
4 Cumulative Impacts

**Supplemental Environmental Impact Statement/
Overseas Environmental Impact Statement
Northwest Training and Testing**

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4 Cumulative Impacts

This chapter (1) defines cumulative impacts, (2) describes past, present, and reasonably foreseeable future actions relevant to cumulative impacts, (3) analyzes the incremental interaction the Proposed Action may have with other actions with coincidental effects, and (4) evaluates cumulative impacts potentially resulting from these interactions of the coincidental effects on the same environmental resource. For this Supplemental Environmental Impact Statement (EIS)/Overseas Environmental Impact Statement (OEIS) (Supplemental), the approach to analysis of cumulative impacts has not changed significantly since the 2015 Northwest Training and Testing (NWTT) Final EIS/OEIS.

4.1 Definition of Cumulative Impacts

The approach taken in the analysis of cumulative impacts follows the objectives of the National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ) Regulations, and CEQ Guidance. Cumulative impacts are defined in 40 Code of Federal Regulations, Section 1508.7.

A cumulative impact is the impact on the environment which results from the incremental impact of the action when added to the other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 Code of Federal Regulations [CFR] section 1508.7). This analysis does not incorporate by reference the 2015 NWTT Final EIS/OEIS, but rather builds upon it for an updated look at cumulative impact potential.

4.2 Scope of Cumulative Analysis

The scope of the cumulative impacts analysis involves both the geographic extent of the effects and the temporal (relating to time) extent in which the coincidental effects could be expected to occur. For this Supplemental, the Study Area defines the geographic extent of the impacts analysis. In general, the Study Area includes those areas previously identified in Chapter 3 (Affected Environment and Environmental Consequences) for the respective resource areas, and is the same Study Area as described in the 2015 NWTT Final EIS/OEIS. The cumulative impacts analysis includes areas far outside of the Study Area used for this Supplemental, because it includes all actions that may add to impacts affecting the resources that were analyzed in this Supplemental (i.e., sediments and water quality, air quality, marine habitats, marine mammals, sea turtles, birds, marine vegetation, marine invertebrates, fishes, cultural resources, American Indian and Alaska Traditional Resources, socioeconomic resources and environmental justice, and public health and safety). The time frame for cumulative impacts centers on the timing of when an activity described as part of the Proposed Action occurs. For example, some activities are anticipated to occur once every other year for a few days. Therefore, the cumulative effects would center on the timing of that activity. Other activities are anticipated to occur on a more regular basis, such as aircraft maneuvers or electronic warfare activities. Therefore, the cumulative impacts from these activities would span a greater timeframe. The time frame for cumulative impacts also includes impacts from past federal and non-federal actions that may still be adding to impacts on a resource at present, as well as anticipated (reasonably foreseeable) actions in the future.

Another factor influencing the scope of cumulative impacts analysis involves identifying other actions to consider. In addition to identifying the geographic scope and time frame for the previously completed and currently ongoing actions, the analysis also includes the identification of “reasonably foreseeable” actions (i.e., anticipated future actions). For the purposes of this analysis, public documents prepared by

federal, state, and local government agencies form the primary sources of information regarding reasonably foreseeable actions. Documents used to identify other actions include notices of intent for EISs and Environmental Assessments (EAs), management plans, land use plans, and other planning related studies. Naval Air Station Whidbey Island (NASWI) staff provided information on local and regional actions, as well as previously completed, currently ongoing, and reasonably foreseeable future actions at Ault Field and Outlying Landing Field Coupeville. Additionally, the NASWI staff completed the EA-18G "Growler" Airfield Operations at Naval Air Station Whidbey Island Complex EIS in September 2018. Finally, local websites for local news outlets were searched for articles pertaining to ongoing and future actions that would need to be included in this analysis.

Multiple Navy actions are ongoing within the Pacific Northwest Region; however, each NEPA document addresses a specific Proposed Action, separated from other actions by its purpose and need, independent utility, timing, and geographic location. Some NEPA documents are stand-alone documents; others tier off of and/or expand the analyses of other existing NEPA documents. NEPA documents for at-sea training (e.g., the 2015 NWT Final EIS/OEIS) focus on training and testing activities occurring within a range complex and/or Military Operating Area and involve different types of aircraft, ships, and range complex enhancements. However, NEPA documents that analyze a specific type of aircraft operation at a military airfield (in this case, the Growler) are focused in and around that airfield and its facility needs. While the Navy has analyzed, and is currently analyzing, various other projects in the area, those projects are not preconditions for Growler operations at the NASWI complex. Growler operations at the NASWI complex are not a precondition for larger military readiness activities on range complexes in the Pacific Northwest. Even in the absence of these Growler operations, military training in the Pacific Northwest would continue independently from this Proposed Action, as analyzed in the documents referenced in Section 1.6 (The Environmental Planning Process). Each of the documents includes the results of a cumulative impact analysis that was conducted at the time the document was prepared; thus, the combined impacts of all of these activities are being captured in multiple documents.

4.3 Past, Present, and Reasonably Foreseeable Actions

This section focuses on past, present, and reasonably foreseeable future actions that occur within or potentially impact resources analyzed in the Study Area. Using the first fundamental question included in Section 4.1 (Definition of Cumulative Impacts), in determining which projects to include in the cumulative impacts analysis, a preliminary determination was made regarding each past, present, or reasonably foreseeable action as to whether a relationship exists such that the affected resource areas of the Proposed Action (included in this Supplemental) might interact with the affected resource area of a past, present, or reasonably foreseeable action. If no such potential relationship exists, the action was not carried forward into the cumulative impacts analysis. In accordance with CEQ guidance (Council on Environmental Quality, 2005), these actions considered but excluded from further cumulative effects analysis are not catalogued here because the intent is to focus the analysis on the meaningful actions relevant to inform decision making. Actions included in this cumulative impacts analysis were determined to affect resource areas that the Proposed Action would also affect and are listed and briefly described in Table 4.3-1. Table 4.3-2 focuses on other major environmental stressors or trends that tend to be widespread and arise from routine human activities and multiple past, present, and future actions.

Table 4.3-1: Past, Present, and Reasonably Foreseeable Actions

Project	Location	Project Description	Summary of Impact Minimization and Mitigation Measures ¹	Project Timeframe		
				Past	Present	Future
Military Mission, Testing, and Training Activities						
Airfield Vegetation Management	Naval Air Station Whidbey Island	Conduct long-term vegetation management (both on and off-Base) to control visual obstructions and pests affecting airfield operations. This project, when considered with the Proposed Action, would not cumulatively impact resources.				O
Bangor Transit Protection Program (TPP) Pier and Support Facilities (P-907)	Naval Base (NAVBASE) Kitsap Bangor	The Draft Environmental Assessment for this project was released in December 2019. The Navy is proposing to construct and operate a Transit Protection Program (TPP) Pier and upland support facilities for berthing TPP blocking vessels and maintaining TPP vessels at NAVBASE Kitsap, Washington (U.S. Department of the Navy, 2019a). This project would include pile driving activities and, when considered with the Proposed Action, could add to the cumulative impacts on air quality, sediments and water quality, marine habitats, marine vegetation, marine invertebrates, fishes, birds, and marine mammals.				C/O
Canadian Training and Testing, including activities at Canadian Forces Maritime Experimental and Test Ranges (CFMETR)	Nanoose Bay, Canada	Canadian forces train and test in Nanoose Bay, as well as the surrounding area the overlaps resources in the Inland Waters portion of the Study Area. Activities at the CFMETR include weapon and torpedo testing that involves aircraft, submarines, and surface ships. These activities are funded and performed by the Royal Canadian Navy,		O	O	O

Table 4.3-1: Past, Present, and Reasonably Foreseeable Actions (continued)

Project	Location	Project Description	Summary of Impact Minimization and Mitigation Measures ¹	Project Timeframe		
				Past	Present	Future
		civilian members of the Department of National Defense, and the U.S. Navy (NanaimoNewsNOW Staff, 2017). This project, when considered with the Proposed Action, could add to the cumulative impacts on air quality, sediments and water quality, marine habitats, marine vegetation, marine invertebrates, fishes, birds, marine mammals, cultural resources, American Indian and Alaska Native Traditional resources, and socioeconomic resources.				
CVN 65 Reactor Disposal/ Facility work at Port of Benton (P-458)	Port of Benton, Washington	Develop/Upgrade dry dock infrastructure to support existing and future workload. This project, when considered with the Proposed Action, could add to the cumulative impacts on biological, cultural, and socioeconomic resources.				C/O/X
EA-18G Growler Airfield Operations	NASWI Complex	The ROD was signed and released in March 2019 for the Navy’s proposed action to home base 36 additional EA-18G (Growler) aircraft at NASWI, station additional personnel and their family members at the NAS Whidbey Island complex and in the surrounding community, construct and renovate facilities at Ault Field, increase airfield operations at both Ault Field and Outlying Landing Field (OLF) Coupeville, and change the distribution of field carrier landing practice (FCLP) to 20% occurring at Ault Field and 80% occurring at OLF Coupeville. The Navy announced the preparation of an EIS in September 2013. In October 2014, the Navy revised the scope of the EIS and invited the public to comment. The Draft EIS was available for public review November 2016 to February 2017. The Navy	The Navy has adopted all practicable means to avoid or minimize environmental harm. Efforts to reduce noise impacts on the community are detailed in Appendix H to the Final EIS and include limiting noise, land use planning and management, and noise abatement operational procedures. One of the Navy’s most significant mitigations is the commitment to employ PLM (a.k.a. Magic Carpet) technology, which, when	O	O	

Table 4.3-1: Past, Present, and Reasonably Foreseeable Actions (continued)

Project	Location	Project Description	Summary of Impact Minimization and Mitigation Measures ¹	Project Timeframe		
				Past	Present	Future
		held public meetings on December 5–9, 2016. The Final EIS was released in Fall 2018. The ROD was signed in March 2019. These proposed operations, when considered with the Proposed Action, could add to the cumulative impacts on air quality, birds, noise, socioeconomic resources, cultural resources, and American Indian and Alaska Native Traditional resources.	combined with a reduction in the number of pilots per squadron, reduced the number of proposed aircraft operations under the preferred alternative as identified in the Draft EIS by 30%. The Navy remains committed to implementing the measures identified in Appendix H to the Final EIS to minimize auditory, visual, and atmospheric effects of flight operations on the surrounding community. As discussed in Appendix H, there have been noise abatement and mitigation measures in place at the Whidbey Island complex for decades, which have been optimized to move aircraft operations away from population centers. These measures will continue to be implemented. Amongst these noise mitigation measures included in Appendix H are: continuing to inform the public of upcoming FCLP			

Table 4.3-1: Past, Present, and Reasonably Foreseeable Actions (continued)

Project	Location	Project Description	Summary of Impact Minimization and Mitigation Measures ¹	Project Timeframe		
				Past	Present	Future
			schedules and other events that may increase noise impacts; continuing to restrict high power jet aircraft turns prior to noon on Sundays and daily between 10:00 pm and 7:30 am; continuing to review operational procedures for changes that reduce noise while supporting safe, effective mission execution; and, continuing to collaborate with the community on compatible land-use planning initiatives under the AICUZ and REPI programs. With respect to mitigating impacts to the perceptual qualities of five historic landscapes located within the Central Whidbey Island Historic District, the Navy will provide \$867,000.00 to the National Park Service (NPS) to support Ferry House preservation projects that meet the Secretary of the Interior standards for preservation. In addition, the Navy will provide up to \$20,000.00 to			

Table 4.3-1: Past, Present, and Reasonably Foreseeable Actions (continued)

Project	Location	Project Description	Summary of Impact Minimization and Mitigation Measures ¹	Project Timeframe		
				Past	Present	Future
			<p>the NPS for the design, construction, and installation of interpretive historical signs at appropriate locations. The Navy will also seek partnership opportunities through the REPI program by working with the community to identify potential projects and communicating its support for those projects to decision-making officials in the DoD.</p> <p>Finally, the Navy is willing to collaborate with stakeholders to evaluate the benefits of designating historic landscapes within the APE as Sentinel Landscapes (U.S. Department of the Navy, 2019c).</p>			
EA-18G Growler Biological Opinion Revision	NASWI Complex	The Navy and USFWS have reinitiated consultation to revise the USFWS Biological Opinion for the Growler operations, in order to better address impacts to marbled murrelets. This project, when considering the Proposed Action, could add to the cumulative impacts on birds.				X/O
Electromagnetic Measurement Ranging System	NAVBASE Kitsap	The Navy constructed and operates an Electromagnetic Measurement Ranging System located on NAVBASE Kitsap Bangor lands and adjacent				C/O

Table 4.3-1: Past, Present, and Reasonably Foreseeable Actions (continued)

Project	Location	Project Description	Summary of Impact Minimization and Mitigation Measures ¹	Project Timeframe		
				Past	Present	Future
	Bangor Hood Canal	waters in Hood Canal (Hood Canal Military Operating Area North) Bangor, Washington. This system, when considered with the Proposed Action, may cumulatively impact biological resources in the Study Area. Currently, the project is on hold. No NEPA analyses have been completed, and no construction has occurred.				
Environmental Assessment (EA) for Electronic Warfare Range	Naval Station Everett Annex Pacific Beach and Olympic Peninsula	The Navy published the Pacific Northwest Electronic Warfare Final EA in August 2014. The EA analyzed impacts of the Navy using a fixed transmitter site and up to three mobile transmitter trucks in U.S. Forest Service (USFS) lands. The Navy issued a Finding of No Significant Impact on August 28, 2014, and the USFS issued a FONSI on July 31, 2017. On October 5, 2017, the USFS issued a road permit that approved the Navy's permit to drive and operate the mobile transmitter trucks on existing USFS roads for a 5-year period.		O	O	O
Establishment and Modification of Oregon Military Training Airspace	Offshore Area	The U.S. Air Force has completed the NEPA process for the proposed establishment and modification of Oregon Military Training Airspace EIS. The additional airspace is over the Pacific Northwest surf/sub-surf operating area and includes new areas such as W-570 B, C, D, and W-570 A. Other changes to airspace established the Redhawk Military Operations Area (MOA) and EEL MOA A-D, and increased the size of Juniper and Hart MOAs, as well as added Juniper Low, C, and D MOAs. The Oregon Air National Guard is the primary user of W-93 and W-570 special use airspace		O	O	O

Table 4.3-1: Past, Present, and Reasonably Foreseeable Actions (continued)

Project	Location	Project Description	Summary of Impact Minimization and Mitigation Measures ¹	Project Timeframe		
				Past	Present	Future
		in the Offshore Area. Oregon Air National Guard flights in W-93 and W-570 are primarily air combat maneuver training flights. These flights occur throughout the year and include the use of chaff and flares in W-570. On rare occasions, self-defense flares may be used during training. This airspace, when considered with the Proposed Action, could add to the cumulative impacts on air quality, birds, and cultural resources. As of December 7, 2017, the updated airspace was established.				
Explosives Handling Wharf Maintenance (EHW-1)	NAVBASE Kitsap Bangor	The Navy is continuing a construction project to conduct necessary repairs and maintenance on the EHW-1 facility. This multiyear project involves removal and replacement of deteriorated steel or concrete piles. NMFS has issued an incidental Harassment Authorization (IHA) to the Navy to incidentally harass, by Level B harassment, five species of marine mammals incidental to pile driving and removal associated with the project. This is the third such incidental harassment authorization for similar work on the same structure. Phased repair of this structure is expected to continue until 2024. This project, when considering the Proposed Action, could add to the cumulative impacts on sediments and water quality, air quality, marine habitats, marine mammals, sea turtles, marine vegetation, marine invertebrates, fishes, birds, and cultural resources.	Mitigation measures for this action include marine mammal zones of influence or mitigation zones to prevent Level A harassment, visual monitoring, sound attenuation devices, acoustic measurements, timing restrictions (to avoid migratory ESA-listed species), the soft-start procedure (a warning or innate noise before beginning pile driving), and daylight construction. There are also mitigation measures to protect fish and the marbled murrelet.	C/O	C/O	C/O

Table 4.3-1: Past, Present, and Reasonably Foreseeable Actions (continued)

