Sanctuary Resource Statement

For the U.S. Navy's Northwest Training and Testing (NWTT) Activities
In the Olympic Coast National Marine Sanctuary
and
For Associated National Marine Fisheries Service Authorization of
Incidental Take Under the Marine Mammal Protection Act

Prepared in Accordance with Section 304(d) of the
National Marine Sanctuaries Act

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1. Description of the proposed federal action, including:

Section 304(d) of the National Marine Sanctuaries Act, requires the U.S. Navy (Navy) consult on Navy activities as documented in the Northwest Training and Testing (NWTT) Environmental Impact Statement/Overseas Environmental Impact Statement (EIS/OEIS), that are likely to injure sanctuary resources[1]. In addition, the National Marine Fisheries Service (NMFS) is required to consult on its associated proposal to issue incidental take authorizations under the Marine Mammal Protection Act (MMPA) to the Navy for takes of marine mammals incidental to NWTT activities. On July 13, 2015 the Navy and representatives of NMFS conducted an initial consultation meeting with the Superintendent of the Olympic Coast National Marine Sanctuary (OCNMS), and Office of National Marine Sanctuaries (ONMS) representatives to address potential impacts to Sanctuary resources from the proposed activities in the NWTT EIS/OEIS and the proposed MMPA authorizations to take marine mammals incidental to those activities. This Sanctuary Resource Statement is jointly prepared by both the Navy and NMFS in support of the Section 304(d) consultation process.

Consultation History Between the U.S. Navy and the OCNMS- The Navy consulted with the OCNMS on Navy subsurface, offshore surface (to include Quinault Range Site testing) and aerial activities that could occur within the Sanctuary when the OCNMS was first proposed and established in 1993. At that time, the existing military training and testing activities were considered in the Sanctuary Management Plan in 1994 (Olympic Coast National Marine Sanctuary, Final EIS (November 1993)).

Since that consultation, the Navy has established an ongoing dialogue with the OCNMS staff. The Navy has been a member of the Sanctuary's Advisory Council and has provided comment and input to more recent updates of the Sanctuary's management plan and regulations as recent as 2011-2012. Activities by the Department of Defense (DoD) and the Navy have been and continue to be compatible with the OCNMS Management Plan.

From 2007 through 2010 the Navy and the OCNMS exchanged correspondence and conducted meetings on the proposed training activities under the Northwest Training Range Complex (NWTRC) EIS/OEIS. At that time, the Navy analyzed the potential for increase in the frequency of certain training activities, but determined there was no anticipated injury to OCNMS resources or significant increases in scope, nature or intensity of the activities previously conducted as explained in prior environmental documents and management plans for the OCNMS. On April 5, 2011, the Navy responded to reasonable and prudent alternatives presented by the OCNMS which included agreeing to provide to the OCNMS annual monitoring reports that are provided to NMFS, to not site a proposed non-explosive training minefield within the Sanctuary, and to consider use of biodegradable components for military expended materials used for training purposes.

[1] Pursuant to Section 304(d) of the National Marine Sanctuaries Act (NMSA), consultation is required when federal agency actions are "likely to destroy, cause the loss of, or injure a sanctuary resource." NMSA and Office of National Marine Sanctuaries (ONMS) regulations (15 CFR 922.3) define a sanctuary resource as "any living or non-living resource of a National Marine Sanctuary that contributes to the conservation, recreational, ecological, historical, research, educational, or aesthetic value of the Sanctuary...". ONMS regulations define "to injure" as "to change adversely, either in the short or long term, a chemical, biological or physical attribute of, or the viability of. This includes, but is not limited to, to cause the loss of or destroy." Throughout this document reference to the word "injury" means "injury" as defined under the ONMS regulations.

The Navy engaged in consultation with the OCNMS in 2011 on activities conducted under the Naval Undersea Warfare Center (NUWC) Keyport Range Complex Extension EIS, specifically activities conducted at the Quinault Range Site within the OCNMS. The Sanctuary presented the Navy with seven reasonable and prudent alternatives in accordance with NMSA Section 304(d), the Navy responded, and consultation concluded.

Currently, the activities proposed in the NWTT EIS/OEIS (Navy 2014a, 2015a) including those at the Quinault Range Site are substantially the same as Navy activities previously analyzed. While Navy activities have evolved over time and specific details have changed, the general activity types conducted in or near the OCNMS have not changed significantly. More importantly, the Navy continues to improve the resource protection measures used during activities at sea, seeking to reduce stress on the environment from its activities.

The NMFS Office of Protected Resources (OPR) is a cooperating agency on the NWTT EIS/OEIS, and the OCNMS is a member of the cooperating agency team by request from the NMFS OPR. As a cooperating agency and member of the cooperating agency team, NMFS and the OCNMS have been involved in the development of the Draft EIS/OEIS, the Supplement to the Draft EIS/OEIS, the Final EIS/OEIS, and public comment resolution. The Navy's NWTT EIS/OEIS team conducted project briefs and meetings with OCNMS staff on December 13, 2012, May 18, 2012, November 19, 2013 and May 16, 2014.

On December 17, 2013, the Navy requested Letters of Authorization (LOA) from the NMFS for Navy training and testing in the NWTT Study Area pursuant to the Marine Mammal Protection Act (MMPA), and on January 9, 2015 initiated formal consultation pursuant to the Endangered Species Act (ESA).

The OCNMS' 2011 Final Management Plan (NOAA 2011) consists of 20 action plans grouped under five priority needs. The Navy supports the priority needs of the Management Plan through current and ongoing consultations and permitting under the MMPA, ESA, and Magnuson-Stevens Fishery Conservation and Management Act, application of robust, established mitigations vetted by the NMFS, and application of standard operating procedures which can have additional protective benefits, as summarized in **Table 1**. The Navy is carrying these measures forward and adapting them to the activities proposed in the NWTT EIS/OEIS.

Table 1. Navy Support Of the OCNMS Final Management Plan Priority Needs

OCNMS Final Management Plan- Priority Needs and Action Plans		Navy Supporting Action
A. Achieve Effective Collaborative and Coordinated Management		
	A1. Collaborative and Coordinated Sanctuary Management Action Plan	The Navy has been meeting with Sanctuary staff to discuss ongoing Navy actions and marine species monitoring results applicable to OCNMS since 2002. Navy Region Northwest has been represented on the OCNMS Advisory Council since 2007. This aligns with Sanctuary Strategy CCM7.
	A2. Community Involvement in Sanctuary Management Action Plan	Not applicable to Navy activity.
	A3. Sanctuary Operations Action Plan	Not applicable to Navy activity.
B. Conduct Collaborative Research, Assessments and Monitoring to Inform Ecosystem-Based Management		
	B1. Habitat Mapping and Classification Action Plan	Navy Region Northwest has assisted in review of data as well as coordination of data access from sources such as the University of Washington. In addition, Navy Region Northwest participates in the Washington State Marine Planning group and the Navy is active with the National Ocean Council's Regional Planning Body.
	B2. Physical and Chemical Oceanography Action Plan	Navy does not actively participate in this element, however, through compliance with various federal environmental laws, Navy has well established protocols for avoiding at-sea pollution from incidental ship discharges or other actions detrimental to OCNMS physical and chemical oceanography. See discussion in Section 2(iii) and Navy (2014a).
	B3. Populations, Communities, and Ecosystems Action Plan	Navy has contributed key marine mammal demographic information from over 10 years of monitoring in and near the OCNMS. Results of the most recent efforts 2011-2014 are available online at: http://www.navymarinespeciesmonitoring.us/reading-room/pacific/ Navy funded monitoring with participation of contract researchers, local academic institutions, and regional NMFS is continuing under proposed NWTT actions. This aligns with OCNMS Strategies EOC7 and ECO9.
	B4. Data Management, Sharing and Reporting Action Plan	While the Navy does not directly participate in OCNMS distribution of data, Navy funded data collection and reporting on marine mammal studies is publically available online at: http://www.navymarinespeciesmonitoring.us/reading-room/pacific/
C. Improve Ocean Literacy		
	C1. K-12 Education Action Plan	Not applicable to Navy activity.
	C2. Higher Education Action Plan	Depending on the institution involved, some Navy funded marine mammal studies applicable to the OCNMS promote the participation of academic graduate students in field work and reporting. This aligns in part with OCNMS Strategy HED3.
	C3. Visitor Services Action Plan	Not applicable to Navy activity.
	C4. Community Outreach Action Plan	Not applicable to Navy activity.
D. Conserve Natural Resources in the Sanctuary		
	D1. Spills Prevention, Preparedness, Response and Restoration Action Plan	The Navy maintains an in-house capability to respond to spills of all sizes. Every Navy ship is equipped with an oil spill kit that is designed to prevent spills from entering the water. Through compliance with various federal environmental laws, the Navy has well established protocols for avoiding at-sea pollution from incidental ship discharges or other actions detrimental to the OCNMS in alignment with OCNMS Strategy SPILL1.
	D2. Climate Change Action Plan	Since 2010, the Navy's Task Force Climate Change has been actively pursuing recommendations to Navy policy, investment and action regarding climate change in not only the Arctic but also other regions of the global environment. This Task Force promulgated the U.S. Navy Climate Change Roadmap in May 2010. The roadmap emphasizes low cost, long-lead activities that position the

OCNMS Final Management Plan- Priority Needs and Action Plans		Navy Supporting Action
		Navy to meet future demands, and cooperative activities with interagency and international partners to share capabilities, reduce cost, and maximize efficiency. Locally, Navy Region Northwest representative chairs the OCNMS Climate Change Working Group. Navy marine mammal demographic monitoring can contribute in some aspects of OCNMS Strategy CLIM2.
	D3. Marine Debris Action Plan	The Navy actively retrieves at-sea items such as drones and some targets utilized in Navy training and Testing (Navy 2014a). Other military expendable material is infrequently used within the OCNMS and does not contribute to floating marine debris or marine species entanglement. This aligns with OCNMS Strategy MD1 and MD2.
	D4. Wildlife Disturbance Action Plan	Navy activities under NWTT would neither affect shore or coastal species nor pinniped haul outs The Navy complies with the OCNMS overflight restrictions supporting the OCNMS Strategy WD2. At-sea impacts to marine mammals are in alignment with Strategy WD3 and as summarized in this consultation and other NWTT environmental documentation would be infrequent, temporally and spatially separated from successive events, non-cumulative, and not expected to decrease overall fitness or result in long-term population-level impacts on any given population. The Navy concludes its activities as described in the NWTT EIS/OEIS are not likely to result in the loss, destruction, or adverse changes to viability of Sanctuary resources. Finally, the Navy adheres to a robust, established set of mitigations as required under MMPA authorizations issued by the NMFS to avoid impacts to marine mammals.
	D5. Water Quality Protection Action Plan	The Navy maintains an in-house capability to respond to spills of all sizes. In addition to pollution control equipment strategically positioned at shore locations around the globe, every Navy ship is equipped with an oil spill kit that is designed to prevent spills from entering the water. The Navy routinely exercises response plans and equipment to ensure preparedness. Through compliance with various federal environmental laws, Navy has well established protocols for avoiding at-sea pollution from incidental ship discharges or other actions detrimental to OCNMS in alignment with OCNMS Strategies. See discussion in Section 2(iii) and in Navy (2014a). Navy military expendable material has been extensively analyzed in NWTT environmental documentation and found not to be a significant contaminant to the environment. Combined with limited use within or adjacent to the OCNMS, Navy would have no impacts to the OCNMS water quality and is in alignment with OCNMS Strategy WQP2.
	D6. Habitat Protection Action Plan	As detailed in NWTT environmental documentation and consultations with NMFS, U.S. Fish and Wildlife and Washington Department of Fish and Wildlife, and combined with established mitigations and standard operating procedure, Navy would not seriously injure marine species , birds, or habitats within the OCNMS. Nor would there be cumulative impacts to any Sanctuary resource. This aligns with OCNMS Strategies HP1, HP2, and HP3
	D7. Regional Ocean Planning Action Plan	In support of Executive Order 13527, Stewardship of the Ocean, Our Coasts, and the Great Lakes (2010) establishing the National Ocean Council, the Navy has a representative on the West Coast Regional Planning Body http://www.westcoastmarineplanning.org/ In addition, Navy Region Northwest participates in the Washington State Marine Spatial Planning group, and a Navy Region Northwest representative holds a position of Secretary on the OCNMS Advisory Council. Finally, U.S. Pacific Fleet has a representative on the Department of Defense/Joint Staff National Ocean Council Executive Steering Group which participates in the Federal National Ocean Council. This aligns with OCNMS Strategy ROP1.
E. Understand the Sanctuary's Cultural, Historical and Socioeconomic Significance		
	E1. Maritime Heritage Action Plan	Not applicable to Navy activity.
	E2. Socioeconomic Values of Resources in the Sanctuary Action Plan	The Navy's standard operating procedure is to avoid conflicts in ocean use by conducting is its activities away from recreational and commercial users.

(i) A statement of the purpose and objectives of the Proposed Action.

The Navy's Proposed Action is to conduct training and testing activities primarily within existing range complexes, operating areas, and testing ranges located in the Pacific Northwest of the United States into the reasonably foreseeable future. The purpose of the Navy's Proposed Action is to ensure that the Navy meets its mission, which is to maintain, train, and equip combat-ready naval forces capable of winning wars, deterring aggression, and maintaining freedom of the seas.[2] Chapters 1 of Navy (2014a and 2014b) contain a detailed discussion of the Navy's purpose of and need for its Proposed Action.

OPR's proposed action is to issue a Final Rule and Letters of Authorization for incidental take of marine mammals under the MMPA for the Navy's Proposed Action for five years from November 2015 to November 2020. The MMPA provides that the Secretary of Commerce shall allow, upon request, the incidental, but not intentional, taking of marine mammals by U.S. citizens who engage in a specified activity during periods of not more than 5 years, if certain findings are made and regulations are issued after notice and opportunity for public comment. The Secretary must find that the taking (Level A and Level B harassment) will have a negligible impact on the species or stock(s) and will not have an unmitigable adverse impact on the availability of the species or stock(s) for subsistence uses. The regulations must set forth the permissible methods of taking, other means of affecting the least practicable adverse impact on the species or stock(s), and requirements pertaining to the monitoring and reporting of such taking.

[2] Title 10, Section 5062 of the U.S. Code provides, "The Navy shall be organized, trained, and equipped primarily for prompt and sustained combat incident to operations at sea. It is responsible for the preparation of naval forces necessary for the effective prosecution of war except as otherwise assigned and, in accordance with integrated joint mobilization plans, for the expansion of the peacetime components of the Navy to meet the needs of war." This Title 10 mission is achieved in part by conducting training and testing activities in the NWTT Study Area.

(ii) The location and timing of the Proposed Action.

The NWTT Study Area is composed of established maritime operating and warning areas in the northeastern Pacific Ocean region, to include the Strait of Juan de Fuca, Puget Sound, and Western Behm Canal in southeastern Alaska. The area includes air and water space within and outside Washington state waters, and air and water space outside of the state waters of Oregon and California, designated by the Navy as the Offshore Area portion of the NWTT Study Area.

For purposes of this consultation, the area under evaluation consists of those surface, subsurface and airspace portions of the Offshore Area that are adjacent to or overlap the OCNMS. The entire Offshore Area includes sea and undersea space approximately 510 nautical miles (NM) in length from the northern boundary at the mouth of the Strait of Juan de Fuca to the southern boundary at 40 degrees (°) north (N) latitude, and 250 NM in breadth from the coastline to the western boundary at 130° west (W) longitude (**Figure 1**). The OCNMS [2,408 square nautical miles (NM^2)(NOAA 2011)] encompasses approximately two-percent (2%) of the NWTT Offshore Area (121,000 NM^2)(Navy 2014a, Navy 2015a).

Within the boundaries of the Offshore Area, several operational area (OPAREA) units and the Quinault Range Site overlap the OCNMS boundaries (**Figures 1** and **2**). The Quinault Range Site coincides with the boundaries of OPAREA W-237A and also includes a surf zone component. The surf zone component extends north to south 5 NM along the eastern boundary of W-237A, extends approximately 3 NM to shore along the mean lower low water line, and encompasses 0.9 NM of shoreline at Pacific Beach, Washington. Surf-zone activities would be conducted from an area on the shore and seaward. The sea and air space of the OPAREAS and Quinault Range Site are routinely used by the Navy for training and testing in accordance with previous consultations.

