



Chapter 5

Cumulative Impacts

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5.0 CUMULATIVE EFFECTS

Cumulative effects are those changes to the physical, biological, and socioeconomic environments that would result from a proposed action when added to other past, ongoing, and reasonably foreseeable actions, regardless of what agency of government or person undertakes such other actions (see 40 CFR 1508.7). The analysis and disclosure of cumulative effects provides the decision-maker and the public with the context in which the effects from the proposed action are occurring, and the environmental implications of the interactions of known and expected activities. This section identifies past and present projects and future actions that, based on currently available information, are reasonably certain to occur and assesses the incremental effect of the proposed action for each resource category.

The impacts of the No-Action Alternative are included in the impacts of past, present and reasonably foreseeable future actions described in this chapter. The No-Action Alternative would not contribute to cumulative effects.

5.1 AREA OF CUMULATIVE EFFECTS ANALYSIS

The cumulative effects analysis for the SISS EIS considers all known past, present, and reasonably foreseeable future activities within and immediately surrounding the NBK–Bangor land and water area, including the base shoreline located along 4.5 miles on the eastern side of Hood Canal, as well as Hood Canal. Additional actions may affect aquatic organisms that migrate or move through Hood Canal and Puget Sound. Surrounding communities potentially affected by base activities include Silverdale, Poulsbo, and Bremerton, all of which are located on the Kitsap Peninsula and within Kitsap County.

5.2 HISTORICAL CONTEXT

After the Navy purchased the land at NBK–Bangor, the U.S. Naval Magazine was established on June 5, 1944, and began operations in January 1945. As part of initial development of the Naval Magazine in 1944, Marginal Wharf was built to handle the loading of ammunition on Navy transport ships headed for the Pacific Theater during World War II. In 1951, KB docks were built and used by small craft from the Naval Undersea Weapons Engineering Station at Keyport. Following World War II, through the Korean and Vietnam conflicts, and until January 1973, Bangor continued its role as a U.S. ammunition depot responsible for shipping conventional weapons abroad. In 1964, the base became a Polaris Missile Storage Facility.

In 1973, Bangor was established as a homeport for the OHIO Class submarines, and housing, offices, and industrial complexes were constructed to support operations for homeported submarines. To support this program, the Delta Pier was constructed from 1977 to 1980 and the Explosives Handling Wharf was constructed shortly thereafter. The first nuclear submarine (USS OHIO) arrived at Delta Pier in 1982, and the program became fully operational. In 2004 Naval Submarine Base Bangor merged with Naval Station Bremerton into a new command known as Naval Base Kitsap. The new command has responsibilities for all Navy properties in Kitsap County, Washington, including Bangor, Bremerton, Keyport, Manchester, and other locations. Over time, as new or revised needs were identified, additional facilities and infrastructure were constructed.

Most major development at the NBK–Bangor site over the past 40 years was analyzed in the TRIDENT Facilities EIS and associated supplements, which were prepared when the ballistic missile submarine support portion of the base was constructed (Navy 1974, 1976, 1978, 1989). Considerable effort was made to limit development effects on the surrounding environment. Although numerous actions were planned to mitigate harmful impacts on the environment from constructing and operating this facility at the base, a number of unavoidable adverse impacts were identified in the Final EIS. These impacts included additional drawdown of the water table and the loss of hundreds of acres of vegetation and associated wildlife and plant habitat from land clearing. The land was primarily forest, orchards, and farmland when purchased in 1944.

Subsequent environmental analyses at NBK–Bangor included preparation of environmental documents that assessed specific development actions at the base and adjacent waterfront (see Appendix G). These projects have been ongoing since the earliest TRIDENT EISs and will continue to be needed as facilities are upgraded and new technology or Navy policy require facility changes. The projects were implemented throughout the base, and project-specific environmental effects varied from negligible to substantial. Even so, the base remains largely forested with a native Pacific Northwest vegetation community flourishing along with its associated wildlife community. The purpose of the NBK–Bangor Integrated Natural Resources Management Plan (INRMP) is to preserve and protect natural resources and provide measures to conserve existing ecosystems, preserve its biodiversity, and develop an increased knowledge of ecosystems through continued surveying of the natural communities present at NBK–Bangor. The Navy has full-time environmental planners and biologists at NBK–Bangor who implement the goals and policies of the INRMP. With the exception of the Delta pier and waterfront facilities, the majority of the shoreline in the project area remains in its natural condition.

Appendix G (Table G–1) lists the past, present, and reasonably foreseeable future actions at NBK–Bangor that would be expected to have some effect on the natural and human environment. There are other actions that had no effect or would have no effect (for example, a carport built over a paved area would have no effect on the amount of impervious surface); these are not included in the appendix. Also, projects were omitted where a detailed environmental analysis was not conducted since those projects were not expected to have environmental impacts. The projects provided in Appendix G represent the best information available at this time; the list of planned future projects at the base is subject to change. Because of the nature of concept development and funding for security projects after September 11, 2001, plans for security projects are particularly dynamic. The notable larger future planned projects at NBK–Bangor include the explosives handling wharf (EHW) #2 (Item #58 in Appendix G) and the Transit Protection System (TPS)/Port Operations Facilities Wharf (Item #59 in Appendix G). Continuing NEPA analysis and documentation would be provided for all future projects as appropriate for these programs and projects when developed and implemented as required by NEPA and OPNAVINST 5090.1C.

Implementation of the proposed action would involve:

- Locating humans and marine mammals (for two alternatives) in facilities at an existing pier on the NBK–Bangor waterfront;
- Locating equipment storage on the same pier; and

- Locating land-based support facilities in modular buildings sited on vacant land within an area planned for office space at NBK–Bangor.

5.3 OTHER PAST AND PRESENT PROJECTS OFF BASE

Past and present projects outside NBK–Bangor that may contribute to cumulative effects are mainly those located within the Hood Canal watershed in the vicinity of the base (Figure 5-1). Land in the upland area has been mostly developed for residential use on larger lots that have retained some natural areas. This has helped to reduce the effects of this development on the environment. Some exceptions are the Vinland and Lofall neighborhoods north of the base, which are residential communities on smaller lots. There are also some scattered commercial uses (neighborhood convenience stores and gas stations) located in the upland area.

Development along the shoreline of Hood Canal has been relatively intense where residential uses predominate with smaller lot sizes compared to those in the upland rural areas of Kitsap and Jefferson Counties. Some of these residences have docks. Commercial uses are scattered along the shoreline and include the community of Seabeck to the south, which has a store, a few businesses, marina, and a retreat center. Further south is Scenic Beach State Park.

5.4 OTHER REASONABLY FORESEEABLE FUTURE PLANS AND PROJECTS

The following sections describe reasonably foreseeable future proposed plans and actions that are mainly focused on shoreline developments in the vicinity of Hood Canal, which have a greater potential to result in cumulative effects on the marine environment. These projects were identified through contacts with the Kitsap County and Jefferson County Departments of Community Development, WSDOT, natural resource agencies, and Native American tribes.

5.4.1 State Plans/Projects

5.4.1.1 Misery Point Boat Launch

WDFW is proposing a \$2.5 million boat launch replacement project located approximately 9 miles south of the NBK–Bangor waterfront on the east side of Hood Canal. The project involves replacement of an on-grade, concrete, boat launch ramp with a 27-foot wide, 230-foot long, elevated ramp. In addition to the ramp, the project would replace an existing vault restroom, restripe a paved parking lot, and regrade a gravel overflow lot. Kitsap County commissioners rejected a design for the boat launch proposed by WDFW and this project remains in the design phase. This project would result in short-term water quality impacts during constructions, as well as long-term loss of shallow marine habitat.

5.4.1.2 Hood Canal East Half Replacement and West Half Rehabilitation Project – Water Shuttle

WSDOT is proposing to construct two docks, one at Lofall and one at South Point, for the passenger-only water shuttle that will run during the closure of the Hood Canal Bridge for approximately two months in 2009. The Lofall site is located approximately 5 miles north of the NBK–Bangor waterfront on the east side of Hood Canal. In order for WSDOT to receive federal funding, the dock must be temporary (i.e., torn down after the bridge improvements are completed).