Project	Location	Project Description	Summary of Impact Minimization and Mitigation Measures ¹	Project Timeframe		
				Past	Present	Future
Explosives Handling Wharf Maintenance (EHW-2)	NAVBASE Kitsap Bangor	The Navy completed a construction project for necessary repairs and maintenance on the EHW-2 facility. This multiyear project involved removal and replacement of deteriorated steel or concrete piles. NMFS issued an incidental harassment authorization to the Navy for Level B harassment of five species of marine mammals incidental to pile driving and removal associated with the project. Additionally, the project included replacement of structural elements such as decking and pile caps, installation of cathodic protection, repair of a concrete wetwell, and recoating of the tops of fender piles and steel mooring fittings (U.S. Department of the Navy, 2012a). This project was completed in 2015 and would not contribute to impacts when considered with the Proposed Action.		C	O	O
Fender Pile Removal and Replacement, Pier 4	NAVBASE Kitsap Bremerton	The Navy wrote an EA on Fender Pile Removal and Replacement at Pier 4. The base serves as homeport for a nuclear aircraft carrier and other Navy vessels, and contains a shipyard that is capable of overhauling and repairing all types and sizes of ships by alteration, construction, deactivation, and dry-docking. Pier 4 was completed in 1922 and needed substantial maintenance to support ship repair and other activities to maintain Navy vessels. The Navy removed approximately 80 deteriorating timber fender piles and replaced them with steel fender piles. This project, when considered with the Proposed Action, could add to the cumulative impacts on any of the resources discussed in this Supplemental as the	Minimization measures were implemented and included an Incidental Harassment Authorization from the NMFS; the issuance criteria required that the unintentional taking of marine mammals authorized by an IHA would have a negligible impact on the species or stock and, where relevant, would not have an unmitigable adverse impact on the availability of	C		

Table 4.3-1: Past, Present, and Reasonably Foreseeable Actions (continued)

Project	Location	Project Description	Summary of Impact Minimization and Mitigation Measures ¹	Project Timeframe		
				Past	Present	Future
		impacts to water resources, noise, and biological resources would be temporary and not significant.	the species or stock for subsistence uses.			
Gulf of Alaska EIS/OEIS and Supplements	Gulf of Alaska	The Navy has prepared two iterations of this EIS/OEIS and is preparing a third to assess the potential environmental impacts associated with at sea training in the GOA Temporary Maritime Activities Area (TMAA) Study Area. This project, when considered with the Proposed Action, could add to the cumulative impacts on any of the resources discussed in this Supplemental especially regarding the impacts to fishes and marine mammals.	The analysis presented in the 2015 GOA Final Supplemental EIS/OEIS indicates that Alternative 1 will include the implementation of standard operating procedures and all practicable mitigation and monitoring measures by the Navy to avoid or reduce environmental impacts, including those identified in the GOA Final Supplemental EIS/OEIS, the NMFS Biological Opinion (April 19, 2017), and the NMFS Final Rule and LOA issued under the MMPA on April 21, 2017. Mitigation measures and monitoring requirements will be implemented for Navy activities which could potentially impact the following resources: <ul style="list-style-type: none"> • Marine Mammals: Mitigation measures and annual exercise and monitoring reporting requirements are identified in 	O	O	O

Table 4.3-1: Past, Present, and Reasonably Foreseeable Actions (continued)

Project	Location	Project Description	Summary of Impact Minimization and Mitigation Measures ¹	Project Timeframe		
				Past	Present	Future
			the GOA Final Supplemental EIS/OEIS, the NMFS Biological Opinion, and the MMPA LOA. In addition to existing procedural mitigation measures, such as the use of lookouts, the Navy has agreed to implement geographic mitigation measures while training in the TMAA. The Navy will establish a North Pacific Right Whale Cautionary Area where the use of surface ship hull-mounted mid-frequency sonar or explosives will not occur in the June to September timeframe. <ul style="list-style-type: none"> • Fish: Given concerns raised by the Kodiak area Tribes during Government-to-Government consultation, the Navy has affirmed a geographic restriction that the use of explosives will not occur in Portlock Bank during Navy training events in the TMAA (U.S. Department of the Navy, 2017). 			

Table 4.3-1: Past, Present, and Reasonably Foreseeable Actions (continued)

Project	Location	Project Description	Summary of Impact Minimization and Mitigation Measures ¹	Project Timeframe		
				Past	Present	Future
Hawaii and Southern California Training and Testing (HSTT) EIS/OEIS	Hawaii and Southern California	The Navy has prepared two iterations of this EIS/OEIS and is preparing the third to assess the potential environmental impacts associated with two categories of military readiness activities: training and testing. The water-based training covered in the HSTT EIS/OEIS is considered at-sea training and does not include land-based components. In the EIS/OEIS, the Navy assesses military readiness activities that could potentially impact human and natural resources, especially marine mammals, sea turtles, and other marine resources. The range of alternatives includes a No Action Alternative and other reasonable courses of action. The Final HSTT EIS/OEIS third iteration was released in October 2018. Resource areas include air quality, biology (marine species), and public health and safety. The emission of criteria pollutants resulting from activities in the Study Area would not cause a violation or contribute to an ongoing violation of the National Ambient Air Quality Standards. This project, when considered with the Proposed Action, could add to the cumulative impacts on marine mammals, sea turtles, fishes, and birds.	Procedural mitigation is mitigation that the Navy will implement whenever and wherever an applicable training or testing activity takes place within the Study Area. Procedural mitigation generally involves (1) the use of one or more trained Lookouts to diligently observe for specific biological resources within a mitigation zone, (2) requirements for Lookouts to immediately communicate sightings of specific biological resources to the appropriate watch station for information dissemination, and (3) requirements for the watch station to implement mitigation until certain recommencement conditions have been met. Mitigation areas are geographic locations within the Study Area where the Navy will implement additional measures to (1) avoid or reduce impacts on biological	O	O	O

Table 4.3-1: Past, Present, and Reasonably Foreseeable Actions (continued)

Project	Location	Project Description	Summary of Impact Minimization and Mitigation Measures ¹	Project Timeframe		
				Past	Present	Future
			<p>or cultural resources that are not observable by Lookouts from the water's surface (i.e., resources for which procedural mitigation cannot be implemented); and (2) in combination with procedural mitigation, to effect the least practicable adverse impact on marine mammal species or stocks and their habitat. The Navy completed an extensive assessment of the Study Area to develop its mitigation areas.</p> <p>For Phase III, this included reanalyzing existing Phase II mitigation areas; assessing additional habitat areas suggested by the public, NMFS, other governmental agencies, and non-governmental organizations; and considering other habitats identified internally by the Navy.</p>			
Hood Canal Bedlands Encroachment	Hood Canal	The Navy and Washington Department of Natural Resources signed a restrictive easement on July 7, 2014. The Navy paid \$720,000 for the easement,		X	X	X

Table 4.3-1: Past, Present, and Reasonably Foreseeable Actions (continued)

Project	Location	Project Description	Summary of Impact Minimization and Mitigation Measures ¹	Project Timeframe		
				Past	Present	Future
Protection Easement		<p>which precludes construction in the easement area. The easement covers 4,804 acres (ac.) of aquatic land, from -18 feet (ft.) mean lower low water down to 70 ft. mean lower low water. All 4,804 ac. overlays designated critical habitat for ESA-listed salmonid species. The restrictive easement area also protects large tracts of wild stock geoduck and extensive eelgrass habitat. The easement will protect the area for 55 years. The Department of Natural Resources will continue to manage the land under its aquatic lands program.</p> <p>To date, NBK has also completed a Bedlands restrictive easement on both shorelines surrounding the Dabob Bay Range Complex. 7,285 acres of aquatic lands covering 100 miles of shoreline surrounding the Dabob Bay Range Complex are protected from incompatible marine development for the next 55 years. Phase 1 was completed in 2014 and Phase 2 was completed in 2018. The Hood Canal REPI partnership for Range sustainment is in the 7th year of execution.</p> <p>To date over 13,000 acres have been protected from incompatible development.</p> <p>In 2019, the first phase of the Thorndyke Bay easements will be executed.</p> <p>This project, when considered with the Proposed Action, could add to the cumulative impacts on biological resources and cultural resources in a positive manner through restricting construction and protecting various biological resources.</p>				

Table 4.3-1: Past, Present, and Reasonably Foreseeable Actions (continued)

Project	Location	Project Description	Summary of Impact Minimization and Mitigation Measures ¹	Project Timeframe		
				Past	Present	Future
Integrated Natural Resource Management Plan (INRMP)	Commander, Navy Region Northwest (CNRNW) Installations: NBK (Bangor, Bremerton, Keyport, and Zelatched Point); NASWI. NAVSTA Everett; Pacific Beach Annex; NAVMAG Indian Island; and SEAFAC	INRMPs were revised for multiple CNRNW INRMPs between fiscal year 2012 and 2018. The Sikes Act, U.S. Department of the Navy Policy, and DoD instruction require that annual and 5-year reviews for operation and effect of INRMPs occur with federal and state partners. The Navy, USFWS, and state wildlife agencies participate in these reviews. NMFS is also invited to participate. The INRMP is generally updated every 5 years, and management actions prescribed in it are implemented to contribute to the conservation and rehabilitation of installation natural resources. These projects, when considered with the Proposed Action, could add to the cumulative impacts on biological resources in a positive manner through the conservation and rehabilitation efforts.	Minimization and mitigation measures pertaining to natural resource management are described in the INRMPs.	O	O	O
Land-Water Interface (P-983)/Service Pier Extension (P-834) Supplemental SEAWOLF Class Service Pier Extension	Naval Base Kitsap Bangor, Silverdale, WA	Construct an extension of the Service Pier. This project, when considered with the Proposed Action, could add to the cumulative impacts on biological resources, cultural resources, and socioeconomic resources.				C/O
Manchester Fuel Tank Replacement (P-856)	Naval Base Kitsap	Construct aboveground fuel storage tanks and replace current system of underground storage tanks. This project, when considered with the Proposed Action,				C/O

Table 4.3-1: Past, Present, and Reasonably Foreseeable Actions (continued)

Project	Location	Project Description	Summary of Impact Minimization and Mitigation Measures ¹	Project Timeframe		
				Past	Present	Future
		could add to the cumulative impacts on biological resources and socioeconomic resources.				
Marine Structure Maintenance and Pile Replacement Activities	NAVBASE Kitsap Bangor, Bremerton, Keyport, Manchester, Zelatched Point and Naval Station Everett	Navy proposes to conduct maintenance and repair activities of marine waterfront structures at six Navy locations within Navy Region Northwest. The Navy released the Final EA in June 2019, and NMFS approved the Navy’s MMPA permit application in April 2019. The repairs, maintenance, and replacement of piles will continue through 2022. This project, when considered with the Proposed Action, could add to the cumulative impacts on biological resources (specifically marine mammals), cultural resources, air quality, and noise.	General best management practices, mitigation, and minimization measures may be implemented for all in-water repair and replacement activities. Additional minimization measures have been added to protect marine mammals, ESA-listed species, and designated critical habitats. These measures include vibratory installation of piles where possible, noise attenuation and performance measures for impact pile driving, and marine mammal monitoring.			C/O
Naval Health Clinic Oak Harbor, Whidbey Island, Washington (P-262)	Oak Harbor, Washington	Construct new facility to serve as medical clinic, dental clinic, and birthing center. This project, when considered with the Proposed Action, does not have the potential to cumulatively impact resources.				C
Naval Magazine (NAVMAG) Indian Island Ammunition Wharf	NAVMAG Indian Island	Environmental analysis and consultation have begun for proposed pile repair and replacement at an ammunition wharf on Indian Island. This project, when considered with the Proposed Action, has the potential to cumulatively impact marine habitats,				C

Table 4.3-1: Past, Present, and Reasonably Foreseeable Actions (continued)

Project	Location	Project Description	Summary of Impact Minimization and Mitigation Measures ¹	Project Timeframe		
				Past	Present	Future
		marine vegetation, marine invertebrates, marine mammals, sea turtles, fishes, and birds.				
Naval Special Operations Training	Puget Sound and Coastal Southwestern Washington	The Navy proposes to conduct small unit, intermediate and advanced land and cold-water maritime training for Navy Special Operations personnel. The training would occur in selected nearshore lands and in the inland waters of Puget Sound, including Hood Canal, as well as the southwestern Washington coast, with the permission of willing property owners. Training would comply with federal and state laws and be consistent with existing non-military use. The public outreach meetings were held in May 2017 for the development of an EA. The EA was finalized in 2019 and a FONSI was signed in December 2019. This project, when considered with the Proposed Action, could add to the cumulative impacts on biological resources, cultural resources, and socioeconomic resources.	The Navy agreed to take the following five actions with Washington State Historic Preservation Officer (SHPO) to minimize the potential to disturb archaeological sites: 1. Reopening of consultation per 36 CFR 800.5(d)(1) if necessitated by a change in the undertaking; 2. A review by a qualified Cultural Resource professional as defined in 36 CFR Part 61 of new and renewed real estate agreements for new information; 3. Implementation of the Inadvertent Discovery Plan (IDP), to be attached to the Memorandum of Agreement as an appendix; 4. Providing sensitivity to cultural resources training to all participants in the program, and; 5. Submittal of an annual report to the SHPO confirming that adverse			O

Table 4.3-1: Past, Present, and Reasonably Foreseeable Actions (continued)

Project	Location	Project Description	Summary of Impact Minimization and Mitigation Measures ¹	Project Timeframe		
				Past	Present	Future
			effects by the program are being avoided.			
P-188 Replace Fuel Pipeline	NASWI	In 2014 the Navy replaced an existing 55-year-old, 5-mile-long cross-island pipeline and pumping system that transfers fuel from the Seaplane Base to Ault Field at NASWI. The pipeline finished under budget and ahead of schedule in 2014 and would not cumulatively impact resources, when considered with the Proposed Action.		C	O	O
P-8A Multi-Mission Aircraft	NASWI	Homebasing of 12 P-8A Multi-Mission Maritime Aircraft (MMA) squadrons and one Fleet Replacement Squadron is proposed to occur to replace the current maritime patrol aircraft, the P-3C Orion, at existing maritime patrol homebases. The action will result in the homebasing of six fleet squadrons (42 aircraft) at NASWI, Washington. Informal consultation with the USFWS in accordance with section 7(a)(2) of the ESA for the Proposed Action concluded with a letter of concurrence from the USFWS on May 13, 2013. The Record of Decision (ROD) was signed in June 2014, and the transition to the P-8A aircraft was completed in May 2020. Most recently Boeing installed a new P-8A Poseidon training center at NASWI that contains simulators to help transition the aircrews effectively and efficiently prior to operating the P-8A MMA. The first P-8A MMA arrived on the base in October 2016. This project, when considered with the Proposed Action, could add to the cumulative impacts on air quality, birds, socioeconomic resources, noise, American Indian, and cultural resources.		O	O	O

Table 4.3-1: Past, Present, and Reasonably Foreseeable Actions (continued)

Project	Location	Project Description	Summary of Impact Minimization and Mitigation Measures ¹	Project Timeframe		
				Past	Present	Future
P-993 Pier and Support Facilities for Transit Protection System at U.S. Coast Guard Air Station/Sector Office Port Angeles	U.S. Coast Guard (USCG) Air Station/Sector Field Office Port Angeles	This project consisted of the construction of a 22,303 square foot pier and 8,300 square foot building for an Alert Forces Facility (single-story sleeping and administration building); a Ready Service Armory (an ammunition and weapons storage facility); diesel fuel, marine storage tank, and distribution system; and site improvements including utilities, parking, lighting, security improvements, and landscaping at the USCG AIRSTA/SFO Port Angeles to support the USCG Maritime Force Protection Unit mission. The Transit Protection System (TPS) pier is designed to provide full hotel services (electricity, potable water, sewer, Internet, phone, fire protection, pier lighting, and fueling lines) and dedicated mooring for up to seven TPS vessels. Construction of the project started in the summer of 2016 was completed in 2018. The new pier and support facilities would have a design life of 50 years (U.S. Department of the Navy, 2015a). This project, when considered with the Proposed Action, could add to the cumulative impacts on biological resources, noise, cultural resources, American Indian, and socioeconomic resources.	The construction included mitigation measures to protect marine mammals and habitat in the project area.	C	O	O
Port Security Barrier (PSB)	NAVBASE Kitsap Bremerton	This project would extend the existing floating fence approximately 1,000 feet to the shoreline, enclosing approximately 6.5 acres of water. The PSB is presently connected to the end of Pier 7, and extension of the PSB will reduce the safety risk to individuals that may otherwise enter the highly industrialized and very active naval shipyard. Extension of the PSB is pending				C

Table 4.3-1: Past, Present, and Reasonably Foreseeable Actions (continued)

