals' wastes would be released to the waters of the NBK–Bangor waterfront during patrols, training, and enclosure cleaning and maintenance. During these times, Navy mammal wastes excreted to the marine environment would be dispersed and diluted by the currents at the site. At NBK–Bangor, water circulation is dominated by fluctuating currents and oscillating flows, with such currents averaging approximately 0.33 foot/second with peak values of 0.66 to 0.88 foot/second (Section 3.1.1, Hydrography).

Table 4–1 provides the daily volume and relevant constituents of bottlenose dolphin and California sea lion urine and feces. The principal constituents of concern are fecal coliform bacteria, DO (as affected by biochemical oxygen demand [BOD]), and nutrients as represented by phosphorus and nitrogen. The analysis assumed the maximum number of Navy marine mammals (20 animals) and enclosures (seven enclosures), and 10 percent of the waste materials would be released throughout the NBK–Bangor waterfront area. The model used in the analysis was HydroQual’s (formerly Hydrosience) Row-Column AESOP (RCA) water quality model. AESOP is an acronym for the Advanced Ecological Systems Modeling Program. The RCA is the newest and most advanced member in a family of water quality models that started with the advent of the Water Quality Assessment Simulation Program (WASP); WASP was developed by Hydrosience, predecessor of HydroQual, and provided to the USEPA, and is now maintained and widely used by the USEPA (USEPA 2006). RCA is a dynamic compartment-modeling program for aquatic systems, including both the water column and underlying benthic community. To be conservative for the purpose of water quality modeling, the analysis assumed that all of the excreted waste material would remain in the water column, although up to 50 percent of sea lion waste could settle to the bottom (see Section 4.1.1.3, Sediment).

Table 4–1. Production and Constituent Concentration of Urine and Fecal Material from Atlantic Bottlenose Dolphins and California Sea Lions

URINE CONCENTRATIONS PER ANIMAL ^a		
	Bottlenose Dolphins	California Sea Lions
Urine Production/Animal/Day (mL/day)	5,000	3,000
Urine Total Nitrogen (mg/liter [L])	33,000	27,300
Urine Total Phosphorus (mg/L)	349	637
Urine 5-day BOD (mg/L)	10,800	5,525
FECAL CONCENTRATIONS		
	Bottlenose Dolphins	California Sea Lions
Fecal Production/Animal/Day (g/day)	1,500	1,020
Fecal Total Nitrogen (mg/kg)	5,950	14,000
Fecal Total Phosphates (mg/L)	18,900	29,000
Fecal 5-day BOD (mg/L)	37,037	65,400
Fecal Coliforms MPN/g	4,865	5 x (10 ⁷)

^a See Appendix F, Water Quality Model, for sources of individual values and their derivation.

The time-varying processes of advection, dispersion, point and diffuse mass loading, and boundary exchange can affect the fate and transport of the constituents of interest (fecal coliform, BOD, and nutrients) and are represented in the model. The analysis included a two-dimensional grid numeric model (Princeton Ocean Model) to simulate the hydrodynamics of Hood Canal. For constituents that decay biologically or chemically with time, such as fecal coliforms and BOD, the model also includes a decay function. The values used in the model for current speed, decay rates, and dispersion coefficients were based on measurements at the site or on conservative estimates (see Appendix F, Water Quality Modeling). The results of the model

(predicted constituent concentrations) are thus considered conservative (likely higher than that which would actually occur).

From review of model results, water quality standards would not be exceeded under this alternative (Table 4–2). The Navy would prepare a JARPA permit application to seek a Clean Water Act Section 401 Certification from WDOE under this alternative.

NUTRIENTS

Table 4–2 provides the results of the water quality modeling. For nitrogen and phosphorus, this table shows that the incremental concentration resulting from the marine mammal waste material would be negligible. Washington State has no standards for nutrients. There would be minimal changes in nutrient levels from this alternative, and negligible additive effects among nutrients. The overall nutrient effect would be negligible.

Table 4–2. Effect of Marine Mammal Waste Products on Key Water Quality Constituents

PARAMETER ¹	EXISTING LEVEL ²	PROJECT EFFECT WITHIN THE NBK–BANGOR WATERFRONT ³	LEVEL WITH PROJECT	GUIDELINE
Fecal coliform bacteria (MPN/100 mL, geometric mean)	3.1	0–0.077	3.1–3.2	14
Total Phosphorus (as phosphate) (mg/L)	0.0127–0.1218	0–1.0x10 ⁻⁶	0.0127–0.1218 (no change)	N/A
Total nitrogen (as nitrate, nitrite, and ammonia) (mg/L)	0.0056–0.3695	0–2.6x10 ⁻⁶	0.0056–0.3695 (no change)	N/A
DO (mg/L)	4.9–9.8	0–3.3x10 ⁻⁶ (BOD)	4.9–9.8 (no change)	7.0 for Extraordinary Quality ³

¹ Model assumes 20 animals and 10 percent of waste released into waters at the NBK–Bangor waterfront.

² Data for depths of 1 to 60 m, from Section 3.1.2.

³ Estimate derived from water quality modeling. Values shown are the range of effects over all cells in the model grid for the waterfront. See Appendix F.

DISSOLVED OXYGEN

As shown in Table 4–2, the effect of the marine mammal waste on DO within the waterfront restricted area of the NBK–Bangor waterfront would be negligible. Table 4–2 also shows that DO at the NBK–Bangor waterfront was measured at levels below the Extraordinary Quality (EQ) standard of 7.0 mg/L, but not below the level considered to have adverse effects on fish (4.5 mg/L). Measurements below 7.0 mg/L were uncommon and occurred in considerably deeper water (20 to 60 meters, or 66 to 197 feet) than the marine mammal enclosures (approximately 9.1 meters, or 30 feet) (Section 3.1.2.2.2, Dissolved Oxygen). BOD is a measure of the reduction in DO caused by discharge of a material into a water body. The greater the BOD in water, the greater the oxygen depletion. For the Navy marine mammals, the change in BOD at the NBK–Bangor waterfront was estimated to range from 0 to 3.3x 10⁻⁶ mg/L, which would not result in a change to DO levels at the NBK–Bangor waterfront or in Hood Canal in

general. This alternative would not exceed water quality standards for DO. The overall impact on DO would be negligible.

BACTERIA

Navy marine mammal wastes would result in a very small increase in fecal coliform levels at the NBK–Bangor waterfront and would result in up to a maximum of 0.077 MPN/100 mL increase (Table 4–2). As noted in Section 3.1.2.2.5, Fecal Coliform Bacteria, fecal coliforms are measured as an indicator for all fecal pathogens. For this EIS, analyses and impact conclusions for fecal coliforms are assumed to apply to other fecal pathogens produced by the Navy marine mammals. The existing overall geometric mean for all sampling stations at the waterfront is 3.1 MPN/100 mL (Section 3.1.2.2.5, Fecal Coliform Bacteria). The Washington State standard for shellfish harvest and primary human contact is a geometric mean of 14 MPN/100 mL. Therefore, the waterfront is within compliance with this standard, and the Marine Mammal Alternative would not affect compliance with this standard. As discussed in Section 3.1.2.2.5, Fecal Coliform Bacteria, the NBK–Bangor waterfront is also in compliance with the Washington State 90th percentile standard of 43 MPN/100 mL at all sampling stations, as calculated using the WDOH method (Table 3–8). Using the WDOE calculation method, one sampling station is not in compliance with the 90th percentile standard (Table 3–9). However, existing fecal coliform levels at the NBK–Bangor waterfront are generally in conformance with the Washington State standard for fecal coliform. The Marine Mammal Alternative would not measurably affect fecal coliform levels or affect compliance with the state standard. The resulting impact on levels of fecal coliform would be negligible. Thus, the resulting fecal coliform levels would not affect shellfish harvest, human contact, or marine organisms.

PHARMACEUTICALS

MMP animals receive the highest quality of veterinary care. MMP animals receive daily vitamin supplements and routine antihelminthics (dewormers) to prevent disease. On occasion and when warranted, veterinarians judiciously prescribe medications to treat disease or to prepare animals for medical procedures (e.g., surgery). No MMP animals are provided routine, prophylactic antibiotics. There are few to no data regarding excretion of unaltered medications or their metabolites in the feces and urine of dolphins and sea lions, and there are no established standards to assess impacts on water quality. A list of supplements, therapeutics, and medications that have been provided to MMP animals in a representative 12-month period is provided in the Classified Annex.

TEMPERATURE/SALINITY/STRATIFICATION

Water temperatures in the immediate vicinity of the enclosures would not be measurably increased during the times when the enclosures are heated. The volume of the temperature-controlled enclosures would be approximately 300,000 liters (81,000 gallons), which is a miniscule fraction (0.00000024) of the 1.2×10^{12} liters (3.4×10^{11} gallons) that represents the daily tidal flow within the waterfront restricted area at the NBK–Bangor waterfront (Section 4.1.1.1.2, Operation). The maximum difference in temperature between the enclosures and site waters would be no more than a 4°C [7.4°F] difference (11°C [52°F] inside the enclosures compared to a minimum ambient temperature of 7°C [44.6°F]) (refer to Table 6–3), which further limits the potential for effects on the temperature of site waters. As a result, there would be a negligible effect on water temperature, including temperature stratification in the water column, along the NBK–Bangor waterfront.

Because water from the enclosures would not be discharged to the environment, the Marine Mammal Alternative would not change the salinity of surrounding waters. There would be no impact on temperature, salinity, or stratification.

TURBIDITY

Considering the relatively small volume of marine mammal wastes (Table 4–1) and the volume and dispersive capacity of site waters ($13.0 \times 10^8 \text{ m}^3$ [3.43×10^{11} gallon] flow volume that would circulate within the area on an average tide day [24 hours and 50 minutes]), solids released in Navy marine mammal waste material would be dissipated throughout the NBK–Bangor waterfront. Marine mammal waste would not cause an overall increase in turbidity at the waterfront. The potential for turbidity effects from small boat operations under this alternative is discussed below.

PH

The waste material from the Navy marine mammals has a moderate acid content (pH of 6.1 for dolphins and 6.2 for sea lions) and is produced in the quantities shown in Table 4–1. Based on the small release of waste material from the Navy marine mammals, the Washington State-designated pH standard of 7.0 to 8.5 for extraordinary quality marine surface waters would not be violated within the NBK–Bangor waterfront. This is considered a negligible effect on pH. No other aspect of operations has the potential to affect pH.

BOAT OPERATIONS (TURBIDITY AND FUEL SPILLS)

Operation of small boats under the Marine Mammal Alternative has the potential to affect water quality due to bottom sediment disturbance (prop wash effect) and the potential for fuel spills. These boats would have outboard engines with shallow propeller depths (up to 1 meter [3 feet] deep), and would normally operate in water at least 9.1 meters [30 feet] deep. Near the marine mammal pens, the boats would operate in water as shallow as 6.1 meters [20 feet] deep, but at very low engine RPM. Thus, the distance from the propeller to the seafloor would be at least 5.1 meters [17 feet], which would be too far to result in disturbance of bottom sediments. The resulting turbidity plume from boat prop wash that would disturb bottom sediments would be negligible. If these boats were to operate in even shallower water, these occurrences would be very infrequent and short term (no more than a few minutes), and resulting turbidity plumes would dissipate within 30 minutes. All Navy vessels are operated to minimize the potential for fuel spills. As described in Chapter 2, the Navy maintains full-time staff to support spill prevention and response capability. A fuel spill prevention and response plan is implemented by the Navy for the NBK–Bangor waterfront. The existing plan would include boat operations associated with the Marine Mammal Alternative. Considering the above factors, operation of boats under this alternative would have a negligible effect on water quality.

Overall water quality impacts are negligible.

4.1.1.2.3 MONITORING AND MITIGATION

The Navy, in coordination with WDOE and USEPA, would develop a water quality monitoring program to validate the model-predicted water quality effects described in this section. Should this monitoring demonstrate a statistically significant increase in a water quality parameter that can be attributed to the Marine Mammal Alternative, the Navy would identify the source of the

problem and take action, as needed, to correct the increase. This monitoring program would be initiated approximately one year prior to implementation of the SISS to establish a baseline against which to evaluate effects of the Marine Mammal Alternative. Other potential sources of water quality effects, such as large concentrations of wild marine mammals or birds or exceptional weather events, would also be monitored to help in determining the source of any observed increase in a monitored parameter. If an extended period (to be determined) of monitoring indicates no water quality effects attributable to the Marine Mammal Alternative, the intensity of the monitoring (in terms of number and frequency of samples) would be reduced, in coordination with WDOE and USEPA.

4.1.1.3 Sediment

Effects on marine sediment can occur as a result of physical disruption from in-water construction and operation activities, such as boat propeller wash, as well as project-related discharges, such as inadvertent releases of construction debris or marine mammal wastes. Effects on sediment quality are considered adverse if conditions (i.e., contaminant concentrations) exceed state standards or interfere with beneficial uses of the water body. Applicable marine SQSs that are the basis for a determination of sediment impacts to sediment quality are discussed in Section 3.1.3, Sediment.

4.1.1.3.1 CONSTRUCTION

Construction activities would have negligible effects on sediment quality. As described in Section 4.1.1.2, Water Quality, measures would be implemented to prevent the discharge of debris into the water and minimize the likelihood of related fuel spills. These measures would also serve to protect sediment quality. However, installation of dock and enclosure anchors (concrete blocks) would temporarily disturb bottom sediments and resuspend sediments into the water column. The coarser resuspended sediments would settle on the sea floor within 30 minutes (Jiménez and Madsen 2003), and the finer particulates would be dissipated by currents. The anchors would alter the bottom habitat, from soft to hard substrate, over the small area represented by the blocks. The resulting effect on bottom sediments would be negligible considering the small area of coverage.

4.1.1.3.2 OPERATION

Effects on sediment quality from project operations would be negligible and related primarily to inputs of organic matter associated with settling fecal materials from sea lions. The deposition flux of sea lion fecal solids to the bottom within the study area is estimated to be 10 percent of the daily production rate (see Table 4-1), and a conservative assumption that up to 50 percent of the fecal material produced could settle to the bottom within the study area (Calambokidis et al. 1987). This represents a negligible increase based on the natural deposition flux of bulk particulate matter (e.g., measured at 1,260 to 8,340 milligrams per square meter per day at depths of 30 meters in Dabob Bay by Hedges et al. [1988]).

Once deposited on the bottom, fecal material would decompose rapidly due to bacterial processes and consumption by benthic organisms. Deposition of fecal material on the bottom would increase the localized, short-term oxygen demand (redox conditions) of bottom sediments. However, the relatively small flux and rapid decomposition of fecal material would minimize the potential for long-term accumulation of organic matter or changes in the redox conditions of

bottom sediments. The concentrations of toxics, such as trace metals or organic contaminants, in the sea lion fecal material would reflect concentrations in the sea lion food. The sea lion food would consist primarily of venter-supplied fish, and sea lion fecal material would be expected to contain concentrations of chemical contaminants that occur in wild fish. Consequently, settling of sea lion fecal material would not increase the flux of contaminants. Thus, sediment quality would not be altered and sediment quality criteria would not be exceeded within the study area as a result of operations.

As discussed in Section 4.1.1.2, Water Quality, boats used for project operations under this alternative would normally operate in water depths of -20 feet MLLW or greater; therefore, boat operations would not cause prop wash that would disturb bottom sediments. Although boat operations in shallower waters would be infrequent, prop wash could cause localized, short-term resuspension of bottom sediments. Sediments resuspended by prop wash would settle rapidly, turbidity plumes would dissipate within 30 minutes, and the overall effect would be negligible. Sediment disturbance would be so infrequent and minimal as to be far less than disturbance caused by natural currents and waves; therefore, there would be no long-term sediment impacts. The measures that would be implemented to minimize the likelihood of or effects from fuel spills during boat operations (Section 4.1.1.2, Water Quality) would serve to protect sediment quality. The resulting effect from project operations on site sediments would be negligible.

4.1.1.4 Marine Vegetation

4.1.1.4.1 CONSTRUCTION

Limited direct effects on marine vegetation would occur during construction. The dock, marine mammal enclosures, and anchors would be constructed on land and then placed in water for attachment to an existing pier. These structures would be placed in water depths of approximately 20 - 30 feet and 200 feet from the 0-foot tide line. Eelgrass occurs at shallower depths (0 to -20 feet MLLW). The closest eelgrass bed is 100 feet from the marine mammal enclosures and would be avoided during construction. Recent transect surveys indicate that sparse macroalgae occurs in the vicinity to depths of nearly 50 feet (Morris et al. 2008b). Approximately 108 square feet of the sea floor would be covered by the anchoring system. The lowest part of the enclosures would be approximately 18 feet above the sea floor where they would not come in contact with the existing marine vegetation communities.

Indirect effects from changes in water quality during construction would be temporary and would not affect marine vegetation. As described in Section 4.1.1.2, Water Quality, increases in turbidity and suspended solids during placement of the anchors would be minimal, temporary, and localized. Similarly, there would be temporary and small-scale reductions in light penetration and DO, and minimal release of contaminants associated with sediment disturbance. Overall, construction would have negligible effects on marine vegetation.

4.1.1.4.2 OPERATION

The new docks, enclosures, and anchors would provide additional hard substrate for colonization and attachment of marine vegetation. Relevant surveys indicate that a variety of turf algae, including green (e.g., *Ulva* spp.) and brown algae (e.g., *Laminaria* spp.) dominate marine fouling communities in Puget Sound (Cohen et al. 1998).

The active industrial NBK–Bangor waterfront supports six major piers and docks, averaging 164,000 square feet each. Each structure is supplied with artificial lighting for both industrial operations and security measures. The largest piers at the NBK–Bangor waterfront are outfitted with more than 100 industrial overhead, security, doorway, and walkway lights. The addition of overhead lighting units along the marine mammal facility dock would not affect overall lighting at the NBK–Bangor piers. Due to the existing level of nighttime artificial lighting at the facility, the additional lighting needed to illuminate the marine mammal docks, enclosures, and support facilities would have a negligible effect on marine vegetation.

Indirect effects associated with shading of marine vegetation by over-water structures can result in the loss or reduced productivity of these communities (examples within Nightingale and Simenstad 2001). Therefore, there may be some reduction of macroalgae, which occurs at depths where new docks would be constructed. However, because macroalgae are sparse in the study area, the potential for shading effects is limited and would result in a negligible effect on submerged aquatic vegetation in the study area. No shading effects would occur to eelgrass beds, which occur at shallower depths approximately 100 feet from where the marine mammal enclosures would be located.

Increased boat traffic from the Marine Mammal Alternative would not adversely affect the marine vegetation community at NBK–Bangor. As discussed in Section 4.1.1.2, Water Quality, small boat operations would not increase turbidity, because the boats would operate at very low RPM and the water depth would be too great (-20 feet MLLW at the shallowest) for propeller wash to disturb bottom sediments. Therefore, eelgrass beds would not experience increased turbidity or substrate disruption as a result of boat operations. Furthermore, fuel spills with the potential to damage marine vegetation would be avoided through adherence to the existing NBK–Bangor fuel spill and response plan.

As described for marine water quality in Section 4.1.1.2, Water Quality, the long-term, but small-scale, release of nutrients as waste products from the Navy marine mammals would meet all Washington State water quality standards and have a negligible effect on marine vegetation communities. The small-scale added nutrients from the waste products may increase the available nutrients to marine plant and epiphyte communities. However, as the Marine Mammal Alternative would not affect currents or tides, these changes in water quality would be negligible and diminished by strong currents typical of the nearshore areas at NBK–Bangor (see Section 4.1.1.1, Hydrography). Changes in DO and fecal coliform as a result of this alternative would be negligible and would not affect marine vegetation. Therefore, enrichment of the marine vegetation community would not occur and overall effects on marine vegetation would be negligible.

4.1.1.5 Plankton

4.1.1.5.1 CONSTRUCTION

No direct effects on plankton would occur during construction since plankton are not sessile or subject to effects associated with placement of the anchoring system or dock assembly and attachment. Indirect effects associated with increases in turbidity and suspended solids during construction and assembly would be temporary and localized and would not have long-term

effects on plankton. Thus, construction of the Marine Mammal Alternative would result in negligible effects on the plankton community along the NBK–Bangor waterfront.

4.1.1.5.2 OPERATION

No adverse effects on plankton movement would occur from the new facilities. The anchoring system may contribute to small-scale eddy flows around human-made structures (Section 4.1.1.1, Hydrography), but currents would otherwise not be modified or affect plankton distribution. The plankton would circulate around the enclosures.

The floating docks would create a site of colonization for common marine fouling communities, including filter-feeders that prey on plankton. However, the size of the docks and enclosures would represent a negligible incremental increase in the fouling community in relation to the existing industrial waterfront at NBK–Bangor. Thus, predation pressure on the plankton community would be considered negligible over existing conditions.

A potential indirect effect of artificial nighttime lighting on plankton is increased feeding opportunities by predators, including salmonids (Nightingale and Simenstad 2001). However, nighttime artificial lighting is already present at the facility, and additional lighting associated with the Marine Mammal Alternative would be negligible.

Plankton would not be affected by the increase in small boat use. This is because there would be no substantial changes to water quality from the six additional boats (see Section 4.1.1.2, Water Quality) resulting in negligible effects.