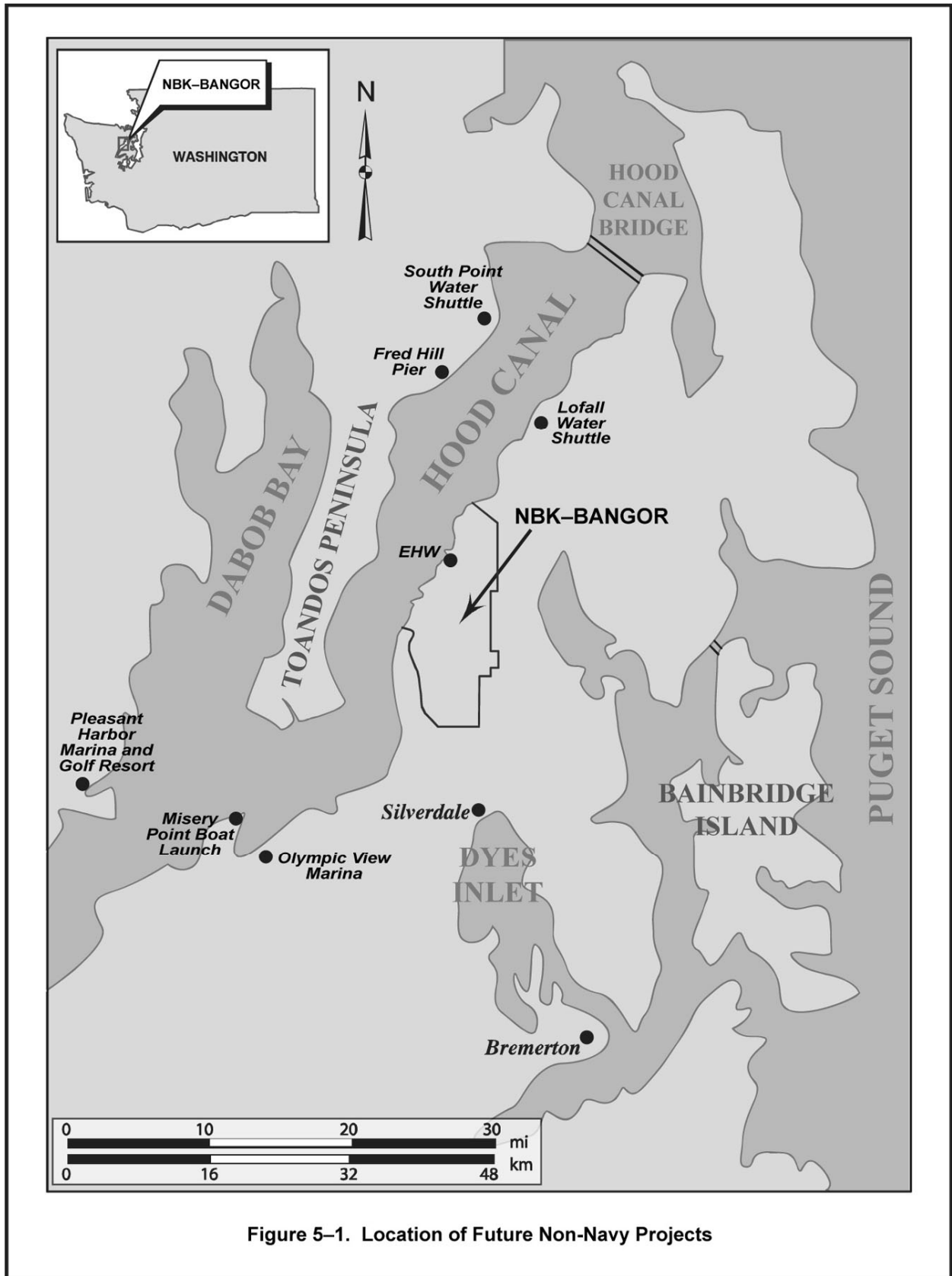


Figure 5-1. Location of Future Non-Navy Projects

The South Point water shuttle site is located approximately 5 miles north of the NBK–Bangor waterfront on the west side of Hood Canal. This shuttle would be available during closure of the Hood Canal Bridge. Two temporary passenger-only water shuttles with the capacity to move 150 passengers each would operate every 30 minutes. This would yield a capacity of 300 passengers per hour in each direction during peak periods. Temporary vehicle park-and-ride lots would also be constructed on each side of Hood Canal. This project would result in short-term water quality and noise impacts during construction, as well as shading and loss of marine habitat while the docks are in place. Upland vegetation would be cleared for the park-and-ride lots.

5.4.2 Local Plans/Projects

5.4.2.1 Olympic View Marina

Olympic View Marina, LLC is proposing to replace the abandoned Seabeck Marina located on Seabeck Bay approximately 7 miles south of NBK–Bangor on the east side of Hood Canal. A new marina would be constructed and involve installation of 72,510 square feet of piers, floats, and gangways (approximately 1.66 acres of over-water structures) for the moorage of approximately 200 boats. New structures would include a 16- by 175-foot concrete main approach dock, steel gangways, concrete approach floats, and concrete finger float systems. WDFW recently conditionally approved the permit for this project with the stipulation that the new marina be temporarily restricted to the size of the old structure. WDOE officials indicated that they are prevented from allowing an expansion of the former Seabeck Marina, because the shoreline is designated a "conservancy" in Kitsap County's Shoreline Management Master Program. Kitsap County will move forward on a process to amend the shoreline designation, which was established in 1976, or to correct the problem by amending the text in the shorelines plan. Assuming the change is made, the marina can be constructed as planned.

The new construction includes lights, signs, and utilities. Other elements include a new breakwater, concrete pump-out float, sewage lines, two office and marina service buildings, and two underground fuel storage tanks. Habitat improvements in intertidal areas at the site include overall reduction in overwater shading, removal of broken concrete pile and rubble, and repair or replacement of shoreline stabilization. This project would result in short-term water quality and noise impacts during construction, as well as long-term shading under the new over-water structures and loss of marine habitats from installation of the breakwater and pier pilings. Upland vegetation would be cleared for the on-land structures.

5.4.2.2 Fred Hills Sand and Gravel

As proposed, the project would mine gravel from the Fred Hills existing pit near Shine and move gravel on a 4-mile long conveyor belt to Thorndyke Bay on Hood Canal. The gravel would then be loaded onto barges and ships at a 1,000-foot long pier. The pier would be supported on piles spaced approximately 100 feet apart. The new pier would be located approximately 3 miles north of the NBK–Bangor waterfront on the west side of Hood Canal. The project is in its early stages of planning and an EIS has not yet been prepared. This project would result in short-term water quality and noise impacts during construction, as well as long-term shading and loss of marine habitat from the new pier. There would be long-term noise impacts (including underwater) from

barge loading, as well as aesthetic impacts and potential interference with marine vessel traffic. Upland vegetation would be cleared for construction of the conveyor belt, with potential impacts to erosion/water quality and wetlands.

5.4.2.3 Pleasant Harbor Marina and Golf Resort

The Statesman Group of Companies is proposing a new master planned development at Pleasant Harbor south of Brinnon. The project is located on the west side of Hood Canal approximately 9 miles southwest of NBK–Bangor. The 256-acre development includes resort housing, hotel, restaurant, spa, clubhouse, 18-hole golf course, and other resort-type facilities. It would refurbish an existing 285-boat marina and involve development of resort facilities along the shoreline. Planning is ongoing for this project. Project construction would likely result in short-term water quality and noise impacts. The new marina would probably result in some loss of marine habitat. The golf course and upland facilities would likely result in considerable clearing of upland vegetation, with a potential for impacts to erosion/water quality and wetlands.

5.4.2.4 Belfair Sewer Line

Mason County is proposing to construct a sewer line in the Belfair area to replace aging and failing septic systems with a sanitary sewer system. The sewer line would run on both the north and south shores of southern Hood Canal. The project was developed as part of the Mason County Facilities Plan approved in 2002. The project received state funding from the 2005 Legislature. The project has been undergoing environmental review, legislative overview, and permitting. The sewer line would not be located directly adjacent to Hood Canal, and thus construction would have minimal potential for marine impacts. However, there would be temporary disturbance of upland habitat along the sewer line route. The project would reduce the impact of failing septic systems on water quality in Hood Canal.