Training and testing under the Proposed Action could occur at any time over a given year, although there is often significant temporal separation between any two successive training or testing events. The majority of events last for several hours to a day. Chapter 2 and Appendices A and E of the Navy's NWTT EIS/OEIS (2014a,b, 2015a) contain the complete discussion of all the Navy's proposed actions within the NWTT Study Area. Activities with the highest possibility of causing injury to OCNMS resources are discussed in this Sanctuary Resource Statement.

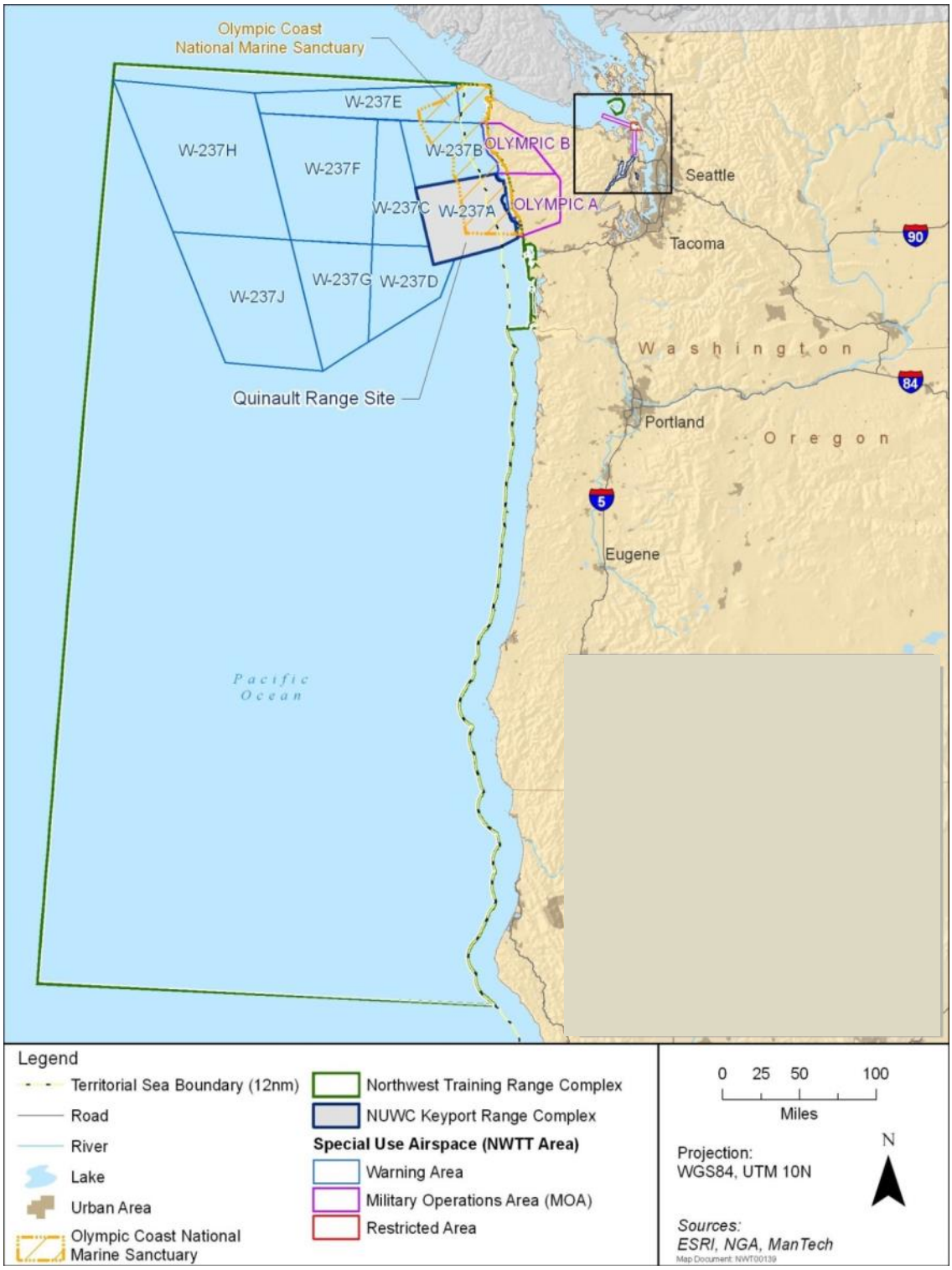

Figure 1. Offshore Area Portion of the Northwest Training and Testing Study Area and Relative Location of Olympic Coast National Marine Sanctuary

Figure 2. Detail of NWTT Offshore Area (Quinault Range Site) and Olympic Coast National Marine Sanctuary

(iii) A description of the methods and means for carrying out the Proposed Action, including the proposed equipment to be used.

The most current analysis of the environmental effects of the Navy's proposed training and testing activities is documented in quantitative and qualitative detail within the *Northwest Training and Testing Draft Final Environmental Impact Statement/ Overseas Environmental Impact Statement-Version 2, and Supplement to the Draft Environmental Impact Statement/Overseas Environmental Impact Statement For Northwest Training and Testing Activities* (Navy 2014b, 2015a).

The NWTT EIS/OEIS shows that training and testing activities have minimal temporary impacts on the quantity or quality of the Study Area's physical environment, and minor to no impacts on marine or shore birds, fin fish, sea turtles and invertebrate marine life. Therefore, the Proposed Action does not injure these physical and biological resources where they occur within the OCNMS. Explosives have the potential to affect the physical and biological resources, but the Navy does not use explosives within the OCNMS, in accordance with previous coordination and the OCNMS Management Plan. Therefore, the Navy's use of explosives does not injure the physical or biological resources of the OCNMS.

OCNMS resources with the most potential to be injured from the Proposed Action are marine mammals. Marine mammals may be injured by acoustic energy, by direct strike through vessel movement or use of towed devices or expending military materials into the water, or through alteration of their habitat. Per the analysis of the NWTT EIS/OEIS, the potential for direct strike (from vessels, towed devices, or expending military materials into the water) is negligible, and marine mammal habitat is not altered. Therefore, only direct impacts from acoustic energy to marine mammals are evaluated below.

For purposes of this Section 304(d) consultation, the Navy has identified the training and testing activities listed in **Table 2** as those with the most potential to injure an OCNMS marine mammal resource in accordance with the definition of Sanctuary resources in 16 C.F.R. 922.3[3]. **Table 2** specifically details activities that 1) could occur within the OCNMS (e.g., select testing activities); 2) have the potential for propagation into the OCNMS (e.g., select training activities); or 3) may injure a marine mammal as defined under Section 304(d).

[3] A Sanctuary resource means any living or non-living resource of a National Marine Sanctuary that contributes to the conservation, recreational, ecological, historical, research, educational, or aesthetic value of the Sanctuary, including, but not limited to, the substratum of the area of the Sanctuary, other submerged features and the surrounding seabed, carbonate rock, corals and other bottom formations, coralline algae and other marine plants and algae, marine invertebrates, brine-seep biota, phytoplankton, zooplankton, fish, seabirds, sea turtles and other marine reptiles, marine mammals and historical resources.

Table 2. Proposed Navy Training and Testing Activities With Potential To Injure OCNMS Marine Mammals

Activity	# Of Events/Year For ALL Of NWTT Offshore (ave. time per event)	Potential to Occur Within or Adjacent to OCNMS	Estimated Occurrence Within or Immediately Adjacent to OCNMS
TRAINING			
Anti-Submarine Warfare Tracking Exercise – Submarine (TRACKEX – Sub)	100 (~8 hrs)	Limited; most well outside >50 NM	<1-5%
Anti-Submarine Warfare Tracking Exercise – Surface (TRACKEX – Surface ship)	65 (~2-4 hrs)	Limited; most well outside >50 NM	<1-5%
Anti-Submarine Warfare Tracking Exercise – Maritime Patrol Aircraft (TRACKEX – MPA/MMA)	300 (~2-8 hrs)	Limited; most well outside >50 NM	<1%
Anti-Submarine Warfare Tracking Exercise – Maritime Patrol Aircraft (TRACKEX – MPA/MMA MAC)	24 (~2-8 hrs)	Limited; most well outside >50 NM	<1%
Surface Ship Sonar Maintenance	13 [Note 1] (< 4 hrs)	Limited; most well outside >50 NM	<5%
Submarine Sonar Maintenance	22 [Note 1] (< 1 hr)	Limited; most well outside >50 NM	<5%
TESTING			
Torpedo Testing (Non-Explosive)	20 (~8 hrs)	Most; on Quinault Range Site	<80%
Autonomous and Non-Autonomous Vehicles: Unmanned Underwater Vehicle	20 (~8 hrs)	Most; on Quinault Range Site	<80%
Fleet Training/Support: Anti-submarine Warfare Testing	20 (~16-48 hrs)	Quinault Range Site	100%
Acoustic Component Test: Countermeasures Testing	6 (~8-40 hrs)	Quinault Range Site	100%
Anti-Surface Warfare (ASUW)/Anti-Submarine Warfare (ASW) Testing Countermeasure Testing	8 (~4 hrs to 10 days)	Some; on Quinault Range Site; potentially some occurrence within OCNMS and some outside	~50%
New Ship Construction: Anti-Submarine Warfare Mission Package Testing	8 (~4-8 hrs)	Limited; on or off Quinault Range; potentially some occurrence within OCNMS and most outside	<5%

Notes
Note 1. While these activities occur pierside pier locations within Puget Sound (outside of the OCNMS) and at sea, only an estimate of periodic at sea occurrence when transiting through the northern portion of the OCNMS is relevant to this analysis.

(iv) Actions and Resources Discounted For In This Section 304(d) Consultation

The below stressor and resources were thoroughly analyzed in multiple NWTT documents which are included here by reference (Navy 2014a,b,c; 2015 a,b,c,d,e).

Resources Considered but Discounted

The Navy concludes that training and testing activities detailed in the Navy's NWTT Draft Final EIS/OEIS Version 2 (Navy 2015a) that would likely occur in or near the OCNMS would not be likely to destroy, cause the loss of, or injure Sanctuary resources.

In compliance with other federal environmental mandates such as the Migratory Bird Treaty Act, Magnuson-Stevens Fisheries Act, Coastal Zone Management Act and the National Historic Preservation Act, the Navy has also assessed impacts to other Sanctuary resources such as essential fish habitat, shipwrecks, and cultural resources. The Navy has also initiated consultation under the ESA with the US Fish and Wildlife Service (USFWS) for several bird species and the bull trout, listed as endangered under USFWS jurisdiction. These determinations have been considered in concluding that these Sanctuary resources will not be injured by proposed Navy training and testing activities in or near the OCNMS when the resources are in the OCNMS.

Table 3 shows where to find the Environmental Consequences analysis for non-marine mammal resources in the NWTT EIS/OEIS by page number.

Table 3. Applicable Non-Marine Mammal Resource Sections From NWTT EIS/OEIS

Resources Sections	NWTT Draft Final EIS/OEIS Version 2 Page Number
3.1.3 Sediments and Water	3.1-27
3.2.3 Air	3.2-16
3.3.3 Marine Habitat	3.3-17
3.5.3 Turtles	3.5-11
3.6.3 Birds	3.6-31
3.7.3 Marine Vegetation	3.7-12
3.8.3 Marine Invertebrates	3.8-18
3.9.3 Fish	3.9-62
3.10.3 Cultural Resources	3.10-10
3.11.3 Native American Resources	3.11-28
3.12.3 Socioeconomics	3.12-17
3.13.3 Public Health and Safety	3.13-12
4 Cumulative Impacts-Resource Specific Impacts	4-28

The text below highlights key points:

a. Fish: Sound would not induce injury to fishes when in the OCNMS because fish in general, including salmon, are hearing generalists with most sensitive hearing lower than the majority of Navy training and testing sources proposed for NWTT. Key species conclusions related to NWTT Offshore activities can be found in Navy's Biological Evaluation and ongoing consultations submitted to the USFWS, Lacey, Washington in January 2015, and the Navy's Essential Fish Habitat analysis and ongoing consultation with NMFS West Coast.
b. Sea Turtles: Sounds would not injure sea turtles when they are within the OCNMS because sea turtles have documented low-frequency hearing sensitivities. Thus, sea turtles would not hear Navy training and testing activities proposed for NWTT. Sea turtle prey, jelly fish, also are not known to hear sound. Therefore, sonar use would not injure sea turtles or their prey resources when they are within the OCNMS.
c. Seabirds: These birds are not adapted for underwater hearing and are primarily visual pursuit predators. It has also been theorized that they have special adaptations for when they dive underwater (feathers cover their ears, ability to close off the ear canal), which further reduces their hearing (Dooling and Therrien 2011). The feathered bodies of seabirds trap large volumes of air, which in addition to providing insulation, also make the birds highly buoyant, thus limiting their dive depth and duration. The majority of the seabirds that would be present in the Study Area do not dive deeply or for extended periods of time, with the exception of the marbled murrelet. The marbled murrelet has a coastal distribution that would preclude exposure to training acoustic sources. The marbled murrelet would be exposed to some testing acoustic sources, but the Navy's analysis shows that, based on the latest science, the marbled murrelet is not expected to be particularly sensitive to the sources the Navy uses in or near the OCNMS. In addition, as noted above, the Navy's activities will not injure fish resources in the OCNMS, and therefore will not alter the feed stock of the marbled murrelet. Therefore, the Navy's activities would not change adversely chemical, biological, or physical attributes of, or the viability of marbled murrelets or other sea birds. The Proposed Action would not injure seabirds within the OCNMS.

Select Impact Analysis Excerpts For Discounted Resources

Below are select extracts from the analysis for three representative species. For additional details, previous documentation contains additional background, discussion, and conclusions (Navy 2014 a,b, 2015 a,b,c,d). Text below is copied from the Navy Biological Evaluation submitted to USFWS pursuant to the ESA (Navy 2015c).

ESA-Listed Marbled Murrelet

Offshore Acoustic Sources- Marbled murrelet exposure to sonar and other active acoustic sources during testing in the Offshore Area would be unlikely given the limited proximity and amount of time sonar could be in use in areas where marbled murrelets could occur. No exposure to training sources is anticipated. Adult marbled murrelets spend most of their time at sea feeding on small schooling fish or invertebrates close to shore, but may be present out to the 400 meters (m) contour (Nelson 1997). Foraging dives are commonly within 10 m of the surface but can be as deep as 30 m (Carter and Erickson

1992). Dive durations for the marbled murrelet can extend up to 115 seconds in duration (Thorensen 1989). Monitored seabird populations in general have a distinctly coastal distribution along the U.S. West Coast although this assessment is biased by more frequent coastal survey effort (Nur et al. 2011). Lance and Pearson (2005) designed a survey along the Washington Coast based on historic observations that marbled murrelets were typically observed within 1,500 m (0.8 NM) from shore with 95% occurring within 5,000-8,000 m (2.7-4.3 NM) from shore (Thompson 1997a,b, 1999). During the subsequent 2005 marbled murrelet survey, 373 individuals were sighted within 350-1,500 m from shore stratum and 173 individuals between 1,500-6,500 m from shore (Lance and Pearson 2005). Raphael et al. (2014, 2015) reported similar coastal distributions in a review of marbled murrelet marine surveys from 2000-2012 for an area from the U.S.-Canada border to San Francisco. Interestingly, Raphael et al. (2014, 2015) concluded that any higher at-sea concentration of marbled murrelets was less influenced by suitable marine foraging habitat, but more by the proximity of suitable inland nesting habitat. Menza et al. (2015) predicted relative densities for marbled murrelet as high in waters less than 10 km (5.3 NM) from shore and along the Olympic Peninsula from Cape Flattery to the Copalis River. This stretch of nearshore water is within the OCNMS. The predictions of high density correspond well with observed patterns and relative densities decrease quickly with distance from shore.