Similar to the discussion for marine vegetation (Section 4.1.1.4, Marine Vegetation), a negligible enrichment of phytoplankton communities would occur. As described in Section 4.1.1.2, Water Quality, the added nutrients from the marine mammal waste products would be localized and dissipated by currents. Therefore, the project would not affect the frequency and/or duration of algae blooms that may occur in the project vicinity. Overall, this alternative would have negligible effects on plankton.

4.1.1.6 Benthic Communities and Shellfish

4.1.1.6.1 CONSTRUCTION

Limited direct effects on the subtidal benthic community would occur during construction. Because the anchoring system, floating dock, and enclosures would be constructed on land and then placed in water for attachment to the existing pier, construction and assembly activities would not disturb the existing benthic community. However, anchor placement would result in the immediate loss of existing soft-bottom benthic organisms within the anchor footprints (expected to be a maximum of 12 anchors covering a total of approximately 108 square feet) on the sea floor.

As addressed in Section 4.1.1.2, Water Quality, increases in turbidity and suspended solids during construction and installation of the floating dock and enclosures would be temporary and localized. The anchors required to stabilize the dock would result in anchor plumes rising an estimated 10 vertical feet in the water column and persisting about 30 minutes due to tides and currents. Filter- and suspension-feeding invertebrates (e.g., bivalves, tunicates, crustaceans) may

close their shells, suspend feeding, or increase feeding rates in response to turbidity increases (LaSalle et al. 1991; Cruz-Rodriguez and Chu 2002) but return to normal behavior immediately thereafter. Generally, marine invertebrates are tolerant of relatively high suspended solids concentrations over periods of hours to days with adverse effects limited to prolonged exposures and/or to very high concentrations (e.g., fluid mud) (LaSalle et al. 1991; Clarke and Wilber 2000; Wilber and Clarke 2001). Consequently, short-term changes in water quality from anchor placement would be minor to the benthic community, including shellfish.

4.1.1.6.2 OPERATION

Anchors placed to stabilize the floating dock would result in a long-term effect of converting the existing soft bottom to hard substrate within the anchor footprints. Similar to existing anchors in place along the waterfront, these anchors are expected to become a site of colonization for hard-bottom species such as mussels (*Mytilus* sp.) and sea anemones, and support associated species (e.g., copepods, amphipods) and predatory sea stars (Kozloff 1983; Cohen et al. 1998; Cordell 2006; PSAT 2006). Additionally, the new floating dock would effectively increase available in-water surface area and become a site of colonization for common marine fouling communities (e.g., mussels, tunicates, small crustaceans, worms). The small decrease in soft-bottom habitat and increase in hard substrate habitat would result in a minor and localized change in species composition but would not result in any net loss of biological productivity.

As discussed in Section 4.1.1.4, Marine Vegetation, the addition of overhead lighting units along the marine mammal facility dock would result in a minor incremental increase in lighting. No measurable increase in predation rates on mobile invertebrates would occur. Regional studies have shown that over-water structures can shade and directly affect benthic productivity in underlying substrates (Simenstad et al. 1999). However, due to the small area of over-water structures (see Table 2–2), shading on sessile benthic organisms would be negligible. Mobile shellfish (e.g., crabs, shrimp) would not be affected.

As described in Section 4.1.1.2, Water Quality, the added nutrients from the marine mammal waste products would be localized, rapidly dissipated by currents, and remain within state water quality standards. Therefore, negligible changes in benthic community composition associated with organic enrichment would occur. In addition, there would be a negligible effect on fecal coliform levels, and compliance with Washington State fecal coliform standards would not be affected. Therefore, benthic organisms and shellfish would not be adversely affected, and there would be no effect on the opportunity to harvest shellfish at the NBK–Bangor waterfront.

The small increase in small boat activity is not expected to affect the benthic community. These boats would avoid shallow waters where props are too close to the sea floor. In addition, it is expected that vessel prop speeds would be low near the marine mammal facilities and the vessel mooring locations, thereby limiting potential disturbance to bottom sediments. Overall, disturbance to benthic communities from use of small boats is expected to be minor.

4.1.1.7 Marine Fish

4.1.1.7.1 CONSTRUCTION

Any in-water construction activities are required to observe site-specific fish windows, outlined to prohibit in-water work in specific times and areas for the protection of migrating juvenile

salmonids (WAC 220-110-271). Conversely, work windows define the time period when in-water work is permissible, generally defined as the entire calendar year less the fish window (USACE, 2008). For in-water projects at Bangor (Tidal Reference Area 13), the salmonid (salmon and bull trout) fish window occurs from February 16 to July 15 (WAC 220-110-271; USACE, 2008). As a result, in-water work is permissible in the marine waters of northern Hood Canal, including Bangor, from July 16 to February 15. NBK–Bangor fish surveys in the 1970s and 2005 to 2006 indicate that greater than 95 percent of the juvenile salmonid migration is complete by July 15 (Schreiner et al. 1977; Salo et al. 1980; Bax 1983; SAIC 2006a).

During construction, the in-water structures would be installed about 200 feet seaward of the shoreline, away from the primary juvenile salmon migration route through intertidal and shallow subtidal nearshore waters. Therefore, negligible effects on juvenile salmonid migration or forage fish habitat use would occur from installation of the in-water marine mammal facility. Adult salmonids, returning to their natal streams to spawn in late summer to fall, are not restricted to the nearshore waters for protection from predators and could occur at the site during in-water placement. However, adult salmonids are much larger and faster and would likely avoid the immediate area during placement. As they regularly utilize offshore waters during their return migration, the avoidance of the immediate area would not be a migration barrier to adult fish. Other fish species, however, may be present in the area during construction.

Construction activities would involve placement of preassembled structures in the water using an onshore crane, which would minimize water quality effects on fish present. Construction would include anchor placement, which would likely result in 12 plumes in the water column that would persist no more than 30 minutes before dissipating due to the tides and currents. The scale of this suspension would not have a long-term effect on fish distribution, abundance, or habitat. Construction noise levels would not be greater than existing noise levels and, thus, would not be harmful to fish. Overall construction effects would be considered minor.

4.1.1.7.2 OPERATION

SALMONIDS AND OTHER MARINE FISH

Shading Effects

Regional studies have shown that light-blocking over-water structures can indirectly affect salmonid and forage fish habitats by affecting benthic species often associated with eelgrass (e.g., epibenthic crustaceans) and organisms associated with plant detritus (e.g., harpacticoid copepods) (Simenstad et al. 1999). Due to the distance from shore, shade from the in-water structures would occur in deeper water habitats (greater than 20 feet [-20 feet MLLW]) where shading effects on fish would be negligible because shading would not affect preferred fish aquatic habitat (eelgrass). Eelgrass beds would not be adversely affected by operations (Section 4.1.1.4.2). Thus, the Marine Mammal Alternative would not result in the loss of or adverse effects on nearshore habitat utilized by juvenile salmonids, forage fish, or nearshore non-salmonids.

Lighting

Nighttime lighting has been identified as a potential cause for disorientation in out-migrating juvenile salmonids and other marine fish (Prinslow et al. 1980; Salo et al. 1980). The construction of the Marine Mammal Alternative would add negligible lighting relative to existing

lighting at the waterfront. The larger piers are outfitted with more than 100 industrial overhead, security, doorway, and walkway lights. The additional 10 overhead lighting units along the marine mammal facility dock would have a localized area affect in the immediate vicinity of the enclosures. Because floating dock would occur approximately 200 feet from the shoreline and adjacent to an existing lit structure, juvenile salmonids and other fish species would be less likely affected by the presence of these additional lights. For these reasons, the additional lighting would have a negligible effect on salmonid or forage fish.

Migration

The on-water and submerged structures that could represent barriers to juvenile salmonid or forage fish migration include the floating dock and the marine mammal enclosures. Simenstad and Nightingale (2001) cite multiple studies that indicate the migrations of juvenile salmon, notably fry, are within shallow nearshore waters. These studies have shown that smaller juveniles (e.g., fry less than 2 inches) migrate along the shoreline in waters less than 3 feet in depth (Schreiner 1977; Bax 1982; Whitmus 1985). As juvenile salmonids become larger, they move further offshore into deeper waters where they encounter piers and bulkheads (Nightingale and Simenstad 2001). The migration of these larger juvenile salmon would be affected in the immediate vicinity of the structures. The submerged enclosures would also affect adult forage fish, which occur in both nearshore and offshore waters.

Activities related to marine mammal and support vessel operation would not create fish disturbance behavior different from that expected from existing daily security and waterfront vessel operation. NBK–Bangor is an actively patrolled industrial waterfront. Other species of non-salmonid fish occurring along the NBK–Bangor waterfront generally do not exhibit shoreline migrations similar to those of salmonids. Of the non-salmonid and forage fish species, shiner perch show the greatest amount of migration to and from the NBK–Bangor shoreline. However, this migration is not along the shoreline, but rather toward the shallow nearshore waters in the spring to bear their young, and to deeper offshore waters to over-winter. The marine mammal enclosures and associated floating docks would not block this migration between habitats. The effect on fish migration would be negligible.

Water Quality

Water quality effects from the proposed project would be within WDOE standards and would not affect the health or well being of native fish that occur in the area. The Marine Mammal Alternative would not result in the introduction of pollutants into Hood Canal. Adherence to the existing NBK–Bangor fuel spill and response plan would help to avoid any potential petroleum spills from small boat use and subsequent water quality effects. Overall, given the localized and small-scale water quality effects, water quality changes under the Marine Mammal Alternative are expected to have negligible effects on fish species.

Noise

Navy bottlenose dolphins are expected to use echolocation clicks (underwater acoustic signals) during routine training and work sessions, in particular for object detection and identification. When target hunting in open water, Navy bottlenose dolphins use echolocation clicks with a frequency content of 20 to 150 kHz and an average source level of approximately 198 dB re 1 μ Pa peak pressure, or 204 dB re 1 μ Pa peak-to-peak pressure (Houser et al. 2005). Sensitivity to echolocation clicks has been studied in one fish, the American shad, which demonstrated an

ability to detect echolocation clicks of peak-to-peak SPL of 171 dB re 1 μ Pa (Mann et al. 1998). (American shad are in the clupeid family, which is one of the fish groups with the most sensitive hearing.) Based on this information, fish at NBK–Bangor (using the conservative assumption that they are as sensitive to these clicks as American shad) should be able to detect bottlenose dolphin echolocation clicks. Fish not located on the main axis of the echolocation beam would be less able to detect these clicks because sound attenuation off the main axis of the beam is rapid due to the high directionality of the beam. Given the directionality of the bottlenose dolphin’s echolocation beam, it is unlikely that any fish would receive more than incidental ensonification from dolphin clicks during target detection tasks. Of the fish that are ensonified, nearly all would be insensitive to the sound frequencies in the echolocation click, as the hearing sensitivity of most fish, including salmonids, is very low above about 400 Hz. However, some clupeid fish, including shad, can hear frequencies up to 100 kHz; other clupeids, such as sardine and anchovy, can hear up to about 10 kHz (Popper and Fay 1973). Therefore, echolocation clicks from the Navy bottlenose dolphins could cause behavioral avoidance effects in fish with similar hearing sensitivity. However, the energy content of the dolphins’ clicks would be insufficient to cause physical harm to fish (Benoit-Bird et al. 2006). No impacts on fish are anticipated as a result of dolphin echolocation.

Predation

The marine mammal enclosures would be located approximately 200 feet from the shore, as noted above, which is beyond the primary migration route for juvenile salmon. It is likely that some larger juvenile salmonids and forage fish would migrate sufficiently offshore to encounter the enclosures. However, fish would not be able to enter closed enclosures and would not be subject to predation from marine mammals within enclosures.

It is possible that Navy sea lions and dolphins would prey on fish when outside the enclosures during mission activities. However, this predation would have a negligible effect on fish at the NBK–Bangor waterfront because the mammals would be well fed with a diet closely monitored by program veterinarians, and they would be kept under close control by their human trainers with little opportunity to pursue wild fish. The expectation is supported by the fact that the Navy’s marine mammals at San Diego, California, and Kings Bay, Georgia, prey on few wild fish while working. Although California sea lions are known to predate on salmon, predation by NBK–Bangor Navy dolphins on adult salmon would be hindered by the large size of the adult fish. Atlantic bottlenose dolphins’ common prey items include fish, cephalopods (squid and octopus), and crabs (Gannon and Waples 2004). One of the more common fish prey sources for these dolphins is menhaden (*Brevoortia tyrannus*), which have been known to reach a maximum size of 18 inches and 3.3 pounds (Menhaden Resource Council 2007). However, menhaden are much more common at smaller sizes and become mature at 7 to 8 inches and less than a pound (Menhaden Resource Council 2007). Upon maturity, menhaden are smaller in comparison to adult salmonids. Therefore, predation by dolphins on adult salmonids is not expected.

Wild California sea lions, present at the NBK–Bangor waterfront during winter months, and harbor seals, which occur in the same waters year round, are known foragers of salmonids and forage fish (NMFS 1997; London et al. 2002). Predation of juvenile salmonids or forage fish by Navy marine mammals at NBK–Bangor would be considered negligible in comparison to those fish consumed by naturally occurring populations of marine mammals (estimated in excess of 1,000 harbor seals and other marine mammals in Hood Canal). Effects of fish predation by Navy

marine mammals would therefore be negligible, with no effects on the overall fish population at the NBK–Bangor waterfront.

Overall effect of operations on fish would be negligible.

ESSENTIAL FISH HABITAT

Coastal Pelagic Species

Coastal pelagic species are considered sensitive to overfishing, the loss of habitat, reduction in water and sediment quality, and changes in marine hydrology, including entrainment through water intakes (PFMC 1998b). No increase in fishing, loss of fish habitat, changes in marine hydrology, or entrainment through water intakes would occur under the Marine Mammal Alternative. In addition, there would be no exceedance of state water quality standards. As discussed above for salmonids and forage fish, changes in artificial lighting levels and in-water noise would be minor. In addition, no anchovy or market squid spawning occurs along the NBK–Bangor waterfront, and thus these species would not be affected. As described above, predation effects from Navy marine mammals are considered negligible. Thus, the Marine Mammal Alternative would not adversely affect habitats vital for the continuation of coastal pelagic species in Hood Canal, specifically northern anchovy and market squid.

Pacific Salmon

Pacific salmon are considered sensitive to overfishing, 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 2000). Under the Marine Mammal Alternative, no increase in fishing, loss of suitable spawning habitat, changes in estuarine hydrology, exceedance of state water quality standards, reduction of sediment quality, or decreases in prey food source would occur. The potential barriers to fish migration are limited to the offshore in-water marine mammal enclosures discussed above, and these structures would not block adult salmon attempting to return to their natal streams to spawn. As with coastal pelagic species, changes in artificial lighting levels, water quality, in-water noise, and predation levels would be negligible to minor. The in-water structures present a potential barrier to juvenile salmonid migration; however, the structures would be located offshore, away from the typical migration route, and would be situated adjacent to an existing in-water structure. Thus, construction and operation would not adversely affect habitats vital for the continuation of Pacific salmon species in Hood Canal.

Pacific Groundfish

Pacific coast groundfish species are considered sensitive to overfishing, the loss of habitat, and water and sediment quality (PFMC 2006). No loss of Pacific groundfish habitat, increase in fishing, exceedance of state water quality standards, or reduction in sediment quality would occur under this alternative. As with coastal pelagic species and salmon, changes in artificial lighting levels, water quality, in-water noise, and predation levels would be negligible to minor and would not adversely affect Pacific groundfish. The new in-water structures would be used by some Pacific groundfish species, but relative to existing conditions, only a minor amount of new in-water structure habitat would be created. In conclusion, construction and operation of the Marine Mammal Alternative would not adversely affect habitats vital for the continuation of Pacific groundfish species.

4.1.1.8 Wild Marine Mammals

This section describes project effects on marine mammals other than those that are listed under the ESA. Effects on ESA-listed marine mammals are discussed in Section 4.1.1.10, Threatened and Endangered Marine Species. As described in Section 3.1.8, Wild Marine Mammals, those marine mammal species in regular and frequent occurrence at the NBK–Bangor waterfront are the California sea lion and harbor seal. About 1,000 harbor seals occur in Hood Canal, with some individuals occurring at the NBK–Bangor waterfront year round (Jeffries et al. 2003). Approximately 20 to 30 predominantly male California sea lions occur in Hood Canal at the NBK–Bangor waterfront during the non-breeding season (fall to late spring) (Jeffries 2007a, personal communication). Marine mammal species not listed under the ESA and only expected to occur occasionally or rarely in Hood Canal are the gray whale, minke whale, Dall’s porpoise, harbor porpoise, transient stock killer whale, and northern elephant seal (see Section 3.1.8, Wild Marine Mammals). Effects on these animals would be similar to those described below for the harbor seal and marine mammals in general because they use similar habitats within the marine environment (refer to Table 3–19).

4.1.1.8.1 CONSTRUCTION

Construction of the Marine Mammal Alternative would result in increased human presence and activity at the location of the new dock and enclosures. Anticipated construction noise would be within the range of existing noise levels. Because the facilities would be located on an existing industrial pier, wild marine mammals have already become habituated to the existing noise, visual disturbance, and human presence. California sea lions currently use existing piers and docked submarines for resting and would continue to use these locations. Harbor seals are generally wary of human activity (Suryan and Harvey 1999). Harbor seals would avoid the immediate area during construction but would return following completion of construction.

Existing habitat features important to marine mammals (river mouths, estuarine habitat, eddies, and upwelling) would not be affected by the Marine Mammal Alternative. Marine haul-out sites at the NBK–Bangor waterfront (docks and submarines) would not be altered from existing conditions. This alternative would not increase haul-out locations for marine mammals. The additional dock and enclosures would not be available as new haul-out sites for California sea lions or harbor seals. There would also be no change in prey abundance during construction. Based on habitat features and available foraging areas, marine mammal abundance and distribution at the NBK–Bangor waterfront would not change from existing conditions during construction, although harbor seals may swim further from the construction area during the 30-day construction period. Overall effects would be expected to be negligible.

4.1.1.8.2 OPERATION

Most of the waterfront facility floating dock and enclosure space, where operation of the Marine Mammal Alternative would occur, would not be accessible to naturally occurring California sea lions because the area would be fenced both above and below water. Wild marine mammals would not have the opportunity to share the same haul-out area within the enclosures as the Navy sea lions because of fencing and enclosures that separate the Navy sea lion enclosures from all other areas of the NBK–Bangor waterfront. Wild marine mammals may also attempt to socialize with working Navy marine mammals within the NBK–Bangor waterfront. However, trainers would work closely with their animals to avoid areas where wild marine mammals are observed

to ensure minimal physical contact and interaction between the Navy marine mammals and wild marine mammals. This effort would be similar to methods used by the SSC San Diego trainers who work with the Navy marine mammals in avoiding interactions with wild marine mammals thus minimizing the potential for disease transfer (refer to Appendix A Section 9, Environmental Health and Disease Potential for MMP Marine Mammals and Chapter 6 Section 6.2.1.2.6, Disease).

These efforts during Navy marine mammal training and routine operations include MMP personnel recalling the Navy marine mammal into the boat when wild marine mammals are within close proximity of the mammal operating boat or when observed behavior indicates the wild marine mammal is pursuing socialization. When the wild marine mammal has moved from the area, MMP personnel would then resume operations. In the unlikely event wild marine mammals are in close proximity to the marine mammal operating boat during an intruder alert, every effort would be made to reduce the possibility of interaction. MMP personnel are trained to take measures to avoid interactions between Navy marine mammals and wild marine mammals.

Marine mammals are sensitive to chemical contaminants, algal toxins, and fecal coliforms (Van Dolah et al. 2003). The Marine Mammal Alternative would not introduce chemical contaminants or result in an increase of algal toxins into marine waters, and effects on fecal coliform levels at the NBK–Bangor waterfront would be negligible. Therefore, there would be no effect on wild marine mammals.

With the new dock and MMP enclosures, human activity at the waterfront facility would increase. However, because substantial human activity already occurs at the NBK–Bangor waterfront and at the existing pier where the dock and enclosures would be located, the wild marine mammals have already become habituated to this activity. Currently, California sea lions hauled out on docked submarines appear undisturbed by the presence of Navy personnel during loading, unloading, and maintenance activities where human activity is in close proximity to the hauled-out mammals. The presence of humans during operation of the Marine Mammal Alternative would not change the existing haul-out conditions for wild marine mammals.

Vessel traffic associated with daily operation of the Marine Mammal Alternative at the waterfront facility would elevate vessel traffic above the existing level that wild marine mammals encounter at the pier where the waterfront facilities would be located. Harbor seals have been observed being disturbed by powerboats at haul-out sites (Suryan and Harvey 1999), although harbor seals have also been shown to become tolerant of powerboat traffic over time (Suryan and Harvey 1999). The increased boat traffic associated with the Marine Mammal Alternative is not expected to result in harbor seals or wild California sea lions altering their foraging activities at the NBK–Bangor waterfront because these marine mammals are already habituated to an industrial waterfront and substantial boat activity. The increased small boat noise is not expected to affect the hearing of the pinnipeds at the NBK–Bangor waterfront because it would be within the accepted noise exposure limits identified for pinnipeds (Kastak et al. 1999, 2005; Finneran et al. 2003). Naturally occurring marine mammals in nearshore waters would avoid these vessels during operation, with minimal additional effort above the existing level of behavioral avoidance by mammals (California sea lions and harbor seals) that normally occurs in the vicinity of the working pier.