5.4.2.5 Programmatic Plans for Hood Canal

Because of water quality problems and concern for salmon and the environmental health of Hood Canal, several governmental entities and community groups are involved in planning and developing programs relating to the environment in Hood Canal. The main mechanism for planning is through the Hood Canal Coordinating Council (HCCC), which is comprised of staff from Kitsap, Jefferson, and Mason Counties and the Port Gamble S'Klallam and Skokomish Tribes. Other organizations helping this effort include the Puget Sound Partnership, Hood Canal Salmon Enhancement, Hood Canal Marine Shoreline Property Owners, and Hood Canal Improvement Club. These governments and groups work together to educate and help landowners restore nearshore areas, remove invasive plants and weeds, control septic runoff into Hood Canal, and identify properties for conservation acquisition.

The primary programmatic action plan for Hood Canal was developed by the HCCC, which was formed to help recover summer-run chum salmon populations in Hood Canal and the eastern Strait of Juan de Fuca and restore native plant communities along adjacent shorelines. Within this recovery plan, NBK–Bangor is part of the West Kitsap Conservation Unit. Recommended key actions include updating Kitsap County's Shoreline Master Plan and critical areas ordinances, conducting a nearshore assessment, adopting the Kitsap County draft shoreline

environmental designations and continued monitoring of the Big Beef Creek summer chum salmon reintroduction project. Habitat factors for the decline of salmon in the area include loss of channel complexity, riparian degradation, estuarine habitat loss and degradation, and summer low and peak flows (HCCC 2005).

The Kitsap County Health District (2005) has also identified part of Upper Hood Canal as a restoration area. The goals of the Upper Hood Canal Restoration Project are to protect public health and the environment by identifying and correcting sources of fecal coliform contamination from failing onsite sewage systems and inadequate animal waste management, obtaining water quality data, and educating Upper Hood Canal residents about the low DO problem and actions they can take to reduce bacteria and nutrient concentrations in Hood Canal. The restoration area extends approximately 20 miles along the eastern shore of Hood Canal from Olympic View Road in the north to the Kitsap County/Mason County line in the south. Most of this area lies directly south of NBK–Bangor, but a portion lies along the western edge of the southern part of the base. Of particular concern are low DO levels resulting from algal blooms, which are triggered by increases in nutrients from failing onsite sewage systems, inadequate animal waste management (i.e., hobby farms), and stormwater flowing into Hood Canal. However, the area of concern for low DO levels is south of the NBK–Bangor waterfront.

5.5 PUGET SOUND TREND DATA (INCLUDING HOOD CANAL)

Trend data observed in the Puget Sound region have been summarized in the *2007 Puget Sound Update - Ninth Report of the Puget Sound Assessment and Monitoring Program* (PSAT 2007a). These trends were used in the following resource sections where applicable to help indicate the cumulative effects of past, present, and future actions. Some of the trends relevant to the proposed action include the following:

- A decrease in marine birds (particularly scoters, loons, and grebes) and increase in California sea lions and harbor seals;
- A decline in native eelgrass, particularly in Hood Canal;
- An increase in the size and duration of phytoplankton blooms and a corresponding decrease in overall DO levels;
- A decrease in some fish stocks (rockfish, spiny dogfish, Pacific cod, and hake);
- An increase in global average air temperature and sea surface temperature; and
- An overall decline in fecal coliform levels.

5.6 CUMULATIVE EFFECTS ON EIS RESOURCES

This section estimates the cumulative environmental impacts of the proposed action when considered in conjunction with past, present, and reasonably foreseeable projects that, based on location, have or would have impacts on the same environmental resources and conditions affected by the proposed action. The impacts of past, present, and reasonably foreseeable projects are assessed using available information on the impacts of these individual projects, as

well as documented trends in environmental conditions in the Kitsap County and Hood Canal region, as described in PSAT 2007a. The information available on the impacts of the past, present, and reasonably foreseeable projects varies in quality and level of detail; these impacts are therefore estimated to the extent possible based on the best information available. The impacts expected to result from implementation of the proposed action are then added to the estimated impacts of the past, present, and reasonably foreseeable future projects to provide an assessment of cumulative impacts. This assessment is provided below for each of the environmental resources evaluated in this EIS.

As discussed in Chapter 4 of this EIS, the impacts of the proposed action on all environmental resources would be either negligible or minor, with the exception of the ROV Alternative. With this exception, for all resources, the proposed action would result in a finite but limited contribution to cumulative impacts with other past, present, and reasonably foreseeable projects. This contribution is acknowledged and described for each resource in the following sections. Because the impacts of the upland aspect of the proposed action are generally smaller than those of the marine aspect, the project's contribution to cumulative impacts would generally be less for the terrestrial resources than for the marine resources.

In the following sections, the term "proposed action" is used when the cumulative impacts of all of the alternatives would be similar. For resources where the cumulative impacts of the alternatives would differ, this difference is described.

5.6.1 Marine Environment

5.6.1.1 Hydrography

The overall hydrography of Hood Canal has not changed substantially over time, except for localized changes in water movement around in-water structures. Past and present placement of in-water structures during construction (such as anchors, piles, floats, and boat ramps) for NBK-Bangor waterfront projects (such as Marginal Wharf, Service Pier, and Delta Pier) has affected and will affect the circulation and pattern of currents by creating eddies and increasing or decreasing current velocity in the vicinity of these structures. Particularly during peak tides, the flow patterns around pilings becomes more chaotic and fractured as the water mass is forced against the pilings, which deflects the linear flow laterally and downward. This produces a minor decrease in water column current velocities down-current of the pilings, but an overall increase in the turbulence and mixing in the water mass. Floating structures and docks (such as those for the proposed action) affect surface currents because the pressure exerted by a moving water body forces the water volume to flow under or around the float, resulting in more turbulence in the water mass. These localized changes in circulation have resulted in negligible effects, as well as some benefits. Changes in current velocities have slightly altered bottom sediment characteristics, such as the ratio of fine to coarse-grained sediments near piles. However, increased turbulence has also resulted in greater mixing in the water column, which benefits water quality.

Other future proposed projects that involve placement of in-water structures during construction, such as the Explosives Handling Wharf #2 and Transit Protection System/Port Operations Facilities, would also cause similar changes to localized hydrographic conditions.

The proposed action would result in negligible changes to localized hydrographic conditions, specifically the surface currents in the vicinity of the dock, because of the placement of floats in the water. The Marine Mammal and Sea Lions Only Alternatives would have slightly more potential to affect currents than the Combat Swimmers and ROV Alternatives since those floats would include 12-foot deep marine mammal enclosures and a larger anchoring system. Under the Marine Mammal Alternative, the enclosures would block seawater from circulating freely through the structure. The area of effect on circulation would be limited to approximately 100 feet from the floats or enclosures. In addition, the Marine Mammal and Sea Lions Only Alternatives would replace water lost to the sanitary sewer system with seawater from the surrounding area; however, this would have no effect on hydrographic conditions. When added to past, present, and future marine waterfront projects, the proposed action would result in an overall additional negligible effect on water flow and currents because of the small area that would be affected compared to the overall area of the NBK–Bangor waterfront.

In comparison to the entire Hood Canal water body, the total localized changes to hydrography from all projects (past, present, and future) combined with the proposed action would produce a negligible cumulative effect. This is due to the relatively small localized changes produced by existing and future in-water structures compared to the larger circulation and current movement throughout Hood Canal.

5.6.1.2 Water Quality

Water quality in Hood Canal has been affected by past and present in-water and upland projects (Table G–2). In-water development has affected water quality from: (1) incidental spills associated with boat operations, such as fueling, or other activities conducted on piers, wharfs, and floats; (2) sediment disturbance from prop wash in shallow areas; (3) use of materials that, over time, leak toxins into the marine waters; and (4) stormwater runoff from over-water structures. Most of these result in periodic inputs of pollutants (i.e., fuel, oil, and other contaminants) directly to Hood Canal, which can affect turbidity, pH, temperature, salinity, DO, and BOD. For example, projects (such as Delta Pier, Marginal Wharf, and existing marinas in Hood Canal) have the potential to cause these effects, although the Navy strictly adheres to a spill prevention and response program to minimize the likelihood of or effects from spills. The Navy also has staff who provide spill prevention and response capability. Fuel transfer operations plans are maintained by the Navy and are approved by the U.S. Coast Guard and WDOE. A facility response plan is maintained by the Navy, and the program is regulated by the U.S. Coast Guard, WDOE, and USEPA, as required by state and federal law. Thus, any cumulative effects on water quality from accidental spills are minimized. However, the waterfront projects are supported by pilings, many of which were treated with creosote, which is now known to contain toxic carcinogens. Other wood materials historically used to construct docks include pressure-treated wood, which is now known to leak chromated copper arsenate and other pesticides. Over time, these materials are no longer being used when constructing piers, boathouses, and other similar in-water facilities and are being replaced with environmentally neutral materials that do not leak toxins. Thus, cumulative effects on water quality have decreased over time. The proposed action would have negligible cumulative effects on water quality.