Therefore, the Navy finds that offshore acoustic training and testing activities are not likely to injure marbled murrelets when in the OCNMS.

Explosives-The Navy does not use explosives within the OCNMS in accordance with previous coordination and the OCNMS Management Plan. Based on lack of co-occurrence between the at-sea distribution of marbled murrelets (generally up to 5-6 NM from shore) and Navy explosive events outside of OCNMS (more than 12 and most >50 NM from shore), no exposures to marbled murrelets from training or testing explosive activities are predicted to occur.

Therefore, the Navy finds that offshore explosive training is not likely to injure marbled murrelets when in OCNMS.

Aircraft overflight- Aircraft overflights in the Offshore Area are not expected to result in meaningful responses from marbled murrelets based on the lowest aircraft flight altitude (6,000 ft. above mean sea level) and the associated worst-case noise levels presented in the consultation. Marbled murrelets would be expected to be at or near the surface. If marbled murrelets were to respond to overflight noise, the responses would be limited to short-term behavioral or physiological reactions (e.g., alert response, startle response, temporary increase in heart rate). Birds would be expected to recover soon after exposure and the general health or fitness of individual birds would not be compromised. Noise generated during testing activities in the Offshore Area would be associated with Unmanned Aerial Systems (UAS) testing at the QRS (at least three NM from shore and within W-237), with up to 20 events occurring per year. Flight time is about two hours per event. On a single-event basis, UASs are estimated to be significantly quieter than the manned jet aircraft and may operate at various altitudes ranging from sea level if launched from a boat deck at sea to 60,000 feet mean sea level. The potential for birds to be exposed to UAS noise during testing is low because of the limited number of events and flight time. Exposure would be brief, and responses would be limited to short-term behavioral or physiological reactions. Birds would

be expected to recover soon after exposure, the general health of individual birds would not be compromised, and population-level impacts would not occur. While marbled murrelets may be found up to 4.3 NM from shore, most foraging occurs within 1 NM. UAS overflights would take place at least 3 NM from shore. Therefore, it is unlikely that marbled murrelets would be exposed to UAS noise in the Offshore Area (including any area within the OCNMS). The effects of testing aircraft noise on marbled murrelets in the Offshore Area would be insignificant.
Therefore, the Navy finds that aircraft overflights during training and testing activities are not likely to injure marbled murrelets when in the OCNMS.

Aircraft strike- For training, fixed-wing aircraft over marbled murrelet habitat would be greater than 6,000 ft. (1,829 m) above mean sea level. Therefore, the risk of striking a murrelet would be low because these birds are not expected to fly this high. Although training activities in the Offshore Area could potentially result in occasional bird mortality or injury from aircraft strikes, no strikes have been recorded by Navy aircraft, and the risk of a strike to the marbled murrelet is discountable. Based on the occurrence and distribution of the marbled murrelet and the location, altitude, and frequency of testing overflights, it is extremely unlikely that individual marbled murrelets would be exposed to aircraft strikes during testing in the Offshore Area and the effects would be discountable

Therefore, the Navy finds that training and testing activities involving the use of aircraft are not likely to injure marbled murrelets when in the OCNMS.

Vessel and In-water Device reaction and strike- While some potential exists for marbled murrelets to be struck by vessels or in-water devices as they are foraging, resting, or flying near the water surface, most birds would be expected to see or hear an oncoming vessel or device and to fly or swim away to avoid a potentially harmful encounter. Injury or mortality could occur if a bird were struck, but most encounters with vessels or in-water devices would be expected to result in a brief behavioral and physiological response, such as alert response, startle response, or fleeing the immediate area. Marbled murrelets would be expected to resume normal behavior soon after the vessel or in-water device passed through the area and the fitness of individual birds would not be compromised. Marbled murrelets could encounter vessels or in-water devices during training and testing activities, but strikes are extremely unlikely. Marbled murrelet responses to vessel operation could include diving, swimming away from a vessel, or abandoning a foraging area. However, the potential for behavioral effects from Navy vessel movements are low because the training and testing events are transitory in time, with few vessels moving over large areas. In addition, if behavioral disruptions result from the vessel operation, they are expected to be temporary. Marbled murrelets are expected to resume their resting, breeding, and foraging bouts with minimal disruption.

Therefore, effects on marbled murrelet are expected to be insignificant. Therefore, the Navy finds that use of vessels and in-water devices during training and testing activities within or near the OCNMS is not likely to injure marbled murrelets when in the OCNMS.

Secondary Stressors- The Navy has analyzed the effects of the Preferred Alternative (Alternative 1) on sediment, water, and air quality in the NWTT Draft EIS/OEIS. Some water and air pollutants would be

released into the environment as part of the Preferred Alternative. The analyses indicate that any increases in sediment, water, or air pollutant concentrations resulting from Navy training and testing in the Action Areas would be minor and localized, and impacts would not be significant. Based on the analyses presented in the Draft EIS/OEISs and Supplement, sediment, water, and air quality changes would have no effect on the marbled murrelet. The NWTT Draft EIS/OEIS and Supplement also analyzed potential impacts on fish, including prey species for the marbled murrelet. The analyses indicate that individual fish could be injured or killed by explosive detonations conducted under the Preferred Alternative, but population level effects would not occur. However, explosives events occur outside of the OCNMS. Based on the analyses presented in the Draft EIS/OEIS and Supplement, impacts of the Preferred Alternative on fish would have no effect on the marbled murrelet because there would be no measurable change in local prey populations.
Therefore, the Navy finds that secondary stressors to marbled murrelets from Navy training and testing would not likely injure marbled murrelets when in OCNMS.

ESA-listed Short-tailed Albatross

Distribution and abundance of short-tailed albatross within the NWTT Study Area indicate that while the short-tailed albatross population continues to grow, available data suggests that sightings of this species off the coasts of Washington, Oregon, and Northern California are very rare. Despite some changes in training and testing activities, it is extremely unlikely that individual albatross would co-occur with Navy training and testing near or within the OCNMS given the small number of birds that are likely to occur in the NWTT Offshore Study Area at any given time. Piatt et al. (2006) predicted higher short-tailed albatross occurrence closely associated with shelf-edge habitats throughout the northern Gulf of Alaska and Bering Sea, outside of the NWTT Study Area. Along the entire U.S. West Coast, NMFS documented only one short-tailed albatross commercial fishing bycatch in April 2011 with no other documented bycatch from 2002-2013 (Good et al. 2015). There were only occasional and periodic West Coast sightings of at-sea short-tailed albatrosses from observers embarked on commercial fishing boats (Good et al. 2015). It is extremely unlikely that albatross would be exposed to underwater sound from sonar or other active acoustic sources used by the Navy during training and testing activities because this species predominately takes prey by surface-seizing. The effect of training and testing activities on the short-tailed albatross would be considered discountable.

Therefore, the Navy finds that training and testing activities within or near the OCNMS are not likely to injure short-tailed Albatross when in the OCNMS.

ESA-listed Bull Trout (Coastal-Puget Sound Distinct Population Segment)

Offshore Acoustic Sources- Most marine fish species are not likely able to detect sounds in the mid-frequency range of operational sonar. Most mid-frequency active sonar used in the Study Area would not have the potential to substantially mask key environmental sounds or produce sustained physiological stress or behavioral reactions because the sound source would be moving and exposure time would be limited. Use of sonar and other active acoustic sources may occur throughout the Offshore Area during training activities, but most use has historically taken place more than 50 NM from shore and outside of

the OCNMS, and such use is likely to continue for the reasonably foreseeable future. Bull trout are not expected to occur more than 3 NM from shore; therefore, it is unlikely that bull trout would be exposed to mid- or high-frequency sources and there would be no likelihood of injury to bull trout when in the OCNMS. Furthermore, it is believed that salmonid species such as bull trout, which are anatomically similar to Atlantic salmon, are unable to detect the sound produced by mid- or high-frequency sonar and other mid- or high-frequency active acoustic sources (NWTT EIS/OEIS Section 3.9.2.1, Hearing and Vocalization). Proposed testing activities that involve the use of sonar and other active acoustic sources differ in number and location from training activities; however, the types and severity of impacts would not be discernible from those described under training activities. Given the majority of testing sonar and other active acoustic sources would be outside the hearing range of bull trout, adverse consequences are not expected. As such, sonar use is unlikely to impact fish species (including bull trout). Adverse consequences for fish populations due to exposure to mid-frequency sonar and other high-frequency active acoustic sources are not expected, so injury to fish species when they are in the OCNMS is unlikely.

Vessel Movements: While vessel movements have the potential to expose fish occupying the water column to sound and general disturbance, potentially resulting in short-term behavioral or physiological responses, such responses would not be expected to compromise the general health or condition of individual fish. In addition, most activities involving vessel movements are infrequent and widely dispersed throughout the Study Area. Therefore, to the extent fish can even hear vessel noise, the impacts would be temporary, localized, and not adverse. Adverse consequences for the population are not expected so injury to fish species when they are in the OCNMS is unlikely.

Explosives- The Navy does not use explosives within the OCNMS in accordance with previous coordination and the OCNMS Management Plan. Based on the lack of co-occurrence between the at-sea distribution of bull trout (within 3 NM of shore) and Navy explosive events outside of OCNMS (more than 12 to 50 NM from shore), no exposures to marbled murrelets from training or testing explosive activities are predicted to occur.

Aircraft Overflight- Aircraft overflights from training and testing activities have the potential to affect surface waters and, therefore, to expose fish occupying those upper portions of the water column to sound and general disturbance, which could potentially result in short-term behavioral or physiological responses. However, within the OCNMS most Navy aircraft would be transiting higher than 6,000 feet which would not propagate significant sound into the water. Infrequent helicopter and unmanned aerial vehicles would be the most likely aircraft at lower altitudes within the OCNMS. If fish were to respond to aircraft overflights, only short-term behavioral or physiological reactions (e.g., swimming away and increased heart rate) would be expected. Therefore, adverse consequences for individuals would be unlikely and adverse consequences for the populations are not expected. Aircraft overflights will not injure fish when they are in the OCNMS.

Physical disturbance and strike- Based on the nearshore distribution of bull trout and overlap of vessel use, potential strike risk would be greatest in the coastal portions of the Offshore Area. Bull trout can sense pressure changes in the water column and swim quickly, and are likely to escape collision with

vessels. While vessels and in-water devices could overlap with bull trout, the likelihood of a strike would be extremely low, with discountable effects. Potential effects of vessel and in-water device strikes and disturbance in the Offshore Area during testing activities would be limited to the Quinault Range Site surf zone (0 to 3 NM from shore). The likelihood of a strike would be extremely low and effects would be discountable because bull trout are expected to avoid collisions. Therefore, testing and training activities that involve the use of vessels and in-water devices will not injure fish when they are in the OCNMS.

Seafloor devices- Seafloor devices include items that are placed on, dropped on, or moved along the seafloor such as mine shapes, anchor blocks, anchors, bottom-placed instruments, bottom-crawling unmanned undersea vehicles, and bottom-placed targets. All sea-floor devices used in the OCNMS are recovered after use. Seafloor devices are either stationary or move very slowly along the bottom and do not pose a threat to highly mobile organisms such as bull trout. However, while a fish might be attracted to the object, a fish's sensory abilities allow it to avoid colliding with fixed tethered objects in the water column so the likelihood of a fish striking one of these objects is implausible. Therefore, strike hazards associated with collision into other seafloor devices such as deployed mine shapes or anchored devices are highly unlikely to pose any strike hazard to fish and are not discussed further. A possibility exists that a small number of fish at or near the surface or resting on the bottom may be directly impacted if they are in the target area and near the point of physical impact at the time of seafloor device strike. However, the likelihood of one of these objects striking a fish is implausible. Testing activities that involve the use of unmanned underwater vehicles that crawl across the seafloor are conducted only in the surf zone area of the QRS at Pacific Beach. The crawlers are slow moving and unlikely to impact fish as most fish would have ample time to detect and avoid approaching devices as they crawl across the seafloor. The slow movement of these vehicles and the ability of bull trout to sense the device in time to avoid it make it unlikely that bull trout would be impacted by these testing activities. Therefore, testing and training activities that involve the use of seafloor devices will not injure fish when they are in the OCNMS.

Entanglement- The overall effects of entanglement are highly variable, ranging from temporary disorientation to mortality due to predation or physical injury. The evaluation of a species' entanglement potential should consider the size, location, and buoyancy of an object as well as the behavior of the fish species. Because of their physical characteristics, guidance wires and fiber optic cables pose a potential, though unlikely, entanglement risk to susceptible fish. Fiber optic cables do not easily form loops, are brittle, and break easily if bent, so they pose a negligible entanglement risk. Additionally, the encounter rate and probability of impact from guidance wires and fiber optic cables are low, as few are expended and, therefore, have limited overlap with bull trout or other sanctuary resource fish. While testing in QRS could lead to expenditure of fiber optic cable and overlap bull trout coastal distribution, the likelihood of entanglement would be extremely low given the physical features of bull trout, the low abundance of bull trout in the Study Area, the properties of guidance wires and fiber optic cables reduce entanglement risk to fish, and the dispersed nature of the activity. Decelerator/parachutes of varying sizes are used during training and testing activities. Entanglement in a newly-expended decelerator/parachute while it is in the water column is unlikely because fish generally react to sound and motion at the surface with a behavioral reaction by swimming away from the source and would detect the oncoming decelerator/parachute in time to avoid contact. While the decelerator/parachute is sinking, fish would have ample opportunity to swim away from the large moving object. Once the decelerator/parachute is on the bottom; however, it is

feasible that a fish could become entangled in the decelerator/parachute or its suspension lines while diving and feeding, especially in deeper waters where it is dark. If the decelerator/parachute dropped in an area of strong bottom currents, it could billow open and pose a short-term entanglement threat to large fish feeding on the bottom. But, this chance is remote and therefore, the Navy determines that the use of these types of items will not injure fish when they are in OCNMS.

Ingestion- Items that could present an ingestion risk to bull trout or other fish in the Offshore Area include byproducts of certain items such as plastic end caps and pistons associated with chaff and flares, as well as certain target-related materials. End caps and pistons sink in salt water, but sink rates are expected to be slow. Therefore, end caps and pistons could be ingested by fish feeding in the water column. Some fragments associated with expended targets may float or remain in the water column for some period of time. However, use of chaff, flares, and target that could result in fragments would be expended more than 3 NM from shore where specifically bull trout are not expected to occur. Some of these items could drift into nearshore areas where bull trout forage, but the likelihood of bull trout ingesting these items is extremely low. For these reasons, the Navy finds that training and testing activities pose no potential to injure bull trout when in the OCNMS.

2. Description of alternatives that would eliminate, minimize, or mitigate the potential injury to any Sanctuary resource or value, including:

(i) Alternative locations outside of national marine sanctuary boundaries.

The Navy has been conducting training and testing offshore of the coast of Washington for decades. The area provides variable bathymetries, and training and testing challenges to simulate potential operational scenarios. The Navy's training and testing activities were occurring when the OCNMS was created as noted earlier.

For training activities occurring in the Offshore Area, less than 3% would be expected to occur within the OCNMS, as listed in **Table 2**. There is relatively small spatial overlap between the NWTT Offshore Area and the OCNMS (~2%), as shown in **Figure 1**. Most training events would occur outside the boundaries of the OCNMS. Although the Navy is specifically authorized to conduct certain activities within the OCNMS, the Navy currently conducts very limited training within the OCNMS and does not use explosives within the OCNMS. The Navy expects this level and type of activity to continue into the reasonably foreseeable future.

About 85% of the testing activities in the NWTT Proposed Action would not occur in the Sanctuary and are not considered in this consultation. The remaining 15% of testing activities (137 events annually), as listed in **Table 2**, could occur in or near the OCNMS. In particular, the Navy conducts testing regularly within the established Quinault Range Site. When the OCNMS was designated, its boundaries overlapped the existing Quinault Underwater Test Range (since then, it has been extended to outside the OCNMS and renamed the Quinault Range Site as described in previous consultation with the OCNMS). Many testing activities require specific environmental conditions to be successful. The Quinault Range Site provides key oceanographic features, depth, and logistics proximity for select at-sea testing events that cannot be conducted elsewhere within the NWTT Offshore Area. The Quinault Range Site was established due to its range of environmental conditions and its proximity to the Navy's port and laboratory facilities in Puget Sound. Alternative locations are generally not practicable. Alternate sites with similar environmental conditions but outside the OCNMS would be located farther from other Navy facilities; the significant additional travel time to set up a test site and return to it repeatedly would have significant adverse impacts on project schedules and costs, reducing the Navy's ability to meet its mission requirements.