In conclusion, the Marine Mammal Alternative would have negligible effects on the abundance and distribution of wild marine mammals that occur along the NBK–Bangor waterfront. This alternative would not result in the capture, harassment, or harm of wild marine mammals. Therefore, this alternative would result in no reasonably foreseeable takes under the MMPA.

4.1.1.9 Other Marine Wildlife

As described in Section 3.1.9, Other Marine Wildlife, other marine wildlife includes shorebirds, marine waterfowl, seabirds, and the bald eagle, a protected species. The marbled murrelet, a seabird, is listed under the ESA, and is further discussed under Section 4.1.1.10, Threatened and Endangered Species.

4.1.1.9.1 CONSTRUCTION

Construction activities have the potential to disrupt other wildlife occurring in the vicinity of the existing pier. The visual presence of construction workers and equipment, as well as the accompanying noise, would displace marine birds to surrounding undisturbed areas during the 30-day construction period. Marine birds that would depart the immediate area (which is subtidal habitat) include seabirds (such as pigeon guillemot, cormorants, and gulls) and marine waterfowl (such as dabbling and diving ducks). Due to the large NBK–Bangor waterfront area and the surrounding Hood Canal, adequate alternative foraging areas are present. Birds that have departed would return to the area immediately following a decrease in activity, such as during evening hours or early morning hours before construction work commences, and when construction activities are completed. The new dock and enclosures are about 200 feet offshore and not near a freshwater source, and estuarine habitat used by marine birds (WDFW 1999) does not occur in the near vicinity. The intertidal zone of nearshore habitat that is used by some marine bird species (such as shorebirds and gulls) would be affected by construction of the waterfront facility during the short duration of construction (up to 30 days). However, there would be no long-term changes to marine bird habitat and marine bird occurrence, distribution, and abundance along the NBK–Bangor waterfront; the impact would be negligible.

4.1.1.9.2 OPERATION

During operation, human presence at the dock would increase but would be similar to other activities and noise along the pier and other areas of the NBK–Bangor waterfront associated with working piers and docks. Currently, marine birds foraging or loafing in marine waters adjacent to working piers at NBK–Bangor are habituated to the presence of Navy personnel conducting loading, unloading, and maintenance activities (Agness and Tannenbaum 2008b). Noise levels are also not expected to be higher than existing noise levels and would not affect marine birds.

Water quality parameters from project operation would meet state water quality standards, and as a result, would not affect distribution and abundance of marine birds. As shown in Table 2–2, small boat vessel traffic would increase under the Marine Mammal Alternative. Marine birds at the NBK–Bangor waterfront would avoid the immediate vicinity where these vessels are in operation; however, existing small vessels, Coast Guard vessels, and submarine traffic already occur as a regular activity at the NBK–Bangor waterfront. It is expected that other marine wildlife are habituated to these conditions, and effects would be negligible.

As mentioned in Section 3.1.9.2.2, Marine Bird Species, military readiness activities are exempt from the take prohibitions of the MBTA provided they do not result in a significant adverse effect on a population of a migratory bird species. Regardless, populations of migratory birds would not be affected by the implementation of the common elements of the proposed action. A number of migratory bird species covered under the MBTA are listed as endangered or threatened, and are discussed in detail in the following section. Other species that occur at NAVBASE Kitsap Bangor are also covered under the MBTA, but are not federally or state-listed as endangered or threatened; these species are not limited to, but include the Caspian tern, yellow-billed loon, black turnstone and short-billed dowitcher. A remote possibility exists that some individuals of some species may be directly impacted if they are at the point of physical impact at the time of training. Overall, however, activities at NAVBASE Kitsap Bangor have maintained the habitat for these species. Noise impacts would also potentially, but likely negligibly, affect migratory bird individuals.

In conclusion, the Marine Mammal Alternative would not affect the distribution and abundance of other marine wildlife (including birds protected under the Migratory Bird Treat Act) over the long term. Short-term displacement would occur to marine wildlife that forage in the immediate vicinity of the enclosures during construction and small boat operations, but these effects would be negligible.

4.1.1.9.3 PROTECTED SPECIES: BALD EAGLE

CONSTRUCTION

Bald eagle foraging habitat at the NBK–Bangor waterfront would not be affected by construction because the site would be located along an active waterfront with substantial daily human activity that is avoided by eagles and other wildlife, including prey. Long-term distribution of bald eagle prey would not be affected during construction because the work would occur over a short period of time (less than 30 days) and in a small, localized area near a working pier. Noise levels generated from construction would be less than that which currently occurs at this industrial waterfront. Bald eagles nesting in Hood Canal have had lower reproductive success than in other areas of Washington (Watson et al. 2002), which has been attributed to concentrations of DDT and/or PCBs in eagle eggs (Anthony et al. 1993; Mahaffy et al. 2000), but was not shown to be related to disturbance or habitat alterations (Watson et al. 1995; Leach 1996). However, Hood Canal bald eagle nests are more widely spaced than nearby territories, and these eagles exhibited lower overall foraging success (Watson and Pierce 1998). Authors noted that Hood Canal foraging areas had a lower abundance of large fish and possibly fewer potential piracy victims (gulls and osprey). Prey availability influences bald eagle foraging success and ultimately their reproductive success. As described under 4.1.1.7, Marine Fish, fish abundance and distribution is not expected to change during construction activities.

Construction of the upland facility would not adversely affect terrestrial habitat use by foraging bald eagles, as the habitat quality of the site is low and there are no trees present for perching, cover, or nesting. Therefore, the construction of the Marine Mammal Alternative enclosures and floating dock would have negligible effects on bald eagles. There would be no incidental take of bald eagles under the BGEPA and no special measures are needed to avoid adverse effects on bald eagles.

OPERATION

The increased vessel traffic activity and associated noise is not expected to affect bald eagles foraging and nesting in Hood Canal. This is because bald eagles forage over a wide area of marine waters in Hood Canal and are already familiar with existing small boat and other vessel activity within the NBK–Bangor waterfront area. The small incremental increased activity from small boats and associated noise would not affect their foraging activities in Hood Canal. The primary food source of the bald eagle is fish (mostly salmon), followed by birds and mammals in the absence of fish (Buehler 2000). The Marine Mammal Alternative would not affect distribution of these food resources. The area along the waterfront where an increase in boat traffic would occur is within the range of one bald eagle nest at the NBK–Bangor base (about 0.5 miles from the enclosures) and two bald eagle nesting territories that occur within 1 mile of the base. Because the nesting eagles are habituated to boat activity within the waterfront, including over 50 boats and vessels for waterfront security, submarines, and Coast Guard boats accompanying submarines, the additional small boats would not affect eagle nesting success.

Daily operation at the upland facility and traffic along the adjacent roadway would not affect bald eagles because bald eagles do not utilize areas near the site or roadway. Therefore, there would be negligible overall effects on bald eagles from project operations.

4.1.1.10 Threatened and Endangered Species

Construction and implementation of any action alternative requires compliance with the ESA, which would consist of preparation of a biological assessment and consultation with NMFS and/or USFWS if a project may affect a listed species. The Navy prepared and submitted the project biological assessment to NMFS and USFWS, who will review the biological assessment concurrent with review of this Draft EIS. The biological assessment additionally includes a discussion and review of project effects on EFH (refer to project effects on EFH fish species under Section 4.1.1.7, Marine Fish).

4.1.1.10.1 CONSTRUCTION

FISH

As mentioned for marine fish, any in-water construction activities are required to observe site-specific fish windows, outlined to prohibit in-water work in specific times and areas for the protection of migrating juvenile salmonids (WAC 220-110-271; USACE 2007). As a result, in-water work is permissible in the marine waters of northern Hood Canal (Tidal Reference Area 13), including Bangor, from July 16 to February 15. NBK–Bangor fish surveys in the 1970s and 2005 to 2006 indicate that greater than 95 percent of the juvenile salmonid migration is complete by July 15 (Schreiner et al. 1977; Salo et al. 1980; Bax 1983; SAIC 2006a).

- *Puget Sound Chinook ESU.* The timing of juvenile out-migration for Puget Sound Chinook salmon varies; however, peak out-migration occurs in May (Bax et al. 1978). Shoreline beach seine surveys conducted in 2005 and 2006 (SAIC 2006a) indicate that the peak juvenile salmonid out-migration ends in spring and occurs during the in-water work closure period, with very few salmonids present after the last week of June. The work windows are designated, in part, to protect the peak out-migrations of juvenile salmonids by limiting in-water work to times when juvenile salmonids are least abundant. Further, most juvenile salmonids migrate closer to shore in shallower areas of nearshore habitat (Bax et al. 1978;

Whitmus and Olsen 1979; Bax 1983; Healey 1991; Salo 1991) compared to the 200-foot distance of the floating structures and are, therefore, not expected to encounter the underwater portion of the enclosures. Adult Chinook are not dependent on the nearshore for refuge from predators and are too large to feed on the benthic invertebrates that are the prey of out-migrating juveniles. As a result, the larger, more mobile adults that occur later in the work window are less likely to occur at the construction site during placement because they are less dependent on nearshore habitats and would better be able to move away from the area should they occur. The construction effect would result in a minor impact to Puget Sound Chinook salmon.

- *Hood Canal Summer-Run Chum ESU.* The timing of juvenile out-migration is variable for Hood Canal summer-run chum salmon, as discussed in Section 3.1.10.2.1, Listed Marine Fish Species, under Hood Canal summer-run chum; however, it can begin as early as January and end as late as June (Schreiner et al. 1977; Salo et al. 1980; Bax 1983; SAIC 2006a). As designed to protect all potentially occurring Hood Canal salmonid species, observing the designated work window would minimize potential effects on Hood Canal summer-run chum salmon during the peak juvenile out-migration (peak timing: March; Bax et al. 1980). Potential avoidance of the immediate site of construction by adult Hood Canal summer-run chum salmon would be similar to that discussed above for Puget Sound Chinook adults. Due to their smaller size upon reaching the marine environment, juvenile chum salmon are more shoreline dependent than Chinook salmon (Bax et al. 1978; Whitmus and Olsen 1979; Bax 1983) and are more likely to occur closer to shore than the 200-foot distance of the floating structures. Construction of the Marine Mammal Alternative would result in minor effects on Hood Canal summer-run chum salmon.
- *Coastal-Puget Sound Bull Trout.* The timing of juvenile out-migration is not well known for anadromous Coastal Puget Sound bull trout, as described in Section 3.1.10.2.1, Listed Marine Fish Species, under Bull Trout. Information to date on bull trout in general suggests that juvenile out-migration likely occurs during April and May (64 FR 59810). The applicability of this estimate to Hood Canal remains unknown, but the best available knowledge indicates that these juveniles would be protected by the designated work window. As a result, the construction for the Marine Mammal Alternative would not occur during juvenile bull trout out-migration. The timing of adult in-migration for bull trout stocks in Hood Canal is also generally unknown; however, it is thought to occur for the South Fork Skokomish stock from mid-September to December (WDFW 2004). Although little is known about bull trout migration patterns, particularly in Hood Canal (WDFW 2004), if adult bull trout were present during construction activities, they would likely avoid the immediate site of construction as discussed for Puget Sound Chinook adults, and consequent conclusions regarding limited species effects during in-migration past the NBK–Bangor waterfront would apply for bull trout. Thus, construction of the Marine Mammal Alternative would result in minor effects on bull trout.
- *Puget Sound Steelhead.* Timing of juvenile out-migration for Puget Sound steelhead is not fully understood, with limited published estimates of out-migration timing for Puget Sound steelhead stocks in Hood Canal. WDFW biologists estimated that out-migration of winter steelhead in Hood Canal occurs from March through June, peaking during April and May (Johnson 2006, personal communication). The designated in-water work window would protect out-migrants of this stock from construction activities. Timing of out-migration for

the summer steelhead stocks remains unknown (WDFW 2002), and therefore potential overlap of adults with the work window is unknown. Adult in-migration of steelhead to Hood Canal natal streams can occur as early as January to as late as mid-July depending on the stock location and type (winter or summer steelhead), with little or no overlap with the designated work window. As with Chinook, adult steelhead would likely avoid the immediate site of construction with minimal effects on their migration. Thus, construction of the Marine Mammal Alternative could occur at a time when out-migration of summer steelhead may be present, resulting in minor effects on steelhead.

Construction of the enclosures and floating dock would not alter existing nearshore habitats, such as the intertidal and shallow subtidal zones, because the construction would occur on the existing pier and the placement of the dock and enclosures would not occur over eelgrass beds utilized by out-migrating juvenile salmonids. For the same reasons, nearshore prey resources utilized by juvenile salmonids would also not be affected because any effects on the benthic community, should they occur, would be minor and temporary.

MARINE WILDLIFE

As discussed in Section 3.1.10, Threatened and Endangered Species, these species (Steller sea lion and humpback whale) are not expected to occur in the study area of Hood Canal. For rare occurrences, effects would be similar to those discussed in Section 4.1.1.8, Wild Marine Mammals. In addition, the primary prey resources of these marine mammals (crustaceans, forage fish, salmon, and other fish species) would not be adversely affected by construction activities for reasons previously described (refer to Section 4.1.1.7, Marine Fish). To summarize, the duration of construction activities necessary to place the pre-fabricated facilities in water would be short, the facilities would be attached to an existing in-water structure, and anticipated noise levels of construction and operation would be below threshold levels for the primary prey. Therefore, negligible effects would occur on the prey resources of the Steller sea lion, southern resident killer whale, and humpback whale.

Marbled murrelets are shy and secretive and avoid human activities (USFWS 1997). As described in Section 3.1.10.2.2, Listed Marine Wildlife, marbled murrelets do not breed at the base or waterfront area, but do forage along the waterfront area where they can avoid noisy areas and vessel traffic. For this reason, construction of the waterfront facilities for the Marine Mammal Alternative would not be expected to displace marbled murrelets from the area because marbled murrelets already avoid the immediate vicinity of the existing pier since it is an active industrial waterfront.

The immediate site of the upland facility would be constructed on previously cleared land. The site does not have suitable nesting habitat for murrelets. Although forested habitat occurs adjacent to the site, the forested stand in this area is less than 100 years of age, which does not meet the critical habitat features needed for marbled murrelet nesting habitat. Therefore, construction of upland facilities would not affect marbled murrelet breeding habitat.

OCCURRENCE

Marbled murrelets have been identified in marine waters within the study area (Navy 2001a; Agness and Tannenbaum 2008b). The Puget Sound Assessment and Monitoring Program (PSAMP) surveys estimated marbled murrelet density in northern Hood Canal between 2.8 to 7

birds per square mile during the winter from 1993 to 2006, and 1.4 to 2.8 birds per square mile during the summer from 1992 to 1999 (WDFW 2007d).

4.1.1.10.2 OPERATION

FISH

The effects of operation of the Marine Mammal Alternative on listed salmonids, considering fish habitat, water quality, migration, underwater noise, and predation, would be the same as those described for marine fish under Section 4.1.1.7.2, Operation. There would be no effect on marine vegetation or benthic communities utilized by ESA-listed juvenile salmonids for refuge and foraging, and no effect on the principal nearshore migration pathway of juvenile chum and Chinook salmon, steelhead, and bull trout. In addition, the distance of the lights from shore and the limited number of lights used to illuminate these structures would be insufficient to disorient migrating juvenile salmonids. Older salmonids are expected to swim around enclosures during migration and experience limited or no effect on their migratory pathway.

The increase in the amount of vessel activity and associated noise would not substantially affect ESA-listed salmonid behavior, presence, or migration. This activity would not be expected to affect salmonid presence or migration. As described for marine fish under Section 4.1.1.7.2, there would be no effects on listed salmonids from dolphin echolocation.

The Navy marine mammals could potentially prey on listed fish. However, the marine mammals are fed a complete fish diet by their trainers, and their predation of existing wild salmon would be considered incidental. The expectation is supported by the fact that the Navy's San Diego-based marine mammals prey on few wild fish while working. Further, any potential predation of ESA-listed salmonids by Navy marine mammals at NBK–Bangor would be considered negligible in comparison to those fish consumed by naturally occurring populations of marine mammals present at the NBK–Bangor waterfront.

MARINE WILDLIFE

As discussed in Section 3.1.10, Threatened and Endangered Species, the Steller sea lion and humpback whale are not expected to occur at the NBK–Bangor waterfront. For rare occurrences, effects would be similar to those discussed in Section 4.1.1.8, Wild Marine Mammals. In addition, the primary prey resources of these marine mammals (crustaceans, forage fish, salmon, and other fish species) would not be adversely affected by operation of the Marine Mammal Alternative because there would be negligible, if any, consumption of wild fish by Navy marine mammals. Anticipated project-related noise levels during operation would be lower or similar to existing noise activities at the pier.

The effects of project operation at the waterfront facility on marbled murrelets may include changes in vessel traffic activity, noise, and water quality. Existing security patrols already result in small boat activity and associated noise within the NBK–Bangor waterfront restricted area. If these boats were to approach marbled murrelets along the NBK–Bangor waterfront, these birds would be expected to increase their flushing and diving behavior. However, the murrelets occurring at the NBK–Bangor waterfront would be expected to continue to remain in the area with the new boats associated with the Marine Mammal Alternative because these birds have already habituated to the existing small boat activity and other industrial waterfront activities. It is not expected that murrelets would avoid the area altogether; rather, they would

avoid active boats and waterfront noises. Such habituation to activity has been observed elsewhere (anecdotal reports cited in Piatt et al. 2007). Project activities and increased human presence at the floating dock and pier are not expected to affect foraging marbled murrelets because the pier is a busy industrial waterfront with a high amount of daily human activity and associated noise levels. The birds would be expected to already avoid the pier when human activity occurs. The human activity at the pier would be similar to existing human activities at the pier, and would not be expected to be noticeably different to the murrelets.

Because remnant older trees, suitable for murrelet nesting, are at least 1 mile north of the waterfront facility and 4 miles north of the upland facility, project operations would not affect marbled murrelet nesting habitat.

4.1.1.10.3 CONCLUSION

Based on the analysis in Sections 4.1.1.10.1 and 4.1.1.10.2, the Navy has determined that this alternative would have no effect on marine mammal species protected under the ESA; it may affect, but is not likely to adversely affect, fish and bird species protected under the ESA. The Navy would seek concurrence with this determination from NMFS and USFWS.

4.1.2 Upland Environment

4.1.2.1 Surface Water and Groundwater

Most components of the Marine Mammal Alternative are located offshore in Hood Canal and would not affect the upland environment. The upland components of this alternative would be limited to three office trailers and two portable above-ground pools situated within the developed boundaries of an existing facility.

There is a wetland in the vicinity of the upland site (see Section 3.2.3.2.4, Wetlands). The addition of the new structures would slightly change impermeable surface area but would have no effect on existing surface water flow or drainage. Nonetheless, during construction, best management practices (BMPs) (such as silt fences) would be employed to prevent silt-laden runoff from leaving the site. Following construction, disturbed areas would be revegetated.

During operation, stormwater would be conveyed from the site via the existing stormwater drainage system and would have no effect on surface water. The facilities would connect to the existing base water system and would generate minimal demand for groundwater and no need for surface water. There would be negligible effects on surface water and groundwater.

4.1.2.2 Geology and Soils

Most components of the Marine Mammal Alternative are located offshore in Hood Canal and would not affect the upland environment. The upland components of this alternative would be limited to three office trailers and two portable above-ground pools situated within a flat and graded area adjacent to existing buildings.

The topography at this site and modeling performed by WDNR (WDNR 2007a) indicate that this area is not located near steep, unstable slopes. Soils in the vicinity of the upland components of this alternative (Alderwood and Indianola Series soils on moderate slopes) are favorable for

construction of small commercial buildings and local roads or streets (Natural Resources Conservation Service 2006) and would not limit construction or operation of the SISS upland facility. There would be negligible effects on geology and soils.

4.1.2.3 Vegetation

The marine mammal dock and associated enclosures would be located over water and would not affect vegetation along the shoreline. Staging would occur on the existing pier. No additional parking area is needed. The upland support facility would be located on an existing graded site with no vegetation other than grass and some remnant Scot's broom and other mixed non-native and native herbaceous species. This vegetation would be removed for the building, above-ground pools, and driveway. Some new landscaping (primarily grass) would also be placed at the front of the building perimeter. Because the existing vegetation is abundant in the area and primarily of non-native species, there would be no detrimental effects on vegetation in the study area. Operation at the upland facilities would be consistent with the NBK–Bangor *Integrated Pest Management Plan* (Navy 2001b) and other measures that the base employs to minimize and control noxious weeds and other exotic organisms, consistent with the Noxious Weed Control Act of 1974 and EO 11987, Exotic Organisms.

No onshore wetlands in the vicinity of the waterfront facility would be affected by the Marine Mammal Alternative. The closest wetland to the waterfront facility is 0.1 acre in size and classified as palustrine forested, broad-leaved deciduous, seasonally flooded wetland. The wetland is located 380 feet from the pier where the marine mammal enclosures would be placed. No changes would occur to this wetland from construction or operation of the Marine Mammal Alternative.

An isolated 2.2-acre palustrine forested, seasonally flooded wetland occurs adjacent to a driveway surrounding the industrial site where the upland facility and above-ground pools would be located. This wetland is in a low lying area and receives a slight amount of stormwater runoff from the adjacent road and parking area. Construction and operation at the upland facility site would not physically alter the wetland or affect surface water drainage into the wetland. For the facilities associated with the project, stormwater runoff would be collected and routed through an existing oil-water separator. Wetland physical disturbance and plant alteration would not occur since construction or operational activities would not affect the wetland.