Upland development has caused localized deterioration in the water quality in Hood Canal from uncontrolled stormwater runoff, failing septic systems, and mismanagement of animal wastes. Stormwater runoff can carry contaminants, such as heavy metals and oils from hard surfaces such as roads, and nitrogen and phosphorus from lawn fertilizers into streams that empty into Hood Canal. While irregular in nature, stormwater runoff-related inputs to water quality may be relatively intense during storm events. Contaminants in the stormwater runoff can adversely affect DO, BOD, pH, and other water quality parameters in localized areas.

Most development in Kitsap County (outside of the cities) uses septic systems, and many older systems have failed over time due to lack of maintenance. These septic systems periodically introduce fecal coliform bacteria and other nutrients into Hood Canal, which adversely affect water quality by promoting algal blooms. When algal blooms occur, the plankton consume the available DO in marine waters, which can result in fish kills due to anoxic conditions. Similarly, animal wastes from hobby farms or animal husbandry sites have also been a source of fecal coliform bacteria and nutrients. These sources have long been recognized as causing this problem in Hood Canal. Efforts have been ongoing to eliminate the use of septic systems or to repair failing systems particularly in nearshore areas. However, in many areas along Hood Canal, future development would continue to use septic systems since sewers are not available. Recent trend data predict a reduction in fecal coliform and nutrient loading in the future (PSAT 2007a).

According to the *State of the Sound Report* (PSAT 2007b), the overall trend is for decreasing water quality in Hood Canal. This is due to a rise in toxic contaminants and pathogens and a lowering of DO levels, which are several of the water quality parameters of concern. There are a number of waters in Puget Sound that are listed as impaired by the WDOE, including southern Hood Canal (PSAT 2007b).

The Marine Mammal and Sea Lions Only Alternatives would contribute a negligible amount of fecal coliform and nutrients to Hood Canal over a long-term period. Most of the fecal coliform from the marine mammals would be removed via a closed-circuit filtration system that continually recirculates the water in the mammal enclosures. Nutrients and bacteria from marine mammal waste that do enter the water while the animals are working within the NBK–Bangor waterfront would be diluted by tides and currents. Water quality modeling indicated that the increase in bacteria and nutrients from mammal waste would be negligible and, when combined with existing levels, would be well within the state water quality standards. These alternatives would also slightly affect other water quality parameters such as DO and pH but would not cumulatively cause a violation of water quality standards. The Combat Swimmers and ROV Alternatives would have negligible effect on any water quality parameters, except for turbidity as described below.

Under the proposed action, there would be an increase in the use of small boats in the intertidal area, which could disturb bottom sediments from prop wash and cause turbidity. The Marine Mammal Alternative would use one more boat, and thus would slightly increase disturbance of sediments as compared to the other alternatives. Increased turbidity from prop wash would be sporadic in nature and negligible in effect since sediment settles rapidly from the water column. The overall cumulative effect on water quality from past, present, and future actions including the proposed action would be negligible.

5.6.1.3 Sediment

Past and present projects that have involved in-water construction (i.e., pile driving and dredging) in Hood Canal have caused short-term disturbances to sediment. Disturbed sediment creates plumes of turbid water that carry finer-grained material down-current from the disturbed area. Thus, there have been some very slight changes in the ratio of fine-grained to coarse-grained sediment in localized areas over time. Future projects involving this type of in-water construction such as the Explosives Handling Wharf #2 would have similar effects on sediment.

Many of the water-dependent projects including marinas, boat ramps, and Navy piers have resulted in an increased use of boats in the nearshore area. Boats that operate in these areas have the potential to disturb sediments from their prop wash. The effect is similar to what was described above for in-water work, where there is a slight change in the ratio of fine-grained to coarse-grained sediment in localized areas. Boat use has increased over time and would continue to increase in the future. However, the effects of this disturbance have been negligible when compared to movement of sediment by tides and currents.

Sediment quality has also been affected over time. Discharges into Hood Canal have carried chemicals that have accumulated in mud and sediment, some of which are absorbed in the tissues of marine organisms. Recent data from PSAT 2007b indicate that many of the urban bays have high to moderate levels of toxic substances in sediments. The overall status of sediment quality is somewhat negative, but there is no trend indicating a continuing decline in sediment quality (PSAT 2007b).

The proposed action would increase the use of small boats in the intertidal area, and this has the potential for short-term disturbance of sediments from prop wash. The Marine Mammal Alternative would use more boats than the other alternatives and would have slightly more potential to disturb sediments. However, the sporadic nature of this activity, the limited area of disturbance, and the rapid dispersal of sediment in the water column would result in a negligible effect.

Under the Marine Mammal and Sea Lions Only Alternatives there would also be negligible deposition of fecal matter on the seafloor when the animals are working along the NBK–Bangor waterfront, which would settle into the sediment during decomposition. However, it is not anticipated that this would result in a cumulative effect on sediment quality because the action of tides and currents would disperse and dilute fecal matter. The Combat Swimmers and ROV Alternatives would not deposit any organic material onto the sediment.

The proposed action, combined with other past, present, and future actions, would result in a negligible long-term cumulative effect on sediments. This is because sediment disturbance from projects is typically localized and of short duration, and the amount of sediment disturbed by project activities would be minor in comparison to the actions of tides and currents on sediment location/composition. Similarly, the fecal matter generated under the Marine Mammal and Sea Lions Only Alternatives would have a negligible cumulative effect on sediment quality.

5.6.1.4 Marine Vegetation

Marine vegetation in Hood Canal has been disturbed by past and present placement of in-water structures, such as piles and anchors, dredging, underwater fills, and construction of over-water structures. These effects include temporary or permanent loss of vegetation, reduced productivity, and changes in the type or abundance of vegetation. Some of the more sensitive and important vegetation for critical habitat, including eelgrass, has decreased over time as indicated by recent trend data (PSAT 2007a).

For the NBK–Bangor waterfront, approximately 22.6 acres of over-water shading have been created by past projects and 5.5 acres would be created by future projects at the base. An estimated 5.2 acres of eelgrass have been lost over time due to in-water structures such as piles and anchors. Less than 1 acre of the total eelgrass occurring at the NBK–Bangor waterfront (37.7 acres) could be lost to known future projects at NBK–Bangor; however, new projects would be designed to avoid eelgrass beds to the fullest extent possible.

The proposed action would not result in any direct loss or indirect effects such as shading on eelgrass because the over-water and in-water structures would be placed in deeper water outside of eelgrass habitat. There would be a negligible effect on other marine vegetation (macroalgae) from placement of the anchors. For example, the direct loss of macroalgae would only be 54 square feet under the Combat Swimmers and ROV Alternatives, 81 square feet for the Sea Lions Only Alternative, and 108 square feet for the Marine Mammal Alternative. (Note: Other vegetation would attach itself to the anchors.)

The proposed action would also cause some reduction in marine vegetation productivity because of over-water shading from the floats and enclosures. Approximately 9,892 square feet, 3,852 square feet, 1,200 square feet, and 2,250 square feet of shading would be created by the Marine Mammal, Sea Lions Only, Combat Swimmers, and ROV Alternatives, respectively. This would cause a negligible effect because of the relatively small area of over-water shading resulting from the proposed action in comparison to NBK–Bangor waterfront areas that are not shaded.

There would be some slight increase in nutrient inputs from fecal matter produced by mammals under the Marine Mammal and Sea Lions Only Alternatives; however, this would not be enough to benefit marine vegetation.

Overall, the cumulative effects on marine vegetation from the proposed action and other past, present, and future actions would be negligible.

5.6.1.5 Plankton

Plankton populations have been largely unaffected by past and present in-water development, and future in-water development would also be unlikely to adversely affect plankton. When wharves and piers are constructed, slight changes in plankton abundance and community type may occur from disturbance to the water column, increased nighttime lighting, over-water shading, and an increase in plankton filter feeders that colonize new underwater structures. However, since plankton are not sessile and tides and currents continually move the water column, resident time under structures is typically short. Thus, slight increases in predation or

disturbances to the water column from in-water structures would have a negligible effect on plankton when compared to the available habitat for plankton in Hood Canal.