To the extent practical, the Navy currently avoids conducting activities within the OCNMS, and expects this practice to continue. However, complete avoidance of all Navy activity inside of the OCNMS does not meet the Navy's overall purpose and need as described in Section 1 of the NWTT EIS/OEIS and Navy (2014a, b, 2015a). There are occasions when the activity purpose requires that the event be conducted within the environmental conditions found within the OCNMS.

Furthermore, the Navy cannot avoid the OCNMS as all Navy vessels must transit through the northern portion of the OCNMS as part of the established Cooperative Vessel Traffic Service and mandated traffic separation scheme for entry/exit to the Strait of Juan de Fuca and transit to/from other Navy range complexes and operating areas within the Pacific (**Figure 3**).

(ii) Other alternatives to the proposed timing, methods, equipment, or a combination of these, as appropriate.

The Navy evaluated the proposed training and testing activities in the NWTT Study Area through a baseline "No Action" Alternative of training and testing activities previously evaluated in existing environmental planning documents, and two Action Alternatives with different adjustments to the type, level, and tempo of training and testing activities in the Navy's NWTT EIS/OEIS and Supplement to the DEIS/OEIS (Navy 2014 a,b, 2015a).

The Final EIS/OEIS process is still ongoing. The Navy's Proposed Action in the NWTT Study Area does not restrict the timing of the activities described, or geographic scope, duration, and extent of the activities. For instance, the Navy's purpose and need (combined with variably scheduled individual unit training and testing community cycles described in Chapter 1 of Navy 2014a) do not include seasonal restrictions on training and testing within the NWTT Study Area, nor dictate the location of certain activities. Individual units have a constrained training cycle that offers as little as 19 days per quarter to conduct training in over 24 warfare mission categories. Individual units take opportunities to train at-sea when they can.

Waters off Washington State, including those near or within the OCNMS, provide variable bathymetries and testing challenges to simulate potential operational scenarios. Temporal or geographic restrictions would not support the Navy's mission to train and test under the widest range of locations and conditions in the NWTT Study Area. As outlined in Section iii below, mitigation and monitoring measures have been proposed for the protection of marine resources under any of the alternatives for this Proposed Action and are in the process of review by NMFS (Navy 2014 a,b,c, 2015a,b, NMFS 2015).

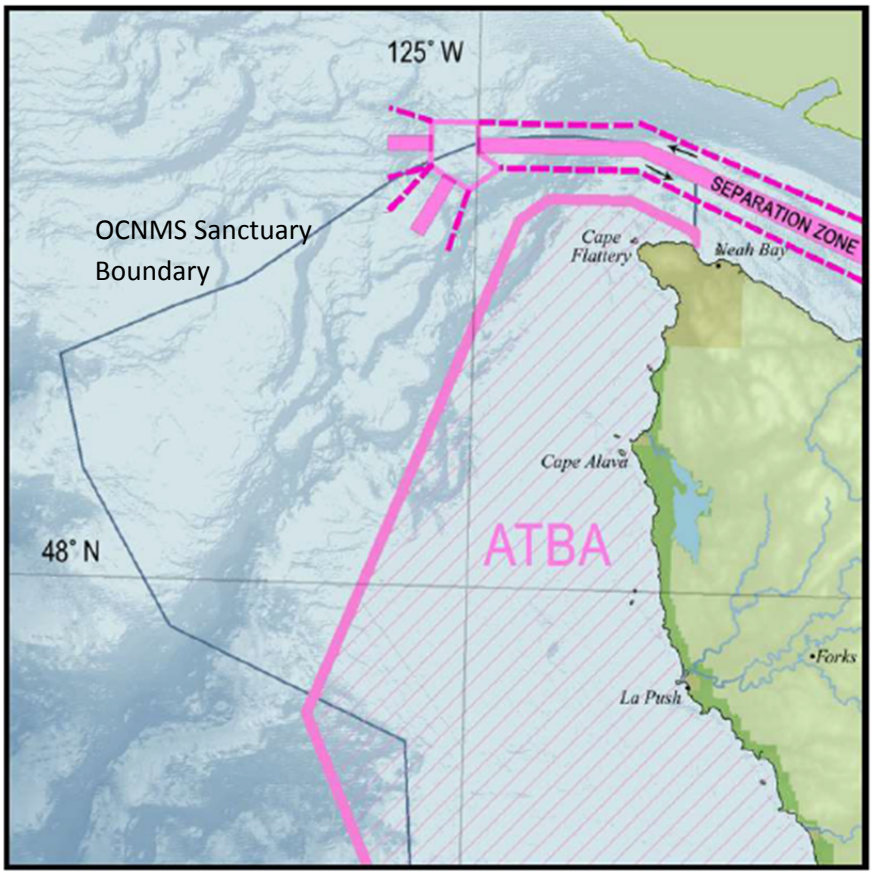

Figure 3. Vessel Traffic Management System From The Cooperative Vessel Traffic Service
(Figure from NOAA 2011; ATBA= Area To Be Avoided)

(iii) Mitigation and monitoring designs that are proposed for implementation associated with the action.

Mitigation- The Navy has proposed an extensive list of Standard Operating Procedures (SOP) and mitigations in supporting documentation (Navy 2014a, b; 2015a,b,c,d). A decision to implement any of the alternatives for this Proposed Action will carry with it mitigation and monitoring requirements through issuance of a MMPA LOA as well.

SOPs are essential to maintaining safety and mission success, and in many cases have the added benefit of reducing potential environmental impacts. Navy standard operating procedures have been developed and refined over years of experience, and are broadcast via numerous naval instructions and manuals, including:

- Navy Range User's Manuals
- Ship, Submarine and Aircraft Safety Manuals
- Ship, Submarine and Aircraft Standard Operating Manuals
- Fleet Area Control and Surveillance Facility Range Operating Instructions
- Fleet Exercise Publications and Instructions
- Naval Sea Systems Command Test Range Safety and Standard Operating Instructions
- Navy Instrumented Range Operating Procedures
- Research, Development, Test and Evaluation Plans
- Naval Gunfire Safety Instructions
- Navy Planned Maintenance System Instructions and Requirements
- Federal Aviation Administration Regulations

In many cases there are incidental environmental, socioeconomic, and cultural benefits resulting from standard operating procedures. Standard operating procedures serve the primary purpose of providing for safety and mission success, and are implemented regardless of their secondary benefits. This is what distinguishes standard operating procedures, which are a component of the Proposed Action, from mitigation measures, which are designed entirely for the purpose of reducing environmental impacts resulting from the Proposed Action. Because standard operating procedures are crucial to safety and mission success, the Navy will not modify them as a way to further reduce effects to environmental resources. Rather, mitigation measures will be used as the tool for avoiding and reducing potential environmental impacts. Standard operating procedures are internal documents and are under the configuration management of the individual commands. Standard operating procedures that are recognized as providing a potential secondary benefit are provided below.

Mitigation measures are designed to reduce or avoid potential impacts on marine resources and are documented in Navy 2014a, b as well as associated consultation documents 2015a,b,c,d. Specifically, Table 5.4-2 in Navy 2014a summarizes NWTT mitigation measures.

Monitoring- The Navy is a world leader in funding marine mammal research under the Office of Naval Research (ONR) Marine Mammals and Biology Program (http://www.onr.navy.mil/Science-Technology/Departments/Code-32/All-Programs/Atmosphere-Research-322/Marine-Mammals-Biology.aspx), Living Marine Resources program (LMR) (http://www.lmr.navy.mil/), and U.S. Fleet Forces/U.S. Pacific Fleet Monitoring (http://www.navymarinespeciesmonitoring.us/).

Each Navy program has a unique focus: ONR on basic and new research topics; LMR on applied research including field demonstration and validation of technologies and analytical techniques; and Fleet on region-specific compliance monitoring associated with MMPA and ESA permits. The three programs are highly integrated and this interrelationship is shown in **Figure 4**. Essentially, there is constant feedback between the three programs such that the Navy continually improves the level of marine mammal scientific information in support of ongoing environmental documentation or permit compliance. Examples of the feedback between the programs could be using a new ONR funded research tool to test for application during a permit required study question. Alternatively, a Fleet monitoring need could generate a new research area that could be filled by ONR or LMR funded projects.

ONR and LMR periodically fund field tests and analysis based on work performed by researchers in the Pacific Northwest and applicable to marine mammal resources within or near OCNMS. These efforts are variable on a year to year basis depending on the particular Navy need at the time, project length of the research study, and available funding each fiscal year. The ONR and LMR websites indicated above list current ongoing efforts.

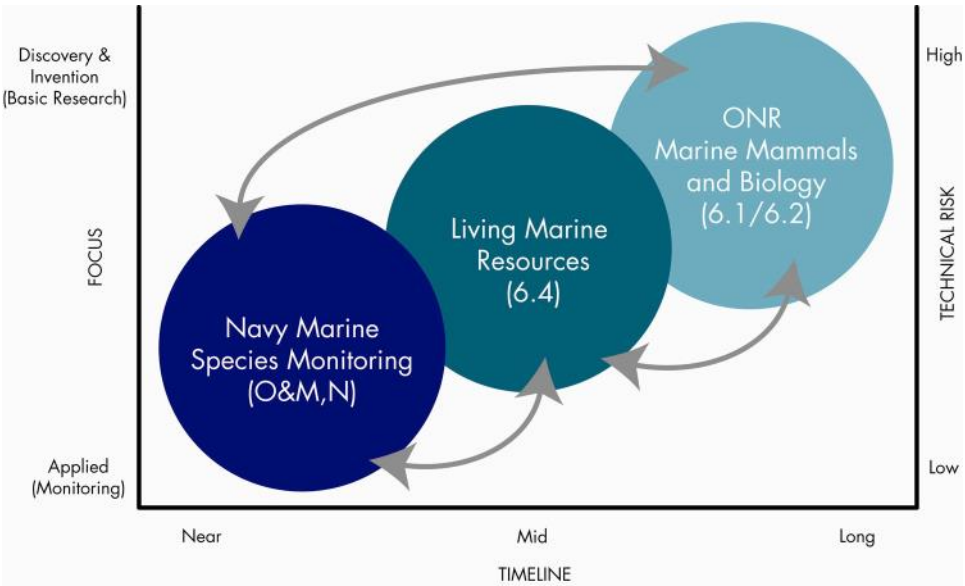

Figure 4. U.S. Navy Marine Resources Investments From Research To Application
(Navy funding sources: 6.1/6.2: basic research, 6.4: applied research, and O&M,N: operating and maintenance, Navy)

Navy Funded Monitoring Within or Adjacent to OCNMS (2011-2015)- Specific to the OCNMS, LMR initially funded the deployment of two long-term bottom-mount acoustic recording packages within and adjacent to OCNMS from 2004 to 2010. Results from this effort are reported in Oelson et al. (2007, 2009) and Oelson and Hildebrand 2012. Under the Navy's MMPA and ESA permits for the Northwest Training Range Complex (2010-2015) off Washington, U.S. Pacific Fleet took over funding for these two devices from 2011-2015 (**Figure 5**).

Passive acoustic monitoring during this period including previous efforts since 2004 has advanced the state of knowledge in regard to marine mammal vocalization and species presence within the offshore waters of Washington. This also includes some of the first offshore ocean sound scape measurement factoring biological and anthropogenic sounds (**Figure 6**). Of the two passive acoustic sites, the slope site (QC in **Figure 5**) adjacent to the OCNMS is subjected to regional commercial shipping (about 20% of hourly time windows), and long-range noise propagation from shipping in the North Pacific which elevates the monthly average ambient noise at this site to 81-83 dB re: µPa2 /Hz at low frequencies. The shelf site (CE in **Figure 5**) within the OCNMS is subject to local small boat noise, but less subject to long-range propagation of commercial shipping noise with monthly average ambient noise of 76-82 dB re: µPa2 /Hz at low frequencies. Both sites display a prominent seasonal peak at 15-30 Hz during the winter, indicative of the presence of fin whale calls. This peak is more pronounced at the slope site and consistent with fin whale spatial preference determined from call detection at both sites. At frequencies above 200 Hz, local wind and waves dominate the noise (Hildebrand 2009) and are generally lower during the summer. The jagged appearance of the spectra during the summer at the slope site (QC) and at frequencies < 200 Hz may be indicative of higher local boating activity. It should be noted that Navy ship and boat presence would likely make up an insignificant and infrequent portion of any anthropogenic sound as compared to other non-Navy ship and boat sources.[4]

In addition to passive acoustic monitoring, the Navy Fleet funded Compliance Monitoring has also funded a series of cetacean satellite tracking projects off the Washington coast using medium and long term tags on fin whale, gray whales, and humpback whales (Schorr et al. 2013, Mate et al. 2014). Mate et al (2015) reports on ongoing blue whale tagging in Southern California with a specific section discussing individual whale movement through the Pacific Northwest including the OCNMS (**Figure 5**).
Nine annual Navy monitoring and seven associated technical reports from Fleet funded monitoring pertinent to the OCNMS cited in the Additional Information portion of this Section 304(d) document and are published online at the website below:
http://www.navymarinespeciesmonitoring.us/reading-room/pacific/

[4] Currently, there are only four Navy surface ships homeported in the Pacific Northwest, two aircraft carriers and two destroyers. Naval Vessel Registry "Homeports of Active Ships" http://www.nvr.navy.mil/nvrships/S_HP.HTM

Ongoing and Future Navy Monitoring in Relation to the OCNMS (2015-2020)- Ongoing Navy Fleet funded Compliance Monitoring includes the aforementioned blue whale tagging study (Mate et al. 2015) and a multi-year collaborative effort with NMFS' Northwest Fisheries Science Center on Southern Resident killer whale movements and occurrence along coastal Washington and Oregon (Hanson et al. 2015)(**Figure 5**). Other studies within Puget Sound outside of the OCNMS will also be initiated.
The Navy meets with the NMFS Office of Protected Resources each year during scheduled adaptive management meetings to review findings from Navy regional monitoring including the Pacific Northwest. Within the existing fiscal year's budget, ongoing projects are reviewed, tweaked if necessary, and new projects considered but only if fiscally supportable by the Navy, scientifically valid, and meet the Navy and NMFS permitting needs. In addition, monitoring within the offshore waters of Washington State must be balanced with annual available budgets for monitoring needs within other parts NWTT (ex., Puget Sound) as well as within four other Navy range complexes within the Pacific. Therefore, during the upcoming period through 2020, there may or may not be adjustments to Pacific Northwest monitoring studies pertinent to environmental information relevant to the OCNMS.
Finally, annual reporting of all results and establishment of next year monitoring priorities will continue to be published on the Navy's monitoring website.