In conclusion, the Marine Mammal Alternative would result in no changes to vegetation in the vicinity of the marine mammal enclosures and dock, negligible effects on vegetation at the upland facility, and no effect on wetlands or associated drainages at NBK–Bangor.

4.1.2.4 Wildlife

Construction of the upland facility for the Marine Mammal Alternative would not result in changes to wildlife habitat since the area is already graded with most vegetation removed. Because the trailers would be placed within an already developed area, habitat connectivity and fragmentation of adjacent areas would remain unchanged. The site is surrounded by a young coniferous forest, a road, and buildings, and is not connected to any other larger native shrubland habitat.

Noise from construction at the waterfront facilities would be within the range of ambient noise conditions along the industrial waterfront of NBK–Bangor and would not affect terrestrial wildlife, including birds protected under the Migratory Bird Treaty Act. At the upland facility site, wildlife would be displaced during the temporary construction activities. However, since the new facility would be located in an office park, existing wildlife is already exposed and habituated to noise and visual disturbances in a developed area. The increased construction noise may cause wildlife, including migratory birds, to temporarily leave the area during the construction period of less than 30 days.

Effects on birds would be minimized by the relatively short duration of construction and the location of construction in areas of existing human presence and low-quality wildlife habitat. No priority species sightings or habitats and no nesting USFWS migratory birds of concern have been identified at or near the upland facility site (USFWS 2002; WDFW 2007a).

Nuisance species, such as European starlings and rock doves (pigeons), are likely to occur at the upland facility site. As discussed in Section 3.2.4, Wildlife, these nuisance species are not protected by the Migratory Bird Treaty Act. Amphibians and reptiles may occur at the wetland near the upland facility construction site; however, vehicle traffic would not substantially increase during construction or operation. Any roadside mortality of amphibians moving from the wetland to other areas (Fahrig et al. 1995) is not expected because the road crossing does not provide access between any two riparian sites. Overall, the construction of the upland facility associated with the Marine Mammal Alternative would have negligible effects on wildlife and habitat at NBK–Bangor.

The presence and operation of the upland facility would slightly increase the visual disturbance to natural areas surrounding the site. Daily operation at the upland facility would increase pedestrian traffic in the immediate building vicinity and increase vehicle traffic along the adjoining roadway during working hours. The slightly increased road activity may deter wildlife species (such as game species and other mammals) from crossing the roadway near the site when a vehicle travels along the roadway; however, substantial human activity and road use already occurs at the adjacent industrial park, and this increase would have a negligible effect on wildlife. Overall, the operation of the upland facility associated with the Marine Mammal Alternative would have negligible effects on wildlife at NBK–Bangor, including those species protected under the Migratory Bird Treaty Act and EO 13186, Protection of Migratory Birds. Furthermore, operation of the upland facility would not result in the use or release of hazardous materials and, thus, would not result in contamination to native wildlife. In conclusion, the Marine Mammal Alternative would have a negligible effect on the occurrence and abundance of terrestrial wildlife at NBK–Bangor.

Effects on bald eagles are addressed in Section 4.1.1.9, Other Marine Wildlife.

4.1.3 Social Environment

4.1.3.1 Noise

This section describes expected noise levels from construction and operation of the dolphin and sea lion enclosures at the floating dock, as well as at the upland support facility where offices, a clinic, and veterinary services would occur. Effects of noise on biological organisms are described in those resource sections of Chapter 4.

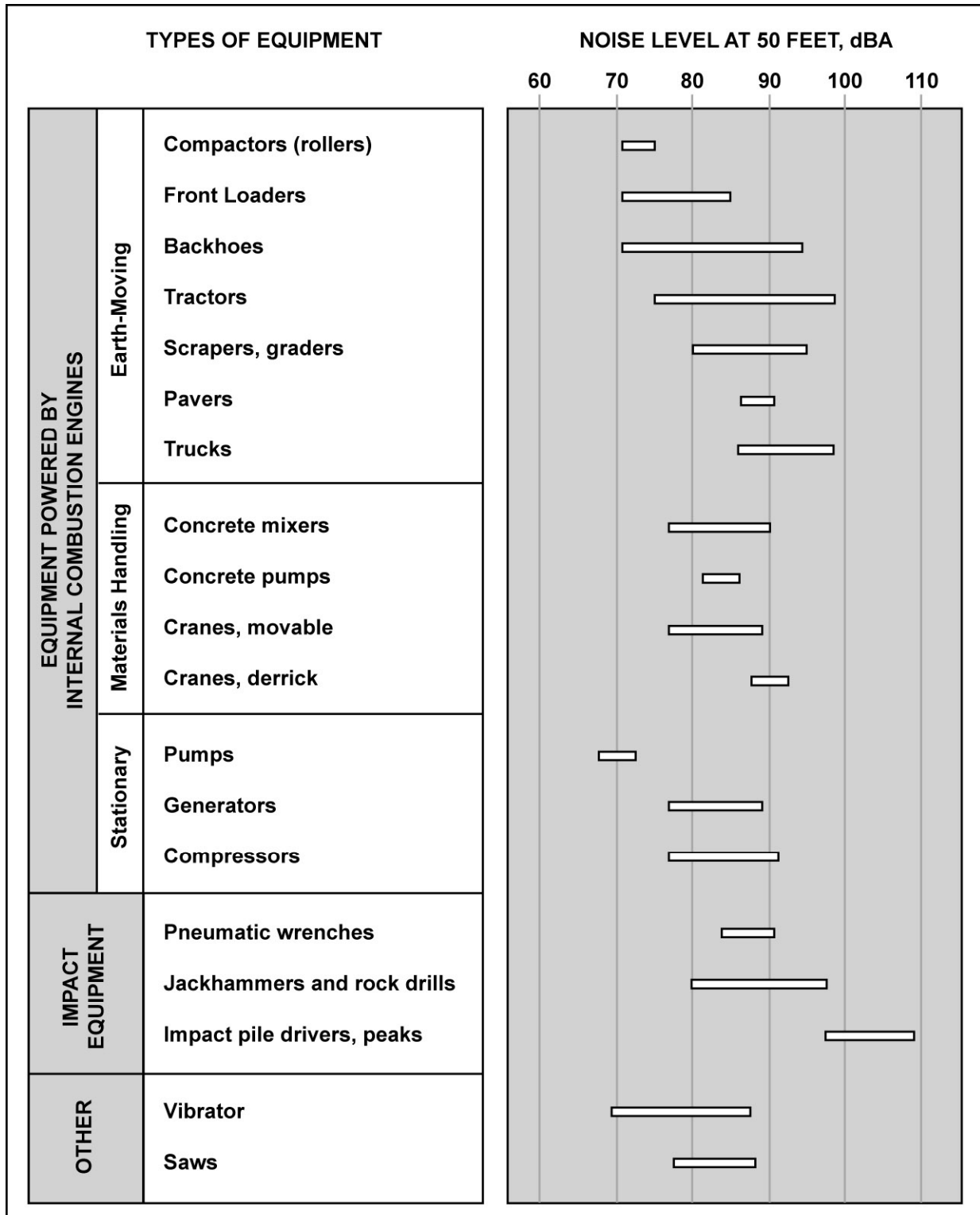
4.1.3.1.1 CONSTRUCTION

Construction noise at the waterfront would originate above water. This would include construction of the dolphin and sea lion enclosures and associated floating dock, followed by placement of these structures adjacent to an existing pier. Thus, most noise at the NBK–Bangor waterfront would be generated by trucks transporting the enclosures to the waterfront, by handheld equipment used to combine separate enclosure and dock components, and by cranes located on the pier that would move these structures over water.

Construction equipment (such as trucks, concrete mixers, pneumatic wrenches, and saws) generate up to 96 dBA at 50 feet from the source (Figure 4–1). When two pieces of similar equipment are operating at the same time and same location, construction noise levels can increase by up to 3 dB (WSDOT 2007) for a total of 99 dBA. These intermittent noise effects would occur over a short construction duration of less than 30 days during the workweek and normal working hours. Assuming a worst case situation of maximum construction noise for the Marine Mammal Alternative at 99 dBA, there would be negligible increases in in-air noise at the waterfront because existing maximum noise levels are likely already in the 99 dBA regime at a distance within 50 feet from the noise-generating sources, with average levels likely in the 70 to 90 dBA range; noise levels would continue to be representative of an industrial waterfront distant from residential neighborhoods.

Noise-generating construction activities would generally not occur underwater; the marine mammal enclosures and anchors would be placed into the water by equipment located above the surface. Some of this in-air noise would transfer into the water, but, given the in-air noise levels generated, the underwater noise generated would be within existing underwater noise levels at NBK–Bangor (Section 3.3.1.2.3, Underwater Noise). Therefore, underwater noise effects from construction would be negligible.

Onsite workers at NBK–Bangor piers are required to comply with Navy noise regulations (OPNAVINST 5100-19D) and EO 12296, Federal Civilian Personnel, which directs federal agencies to furnish places and conditions of employment free from recognized hazards, including load noise conditions. The NBK–Bangor waterfront is considered a Class C zone according to WAC Chapter 173-60, which limits the amount of noise that can be emitted from a Class C noise source to a Class A receiving property (residence). There are no Class A properties near the NBK–Bangor waterfront that would be subject to Class C industrial noises. Because the expected noise levels that would occur under construction would be similar to baseline conditions at the site, the Marine Mammal Alternative would comply with applicable noise regulations.



Source: USEPA 1971
Based on limited available data samples

dBA: A-weighted decibel scale

Figure 4-1. Construction Equipment Noise Ranges

Placement of temporary trailers and marine mammal pools at the upland site would have minimal noise effects because the facilities are of prefabricated materials (trailers and small portable above-ground holding pools for the dolphins and sea lions), which would only require parking the temporary trailers and using handheld equipment to install the dolphin and sea lion holding pools. Construction noise would be temporary in duration and is not expected to exceed levels of approximately 96 dBA at a distance of 50 feet from noise-generating sources.

For the upland site where the marine mammal support facilities would be located, there would be an expected increase of up to a maximum of 34 dB from existing estimated baseline conditions of 65 dBA for a total maximum noise of 99 dBA during the work week and normal work hours of 8:00 a.m. to 5:00 p.m. These intermittent noise levels would occur from the use of construction equipment for a period of less than 30 days during the work week and standard working hours. The short time duration when trucks would bring the trailers to the site is not expected to generate enough increased noise over a long enough time duration to have an effect on the surrounding area. Referring to noise level attenuation as shown in Figure 4–2, construction noise from a land site would attenuate to average baseline levels (65 dBA) at approximately 1,600 feet, which is a distance of 0.3 mile. Thus, these noises could be heard from offices situated up to 1,600 feet from the land-based facility. Although people in offices near the upland support facility would likely hear the temporary construction noises, these noises would not be enough of a distraction to prevent office employees from continuing their work either inside or outside the office. Construction noise would be below existing noise levels for the closest sensitive noise receptors, including residences located about 0.8 mile west of the upland site and a bald eagle nest located about 1 mile north of the waterfront. Construction noise would be in compliance with Washington State noise standards and overall effects would be minor.

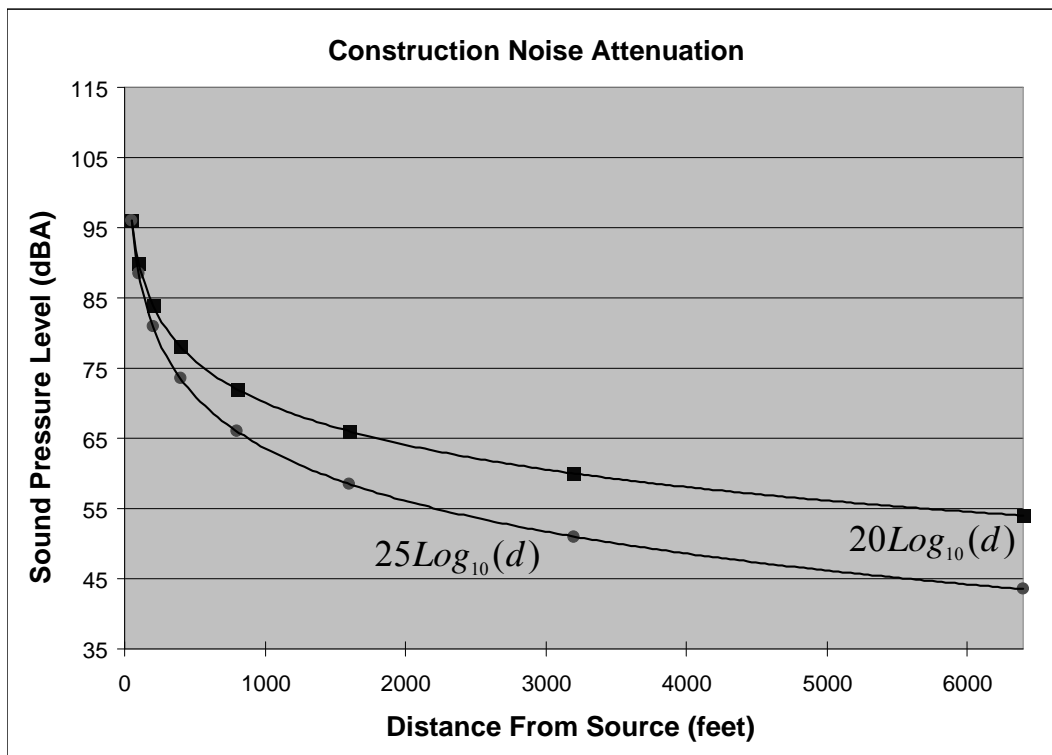


Figure 4–2. Sound Attenuation Graph for Construction Noise

Noise-induced hearing loss to humans is caused by exposure to excessive noise. For the Marine Mammal Alternative, noise levels from construction activities would vary from less than 65 dBA to potentially 99 dBA over an 8-hour work day. Construction workers who might weld or use loud handheld equipment that generates noise would be required to wear noise protection. The noise expected at either the waterfront or upland site would be typical of construction noise to which these workers are exposed on a daily basis. Therefore, noise from the use of construction equipment would not cause a health effect because noise protective devices would be worn.

4.1.3.1.2 OPERATION

Waterfront operation would include increased human presence from system personnel, an increase in noise from marine mammal vocalizations, and increased boat operation. Human and industrial activity already occurs at the pier and the noise from the Navy California sea lions would be similar to the noise already generated from the wild California sea lions already present at NBK–Bangor during part of the year. In addition, small boats are already operating at NBK–Bangor for waterfront security and the additional small boat noise would be similar to that which already occurs.

In summary, operation associated with the Marine Mammal Alternative would not generate higher noise levels than existing conditions at the NBK–Bangor waterfront. Operational activity at the upland site, including increased traffic, would not be different from that which already occurs. Thus, noise levels associated with operation of the Marine Mammal Alternative would be within regulatory compliance and resulting impacts would be negligible.

4.1.3.2 Air Quality

Effects on air quality due to marine and terrestrial construction activities from the Marine Mammal Alternative would occur from combustive emissions due to the use of fossil fuel-powered construction equipment and fugitive dust (PM₁₀) emissions generated by ground-disturbing activities. However, emissions would remain below the annual emission significance thresholds due to the nominal amount of equipment usage needed to perform construction (placement of enclosures and a floating dock at the pier, and trailers and small pools at the upland site) and the limited number of construction days. For example, the largest emitting piece of equipment associated with project construction would be a crane, which would emit a maximum of 15 pounds per day of nitrogen oxides, which meets all air quality standards (see Table 3–29). Assuming 30 days of construction, total nitrogen oxides emissions produced from this source would amount to 0.23 ton of nitrogen oxides. With the addition of emissions from a small number of other construction equipment pieces, total nitrogen oxides emissions from project construction would remain below maximum allowed limits and would have a minor effect on air quality at the base.

Only terrestrial construction activities would produce fugitive dust. Fugitive dust emissions from dry ground generally occur at a daily rate of 55 pounds of PM₁₀ per acre of disturbed ground (USEPA 1995). The project construction contractor would be required to comply with PSCAA Regulation I, Section 9.15, *Fugitive Dust Control Measures*, to minimize fugitive dust emissions during construction. Thus, construction emissions from the Marine Mammal Alternative would have a minor effect on air quality, and these emissions would be within NAAQS and PSCAA standards.

Operation would require the use of a few diesel- and/or gasoline-powered vehicles, including (1) boats up to 25 feet long for deployment/interdiction activities and (2) trucks to transport marine mammals between the in-water enclosures and upland veterinary pools. Due to the small number and size of vehicles for the Marine Mammal Alternative, operational emissions would remain below the annual emission significance thresholds.

Global temperature and climate change have become a concern from the realization that these changes are in response to human-induced levels of green house gas emissions. An individual project does not by itself generate enough green house gas emissions to significantly influence global climate change. Thus, the issue of global climate change is a cumulative impact, such that an appreciable impact would only occur when green house gas emissions from a project combine with green house gas emissions from other human-made activities to affect climate on a global scale.

Several of the emissions from the proposed action, such as carbon dioxide and nitrogen oxide, would be contributors to greenhouse gases. The annual emission of greenhouse gases that would be produced under the Marine Mammal Alternative is predicted to be 116 tons per year.

Therefore, operation of the Marine Mammal Alternative would have a negligible effect on air quality, and these emissions would be within NAAQS and PSCAA annual standards.

4.1.3.3 Cultural Resources

4.1.3.3.1 CONSTRUCTION AND OPERATION

The entire NBK–Bangor shoreline has been surveyed for cultural resources, and no historic properties have been identified within the area of direct project effects (i.e., within the shoreline construction area). Existing shell middens at the waterfront are not near the shoreline construction area. No submerged archaeological sites are expected because of historical activity associated with resource harvesting, including logging, that occurred primarily along the shoreline. Because the pier where the enclosures would be located is not a historic property (i.e., it is not an NRHP-eligible architectural resource) and does not require special preservation measures (Navy 2001), it would not be adversely affected by the additional floating dock.

Upland facilities consisting of trailers and above-ground pools would be located in previously developed areas. No existing buildings would be modified. As these facilities would be connected to existing utilities, no ground-disturbing activities that could cause direct effects are anticipated. The additional staff required for the marine mammal facility would not be enough to create the possibility of indirect effects on archaeological, architectural, or traditional resources at NBK–Bangor. However, if in the course of activities associated with this alternative, any cultural resources were encountered, then the Navy would immediately notify the NBK–Bangor cultural resources manager, who would ensure compliance with Navy regulations and Section 106 of the NHPA, including consultation with the SHPO and any other appropriate entity. If the discovery consists of human remains, or other objects addressed by NAGPRA, then consultation with the appropriate Native American tribe would also be necessary. Navy staff at NBK–Bangor has initiated consultation concerning this project with the Washington SHPO and appropriate tribes to ensure compliance with the NHPA.

Under EO 13175, Consultation and Coordination with Indian Tribal Governments, the U.S. government works with Indian tribes on a government-to-government basis to address issues governing Indian tribal self-government, trust resources, and Indian tribal treaty and other rights. At NBK–Bangor, the Navy consults directly with affected Indian tribes on waterfront locations available for their continued shellfish harvest uses that do not jeopardize national security. The Navy has met with the Skokomish, Port Gamble S’Klallam, Jamestown S’Klallam and Lower Elwha Klallam tribes to provide information about the SISS and provide an opportunity to provide feedback on the proposed project. These discussions identified concerns over the potential for fecal coliform from the marine mammals in open-net enclosures to impact tribal shellfishing. The Navy modified the preferred alternative to house the mammals in closed-circuit enclosures (compared to open-net enclosures) and discharge waste from the pens into the base's sanitary sewer. The Navy has also submitted a letter to each tribe asking the tribe to identify their interest in formal Government-to-Government consultation.

As described under Section 4.1.1.2, Water Quality, release of waste from the Navy mammals would have a negligible effect on fecal coliform levels throughout the NBK–Bangor waterfront. Compliance with the Washington State fecal coliform standard for shellfish harvest would not be affected. Therefore, this alternative would not affect tribal shellfish harvest along the NBK–Bangor waterfront. This would be confirmed by water quality monitoring to be conducted by the Navy at the waterfront before and after deployment of the Navy marine mammals to the NBK–Bangor waterfront (Section 4.1.1.2.3, Monitoring and Mitigation). Overall, cultural and historic resources would not be affected and there would be no effect under the NHPA.

4.1.3.4 Coastal and Shoreline Management

Outside of preparation of an EIS, compliance with the CZMA for this project requires federal consistency with three applicable regulations: the Clean Water Act, Clean Air Act, and SMA. Federal consistency with these local requirements is described under the following resource areas:

- Section 4.1.1.2, Water Quality (Clean Water Act and SMA);
- Section 4.1.1.3, Sediment (SMA);
- Section 4.1.1.4, Marine Vegetation (SMA);
- Section 4.1.1.6, Benthic Communities and Shellfish (SMA);
- Section 4.1.1.7, Marine Fish (SMA);
- Section 4.1.1.8, Wild Marine Mammals (SMA);
- Section 4.1.1.9, Other Marine Wildlife (SMA);
- Section 4.1.1.10, Threatened and Endangered Fish (SMA);
- Section 4.1.2.1, Surface Water and Groundwater (Clean Water Act);
- Section 4.1.2.3, Vegetation (Clean Water Act); and
- Section 4.1.3.2, Air Quality (Clean Air Act).