Plankton have been affected by upland developments that contribute sources of nutrients to Hood Canal. For example, upland projects that use fertilizers are likely to produce stormwater runoff that contains nutrients such as nitrogen and phosphorus. While these nutrients favor plankton productivity, their blooms reduce the available DO in the water and adversely affect other marine organisms that rely on DO. In Hood Canal, there has been an increasing trend in phytoplankton blooms, primarily due to changes in nutrient levels, which has mostly occurred in southern Hood Canal (PSAT 2007a). Blooms of plankton are lasting longer and occurring more frequently (PSAT 2007a). Future upland development may continue to contribute to this problem.

Under the Marine Mammal and Sea Lions Only Alternatives, some nutrients in the form of animal wastes from the mammals would enter the water (this would not occur under the Combat Swimmers and ROV Alternatives). However, this would be a negligible amount (see Section 5.6.1.2, Water Quality) and there would be a short resident time for any concentrated nutrients due to circulation and dilution in the water column. Thus, the nutrient levels from these alternatives would not be sufficient to support blooms of plankton.

Under any of the alternatives there would be an incremental increase in filter feeders from placement of in-water structures and some increase in shading, which would slightly reduce plankton populations. Therefore, there would be a negligible cumulative effect on plankton from the in-water structures associated with the proposed action.

Impacts to plankton attributable to past, present, and other foreseeable future actions include creating sites for plankton filter feeders, thus increasing predation and causing shading, which reduces plankton productivity. The proposed action would have similar types of impacts; however, due to the small size of the dock and enclosures, the overall effect would be negligible. The proposed action would not cumulatively contribute to nutrient input and plankton blooms. Combining the effects of the proposed action with other past, present, and future projects would result in a negligible cumulative effect on plankton.

5.6.1.6 Benthic Communities and Shellfish

Past and present projects including marinas, residential docks, boat ramps, and piers at NBK–Bangor that involved placement of piles, anchors, or other material (such as concrete on the seafloor) have resulted in the loss of the natural benthic soft-bottom habitat. Future in-water structures would similarly result in a direct loss of soft-bottom habitat. However, these in-water structures do provide hard-surface habitat for other types of benthic organisms. Thus, the cumulative effect of in-water structures has been to replace native soft-bottom habitat with hard-surface habitat. Similarly, over-water structures have increased shading and nighttime lighting. Shading can affect the abundance of some benthic organisms and lighting can increase predation rates. Shading and loss/alteration of soft-bottom habitat has affected the type and abundance of benthic organisms that occur in the vicinity of these structures.

Another effect on the benthic community related to past, present, or future development is the release of fecal coliform bacteria into Hood Canal (see Section 5.6.1.2, Water Quality). Fecal coliform bacteria are a health concern for humans who harvest and eat shellfish because shellfish consume bacteria and the bacteria become concentrated enough to cause illness. The *State of the Sound Report* describes the status of safe shellfish as slightly negative because there were harvesting restrictions placed on one-third of the commercial shellfish areas in 2005 and a high number of other areas may be restricted in the future (PSAT 2007b).

There would be a loss of soft-bottom habitat and conversion to hard-surface habitat under the proposed action. The direct loss of soft-bottom habitat would be 54 square feet under the Combat Swimmers and ROV Alternatives, 81 square feet for the Sea Lions Only Alternative, and 108 square feet for the Marine Mammal Alternative. Thus, there would be some localized changes to the benthic community as the anchors would be colonized by hard-bottom species, including algae and various brown algae, mussels, barnacles, amphipods, anemones, and sea stars.

Under the Marine Mammal and Sea Lions Only Alternatives, some nutrients would be generated (this would not occur under the Combat Swimmers and ROV Alternatives). However, because the amount would be negligible, there would not be enough to benefit benthic organisms such as polychaetes.

Adding the proposed action to past, present, and future development would result in negligible cumulative effects on benthic organisms and on the safety of shellfish for human consumption.

5.6.1.7 Marine Fish

Past in-water construction of docks, piers, and boat ramps on Hood Canal affected fish species presence and abundance, particularly when it was not yet recognized that in-water construction work should not occur during juvenile salmon migration and spawning of forage fish species such as sand lance, Pacific herring, and surf smelt. For example, underwater noise from pile driving is intense and can cause fish mortality, as well as changes in fish behavior. Since the 1980s, in-water construction has been limited to work windows that help to minimize adverse effects on migrating and spawning fish.

The placement of in-water structures would continue to slightly change fish habitat in and around these structures. In-water structures can cause several effects on fish including: (1) increasing the presence of predators that prey on juvenile fish; (2) posing a barrier to fish movement, particularly juvenile fish; (3) causing direct loss of marine vegetation, such as eelgrass, which is essential to juvenile salmon; and (4) creating shade that reduces the productivity of aquatic vegetation and benthic organisms, which are preyed on by fish.

Water quality has been affected by past and present actions and could be affected by potential future development. In particular, DO levels in Hood Canal are chronically affected by nutrient levels from development activities that have increased over time. Nutrients can cause algal blooms that deplete DO and result in fish kills (see Section 5.6.1.2, Water Quality).

Currently, efforts are being made to reverse the decline of fish populations by regulating development and restoring fish habitat. Numerous salmon preservation and restoration groups

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

The proposed action would place structures in the water that would cause shade effects on aquatic vegetation and benthic organisms, as well as provide habitat for predators. However, there would be no effect on eelgrass critical habitat. The amount of shading would vary among the alternatives with approximately 9,892 square feet, 3,852 square feet, 1,200 square feet, and 2,250 square feet of shading created by the Marine Mammal, Sea Lions Only, Combat Swimmers, and ROV Alternatives, respectively. This would cause a negligible effect because of the relatively small area of over-water shading resulting from the proposed action in comparison to areas that are not shaded.

The floats and enclosures associated with the proposed action would be located in deeper water (around 30 feet) and not extend to the seafloor; thus, there would be no barriers to fish movement. Even though the floats and enclosures would provide habitat for predators, the location in deeper water would preclude opportunities for predator fish to prey on juvenile salmon since juvenile salmon migrate close to shore. There would be a slight increase in nighttime lighting, but because of the amount of existing lighting along the waterfront, there would be a negligible effect (i.e., disorientation) on out-migrating fish.

Under the Marine Mammal and Sea Lions Only Alternatives, there would be an effect on some water quality parameters because of the negligible increase in fecal coliform and nutrients, but this change would not be enough to affect the distribution or abundance of marine fish. There would be no effect on water quality under the Combat Swimmers and ROV Alternatives.

There would be a negligible avoidance effect on fish under the Combat Swimmers Alternative from use of the Farallon-type propulsion device. The device would produce some underwater noise, as well as increased awareness of human presence, because of the increase in swimming speed from the propulsion device.

The proposed action would have some effect on essential fish habitat because of changes in artificial lighting levels, increased predation by marine mammals or sea lions and increased nutrients (under the Marine Mammal and Sea Lions Only Alternatives), and changes to fish habitat due to shading. However, these effects are considered negligible. Sonars used under the Combat Swimmers and ROV alternatives would not affect fish, because the sonar frequencies would be outside the hearing range of fish. Bright lights under the ROV Alternative would have avoidance effect on fish, because the lights would be used rarely.

Past, present, and future development projects have had and will have the potential to result in many of the impacts to marine fish described above, and add to declining population trends. Although there are ongoing and future actions and plans intended to improve conditions for salmonids in Hood Canal (described above), the impacts of the proposed action would contribute to past and ongoing cumulative impacts to these species. There would be negligible-to-minor

cumulative effects on marine fish when combining all past, present, and future actions with the proposed action due to the short duration and localized nature of the effects of the ROV Alternative.

5.6.1.8 Wild Marine Mammals

Construction of some past and present shoreline projects has involved activities such as pile driving or dredging that generated high levels of noise. Future in-water projects may also generate high levels of noise during construction. While these effects are usually temporary, they may be of an intensity to cause short-term behavioral effects (such as avoidance or changes in feeding behavior). This noise from these other projects may constitute incidental harassment to marine mammals under the ESA and MMPA.

Generally, water-dependent projects have minimal effects on marine mammals and may provide some benefits. There may be slight effects on some species such as harbor seals, which may avoid areas of human presence and activities on piers and wharfs, but these same facilities may be used as haul outs for other species such as California sea lions.