Project	Location	Project Description	Summary of Impact Minimization and Mitigation Measures ¹	Project Timeframe		
				Past	Present	Future
		issuance of a permit by the U.S. Army Corps of Engineers. This project, when considered with the Proposed Action, could add to the cumulative impacts on sediments and water quality, air quality, marine habitats, marine mammals, sea turtles, birds, marine vegetation, marine invertebrates, fishes, and cultural resources.				
Readiness and Environmental Protection Integration Program/ Encroachment Protection Partnering Agreement Transactions	Hood Canal	Under the Readiness and Environmental Protection Integration Program, the Navy has established a multi-year agreement with The Trust for Public Lands, Washington Department of Natural Resources, and Jefferson Land Trust. To date, the Navy and its partners have purchased protective easements on 5,149 ac. of upland and shoreline properties around Hood Canal, including protection of approximately 2 miles of the riparian corridor along the Dosewallips River. The Navy purchased a restrictive easement to maintain 3,607 ac. of working forest as a buffer and permanently protect these lands from development. These areas provide protection for designated critical habitat for ESA-listed salmonid species. Additional Readiness and Environmental Protection Initiative transactions are underway within the agreement area around Hood Canal. This project, when considered with the Proposed Action, beneficially and cumulatively impacts biological resources, and American Indian and commercial fishing.		X	X	X

Table 4.3-1: Past, Present, and Reasonably Foreseeable Actions (continued)

Project	Location	Project Description	Summary of Impact Minimization and Mitigation Measures ¹	Project Timeframe		
				Past	Present	Future
Seismic Retrofit of Building 431	NAVBASE Kitsap Bremerton	The Navy performed repair and construction for seismic upgrades and renovation of a ship maintenance machine shop facility, which is within the coastal zone. The project included seismic retrofit renovation of all architectural, mechanical, and electrical systems, demolishing portions of the building interior and hazardous material remediation. This project, when considered with the Proposed Action, would not cumulatively impact resources.		C	C	
Ship Maintenance and Waterfront Operations	Naval Station Everett (NSE) (P-173)	Construct new Ship Maintenance and Waterfront Operations Facility, demolish and consolidate substandard and inadequate temporary facilities, and relocate ship support operations to waterfront. This project, could add to the cumulative impacts on biological, cultural, and socioeconomic resources.				C/O
Surveillance Towed Array Sensor System Low Frequency Active Sonar	Pacific Ocean, Atlantic Ocean, Indian Ocean, and the Mediterranean Sea	The Navy utilizes Surveillance Towed Array Sensor System (SURTASS) Low Frequency Active Sonar systems onboard several T-AGOS class vessels in the western and central North Pacific Ocean, not including the polar waters, and the southwestern Indian Ocean. The Navy has been operating SURTASS since 2002 and plans to continue into the reasonably foreseeable future (U.S. Department of the Navy, 2019b). Navy is operating under a LOA signed by NMFS August 12, 2019. In general, the operation of SURTASS Low Frequency Active Sonar has low to moderate potential to affect marine mammals, sea turtles, and fishes. Anticipated impacts on turtles include ESA harassment, including	Monitoring (visual, passive acoustic, and active acoustic) and enforcing delay/suspension protocols. Use of “fish finder” (High Frequency/Mid Frequency-3 sonar) detects, locates, and tracks marine mammals and, to an extent, sea turtles, that may pass close enough to the SURTASS Low Frequency Active sonar’s transmit array to enter the mitigation zone.	O	O	O

Table 4.3-1: Past, Present, and Reasonably Foreseeable Actions (continued)

Project	Location	Project Description	Summary of Impact Minimization and Mitigation Measures ¹	Project Timeframe		
				Past	Present	Future
		non-auditory, auditory, behavioral, masking, or physiological stress impacts when turtles are in close proximity. Impacts on marine mammals are anticipated to be Level B harassment, including auditory or behavioral impacts. The underwater sound produced by this activity may contribute to the cumulative impacts on marine mammals and sea turtles in the Study Area (U.S. Department of the Navy, 2012b).				
Transit Protection Program (TPP) Pier and Support Facilities	Naval Base Kitsap Bangor (P-907/P-932)	Build fixed-pile or floating pontoon main pier and finger piers at K/B Spit. This project, when considered with the Proposed Action, could add to the cumulative impacts on biological, cultural, American Indian, and socioeconomic resources.				C/O
USCG Training	California, Oregon, and Washington	The USCG conducts training throughout the Study Area. In California, District 11 conducts search and rescue, homeland security, law enforcement, marine safety, and aids to navigation missions in over 3.3 million square miles (mi. ²) of water. The District 13 Coast Guard unit is located in the Pacific Northwest along the coasts of Oregon and Washington. District 13 conducts the same operational duties as the units in District 11 and covers more than 460,000 mi. ² of the Pacific Ocean. These activities, when considered with the Proposed Action, could add to the cumulative impacts on sediments and water quality, air quality, marine habitats, marine mammals, sea turtles, birds, marine vegetation, marine invertebrates, fishes, and cultural resources.	USCG activities that were part of the Proposed Action in the 2015 NWTT Final EIS/OEIS and continue to be analyzed in this Supplemental under the Proposed Action include Maritime Security Operations, where USCG personnel participate. The following USCG activities are not part of the Proposed Action for this Supplemental and are analyzed only for their cumulative impact: 1. Small- and medium-caliber weapons firing from ships,	O	O	O

Table 4.3-1: Past, Present, and Reasonably Foreseeable Actions (continued)

Project	Location	Project Description	Summary of Impact Minimization and Mitigation Measures ¹	Project Timeframe		
				Past	Present	Future
			similar to that of the Navy’s Gunnery Exercises (Surface-to-Surface). 2. Flight training in W-237A. This flight training includes low-altitude helicopter flights but does not include expenditure of munitions or any other materials. 3. Shipboard aircraft operations, such as deck landing qualification training. 4. Shipboard maneuvering and engineering training (e.g., abandon ship, anchoring, full power trials, man overboard, and flooding). 5. Search and rescue training.			
VAQ Electronic Attack Squadron Expeditionary Wing	NASWI	The Navy prepared an EA to analyze the transition of the Expeditionary Electronic Attack squadrons (VAQ) at NASWI from the aging EA-6B Prowler to the newer EA-18G Growler in the 2012–2014 timeframe. The 2012 EA analyzed retaining three expeditionary VAQ squadrons that operated Prowlers and their transition to Growler, in addition to relocating a reserve squadron to NASWI, and resulted in a finding of no significant impact. Training for these Growler aircrew was included as part of the Proposed Action in the NWTT Final EIS/OEIS (2015b). This transition, when		O	O	O

Table 4.3-1: Past, Present, and Reasonably Foreseeable Actions (continued)

Project	Location	Project Description	Summary of Impact Minimization and Mitigation Measures ¹	Project Timeframe		
				Past	Present	Future
		considered with the Proposed Action, could add to the cumulative impacts on air quality, birds, and cultural resources.				
Waterfront Improvements	NAVBASE Kitsap Bremerton	This proposed action would consist of two main projects: (1) development of a new Multi-Mission Dry Dock (M2D2) and (2) Reconstruction of existing Dry Dock 6. This project, when considered with the Proposed Action, could add to the cumulative impacts on sediments and water quality, air quality, marine habitats, marine mammals, sea turtles, birds, marine vegetation, marine invertebrates, fishes, and cultural resources.				C/O
Waterfront Service Craft Piers	Naval Station Everett (P-65)	Construct new pier(s) to replace Piers D and E (small craft berthing piers). This project, when considered with the Proposed Action, could add to the cumulative impacts on sediments and water quality, air quality, marine habitats, marine mammals, sea turtles, birds, marine vegetation, marine invertebrates, fishes, American Indian, and cultural resources.				C/O
Whidbey Island Extend Shoreline Erosion Protection System South	Whidbey Island	The Navy is constructing an extended shoreline erosion protection system on Whidbey Island near Ault field off of Saratoga Street and Lexington Street. These activities, when considered with the Proposed Action, could add to the cumulative impacts on sediments and water quality, air quality, marine habitats, and birds.		C		C

Table 4.3-1: Past, Present, and Reasonably Foreseeable Actions (continued)

Project	Location	Project Description	Summary of Impact Minimization and Mitigation Measures ¹	Project Timeframe		
				Past	Present	Future
Non-Military Actions						
Local including part of the NWTT Study Area						
Aquaculture	Inland waters of the State of Washington	Aquaculture occurs in the State of Washington’s inland waters and includes farming native Pacific salmon, clams, mussels, oysters, and other marine subsistence species. In addition to the aquaculture farms already in operation there are new farms that have been permitted to begin development and others that are in the permitting process under Washington’s State Environmental Policy Act (SEPA) (Washington State Department of Ecology, 2019). An example of this is the Jamestown S’Klallam Tribe Dungeness Bay Oyster Farm which is in the permitting process to re-establish a 50-acre oyster farm in Dungeness Bay (Allen, 2019). These activities, when considered with the proposed action, could have cumulative effects on marine habitats, marine vegetation, and socioeconomic resources.	Aquaculture projects within inland waters of the State of Washington are subject to the state’s SEPA review before approval. The applicant must also submit other documentation—such as a Shoreline Substantial Development and Conditional Use Permit—to assure the project abides by all state laws and is has a minimal environmental impact.	C/O/ X	C/O/X	C/O/X
Bainbridge Ferry Terminal Overhead Loading Fixed Walkway Replacement	Bainbridge, Washington	This construction for the project is set to begin Spring 2021, it will replace the existing walkway with a new steel-fortified walkway anchored by concrete and steel columns walkway that will be safer during earthquake activity (Washington Department of Transportation, 2019a). This project, when considered with the Proposed Action, would not be likely to cumulatively impact resources in the Study Area.				C
Construction and Land Development on the Olympic Peninsula	Clallam, Jefferson, and Northern	In 2019 a number of residential, commercial, road and other development projects were permitted to be carried forward in the coming years in Clallam, Jefferson, and Northern Grays Harbor counties may		C/X	C/X	C/X

Table 4.3-1: Past, Present, and Reasonably Foreseeable Actions (continued)

Project	Location	Project Description	Summary of Impact Minimization and Mitigation Measures ¹	Project Timeframe		
				Past	Present	Future
	Grays Harbor Counties	be impacted. In total, approximately 200 acres has been permitted for development in these counties, most of which will be residential; however, other projects include public recreational areas, commercial buildings, and gravel pits. Additionally, approximately 22 miles of road construction was permitted with a majority of the roads being for logging purposes (Washington State Department of Ecology, 2019). These projects, when considered with the Proposed Action, could have a cumulative effect on air quality, socioeconomic resources, and public health and safety.				
Ecosystem Management Plans	State of Washington	Throughout Washington State there are many ecosystem management plans in place including EISs, Shoreline Master Programs, and other environmental documents. These documents describe how to proceed with issues such as habitat improvements, cleaning up contaminated soils, coping with potentially rising sea levels, improving fish passage in waterways, beaver dam management, developing previously undeveloped lands, restoring wetlands, and other actions that encompass ecosystem management (Washington State Department of Ecology, 2019). These projects, when considered with the Proposed Action, could have a cumulative effect on all resource categories considered in this Supplemental EIS/OEIS.		X	X	X
Elwha River Restoration	Elwha River, Washington	In 2011, the largest dam removal in the U.S. began, and the Elwha Dam was removed, followed by the Glines Canyon Dam on the Elwha River. The removal		C	X	X

Table 4.3-1: Past, Present, and Reasonably Foreseeable Actions (continued)

Project	Location	Project Description	Summary of Impact Minimization and Mitigation Measures ¹	Project Timeframe		
				Past	Present	Future
		of these dams has aided the restoration of the Elwha river ecosystem for salmon restoration, as well as watershed improvement (National Park Service, 2019). These activities, when considered with the Proposed Action, could add to the cumulative impacts on sediments and water quality, marine habitats, marine vegetation, marine invertebrates, and fishes.				
Inland Waters Construction	Inland waters	Construction projects have already begun, have been permitted to begin, or are under review to be permitted in Washington’s inland waters. These types of projects include, but are not limited to, pier construction and renovation, bridge construction, breakwater repair, bulkhead removal and construction, and boat ramp renovation and construction. An example of this is the Brown pier, ramp, and float replacement and extension in Jefferson county (Washington State Department of Ecology, 2019). These activities, when considered with the Proposed Action, could add to the cumulative impacts on sediments and water quality, marine habitats, marine vegetation, socioeconomic resources, and public health and safety.	Construction projects within inland waters of the State of Washington are subject to the state’s SEPA review before approval. The applicant must also submit other documentation—such as Joint Aquatic Resource Permits Applications and Habitat Assessments—to assure the project abides by all state laws and is has a minimal environmental impact.	C	C	C
Hood Canal In-Lieu Fee Mitigation Program	Hood Canal	The Hood Canal In-Lieu Fee Mitigation Program is a voluntary program sponsored by the Hood Canal Coordinating Council. Entities pursuing development on aquatic resources such as wetlands or shoreline habitats can purchase mitigation credits to offset unavoidable adverse impacts to these resources within the Hood Canal watershed. The primary goal of the program is to increase aquatic resource functions		X	X	X

Table 4.3-1: Past, Present, and Reasonably Foreseeable Actions (continued)

Project	Location	Project Description	Summary of Impact Minimization and Mitigation Measures ¹	Project Timeframe		
				Past	Present	Future
		<p>in the Hood Canal watershed. The program is intended to ensure no net loss through the preservation, enhancement, establishment, and restoration of ecological functions within target watersheds.</p> <p>This will be accomplished through the establishment and management of mitigation sites. The service area for the Hood Canal Coordinating Council In-Lieu Fee Program encompasses Hood Canal and those portions of Water Resource Inventory Areas 14, 15, 16, and 17 draining to Hood Canal, defined by a line extending from Foul Weather Bluff to Tala Point, south through the Great Bend to its terminus near the town of Belfair, Washington. The service area is divided into two components for the In-Lieu Fee Program. The first is the Freshwater Environment, which generally includes areas landward of the marine riparian zone, including freshwater and estuarine wetlands and streams up to and excluding any National Park or National Forest Lands. The second is the Marine/Nearshore Environment, which extends from the marine riparian area at the top of the coastal bluffs to the adjacent aquatic intertidal and subtidal zones. The mitigation strategy selected for each permitted impact will be based on an assessment of type and degree of disturbance to the landscape or drift cell. These activities, when considered with the Proposed Action, could add to the cumulative impacts on marine habitats and biological resources.</p>				

Table 4.3-1: Past, Present, and Reasonably Foreseeable Actions (continued)

Project	Location	Project Description	Summary of Impact Minimization and Mitigation Measures ¹	Project Timeframe C = Construction O = Operation X = Other		
				Past	Present	Future
Logging	Washington State (Olympic Peninsula)	Industrial logging began in Washington in the mid-1800s. Between 1900 and 1910, new laws were put in place to regulate clearcutting and create a state forest commission as well as a burn-permit system (Dundon, 2018). During the 1980s and 90s, a “timber war” including the implementation of environmental restrictions on logging led to a dramatic drop in the amount of public lands that were open to logging. Due to the increase in severity of wildfires, forest services are increasing the use of thinning forests and selective logging in order to decrease wildfire severity and maintain healthy forests (Siegler, 2019). Noise from logging may have the potential to impact terrestrial animals including birds. On the Olympic Peninsula in 2019, where noise from Navy overflights may be heard, the amount of land permitted for logging in the coming years was approximately 10,000 acres for approximately 18,000 MBF (thousand board feet) (Washington State Department of Ecology, 2019). Generally, these actions would have the potential to have cumulative impacts to air quality, birds, cultural resources, American Indian and Alaska Native Traditional Resources, socioeconomic resources, and public health and safety.		X	X	X
Marbled Murrelet Long-Term Conservation Strategy Final EIS	Washington State	The Washington Department of Natural Resources and USFWS developed an EIS to amend the DNR’s State Trust Lands Habitat Conservation Plan (1997). The amendment will replace the interim conservation strategy for the marbled murrelet (<i>Brachyramphus marmoratus</i>) with a long-term conservation strategy		X	X	X

Table 4.3-1: Past, Present, and Reasonably Foreseeable Actions (continued)