Consistency with the three SMA broad policies would also occur. The marine mammal enclosures and associated dock are a water-dependent action. The upland facility is not a water-dependent action and would be located greater than 200 feet from the shoreline, which meets SMA's goal. The enclosures and associated dock would be placed in marine waters that are a minimum of -30 feet MLLW, which protects the seafloor, benthic communities, and marine vegetation (including eelgrass beds), from disturbance. No change to the existing shoreline would occur for the SISS. There would be no barges needed for construction, which would

ensure that grounding of construction equipment in the seafloor would not occur. Most assembly of the dock would occur on the existing pier to avoid release of equipment and materials during assembly into Hood Canal. Delta Pier is restricted from public access. Thus, the SMA policy of promoting public access would not be applicable

Under the Clean Water Act and Clean Air Act, the Marine Mammal Alternative would meet all regulatory standards. Under the SMA, there would be no significant degradation of the natural resources in Hood Canal. The Marine Mammal Alternative would be consistent, to the maximum extent practicable, with the SMA.

4.1.3.5 Land Use and Recreation

The construction of the dolphin and sea lion enclosures and associated upland support buildings would be consistent with land uses in the surrounding waterfront and office building areas on the base. The Marine Mammal Alternative would also be consistent with the CZMA regarding land uses because the action would not affect land use of adjacent private and other publicly owned lands or marine waters outside of the USACE DoD restricted area. The base does not have a current comprehensive land management plan specifically guiding base development; however, the INRMP provides guidance for integrating natural resource uses with the military mission. Although construction would be identified in the updated INRMP as an additional management area, the base could continue to manage natural resources consistent with the INRMP because construction would occur in areas already encumbered by other industrial type facilities. No neighboring properties would be near or potentially affected by the project. There are no known future public or base land use plans that could be affected by the Marine Mammal Alternative.

Recreational access to the NBK–Bangor shoreline, including areas where the marine mammals would reside and operate, is restricted from the general public because of the presence of the USACE DoD restricted area. No swimming or other recreational use is allowed at the NBK–Bangor waterfront. Public boating along Hood Canal that is outside of the restricted area, access to state parks, and public water access would continue. The distance from these areas to the marine mammal enclosures precludes any effect on the public, including any changes in fecal coliform levels. Because the upland site is within a Navy industrial park, the area is not used for recreational purposes. There are no known future public or base recreation plans that could be affected by the Marine Mammal Alternative. Since the beginning of the Navy MMP, no civilian has ever been injured by a Navy marine mammal. In conclusion, the Marine Mammal Alternative would have a negligible effect on land use or recreation at NBK–Bangor or the surrounding area.

4.1.3.6 Aesthetics

The marine mammal enclosures and support facilities would not alter the current viewscape of the surrounding area. The enclosures would occur in a waterfront area currently developed with similar pier-associated structures, and would be attached to an existing pier with a low profile, less than 12 feet high, limiting their visibility from boats passing the base or from the western shore of Hood Canal or the Toandos Peninsula. The upland facility is located in an area that is already an industrial complex and does not support a natural vegetative community. Therefore, there would be negligible effects on visual resources as a result of construction or operation of the facilities associated with the Marine Mammal Alternative.

4.1.3.7 Socioeconomics and Environmental Justice

Construction activities under this alternative would generate temporary jobs during the construction period and would contribute to local earnings and induced spending. Because the anticipated socioeconomic effects would occur only for the short duration (less than 30 days) of the construction period, no permanent or long-lasting socioeconomic effects are anticipated as a result of construction associated with the Marine Mammal Alternative.

Environmental justice concerns related to construction activity may include safety, noise, pollutants, and hazardous materials and the potential for disproportionate effects on minority or low-income populations. Specific issues of concern involve potential accidents at construction sites, exposure to asbestos and lead-based paint, and noise from construction activity. Safety precautions in areas surrounding the work sites would include adequate measures to restrict access, minimization of hazards associated with construction activities, and proper handling and disposal of hazardous materials. Such measures, particularly the restricted access to the study area, would preclude the potential for adverse effects on minority or low-income populations. Noise associated with construction would be intermittent and short in duration, with negligible effect on the existing acoustic environment in the area. Therefore, this alternative would not have adverse effects related to environmental justice (EO 12898).

Under the Marine Mammal Alternative, NBK–Bangor would receive a maximum of 37 additional personnel in support of the expanded mission (Table 2–2), representing an increase of less than 1 percent to the existing employment of over 6,000 military personnel. Based on estimated family size ratios, it is anticipated that 47 military dependents (including 22 school-age dependents) would accompany the incoming military personnel, yielding a direct population impact of 84 persons (less than 0.04 percent of the Kitsap County population of over 230,000 persons). This increase would yield a negligible effect on socioeconomic resources in the region. Sufficient vacant housing and school enrollment capacity exist within the region to accommodate the anticipated incoming population (see Section 3.3.7, Socioeconomics and Environmental Justice).

There would be negligible socioeconomic effects under the Marine Mammal Alternative and no environmental justice effects associated with personnel increases and resultant population growth.

4.1.3.8 Utilities and Energy

Electric power, telecommunications and data transfer, domestic water supply, and wastewater services would be provided through connection to existing utility lines at both the waterfront and upland sites. The facilities, including use of electricity for warming dolphin enclosures and use of a marine water treatment system prior to discharge to NBK–Bangor’s sanitary sewer and ship wastewater system, would generate negligible demand for additional utilities and energy, and can be supplied from existing sources at NBK–Bangor. As a result, there would be negligible effects on utility, energy capacity, or delivery service under the Marine Mammal Alternative.

4.1.3.9 Transportation

Under the Marine Mammal Alternative, NBK–Bangor would receive additional personnel in support of the expanded mission, representing an increase of less than 1 percent to the existing employment of over 6,000 military personnel. An increase of this size would yield a negligible effect on transportation resources and traffic patterns on the base or in the region. Local roads

are adequate and able to accommodate additional vehicles for moving equipment during construction. The waterfront area, where the boats would be employed, is restricted to use by the Navy and its contractors. Construction activities at the waterfront and the addition of six boats to the number already active at the NBK–Bangor waterfront for operations (over 50 boats and vessels) would not affect boating transportation at the waterfront. As a result, negligible effects would occur to both land-based and marine transportation services occur under the Marine Mammal Alternative.

4.2 SEA LIONS ONLY ALTERNATIVE

4.2.1 Marine Environment

4.2.1.1 Hydrography

Under the Sea Lions Only Alternative, marine waters would move around the closed nets of the sea lion enclosures. Tides and currents would not be obstructed appreciably from their normal patterns of movement or affect the existing structure of the water column. As stated under the Marine Mammal Alternative (Section 4.1.1.1, Hydrography), placement of any structure in or over navigable waters of the United States would require a Section 10 Rivers and Harbors Act permit, for which the Navy would apply through a JARPA if this alternative is selected.

Similar to the Marine Mammal Alternative, the Sea Lions Only Alternative would include the operation of small boats. These boats would have outboard engines with shallow propeller depths (up to 3 feet), and would normally operate in water at least 20 feet deep. When in operation, the propeller wash from these boats would create small, localized movement of surface water that would dissipate within a few minutes. The resulting effect on marine hydrography would be negligible.

4.2.1.2 Water Quality

4.2.1.2.1 CONSTRUCTION

During construction, effects on water quality for the Sea Lions Only Alternative would be the same as those described for the Marine Mammal Alternative (Section 4.1.1.2.1, Construction) because the construction of waterfront facilities would be similar for both alternatives, although fewer enclosures would be needed. Both alternatives include measures to prevent discharge of debris into the water and minimize the likelihood of or effects from fuel spills during equipment usage through adherence to the existing NBK–Bangor fuel spill and response plan. Placement of anchors to secure the sea lion enclosures would cause disturbance of bottom sediments and resuspension of these particulates into the water column. However, these effects would be localized and temporary and the turbidity plumes would dissipate within 30 minutes. The structures would have a negligible effect on water quality parameters at the NBK–Bangor waterfront.

4.2.1.2.2 OPERATION

Similar to the Marine Mammal Alternative, the principal effect that operation of the Sea Lions Only Alternative would have on water quality would be the release of urine and feces from the Navy sea lions into marine water when the animals are working outside of their enclosures. The water quality modeling analysis for the Sea Lions Only Alternative also used the WASP7 model integrated with the Princeton Ocean Model to simulate the hydrodynamics of Hood Canal. The analysis assumed the maximum number of Navy sea lions (16 animals) that would be in direct contact with Hood Canal marine waters. The wastes would be dispersed and diluted by the fairly strong currents present at the site (Section 3.1.1, Hydrography).

Table 4–1 provides the daily volume and relevant constituents of California sea lion urine and feces. The principal constituents of concern are fecal coliform bacteria, dissolved oxygen (DO),

and nutrients, as represented by total phosphorus and nitrogen. Effects on water quality would be negligible and water quality standards would not be exceeded under this alternative (Table 4–3).

Table 4–3. Effect of Navy Sea Lion Waste Products on Key Water Quality Constituents

PARAMETER ¹	EXISTING LEVEL ²	PROJECT EFFECT WITHIN THE NBK–BANGOR WATERFRONT ³	LEVEL WITH PROJECT	GUIDELINE
Fecal coliform bacteria (MPN/100 mL)	3.1	0–0.077	3.1–3.2	14
Total Phosphorus (as phosphate) (mg/L)	0.0127–0.1218	9×10^{-7}	0.0127–0.1218 (no change)	N/A
Total Nitrogen (as nitrate, nitrite, and ammonia) (mg/L)	0.0056–0.3695	1.3×10^{-6}	0.0056–0.3695 (no change)	N/A
DO (mg/L)	4.9–9.8	2.5×10^{-6} (BOD)	4.9–9.8 (no change)	7.0 ⁴ 4.5 ⁵

¹ Model assumes 16 sea lions and 10 percent of waste released into waters at the NBK–Bangor waterfront.

² Data for depths of 1 to 60 m, from Section 3.1.2, Water Quality.

³ Estimated using water quality model described in Section 4.1.1.2. Fecal coliform impact is the same as for Marine Mammal Alternative.

⁴ WDOE standard for Extraordinary Quality waters.

⁵ Threshold for negative effects on fish (WDOE 1997 [as amended 2006]).

NUTRIENTS

For the nutrients nitrogen and phosphate, the incremental concentration resulting from the sea lion waste material would have a negligible effect on existing concentrations of nutrient levels at the NBK–Bangor waterfront or the surrounding area (Table 4–3).

DISSOLVED OXYGEN

As shown in Table 4–3, the effect of marine mammal waste on DO within the waterfront restricted area of the NBK–Bangor waterfront would be negligible. The Washington State water quality standards for DO would not be violated under this alternative.

BACTERIA

Although there are fewer animals, the fecal coliform effects of the Sea Lions Only Alternative would be the same as those described for the Marine Mammal Alternative (see Tables 4–1 and 4–2). Assuming an existing fecal coliform level of 3.1 MPN/100 mL (Section 3.1.2.2.4, Nutrients), the EQ standard of 14 MPN/100mL (for shellfish harvest and primary human contact) would not be exceeded (Table 4–3). The changes to fecal coliform bacteria under this alternative are considered a negligible effect on water quality.

PHARMACEUTICALS

MMP animals receive the highest quality of veterinary care. MMP animals receive daily vitamin supplements and routine antihelminthics (dewormers) to prevent disease. On occasion and when warranted, veterinarians judiciously prescribe medications to treat disease or to prepare animals

for medical procedures (e.g., surgery). No MMP animals are provided routine, prophylactic antibiotics. There are few to no data regarding excretion of unaltered medications or their metabolites in the feces and urine of sea lions, and there are no established standards to assess impacts on water quality. A list of supplements, therapeutics, and medications that have been provided to MMP animals in a representative 12-month period is provided in the Classified Annex.

TEMPERATURE/SALINITY/STRATIFICATION

The sea water in the sea lion enclosure would not exchange freely with the site waters at NBK–Bangor and the water within the enclosures would not be heated. Therefore, the Sea Lions Only Alternative would have no effect on temperature, salinity, and stratification of waters at NBK–Bangor or the surrounding area.

TURBIDITY

Similar to the Marine Mammal Alternative, the sea lion wastes produced would have a negligible effect on turbidity at the NBK–Bangor waterfront because solids released in Navy sea lion waste material would be dissipated by the volume and dispersive capacity of site waters. Concerning boat operations, the effects from the Sea Lions Only Alternative would be the same as those described for the Marine Mammal Alternative because the boat operations would be the same, including the use of outboard engines with shallow propeller depths. Small boat operations have the potential to affect water quality due to bottom sediment disturbance (prop wash effect) and the potential for spills. These boats would normally operate in relatively deep water (-20 feet MLLW or deeper) and avoid disturbance to bottom sediments. In the infrequent instances when boats would operate in shallower water, the resulting turbidity plumes would be small and dissipate quickly (within 30 minutes) in the wave and current action in the shallow water. Through adherence to the existing NBK–Bangor fuel spill and response plan, the likelihood of fuel spills during use of construction equipment would be minimized.

pH

Operation of this alternative would not affect the pH of site waters because the waste material of the Navy sea lions has a moderate acid content (pH of 6.2) that would not affect pH at the NBK–Bangor waterfront, considering the dilutive and dispersive capacity of site waters. No other aspect of operations has the potential to affect pH.

Considering all parameters, the overall impacts on water quality would be negligible.

4.2.1.2.3 MONITORING AND MITIGATION

Mitigation and monitoring would be the same as described under the Marine Mammal Alternative. The Navy, in coordination with WDOE and USEPA, would develop a water quality monitoring program to validate the model-predicted water quality effects described in this section. Should this monitoring demonstrate a statistically significant increase in a water quality parameter that can be attributed to the Sea Lions Only Alternative, the Navy would identify the source of the problem and take action, as needed, to correct the increase. This monitoring program would be initiated approximately one year prior to implementation of the SISS to establish a baseline against which to evaluate effects of the Sea Lions Only Alternative. Other potential sources of water quality effects, such as large concentrations of wild marine mammals

or birds or exceptional weather events, would also be monitored to help in determining the source of any observed increase in a monitored parameter. If an extended period (to be determined) of monitoring indicates no water quality effects attributable to the Sea Lions Only Alternative, the intensity of the monitoring (in terms of number and frequency of samples) would be reduced, in coordination with WDOE and USEPA.

4.2.1.3 Sediment

4.2.1.3.1 CONSTRUCTION

Effects on marine sediment from construction of the Sea Lions Only Alternative would be similar to those described for the Marine Mammal Alternative because the construction process at the waterfront facilities would be the same. As described in Section 4.2.1.2, Water Quality, measures that would be implemented to prevent the discharge of debris into the water and minimize the likelihood of related fuel spills would also protect sediment quality. The installation of the concrete block anchors would temporarily disturb bottom sediments and resuspend sediments into the water column. The coarser resuspended sediments would settle to the sea floor within 30 minutes (Jiménez and Madsen 2003), and the finer particulates would be dissipated by currents. The concrete blocks would cover up the surface sediments in the small area directly under the blocks. However, the resulting effect on site sediments would be negligible.

4.2.1.3.2 OPERATION

Effects on marine sediment from operation of the Sea Lions Only Alternative would be similar to those described for the Marine Mammal Alternative (Section 4.1.1.3.2, Operation). Effects from project operations would be negligible and related primarily to inputs of organic matter associated with settling fecal materials from sea lions. As discussed in Section 4.1.1.3.2, Operation, the contribution of settling sea lion fecal matter to the baseline deposition rate for organic materials (estimated to be 7.6 milligrams per square meter per day) would be negligible. Once deposited on the bottom, fecal particles would decompose rapidly due to bacterial processes and consumption by benthic organisms. Deposition of fecal material on the bottom would increase the localized, short-term oxygen demand (redox conditions) of bottom sediments. However, the relatively small flux and rapid decomposition of fecal material would minimize the potentials for long-term accumulations of organic matter or changes in the redox conditions of bottom sediments. The concentrations of toxics, such as trace metals or organic contaminants, in the sea lion fecal material would reflect concentrations in the sea lion food. The sea lion food would consist of native fish with concentrations of chemical contaminants that are similar to those in the background particulate organic matter of Hood Canal. Consequently, settling of sea lion fecal material would not increase the flux of contaminants, sediment quality would not be altered, and sediment quality criteria would not be exceeded within the study area as a result of operations.

Effects on marine sediments from small boat operations under the Sea Lions Only Alternative would be similar to those described under the Marine Mammal Alternative. Boats would normally operate in water depths of -20 feet MLLW or deeper. Although boat operations in shallow waters would be infrequent, prop wash could cause localized, short-term resuspension of bottom sediments. Sediments resuspended by prop wash would settle rapidly, turbidity plumes would dissipate within 30 minutes, and the overall effect would be negligible. The measures that

would be implemented to minimize the likelihood of or effects from fuel spills during boat operations (Section 4.2.1.2, Water Quality) would protect sediment quality and ensure that operational effects are negligible.

4.2.1.4 Marine Vegetation

Effects on marine vegetation would be similar to those described under the Marine Mammal Alternative. The closest eelgrass beds would be approximately 100 feet from the enclosures. Therefore, eelgrass would not be altered or adversely affected by the project. Lighting for this alternative would not alter overall lighting on water from the existing pier and therefore would have negligible effects on marine vegetation. Approximately 81 square feet of sparse macroalgae may be covered by the anchoring system. Shadowing effects would be minor, as there is only sparse macroalgae in the vicinity. Changes to nutrients and other water quality parameters would be negligible (Section 4.2.1.2, Water Quality) and would not affect marine vegetation. Boat prop wash could cause scouring in shallow waters, but these areas are generally avoided to ensure that the boat props are not damaged. Fuel spills with the potential to damage marine vegetation would be avoided through adherence to the existing NBK–Bangor fuel spill and response plan. In conclusion, there would be negligible effects on marine vegetation during construction and operation.

4.2.1.5 Plankton

Effects from the Sea Lions Only Alternative would be similar to those described for the Marine Mammal Alternative. There would be no long-term effects on the plankton community due to construction activities, negligible disruption in plankton movement by the sea lion enclosures, a slight increase in plankton filter feeders from the increase in hard-surface species and common fouling communities at the structures, and no anticipated increase in phytoplankton blooms. Changes to nutrients and other water quality parameters would be negligible (Section 4.2.1.2, Water Quality) and would not affect plankton. The Sea Lions Only Alternative would have negligible effects on plankton communities at NBK–Bangor or the surrounding area.

4.2.1.6 Benthic Communities and Shellfish

Effects from the Sea Lions Only Alternative would be similar to those described for the Marine Mammal Alternative, although there would be fewer enclosures and animals, one less boat required for operations, and three fewer anchors resulting in less overall effect on new and existing benthic communities. These effects include behavioral changes from short term-changes in water quality, a minor increase in in-water surface area for colonization, a decrease in soft-bottom habitat from anchor placement, increased lighting and over-water shading from the docks and enclosures, and a minor change in fecal coliform levels. All of these changes would be considered negligible and within state water quality standards. The Sea Lions Only Alternative would result in minor impacts to benthic organisms and not affect the harvest of shellfish at the NBK–Bangor waterfront.

4.2.1.7 Marine Fish

4.2.1.7.1 CONSTRUCTION

Effects of construction on the nearshore marine vegetation and benthic habitats used by juvenile salmonids, forage fish, and other marine fish would be similar to those described for the Marine Mammal Alternative. The over-water structures and anchors would occur seaward of existing eelgrass communities and would not affect fish refuge and foraging habitats. The enclosures would be placed into the water seaward of the normal migratory pathway of juvenile salmonids and forage fish and construction would occur during the approved in-water work window (July 16 to February 15), minimizing the number of potentially occurring juvenile salmonids during construction activities. The anchors would affect approximately 81 square feet of demersal habitat. Anchors would be placed on the sea floor with a temporary increase in turbidity. Overall, construction effects would be considered minor.

4.2.1.7.2 OPERATION

As with construction, effects of operation of the Sea Lions Only Alternative on salmonids, forage fish, and other marine fish would be similar to those described for the Marine Mammal Alternative. The project aspect with the greatest potential to affect fish is the potential predation by sea lions during operations. However, as mentioned for the Marine Mammal Alternative, this predation would be minimal because the mammals would be well fed, with a diet closely monitored by program veterinarians, and they would be kept under close control by their human trainers, with little opportunity to pursue wild food. Therefore, overall operational effects on marine fish would be considered negligible.

The effects of the Sea Lions Only Alternative on EFH would not result in an increase in overfishing, degradation of spawning habitat, change in estuarine hydrology, decrease or change in available food resources, change in salmonid migration, or loss in water or sediment quality. Effects would be considered negligible, and there would be only temporary changes (less than 30 minutes) in water quality during anchor placement, resulting in no long-term effect on EFH. Thus, project effects would not adversely affect EFH.

4.2.1.8 Wild Marine Mammals

Effects on marine mammals from the Sea Lions Only Alternative would be similar to those described for the Marine Mammal Alternative. Noise, human activity, water quality effects, small boat operations, and the potential for interactions between wild and Navy sea lions would be similar to those described under the Marine Mammal Alternative. The Sea Lions Only Alternative would have negligible effects on the abundance and distribution of wild marine mammals that occur along the NBK–Bangor waterfront. This alternative would not result in the capture, harassment, or harm of wild marine mammals. Therefore, this alternative would result in no reasonably foreseeable takes under the MMPA.