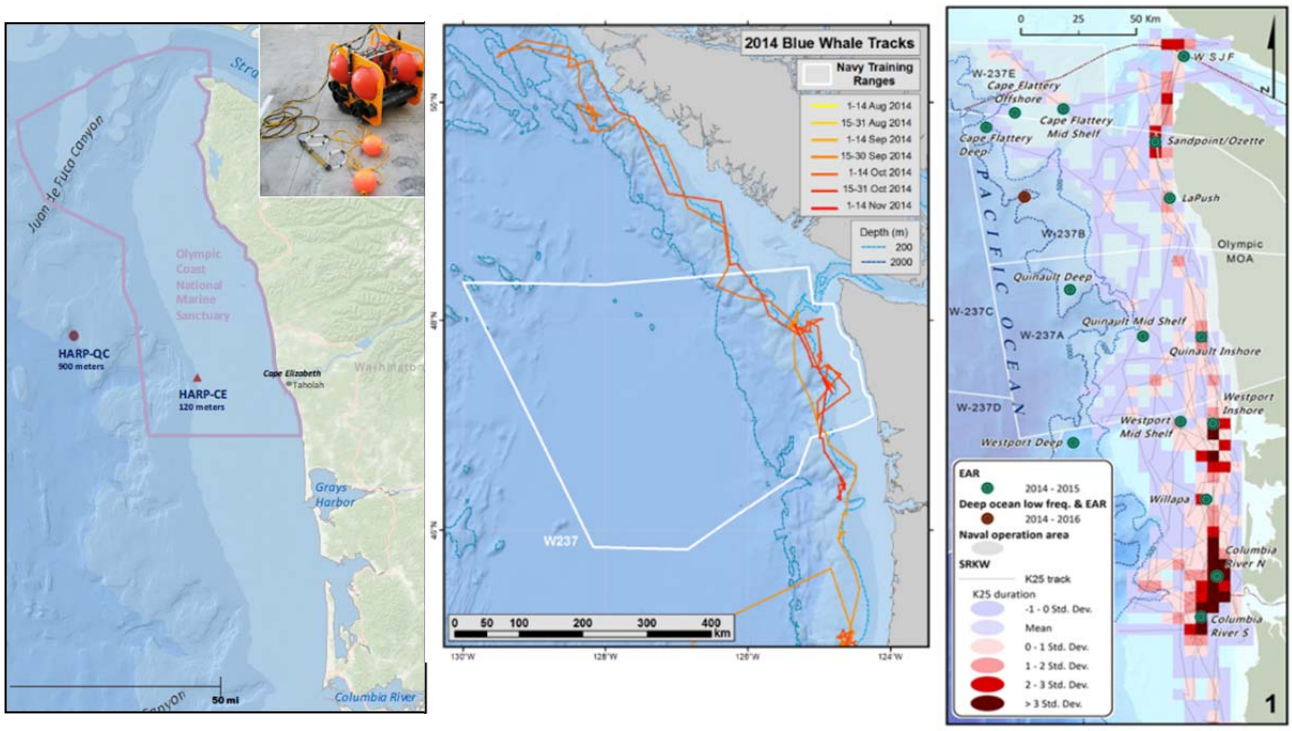

Figure 5. Locations Of Navy Funded Bottom-mounted Passive Acoustic Recording Devices Within And Adjacent To OCNMS 2004-2015 (*left*); Satellite-monitored track for a blue whales tagged off Southern California in 2014 and movement within NWTT (*middle*); Locations of 2014 -2015 season acoustic recorders and 2013 track of satellite-tagged Southern Resident killer whale K25. Density 5x5 km grid cells based on duration of occurrence are shown in red (*right*).

(High-frequency Acoustic Recording Packages (HARP); QC= Quinault Canyon deployed from 2004-2015 and removed in 2015; CE= Cape Elizabeth deployed from 2004-2014 and removed in 2014)

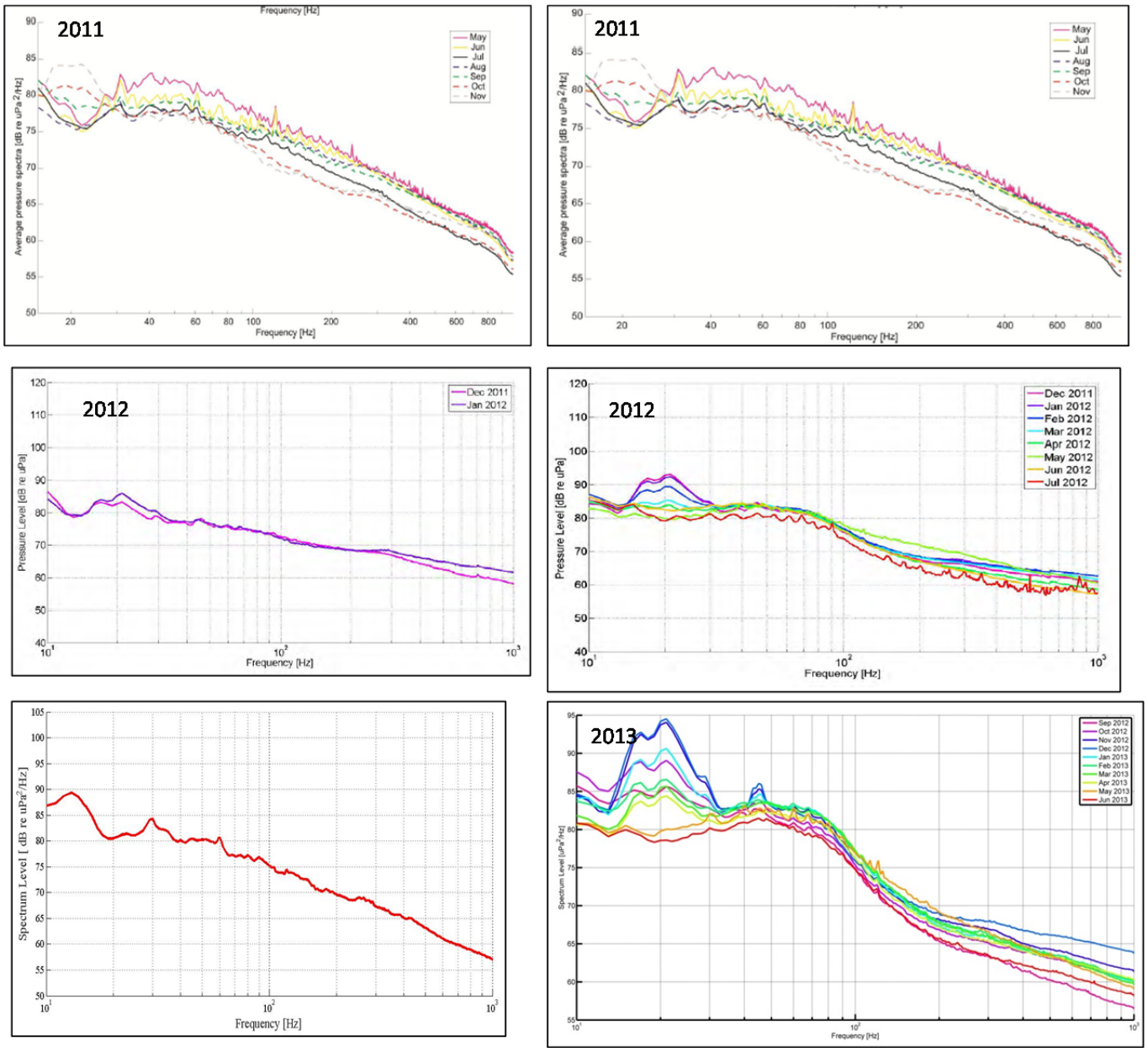

Figure 6. Monthly Average Of Ambient Noise Detected By Navy Funded Passive Acoustic Monitoring At Bottom Site Within (*left*) And Adjacent (*right*) To OCNMS

(Source: Širović et al. 2012, Kerosky et al 2013, Debich et al. 2014, Tricky et al. 2015)

3. Analysis of the potential effects of the proposed action and the alternatives on Sanctuary resources and values, including:

(i) An identification of sanctuary resources and values that are likely to be injured.

Marine mammals- **Table 4** lists marine mammal species potentially injured (as defined under the NMSA and its implementing regulations) by Navy training and testing activities within the OCNMS, and for which the Navy has applied for MMPA LOAs from and initiated formal consultations pursuant to the ESA with NMFS OPR.

Table 4 only contains those species and stocks the Navy anticipates as the most relevant to the potential to injure Sanctuary resources when in the OCNMS and not all species and stocks within the NWTT Study Area for which incidental take authorizations are being sought. For example, stocks that only occur in Puget Sound are not included in **Table 4**.

Table 4. Marine Mammal Species and Stocks Assessed for This Consultation

Species And Stock			References supporting justification for species and stock inclusion based on detection or sighting history				
Species (Bold italics indicate Endangered Status)	**Scientific Name**	**Stock**	Barlow et al 2010	Oleson & Hildebrand 2012	Kerosky et al 2013	Becker et al 2014	Rice et al 2015
humpback whale	*Megaptera novaeangliae*	CA/OR/WA	S	S, D	D	***	
blue whale	*Balaenoptera musculus*	Eastern North Pacific	-	S, D	D		
fin whale	*Balaenoptera physalus*	CA/OR/WA	S	S, D	D		
minke whale	*Balaenoptera acutorostrata*	CA/OR/WA	-	-	-		
gray whale	*Eschrichtius robustus*	Eastern North Pacific	-	S, D	D		
sperm whale	*Physeter macrocephalus*	CA/OR/WA	S	D	D		
Kogia (spp)	*Kogia* spp	CA/OR/WA	-	-	-		
killer whale	*Orcinus orca*	West Coast transient	-	S, D	D		D
		Eastern North Pacific Offshore	-				D
		Southern Resident	-	D	-		D
Baird's beaked whale	*Berardius bairdii*	CA/OR/WA	-	-	D		
Cuvier's beaked whale	*Ziphius cavirostris*	CA/OR/WA		D	D		
Mesoplodon beaked whale*	*Mesoplodon* spp.	CA/OR/WA		D	D		
short-beaked common dolphin	*Delphinus delphis*	CA/OR/WA	-	-		S	
Pacific white-sided dolphin	*Lagenorhynchus obliquidens*	CA/OR/WA	S	S	D	S	
Northern right whale dolphin	*Lissodelphis borealis*	CA/OR/WA	S	-		S	
Risso's dolphin	*Grampus griseus*	CA/OR/WA	-	D	D		
harbor porpoise	*Phocoena phocoena*	Northern OR/WA Coast	-	S			
Dall's porpoise	*Phocoenoides dalli*	CA/OR/WA	-	S		S	
Steller sea lion	*Eumetopias jubatus*	Eastern U.S.	-	S			
Guadalupe fur seal	*Arctocephalus townsendi*	Mexico	-	-			
California sea lion	*Zalophus californianus*	U.S.	-	S			
Northern fur seal	*Callorhinus ursinus*	California	-	S			
Northern elephant seal	*Mirounga angustirostris*	California breeding	-	S			
harbor seal	*Phoca vitulina*	OR/WA Coastal	-	S			

* Many studies do not designate between the stocks of killer whales sighted at sea
** Most common detected Mesoplodon during multiple years (2004-2015) of Navy funded monitoring has Stejneger's beaked whale
*** Gray cell for species not part of a particular study
S= visually sighted; D= passive acoustically detected; CA= California, OR= Oregon, WA= Washington

(ii) An assessment of the nature and likelihood of direct, indirect, and cumulative effects

Marine mammals in the Sanctuary may be affected by exposure to acoustic energy, such as that resulting from Navy sonar use. If a marine mammal is in close proximity to the sonar when there is an active ping, a hearing threshold shift with the loss of hearing sensitivity over a narrow range of frequency may result. To fully understand the Navy's assessment of its potential impacts on sanctuary resources and in order to present the views of recognized experts on the likely or potential effects of the action on sanctuary resources, background on the Marine Mammal Protection Act is presented below.

Public Law 108-136 (2004) amended the MMPA definitions of Level B harassment for military readiness activities to be "any act that disturbs or is likely to disturb a marine mammal or marine mammal stock by causing disruption of natural behavioral patterns including, but not limited to, migration, surfacing, nursing, breeding, feeding, or sheltering to a point where such behaviors are abandoned or significantly altered." Unlike MMPA Level A harassment, which is solely associated with injurious physiological effects, both non-injurious physiological and behavioral effects may cause MMPA Level B harassment.

Temporary Threshold Shift (TTS) is recoverable and is considered to result from the temporary, non-damaging fatigue of hearing-related tissues. The smallest measurable amount of TTS (onset TTS) is taken as the best indicator for slight temporary sensory impairment. Because it does not cause damage, the acoustic exposure associated with onset-TTS is used to define the outer limit of the portion of the MMPA Level B exposure zone attributable to physiological effects. Since short-term reduction in hearing acuity could be considered a temporary decrement, reduction in hearing acuity could be considered temporary and similar in scope to a period of hearing masking or behavioral disturbance. As such, it is considered by the Navy and NMFS as a Level B effect overlapping the range of sounds producing behavioral effects.

The TTS and Permanent Threshold Shift (PTS) criteria used by the Navy in the quantification of MMPA effects parallels the NOAA's recent draft "Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammals." This criteria was proposed in December 2013 and is still in review as of August 2015. Details can be found at www.nmfs.noaa.gov/pr/acoustics/guidelines.htm

Furthermore, the threshold shift may be permanent, but more often is temporary. The distinction between PTS and TTS is whether there is a complete recovery of hearing sensitivity following exposure. If hearing returns to "normal", the threshold shift is considered temporary; otherwise, it is permanent. For TTS, exposure may result in fatigue of the audio receptors, but not damage, and full recovery occurs within minutes to hours, as determined by scientific studies cited in the NWTT EIS/OEIS. TTS involves no tissue damage, is by definition temporary, and therefore consistent with NOAA's 2013 "Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammals", does not result in damage.

The harassment status of slight behavior disruption has been addressed in workshops, previous actions, and rulings (National Oceanic and Atmospheric Administration 2011a, b; U.S. Department of the Navy 2004). The conclusion is that a momentary behavioral reaction of an animal to a brief, time-isolated acoustic event does not qualify as MMPA Level B harassment. However, as explained in Section 3.4.3.1.14.4 (Model Assumptions and Limitations) of the NWTT EIS/OEIS, the model cannot predict the severity of the behavioral response. This analysis uses behavioral criteria to predict the number of animals

likely to experience a behavioral reaction and, therefore, a MMPA Level B harassment. Therefore, the model conservatively overestimates the number of Level B takes because it includes momentary behavior reactions that may not be significant.

However, a PTS involves some tissue damage and a permanent reduction of hearing sensitivity for a finite frequency range based on the sound exposure. For permanent threshold shifts (PTS), consistent with NOAA's 2013 "Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammals", Navy and NMFS consider PTS as an injury to an individual marine mammal. PTS is non-recoverable and, by definition, results from the irreversible impacts to auditory sensory cells, supporting tissues, or neural structures within the auditory system. A PTS represents a destruction or loss of biological tissue and is an alteration of physiological function that exceeds the normal daily physiological variation of the intact tissue. However, it is uncertain whether some permanent loss of hearing sensitivity over a narrow part of a marine mammal's full hearing range would have long-term consequences for that individual, given that natural hearing loss occurs in marine mammals as a result of disease, parasitic infestations, and age-related impairment. PTS as an injury to an individual marine mammal may not be biologically relevant to viability of that individual.

Table 5 presents potential PTS, TTS and behavioral estimated exposures to marine mammals within the OCNMS. In previous correspondence the ONMS has presented its view that any activity likely to cause disruption of behavioral patterns of a sanctuary resource as described in the definition of Level B MMPA harassment requires consultation under the NMSA. The Navy's position remains that Level B harassment takes should not be characterized as injury to sanctuary resources as they do not represent adverse biological changes. With respect to activities that may injure marine mammals when they are within the OCNMS, training activities have no potential to cause PTS exposures or injury of marine mammals within the OCNMS. Testing activities have the potential to result in PTS injury to only five species of marine mammals within the OCNMS. The estimate across these five species is 122 PTS exposures (**Table 5**).