Project	Location	Project Description	Summary of Impact Minimization and Mitigation Measures ¹	Project Timeframe		
				Past	Present	Future
		(Washington Department of Natural Resources & U.S. Fish and Wildlife Service, 2019). This amendment would have the potential to have cumulative impacts to birds in the NWTT Study Area.				
Marine Spatial Plan for Washington’s Pacific Coast	Washington’s Pacific Coast	The Washington Department of Ecology created a Marine Spatial Plan, adopted in June 2018, which provided: a consistent way of evaluating future ocean use proposals; a new base of scientific information on coastal uses and resources; a framework to coordinate decisions for new ocean uses; and protections for sensitive ecological areas and fishing. This plan is a tool to assist state agencies and others in evaluating and engaging in proposals or new ocean uses and guide potential applicants as they develop those proposals (Washington Department of Ecology, 2017). These activities, when considered with the Proposed Action, could add to the cumulative impacts on marine habitats and marine biological species.		X	X	X
Marine Tourism/Whale Watching	Puget Sound	In April of 2018, the Pacific Whale Watch Association adopted new guidelines for marine tourism in the Puget Sound. These guidelines are meant to keep endangered whales, such as the Southern Resident Killer Whale population and humpback whales, safe around commercial and private boats. These guidelines include implementing a “slow zone” of 7 knots within 1 kilometer of whales; limiting viewing time to 1 hour in the vicinity of a group of whales, or limiting viewing time to 30 minutes if there are 10 or more vessels within 1 kilometer of the whales (Donaldson, 2018). These activities, when considered	Regulations under the ESA and MMPA prohibit vessels from approaching killer whales within 200 yards and from parking in the path of whales when in the Inland Waters of Washington State. Certain vessels are exempt from the prohibitions (76 Federal Register 20870). In 2018, the State of Washington adopted a law to	O	O	O

Table 4.3-1: Past, Present, and Reasonably Foreseeable Actions (continued)

Project	Location	Project Description	Summary of Impact Minimization and Mitigation Measures ¹	Project Timeframe		
				Past	Present	Future
		with the Proposed Action could benefit species in a positive manner due to the restrictions helping marine mammals to thrive. The impact on socioeconomics could be positive or negative as an increase in marine mammals could draw more tourism, while the increased regulations could cause the enjoyment of the whale watchers to decrease.	increase the viewing distance around whales to from 200 yards to 300 yards. In addition, boats are now forbidden from following closer than 400 yards behind a pod of endangered orcas (State Bill 5577).			
Mukilteo Multimodal Terminal Project	Mukilteo, Washington	This project for the new terminal began with a decontamination process in 2015, in-water work began in Fall 2019 and, in late 2020, the schedule shows that construction to begin removing the existing terminal would commence. This project would improve safety and accessibility for the public, improve efficiency and reliability of ferry operations, improve transit connections, reduce the ferry-related congestion, and provide public access to the waterfront (Washington Department of Transportation, 2019b). This project, when considered with the Proposed Action, could add to the cumulative impacts on marine habitat, sediments and water quality, and marine biological resources.		C	C	C/O
North Seattle Lateral Upgrade Project Northwest Pipeline LLC	Shonomish, WA	This project will upgrade the North Seattle natural gas mainline. The project is to remove and replace up to 5.85 miles of 8" diameter pipeline with 2" diameter pipeline. Upon completion, this would create a significant increase in the amount of natural gas this pipeline can transport (Schwalbe, 2019). This project, with respect to the Proposed Action, could have			X	C/O

Table 4.3-1: Past, Present, and Reasonably Foreseeable Actions (continued)

Project	Location	Project Description	Summary of Impact Minimization and Mitigation Measures ¹	Project Timeframe		
				Past	Present	Future
		cumulative impacts on socioeconomics and public health and safety.				
Olympic Class (144-Car) Ferries	Puget Sound	A fifth Olympic Class ferry, a hybrid-electric propulsion ferry, was approved for funding in Spring 2019. The new vessels would improve safety, efficiency, access, comfort, and operating costs (Washington Department of Transportation, 2019c). The new ferries use cleaner burning engines with low-emissions fuels, and they are designed with quieter machinery. The quieter machinery would be a positive effect for marine life, especially the Southern Resident Killer Whale. The new ferries would also improve public safety. This project, when considered with the Proposed Action, could add to beneficial cumulative impacts on air quality, marine mammals, and public health and safety.				O
Pacific Marine Energy Center South Energy Test Site	6 NM southwest of Newport, OR	The Oregon State University proposes to build a grid-connected offshore wave energy test site. It would be about 33 miles in area and is in the planning and permitting stages of development. The project is still undergoing geophysical surveys, finalizing locations of terrestrial project infrastructure, conducting cultural surveys, and completing draft license applications, as well as proposing future research. If successful they will finalize, design, receive permits for, and construct and commission the test site (Batten, 2017). This project could add to the cumulative impacts on biological resources, transportation, American Indian, and cultural resources.				C/O

Table 4.3-1: Past, Present, and Reasonably Foreseeable Actions (continued)

Project	Location	Project Description	Summary of Impact Minimization and Mitigation Measures ¹	Project Timeframe		
				Past	Present	Future
Pacific Northwest National Laboratory's research and development of renewable energy in Clallam Bay	Clallam Bay	This project includes researching the meteorological and aquatic physical parameters of Clallam Bay for the potential environmental and biological impacts of technologies that harvest renewable energy resources and small-scale pilot projects to test new means to harvest renewable energy resources. Sonar or lidar would be used in some cases to characterize and monitor resources. The research will support development of pilot renewable energy projects including solar, wind, wave, tidal, or other aquatic renewable energy resources (Ballard, 2019). This project could add to the cumulative impacts on all resource categories except for birds and public health and safety.			X	C/X
Pleasant Harbor Master Planned Resort	Black Point Peninsula	In November 2007, a programmatic Final EIS was issued in association with an Amendment to re-designate the 256 acres from rural residential to Master Planned Resort. The proposed Master Planned Resort is located south of Brinnon, Washington, on the Black Point Peninsula, on the western shore of the Hood Canal. Under Alternative 1, an 18-hole golf course, 890 residential units, 49,772 ft. ² of commercial space, and resort-related amenities on a 231 ac. Site (with 33 ac. of natural area preserved and 2.2 million cubic yards of earthwork required for golf course grading) would be built. Alternative 2 consists of the golf course, 890 residential units, 52,650 ft. of commercial space with resort-related amenities, and 80 ac. of natural area preserved with 1 million cubic				C

Table 4.3-1: Past, Present, and Reasonably Foreseeable Actions (continued)

Project	Location	Project Description	Summary of Impact Minimization and Mitigation Measures ¹	Project Timeframe		
				Past	Present	Future
		yards of earthwork for golf course grading. Finally, under the No Action Alternative, the Master Planned Resort would not be constructed. The Final Supplemental EIS was released in December 2015 (Jefferson County, 2015). Jefferson County government held meetings in 2016 with tribes in the area to understand their concerns with the proposed development. A Staff Report on the application for a Development Agreement and Development Regulations was received on January 4, 2016; the Planning Commission Public Hearing occurred on January 6, 2016; and on August 14, 2017, the Board of County Commissioners meeting watched a presentation on the Pleasant Harbor Master Planned Resort (Jefferson County, 2017). This project, with respect to the Proposed Action, could add to the cumulative impacts on biological resources, water quality, transportation, Native American, and socioeconomic resources.				
Puget Sound Partnership	Tacoma, Washington	The Puget Sound Partnership in Washington has many programs, related to the executive management team, external operations, adaptive systems, boards, communications, integrated planning, planning, ecosystem recovery, science and evaluation, internal operations, fiscal, and the Environmental Protection Agency (Puget Sound Partnership, 2019). This group, with respect to the Proposed Action, could add to the cumulative impacts on biological resources and sediments and water quality.		X	X	X

Table 4.3-1: Past, Present, and Reasonably Foreseeable Actions (continued)

Project	Location	Project Description	Summary of Impact Minimization and Mitigation Measures ¹	Project Timeframe		
				Past	Present	Future
Rocky Brook Hydroelectric LP	Brinnon, WA	This project proposes to install new turbines, upgrade the current concrete spill over and install a new 20' outflow pipe at the power house. These upgrades will result in a decrease of the amount of water needed to power the turbines by up to 50%, and a new outflow structure to return the water to the source creek (Charnas, 2019). This project, with respect to the Proposed Action, could have a cumulative effect on socioeconomics.			X	C/O
San Juan Islands National Monument Proposed Resource Management Plan and Final Environmental Impact Statement	Lopez, Washington	This document, published in November 2019, describes and evaluates a range of potential management approaches for the San Juan Islands, as prepared by the BLM (Bureau of Land Management, 2019). These activities, with respect to the Proposed Action, could add to the cumulative impacts on biological and cultural resources.				X
Southern Resident Orca Task Force	Olympia, Washington	The Southern Resident Orca Task Force submitted their final report and recommendations summarizing the challenges threatening the Southern Residents and bringing important scientific focus to resources that may assist with the recovery of the whales. The report provides 49 recommendations that would have multiple benefits to water quality, ecosystem health, and salmon runs (Southern Resident Orca Task Force, 2019). These activities, with respect to the Proposed Action, could beneficially add to the cumulative impacts on sediments and water quality, marine		X	X	

Table 4.3-1: Past, Present, and Reasonably Foreseeable Actions (continued)

Project	Location	Project Description	Summary of Impact Minimization and Mitigation Measures ¹	Project Timeframe		
				Past	Present	Future
		habitats and other biological resources, especially fishes and marine mammals.				
Tesoro Anacortes Refinery Clean Products Upgrade Project (CPUP) Vessel Traffic Assessment Technical Report	Fidalgo Bay, Skagit County, Washington	The Clean Products Upgrade Project, located approximately 70 miles north of Seattle, would include construction of an Aromatics Recovery Unit, installation of a new Marine Vapor Emission Control System, and on-shore facility upgrades and expansions. The Vessel Traffic Assessment Technical Report demonstrates vessel traffic levels in the study area and shows the current shipping plan and impacts to vessel traffic in the Salish Sea, impacts to vessel traffic days, and comprehensive vessel traffic management systems (CH2m, 2016). With respect to the Proposed Action, the project could add to the cumulative impacts on biological resources, sediments and water quality, transportation and noise, water resources, air quality, Native American, and cultural resources.	Existing passive and active mitigation measures were found to be adequate for the anticipated volume of vessel traffic associated with the proposed action and other anticipated development in the Study Area.	C	O	O
The Seattle Multimodal Ferry Terminal at Colman Dock Project	Seattle	Construction began in 2017 on the Seattle Multimodal Ferry Terminal and is expected to continue through 2023 (Washington Department of Transportation, 2017). With respect to the Proposed Action, the project could add to the cumulative impacts on biological resources, sediments and water quality, transportation and noise, with temporary impacts on water resources, air quality, and cultural resources.		C	C	C/O
Skookumchuck Wind Energy Project	Thurston County	This project proposes to expand the current O&M Facility and develop forest land for the Skookumchuck Wind Energy Project which will contain 38 wind			X	C/O

Table 4.3-1: Past, Present, and Reasonably Foreseeable Actions (continued)

Project	Location	Project Description	Summary of Impact Minimization and Mitigation Measures ¹	Project Timeframe		
				Past	Present	Future
		turbines with a 137-megawatt capacity. This project also includes development of necessary infrastructure, including a well and septic system (Smith, 2019). With respect to the Proposed Action, the project could add to the cumulative impacts on air quality, birds, and socioeconomics.				
Smith Island Dredging Project	Union Slough - Snohomish County, WA	This project includes the Union Slough 10-Year Maintenance Dredging Program in Union Slough near Smith Island proposed by Snohomish County Public Works. Over a 10-year period, the project proposes dredging up to 100,000 cubic yards of sediment to offset sediment accumulation resulting from the 2018 removal of portions of the Smith Island diking. Additional maintenance dredging would be scheduled as necessary (Highton, 2019). This project, with respect to the Proposed Action, could have cumulative effects on all resource categories except for cultural resources, and American Indian and Alaskan Native Traditional Resources.		X	O	
Thorndyke Resources (Pit-to-Pier) Project	Hood Canal	This project, by Hood Canal Sand and Gravel LLC, has permits through Jefferson County, that were vested under Washington’s land use laws March 29, 2003. In 2014 an updated application packet was submitted for the project that did not alter the project’s vesting date. No final action has been taken on the applications for this project and those applications remain pending. The construction and operation of the pier on Hood Canal, which would be used exclusively for gravel loading operations, is a reasonably foreseeable future action. With respect to	There should be no adverse effect on the Navy’s planned training and testing operations as a result of the project as the Navy has committed through its encroachment plan for the Hood Canal Facilities to coordinate with Thorndyke Resource, Jefferson County, Department of Homeland			C/O

Table 4.3-1: Past, Present, and Reasonably Foreseeable Actions (continued)

Project	Location	Project Description	Summary of Impact Minimization and Mitigation Measures ¹	Project Timeframe		
				Past	Present	Future
		the Proposed Action, the project could add to the cumulative impacts on biological resources, sediments and water quality, transportation and noise, with temporary impacts on water resources, air quality, and cultural resources.	Security, Department of Transportation, and the Army Corps of Engineers to ensure mutually safe operations.			
U.S. Army Corps of Engineers Tacoma Harbor Navigation Improvement Project	Tacoma, Washington	The U.S. Army Corps of Engineers released a Draft Feasibility Report and Environmental Assessment regarding the Tacoma Harbor Navigation Improvement Project in December 2019. The study looks at channel deepening opportunities in Tacoma Harbor for larger vessels through the Blair Waterway (Port of Tacoma, 2019). This project, considered with the Proposed Action, could add to the cumulative impacts to marine biological resources.				C/O
Washington State Ferries	North and South Puget Sound	Routine operation of approximately 14 ferry routes in the Puget sound mainly localized around Seattle and the San Juan Islands. There are 23 Washington state ferries that make almost 450 transits per day (Washington State Department of Transportation, 2018), equivalent to approximately 164,000 transits per year, that contribute to underwater ambient noise in the Inland Waters. These activities, when considered with the Proposed Action, could add to the cumulative impacts on air quality, and marine mammals, due to noise and vessel strikes.		O	O	O
Washington State's Marine Spatial Plan and EIS	Pacific Ocean adjacent to Washington State coastline	The Marine Spatial Plan Study Area consists of marine waters of the Pacific Ocean adjacent to Washington's coastline from the intertidal zone out to the continental slope. The plan provides information and guidance intended for use throughout the	Proposed mitigation would depend on the project chosen.		C/O	C/O

Table 4.3-1: Past, Present, and Reasonably Foreseeable Actions (continued)

Project	Location	Project Description	Summary of Impact Minimization and Mitigation Measures ¹	Project Timeframe		
				Past	Present	Future
		development of new ocean use proposal along the coast. It assists agencies, tribal governments, and others in evaluating and engaging in proposals for new ocean uses and guides potential applicants as they develop those proposals. The proposals for new ocean uses, if implemented, could add to the cumulative impacts on biological resources (marine species, habitat, and vegetation) and water quality.				
Wind Energy Project	Naval Radio Station Transmitter Jim Creek	Installation of 10 wind turbines on Wheeler Mountain and Blue Mountain. Turbine utility would be privately operated under 30-year lease. This project is currently on hold; however, if implemented in the future, these activities, when considered with the Proposed Action, could add to the cumulative impacts on air quality, and birds.				C/O
General Pacific Ocean/Global (including the NWTT Study Area)						
Academic Research	Global	Wide-scale academic research is conducted in the Study Area by federal entities, such as the Navy and National Oceanic and Atmospheric Administration/NMFS, as well as state and private entities and other partnerships. Although academic research aims to capture data without disturbing the ambient conditions of the ocean environment, vessels contribute to traffic, noise, and strike hazard; seismic activity contributes noise; and various other collection methods, such as trawling, could be disruptive to the ecosystems under observation. Impacts from academic research operations can be similar to the impacts expected from oil and gas airgun survey activities, which can		O	O	O

Table 4.3-1: Past, Present, and Reasonably Foreseeable Actions (continued)

Project	Location	Project Description	Summary of Impact Minimization and Mitigation Measures ¹	Project Timeframe		
				Past	Present	Future
		cause death in microscopic animals due to powerful sound wave creation. These sound waves can also kill or injure fishes and invertebrates. With respect to the Proposed Action, academic research could add to the cumulative impacts on noise and biological resources, including both marine species and marine habitats.				
Aquaculture	Oceans worldwide	<p>Globally, 29% of stocks are fished at biologically unsustainable levels, and aquaculture helps meet demand and offsets stress to wild populations (National Marine Fisheries Service, 2015b). Aquaculture production reached an all-time high of 97 million metric tons in 2013 and is the fastest growing form of food production, at 6% per year globally. Forty-seven percent of aquaculture operations occur in the Pacific Ocean. Salmon and shellfish aquaculture have existed since the 1970s in the Puget Sound. In April of 2018, Washington passed HB 2957, to phase out non-native fish farming in Washington State by 2022; which will eliminate threats from Atlantic salmon net pen farming and protect native salmon populations.</p> <p>Aquaculture introduces excess fecal matter, fish pellets, and introduced chemicals into the environment which harms the marine ecosystem (Audubon Washington, 2018).</p> <p>The threats of aquaculture operations on wild fish populations include reduced water quality, competition for food, predation by escaped or released farmed fishes, the spread of disease and parasites, and reduced genetic diversity (Kappel,</p>		C/O	C/O	C/O