4.2.1.9 Other Marine Wildlife

Effects on other wildlife from the Sea Lions Only Alternative would be the same as those described for the Marine Mammal Alternative since construction and operation would occur at the same locations and time of day. However, fewer Navy marine mammals (i.e., no dolphins)

would be present, but these animals would not have affected the presence of other marine wildlife. Effects on bald eagles would be similar to those described for the Marine Mammal Alternative. Water quality effects would be negligible. In conclusion, the Sea Lions Only Alternative would not affect the distribution and abundance of marine wildlife over the long term. Short-term displacement would occur to wildlife that forage in the immediate vicinity of the enclosures during construction and small boat operations. Overall effects would be negligible. There would be no adverse effects on birds protected under the Migratory Bird Treaty Act. There would be no incidental take of bald eagles under the BGEPA and no special measures are needed to avoid adverse effects on bald eagles.

4.2.1.10 Threatened and Endangered Species

4.2.1.10.1 CONSTRUCTION

FISH

Effects from the construction of the Sea Lions Only Alternative on ESA-listed salmonid species would be the same as those described for the Marine Mammal Alternative. The over-water structures and anchors would be placed seaward of existing marine eelgrass communities and would not reduce the size of these communities used by juvenile salmonids as refuge and foraging habitats. Furthermore, most listed fish would be protected by construction observance of the work window (July 16 to February 15). Noise-generating construction activities would generally not occur underwater because the marine mammal enclosures and anchors would be placed into the water by equipment located above the surface, and these activities would occur during the approved work window.

MARINE WILDLIFE

Similar to the Marine Mammal Alternative, the Sea Lions Only Alternative would not affect the Steller sea lion or humpback whale since these species are only expected to rarely occur at the NBK–Bangor waterfront and their prey resources (crustaceans, forage fish, salmon, and other fish species) would not be affected by construction activities. Project effects described under the Marine Mammal Alternative for the marbled murrelet would also occur under the Sea Lions Only Alternative. These effects would include avoidance of the immediate construction area during the 30-day work period.

4.2.1.10.2 OPERATION

FISH

Effects from the operation of the Sea Lions Only Alternative on ESA-listed fish would be similar to those described for the Marine Mammal Alternative. There would be no effect on marine vegetation or benthic communities utilized by ESA-listed juvenile salmonids for refuge and foraging, and no effect on the principal nearshore migration pathway of juvenile chum and Chinook salmon and steelhead and bull trout. As described under the Marine Mammal Alternative, older salmonids would be able to swim around enclosures during migration and experience limited or no effect on their migratory pathway. In addition, the distance of the lights from shore and the limited number of lights used to illuminate these structures would be insufficient to disorient migrating juvenile salmonids. Increased vessel activity is not expected to affect salmonid presence or migration. Water quality effects would be negligible.

As discussed for the Marine Mammal Alternative, the Navy marine mammals would not be expected to predate on listed fish because the mammals would be well fed and kept under close control by their human trainers, with little opportunity to pursue wild food.

MARINE WILDLIFE

Similar to the Marine Mammal Alternative, the Sea Lions Only Alternative would not affect the Steller sea lion or humpback whale since these species are only expected to rarely occur at the NBK–Bangor waterfront, and the distribution and abundance of their prey resources (crustaceans, forage fish, salmon, and other fish species) would have a negligible change from existing conditions. Marbled murrelet effects described under the Marine Mammal Alternative would also be similar to those described under the Sea Lions Only Alternative, which would be avoidance of small boats used during operations. Since the birds already avoid boats in use at the NBK–Bangor waterfront, there would be a negligible change to their activity levels.

4.2.1.10.3 CONCLUSION

Based on the analysis in Sections 4.2.1.10.1 and 4.2.1.10.2, the Navy has determined that this alternative would have no effect on marine mammal species protected under the ESA; it may affect, but not likely to adversely affect, fish and bird species protected under the ESA. If this alternative is selected, the Navy would seek concurrence with this determination from NMFS and USFWS.

4.2.2 Upland Environment

4.2.2.1 *Surface Water and Groundwater*

Effects on surface water and groundwater under the Sea Lions Only Alternative would be the same as those described for the Marine Mammal Alternative. No removal or changes to surface or groundwater would occur, and negligible effects would occur to surface water and groundwater.

4.2.2.2 *Geology and Soils*

Effects on geology and soils from the Sea Lions Only Alternative would be the same as those described for the Marine Mammal Alternative because the inland facility site would occur at the same location with similar construction and operation activities, and negligible effects would occur to geology and soils.

4.2.2.3 *Vegetation*

Effects on vegetation from the Sea Lions Only Alternative would be the same as those described for the Marine Mammal Alternative because the enclosures and upland facility sites would occupy similar footprints and affect the same plant community. The Sea Lions Only Alternative would result in no changes to vegetation in the vicinity of the marine mammal enclosures and dock, a slight change in herbaceous vegetation at the upland facility, and no effect on wetlands or associated drainages at NBK–Bangor. The overall affect to vegetation would be negligible.

4.2.2.4 Wildlife

Effects on terrestrial wildlife from the Sea Lions Only Alternative would be the same as those described for the Marine Mammal Alternative because the facilities would be located in the same waterfront and upland locations with similar habitat, noise, water quality, and hazardous material effects as described under the Marine Mammal Alternative. The Sea Lions Only Alternative would have a negligible overall effect on the occurrence and abundance of terrestrial wildlife at NBK–Bangor and there would be no adverse effects under the Migratory Bird Treaty Act.

Effects on bald eagles are addressed in Section 4.2.1.9, Other Marine Wildlife.

4.2.3 Social Environment

4.2.3.1 Noise

Effects on noise from construction and operation of the Sea Lions Only Alternative would be similar to those described for the Marine Mammal Alternative. Construction noise over the 30-day period would be lower than the existing industrial noise at the NBK–Bangor waterfront (99 dBA) but higher than existing noises at the inland facility (up to 96 dBA). However, the noise levels at the inland facility would be within that expected for construction activities within normal working hours, and overall effects would be minor for construction and negligible for operations.

4.2.3.2 Air Quality

Effects on air quality from construction and operation of the Sea Lions Only Alternative would be slightly less than those described for the Marine Mammal Alternative. Air emissions during operations would also be slightly less because five rather than six boats would be used for waterfront security and 30 rather than 37 personnel would be needed.

Global temperature and climate change have become a concern from the realization that these changes are in response to human-induced levels of green house gas emissions. An individual project does not by itself generate enough green house gas emissions to significantly influence global climate change. Thus, the issue of global climate change is a cumulative impact, such that an appreciable impact would only occur when green house gas emissions from a project combine with green house gas emissions from other human-made activities to affect climate on a global scale.

Several of the emissions from the proposed action, such as carbon dioxide and nitrogen oxide, would be contributors to greenhouse gases. The annual emission of greenhouse gases that would be produced under the Sea Lions Only Alternative is predicted to be 98 tons per year, which is a negligible amount.

Total emissions under both construction and operation would be within NAAQS and PSCAA annual standards and would therefore have a negligible effect on air quality at the base.

4.2.3.3 Cultural Resources

Effects on cultural resources from the Sea Lions Only Alternative would be similar to those described for the Marine Mammal Alternative. Because construction would occur in the same places as described under the Marine Mammal Alternative, and no historic properties have been

identified in these locations, there would be no effect on historic properties. Water quality monitoring, as described under the Marine Mammal Alternative, would also be applied to the Sea Lions Only Alternative to confirm that this alternative would have no effect on tribal shellfish harvesting sites. There would be no adverse effect on cultural resources.

4.2.3.4 Coastal and Shoreline Management

Similar to that described under the Marine Mammal Alternative, CZMA consistency with applicable regulations includes the following:

- Section 4.2.1.2, Water Quality (Clean Water Act and SMA);
- Section 4.2.1.3, Sediment (SMA);
- Section 4.2.1.4, Marine Vegetation (SMA);
- Section 4.2.1.6, Benthic Communities and Shellfish (SMA);
- Section 4.2.1.7, Marine Fish (SMA);
- Section 4.2.1.8, Wild Marine Mammals (SMA);
- Section 4.2.1.9, Other Marine Wildlife (SMA);
- Section 4.2.1.10, Threatened and Endangered Fish (SMA);
- Section 4.2.2.1, Surface Water and Groundwater (Clean Water Act);
- Section 4.2.2.3, Vegetation (Clean Water Act); and
- Section 4.2.3.2, Air Quality (Clean Air Act).

Under the Clean Water Act and Clean Air Act, the Marine Mammal Alternative would meet all regulatory standards. Under the SMA, there would be no significant degradation of the natural resources in Hood Canal. The Sea Lions Only Alternative would be consistent, to the maximum extent practicable, with the SMA.

4.2.3.5 Land Use and Recreation

Effects on land use and recreation from the Sea Lions Only Alternative would be the same as those described for the Marine Mammal Alternative because existing land uses and waterfront recreation would not be changed due to the presence of the waterfront and inland facilities associated with this alternative. There would be no changes in existing access or use. Private and other public ownerships are not near the facilities associated with the Sea Lions Only Alternative and/or are outside of the restricted area where activities would occur. Since the beginning of the Navy MMP, no civilian has ever been injured by a Navy marine mammal. In conclusion, the Sea Lions Only Alternative would have no effect on land use or recreation at NBK–Bangor or the surrounding area.

4.2.3.6 Aesthetics

Effects on aesthetics from the Sea Lions Only Alternative would be the same as those described for the Marine Mammal Alternative because the structures associated with both the waterfront and inland facilities would be similar in size, shape, and location as that planned for the Marine Mammal Alternative, except that there would be fewer enclosures. In conclusion, the Sea Lions Only Alternative would have a negligible effect on aesthetics at NBK–Bangor or the surrounding area.

4.2.3.7 Socioeconomics and Environmental Justice

Construction activities for the Sea Lions Only Alternative would generate slightly fewer temporary jobs than for the Marine Mammal Alternative because less dock space and fewer enclosures would be required. However, both installation of the floating docks and construction of the upland facilities are small projects that would require a small number of workers and quantities of materials. Therefore, no permanent or long-lasting socioeconomic effects are anticipated as a result of construction associated with the Sea Lions Only Alternative.

Operation of the Sea Lions Only Alternative would create a maximum of 30 jobs compared to 37 jobs with the Marine Mammal Alternative. The 30 personnel would represent less than 1 percent of the existing employment of over 6,000 military personnel. Based on estimated family size ratios, it is anticipated that 38 military dependents (including 18 school-age dependents) would accompany the incoming military personnel, yielding a direct population impact of 68 persons (less than 0.03 percent of the Kitsap County population of over 230,000 persons). An increase of this size would yield a negligible effect on socioeconomic resources in the region. Sufficient vacant housing and school enrollment capacity exist within the region to accommodate the anticipated incoming population (refer to Section 3.3.7, Socioeconomics and Environmental Justice).

There would be negligible socioeconomic effects under the Sea Lions Only Alternative and no environmental effects (EO 12898) associated with personnel increases and resultant population growth.

4.2.3.8 Utilities and Energy

As described under the Marine Mammal Alternative, electric power, telecommunications and data transfer, domestic water supply, and wastewater services would be provided through connection to existing utility lines located at the waterfront and upland site. However, the Sea Lions Only Alternative would require fewer utilities and less energy than the Marine Mammals Alternative because fewer enclosures and no heated enclosures would be needed. The facilities would generate minimal demand for additional utilities and energy and could be supplied from existing facilities at NBK–Bangor. As a result, negligible effects on utility or energy capacity would occur under the Sea Lions Only Alternative.

4.2.3.9 Transportation

Effects on transportation from construction and operation of the Sea Lions Only Alternative would be similar to those described under the Marine Mammal Alternative, except that there would be fewer personnel (resulting in slightly less use of the transportation resources at NBK–Bangor) and one less boat to support operations of the Sea Lions Only Alternative. However, the effect on existing transportation from both the Marine Mammal and Sea Lions Only Alternatives would not result in an increased need for road improvements, parking, or other vessel-related services. Boats associated with the Sea Lions Only Alternative would be stationed at the new dock when not in use. Local roads are capable of supporting additional transportation use for moving equipment during construction. The overall effect on transportation would be negligible.

4.3 COMBAT SWIMMERS ALTERNATIVE

4.3.1 Marine Environment

4.3.1.1 Hydrography

The Combat Swimmers Alternative would include a floating dock attached to an existing pier with no additional enclosures. Under this alternative, anchors for the floating dock would be installed. Construction for this alternative would not affect existing marine hydrography at the NBK–Bangor waterfront because tides, circulation, currents, and seasonal variability of marine waters would not appreciably change from existing conditions. Placement of any structure in or over navigable waters of the United States (including a dock) would require a Section 10 Rivers and Harbors Act permit, for which the Navy would apply if this alternative were selected. However, construction under the Combat Swimmers Alternative would have a negligible effect on marine hydrography at NBK–Bangor or the surrounding area.

For operations, the small boats used under the Combat Swimmers Alternative would be similar to those used for the Marine Mammal and Sea Lions Only Alternatives, including the use of outboard engines with shallow propeller depths. However, one less boat would be used and all boats would be 24 feet in length. When in operation, the propeller wash from these boats would create small localized movement of surface water that would dissipate rapidly. Propeller wash would have a negligible effect on the existing nearshore current structure. In conclusion, operations under the Combat Swimmers Alternative would have no effect on marine hydrography at NBK–Bangor or the surrounding area.

4.3.1.2 Water Quality

Construction of the Combat Swimmers Alternative would have similar effects as described under the Marine Mammal and Sea Lions Only Alternatives although enclosures would not be needed. The Combat Swimmers Alternative would include measures to prevent discharge of debris into the water and minimize the likelihood of or effects from spills during equipment usage through adherence to the existing NBK–Bangor fuel spill and response plan. Fewer anchors for the new floating dock would be needed under this alternative, and there is some potential for temporary water quality effects (turbidity plumes occurring over 30 minutes or less) due to anchor placement.

Under operations, there would be no potential for the release of nutrients or fecal coliforms into the water column because marine mammals are not a component of this alternative. As described under the Marine Mammal and Sea Lions Only Alternatives, the small boats used for operations under the Combat Swimmers Alternative would not create water quality effects. These boats would normally operate in relatively deep water (-20 feet MLLW or deeper) and avoid disturbance to bottom sediments. In the infrequent instances when boats would operate in shallow water, the resulting turbidity plumes would be small and dissipate quickly in shallow water (within 30 minutes). Considering the above factors, boat operations under the Combat Swimmers Alternative would have no effect on water quality, including temperature/salinity/stratification, DO, turbidity, nutrients, bacteria, and pH. Water quality standards would not be exceeded.

The handheld sonar and propulsion devices used by the combat swimmers would be electrically powered (mechanically powered in the case of the PowerSwim propulsion device) and securely sealed against flooding or leaking of lubricants. Therefore, there would be no potential for these devices to affect water quality.

Overall, there would be a negligible impact on water quality.

4.3.1.3 Sediment

During construction, effects on sediment from the Combat Swimmers Alternative would be similar to those described for the Marine Mammal Alternative because the construction activities at the waterfront facilities would be similar but without enclosures. The floating dock for the Combat Swimmers Alternative would be built on shore and placed into the water by cranes, which would minimize the potential for losses of construction debris into the water. Measures that would be implemented to minimize the likelihood of fuel spills, as described in Section 4.3.1.2, Water Quality, would also protect sediment quality. Construction activities for this alternative would have a negligible effect on sediments at NBK–Bangor or the surrounding area.

As discussed in Section 4.3.1.2, Water Quality, boats used under this alternative would normally operate in water depths of -20 feet MLLW or deeper. This would minimize the potential for prop wash to disturb bottom sediments. Although boat operations in shallow waters would be infrequent, prop wash could cause localized, short-term resuspension of bottom sediments. Sediments resuspended by prop wash would settle rapidly, turbidity plumes would dissipate within 30 minutes, and the overall effect on sediments would be negligible. The measures that would be implemented to minimize the likelihood of or effects from fuel spills during boat operations would also protect sediment quality. Therefore, operations under this alternative would have a negligible effect on sediments at NBK–Bangor or the surrounding area.

4.3.1.4 Marine Vegetation

The floating dock for mooring the five support vessels would be the only in-water structure associated with the Combat Swimmers Alternative. This dock would be attached to an existing pier in the waterfront area, and anchors would be necessary. The anchors would be placed in an area of -20 feet MLLW or deeper where no eelgrass beds are present. Approximately 54 square feet of sparse macroalgae may be covered by the anchoring system, which is considered a negligible effect. Altogether, construction would result in negligible effects on aquatic vegetation from the construction and assembly of the floating dock.

Effects on marine vegetation from operation of the Combat Swimmers Alternative would include over-water shading, nighttime lighting, habitat for fouling communities, and use of boats. The dock is not over eelgrass beds and only sparse macroalgae occurs in the vicinity. Therefore, negligible effects would occur to marine vegetation including some shading and potential prop disturbance to the vegetation if the boats were to operate in shallow water. Boats would avoid very shallow waters to ensure that the props are not damaged. Furthermore, fuel spills with the potential to damage marine vegetation would be avoided through adherence to the existing NBK–Bangor fuel spill and response plan. Thus, operations associated with the Combat Swimmers Alternative would have negligible effects on the marine vegetation community along the NBK–Bangor waterfront.

4.3.1.5 Plankton

Assembly and installation of the floating dock would not affect plankton communities. The floating dock for mooring the five support vessels would be the only in-water structure associated with the Combat Swimmers Alternative. This dock would be attached to an existing pier in the waterfront area along with some anchoring of the dock. However, these activities would not disrupt the plankton community or change the marine nutrient content within the NBK–Bangor waterfront. Therefore, construction of the in-water structures would result in negligible effects on the plankton community along the NBK–Bangor shoreline.

Operation of the Combat Swimmers Alternative would not result in changes to the nutrient content of marine waters and would not affect circulation and movement of marine waters. Thus, operations would have a negligible effect on the plankton community along the NBK–Bangor waterfront.

4.3.1.6 Benthic Communities and Shellfish

The floating dock for mooring the five support vessels would be the only in-water structure associated with the Combat Swimmers Alternative. This dock would be attached to an existing pier in the waterfront area, and anchoring would be necessary. Effects due to the anchoring system (loss of existing soft-bottom benthic organisms in the footprints) would be similar to those described for the Marine Mammal and Sea Lions Only Alternatives, except there would be fewer anchors covering 54 square feet. Unlike the Marine Mammal and Sea Lions Only Alternatives, the Combat Swimmers Alternative would not affect fecal coliform levels at the NBK–Bangor waterfront. In addition, there would be less area for site colonization by common fouling communities and less area affected by shading. Construction and operation of the Combat Swimmers Alternative would result in minor effects on benthic communities and shellfish.

4.3.1.7 Marine Fish

Effects on marine fish from construction of the Combat Swimmers Alternative would be the same as described for the Marine Mammal and Sea Lions Only Alternatives, except that enclosures would not be placed in the water. Construction activity may temporarily displace fish, but it would not affect fish habitat. Effects on marine fish from operations would be the same as described for the Marine Mammal and Sea Lions Only Alternatives, except that the lack of enclosures would result in less shading effects on fish habitat. There would also be similar noise and disturbance to fish from boats used under the Combat Swimmers Alternative compared to the Marine Mammal and Sea Lions Only Alternatives. There would be no predation effects from Navy marine mammals under the Combat Swimmers Alternative.

The handheld sonar used under this alternative would operate at frequencies of 700 kHz to 1.8 MHz, which is well above the frequencies at which fish can hear (Popper and Fay 1973; Hawkins 1981; Stocker 2001; Nedwell et al. 2004). These devices would not affect fish physically or behaviorally. No noise information is available for the Farallon-type propulsion devices, but these devices use 12-volt electric motors similar to those used in electric trolling motors on small fishing boats. These devices are not expected to produce noise levels that could be harmful to fish. The higher swimming speeds afforded by the devices are unlikely to affect fish, as fish would swim away from divers even when swimming at the higher speeds. Overall,

effects on marine fish would be considered minor for construction, negligible for operation, and no adverse effects would occur to EFH.

4.3.1.8 Wild Marine Mammals

Effects on marine mammals from the Combat Swimmers Alternative would be similar to those described under the Marine Mammal and Sea Lions Only Alternatives, except that no Navy marine mammals would be present at the NBK–Bangor waterfront. Noise, human activity, use of a handheld sonar, and small boat operations (similar to that described for the Marine Mammal and Sea Lions Only Alternatives) would also not affect wild marine mammals at the NBK–Bangor waterfront. Although the wild marine mammals would likely come into contact with the boats and combat swimmers, the wild marine mammals are habituated to the industrial activity already existing at the NBK–Bangor waterfront.

The handheld sonar used by the combat swimmers would operate at frequencies of 700 kHz to 1.8 MHz, which is well above the frequencies at which marine mammals can hear (upper limit is approximately 150 to 180 kHz). These devices would not affect marine mammals physically or behaviorally. The noise emitted by the mechanical Power Swim propulsion device would be minimal. No noise information is available for the Farallon-type propulsion devices, but these devices use 12-volt electric motors similar to those used in electric trolling motors on small fishing boats. These devices are not expected to produce noise levels that could be harmful to marine mammals. The higher swimming speeds afforded by these devices are unlikely to affect marine mammals, as the mammals occurring at the site would be able to avoid divers even when swimming at the higher speeds. The Combat Swimmers Alternative would have negligible effects on the abundance and distribution of wild marine mammals that occur along the NBK–Bangor waterfront. This alternative would not result in the capture, harassment, or harm of wild marine mammals. Therefore, this alternative would result in no reasonably foreseeable takes under the MMPA.