Table 5. Estimated Annual Exposures To Marine Mammals Within the OCNMS From Navy Training And Testing Activities

Species	Stock	Behavioral and TTS			PTS	
		Training	Testing	*Training + Testing Combined*	Training	Testing
Humpback whale	CA/OR/WA	0	0	*0*	0	0
Blue whale	Eastern North Pacific	0	0	*0*	0	0
Fin whale	CA/OR/WA	0	1	*1*	0	0
Minke whale	CA/OR/WA	0	0	*0*	0	0
Gray whale	Eastern North Pacific	0	0	*0*	0	0
Sperm whale	CA/OR/WA	2	2	*4*	0	0
Kogia (spp)	CA/OR/WA	0	2	*2*	0	1
Killer whale	West Coast Transient	0	4	*4*	0	0
	Eastern North Pacific Offshore	0	0	*0*	0	0
	Southern Resident	0	0	*0*	0	0
Baird's beaked whale	CA/OR/WA	12	3	*15*	0	0
Cuvier's beaked whale	CA/OR/WA	7	2	*9*	0	0
Mesoplodon beaked whale	CA/OR/WA	28	7	*35*	0	0
Short-beaked common dolphin	CA/OR/WA	14	33	*47*	0	0
Pacific white-sided dolphin	CA/OR/WA	65	97	*162*	0	0
Northern right whale dolphin	CA/OR/WA	25	41	*66*	0	0
Risso's dolphin	CA/OR/WA	13	23	*36*	0	0
Harbor porpoise	Northern OR/WA Coast	700	459	*1,159*	0	39
Dall's porpoise	CA/OR/WA	15	203	*218*	0	42
Steller sea lion	Eastern U.S.	8	11	*19*	0	0
Guadalupe fur seal	Mexico	0	0	*0*	0	0
California sea lion	U.S.	16	41	*75*	0	0
Northern fur seal	California	1	1	*2*	0	0
Northern elephant seal	California breeding	20	27	*47*	0	3
Harbor seal	OR/WA Coastal	0	33	*33*	0	37

ANALYSIS SUMMARY

The following is a brief assessment of several Navy methods, means and equipment used during Navy training and testing and justification as to why the particular stressors related to each do not injure marine mammals or sea turtles when they are within the OCNMS.

Military expended materials (entanglement, strike)- While marine mammal interaction with military expended material could result in sub-lethal effects, based on the small number of events from **Table 1**, time between successive events within the OCNMS, and small amounts of any Navy military expended material that would occur directly within the OCNMS, the overall impact to marine mammals would be discountable. Expended materials from Navy training and testing may include the following: fiber optic cables, guidance wires, parachutes, non-explosive munitions (e.g., small arms ammunition, large and medium caliber non-explosive projectiles), marine markers, flares, chaff, sonobuoys, unrecovered aircraft stores (e.g., fuel tanks, carriages, dispensers, racks), ship hulks, and targets. At-sea targets are usually remotely-operated airborne, surface, or subsurface traveling units, most of which are designed to be recovered for reuse. Expendable targets that may fragment include air-launched decoys, surface targets (such as marine markers, paraflares, cardboard boxes, and 10 foot diameter red balloons), and mine shapes. Most expended materials and target fragments are expected to sink quickly to the seafloor. As discussed above and in the NWTT EIS/OEIS, the majority of all training items would be used in the NWTT Offshore Area outside of the OCNMS. A small subset would be used within the OCNMS during testing activities. There has never been a reported or recorded instance of marine mammals or sea turtles struck by or entangled in military expended materials. Though there is a potential for marine mammals or sea turtles to encounter military expended material, given the large geographic area involved (OCNMS= 2,408 NM^2), and small relative amounts of material that could be within the OCNMS, the Navy does not believe such interactions within the OCNMS are reasonably likely to occur and injure marine mammals within the OCNMS. Additionally, most expended materials are expected to sink upon release, and relatively few marine mammals feed in the deepwater benthic habitats where most expended materials are likely to settle. While disturbance or strike from any expended material as it falls through the water column is possible, it is not likely because the objects will slow in velocity as they sink toward the bottom (e.g., guidance wires sink at an estimated rate of 0.7 foot per second), and can be avoided by highly mobile organisms such as marine mammals. As the NMFS has determined in other areas for purposes of ESA conclusions that, "If encountered, it is unlikely that an animal would get entangled in a fiber optic cable, guide wire, parachute, or other expended material while it was sinking or upon settling to the seafloor. In the event an animal would swim through loops or become twisted within the cable or wire, and given low breaking strength of expended cables and fast sinking rate of wires would result in low probability of serious injury or mortality. Specifically, fiber optic cable is brittle and would be expected to break if kinked, twisted or sharply bent. Thus, the physical properties of the fiber optic cable would not allow the cable to loop, greatly reducing the likelihood of entanglement of ESA-listed species or other marine mammals and turtles. Based on degradation times, guidance wires would break down within one to two years and no longer pose an entanglement risk. Parachutes used by the Navy range in size from 18 to 48 inches, but the vast majority of expended decelerator/parachutes are small (18 inches) cruciform shaped decelerators used with sonobuoys. They have short attachment lines and, upon water impact, may remain at the surface for 5 to 15 seconds before the decelerator/parachute and its housing sink to the

seafloor. Entanglement of an animal in a parachute assembly at the surface or within the water column would be unlikely, since the parachute would have to land directly on an animal, or an animal would have to swim into it before it sinks."[5]

Given the information provided above and limited use of military expended materials within the boundaries of the OCNMS, the likelihood of marine mammals or sea turtles encountering, interacting with (becoming entangled, strike), and then being negatively impacted by expended materials, is so low as to be discountable. Because the encounter is so discountable, the Navy does not find that injury will occur to marine mammals or sea turtles when within the OCNMS.

Effects from Explosives- Navy training and testing activities during which explosive munitions are used within the NWTT Study Area do not occur within the OCNMS. Training activities that involve at-sea bombing are specifically prohibited in the OCNMS. And while live fire activities involving gunnery, missiles and torpedoes using explosive munitions are not prohibited from occurring within the OCNMS, these activities are not currently conducted there. Multiple years of Navy funded passive acoustic monitoring within and adjacent to the OCNMS detected numerous instances of in-water low source level explosives (**Figure 7**)(Širović et al. 2012, Kerosky et al 2013, Debich et al. 2014, Tricky et al. 2015). By cross-checking with Navy logs and reporting, none of the low source level explosives were associated with any Navy training or testing events in or near the OCNMS. Rather, it is quite possible these instances are associated with fishing or the activities of some other entities.

[5] NMFS, Biological Opinion for U.S. Navy's Training Exercises and Testing Activities in the Hawaii-Southern California Training and Testing Study Area (April 2, 2015)

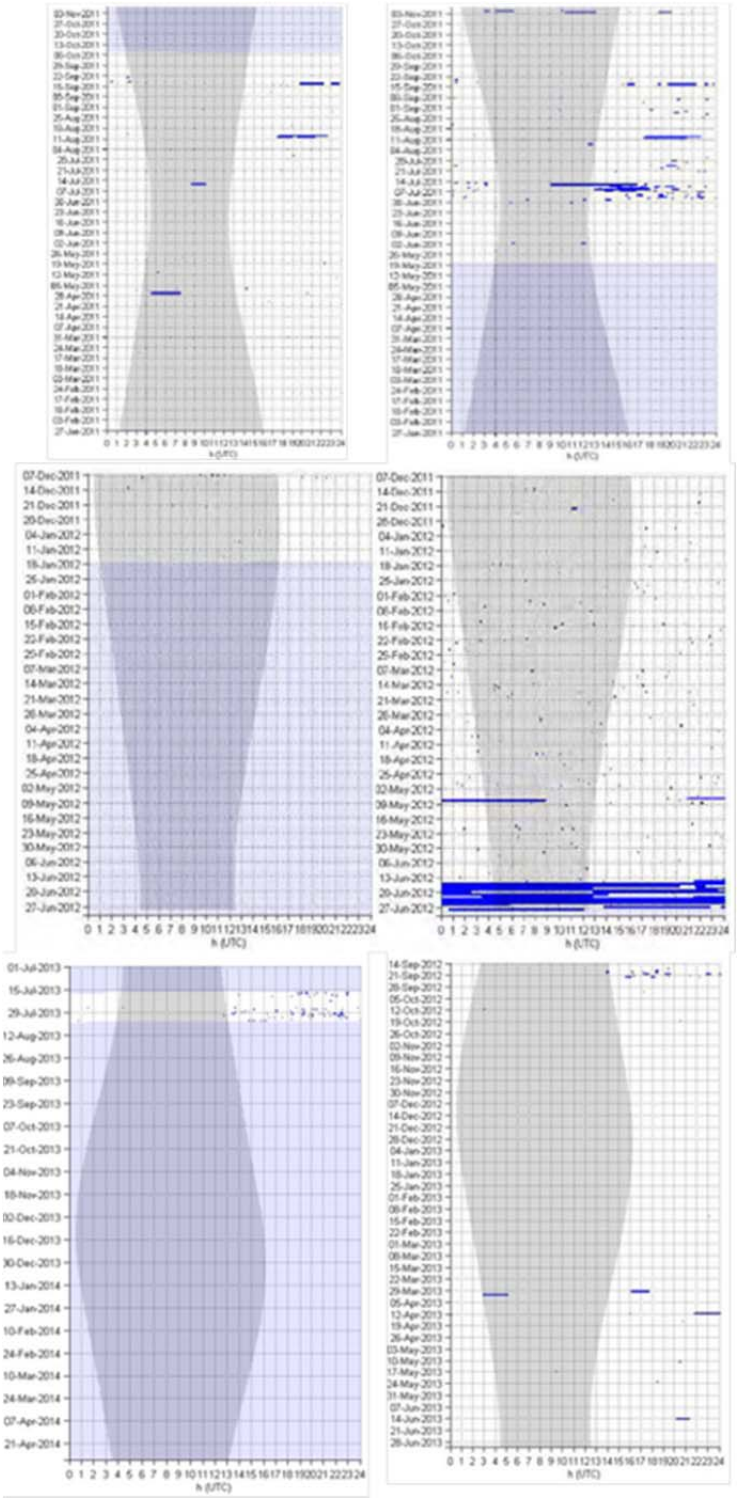

Figure 7. Periods Where Non-Navy Underwater Explosives Were Detected By Navy Funded Passive Acoustic Monitoring At Bottom Site Within (left) And Adjacent To (right) OCNMS
(gray shading indicated night; Source: Širović et al. 2012, Kerosky et al 2013, Debich et al. 2014, Tricky et al. 2015)

Cumulative Effects To Marine Mammals from Sound Exposure- When assessing impacts to marine mammals from acoustic energy the criteria and thresholds for assessing the potential for auditory threshold shifts already take into account the accumulation of energy from successive exposures (e.g. pings) that an animal may receive within a short period of time. Subsequent exposure to sound from a temporally or spatially separate event would not result in further accumulation of energy, because the auditory system would have had a chance to recover in the intervening time period. Temporary effects such as behavioral disturbance do not "accumulate" over time, because the animal's behavior usually returns to normal with the cessation of the exposure or during a short period of time (minutes to hours) thereafter. As a result, an animals' exposure to a sound days, weeks, or months later would not trigger an additive behavioral response. Also, based on the current best available science there is no evidence that minor, temporary modifications in behavior have any long term consequences to the individual, therefore, successive exposures would not result in cumulative effects or any decreased viability of the animal. While chronic exposure to high levels of noise, such as those associated with shipping lanes, could have impacts on marine mammals, this is dissimilar to the types of sound exposures that would result from Navy training and testing events using sonar. Navy training and testing within the NWTT Study Area, including the OCNMS, is infrequent, of short duration (i.e. up to a few hours), and spatially distributed. Therefore, the potential for chronic, continuous exposure such as that associated with persistent vessel traffic does not exist for Navy activities in the OCNMS. Since no serious injury or mortality is anticipated from Navy training and testing activities in the NWTT Study Area, there would also be no cumulative effects to the population associated with a reduction in abundance or breeding individuals as the action continued into the reasonably foreseeable future.

Therefore, given the spatial extent of the OCNMS, the limited amount of Navy training and testing events that would impact marine mammals found within the OCNMS, and in consideration of the non-cumulative nature itself of the sound exposure from Navy activities, the likelihood of marine mammals experiencing any sort of cumulative impacts associated with this action within the OCNMS is so low as to be discountable

DETAILED ANALYSIS

Primary direct effect from Navy acoustic sources and vessels- Navy training and testing activities under the NWTT Proposed Action may affect marine mammal species and stocks by exposing them for short periods to elevated narrow band sound levels such as sonar or related non-impulsive sounds within or in the vicinity of the Sanctuary. The Navy is seeking authorization from NMFS for such takes under the MMPA and formally consulting with NMFS under the ESA for the entire NWTT Study Area.

Over the 10 years of Navy funded passive acoustic monitoring within and adjacent to the OCNMS, there were relatively few detections of distant propagation from Navy mid-frequency active sonars (Širović et al. 2012, Kerosky et al 2013, Debich et al. 2014, Tricky et al. 2015). Sonar was detected during infrequent (four to seven days per year), temporally separated events, lasting at most a few hours in duration. Received signal levels varied from 108-148 dB re1 μPa, with the majority of pings less than 120 dB. More of these infrequent detections occurs at the monitoring site outside of the OCNMS.

Broad band sounds from Navy ships and boats would be more limited and not a significant stressor based on 1) few large Navy surface vessels within the Pacific Northwest; 2) spatial and temporal separation between training and testing activities; 3) the transitory nature of vessel movement to and from the NWTT Study Area, 4) the relatively sound dampening qualities of Navy surface combatants; and 5) masking and overall ambient sounds level contributed from significantly more civilian vessels (**Figures 8** and **9**).

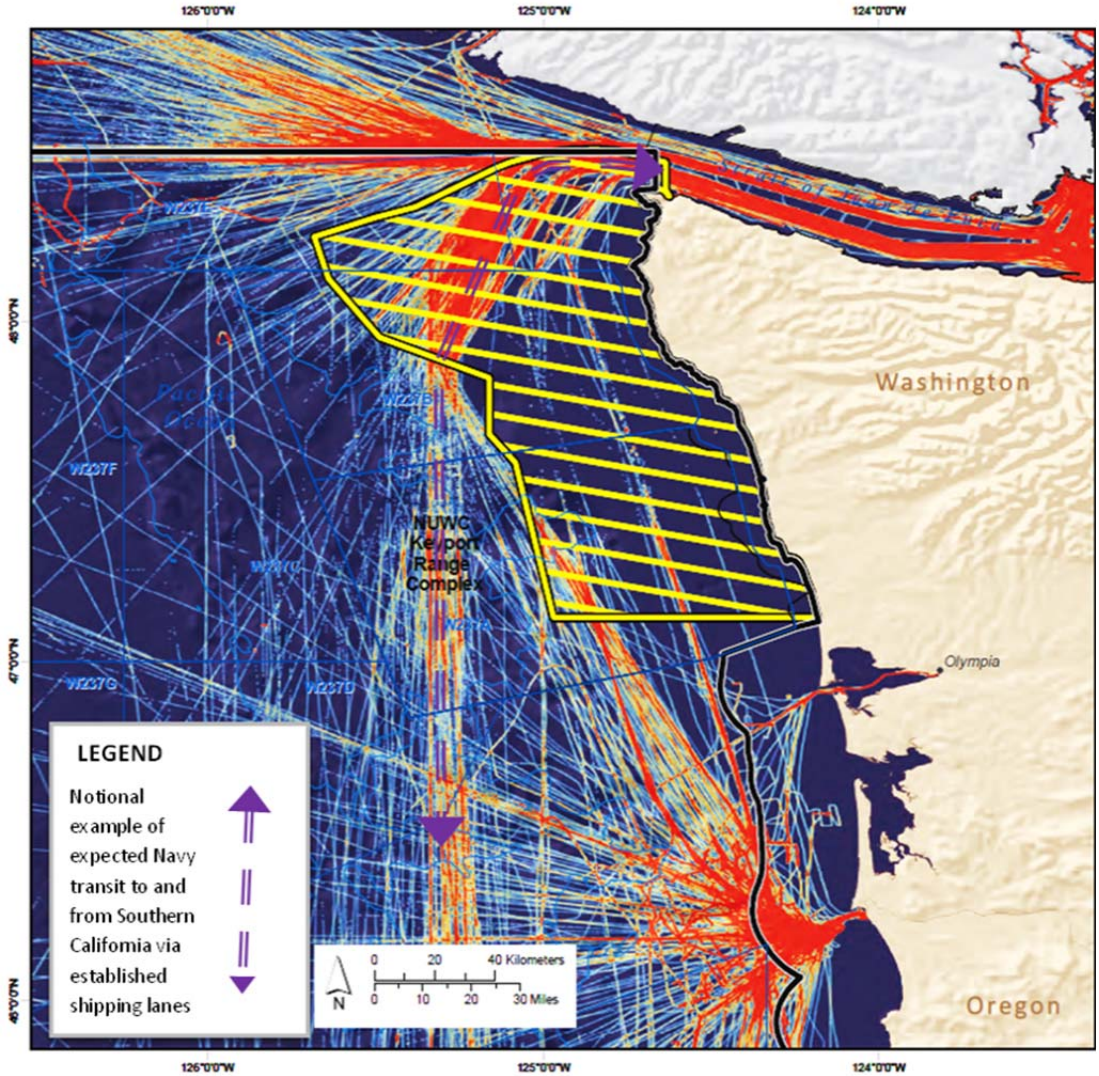

Figure 8. Commercial Shipping Density In Relation To Olympic Coast National Marine Sanctuary