Table 4.3-1: Past, Present, and Reasonably Foreseeable Actions (continued)

Project	Location	Project Description	Summary of Impact Minimization and Mitigation Measures ¹	Project Timeframe		
				Past	Present	Future
		2005). These threats become apparent when farmed fish escape and enter the natural ecosystem (Hansen & Windsor, 2006; Ormerod, 2003). The Marine Aquaculture Policy provides direction to enable the development of sustainable marine aquaculture (National Marine Fisheries Service, 2015b).				
Bureau of Ocean Energy Management (BOEM) Environmental Studies	Pacific Ocean	The BOEM conducts environmental studies in the Pacific. Current studies in Washington include Archaeological and Biological Assessment of Submerged Landforms off the Pacific Coast; Potential Impacts of Submarine Power Cables on Crab Harvest; Cross-shelf Habitat Suitability Modeling; Analysis of Long-term Seabird Colony Legacy Data in the Pacific Northwest as a Regional Baseline; Seabird and Marine Mammal Surveys off the Northern California, Oregon, and Washington Coasts; Data Synthesis and High-resolution Predictive Modeling of Marine Bird Spatial Distributions on the Pacific OCS; Pacific Marine Assessment Partnership for Protected Species (PacMAPPS); Offshore Acoustic Bat Study Along Western U.S. Continental and Hawaiian Island Coastlines; and Over Water Migration Movements of Black Brant (Bureau of Ocean Energy Management, 2019). These activities, when considered with the Proposed Action, could add to the cumulative impacts on cultural resources and marine biological resources.		X	X	X
Commercial and General Aviation Activities	Global	Commercial and general aviation are retained for analysis and discussion due to associated noise and emissions from aviation activities and effects on		O	O	O

Table 4.3-1: Past, Present, and Reasonably Foreseeable Actions (continued)

Project	Location	Project Description	Summary of Impact Minimization and Mitigation Measures ¹	Project Timeframe		
				Past	Present	Future
		greenhouse gas on air quality and climate change. These activities, when considered with the Proposed Action, could add to the cumulative impacts on air quality, birds, cultural, Native American, and socioeconomic resources.				
Commercial Fishing (Section 3.12.2.2, Commercial and Recreational Fishing)	Pacific Ocean	<p>Commercial and recreational fishing constitutes an important and widespread use of the ocean resources throughout the Study Area. Fishing can adversely affect fish populations, other species, and habitats.</p> <p>Potential impacts of fishing include overfishing of targeted species, bycatch, entanglement, and habitat destruction, all of which negatively affect fish stocks and other marine resources. Bycatch is the capture of fish, marine mammals, sea turtles, seabirds, and other nontargeted species that occur incidentally to normal fishing operations. Use of mobile fishing gear such as bottom trawls disturbs the seafloor and reduces habitat structural complexity. Indirect impacts of trawls include increased turbidity, alteration of surface sediment, removal of prey (leading to declines in predator abundance), removal of predators, ghost fishing (i.e., lost fishing gear continuing to ensnare fish and other marine animals), habitat destruction, and the generation of marine debris.</p> <p>Lost gill nets, purse seines, and long-lines may foul and disrupt bottom habitats and have the potential to entangle or be ingested by marine animals (i.e., microplastic ingestion by birds and fishes).</p>	<p>Various bycatch mitigation technologies, quotas, and seasonal restrictions required per the fishery-specific permit process.</p> <p>Operational regulations, seasonal restrictions, licensing, and quotas are used to mitigate negative effects of recreational fishing.</p>	O	O	O

Table 4.3-1: Past, Present, and Reasonably Foreseeable Actions (continued)

Project	Location	Project Description	Summary of Impact Minimization and Mitigation Measures ¹	Project Timeframe		
				Past	Present	Future
		<p>Fishing can also have a profound influence on individual targeted species populations. In a study of retrospective data, Jackson et al. (2001) analyzed paleoecological records of marine sediments from 125,000 years ago to present, archaeological records from 10,000 years before the present, historical documents, and ecological records from scientific literature sources over the past century. Examining this longer-term data and information, they concluded that ecological extinction caused by overfishing precedes all other pervasive human disturbance of coastal ecosystems, including pollution and anthropogenic climatic change.</p> <p>Fisheries bycatch has been identified as a primary driver of population declines in several marine species, including sharks, mammals, seabirds, and sea turtles (Wallace et al., 2010). For example, entanglement in nets from the Pacific Northwest coastal salmon fisheries has been shown to increase mortality in seabirds (Hamel et al., 2009). Habitat destruction caused by bottom trawling and other fishing methods also contributes to the negative effects of commercial and recreation fishing on multiple species, such as the North American groundfish (Melnichuk et al., 2013).</p>				
Maritime Traffic (Commercial Transportation and Shipping)	Pacific Ocean	Portions of the Study Area are heavily traveled by commercial, recreational, and government marine vessels, with several commercial ports occurring in or near the Study Area. Section 3.12 (Socioeconomic		O	O	O

Table 4.3-1: Past, Present, and Reasonably Foreseeable Actions (continued)

Project	Location	Project Description	Summary of Impact Minimization and Mitigation Measures ¹	Project Timeframe		
				Past	Present	Future
		Resources and Environmental Justice) provides additional information for marine vessel traffic in the Study Area. Primary concerns for the cumulative impacts analysis include vessels striking marine mammals and sea turtles, introduction of non-native species through ballast water, and underwater sound from ships and other vessels. Therefore, maritime traffic could add to the cumulative impacts on marine mammals and sea turtles in the Study Area.				
National Data Buoy Center (NDBC)	Pacific Ocean and Coastal Areas of the United States	The NDBC has prepared a Programmatic EA to analyze the continued operation of the network of moored buoys and coastal stations of the NDBC program. The NDBC network of buoys includes Coastal Weather Buoys, land based Coastal-Marine Automated Network stations, Tropical Atmosphere Ocean Array, and Deep-ocean Assessment and Reporting of Tsunamis. The NDBC proposes to continue the use of these buoys and stations in order to provide quality in-situ marine observations in a safe and sustainable manner to understand and predict changes in weather, climate, oceans, and coasts (National Data Buoy Center, 2017).		O	O	O
Seismic Surveys	Global	Seismic surveys are typically accomplished by towing a sound source such as an airgun array that emits acoustic energy in timed intervals behind a research vessel. The transmitted acoustic energy is reflected and received by an array of hydrophones. This acoustic information is processed to provide information about geological structure below the		O	O	O

Table 4.3-1: Past, Present, and Reasonably Foreseeable Actions (continued)

Project	Location	Project Description	Summary of Impact Minimization and Mitigation Measures ¹	Project Timeframe		
				Past	Present	Future
		<p>seafloor. The oil and gas industry uses seismic surveys to search for new hydrocarbon deposits. In addition, academic geologists use them to study plate tectonics and other topics. In Washington and the Pacific Northwest, seismic surveys are mostly used for collecting marine seismic reflection data to investigate the earthquake hazard in the region.</p> <p>The underwater sound produced by these surveys could add to the cumulative impacts on marine life, including marine mammals.</p> <p>For example, the potential exists to expose some animals to sound levels exceeding 180 decibels (dB) referenced to (re) 1 micropascal (μPa) root mean square, which would, in turn, potentially result in temporary or permanent loss of hearing (Bureau of Ocean Energy Management, 2011). All seismic surveys conducted by U.S. vessels are subject to the MMPA authorization process administered by the NMFS, as well as the NEPA process associated with issuing MMPA authorizations. Seismic surveys could add to the cumulative impacts on biological resources, including marine mammals, fishes, sea turtles, and invertebrates.</p>				
Undersea Communication Cables	Oceans worldwide	Submarine cables provide the primary means of voice, data, and Internet connectivity between the mainland United States and the rest of the world (Federal Communications Commission, 2017). The Federal Communications Commission grants licenses authorizing cable applicants to install, own, and operate submarine cables and associated landing		C/O	C/O	C/O

Table 4.3-1: Past, Present, and Reasonably Foreseeable Actions (continued)

Project	Location	Project Description	Summary of Impact Minimization and Mitigation Measures ¹	Project Timeframe		
				Past	Present	Future
		<p>stations in the United States. Cables are installed by specialized boats across flat ocean surfaces and dug into the seabed in shallow areas. Over 550,000 mi. of cables currently exist in the world’s oceans.</p> <p>Potential impacts of installation and maintenance activities would include noise and vessel strike from boat traffic, and increased seafloor disturbance and sedimentation in localized areas where the cable is installed.</p> <p>Likewise, electromagnetic fields are generated by some cables that may be sensed by and affect the migration behavior of some fish, sharks, rays, and eels (Bureau of Ocean Energy Management, 2016). With respect to the Proposed Action, this project could add to the cumulative impacts on noise and biological resources, including both marine species and marine habitats.</p>				

¹ Some projects/activities did not list specific impacts minimization measures (such as avoidance techniques, standard operating procedures, or industry best management practices) or mitigation requirements; either official documentation of project descriptions could not be obtained or did not specify these actions. In most cases, site-specific actions are to be developed as specific projects are developed.

Notes: EA = Environmental Assessment, EIS = Environmental Impact Statement, ESA = Endangered Species Act, MMPA = Marine Mammal Protection Act, NMFS = National Marine Fisheries Service, OEIS = Overseas Environmental Impact Statement, U.S. = United States, USFWS = U.S. Fish and Wildlife Service

Table 4.3-2: Ocean Pollution and Ecosystem Alteration Trends

<i>Stressor</i>	<i>Location</i>	<i>Description</i>
Climate Change (Section 3.2, Air Quality)	Global	<p>Predictions of long-term negative environmental impacts due to climate change include sea level rise; changes in ocean surface temperature; changes in weather patterns with increases in the severity of storms and droughts; changes to local and regional ecosystems; ocean acidification; shrinking glaciers and sea ice; thawing permafrost; a longer growing season; and shifts in plant and animal ranges.</p> <p>Anthropogenic greenhouse gas emissions have changed the physical and chemical properties of the oceans, including a 1-degree Celsius temperature rise, increased carbon dioxide absorption, decreased pH, and alteration of carbonate chemistry (Poloczanska et al., 2016). Observations of species responses that have been linked to anthropogenic climate change are widespread, and trends include shifts in species distribution to higher latitudes and deeper locations, earlier onset of spring and later arrival of fall, and declines in calcification.</p> <p>Climate change is likely to impact the Study Area negatively and will contribute added stressors to all resources in the Study Area.</p>
Noise	Global	<p>Vessel noise from commercial shipping and general vessel traffic, oceanographic research, oil and gas exploration, underwater construction, and naval and other use of sound navigation and ranging are most likely to contribute to increases in ocean noise. Any potential for cumulative impact should be put into the context of recent changes to ambient sound levels in the world’s oceans as a result of anthropogenic activities. Appendix D (Acoustic and Explosive Concepts) provides additional information about sources of anthropogenic sound in the ocean and other background information about underwater noise. This section describes the different types of effects that are possible and the potential relationships between sound stimuli and long-term consequences for individual animals and populations. A variety of impacts may result from exposure to sound-producing activities. The severity of these impacts can vary greatly between minor impacts that have no real cost to the animal, to more severe impacts that may have lasting consequences. The major categories of potential impacts are behavioral reactions, physiological stress, auditory fatigue, auditory masking, and direct trauma. With respect to the Proposed Action, noise can cumulatively add to the impacts on marine mammals, and sea turtles, in the Study Area.</p>
Hypoxic Zones	Global	<p>Hypoxia, or low oxygen, is an environmental phenomenon where the concentration of dissolved oxygen in the water column decreases to a level that can no longer support living aquatic organisms. Hypoxia occurs from the rapid growth and decay of algal blooms in response to excess nutrient loading (primarily nitrogen and phosphorus from agriculture runoff, sewage treatment plants, bilge water, and atmospheric deposition). Animals that encounter the Dead Zones flee, experience physiological stress, or suffocate (National Oceanic and Atmospheric Administration, 2016; Texas A&M University, 2011, 2014). Hypoxic zones can be natural phenomena but are occurring in increasing size and frequency due to human-induced nonpoint source water pollution (National Oceanic and Atmospheric Administration, 2016, 2017). In the northern part of the California Current System in the Offshore Area of the Study Area, a seasonal decline in oxygen concentrations and increasing hypoxia (dead zones) occurring over the summer upwelling season has increased over the past few years. With respect to the Proposed Action, hypoxia could add to the cumulative impacts on biological resources, water quality, and socioeconomic resources.</p>

Table 4.3 2: Ocean Pollution and Ecosystem Alteration Trends (continued)

<i>Stressor</i>	<i>Location</i>	<i>Description</i>
Marine Debris (Section 3.1.3.2, Marine Debris)	Global	Marine debris is any anthropogenic object intentionally or unintentionally discarded, disposed of, or abandoned that enters the marine environment (National Marine Fisheries Service, 2006). Common types of marine debris include various forms of plastic and abandoned fishing gear. Marine debris degrades marine habitat quality and poses ingestion and entanglement risks to marine life and birds (National Marine Fisheries Service, 2006). Plastic debris is a major concern because it degrades slowly and many plastics float. The floating debris is transported by currents throughout the oceans and has been discovered accumulating in oceanic gyres (Law et al., 2010). Additionally, plastic waste in the ocean chemically attracts hydrocarbon pollutants such as polychlorinated biphenyl and dichlorodiphenyltrichloroethane, which accumulate up to one million times more in plastic than in ocean water (Mato et al., 2001). Fish, marine animals, and birds can mistakenly consume these wastes containing elevated levels of toxins instead of their prey. In the North Pacific Subtropical Gyre, it is estimated that the fishes in this area are ingesting 12,000–24,000 U.S. tons of plastic debris a year (Davison & Asch, 2011). Marine Debris is likely to impact the Study Area negatively and will contribute added stressors to all resources in the Study Area. With respect to the Proposed Action, marine debris could add to the cumulative impacts on biological resources, water quality, and socioeconomic resources.
Pollution (Section 3.1, Sediments and Water Quality)	Global	Common ocean pollutants are derived from land-based activities and include toxic compounds such as metals, pesticides, and other organic chemicals; excess nutrients from fertilizers and sewage; detergents; oil; plastics; and other solids. Pollutants enter oceans from non-point sources (stormwater runoff from watersheds), point sources (wastewater treatment plant discharges), other land-based sources (windblown debris), spills, dumping, vessels, and atmospheric deposition. Bilgewater is a mix of water, oily fluids, lubricants, and grease, cleaning fluids, and other wastes that are pumped out periodically from vessel holding tanks, either to a reception facility onshore or treated with a bilge oil-separator and discharged at sea. Discharging sewage within 3 NM of the coast is largely prohibited under the Clean Water Act. The main risk of oil or other petroleum product spills is from ships, whether carrying petroleum to and from ports or in fuel tanks and from pipelines and onshore facilities that transport and store oil and gas. With respect to the Proposed Action, pollution could add to the cumulative impacts on sediments and water quality, biological resources, air quality, socioeconomic resource, and public health and safety.

Notes: U.S. = United States, NM = nautical miles

4.4 Resource-Specific Cumulative Impacts

In accordance with CEQ Guidance (Council on Environmental Quality, 1997), the following cumulative impacts analysis focuses on impacts that are “truly meaningful.” The level of analysis for each resource is commensurate with the intensity of the impacts identified in Chapter 3 (Affected Environment and Environmental Consequences) and the level to which impacts from the Proposed Action are expected to mingle with similar impacts from existing activities. A full analysis of potential cumulative impacts is provided for marine mammals, sea turtles, marine invertebrates, and fish. The rationale is also provided for an abbreviated analysis of the following resources: sediments and water quality, air quality, marine habitats, birds, marine vegetation, fishes, cultural resources, Native American and Alaska Native Traditional Resources, socioeconomic resources, and public health and safety.