Past and present projects have resulted in a trend that is continuing into the future whereby toxic materials such as PCBs are increasing in waters such as Hood Canal. These contaminants are affecting the health of marine mammals. For example, the levels of contaminants in harbor seals have increased dramatically over the past 20 years (PSAT 2007a).

There may be some negligible effects on wild marine mammals under the Marine Mammal and Sea Lions Only Alternatives resulting from increases in human activity, noise, and boat traffic. These activities may cause some wild marine mammals to avoid the area or alter their behavior. There would be a slight increase in fecal coliform, but it is not anticipated that this would result in any health effects on wild mammals. Some increased opportunity for interaction between wild and trained marine mammals would have a negligible effect on wild marine mammal behavior.

Under the Combat Swimmers Alternative, there would be increases in noise, human activity, and small boat operation, as well as use of the Farallon-type propulsion device. Similar to the other alternatives, these activities may cause avoidance or alter the behavior of some wild marine mammals, but this is anticipated to have a negligible effect because wild marine mammals that reside in the area have generally habituated to these types of activities.

Under the ROV Alternative, there would be increases in noise, human activity, and small boat operation, as well as use of the bright lights. Similar to the other alternatives, these activities may cause avoidance or alter the behavior of some wild marine mammals, but this is anticipated to have a negligible effect because wild marine mammals that reside in the area have generally habituated to these types of activities. The bright lights would be used rarely and so would have little to no effect on marine mammals.

Past, present, and future development projects have had and would have the potential to result in many of the impacts to marine mammals described above. The greatest potential for cumulative impacts to marine mammals would be simultaneous exposure to bright lights (ROV Alternative only) and pile driving noise from the proposed future EHW #2 and/or TPS/Port Operations

Facilities projects. This is more likely to result in marine mammals being affected (Level B behavioral harassment under the MMPA) than for one of these projects alone. Similar cumulative impacts could also occur among the proposed action and non-Navy projects that occur in Hood Canal at the same time, but geographic separation among the projects would reduce the potential for cumulative effects. All other action alternatives outside of the ROV Alternative would not contribute to cumulative effects on marine mammals.

5.6.1.9 Other Marine Wildlife

Construction and operation of past and present NBK–Bangor waterfront projects such as Delta Pier and KB Docks (see Table G–1) have resulted in increased human presence, noise, boat movement, and other activities, which has likely deterred some water-dependent wildlife such as marine birds from the waterfront area. Marine birds typically avoid areas with continuous activity or that produce periodic effects such as loud noises. Often birds will return to these areas when human presence is lower or there is less activity (Gill et al., 1999; Gill 2007). Future waterfront projects may have similar effects; however, proposed projects along the NBK–Bangor waterfront such as the Explosives Handling Wharf #2 would occur in an area that already has industrial uses with higher than normal activity levels. Thus, marine birds in the area may be somewhat used to these higher levels of activity and less affected by ongoing waterfront development.

Trend data for Hood Canal indicate that marine bird species have been on the decline. Of the 30 most common marine birds, 19 have experienced declining populations of 20 percent or more over the past 20 years. It is unknown what is causing this decline, but it is believed that possible reasons include increased predation, habitat loss, changing migration patterns, decreases in forage fish populations, hunting, and disturbance to breeding grounds in the Arctic (PSAT 2007a).

The proposed action would increase human activity, noise, and boat traffic, which may cause some avoidance of the area by marine birds. This would be a negligible effect since marine birds are either habituated to activities along the waterfront or would avoid the area. Under the ROV Alternative, the use of bright lights may disturb marine birds in the area, causing a startle response and potentially other temporary behavioral effects such as reduced feeding, increase predation, or avoidance.

Under the Marine Mammal and Sea Lions Only Alternatives, a negligible amount of fecal coliform from the marine mammals would be released into the surrounding water. This amount when added to existing levels from past and present projects, as well as anticipated future projects, would still be well within water quality standards and would not result in health risks to marine birds.

Past, present, and future development projects have had and would have the potential to result in many of the impacts to marine birds described above, and add to declining population trends. The greatest potential for cumulative impacts to marine birds would be simultaneous exposure to bright lights (ROV Alternative only) and pile driving noise from the proposed EHW #2 and/or TPS/Port Operations Facilities projects. Similar cumulative impacts could occur among the proposed action and non-Navy projects that occur in Hood Canal at the same time, but

geographic separation among the projects would reduce the potential for such cumulative impacts. However, there would be negligible to minor cumulative effects on other wildlife when combining all past, present, and future actions with the proposed action due to the short duration and localized nature of the effects of the action alternatives.

5.6.1.10 Threatened and Endangered Species

Threatened and endangered species have been affected by some past development and activities in and around Hood Canal, particularly if the projects or activities occurred prior to the ESA, MMPA, and NEPA. That is because these projects did not consider environmental effects specific to sensitive species and thus did not try to avoid or minimize impacts. Some past development adversely affected species by reducing available habitat or causing direct harm or harassment, which cumulatively resulted in the later listing of some species as threatened or endangered. For example, shoreline residential development along Hood Canal has relied on the use of septic systems, many of which have failed over time. This has released nutrients into Hood Canal that encouraged algal blooms, which subsequently reduced DO and caused fish kills, including fish that are considered threatened or endangered. The use of DDT as a pesticide is well known for causing a past decline in eagle populations and subsequent listing of bald eagles as threatened.

However, federal or federally funded projects that have occurred since legislation such as the ESA, MMPA, and NEPA were enacted have been and are required to consider environmental effects on threatened and endangered species, prepare analysis (including a biological assessment), and consult with federal oversight agencies to minimize project impacts. Future projects are also required to go through this same process. Previous biological assessments at NBK–Bangor included use of: construction in-water work windows to minimize construction effects on threatened and endangered salmon, forage fish, and marine mammals; noise reduction strategies during construction; and minimization of overall project footprints to protect ESA-listed species habitat.

The proposed action would cause a negligible effect on threatened and endangered species from placement of structures in the water, increased human activity, noise, nighttime lighting, boat traffic, and other activities.

5.6.1.11 Candidate Species and Species of Concern

Impacts to the Candidate Species and Species of Concern will be the same as those described for the benthic communities and shellfish (Section 5.6.1.6) and marine fish (Section 5.6.1.7). There would be negligible cumulative effects on the pinto abalone and there would be negligible-to-minor cumulative effects on the seven fish Candidate Species and Species of Concern.

5.6.2 Upland Environment

5.6.2.1 Surface Water and Groundwater

Past and present upland projects such as the initial development of the TRIDENT support facilities (i.e., roads, housing units, and industrial facilities) as well as off-base projects have affected stormwater runoff and groundwater infiltration due to the creation of impervious

surfaces. Impervious surfaces increase the quantity of stormwater runoff and can adversely affect the quality of the runoff (stormwater runoff from impervious surfaces can entrain sediment and contaminants and carry these contaminants into receiving waters), as well as limit the rate of groundwater recharge. Future development would also increase the amount of impervious surface in the area.

Over time, the regional trend has been an increase in impervious surface area. For example, between 1991 and 2001 there was an impervious surface increase of 10.4 percent in the Puget Sound region. Approximately 7.3 percent of the region was covered with impervious surfaces below 1,000 feet of elevation in 2001. There is a substantial decline in biological function when a watershed nears 10 percent in impervious surfaces (PSAT 2007b).

The upland site of the proposed action would create less than 0.1 acre of impervious surface. This slight increase in impervious surface would be negligible in comparison to the total impervious surface at NBK–Bangor. Best management practices (BMPs) to control runoff would be implemented at the upland site. In addition, the upland site would not be located in a critical aquifer recharge area (rather this is a groundwater discharge area). Thus, while there would be an incremental increase in impervious surfaces for the proposed action, there would be a negligible cumulative effect on surface water and groundwater when combined with other past, present, and future actions.

5.6.2.2 *Geology and Soils*

Development in the Hood Canal region and at NBK–Bangor has involved land clearing and earth disturbance, which has resulted in the loss of soil from erosion. For example, upland development such as the initial base construction that cleared 780 acres resulted in some soil loss. Future development would also result in earth disturbance and would incrementally add to the amount of soil lost due to land clearing. However, construction BMPs are now commonly used to control erosion, and the amount and rate of soil loss have been slowed considerably.

Some past developments in the region also adversely affected geologically hazardous areas by increasing stormwater runoff and/or overburdening the tops of slopes with structures, which has led to slope failures. Geologically hazardous areas are now protected under Growth Management Act mandated critical areas ordinances, and this type of impact is now less likely to occur.