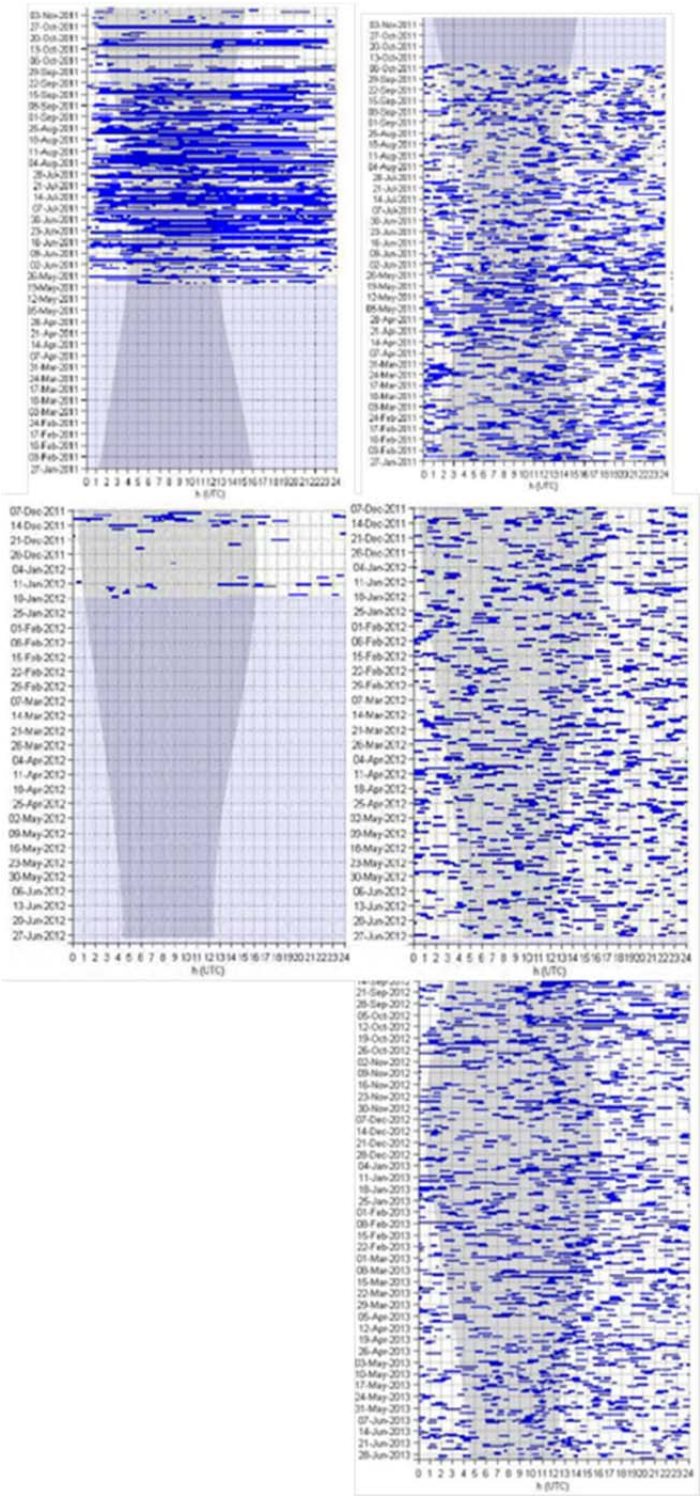

Figure 9. Broadband Vessel Noise Detected By Navy Funded Passive Acoustic Monitoring At Bottom Site Within (left) And Adjacent (right) To OCNMS

(gray shading indicated night; Source: Širović et al. 2012, Kerosky et al 2013, Debich et al. 2014, Tricky et al. 2015)

No acoustic energy or other stressor will cause serious injuries (i.e., injuries that could potentially lead to mortality) or actual mortalities to marine mammals in the NWTT Study Area (including within the OCNMS), and it is anticipated that no serious injury or mortality takes will be authorized by NMFS under MMPA.

The Navy's NWTT environmental documentation (Navy 2014a,b) and associated consultation documents (see Section 5) contain a more detailed description of the framework for analysis, supporting science, species specific densities and effects discussions, and how the Navy's impact assessment model works including model limitations and caveats. Based on expert analysis, the Navy is seeking MMPA authorization for incidental take and formally consulting under ESA for training and testing activities occurring in the NWTT Study Area.

For purposes of this sanctuary resource statement, an estimate of the number of marine mammal takes relative to marine mammals and activities within or adjacent to the OCNMS, or that could arise from distant propagation is presented in **Table 5**. It should be noted that these are general estimates of potential takes, and not direct output from the Navy's impact assessment model which cannot predict takes by subareas (such as the OCNMS) within the NWTT Offshore Area. The general estimates in **Table 5** are informed by the selection of the most appropriate species and stocks (**Table 4**), in consideration of the training and testing activities thought to have the most likely impact (**Table 2**), and the small spatial extent of OCNMS as compared to the larger NWTT Offshore Area.

It is the Navy's position that the proposed activities occurring in the Sanctuary will not affect the viability of any resource to the point at which that population or attribute is no longer contributing to the conservation, recreational, ecological, historical, research, educational, or aesthetic value of the Sanctuary. Especially with regard to the use of sonar and other acoustic energy during training and testing.[6]

Primary direct effect from Navy vessel or boat strike to marine mammals or sea turtles- Navy vessel or boat strike of large whales or sea turtles within the OCNMS is possible, although there has not been a recorded Navy strike resulting from training or testing activities in the Pacific Northwest as of this consultation. Navy vessels are likely to detect vessel strikes of a large whale, and Navy policy (Chief of Naval Operations Instruction [OPNAVINST] 3100.6H) requires Navy vessels to report all whale strikes up the chain of command. That information is collected by U.S. Pacific Fleet and the Office of the Chief of Naval Operations Energy and Environmental Readiness Division, and provided to NMFS within 72 hours of the incident and on an annual basis. It is unlikely that a whale vessel strike would go undetected. The ability of a ship to detect a marine mammal and avoid a collision depends on a variety of factors, including environmental conditions, ship design, size, speed, and manning, as well as the behavior of the animal. Key points in discussion of Navy vessels in relationship to potential ship strike include:

[6] As summed up by NMFS in a recently revised Biological Opinion for similar activities to those, NMFS determined that Navy's activities like those conducted in the NWTT Study Area:, " [The activities] do not create conditions of chronic, continuous underwater noise and are unlikely to lead to more than temporary changes in habitat selection or are unlikely to lead to long-term hormonal or physiological stress responses in marine mammals." In short, NMFS does not expect any fitness consequences to individual animals and does not expect any population level effects from behavioral responses resulting from those sources.

- Many Navy ships have their bridges positioned closer to the bow (i.e., a destroyer) than most commercial ships, offering good visibility ahead of the ship.
- There are often aircraft associated with the training or testing activity, which can detect marine mammals in the vicinity or ahead of a vessel's present course.
- Navy ships are generally much more maneuverable than commercial merchant vessels if marine mammals are spotted and the need to change direction is necessary. Navy ships operate at the slowest speed possible consistent with either transit needs, or training or testing need. While minimum speed is intended as a fuel conservation measure particular to a certain ship class, secondary benefits include better ability to spot and avoid objects in the water including marine mammals.
- A standard operating procedure also added as a mitigation measure in previous MMPA permits is for Navy vessels to maneuver to keep at least 500 yards away from any observed whale in the vessel's path and avoid approaching whales head-on, so long as safety of navigation is not imperiled.
- Navy overall crew size is much larger than merchant ships allowing for more potential observers on the bridge. At all times when vessels are underway, trained lookouts and bridge navigation teams are used to detect objects on the surface of the water ahead of the ship, including marine mammals. Additional lookouts, beyond already stationed bridge watch and navigation teams, are stationed during some training events.
- Navy lookouts receive extensive training including Marine Species Awareness Training designed to provide marine species detection cues and information necessary to detect marine mammals.

The potential for Navy ship strikes and mitigating procedures are thoroughly discussed in NWTT environmental documentation (Navy 2014). Currently, there are only four large Navy surface vessels homeported at two ports within Puget Sound.[7] In comparison with non-Navy vessel traffic, NOAA (2011) estimated there were approximately 7,163 civilian vessel transits (commercial, fishing, passenger, public, recreational, tugs) through or in the OCNMS based on a review of 2009 data. This represented a cumulative time of approximately 600 days of civilian vessel transit within the OCNMS.

Therefore, the Navy does not anticipate Navy vessel or boat strikes of marine mammals or sea turtles would occur within the NWTT Study Area or more specifically within the OCNMS, and NMFS is not anticipated to issue a ship strike take allocation since such strikes are not reasonably certain to occur.

(ii) Documentation supporting the assessment of the effects on sanctuary resources

See previous discussions in this sanctuary resource statement and attachments listed in additional information below and References.

[7] Two aircraft carriers and two Arleigh Burke class destroyers: http://www.nvr.navy.mil/nvrships/S_HP.HTM

4. Federal agency's conclusions regarding the effects of the proposed action

Only less than two percent of proposed training and 15 percent of proposed testing activities would occur within or immediately adjacent to the OCNMS compared to the rest of the NWTT Study Area. Individual events occurring primarily within the Quinault Range Site would be the activities most likely to occur within the Sanctuary (**Table 2**). Navy activities in the Sanctuary would be spread out over time throughout the year. There would be no marine mammal mortality associated with the Proposed Action. The estimated injury which could result from the Proposed Action would be a permanent reduction in hearing sensitivity to a particular frequency of sound for certain individual marine mammals from five species (**Table 5**) that would have PTS takes associated under MMPA. However, these injuries would be minor with respect to the overall viability of the individual and the population. As indicated previously, it is Navy's position that the temporary behavioral and TTS takes identified through the MMPA process may create affects to these marine mammals if the exposure is within the OCNMS but these exposures are temporary in nature and do not result in adverse effects.

Navy vessels and boats must typically travel through the northern section of the Sanctuary as part of the established shipping lanes to and from the Straits of Juan de Fuca in order to access offshore training and testing sites as well as transit to other Navy training ranges in Southern California and Hawaii. However, the Navy's contribution to shipping noise within the Sanctuary would be negligible due to the small number of Navy vessels and boats homeported in Puget Sound when compared to the several thousand civilian vessels that transit through the Sanctuary each year (NOAA 2011).

The primary stressor to OCNMS resources from Navy activities would be from underwater sound propagation associated with the Navy's very infrequent use of active sonar which could cause temporary behavioral impacts to marine mammals. Other sanctuary resources (water quality, bottom habitat, fish, bird, socioeconomics) would not be significantly impacted by Navy training and testing and there would not be injury to these resources within the OCNMS. Justification for this basis is detailed in the Navy's Draft Final NWTT EIS/OEIS Version 2 (Navy 2015a) and other listed supporting documents in Section 5 of this statement below. Section 3.4 "Marine Mammals" of the Navy's Draft Final NWTT EIS/OEIS (Navy 2015a) highlights the available science on marine mammals and sound interactions and the Navy and NMFS framework for analysis. Using an extrapolation of the spatial extent of OCNMS as compared to the overall NWTT Offshore study area, for appropriate species and stocks, Level B harassment takes (**Table 5)** would be relatively low within the Sanctuary. Navy-funded passive acoustic monitoring over the preceding 10 years confirms that Navy mid-frequency active sonar is detected very infrequently and at relatively low levels within or adjacent to the Sanctuary.

The Navy concludes any marine mammal behavioral reactions to NWTT training and testing activities would be transitory, infrequent, non-cumulative, and impacts are not expected to decrease overall individual fitness or result in long-term population-level impacts on any given population, and consequently will not result in any adverse changes to the sanctuary.

5. Applications for or copies of any federal, territory, state, tribal, or local authorizations, permits, licenses, or other forms of approval required for the project, or a summary of such approvals that would be required, if applicable

(i) NMFS Office of Protected Resources Permits And Conservation Division (F/PR1) Proposed Rule For Takes of Marine Mammals Incidental to Specified Activities; U.S. Navy Training and Testing Activities in the Northwest Training and Testing Study Area of 3 June 2015 (80 FR 31738).
http://www.gpo.gov/fdsys/pkg/FR-2015-06-03/pdf/2015-13038.pdf

Additional Information

(1) The results of any on-site surveys of the action area;
(2) A review of pertinent literature and related information;
(3) The views of recognized experts on the potential effects of the action on sanctuary resources; or
(4) Copies of pertinent reports, including, but not limited to, any environmental impact statement, environmental assessment or biological assessment prepared

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(1) The results of any on-site surveys of the action area;

Marine Mammal Monitoring Reports

(i) U.S. Department of the Navy (Navy). 2015. Marine Species Monitoring Report For the U.S. Navy's Northwest Training Range Complex- Annual Report 2015. U.S. Pacific Fleet, Pearl Harbor, HI. July 2015.

Navy 2015 supporting technical reports:

Trickey, J.S., S.Baumann-Pickering, A. Širović, J.A. Hildebrand, A.M. Brewer, A.J. Debich, S. Herbert, A.C. Rice, B. Thayre, and S.M. Wiggins. 2015. Passive Acoustic Monitoring for Marine Mammals in the Northwest Training Range Complex July 2013 – April 2014. Marine Physical Laboratory, Scripps Institution of Oceanography, University of California San Diego. MPL Technical Memorandum MPL-TM-557. June 2015. 44p.

Rice, A., V. Deecke, J.Ford, J. Pilkington, S. Baumann-Pickering, A. Debich, J. Hildebrand, A. Širović. 2015. Seasonality of killer whale (*Orcinus orca*) ecotypes in the Northwest Training Range Complex. Marine Physical Laboratory, Scripps Institution of Oceanography, University of California San Diego. . MPL Technical Memorandum MPL-TM-558. June 2015. 10p.

(ii) U.S. Department of the Navy (Navy). 2014c. Comprehensive Marine Species Monitoring Report For the U.S. Navy's Northwest Training Range Complex 2011-2014. U.S. Pacific Fleet, Pearl Harbor, HI. July 2014.
http://www.navymarinespeciesmonitoring.us/index.php/download_file/view/1048/

Navy 2014c supporting technical reports:

Debich, A.J., S. Baumann-Pickering, A. Širović, J.A. Hildebrand, A.L. Alldredge, R.S. Gottlieb, S. Herbert, S.C. Johnson, L.K. Roche, B. Thayre, J.S. Trickey, and S.M. Wiggins. 2014. Passive Acoustic Monitoring for Marine Mammals in the Northwest Training Range Complex 2012-2013. Marine Physical Laboratory, Scripps Institution of Oceanography, University of California San Diego. MPL Technical Memorandum MPL-TM 548. http://www.navymarinespeciesmonitoring.us/index.php/download_file/view/1050/

Mate, B., L. Irvine, and T. Follett. 2014. Offshore Gray Whale Satellite Tagging in the Northwest Training Range Complex (NWTRC). Prepared by Oregon State University for Commander, U.S. Pacific Fleet, Pearl Harbor, Hawaii. Submitted to Naval Facilities Engineering Command Northwest (NAVFAC NW), Silverdale, WA 98315-1101, under Contract # N62470-10-D-3011, issued to HDR Inc., San Diego, California 92123. June 2014.