4.4.1 Sediments and Water Quality

Based on the analysis in Section 3.1 (Sediments and Water Quality), which supplements the analysis presented in the 2015 NWT Final EIS/OEIS, sediments and water quality would still be within applicable standards and guidelines that are established to protect sediments and water quality. Furthermore, the Proposed Action would not result in measurable changes in environmental conditions, including concentrations of metals or munitions constituents in water or sediments, nutrient loading, turbidity, dissolved oxygen, or pH (a measure of acidity). The conclusions of available research indicate that environmental risks from munitions constituents and metals in expended materials in aquatic environments are low, based on the following factors:

- The fate and transport of munitions constituents, including metals, in underwater environments is affected by numerous physical, chemical, and biological processes that typically combine to attenuate the concentrations of munitions constituents and their degradation products at a given site.
- Data from multiple underwater munitions sites indicate that munitions constituent concentrations in seawater and sediments are at detectable levels only in close proximity (1–2 m) from the munition or munitions fragments.
- Sampling data and modeling indicate that munitions constituent concentrations measure in the parts per billion range or lower. There is no significant toxicity to most marine species for munitions constituents at parts per billion concentrations. Therefore, based on toxicity studies conducted at sites with munitions, the concentrations of munitions constituents typically found in seawater and sediments are unlikely to have an adverse effect on marine species at the population and community level.
- The small areas of higher constituent concentrations are considered to pose a low risk to the surrounding benthic community, and the disturbance that would be caused by widespread remedial measures, such as removing the munitions, would pose a comparatively higher risk to the benthic environment.

Other projects proposed to occur within or near the Study Area may add to expended materials, such as Bangor Transit Protection Program Pier and Support Facilities (P-907); Canadian Training and Testing, including activities at Canadian Forces Maritime Experimental and Test Ranges; Explosives Handling Wharf Maintenance; Port Security Barrier; U.S. Coast Guard (USCG) Training; Waterfront Improvements at Naval Base Kitsap Bremerton; Waterfront Service Craft Piers at Naval Station Everett (P-65); Whidbey Island Extend Shoreline Erosion Protection System South; Elwha River Restoration; Inland Waters

Construction covered by the State of Washington; Mukilteo Multimodal Terminal Project; Puget Sound Partnership activities; Southern Resident Orca Task Force; The Seattle Multimodal Ferry Terminal at Colman Dock Project; Smith Island Dredging Project; Thorndyke Resources (Pit-to-Pier) Project; and Undersea Communication Cables; however, the Proposed Action would not contribute significantly to the cumulative expended materials in the Study Area. Therefore, the incremental contribution of the Proposed Action to cumulative impacts on sediments and water quality would be low, and further analysis of cumulative impacts is not warranted.

4.4.2 Air Quality

The incremental contribution of the Proposed Action to cumulative impacts would be low and would still be below applicable state, federal, and USEPA standards and guidelines based on the analysis presented in Section 3.2 (Air Quality) of this Supplemental and the reasons summarized below:

- All of the air emissions sources proposed in this Supplemental are mobile sources and do not impact the current attainment status.
- Few stationary offshore air pollutant emission sources exist within the Study Area and few are expected in the foreseeable future.
- International regulations by the International Maritime Organization required commercial shipping vessels to switch to lower-sulfur fuel near U.S. and international coasts beginning in 2012 (National Oceanic and Atmospheric Administration, 2011). In addition, the International Maritime Organization is set to impose a new 0.5 percent sulfur cap on marine fuel emissions (International Maritime Organization, 2017). The DoD has released the Operational Energy Strategy: Implementation Plan, which will reduce demand, diversify energy sources, and integrate energy consideration into planning (U.S. Department of Defense, 2012). Since then, the Navy has released the 2016 Operational Energy Strategy, which builds on the successes of the 2011 Operational Energy Strategy (U.S. Department of Defense, 2016).

Under this Supplemental, the contribution of proposed increases in training and testing under the Proposed Action would still be negligible based on the reasons presented in Section 3.2 (Air Quality). Vessel and construction-related activities associated with the additional projects could generate increased air emissions; however, air quality in the region would remain below *de minimis* levels due to the quick dispersive nature of emissions. Therefore, further analysis of cumulative impacts on air quality is not warranted.

4.4.3 Marine Habitats

The incremental contribution of the Proposed Action to cumulative impacts would be negligible based on the analysis presented in Section 3.3 (Marine Habitats) of this Supplemental, and the reasons summarized below:

- Most of the proposed activities that might affect marine habitats would occur in areas where hard bottom does not occur.
- Impacts on soft-bottom habitats would be confined to a limited area, and recovery would occur quickly.

Other projects proposed to occur within or near the Study Area, such as in-water construction, may add to impacts on marine habitats; however, the Proposed Action would not contribute significantly to the cumulative impacts on marine habitats in the Study Area. Therefore, further analysis of cumulative impacts on marine habitats is not warranted.

4.4.4 Marine Mammals

The analysis presented in the 2015 NWTT Final EIS/OEIS Section 3.4 (Marine Mammals) detailed the potential for impacts on marine mammals from the various stressors related to Navy training and testing activities. As discussed in Section 3.4.2 (Environmental Consequences) of this Supplemental, in general there have been no substantial changes to the activities analyzed in the 2015 NWTT Final EIS/OEIS that would change the conclusions reached regarding populations of marine mammals in the Study Area. Analysis of cumulative impacts on marine mammals was specifically addressed in the 2015 NWTT Final EIS/OEIS Section 4.4.6 (Marine Mammals).

In association with the 2015 NWTT Final EIS/OEIS, National Marine Fisheries Service (NMFS) determined that within the Study Area only acoustic stressors and explosive stressors could potentially result in harassment and/or the incidental taking of marine mammals from Navy training and testing activities (National Marine Fisheries Service, 2015a; National Oceanic and Atmospheric Administration, 2015) and that none of the other stressors would result in significant adverse impacts or jeopardize the continued existence of any Endangered Species Act (ESA) listed marine mammals (National Marine Fisheries Service, 2014). In addition, NMFS determined that the vast majority of impacts expected from sonar exposure and underwater detonations are behavioral in nature, temporary and comparatively short in duration, relatively infrequent, and specifically not of the type or severity that would be expected to be additive for the small portion of the stocks and species likely to be exposed, and they therefore would not contribute to cumulative impacts.

NMFS specifically incorporated the impacts from other past and ongoing anthropogenic activities (see Section 3.4.1.7, General Threats) into their negligible impact analyses pursuant to the Marine Mammal Protection Act (MMPA) and ESA (National Marine Fisheries Service, 2014; National Oceanic and Atmospheric Administration, 2015). The NMFS Biological Opinion included an explanation of how the results of NMFS' baseline and effects analyses in Biological Opinions relate to those contained in the cumulative impact section of the 2015 NWTT Final EIS/OEIS (National Marine Fisheries Service, 2014, 2015a). NMFS found that Navy training and testing activities are not likely to jeopardize the continued existence of threatened or endangered species in the NWTT Study Area during any single year or as a result of the cumulative impacts of the 5-year authorization under the MMPA (ending in 2020). There has been no emergent science that would necessitate changes to conclusions reached by Navy or NMFS (as a cooperating agency) in association with the 2015 NWTT Final EIS/OEIS with regard to marine mammals. It has long been understood that the cumulative effects of stressors on marine organisms in general and marine mammal populations in particular is extremely difficult to predict (National Academies of Sciences Engineering and Medicine, 2017a). Recognizing the difficulties with measuring trends in marine mammal populations, the focus has been on indicators for adverse impacts, including health and other population metrics (Bradford et al., 2014; Murray et al., 2020; National Academies of Sciences Engineering and Medicine, 2017a, 2017b; Ward et al., 2009). This recommended use of population indicators is the approach Navy has presented in the previous environmental analyses of Navy training and testing activities; see in particular the 2015 NWTT Final EIS/OEIS Section 3.4.4.1 (Summary of Monitoring and Observations During Navy Activities) and the update to that information in this Supplemental (Section 3.4.3.4, Summary of Monitoring and Observations During Navy Activities Since 2015) and National Marine Fisheries Service (2015a). Since the 2015 analyses, neither the present nor the reasonably foreseeable actions detailed in Table 4.3-1 and Table 4.3-2 change the previous assessment that the Navy's contribution to any cumulative impacts on marine mammal populations would be negligible.

Based on the analysis presented in Section 3.4 (Marine Mammals) of this Supplemental, the findings from NMFS regarding cumulative impacts on marine mammals in the NWTT Study Area (National Marine Fisheries Service, 2014), and the reasons summarized above relating to the 2015 NWTT Final EIS/OEIS, the incremental contribution of the Proposed Action to cumulative impacts would be negligible. Therefore, further analysis of cumulative impacts on marine mammals is not warranted.

4.4.5 Sea Turtles

The analysis presented in the 2015 NWTT Final EIS/OEIS Section 3.5 (Sea Turtles) detailed the potential for impacts on sea turtles from the various stressors related to Navy training and testing activities. As discussed in Section 3.5.2 (Environmental Consequences) of this Supplemental, in general there have been no substantial changes to the activities analyzed in the 2015 NWTT Final EIS/OEIS that would change the conclusions reached regarding populations of sea turtles in the Study Area. Analysis of cumulative impacts on sea turtles was specifically addressed in the 2015 NWTT Final EIS/OEIS Section 4.4.7 (Sea Turtles).

Use of acoustic stressors (sonar and other active acoustic sources) and use of explosives have occurred since the 2015 completion of the NWTT Final EIS/OEIS Record of Decision and the 2015 NMFS Biological Opinion. There have been no known adverse effects to sea turtles, impacts on leatherback sea turtle prey items, or population impacts that were not otherwise previously analyzed or accounted for in the 2015 NWTT Final EIS/OEIS or the NMFS Biological Opinion pursuant to the ESA (National Oceanic and Atmospheric Administration, 2015) with regard to acoustic or explosive stressors. Therefore, because there have been no known adverse effects to sea turtles, use of acoustic stressors and explosives would not contribute to cumulative impacts.

There has been no emergent science that would necessitate changes to conclusions reached by Navy or NMFS (as a cooperating agency) in association with the 2015 NWTT Final EIS/OEIS. Since the 2015 analyses, neither the present nor the reasonably foreseeable actions detailed in Table 4.3-1 and Table 4.3-2 change the previous assessment that the Navy's contribution to any cumulative impacts on sea turtles would be negligible.

Based on the analysis presented in Section 3.5 (Sea Turtles) of this Supplemental, and the reasons summarized above relating to the 2015 NWTT Final EIS/OEIS, the incremental contribution of the Proposed Action to cumulative impacts would be negligible. Therefore, further analysis of cumulative impacts on sea turtles is not warranted.

4.4.6 Birds

The analysis presented in the 2015 NWTT Final EIS/OEIS Section 3.6 (Birds) detailed the potential for impacts on birds from the various stressors related to Navy training and testing activities. As discussed in Section 3.6.2 (Environmental Consequences) of this Supplemental, in general there have been no substantial changes to the activities analyzed in the 2015 NWTT Final EIS/OEIS that would change the conclusions reached regarding populations of birds in the Study Area. Analysis of cumulative impacts on birds was specifically addressed in the 2015 NWTT Final EIS/OEIS Section 4.4.8 (Birds).

Marine birds, including ESA-listed species (marbled murrelet and short-tailed albatross), in the Offshore Area are threatened by continued overfishing, pollution, shipping, and oil and gas development (Bureau of Ocean Energy Management, 2017; Melnychuk et al., 2013; Wisniewska et al., 2018). Many of these actions are currently present and are expected to increase in the future (U.S. Fish and Wildlife Service, 2016). Approximately 90 percent of the world's fisheries are already overfished, threatening the ocean

life and habitat. The shipping industry is expected to increase as global trade grows, particularly trans-Pacific container ship trade. Increasing the size of ships carrying containers and cargo goods increase oil spills, dumping of trash, ballast water, and oily waste. Therefore, the aggregate impacts of past, present, and reasonably foreseeable future actions may have a significant effect on birds.

The Proposed Action could also result in injury and mortality to individual birds from underwater explosions, sonar, and strikes. Injury and mortality that might occur under the Proposed Action would be additive to injury and mortality associated with other actions. In the U.S. Fish and Wildlife Service (USFWS) 2016 and 2018 Biological Opinions on activities described in the 2015 NWTT Final EIS/OEIS, the USFWS determined that the relative contribution of military training activities to overall injury and mortality of marbled murrelets and short-tailed albatrosses would be low compared to other major threats to marine birds, such as pervasive plastic debris deposition in the marine environment, bycatch, point and non-point source pollution from land, and other sources of pollution from non-military activities (U.S. Fish and Wildlife Service, 2016). In August 2019, the Navy re-initiated consultation with USFWS on the impact of the Growler homebasing decision on marbled murrelets, and this re-initiation began before the initiation of the consultation for this Supplemental EIS/OEIS. The second Growler Biological Opinion therefore forms the baseline for the NWTT Biological Opinion for this species. The cumulative impacts considerations for this species, based upon the NWTT and Growler consultations, would be addressed in the Record of Decision for this Supplemental EIS/OEIS.

It is likely that distant shipping and aircraft noise (which is more pervasive and continuous) and sound associated with underwater explosions and sonar would overlap in time and space. However, there is no evidence indicating that the combined noise of shipping activities and aircraft noise, and sounds associated with underwater explosions and sonar use, would result in harmful additive impacts on birds.

The potential also exists for the impacts of ocean pollution and acoustic stressors associated with the Proposed Action to be additive or synergistic. It is possible that the response of a previously stressed animal would be more severe than the response of an unstressed animal. However, there are no data indicating that a seabird affected by ocean pollution would be more susceptible to stressors associated with the Proposed Action.

The analysis presented in the 2015 NWTT Final EIS/OEIS Section 3.6 (Birds) detailed the potential for impacts on birds from the various stressors related to Navy training and testing activities. As discussed in this Supplemental (Section 3.6.2, Environmental Consequences), in general there have been no substantial changes to the activities analyzed in the 2015 NWTT Final EIS/OEIS that would change the conclusions reached regarding populations of birds in the Study Area. Analysis of cumulative impacts on birds was specifically addressed in the 2015 NWTT Final EIS/OEIS, Section 4.4.8 (Birds).

In summary, based upon the analysis in Section 3.6 (Birds), and the reasons summarized above, the incremental contribution of the Proposed Action to cumulative impacts on bird populations would be low. Therefore, further analysis of cumulative impacts on birds is not warranted.

4.4.7 Marine Vegetation

Impacts on marine vegetation from projects, such as those that contribute to pollution or climate change, could result in long-term or widespread changes in secondary stressors to the environment that would change environmental conditions such as turbidity, salinity, pH, or water temperature that would impact marine vegetation. The incremental contribution of the Proposed Action to cumulative impacts would be negligible based on the analysis presented in Section 3.7 (Marine Vegetation) and the reasons summarized below:

- Most of the proposed activities would occur in areas where seagrasses and other attached marine vegetation do not grow.
- Impacts would be localized, recovery would occur quickly, and no population level impacts would be expected.
- The Proposed Action would not result in impacts that have been historically significant to marine vegetation. For example, the Proposed Action would not increase nutrient loading, which can cause algal blooms, decrease light penetration, and impact photosynthesis of seagrasses. Furthermore, the Proposed Action would not result in long-term or widespread changes in environmental conditions, such as turbidity, salinity, pH, or water temperature that could impact marine vegetation.
- The Proposed Action would have no effect on ESA-listed species of marine vegetation and would not result in the destruction or adverse modification of critical habitat.

Under this Supplemental, the contribution of proposed increases in training and testing under the Proposed Action would be low, based on the reasons presented above. However, these impacts are expected to be localized, recovery would occur quickly, and no population-level impacts would be expected. Therefore, further analysis of cumulative impacts on marine vegetation is not warranted.

4.4.8 Marine Invertebrates

Under this Supplemental, stressors from the Proposed Action would have no effect or would not significantly impact marine invertebrates. Based upon the analysis in Section 3.8 (Marine Invertebrates), the invertebrate mortality impacts of the Proposed Action under this Supplemental would be cumulative with other actions that cause mortality (e.g., commercial fishing). Under this Supplemental, stressors from the Proposed Action would have no effect or would not significantly impact marine invertebrates. The incremental contribution of the Proposed Action to cumulative impacts would be negligible. This is mainly due to marine invertebrates not being particularly susceptible to energy, entanglement, or ingestion stressors resulting from Navy activities, and none of the alternatives would result in or interact with impacts that have been historically significant to marine invertebrates, such as overfishing, nutrient loading, disease, or the presence of invasive species. Therefore, further analysis of cumulative impacts on marine invertebrates is not warranted.

4.4.9 Fishes

4.4.9.1 Impacts of the Proposed Action that May Contribute to Cumulative Impacts

Based on the analysis presented in Section 3.9 (Fishes) under this Supplemental and the analysis presented in the 2015 NWTT Final EIS/OEIS Section 3.9 (Fish), it is anticipated that the Proposed Action would affect fish species within the Study Area, including ESA-listed fish species. Fishes could be affected by acoustic stressors (sonar and other transducers, vessel noise, and weapons noise), explosives, energy stressors, physical disturbance or strikes (vessels and in-water devices, military expended materials, seafloor devices), entanglement (wires and cables, decelerators/parachutes), and ingestion of military expended materials. The majority of potential impacts include short-term behavioral and physiological responses. For example, fish species that are exposed to sonar and other transducers within their hearing range or that are within close proximity to vessel or weapons noise may experience brief periods of masking or behavioral reactions, such as startle or avoidance responses, or no reaction at all. Other stressors (such as explosives) could also result in injury or mortality to a relatively small number of individuals. As described in Section 3.9.3 (Environmental Consequences), long-term consequences for

most individual fishes or populations are unlikely because exposures from the majority of stressors are intermittent, transient, and unlikely to repeat over short periods.