The upland site for the proposed action would be located on a site that has been cleared and is not geologically hazardous. A negligible amount of earth disturbance would be necessary to prepare the site for trailers. Since construction BMPs would be used, there is little likelihood of any soil erosion occurring. Thus there would only be a negligible cumulative effect on soils and geology when the proposed action is added to past, present, and future actions.

5.6.2.3 *Vegetation*

At NBK–Bangor, past and present development has resulted in the loss of forested area and grassland/shrubland habitat to development (Table G–2). Similarly, the overall vegetative trend along shoreline areas at Hood Canal has been a decrease in vegetation as land is developed. Future projects are likely to continue this trend. To minimize this land conversion, the HCCC

has been supporting projects that increase shoreline vegetation along Hood Canal (see Section 5.4.2.6, Programmatic Plans for Hood Canal). Recently, land acquisitions and conservation projects have helped to slow this trend.

The proposed action would not alter vegetation types or abundance at NBK–Bangor. There would be no effect on wetlands. The upland trailer site has already been altered by past activities and the previous rural/native vegetation community is now an urban landscaped community. There would be negligible effects from clearing the Scot’s broom and other mixed non-native and native herbaceous species for placement of the trailers. Some landscaping (mainly grass) would be planted as part of the project. Therefore, the proposed action would result in a negligible cumulative effect on vegetation when added to past, present, and future actions. However, there would be no cumulative effects on wetlands when combining the proposed action with past, present, and future actions.

5.6.2.4 Wildlife

Considering past and present projects, forested wildlife habitat has been lost and/or impacted by development (Table G–2). These projects have resulted in removal of mostly second and third growth forested habitat, which has been replaced by either buildings, parking lots, or grassland habitat that is generally not considered optimum wildlife habitat. Over time, this loss of wildlife habitat has resulted in fewer native species and occasional replacement by non-native wildlife more adaptive to an urban environment. In addition, the loss of forested area affects an animal’s ability to move among areas on the base due to loss of contiguous habitat. Similar loss of wildlife habitat has occurred throughout the Hood Canal region due to development activities associated with public and private projects, and is likely to continue into the future as land is converted to more developed uses.

The proposed action may cause some slight changes in the presence and abundance of terrestrial wildlife because of increased human presence and activity at the upland site (this may cause larger wildlife species such as deer and birds to avoid the area). The potential wildlife habitat on the upland site is already disturbed and degraded by past grading and the presence of trailers and thus is not likely to support wildlife populations, although wildlife may move through the area. Even though the site would be further disturbed under the proposed action, there may be some use of the upland site by small mammals, such as shrews and mice and/or amphibians, during operations. Thus, when added to past, present, and future projects, the proposed action would have a negligible cumulative effect on wildlife.

5.6.3 Social Environment

5.6.3.1 Noise

As described previously in Sections 5.6.1.7 through 5.6.1.10, past in-water construction that involved activities such as dredging or pile driving may have produced in-air noise levels that adversely affected the social environment.

Many past and existing projects produce some form of noise, as would future projects. The noise environment is complex and dependent upon many elements that vary over time. Also, the degree of noise effect depends on the type and characteristic of the noise (i.e., a constant noise

source is less likely to create annoyance than one that has periodic, short bursts of intense noise), distance from the source, and other existing noise in the environment. For example, adding a project that produces noise to the NBK–Bangor waterfront, which is an active industrial waterfront, is likely to be less noticeable than placing a project in a quiet location. This is because the industrial type activities at NBK–Bangor already produce higher levels of noise. Thus, the cumulative effects from noise are not constant and are difficult to predict. In any event, past, present, and future projects do produce noise mainly during daylight hours when human activity is highest, and over time noise levels have increased as development has occurred.

For operations, the proposed action would create noise from increased human activity and vehicle and boat traffic. Equipment (such as pumps for the marine mammal pools and enclosures) that would be used under the Action Alternatives would also create noise. These noises would be considered negligible. Operational noise at the upland facility would be negligible since this facility would be used for offices.

Future planned Navy projects, such as the EHW #2 and TPS/Port Operations Facilities, would generate noise from sources such as boat traffic, cranes, pile driving, and other human activities on the piers. Thus, it is anticipated that noise levels at NBK–Bangor would increase over time. Other non-Navy projects could also increase noise, particularly from sources such as boats (i.e. most of the future non-Navy projects involve facilities for boats), which may operate in the vicinity of the NBK–Bangor waterfront. These construction activities at NBK–Bangor may also occur during the same time period as SISS construction and operation. Most of these activities would produce the majority of project noise during construction pile driving. Combined, these activities would produce loud noise. The SISS project would add to these cumulative effects but the addition would be negligible.

5.6.3.2 Air Quality

Past and present projects have had varying effects on air quality. Some projects may have little or no emissions, such as the Trident Lakes softball field project (Table G–2), while others, such as the Refit Industrial Facility at NBK–Bangor (Table G–2), may produce emissions including volatile organic compounds, nitrogen oxides, particulates, or other emissions. Most projects include the use of vehicles and vehicle emissions are typically produced. However, existing emissions from past and present projects have not had a large effect on the overall quality of air in the Hood Canal region. The region is in compliance with all air quality standards, and these standards have never been exceeded. Future projects that produce air emissions would be required to install filters and other systems to limit emissions and are required to comply with permit conditions on the amount of air pollutants generated.

The proposed action would generate some emissions, such as carbon monoxide, carbon dioxide, nitrogen oxide, and particulates from boats, vehicles, and equipment. The individual emissions of these criteria pollutants would be well below the air quality standard compliance levels. The addition of emissions from the proposed action and all reasonably foreseeable projects would not cause any air quality standard to be exceeded.

Global temperature and climate change have become a concern from the realization that these changes are in response to human-induced levels of greenhouse gas emissions. An individual project does not by itself generate enough greenhouse 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 greenhouse gas emissions from a project combine with greenhouse 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 various alternatives was predicted to be 45, 98, 116, and 132 tons per year for the ROV, Sea Lions Only, Marine Mammals, and Combat Swimmers Alternatives, respectively. While there would be a cumulative effect from the production of greenhouse gases, these levels are extremely minimal. Therefore, the proposed action would have a negligible cumulative effect on greenhouse gases when combined with other past, present, and future actions.

5.6.3.3 Cultural Resources

It is likely that some past or present developments inadvertently disturbed unknown archaeological resources during construction activities such as excavation and earth movement. This is particularly true for locations along the shorelines of Hood Canal, as well as streams and wetlands that Native Americans are known to have used. Other types of cultural resources, such as traditional use areas, subsistence resources, and special places (religious and traditional) may have been affected over time as a result of land development and population that resulted in increased use of natural resources such as fish and shellfish. The types of impacts on cultural resources include loss of access to traditional areas, conversion of a traditional area or special place to another land use, and reduction in the abundance of resources used for subsistence or ceremonial/religious uses.

The trend associated with cultural resources is ongoing identification and preservation of resources. Agencies have recognized the importance of these resources and there are regulations in place to protect and preserve archaeological and cultural resources. In addition, American Indian tribes have been proactive in acquiring traditional areas and preserving cultural resources, including subsistence resources.

Future Navy or non-Navy projects that involve earth disturbance have some potential for disturbing archaeological resources. Generally, cultural resources (such as traditional use areas, subsistence resources, and special places) have been identified and often are preserved. Access to these resources is also generally allowed for Native American tribes with treaty rights. However, there is some potential for future projects to disturb archaeological resources that may go unrecognized and unrecorded.

The proposed action would not affect any known archaeological or historic resources. Any archaeological discovery would stop work in the vicinity of the area of discovery and consultation with Native American tribes and the Washington SHPO would ensure the find would be properly catalogued and preserved.

While unlikely, there is some potential for the proposed action to inadvertently disturb unknown archaeological resources during construction from clearing and excavation. However, since the proposed action would not cause any intentional impacts on cultural resources, there would be no cumulative impacts when the proposed action is considered with past, present, and future actions.

Under the Marine Mammal and Sea Lions Only Alternatives, operations would result in a negligible increase in fecal coliform and nutrients into the water. The increase would be within state standards and there would be no anticipated health effect due to consumption of shellfish that are harvested by tribes.