4.3.1.9 Other Marine Wildlife

Similar to that described under the Marine Mammal and Sea Lions Only Alternatives, there would be negligible effects from the Combat Swimmers Alternative on other marine wildlife. During the short-term construction period, wildlife would be displaced from the immediate vicinity of the dock but would return following construction activity both in the evening and after the 30-day construction period. During operation, the small boat activity would increase existing vessel use at the NBK–Bangor waterfront. In addition, combat swimmers transferring in and out of boats would displace wildlife. However, marine wildlife are already habituated to boat operations and would not altogether depart the area. Effects on bald eagles would be similar to those described for the Marine Mammal and Sea Lions Only Alternatives.

The handheld sonar used by the combat swimmers would operate at frequencies of 700 kHz to 1.8 MHz, which is well above the frequencies at which marine birds can hear (upper limit is approximately 5 kHz) (Dooling 1980, 1982, 2002). These devices would not affect marine birds physically or behaviorally. The noise emitted by the mechanical Power Swim propulsion device would be minimal. No noise information is available for the Farallon-type propulsion devices, but these devices use 12-volt electric motors similar to those used in electric trolling motors on small fishing boats. These devices are not expected to produce noise levels that could be

harmful to marine birds. The higher swimming speeds afforded by these devices are unlikely to affect marine birds, as these birds would be able to avoid divers even when swimming at the higher speeds. In conclusion, the Combat Swimmers Alternative would not affect the distribution and abundance of other marine wildlife over the long term. Short-term displacement would occur to wildlife that forage in the immediate vicinity of the dock construction area and in the vicinity of small boat operations. There would be no adverse effect on birds associated with the Migratory Bird Treaty Act, and overall impacts would be negligible. As described for the Marine Mammal and Sea Lions Only Alternatives, there would be no incidental take of bald eagles under the BGEPA and no special measures are needed to avoid adverse effects on bald eagles.

4.3.1.10 Threatened and Endangered Species

Construction timing and duration for the Combat Swimmers Alternative would be the same as that described for the Marine Mammal and Sea Lions Only Alternatives. If present, listed fish (Puget Sound Chinook, Hood Canal summer-run chum, bull trout, and Puget Sound steelhead) and wildlife (Steller sea lion, humpback whale, and marbled murrelet) would avoid the immediate area within the NBK–Bangor waterfront. There would be no project effects on their prey resources. These species would continue to use the area following construction, if present at the waterfront.

Dock operations and small boat use affecting listed fish and wildlife would be similar to that described under the Marine Mammal and Sea Lions Only Alternatives. Although more humans would be present at the dock, its associated pier already supports substantial human use, and the additional people needed for this alternative would not alter NBK–Bangor waterfront use by listed fish and wildlife. Some boats under the Combat Swimmers Alternative would be slightly larger than for the Marine Mammal and Sea Lions Only Alternatives, but this size increase would not affect the listed species.

As discussed for marine fish and marine birds (Sections 4.3.1.7, Marine Fish, and 4.3.1.9, Other Marine Wildlife), the handheld sonar would operate at frequencies not audible to fish or marine birds and would not affect these species, including ESA-protected species. Likewise, the propulsion devices used by combat swimmers would not produce noise sufficient to adversely affect marine fish or birds; the Farallon-type propulsion devices use 12-volt electric motors similar to those used in electric trolling motors on small fishing boats (see Section 4.3.1.7, Marine Fish). The propulsion devices are not expected to produce noise levels that could be harmful to ESA-protected marine fish or birds. The higher swimming speeds afforded by these devices are unlikely to affect marine fish or birds, as fish and birds would be able to avoid divers even when swimming at the higher speeds.

Based on the analysis above, the Navy has determined that this alternative would have no effect on marine mammal species protected under the ESA; it may affect, but is not likely to adversely affect, fish and bird species protected under the ESA. If this alternative is selected, the Navy would seek concurrence with this determination from NMFS and USFWS.

4.3.2 Upland Environment

4.3.2.1 Surface Water and Groundwater

The upland facility for the Combat Swimmers Alternative would be constructed at the same location with similar construction timing and similar facility size as for the Marine Mammal and Sea Lions Only Alternatives, except that no above-ground pools would be constructed. Impervious surface effects on surface water and groundwater under the Combat Swimmers Alternative would be the same as those described under the Marine Mammal and Sea Lions Only Alternatives and is considered negligible.

4.3.2.2 Geology and Soils

Effects on geology and soils under the Combat Swimmers Alternative would be the same as those described under the Marine Mammal and Sea Lions Only Alternatives and is considered negligible. A temporary erosion and sediment control plan would be implemented to avoid soil loss.

4.3.2.3 Vegetation

Effects on vegetation from the Combat Swimmers Alternative would be the same as those described for the Marine Mammal and Sea Lions Only Alternatives because the enclosures and upland facility sites would occupy similar footprints. The Combat Swimmers Alternative would result in no changes to vegetation in the vicinity of the dock, slight changes to herbaceous vegetation at the upland facility, a decrease in the amount of Scot's broom in the immediate vicinity of the upland facility, and no effect on wetlands or associated drainages at NBK–Bangor. The overall vegetation effect would be negligible.

4.3.2.4 Wildlife

Effects on wildlife from the Combat Swimmers Alternative would be the same as those described for the Marine Mammal and Sea Lions Only Alternatives because the facilities would be in the same waterfront and upland locations with similar habitat, noise, and water quality effects. In conclusion, the Combat Swimmers Alternative would have a negligible effect on the occurrence and abundance of terrestrial wildlife at NBK–Bangor. There would be no adverse effect on birds associated with the Migratory Bird Treaty Act.

Effects on bald eagles are addressed in Section 4.3.1.9, Other Marine Wildlife.

4.3.3 Social Environment

4.3.3.1 Noise

Effects on noise from construction of the Combat Swimmers Alternative are similar to those described for the Marine Mammal and Sea Lions Only Alternatives. Construction over the 30-day period would be lower than the existing industrial noise at the NBK–Bangor waterfront (99 dBA) but higher than existing noises at the inland facility (up to 96 dBA). However, the noise levels at the inland facility would be within that expected for construction activities within normal working hours and its effect would be minor and within regulatory standards.

The handheld sonar used by the combat swimmers would operate at frequencies of 700 kHz to 1.8 MHz and at source levels of 205 to 210 dB re 1 μ Pa. As discussed above (see Sections 4.3.1.7, Marine Fish, 4.3.1.8 Marine Mammals, 4.3.1.9, Other Marine Wildlife, and 4.3.1.10, Threatened and Endangered Species), this frequency is well above the frequencies at which fish, marine mammals, birds, and humans can hear. The noise emitted by the mechanical Power Swim propulsion device would be minimal. No noise information is available for the Farallon-type propulsion devices, but these devices use 12-volt electric motors similar to those used in electric trolling motors on small fishing boats.

These devices would not produce noise levels that could be harmful to marine biota, and impacts would be negligible.

4.3.3.2 Air Quality

Effects on air quality from construction and operation of the Combat Swimmers Alternative would be greater than existing conditions as described for the Marine Mammal and Sea Lions Only Alternatives but would be within NAAQS and PSCAA air quality standards. Project effects would include fugitive dust and construction equipment emissions during construction, and boat and vehicle emissions during operation.

Global temperature and climate change have become a concern from the realization that these changes are in response to human-induced levels of green house gas emissions. An individual project does not by itself generate enough green house gas emissions to significantly influence global climate change. Thus, the issue of global climate change is a cumulative impact, such that an appreciable impact would only occur when green house gas emissions from a project combine with green house gas emissions from other human-made activities to affect climate on a global scale.

Several of the emissions from the proposed action, such as carbon dioxide and nitrogen oxide, would be contributors to greenhouse gases. The annual emission of greenhouse gases that would be produced under the Combat Swimmers Alternative is predicted to be 45 tons per year, a negligible amount.

There would be minor short-term construction emissions and negligible operation emissions.

4.3.3.3 Cultural Resources

Effects on archaeological and architectural cultural resources from the Combat Swimmers Alternative would be the same as those described for the Marine Mammal and Sea Lions Only Alternatives because construction would occur in the same places, and no cultural or historic properties have been identified in these locations. The Combat Swimmers Alternative would have no effect on traditional cultural resources.

4.3.3.4 Coastal and Shoreline Management

Similar to that described under the Marine Mammal and Sea Lions Only Alternatives, CZMA consistency with applicable regulations includes the following:

- Section 4.3.1.2, Water Quality (Clean Water Act and SMA);
- Section 4.3.1.3, Sediment (SMA);
- Section 4.3.1.4, Marine Vegetation (SMA);
- Section 4.3.1.6, Benthic Communities and Shellfish (SMA);
- Section 4.3.1.7, Marine Fish (SMA);
- Section 4.3.1.8, Wild Marine Mammals (SMA);
- Section 4.3.1.9, Other Marine Wildlife (SMA);
- Section 4.3.1.10, Threatened and Endangered Fish (SMA);
- Section 4.3.2.1, Surface Water and Groundwater (Clean Water Act);
- Section 4.3.2.3, Vegetation (Clean Water Act); and
- Section 4.3.3.2, Air Quality (Clean Air Act).

Under the Clean Water Act and Clean Air Act, the Marine Mammal Alternative would meet all Washington state regulatory standards. Under the SMA, there would be no significant degradation of the natural resources in Hood Canal. The Combat Swimmers Alternative would be consistent, to the maximum extent practicable, with the SMA.

4.3.3.5 Land Use and Recreation

Effects on land use and recreation from the Combat Swimmers Alternative would be the same as those described for the Marine Mammal and Sea Lions Only Alternatives because existing land uses and waterfront recreation would not be changed due to the presence of the waterfront and inland facilities. There would be no changes in existing access or use. Private and other public ownerships are not near the facilities associated with the Combat Swimmers Alternative and/or are outside of the restricted area where activities would occur. In conclusion, the Combat Swimmers Alternative would have no effect on land use or recreation at NBK–Bangor or the surrounding area.

4.3.3.6 Aesthetics

Effects on aesthetics from the Combat Swimmers Alternative would be similar to those described for the Marine Mammal and Sea Lions Only Alternatives because the structures associated with both the waterfront and inland facilities would be similar in size, shape, and location, although the marine mammal enclosures would not be present. The Combat Swimmers Alternative would have no effect on aesthetics at NBK–Bangor or the surrounding area.

4.3.3.7 Socioeconomics and Environmental Justice

Construction activities would generate fewer temporary jobs under the Combat Swimmers Alternative than under the Marine Mammal and Sea Lions Only Alternatives because marine mammal enclosures would not be needed. However, both installation of the floating docks and construction of the upland facilities are small projects that would require a small number of workers and quantities of materials. Therefore, no permanent or long-lasting socioeconomic effects are anticipated as a result of construction associated with the Combat Swimmers Alternative.

Operation of the Combat Swimmers Alternative would create a maximum of 55 jobs compared to 37 and 30 jobs with the Marine Mammal and Sea Lions Only Alternatives, respectively.

Although this is half-again as many jobs, the long-term effect on the local economy of 37 to 55 jobs would not significantly affect the retail sector, housing, utility needs, or schools in the region. The 55 personnel would represent less than 1 percent of the existing employment of over 6,000 military personnel. Based on estimated family size ratios, it is anticipated that 70 military dependents (including 33 school-age dependents) would accompany the incoming military personnel, yielding a direct population impact of 125 persons (less than 0.05 percent of the Kitsap County population of over 230,000 persons). An increase of this size would yield a negligible effect on socioeconomic resources in the region. Sufficient vacant housing and school enrollment capacity exist within the region to accommodate the anticipated incoming population (refer to Section 3.3.7, Socioeconomics and Environmental Justice).

With the negligible environmental effects on the human population anticipated under the Combat Swimmers Alternative, there would be no environmental justice effects associated with the personnel increases and resultant population growth (EO 12898).

4.3.3.8 Utilities and Energy

As described under the Marine Mammal and Sea Lions Only Alternatives, electric power, telecommunications and data transfer, domestic water supply, and wastewater services for the Combat Swimmers Alternative would be provided through connection to existing utility lines located at the waterfront and upland site. Fewer utilities and less energy would be needed for the Combat Swimmers Alternative because there would be no marine mammal enclosures or need for a marine water treatment system.

The facilities would generate minimal demand for additional utilities and energy, and could be supplied from existing facilities at NBK–Bangor. As a result, there would be negligible effects on utility or energy capacity under the Combat Swimmers Alternative.

4.3.3.9 Transportation

Effects on transportation from construction and operation of the Combat Swimmers Alternative would be similar to those described for the Marine Mammal and Sea Lions Only. This increase would result in a negligible effect on transportation resources at the base.

4.4 ROV ALTERNATIVE

4.4.1 Marine Environment

4.4.1.1 Hydrography

Effects on hydrography from construction of the ROV Alternative would be similar to those described for the Combat Swimmers Alternative because this alternative consists of construction of a floating dock attached to an existing pier without enclosures. Under the ROV Alternative, anchors for the floating docks would be installed. Construction for this alternative would have a negligible effect on existing marine hydrography at the NBK–Bangor waterfront because tides, circulation, currents, and seasonal variability of marine waters would not appreciably change from existing conditions.

The small boats used under the ROV Alternative would be similar (although larger in size) to those for the other action alternatives, including the use of outboard engines with shallow propeller depths. When in operation, the propeller wash from these boats would create small localized movement of surface water that would dissipate rapidly. Propeller wash would have a negligible effect on the existing nearshore current structure. Operations under the ROV Alternative would have a negligible effect on marine hydrography at NBK–Bangor or the surrounding area.

4.4.1.2 Water Quality

Effects on water quality from construction of the ROV Alternative would be similar to those described for the Combat Swimmers Alternative. The ROV Alternative would include measures to prevent discharge of debris into the water and to minimize the likelihood of or effects from fuel spills during equipment usage through adherence to the existing NBK–Bangor fuel spill and response plan. Construction of the ROV Alternative would have a negligible effect on water quality at NBK–Bangor or the surrounding area.

The small boats used under the ROV Alternative would be similar to those for the other action alternatives, including the use of outboard engines with shallow propeller depths. These boats would normally operate in relatively deep water (-20 feet MLLW or deeper) and avoid disturbance to bottom sediments. In the infrequent instances when boats would operate in shallow water and sediments are resuspended, the resulting turbidity plumes would be small and dissipate quickly (within 30 minutes); the larger boats for the ROV Alternative would result in greater turbidity effects, but the effects would again be short term (less than 30 minutes). Through adherence to the existing NBK–Bangor fuel spill and response plan, fuel spills from operation of these boats would be avoided. Considering the above factors, boat operations under the ROV Alternative would have a negligible effect on water quality.

The various devices used by the ROV, as well as the ROV itself, would be electrically powered and securely sealed against flooding and leaking of lubricants. Therefore, there would be no potential for these devices to affect water quality.

4.4.1.3 Sediment

Construction effects on sediment from the ROV Alternative would be similar to those described for the other action alternatives because the construction process of the waterfront facilities would be same. The floating dock for the ROV Alternative would be built on shore and placed into the water by cranes, which would minimize the potential for inadvertent discharges of construction debris into the water. Measures that would be implemented to minimize the likelihood of fuel spills, as described in Section 4.4.1.2, Water Quality, would also protect sediment quality. Under this alternative, six anchors for the floating docks would be installed. Effects on sediments from anchor installation would be negligible. Consequently, construction for this alternative would have a negligible effect on sediments at NBK–Bangor or the surrounding area.

The small boats used under the ROV Alternative would be larger than those used for the Combat Swimmers Alternative, but the boats would use outboard engines with shallow propeller depths. Boats would normally operate in water depths of -20 feet MLLW or deeper. Therefore, typical boat operations would not create prop wash that would disturb bottom sediments. Although boat operations in shallow waters would be infrequent, prop wash could cause localized, short-term resuspension of bottom sediments. Sediments resuspended by prop wash would settle rapidly, turbidity plumes would dissipate within 30 minutes, and the overall effect would be negligible. The measures that would be implemented to minimize the likelihood of or effects from fuel spills during boat operations would also protect sediment quality. Consequently, operations under this alternative would have negligible effects on sediments at NBK–Bangor or the surrounding area.

4.4.1.4 Marine Vegetation

Effects from the ROV Alternative would be similar to the Combat Swimmers Alternative. There would be six anchors for this alternative that may cover approximately 54 square feet of sparse macroalgae. Shadowing effects would be negligible. Operations would occur in marine waters with minimal contact with bottom sediments or marine vegetation. It is possible that the small boats could disturb bottom sediments if traversing shallow waters; however, drivers would avoid prop disturbance on these sediments. Furthermore, fuel spills with the potential to damage marine vegetation would be avoided through adherence to the existing NBK–Bangor fuel spill and response plan. Thus, construction would have negligible effects on marine vegetation and no effect on eelgrass.

4.4.1.5 Plankton

Similar to the Combat Swimmers Alternative, plankton would not change from existing conditions under the ROV Alternative. Construction and operation (ROV and boat use) would have a negligible effect on the plankton community at the NBK–Bangor waterfront.

4.4.1.6 Benthic Communities and Shellfish

Effects on benthic communities and shellfish from construction and operation of the ROV Alternative would be the same as those described for the Combat Swimmers Alternative, except that the dock would create an additional 1,050 feet for site colonization for common fouling communities, such as mussels (*Mytilus* spp.), copepods, and amphipods. Overall, construction

and operation of the ROV Alternative would result in minor effects on benthic communities and shellfish.

4.4.1.7 Marine Fish

Most effects on marine fish from construction and operation of the ROV Alternative would be similar to those described for the other alternatives, which includes effects from shading, human presence on the docks, and boat use, except there would be a larger dock and use of larger boats resulting in a slight increase in fish habitat and increased boat disturbance. Fish would likely avoid the immediate area where ROVs are present and active.

The EDGETECH side scan sonar would operate at a frequency of 100 kHz, which is above the frequencies at which fish native to Pacific Northwest waters can hear (Hawkins 1981; Stocker 2001; Nedwell et al. 2004). Thus, operation of sonar would not affect fish physically or behaviorally. The high-resolution, DIDSON-type sonar would operate at 300 kHz, which is well above the hearing range of fish, and would have no effect on fish.

The ROV is equipped with bright xenon-metal halide lights used to illuminate underwater intruders. Non-stationary or intermittently used lighting, including strobe lights, has been documented to invoke an avoidance response in fish, notably salmonids (Johnson and Ploskey 1998; Maiolie et al. 1999; Brown 2000; Simmons 2004; Johnson et al. 2005). These studies indicate that the use of such lights is highly effective in reducing juvenile salmonid impingement and entrainment in dams and locks due to this behavior. Fish encountering the ROV when the halide lights are illuminated would be expected to display a similar avoidance response.

Although studies investigating the effects of light on salmonids with regards to spectral content is limited (Boeuf and Le Bail 1999), high intensity blue lighting appears to promote an acute response in pre-smolt Atlantic salmon, whereas white light similar to the spectrum the ROV halide lights does not produce a similar response (Migaud et al. 2007). One suggestion for the reduced response to metal halide bulbs is that much of their energy is in longer wavelengths (yellow-red), which are rapidly absorbed in water over a distance and therefore cannot be detected by fish (Migaud et al. 2007). Although fish cortisol levels (indicators of fish stress) have been shown to remain elevated 3 hours following exposure to high intensity blue light, no similar response was observed in fish exposed to high intensity white light (Migaud et al. 2007). However, even at constant high intensity blue light levels of fish stress indicators returned to basal levels within 24 hours (Migaud et al. 2007).

Light is attenuated by the water itself, absorbed by chlorophyll, and is absorbed and refracted by suspended materials in the water column. The attenuation of light in coastal and intercoastal waterways tends to be greater than the open ocean due to a higher level of turbidity. The distance at which avoidance would occur in fish would depend on the sensitivity of the fish, the degree of absorption and refraction that occurs in the water column due to particulate matter and chlorophyll, the intensity of the light source, and the movement of the ROV during operations.

The response of fish to ROV lights would be expected to be avoidance, is not expected to result in fish stress. However, the ROV would only be illuminated when an intruder is encountered, which is expected to occur only rarely. Those salmonids exposed to this light source would return to the area once the light is turned off. Due to the infrequency of the action, it will not alter the migration of juvenile salmonids along the NBK-Bangor shoreline.

When considering effects on EFH, no increase in fishing, loss of fish habitat, changes in marine hydrology, or entrainment through water intakes would occur under the ROV Alternative. In addition, there would be no exceedance of state water quality standards. Changes in artificial lighting levels and in-water noise would be minor. No anchovy or market squid spawning occurs along the NBK–Bangor waterfront, and thus these species would not be affected. The dock associated with the ROV Alternative would not present a potential barrier to fish migration, and the in-water structures would be used for some Pacific groundfish species, but only a minor amount of new in-water structure habitat would be created. Overall, effects on marine fish would be considered minor for construction and negligible for operation and would not adversely affect EFH.