The general region of influence for fishes extends beyond the Study Area boundaries for some species because the Study Area represents only a portion of the available habitat during its lifecycle, such as anadromous species that spend part of their lifecycle in freshwater. Fishes are usually not distributed uniformly throughout the Study Area, but are typically associated with a specific habitat type (e.g., soft bottom, reef, or open water) or can utilize a variety of habitats at different life stages. The distribution and specific habitats in which an individual of a single fish species occurs may also be influenced by its size, sex, reproductive condition, and other factors such as water temperature and depth. The highest number and diversity of fishes typically occur where the habitat is most diverse; thus, coastal ecosystems tend to support a greater diversity of species than oceanic and deep-sea habitats (Moyle & Cech, 2004).

4.4.9.2 Impacts of Other Actions

The potential impacts of other actions that are relevant to the cumulative impact analysis for fish include the following:

- Mortality associated with vessel strikes, commercial fisheries, bycatch, and entanglement in fishing and other gear
- Injury associated with vessel strikes, bycatch, entanglement, and underwater sound
- Disturbance, behavioral modifications, and reduced animal fitness associated with underwater noise
- Reduced animal fitness associated with water pollution

Most of the other actions and considerations retained for analysis would include operation of marine vessels. Exceptions include the actions listed under environmental regulations and permitting. Stressors associated with marine vessel operations that are of primary concern for the cumulative impacts analysis includes vessel strikes and underwater noise. Many of the actions would also result in underwater noise from sources other than vessels, seismic surveys, and construction activities. Rather than discussing these stressors for individual actions, their aggregate impacts are considered below as “other environmental considerations” in the maritime traffic and ocean noise subsections. Similarly, many of the actions would result in water pollution. The aggregate impacts of water pollution and stressors from commercial and recreation fishing are discussed in the following paragraphs.

As stated in the 2015 NWTT Final EIS/OEIS and in Section 3.9 (Fish) in this Supplemental, with few exceptions, activities involving vessels and in-water devices are not intended to contact the seafloor. Except for bottom-crawling unmanned underwater vehicles, there is minimal potential for strike impact. Physical disturbance and strike stressors from vessels and in-water devices, military expended materials, and seafloor devices have the potential to affect all marine fish groups found within the Study Area, although some fish groups may be more susceptible to strike potential than others. In addition, the potential responses to physical strikes are varied, but include behavioral changes such as avoidance, altered swimming speed and direction, physiological stress, and physical injury or mortality.

Underwater noise can be a threat to marine fishes. Anthropogenic noise is generated from a variety of sources including commercial shipping, oil and gas exploration and production activities, commercial and recreational fishing (including fish-finding sonar, fathometers, and acoustic deterrent devices), recreational boating, whale watching activities and other marine transportation vessels such as ferries,

marine and coastal development (i.e., construction of bridges, ferry terminals, windfarms, etc.), and research (including sound from air guns, sonar, and telemetry). Vessel noise in particular is a major contributor to anthropogenic noise in the ocean and is intensively produced in inland waters. Commercial shipping's contribution to ambient noise in the ocean increased by as much as 12 dB between approximately the 1960s and 2005 (Hildebrand, 2009; McDonald et al., 2008). Frisk (2012) confirmed the trend and reported that between 1950 and 2007 ocean noise in the 25 to 50 Hz frequency range increased 3.3 dB per decade, resulting in a cumulative increase of approximately 19 dB over a baseline of 52 dB (decibels re 1 $\mu\text{Pa}^2/\text{Hz}$). The increase in noise is associated with an increase in commercial shipping, which correlates with global economic growth (Frisk, 2012). Miksis-Olds and Nichols (2016) found low-frequency ocean sound levels have decreased in the South Atlantic and Equatorial Pacific Oceans, similar to a trend of slightly decreasing low-frequency noise levels in the Northeast Pacific. In addition to vessels, other sources of underwater noise include pile-driving activity (Carlson et al., 2007; Casper et al., 2013a; Casper et al., 2012; Casper et al., 2013b; Dahl et al., 2015; Debusschere et al., 2014; Feist et al., 1992; Halvorsen et al., 2012; Popper et al., 2006; Ruggerone et al., 2008; Stadler & Woodbury, 2009), sonar (California Department of Transportation, 2001; Carlson et al., 2007; Mueller-Blenkle et al., 2010; Popper et al., 2006), seismic activity (Popper & Hastings, 2009), and offshore construction projects (Foderaro, 2015).

Noise can cause permanent injury in some marine animals (Popper et al., 2005). Physiological responses to noise have shown a variety of results. For example, the giant kelpfish (*Heterostichus rostratus*) exhibited acute stress response when exposed to intermittent recorded boat engine noise (Nichols et al., 2015). In another study, Holles et al. (2013) found that local, low-intensity noise from recreational boat engines has the capacity to disrupt settlement in coral reef fish larvae, which may lead to impacts on recruitment to adult populations.

Chemicals and debris are the two most common types of pollutants in the marine environment. Global oceanic circulation patterns result in the accumulation of a considerable amount of pollutants and debris scattered throughout the open ocean and concentrated in gyres and other places (Crain et al., 2009). Pollution initially impacts fishes that occur near the sources of pollution, but may also affect future generations from effects to reproduction and increased mortality across life stages.

Chemical pollutants in the marine environment that may impact marine fishes include organic pollutants (e.g., pesticides, herbicides, polycyclic aromatic hydrocarbons, flame retardants, and oil) and inorganic pollutants (e.g., heavy metals) (Pew Oceans Commission, 2003). High chemical pollutant levels in marine fishes may cause behavioral changes, physiological changes, or genetic damage (Goncalves et al., 2008; Moore, 2008; Pew Oceans Commission, 2003). Bioaccumulation is the net buildup of substances (e.g., chemicals or metals) in an organism from inhabiting a contaminated habitat or from ingesting food or prey containing the contaminated substance (Newman, 1998), or from ingesting the substance directly (Moore, 2008). Bioaccumulation of pollutants (e.g., metals and organic pollutants) is also a concern to human health because people consume top predators with high pollutant loads.

Marine debris is a widespread global pollution problem, and trends suggest that accumulations are increasing as plastic production rises (Rochman et al., 2013). Debris includes plastics, metals, rubber, textiles, derelict fishing gear, vessels, and other lost or discarded items. Derelict fishing gear include abandoned nets and lines that pose a threat to fishes. Due to body shape, habitat use, and feeding strategies, some fishes are more susceptible to marine debris entanglement than others (Musick et al., 2000; Ocean Conservancy, 2010). Entanglement in abandoned commercial and recreational fishing gear has caused declines for some marine fishes.

Microplastics (i.e., plastics less than 5mm in size) in the marine environment are well documented, and interactions with marine biota, including numerous fish species have been described worldwide (Lusher et al., 2016). Plastic waste in the ocean chemically attracts hydrocarbon pollutants such as polychlorinated biphenyl (PCB) and dichlorodiphenyltrichloroethane, which accumulate up to one million times more in plastic than in ocean water (Mato et al., 2001). Fishes can mistakenly consume these wastes containing elevated levels of toxins instead of their prey. Rochman et al., (2015) found marine debris in 28 percent of the individual fish examined and in 55 percent of all fish species analyzed.

Coastal development and increased human population activities in coastal areas, such as increased tourism, non-point source pollution and runoff, power plant entrainment, and degradation of nearshore water quality and seagrass beds, will continue to have impacts on fish.

Exploitation from commercial and recreational fishing is the single-biggest cause of changes in fish populations and communities (Moyle & Cech, 2004). Historic and current overfishing largely contributed to the listing of ESA-protected marine species (Crain et al., 2009; Kappel, 2005). Overfishing of a resource results from both legal and illegal fishing (poaching) and bycatch of resources in quantities above a sustainable level. By the end of 2015, 28 managed fish stocks in the U.S. were on the overfishing list and 38 stocks were on the overfished list, while the number of rebuilt fish stocks since 2000 increased to 39 (National Marine Fisheries Service, 2016b).

In recent decades, commercial fisheries have targeted the larger, predatory, and sometimes higher-priced fish species. Gradually, the fishing pressure could make the larger species more scarce, and fishing will move towards the smaller species (Pauly & Palomares, 2005). Other factors, such as fisheries-induced evolution and intrinsic vulnerability to overfishing, have been shown to reduce the abundance of some populations (Kauparinen & Merila, 2007). Fisheries-induced evolution is a change in genetic composition of the population that results from intense fishing pressure, such as a reduction in the overall size and growth rates of fishes in a population. Intrinsic vulnerability is when certain life history traits (e.g., large body size, late maturity age, low growth rate, low offspring production) result in a species being more susceptible to overfishing than others (Cheung et al., 2007).

Although these factors are a concern for fisheries worldwide, fisheries off the U.S. West Coast are managed conservatively, in keeping with the requirements of the Magnuson-Stevens Fishery Conservation and Management Act. Fish stocks within the Study Area that were historically overfished have recovered or are recovering from their overfished status and contributing to the overall trend of increasing abundance of U.S. marine fish stocks (National Marine Fisheries Service 2013, National Marine Fisheries Service 2014b).

4.4.9.3 Cumulative Impacts on Fish

The Proposed Action could also result in injury and mortality to individual fish from underwater explosions, sonar, and strikes. Injury and mortality that might occur under the Proposed Action would be additive to injury and mortality associated with other actions. However, the relative contribution to the overall injury and mortality would be low compared to other actions, such as bycatch, storm runoff, plastic debris, and other non-military activities (as discussed in Section 4.4.9.2, Impacts of Other Actions).

It is likely that distant shipping and aircraft noise (which is more pervasive and continuous) and sound associated with underwater explosions and sonar would overlap in time and space. However, there is no evidence indicating that the co-occurrence of shipping and aircraft noise, and sounds associated with underwater explosions and sonar use would result in harmful additive impacts on fish.

The potential also exists for the impacts of ocean pollution and acoustic stressors associated with the Proposed Action to be additive or synergistic. It is possible that the response of a previously stressed animal would be more severe than the response of an unstressed animal. However, there are no data indicating that a fish affected by ocean pollution would be more susceptible to stressors associated with the Proposed Action.

In summary, based upon the analysis in Section 3.9 (Fishes), the aggregate impacts of past, present, and other reasonably foreseeable future actions contributing multiple water quality, noise, and physical risks to fishes would likely continue to have significant effects on individual fishes and fish populations. However, Navy training and testing activities are generally isolated from other activities in space and time and the majority of the proposed training and testing activities occur over a small spatial scale relative to the entire Study Area, have few participants, and are of a short duration. Although it is possible that the Proposed Action could contribute incremental stressors to a small number of individuals, which would further compound effects on a given individual already experiencing stress, it is not anticipated that the Proposed Action has the potential to put additional stress on entire populations already in significant decline. Therefore, it is anticipated that the incremental contribution of the Proposed Action, when added to the impacts of all other past, present, and reasonably foreseeable future actions, would not result in measurable additional significant impacts on fishes in the Study Area or beyond.

4.4.10 Cultural Resources

4.4.10.1 Impacts of the Proposed Action That May Contribute to Cumulative Impacts

Based on the analysis presented in Section 3.10 (Cultural Resources) under this Supplemental and the analysis presented in the 2015 NWTT Final EIS/OEIS Section 3.10 (Cultural Resources), the Proposed Action could result in impacts on submerged prehistoric sites and previously unidentified submerged historic resources if certain training and testing activities are conducted where these resources occur. Stressors that could impact cultural resources include underwater explosions on or near the bottom, use of towed in-water devices, and use of ocean bottom deployed devices. Because cultural resources are considered nonrenewable resources, these impacts would be considered long-term and permanent.

The Navy avoids locations of known obstructions to prevent damage to sensitive Navy equipment and vessels and to ensure the accuracy of training and testing exercises. Known obstructions include some historic shipwrecks; however, it is unknown if all submerged obstructions, historic shipwrecks, or other cultural resources have yet been discovered in the Study Area.

4.4.10.2 Impacts of Other Actions

With a few exceptions, most of the other actions described in Table 4-1 that are not related to the Proposed Action, but retained for cumulative impacts analysis, would involve some form of disturbance to the ocean bottom. Exceptions include environmental regulations and planning actions, ocean pollution, and most forms of ocean noise. Actions that would disturb the ocean bottom could impact submerged cultural resources. For example, ocean bottom disturbance would occur from construction related activities such as ship anchoring, and installation of wind turbine piers. Any physical disturbance on the continental shelf and ocean floor could inadvertently damage or destroy submerged prehistoric sites and submerged historic resources.

The other actions that result in ocean bottom disturbance require some form of federal authorization or permitting. Requirements of the National Historic Preservation Act (NHPA) apply to actions in territorial

waters. Therefore, for these actions in territorial waters, federal agency procedures have been implemented to identify cultural resources, avoid impacts, and mitigate if impacts cannot be avoided. For example, the Bureau of Ocean Energy Management, Regulation and Enforcement has procedures in place to identify the probability for the presence of submerged historic resources and the locations submerged prehistoric sites shoreward from the 148 ft. (45.1 m) isobath, and for project redesign and relocation to avoid identified resources (Minerals Management Service, 2007). Nonetheless, inadvertent impacts could occur if unidentified submerged cultural resources are present.

4.4.10.3 Cumulative Impacts on Cultural Resources

Impacts on submerged cultural resources from other actions would typically be avoided or mitigated through implementing federal agency programs. However, impacts could occur if mitigation measures cannot be implemented as intended or if inadvertent disturbance or destruction of unidentified resources occurs. Disturbance or destruction of a submerged prehistoric site would diminish the overall archaeological record and decrease the potential for meaningful research on Paleomarine traditions (6,500–5,000 Before Present) and early European explorers of the Northwest coast (1700s–1800s). Disturbance or destruction of a submerged historic site, including a shipwreck, could diminish the overall record for these resources and decrease the potential for meaningful research on these resources. Based upon the analysis in Section 3.10 (Cultural Resources), when considered with other actions (see Table 4.3-1 and Table 4.3-2), the Proposed Action would not contribute to and increase the cumulative impacts on submerged prehistoric and historic resources. Therefore, further analysis of cumulative impacts on cultural resources is not warranted.

The Olympic National Park was accepted as a World Heritage Site in 1981. Because most of the Olympic National Park is designated as wilderness, the natural soundscape is an important element and prevalent in much of the park. The National Park Service regards natural and cultural sounds as part of a web of resources that must be protected. Threats to natural soundscape come from development and other human activities inside and outside the park (National Park Service, 2008). Based on the analysis in the noise study for this Supplemental (Appendix J, Airspace Noise Analysis for the Olympic Military Operations Area), it is notable that the noise exposure for more than 91 percent of the area beneath the Olympic Military Operations Area (MOA) would be less than 35 A-weighted decibels (dBA). For the cumulative noise metrics, the noise modeling results show that the area underneath the Olympic MOA would experience a cumulative noise exposure of less than 37 dBA for both the reference (current) activities and the proposed activities. Flyover event noise levels during transit (less than one minute) would be higher than average background noise levels in the national park and wilderness areas. Although they are not substantially above the range of noise levels that can occur under natural conditions, they would still be additive to the baseline average of 35 dBA and the proposed aircraft activity average hovers around 36 dBA. The noise levels experienced within the MOA would not result in any risks to public health and safety. Other activities such as logging, construction, academic research, and recreation in the Olympic National Park contribute to cumulative impacts to the noise environment. When considered with other actions (e.g., logging, construction, recreation, transportation, and others; see Table 4.3-1 and Table 4.3-2), the contribution of the Proposed Action of this Supplemental EIS/OEIS to the Olympic National Park soundscape would be short term, intermittent, and temporary due to the nature of the activities as overflights. Therefore, because the area underneath the Olympic MOA would experience a cumulative noise exposure of less than 37 dBA for both the reference (current) activities and the proposed activities, cumulative impacts on key resources or the value of the Olympic National Park would not be significant.