5.6.3.4 Coastal and Shoreline Management

In the past, competing uses of the coastal and shoreline areas created conflicts between users. In an effort to balance competing uses, the CZMA was enacted and resulting state shoreline management plans such as Washington's Shoreline Management Plan were enacted. Today and in the future, projects must comply with these programs, which not only helps Washington to manage coastal uses and resources but also facilitates cooperation and coordination among agencies. However, there have been past projects that were consistent with the CZMA but may have affected shoreline management programs by resulting in the need to develop additional regulations to adapt to changing shoreline conditions.

The proposed action would have a negligible effect on shoreline programs and would be consistent with the CZMA for several reasons including the following:

- The upland facility would be within the federal enclave and therefore not within Washington State's coastal zone. Its potential effects would not extend beyond the enclave fence line.
- The waterfront development and all activities would occur within the waterfront restricted area, which does not allow public access.
- There are no competing recreational purposes since the area is secure and there is no public access.
- There would be negligible effects on water and air (see Sections 5.6.1.2 and 5.6.3.2).
- The proposed project would not be energy-generating or located on the Pacific Ocean so the Energy Facility Site Evaluation Council requirements and Ocean Resource Management Act do not apply, respectively.

Therefore, there would be a negligible cumulative effect on coastal and shoreline management programs from combining the proposed action with past, present, and future actions.

5.6.3.5 Land Use and Recreation

Land use at NBK-Bangor has changed markedly over time from its rural residential and heavily forested beginnings to its present use. Approximately 15 percent of the base property has been developed and future projects would increase this amount. Future projects are planned both along the waterfront and in upland areas (Table G-1); however, these uses are consistent with an

industrial waterfront. Neither the proposed action nor future projects are inconsistent with the overall base master plan of military development.

The shoreline areas of Hood Canal have long been attractive to residents for homes. The shoreline and waters of Hood Canal also provide many recreational opportunities with land uses and facilities related to recreation such as boat ramps, marinas, parks, and trails. Other past, present, and future actions off base have continued a trend of converting natural areas to developed residential and commercial uses. However, the SMA and county critical areas ordinances have limited development in sensitive areas.

The proposed action would convert a small amount of land and water, which would be a conversion of the land and water. The upland portion of the proposed action would occur on an existing disturbed area on the base and would not displace native forest. The upland and in-water portions would be compatible with existing uses since this project would provide an enhancement to security operations. The project would not displace or affect any recreational uses or adversely affect any adjacent uses. Therefore, the proposed action would not have any cumulative effect on land use or recreation when added to other past, present, and future actions.

5.6.3.6 Aesthetics

Visual conditions have been altered by past and present projects and the viewscape would continue to change as natural and rural views are replaced by more suburban or urbanized views. However, much of the area around Hood Canal has retained its natural and rural visual quality because of large lot residential development, an abundance of forested land, and unobstructed views of Hood Canal and the Olympic Mountains. Approximately 4,663 acres or 66 percent of NBK–Bangor is forested, and this has helped retain the natural visual quality at the base.

Future base projects would result in some cumulative effects by creating more urbanized views; however, base plans and policies recommend using existing developed areas as much as practicable and maintaining natural areas in their existing condition. This would help to minimize cumulative effects on visual quality at the base.

Generally, the proposed action would produce similar shoreline views and be visually compatible with the other waterfront industrial activities. The Combat Swimmers and ROV Alternatives would not include covered mammal enclosures and thus would have a lower profile as compared to the 12-foot high mammal enclosures. Thus, the Marine Mammal and Sea Lions Only Alternatives would be slightly more visible and look different than the Combat Swimmers and ROV Alternatives. The waterfront facilities associated with the proposed action would not block any views or viewsheds. The upland portion of the proposed action would also not block any views and would be visually compatible with other nearby structures (trailers). The visual change resulting from the proposed action at the waterfront and upland site would be negligible. Therefore, the cumulative effect on visual resources when added to other past, present, and future projects would be negligible.

5.6.3.7 Socioeconomics and Environmental Justice

Over time, projects at NBK–Bangor have had a substantial cumulative effect on socioeconomic conditions, and the Navy has become one of the primary employers in Kitsap County.

Development of NBK–Bangor has brought population, long-term employment opportunities, and income to Kitsap County, as well as increased the demand for housing and public services (such as police, fire, emergency and medical services, schools, and other public services). It is estimated that approximately 40,000 personnel work for the military in Kitsap County (including military and civilian personnel, as well as contractors). Future projects would increase employment. However, these conditions would vary over time based on military need and economic conditions.

The proposed action would provide a slight long-term benefit in terms of income and spending in the regional economy by increasing employment from 37 to 55 employees, depending on the action alternative. For example, the project would add 37, 30, 55, or 40 employees under the Marine Mammal, Sea Lions Only, Combat Swimmers, and ROV Alternatives, respectively. The additional staff and their dependents would slightly increase demand for public services. However, the relatively small number of additional staff/dependents would not substantially affect the socioeconomic condition in the general area, and public services have capacity to support these increases. Thus, there would be a negligible effect on socioeconomic conditions.

The proposed action would have no effect on minority or low income (environmental justice) populations, because there are no low income or minority populations located within the range of impacts from the project. (Note: Recent security measures now deny Native Americans access to shellfish beaches at NBK–Bangor.)

Adding the effects from the proposed action on socioeconomics with other past, present, and future actions would result in a negligible cumulative effect. There would be no cumulative effect on environmental justice populations as a result of adding the proposed action to other actions.

5.6.3.8 Utilities and Energy

The demand for both renewable and nonrenewable energy resources and utility services has increased over time as development occurred in the region. However, the government and public utility companies that provide these services have expanded their service areas and the capacity in their systems to accommodate the new growth. Generally, energy and utility providers track and predict the demands of existing and future development and increase their service infrastructure and capacity accordingly.

NBK–Bangor provides some of its own utility services on the base, such as backup electrical power, and water and sewer service (the internal sewer system discharges into the Kitsap County system where it is directed to a wastewater treatment plant). The base also stores fuel, and future projects may increase the fuel storage capacity at NBK–Bangor. Both on-base and off-base utilities have adequate supplies to meet future demand over a 20-year planning horizon.

The proposed action would require energy in the form of electricity for operating facilities and fuel for vehicles and boats. Telecommunications and water and sewer service would also be required. Utilities are already in place at the waterfront and upland site, and the proposed action can connect to these existing utilities. There would be slightly more demand for electricity under the Marine Mammal Alternative as compared to the other alternatives because of the need to heat

the mammal enclosure and to recirculate and treat the water (since the dolphin enclosure is a closed system). Since utilities are already in place and there is existing capacity in the systems to serve the proposed action, there would be a negligible effect on utilities. Similarly, while the proposed action would increase demand for fuel, there are adequate supplies to meet this demand. Adding the proposed action to other past, present, and future actions would result in a negligible cumulative effect.

5.6.3.9 Transportation

Vehicle circulation patterns have changed and traffic volumes have increased in Kitsap County as employment and residential population increased from past and present projects, particularly projects at NBK–Bangor and other Navy installations. As growth occurs, it is accompanied by increased vehicle traffic, which has a cumulative effect on road travel conditions such as intersection delay, level of service, safety, and other transportation considerations. Recent traffic counts of average daily traffic entering or leaving the base on Trigger Avenue or Luoto Road total 23,721 trips (All Traffic Data Services 2008).

The proposed action would contribute additional vehicle trips and result in an incremental increase on traffic circulation and access, safety, intersection delay, and overall traffic volumes. The project would add 37, 30, 55, or 40 employees under the Marine Mammal, Sea Lions Only, Combat Swimmers, and ROV Alternatives, respectively. These employees would generate two one-way trips per day. Thus, the average daily traffic would increase from 60 to 110 trips depending on the alternative. Even using the higher trip generation under the Combat Swimmers Alternative (110 trips), is negligible when compared to the total average traffic levels. Thus, the proposed action would produce a negligible effect on traffic volumes, intersection delay, level of service, and other transportation factors.

Over time, vessel traffic in Hood Canal has increased from NBK–Bangor waterfront projects, as well as from the general increase in the residential population who owns boats. Future projects at NBK–Bangor, such as the Transit Protection System/Port Operations Facilities and off-base projects, would increase vessel traffic. However, increased vessel traffic associated with the proposed action would not affect the general boat traffic in Hood Canal because the majority of operations would be within the waterfront restricted area where public vessels are not allowed.

The proposed action when added to other past, present, and future actions would produce a negligible cumulative effect on transportation.