4.4.1.8 Wild Marine Mammals

Most effects on marine mammals from the ROV Alternative would be similar to those described for the Combat Swimmers Alternative. Noise, human activity, and small boat operations (similar to that described for the Combat Swimmers Alternative) would also not affect wild marine mammals at the NBK–Bangor waterfront, although larger boats would be used for the ROV Alternative. The wild marine mammals would likely come into contact with ROVs and, when in contact, would avoid the immediate area where the ROV is present.

Harbor seals and California sea lions, the principal marine mammals occurring at NBK–Bangor, are considered to have an auditory bandwidth between 75 Hz and 75 kHz (Southall et al. 2007) and are insensitive to sound at 100 kHz. Therefore, these pinnipeds are unlikely to be affected by occasional, short-term (20 to 30 minutes) operation of the EDGETECH side scan sonar (which operates at 100 kHz). In addition, the operating specifications for this side scan sonar are similar to those of the Underwater Sonar System (USS) swimmer detection sonar already operating at NBK–Bangor. The environmental assessment for that system concluded that there would be no adverse effects on wild marine mammals (Navy 2005a). The side scan sonar signal is within the frequency range heard by cetaceans (porpoise and dolphins). However cetaceans occur rarely in Hood Canal; the most common species is the harbor porpoise, which occurs so infrequently that it is not possible to estimate its density in Hood Canal (Calambokidis 2008, personal communication). This, in conjunction with the infrequent use of the side scan sonar, indicates that marine mammals would not be affected by the side scan sonar. The high-resolution, DIDSON-type sonar would operate at 300 kHz, which is above the hearing range of marine mammals, and would have no effect on marine mammals.

Marine mammals could be startled if exposed to the bright lights that would be used under this alternative. As described above for marine fish (Section 4.4.1.7), however, the very infrequent use of the bright lights means there is little potential for adverse effects on marine mammals.

This alternative would not result in the capture, harassment, or harm of wild marine mammals. Therefore, this alternative would result in no reasonably foreseeable takes under the MMPA.

4.4.1.9 Other Marine Wildlife

Similar to that described for the other action alternatives, construction effects on other marine wildlife would be negligible. During the short-term construction period, wildlife would be displaced from the immediate vicinity of the dock but would return following construction. During operation, the small boat activity would increase existing vessel use at the NBK–Bangor

waterfront. In addition, ROVs transferring in and out of boats would displace wildlife. However, marine wildlife is already habituated to boat operations and would not altogether depart the area. Although the ROV Alternative would have larger boats, effects would be similar to that described under the other action alternatives. Effects on bald eagles would be similar to those described for the Marine Mammal Alternative.

The EDGETECH side scan sonar would operate at a frequency of 100 kHz, which is well above the frequencies at which marine birds can hear (upper limit is approximately 5 kHz) (Dooling 1980, 1982, 2002), and would not affect marine birds physically or behaviorally. The high-resolution, DIDSON-type sonar would operate at 300 kHz, which is well above the hearing range of marine birds, and would have no effect on marine birds.

However, marine birds would likely avoid small craft associated with the ROV, which would further reduce their potential for physical injury from the bright lights, which could startle marine birds. In conclusion, short-term displacement might occur to wildlife that forage in the immediate vicinity of the construction area, in the area of small boat operations, and when the bright lights are in use. These effects would be measurable, but small and localized and would be considered a negligible effect. As described for the Marine Mammal and Sea Lions Only Alternatives, there would be no incidental take of bald eagles under the BGEPA and no special measures are needed to avoid adverse effects on bald eagles.

4.4.1.10 Threatened and Endangered Species

Construction timing and duration for the ROV Alternative would be the same as that described under the other action alternatives. If present, listed fish (Puget Sound Chinook, Hood Canal summer-run chum, bull trout, and Puget Sound steelhead) and wildlife (Steller sea lion, humpback whale, and marbled murrelet) would avoid the immediate construction area within the NBK–Bangor waterfront. There would be no project effects on their prey resources. The work window would minimize any effects on listed fish. Thus, construction of the ROV Alternative would result in minor effects on listed fish and the marbled murrelet with an ESA finding of may affect, not likely to adversely affect, and negligible effects on listed marine mammals with an ESA finding of no effect.

For the ROV Alternative, dock operations and small boat use affecting listed fish and wildlife would be similar to that described under the Combat Swimmers Alternative. Although fewer humans would be present at the dock, its associated pier already supports substantial human use, and the additional people needed for this alternative would not alter NBK–Bangor waterfront use by listed fish and wildlife. Boats under the ROV Alternative would be slightly larger than for the Combat Swimmers Alternative, but this size increase would not affect listed fish and wildlife.

As discussed above for marine fish and marine birds (Sections 4.4.1.7, Marine Fish, and 4.4.1.9, Other Marine Wildlife), the EDGETECH and DIDSON sonars that would be used under this alternative operate at frequencies above 100 kHz, which is not audible to marine fish native to the Pacific Northwest, including salmon and bull trout, nor to marine birds. Therefore, ESA-protected marine fish and birds would not be affected by these devices.

The bright lights may result in avoidance behavior by fish and marbled murrelets when in use. Because the bright lights would be used rarely, however, such effects would be minor.

CONCLUSION

Based on the analysis above, the Navy has determined that this alternative would have no effect on marine mammal species protected under the ESA; it may affect, but not likely to adversely affect, fish and bird species protected under the ESA. If this alternative is selected, the Navy would seek concurrence with this determination from NMFS and USFWS.

4.4.2 Upland Environment

4.4.2.1 Surface Water and Groundwater

Effects on surface water and groundwater under the ROV Alternative would be the same as those described for the other action alternatives because the facilities would be located in the same area with the same construction period and similar use during operation, although there would be no above-ground pools for marine mammals. There would be negligible effects on surface water and groundwater due to the small increase in impervious surfaces.

4.4.2.2 Geology and Soils

Effects on geology and soils under the ROV Alternative would be the same as those described for the other action alternatives because the facilities would be located in the same area with the same construction period and similar use during operation, although there would be no above-ground pools for marine mammals. A temporary erosion and sediment control plan would be implemented to avoid soil loss. There would be negligible effects on geology and soils.

4.4.2.3 Vegetation

Effects on vegetation from the ROV Alternative would be the same as those described for the other action alternatives because the enclosures and upland facility sites would be in the same locations. The ROV Alternative would result in no changes to vegetation in the vicinity of the dock, a slight change to herbaceous vegetation at the upland facility, and would have no effect on wetlands or associated drainages at NBK–Bangor. Overall, there would be negligible effects on vegetation.

4.4.2.4 Wildlife

Effects on wildlife from the ROV Alternative would be the same as those described for the other action alternatives because the facilities would be in the same waterfront and upland locations with similar habitat, noise, water quality, and hazardous materials effects. The ROV Alternative would have a negligible effect on the occurrence and abundance of terrestrial wildlife at NBK–Bangor. Under the Migratory Bird Treaty Act, no adverse effect would occur to migratory birds.

Effects on bald eagles are addressed in Section 4.4.1.9, Other Marine Wildlife.

4.4.3 Social Environment

4.4.3.1 Noise

Effects on noise associated with construction of the ROV Alternative would be the same as those described under the other action alternatives. Construction over the 30-day period would be lower than the existing industrial noise at the NBK–Bangor waterfront (99 dBA) but higher than

existing noises at the inland facility (up to 96 dBA). However, the noise levels at the inland facility would be within that expected for construction activities within normal working hours. Noise will have a negligible effect on the social environment.

4.4.3.2 Air Quality

Effects on air quality associated with construction and operation of the ROV Alternative would be greater than that described for the other action alternatives (due to larger boats) but would be within NAAQS and PSCAA air quality standards. Project effects would include fugitive dust and construction equipment emissions during construction, and boat emissions during operation. For construction, there would be minor air quality effects and negligible air quality effects during operations.

Global temperature and climate change have become a concern from the realization that these changes are in response to human-induced levels of green house gas emissions. An individual project does not by itself generate enough green house gas emissions to significantly influence global climate change. Thus, the issue of global climate change is a cumulative impact, such that an appreciable impact would only occur when green house gas emissions from a project combine with green house gas emissions from other human-made activities to affect climate on a global scale.

Several of the emissions from the proposed action, such as carbon dioxide and nitrogen oxide, would be contributors to greenhouse gases. The annual emission of greenhouse gases that would be produced under the ROV Alternative is predicted to be 45 tons per year.

4.4.3.3 Cultural Resources

Effects on cultural resources associated with construction and operation of the ROV Alternative would be the same as those described under the Combat Swimmers Alternative. This is because no historic properties have been identified in the locations where project activities would occur. No effects would occur to tribal shellfish harvesting locations. Overall, there would be no effect on cultural resources.

4.4.3.4 Coastal and Shoreline Management

Similar to that described under the other action alternatives, CZMA consistency with applicable regulations includes:

- Section 4.4.1.2, Water Quality (Clean Water Act and SMA);
- Section 4.4.1.3, Sediment (SMA);
- Section 4.4.1.4, Marine Vegetation (SMA);
- Section 4.4.1.6, Benthic Communities and Shellfish (SMA);
- Section 4.4.1.7, Marine Fish (SMA);
- Section 4.4.1.8, Wild Marine Mammals (SMA);
- Section 4.4.1.9, Other Marine Wildlife (SMA);
- Section 4.4.1.10, Threatened and Endangered Fish (SMA);
- Section 4.4.2.1, Surface Water and Groundwater (Clean Water Act);
- Section 4.4.2.3, Vegetation (Clean Water Act); and
- Section 4.4.3.2, Air Quality (Clean Air Act).

Under the Clean Water Act and Clean Air Act, the ROV Alternative would meet Washington State regulatory standards. Under the SMA, there would be no significant degradation of the natural resources in Hood Canal. The ROV Alternative would be consistent, to the maximum extent practicable, with the SMA.

4.4.3.5 Land Use and Recreation

Effects on land use and recreation from the ROV Alternative would be the same as those described for the other action alternatives because existing land uses and waterfront recreation would not be changed due to the presence of the waterfront and inland facilities. There would be no changes in existing access or use. Private and other public ownerships are not near the facilities associated with the ROV Alternative and/or are outside of the restricted area where activities would occur. The ROV Alternative would have no effect on land use or recreation at NBK–Bangor or the surrounding area.

4.4.3.6 Aesthetics

Effects on aesthetics from the ROV Alternative would be similar to that described for the other Action Alternatives because the structures associated with both the waterfront and inland facilities would be similar in size, shape, and location. The ROV Alternative would have a negligible effect on aesthetics at NBK–Bangor or the surrounding area.

4.4.3.7 Socioeconomics and Environmental Justice

The number of personnel required for construction of the ROV Alternative would be similar to that described for the other action alternatives. No permanent or long-lasting socioeconomic effects are anticipated as a result of construction or operation associated with the ROV Alternative.

For operation under the ROV Alternative, NBK–Bangor would receive a maximum of 40 additional permanent personnel in support of the expanded mission, representing an increase of less than 1 percent to the existing employment of over 6,000 military personnel. Based on estimated family size ratios, it is anticipated that 51 military dependents (including 24 school-age dependents) would accompany the incoming military personnel, yielding a direct population impact of 91 persons (less than 0.04 percent of the Kitsap County population of over 230,000 persons). An increase of this negligible size would yield an imperceptible effect on socioeconomic resources in the region. Sufficient vacant housing and school enrollment capacity exist within the region to accommodate the anticipated incoming population (see Section 3.3.7, Socioeconomics and Environmental Justice).

There would be negligible socioeconomic effects under the ROV alternative and no environmental justice effects (EO 12898) associated with personnel increases and resultant population growth.

4.4.3.8 Utilities and Energy

As described under the other action alternatives, electric power, telecommunications and data transfer, domestic water supply, and wastewater services would be provided through connection

to existing utility lines located at the waterfront and upland site. Fewer utilities and less energy would be needed for the ROV Alternative compared to the Marine Mammal and Sea Lions Only Alternatives because there would be no marine mammal enclosures and there would be no need for a marine water treatment system. The overall effect on utilities and energy would be negligible.

The facilities would generate minimal demand for additional utilities and energy and could be supplied from existing facilities at NBK–Bangor. As a result, negligible effects on utility or energy capacity would occur under the ROV Alternative.

4.4.3.9 Transportation

Effects on transportation from construction and operation of the ROV Alternative would be similar to that described for the other action alternatives, except that there would be larger boats (36-foot size) to support operations of the ROV Alternative. There would be negligible effects on transportation resources.

4.5 NO-ACTION ALTERNATIVE

Under the No-Action Alternative, no SISS would be implemented at NBK–Bangor, and none of the effects described in the preceding sections of Chapter 4 would occur. No other action would be implemented as an alternative to the SISS; security measures at the NBK–Bangor waterfront would remain unchanged, and there would be no related environmental effects.

4.5.1 Marine Environment

4.5.1.1 Hydrography

Under the No-Action Alternative, the hydrographic setting of the NBK–Bangor waterfront, which includes tidal cycles, circulation, and currents, is not expected to change from existing conditions. Annual and seasonal variability would continue to occur based on El Niño and La Niña events.

4.5.1.2 Water Quality

Under the No-Action Alternative, water quality parameters (temperature, salinity, DO, turbidity, nutrients, fecal coliform, and pH) are not expected to change at the NBK–Bangor waterfront. These parameters are currently within extraordinary quality standards or within typical ranges of the Puget Sound if specific state water quality standards are not available. The exception is DO in deeper waters during late summer and early fall, which met fair and excellent quality standards rather than extraordinary quality standards. Another exception is temperature during summer months, but these temperatures are expected to be higher in shallow nearshore waters.

4.5.1.3 Sediment

Natural recovery of sediments at NBK–Bangor would continue to occur, resulting in less sediment contamination under the No-Action Alternative. There would be no increase in chemical concentrations for sediments at the NBK–Bangor waterfront.

4.5.1.4 Marine Vegetation

Under the No-Action Alternative, marine vegetation (including red, green, and brown algae; and eelgrass) would remain undisturbed in the intertidal and subtidal photic zone. The current abundance and distribution of these grasses would not change.

4.5.1.5 Plankton

Under the No-Action Alternative, plankton would change over time based on weather conditions, temperature, freshwater influx, tides, currents, and changes in nutrients within the water column. Phytoplankton blooms may occur based on conditions of the marine waters.

4.5.1.6 Benthic Communities and Shellfish

The benthic community at the NBK–Bangor waterfront is abundant and diverse. Tribes have historically been allowed onto the waterfront to collect shellfish, and this tradition is expected to continue to occur subject to homeland security restrictions. Natural or anthropomorphic exceedances of state water quality standards could also prevent shellfish harvesting when these

exceedances occur. Homeland Security measures would continue to affect the location where tribes are allowed to harvest at the NBK–Bangor waterfront. Recreational shellfish harvesting was no longer permitted after 2001, and is not likely to be permitted in the future. Native shellfish collection has not affected overall shellfish distribution or abundance and distribution of benthic communities and shellfish, and no changes are expected under the No-Action Alternative.

4.5.1.7 Marine Fish

The marine fish community includes salmon, forage fish, and all other marine fish with a total species list of at least 140 different species. The area provided foraging, migration, and reproductive habitat depending on species, including EFH for coastal pelagic species, salmon, and groundfish. No changes to fish populations or habitat quality or quantity are expected under the No-Action Alternative.

4.5.1.8 Wild Marine Mammals

Under the No-Action Alternative, California sea lions and harbor seals would continue to use the NBK–Bangor waterfront for foraging (both species) and haul-out sites. There are no expected changes in water quality, noise, or human activity that would affect occurrence, abundance, and distribution of marine mammals at the waterfront.

4.5.1.9 Other Marine Wildlife

Under the No-Action Alternative, other marine wildlife would continue to use the NBK–Bangor waterfront and would be temporarily displaced during dock activities where humans and loud noises are present. Wildlife would also continue to be temporarily displaced during existing boat activities. However, since these activities occur continuously at the waterfront, the wildlife that are present have already become habituated to this activity.

4.5.1.10 Threatened and Endangered Species

Threatened and endangered species include fish (Puget Sound Chinook, Hood Canal summer-run chum, bull trout, and Puget Sound steelhead), Steller sea lion, southern resident killer whale, humpback whale, and marbled murrelet. The fish and the marbled murrelet occur regularly at the NBK–Bangor waterfront, while the Steller sea lion and humpback whale are considered rare visitors. The presence of these species is not expected to change. There are no anticipated changes in water quality or sedimentation under the No-Action Alternative.

4.5.2 Upland Environment

4.5.2.1 Surface Water and Groundwater

Under the No-Action Alternative, there would be no changes to surface water, groundwater, or impervious surfaces if the SISS is not constructed.

4.5.2.2 Geology and Soils

The geologic conditions and soils underlying NBK–Bangor would not change under the No-Action Alternative. The base does not have areas mapped as highly unstable or highly erodible.

4.5.2.3 Vegetation

Under the No-Action Alternative, the upland site would continue to grow with invasive shrubs and weeds. Over time, a forested community would develop if not cut back on a regular basis. However, since the site has existing utility connections and is adjacent to other office and laboratory buildings, it is most likely that other types of office development would proceed at the site and that the area would lose the existing vegetation for an office building and sidewalks.

4.5.2.4 Wildlife

Under the No-Action Alternative, the disturbed site in the industrial park would likely be developed for another NBK–Bangor facility because it is in an industrial area slated for office development. Thus, the few remaining shrubs, and associated noxious weeds (Scot’s broom) at the site would likely be lost over time and replaced with a building, sidewalk, pools, or grass. The existing and future vegetation at the site is of low value for native wildlife and is not connected to any other adjacent native habitat type. If the site is developed for other facilities, temporary construction noise and visual disturbances would deter some wildlife from using the area. Following building construction, most wildlife at the site would likely be those that are habituated to human activity.

4.5.3 Social Environment

4.5.3.1 Noise

Noise levels at NBK–Bangor range from 60 to 80 dBA at the base to 70 to 90 dBA at the industrial waterfront. These noise levels are expected to remain within these ranges under the No-Action Alternative.

4.5.3.2 Air Quality

The No-Action Alternative would not implement the SISS and would not produce any new air quality effects. Air quality would remain in attainment of all NAAQS.

4.5.3.3 Cultural Resources

Under the No-Action Alternative, there would be no effects on cultural resources. The Navy would continue to manage resources in accordance with Navy instructions, and federal laws and regulations, including compliance with Section 106 of the NHPA and consultation with the Washington SHPO in the event previously undocumented cultural resources are located.

4.5.3.4 Coastal and Shoreline Management

Under the No-Action Alternative, the Navy would continue to meet federal consistency with applicable CZMA regulations where existing projects occur within the NBK–Bangor waterfront area under jurisdiction of the CZMA.

4.5.3.5 Land Use and Recreation

Under the No-Action Alternative, existing land uses and recreation would not change, except that future Homeland Security requirements might further restrict land uses and recreation access

within NBK–Bangor boundaries. The proposed action is not associated with these potential future restrictions.

4.5.3.6 Aesthetics

The landscape of land and water structures at NBK–Bangor would not change under the No-Action Alternative. The land area of NBK–Bangor would continue to be a mixture of undeveloped forest, industrial sites, and residential homes. The waterfront would continue to be an active industrial waterfront with substantial human activity and over-water structure.

4.5.3.7 Socioeconomics and Environmental Justice

Under the No-Action Alternative, population and housing, education and welfare, and economic activities generated from base employees and residents would not change from existing conditions.

4.5.3.8 Utilities and Energy

Under the No-Action Alternative, there would be no increased need for additional water, sanitary sewer and wastewater, electricity, or natural gas.

4.5.3.9 Transportation

Transportation at NBK–Bangor would not change, and there would be no need for improved roads or other transportation facilities.

4.6 UNAVOIDABLE ADVERSE EFFECTS

Under the proposed action, there are no unavoidable adverse effects outside of bright lights for the ROV Alternative. The bright lights would affect marine mammals, birds, and fish, including ESA-listed species in the near vicinity of its use. Under the ESA, the action would have a finding of may affect, likely to adversely affect. Under the MMPA, the action would have a finding of Level B harassment. Formal consultation with NMFS and USFWS would be necessary to determine if a permit could be obtained. The Services may require additional conservation measures to protect listed species under the ROV Alternatives or may deny the permit request.

4.7 RELATIONSHIP BETWEEN SHORT-TERM USES OF THE HUMAN ENVIRONMENT AND THE ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The SISS would meet the Navy's need for improved capability in detecting intruders originating from marine waters. This capability would provide Naval forces with adequate time to react to, and defend against, potential enemy threats. Both short-term and long-term commitments of labor and capital, along with use of non-renewable materials for energy use during construction and operation, would result from the proposed action. Consequently, the majority of construction and operation activities for the SISS would have no significant adverse long-term effect on the natural environment and biological organisms at the NBK–Bangor waterfront.

4.8 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Section 102(c)(v) of NEPA requires that an EIS identify “any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented.” While implementing the SISS would provide important benefits by providing the Navy with enhanced detection of marine intruders, nonrenewable resources would be consumed during construction and operation of the proposed system. Since the reuse of these resources may not be possible, they could be considered irreversibly and irretrievably committed should the proposed action be implemented. The nonrenewable resources would include expendable materials (such as building materials, fuel, and energy) that would be used during construction and operation of the proposed system. The Navy is not aware of any cultural resources that would be irreversibly and irretrievably committed or lost should the proposed action be implemented. This commitment would occur until another SISS technology would replace the marine mammals.