4.4.11 Native American and Alaska Native Traditional Resources

4.4.11.1 Impacts of the Proposed Action that May Contribute to Cumulative Impacts

Based on the analysis presented in Section 3.11 (American Indian and Alaska Native Traditional Resources) under this Supplemental and the analysis presented in the 2015 NWTT Final EIS/OEIS Section 3.11 (American Indian and Alaska Native Traditional Resources), the Proposed Action could result in impacts on American Indian and Alaska Native protected tribal resources and other traditional resources by impeding, generally for brief duration, access to areas of co-use such as usual and accustomed (U&A) fishing grounds, which may prevent fishing in limited seasons. Stressors that could impact American Indian and Alaska Native Traditional resources include impeding access to U&A fishing grounds or traditional fishing areas, changes in the availability of marine resources or habitat, and loss of fishing gear.

The Navy has established protective measures to reduce potential effects on cultural and natural resources from training and testing exercises. While most of these protective measures focus on protection of the natural environment, they also benefit culturally valued natural resources, such as salmon and shellfish. Some of the protective measures include avoidance of known submerged obstructions, use of inert ordnance and passive tracking and acoustical tools, and avoidance of sensitive habitats to ensure that significant concentrations of sea life are not present.

The Navy strives to maintain safety and accommodate, to the extent possible, access to tribes' usual and accustomed areas in co-use navigable waters. The Navy provides the USCG with information on the locations of potentially hazardous training or testing activities at sea so the USCG can issue Notices to Mariners (NTMs). In some instances, the Navy has directly notified affected American Indian tribes and nations to ensure that their activities in usual and accustomed fishing areas can avoid any potentially hazardous training or testing locations at sea. Advance communication of intent directly and through NTMs issued by the USCG increases the ability of the Tribes and Navy to share use of the Study Area with less conflict, reducing the potential for lost or damaged Tribal fishing gear. Any claims for loss or damage to fishing gear related to Navy activities are addressed through the Navy's claims adjudication process. Information on admiralty claims can be found at the Navy Judge Advocate General's Corps website: http://www.jag.navy.mil/organization/code_11.htm. Reduced access to human activities in the ocean or inland waterways would be an impact if it directly contributed to loss of income, revenue, or employment, or if cultural knowledge is lost because tribal members cannot teach their children and grandchildren to fish in areas where they were taught by their ancestors.

4.4.11.2 Impacts of Other Actions

Actions that would disturb the ocean bottom could impact submerged American Indian and Alaska Native Traditional resources. For example, ocean bottom disturbance would occur from installing a piling in a former oyster bed of significance to a tribe or nation. Any physical disturbance on the continental shelf and ocean floor (including the Inland Waters and the Western Behm Canal) could inadvertently damage or destroy submerged fishing gear, or areas of traditional or cultural significance. Other actions that could impact American Indian and Alaska Native Traditional Resources include environmental regulations and planning actions, ocean pollution, and most forms of ocean noise.

The construction of the Seattle Multimodal Ferry Terminal at Colman Dock, has the potential to impact American Indian Traditional Resources. The other actions that result in ocean bottom disturbance require some form of federal authorization or permitting. Therefore, requirements of the NHPA apply to actions in territorial waters. Federal agency procedures have been implemented to identify American

Indian and Alaska Native Traditional resources, avoid impacts, and mitigate if impacts cannot be avoided. For example, traditional resources along with archaeological and architectural resources are protected by various laws and their implementing regulations: the NHPA of 1966 as amended in 2006, the American Indian Religious Freedom Act of 1978, and the Native American Graves Protection and Repatriation Act of 1990. Within state territorial waters (0–3 NM), the NHPA is the guiding mandate; within U.S. territorial waters (0–12 NM), the NEPA is the primary mandate. Areas beyond 12 NM are beyond the jurisdiction of NEPA, but they are covered by Executive Order 12114. Nonetheless, inadvertent impacts could occur if unidentified submerged tribal or traditional resources are present.

4.4.11.3 Cumulative Impacts on Native American and Alaska Native Traditional Resources

The success of American Indian tribal fisheries has been impacted by long-term changes in the environment that can reduce fish stocks due to impacted water quality, reduced habitat—especially spawning habitat for salmon runs, and increased commercial harvests. The Navy has an active consultation process in place and will continue to consult on a government-to-government basis with potentially affected American Indian tribes and nations regarding Navy activities that may have the potential to impact protected tribal treaty rights and resources. The Navy's other measures to prevent pollution from its own operations and sustain or improve habitat value help to offset some of the cumulative impacts. Pursuant to the Navy's government-to-government consultation with federally-recognized American Indian and Alaska Native tribes and nations, agreements (both formal and informal) regarding protocols or tribal mitigation measures may be developed to reduce or eliminate impacts on protected tribal treaty reserved rights and protected tribal resources.

4.4.12 Socioeconomic Resources

As stated in the 2015 NWTT Final EIS/OEIS, the Proposed Action could contribute to impacts on accessibility to nearshore areas popular for commercial and recreational fishing and some tourism activities that access the marine environment. However, limits on accessibility to these areas are not expected to significantly impact these resources, because restrictions would be temporary and of short duration (hours). To ensure public safety, access to waters within exclusion areas would be limited during military training and testing activities. The same limitations on accessing portions of the Study Area designated as restricted areas, and warning areas as described in the 2015 NWTT Final EIS/OEIS and in the CFR would still apply. Refer to 33 CFR (Navigation and Navigable Waters) Part 334 (Danger Zone and Restricted Area Regulations), 33 CFR 165.1401 (Safety Zones), and 14 CFR 73.1 (Special Use Airspace) for specific regulations regarding these ocean areas and airspace. In addition, the USCG has published a final rule establishing protection zones extending 500 yards (yd.) around all Navy vessels in navigable waters of the United States and within the boundaries of Coast Guard Pacific Area (32 CFR Part 761). All vessels must proceed at a no-wake speed when within a protection zone. Non-military vessels are not permitted to enter within 100 yd. of a U.S. naval vessel, whether underway or moored, unless authorized by an official patrol. Refer to Section 3.12.2.1.1.2 (Inland Waters) for more information on accessibility to areas of the Study Area.

When training or testing activities are scheduled that require specific areas to be free of non-participating vessels and aircraft, the military requests that the USCG issues an NTM and that the Federal Aviation Administration issues a notice to airmen (NOTAM), as applicable for the activity. These measures are intended to alert the public of pending training or testing activities and to ensure the safety of the public and military personnel. Providing advance notice of scheduled activities should allow members of the public to avoid unexpected delays or interruptions to their planned activities due to restrictions on accessing areas used for military activities.

4.4.12.1 Resource Trends

The maritime ports of Seattle and Tacoma (combined) were the nation's sixth-highest ranked port (out of 150) by value of shipments for international waterborne trade (imports + exports) in 2015. The port has not ranked as high since 2011, when it was fifth in the nation (American Association of Port Authorities, 2016). The volume of international trade at Seattle-Tacoma peaked in 2012 at nearly 20.5 million metric tons, declining to just under 19 million metric tons in 2015. While recent trends show a decline, the volume of goods in 2015 is approximately equivalent to pre-recession totals (U.S. Maritime Administration, 2015).

Recent trends in commercial fisheries landings are mixed. The value of commercial fisheries landings in the State of Washington declined from 2013 through 2016 (the latest year available), and the volume (measured in pounds) of commercial landings declined between 2013 and 2015 but increased by approximately 10 percent in 2016. Commercial landings in Oregon followed a similar trend from 2013 through 2016; however, both the volume and value of commercial landings in Oregon increased from 2015 to 2016 (National Marine Fisheries Service, 2016a). These trends suggest that the volume and value of fisheries landings in the State of Washington and Oregon may begin trending upwards in 2017.

Portions of the Olympic National Park and Olympic National Forest underlie the Olympic MOA (special use airspace) and are within the Study Area, and draw tourists into the State of Washington. Visitation increased each year from 2013 through 2017, reaching a peak of over 3.4 million people in 2017, declining to 3.1 million in 2018, and increasing again to 3.25 million in 2019 (National Park Service, 2020). Other economic sectors associated with the tourism industry have also been trending upwards. Airborne noise generated by aircraft overflights continues to be a concern for some visitors to the Olympic National Park (Rudzitis, 2018). While visitation to the park does not appear to be impacted, the enjoyment of the park by some visitors could be disturbed by aircraft overflights and may be temporarily interrupted. Tourism continues to be popular in the inland waters area including Puget Sound and Hood Canal (see Section 3.12.2.2.2, Inland Waters, for details). As described in Section 3.12.2.2.3 (Western Behm Canal, Alaska), tourism, primarily via larger cruise ships, continues to be seasonally popular in southeast Alaska waterways, although large cruise ships do not enter Behm Canal.

4.4.12.2 Impacts of Other Actions

Waterways in the Study Area are heavily traveled by commercial, recreational, and other vessels, including military and USCG vessels. Several major commercial ports are located in or near the Study Area, including the ports of Seattle and Tacoma in southern Puget Sound, and the Canadian ports of Vancouver and Victoria. Vessels transiting to and from U.S. and Canadian ports use the Strait of Juan de Fuca. Van Dorp and Merrick (2017) estimate that there are 8,300 transits of deep draft vessels through the Strait of Juan de Fuca annually, with 5,500 accessing Canadian Ports and the other 3,700 transiting through Puget Sound at Admiralty Inlet. Within Washington state waters, the USCG Vessel Traffic Service handles approximately 170,000 ferry transits annually. Commercial vessel traffic has the potential to limit access by the public to waterways, which would also include access by tourism related activities and businesses (e.g., whale watching vessels).

Several commercial airways traverse the Olympic Peninsula and Olympic National Park, connecting major airports in the region, including the Seattle-Tacoma International Airport, Portland International Airport, and the Olympia Regional Airport (see Figure 3.12-4 and Figure 3.12-5). There are also numerous smaller commercial and general aviation airports in the region, including on the Olympic

Peninsula. Airborne noise generated by commercial and private aircraft using airways traversing the Olympic National Park may disturb, or otherwise impact the enjoyment of, individuals visiting the park.

Aquaculture activities using inland waters in Puget Sound have been shown to impact social and economic resources in the Inland Waters portion of the Study Area, as demonstrated by the August 2017 spill of farmed Atlantic salmon off Cypress Island (Mapes, 2018). Initially, it was assumed that the escaped salmon were not able to feed and died from starvation. Subsequent findings contradicted that assertion, and Atlantic salmon continued to be caught by tribal fishermen through December 2017 (Cauvel, 2017; Mapes, 2018). The possibility of future spills of farmed salmon and the risk that they would pose to the survival of native salmon species led Governor Inslee to sign into law a ban on the farming of Atlantic Salmon in Washington State waters (Ryan, 2018). The State's remaining Atlantic salmon farms would cease operations by 2022, once their existing leases with the Washington Department of Natural Resources expire.

4.4.12.3 Cumulative Impacts on Socioeconomic Resources

Regarding cumulative impacts to the Olympic National Park from military, civilian, and private flights, data from the FAA indicates that the military makes up approximately 7 percent of flights within the transition area to and from the Olympic Military Operating Area, while air carriers make up approximately 71 percent of flights and general aviation makes up approximately 22 percent of the flights; over the Olympic National Park, the military flights make up approximately 25 percent of flights, while air carriers make up approximately 67 percent and general aviation makes up approximately 8 percent of flights; over the Olympic Peninsula and Puget Sound military flights make up approximately 6 percent of flights, while air carriers make up approximately 74 percent and general aviation makes up approximately 20 percent of flights. While an increase in military flights over the Olympic Peninsula would contribute to cumulative impacts from airborne noise, 75 to 94 percent of flights over the region are conducted by commercial air carrier aircraft and general aviation aircraft (FAA ATO NAS Analytics - AJV-W25, 2019). The approximately 13 percent increase in military flights under Alternative 1 and 2 would not substantially change the proportion of military flights over the Olympic Peninsula or substantially increase the potential for noise impacts on the Olympic Peninsula, including in the Olympic National Park. Furthermore, the analysis in Section 3.12 (Socioeconomic Resources and Environmental Justice) indicates that the impacts of the Proposed Action on socioeconomic resources would be negligible.

The Proposed Action is not expected to contribute to cumulative socioeconomic impacts. Cumulative impacts from intermittent and short-term impacts on accessibility to areas within the Study Area, physical disturbances and interactions, airborne acoustics that disturb people on the ground (e.g., in the Olympic National Park), and secondary impacts (e.g., to tourism) resulting from effects on marine species populations are not anticipated. No cumulative impacts on commercial transportation and shipping are anticipated, because major shipping routes and airways are well defined, and training and testing activities would avoid those areas. The Navy would continue to reduce or avoid impacts on commercial and recreational fishing and tourism and recreation by continuing to notify the public of upcoming activities that may limit accessibility to certain areas of the Study Area popular participants in these activities. Broader socioeconomic metrics generally indicate that the region is prospering economically. For example, data reported by the National Ocean Economics Program show that the tourism and recreation industry in Washington coastal counties increased steadily from 2010 to 2014 (National Ocean Economics Program, 2017). Short duration limits on accessibility, potentially impacting recreational and tourism related activities, are expected to be intermittent and have no long-term,

cumulative impacts. Airborne acoustics from aircraft overflights in the Olympic MOA, potentially impacting recreational and tourism activities on the Olympic Peninsula, are expected to be brief (seconds) and discrete and are not expected to have long-term negative impacts on the enjoyment of the Olympic Peninsula, including Olympic National Park. Because much of the Proposed Action would take place at 12 NM or more offshore from northern California, and Oregon, and because the Proposed Action is not expected to contribute to cumulative socioeconomic impacts in any of the states included in the Study Area, no cumulative negative impacts on the economies of Northern California, Oregon, Washington, or southeast Alaska are anticipated.

4.4.13 Public Health and Safety

The analysis presented in Section 3.13 (Public Health and Safety) of this Supplemental demonstrates that the Proposed Action would not contribute incrementally to cumulative impacts on public health and safety. Other actions discussed in Table 4.3-1 and Table 4.3-2 are not expected to contribute incrementally to cumulative public health and safety impacts. Because the Proposed Action would not contribute to cumulative impacts, and other actions discussed in Table 4.3-1 and Table 4.3-2 are not expected to contribute to cumulative impacts, further analysis of cumulative impacts on public health and safety is not warranted.

4.5 Summary of Cumulative Impacts

The analyses presented in this chapter and Chapter 3 (Affected Environment and Environmental Consequences) indicate that the incremental contribution of the Proposed Action to cumulative impacts on sediments and water quality, air quality, marine habitats, marine vegetation, marine invertebrates, and public health and safety would not rise to a level of significance. Marine mammals, sea turtles, birds, fishes, cultural resources, Native American and Alaska Native Traditional resources, and socioeconomic resources are the primary resources of concern for this cumulative impacts analysis:

- Due to past and present activities, several marine mammal species, all sea turtles, three birds, and multiple fish species occurring in the Study Area are ESA-listed.
- These resources would be impacted by multiple present and reasonably foreseeable future actions.
- Explosive detonations and vessel strikes under the Proposed Action have the potential to disturb, injure, or kill marine mammals, sea turtles, birds, and fish.
- The use of sonar and other non-impulsive sound sources under the Proposed Action has the potential to disturb or injure marine mammals, sea turtles, birds, and fish.
- Impacts on American Indian traditional resources could occur during training and testing activities due to short-term reduced access to tribal usual and accustomed fishing grounds in the Inland Waters. Impacts from training and testing activities would not alter fishes and other marine species population levels or the availability of these resources for tribal use. Loss or damage to American Indian fishing equipment from vessel and in-water device strikes, and inadvertent snagging of military expended materials, could occur in the Offshore Area and in the Inland Waters, reducing fishing opportunities while fishing equipment is being replaced or repaired and increasing the amount of effort and resources required to catch the same amount of fish.
- The noise exposure within the Olympic MOA and W-237A is within the Department of Defense's Noise Zone 1, with Day Night Average Sound Levels below 65 A-weighted decibels, the federal threshold for significance, for the entire area studied (see Appendix J, Airspace Noise Analysis

for the Olympic Military Operations Area). Therefore, there would be no cumulative significant impact to jet noise over the Olympic National Park as a result of the impacts of the Proposed Action.

In summary, based on the analysis presented in Section 3.4 (Marine Mammals), 3.5 (Sea Turtles), 3.6 (Birds), 3.9 (Fishes), 3.10 (Cultural Resources), 3.11 (American Indian and Alaska Native Traditional Resources), and 3.12 (Socioeconomic Resources and Environmental Justice), the current aggregate impacts of past, present, and other reasonably foreseeable future actions are not significantly different than the assessment in the 2015 NWTT Final EIS/OEIS. No new information or circumstances are significant enough to warrant further cumulative impact review.

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