(iii) U.S. Department of the Navy (Navy). 2014d. Unclassified Northwest Training Range Complex Exercise Report. U.S. Pacific Fleet, Pearl Harbor, HI. July 2014.
http://www.navymarinespeciesmonitoring.us/index.php/download_file/view/1049/

(iv) U.S. Department of the Navy (Navy). 2013a. Marine Species Monitoring Report For the U.S. Navy's Northwest Training Range Complex- Annual Report 2013. U.S. Pacific Fleet, Pearl Harbor, HI. July 2013. http://www.navymarinespeciesmonitoring.us/index.php/download_file/view/455/

Navy 2013a supporting technical reports:
Kerosky, S.M., S. Baumann-Pickering, A. Širović, J.S. Buccowich, A. J. Debich, Z. Gentes, R. S. Gottlieb, S.C. Johnson, L.K. Roche, B. Thayre, S.M. Wiggins, and J.A. Hildebrand. 2013. Passive Acoustic Monitoring for Marine Mammals in the Northwest Training Range Complex 2011-2012. Marine Physical Laboratory, Scripps Institution of Oceanography, University of California San Diego, La Jolla, CA. MPL Technical Memorandum MPL-TM 542. 58p.
http://www.navymarinespeciesmonitoring.us/index.php/download_file/view/459/

Mate, B. 2013. Offshore Gray Whale Satellite Tagging in the Pacific Northwest. Prepared for Commander, U.S. Pacific Fleet, Pearl Harbor, Hawaii. Submitted to Naval Facilities Engineering Command Northwest (NAVFAC NW), Silverdale, WA 98315-1101, under Contract # N62470-10-D-3011, issued to HDR Inc., San Diego, California 92123. 12 June 2013.
http://www.navymarinespeciesmonitoring.us/index.php/download_file/view/458/
Schorr, G., E. Falcone, and C. Calambokidis. 2013. Summary of Tag Deployments on Cetaceans off Washington, May 2010 to May 2013. Prepared for: U.S. Pacific Fleet, Pearl Harbor, Hawaii. Submitted to Naval Facilities Engineering Command Pacific, Pearl Harbor, Hawaii, and Naval Facilities Engineering Command Northwest, Silverdale, WA, under Contract # N62470-10-D-3011, issued to HDR Inc., San Diego, California 92123. 12 June 2013.
http://www.navymarinespeciesmonitoring.us/index.php/download_file/view/457/

(v) U.S. Department of the Navy (Navy). 2013b. Unclassified Northwest Training Range Complex Exercise Report. U.S. Pacific Fleet, Pearl Harbor, HI. July 2013.
http://www.navymarinespeciesmonitoring.us/index.php/download_file/view/456/
(vi) U.S. Department of the Navy (Navy). 2012a. Marine Species Monitoring Report For the U.S. Navy's Northwest Training Range Complex- Annual Report 2012. U.S. Pacific Fleet, Pearl Harbor, HI. July 2012.
http://www.navymarinespeciesmonitoring.us/index.php/download_file/view/271/
(vii) U.S. Department of the Navy (Navy). 2012b. Unclassified Northwest Training Range Complex Exercise Report. U.S. Pacific Fleet, Pearl Harbor, HI. July 2012.
http://www.navymarinespeciesmonitoring.us/index.php/download_file/view/278/
(viii) U.S. Department of the Navy (Navy). 2011a. Marine Species Monitoring Report For the U.S. Navy's Northwest Training Range Complex- Annual Report 2011. U.S. Pacific Fleet, Pearl Harbor, HI. July 2011. http://www.navymarinespeciesmonitoring.us/index.php/download_file/view/205/
(ix) U.S. Department of the Navy (Navy). 2011b. Unclassified Northwest Training Range Complex Exercise Report. U.S. Pacific Fleet, Pearl Harbor, HI. July 2011.
http://www.navymarinespeciesmonitoring.us/index.php/download_file/view/287/

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(2) A review of pertinent literature and related information;

Section 5, References, and Additional Information (1) and (4) scientific literature submitted to NMFS for MMPA and ESA consultation purposes.

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(3) Copies of pertinent reports, including, but not limited to, any environmental impact statement, environmental assessment or biological assessment prepared

Environmental Documents

(i) U.S. Department of the Navy (Navy). 2014a. Northwest Training and Testing Activities Draft Environmental Impact Statement/Overseas Environmental Impact Statement. U.S. Pacific Fleet, Pearl Harbor, HI and Navy System Commands (Naval Sea Systems Command and Naval Air Systems Command), as Represented By Naval Sea Systems Command, Washington Navy Yard, DC. January 2014. http://nwtteis.com/DocumentsandReferences/NWTTDocuments/DraftEISOEIS.aspx
(ii) U.S. Department of the Navy (Navy). 2014b. Supplement to the Draft Environmental Impact Statement/Overseas Environmental Impact Statement For Northwest Training and Testing Activities. . U.S. Pacific Fleet, Pearl Harbor, HI and Navy System Commands (Naval Sea Systems Command and Naval Air Systems Command), as Represented By Naval Sea Systems Command, Washington Navy Yard, DC. December 2014.
http://nwtteis.com/Portals/NWTT/files/documents/NWTT_Supplement_DEIS-OEIS.pdf
(iii) U.S. Department of the Navy (Navy). 2015a. Northwest Training and Testing Activities Draft Final Environmental Impact Statement/Overseas Environmental Impact Statement- Version 2. U.S. Pacific Fleet, Pearl Harbor, HI and Navy System Commands (Naval Sea Systems Command and Naval Air Systems Command), as Represented By Naval Sea Systems Command, Washington Navy Yard, DC. March 2015.
(iv) Navy Letter of Authorization application to NMFS Office of Protected Resources Permits And Conservation Division (F/PR1) of 7 November 2014.
http://www.nmfs.noaa.gov/pr/permits/incidental/military.htm#nwtt
(v) Navy Biological Evaluation to NMFS Office of Protected Resources ESA Interagency Cooperation Division (F/PR5) of 9 January 2015 and subsequent consultation documents.
(vi) Navy Essential Fish Habitat Analysis to NMFS West Coast Region of March 2015.
http://nwtteis.com/Portals/NWTT/files/documents/NWTT_Final_EFHA_March_2015.pdf
(vii) Navy Biological Evaluation to the U.S. Fish and Wildlife Service Lacey, Washington of January 2015 and subsequent consultation documents.

References

Becker, E.A., K.A. Forney, D.G. Foley, R.C. Smith, T.J. Moore, and J. Barlow. 2014. Predicting seasonal density patterns of California cetaceans based on habitat models. Endangered Species Research 23:1-22.

Barlow, J., A. Henry, J.V. Redfern, T. Yack, A. Jackson, C. Hall, E. Archer, and L. Balance. 2010. Oregon, California and Washington Line-Transect and Ecosystem (ORCAWALE) 2008 Cruise Report. National Marine Fisheries Service, Southwest Fisheries Science Center. NOAA Technical Memorandum NOAA-TM-NMFS-SWFSC-465. 33 p.

Carter, H. R. and R. A. Erickson. 1992. "Status and conservation of the marbled murrelet in California, 1892-1987," Status and conservation of the marbled murrelet in North America. Proceedings of the W. Foundation for Vertebrate Zoology 5.

Dooling R.J. and S.C. Therrien. 2012. "Hearing in Birds: What Changes From Air to Water," in The Effects of Noise on Aquatic Life, (edited by Popper A. N. and Hawkins A.) Springer Science + Business Media, LLC.

Good, T.P., V. Tuttle, J. Jannot, R. Shama, N. Riley, and J. McVeigh. 2015. Observed and Estimated Bycatch of Short-tailed Albatross in U.S. West Coast Groundfish Fisheries 2010-2013. NOAA Fisheries, Northwest Fisheries Science Center. 38 p. http://www.pcouncil.org/wp-content/uploads/2015/06/D4_Sup_Att5_Bycatch_Rpt_short-tailed-albatross_E-ONLY_JUN2015BB.pdf

Hanson, M.B., E.J. Ward, C.K. Emmons, M.M. Holt, and D.M. Holzer. 2015. Using satellite-tag locations to improve acoustic detection data for endangered killer whales near a U.S. Navy Training Range in Washington State. Prepared for U.S. Navy, U.S. Pacific Fleet, Pearl Harbor, HI. Prepared by National Oceanic and Atmospheric Administration, Northwest Fisheries Science Center, Seattle, WA Under MIPR Number N00070-14-MP-4C762. 29 June 2015. 26 p.

Hildebrand, J.A. 2009. Anthropogenic and natural sources of ambient noise in the ocean. Marine Ecology Progress Series 395:5-20. doi: 10.3354/meps08353

Kerosky, S.M., S. Baumann-Pickering, A. Širović, J.S. Buccowich, A. J. Debich, Z. Gentes, R. S. Gottlieb, S.C. Johnson, L.K. Roche, B. Thayre, S.M. Wiggins, and J.A. Hildebrand. 2013. Passive Acoustic Monitoring for Marine Mammals in the Northwest Training Range Complex 2011-2012. Marine Physical Laboratory, Scripps Institution of Oceanography, University of California San Diego, La Jolla, CA. MPL Technical Memorandum MPL-TM 542. 58p.

Menza, C., J. Leriness, T. White, A. Winship, B.Kinlan, J.E. Zamon, L. Balance, E. Becker, K. Forney, J. Adams, D. Pereksta, S. Pearson, J. Pierce, L. Antrim, N. Wright, and E. Bowlby. 2015. Modeling seabird distribution off the Pacific Coast of Washington-Final Report June 2015. Prepared for: Washington State Department of Natural Resources, Olympia, WA. Prepared by NOAA, National Centers for Coastal Ocean Science under deliverable NOS Agreement Code: MOA-2013-038 (Annex #002)/8963. 60 p.

National Oceanic and Atmospheric Administration (NOAA). 2011. Olympic Coast National Marine Sanctuary-Final Management Plan and Environmental Assessment. Office of National Marine Sanctuaries. 329 p.

Nelson, S.K. 1997. "Marbled Murrelet (*Brachyramphus marmoratus*), the Birds of North America Online," Available online: http://bna.birds.cornell.edu.offcampus.lib.washington.edu/bna/species/276 Cornell Lab of Ornithology, Ithaca NY.

Oelson, E.M., J.A. Hildebrand, J. Calambokidis, G. Schorr, and E. Falcone. 2007. 2006 Progress Report on Acoustic and Visual Monitoring for Cetaceans along the Outer Washington Coast. Prepared for and funded by the Chief of Naval Operations, Energy and Environmental Readiness Division [CNO(N45)], Washington, D.C. Report prepared by Scripps Institution of Oceanography University of California San Diego and Cascadia Research Collective. Under NPS grant N00244-06-C-0025. Naval Postgraduate School Report NPS-OC-07-003. 30 p.

Oelson, E.M., J. Calambokidis, E. Falcone, G. Schorr, and J.A. Hildebrand. 2009. Acoustic and visual monitoring for cetaceans along the outer Washington coast. Prepared for and funded by the Chief of Naval Operations, Energy and Environmental Readiness Division [CNO(N45)], Washington, D.C. Report prepared by Scripps Institution of Oceanography University of California San Diego and Cascadia Research Collective under NPS grant N0002407WX12527. Naval Postgraduate School Report NPS-OC-09-001. 45 p.

Oleson, E. and J. Hildebrand. 2012. Marine Mammal Demographics off the Outer Washington Coast and near Hawaii. Prepared for and funded by the Chief of Naval Operations, Energy and Environmental Readiness Division [CNO(N45)], Washington, D.C. Report was prepared by Scripps Institution of Oceanography University of California at San Diego and Cascadia Research Collective under NPS grant N00244-08-1-0023. Naval Postgraduate School Report NPS-OC-12-001CR. http://hdl.handle.net/10945/6893

Lance, M.M., and S.F. Pearson. 2005. 2005 at-sea Marbled Murrelet population monitoring. Washington Department of Fish and Wildlife, Olympia, WA. 11 p.

Mate, B., L. Irvine, and T. Follett. 2014. Offshore Gray Whale Satellite Tagging in the Northwest Training Range Complex (NWTRC). Prepared by Oregon State University for Commander, U.S. Pacific Fleet, Pearl Harbor, Hawaii. Submitted to Naval Facilities Engineering Command Northwest (NAVFAC NW), Silverdale, WA 98315-1101, under Contract # N62470-10-D-3011, issued to HDR Inc., San Diego, California 92123. June 2014.

Mate, B.R., D.M. Palacios, L.M. Irvine, B.A. Lagerquist, T. Follett and M.H. Winsor. 2015. Preliminary Summary: Baleen (Blue & Fin) Whale Tagging in Southern California in Support of Marine Mammal Monitoring Across Multiple Navy Training Areas (SOCAL, NWTRC, GOA). Prepared for U.S. Pacific Fleet. Submitted to Naval Facilities Engineering Command Pacific, Pearl Harbor, Hawaii, under Contract No. N62470-10-3011, Task Orders JP03 and KB27, issued to HDR, Inc., San Diego, California. 10 March 2015.

National Marine Fisheries Service (NMFS). 2015. Office of Protected Resources Permits And Conservation Division (F/PR1) Proposed Rule For Takes of Marine Mammals Incidental to Specified Activities; U.S. Navy Training and Testing Activities in the Northwest Training and Testing Study Area of 3 June 2015 (80 FR 31738).

Nur, N.J. , J. Jahncke, M. Herzog, J. Howar, D. Hyrenbach, J. Zamon, D. Ainley, J. Wiens, K. Morgan, L. Ballance, and D. Stralberg. 2011. Where the Wild Things Are: Predicting Hotspots of Seabird Aggregations in the California Current System. Ecological Applications 21(6): 2241–2257. PRBO Publication #1748.

Piatt, J.F. J. Wetzel, K. Bell, A.R. DeGange, G.R. Balogh, G.S. Drew, T. Geernaert, C. Ladd, and G.V. Byrd. 2006. Predictable hotspots and foraging habitat of the endangered short-tailed albatross (*Phoebastria albatrus*) in the North Pacific: Implications for conservation. Deep Sea Research Part II: Topical Studies in Oceanography 53(3-4):387-398. doi:10.1016/j.dsr2.2006.01.008

Raphael, M., A. Shirk, G. Falza, and S. Pearson. 2014. Spatio-temporal dynamics of Marbled Murrelet hotspots during nesting in nearshore waters along the Washington to California coast. Salish Sea Ecosystem Conference 2016. Paper 131. http://cedar.wwu.edu/ssec/2014ssec/Day2/131

Raphael, M.G., A. J. Shirk, G.A. Falza, and S.F. Pearson. 2015. Habitat associations of marbled murrelets during the nesting season in nearshore waters along the Washington to California coast. Journal of Marine Science 146:17-25. doi:10.1016/j.jmarsys.2014.06.010

Rice, A., V. Deecke, J. Ford, J. Pilkington, S. Baumann-Pickering, A. Debich, J. Hildebrand, A. Širović. 2015. Seasonality of killer whale (*Orcinus orca*) ecotypes in the Northwest Training Range Complex. Marine Physical Laboratory, Scripps Institution of Oceanography, University of California San Diego. MPL TM-558. 10 p.

Schorr, G., E. Falcone, and C. Calambokidis. 2013. Summary of Tag Deployments on Cetaceans off Washington, May 2010 to May 2013. Prepared for: U.S. Pacific Fleet, Pearl Harbor, Hawaii. Submitted to Naval Facilities Engineering Command Pacific, Pearl Harbor, Hawaii, and Naval Facilities Engineering Command Northwest, Silverdale, WA, under Contract # N62470-10-D-3011, issued to HDR Inc., San Diego, California 92123. 12 June 2013.

Thompson, C.W. 1997a. Distribution and abundance of Marbled Murrelets and Common Murres on the outer coast of Washington. 1997 completion report to the Tenyo Maru Trustees Council. Unpubl. Report, Washington Dept. of Fish and Wildlife, Mill Creek, WA.

Thompson, C.W. 1997b. Distribution and abundance of Marbled Murrelets on the outer coast of Washington. Winter 1996-1997. Unpubl. Report for the Washington Dept. of Natural Resources.

Thompson, C.W. 1999. Distribution and abundance of Marbled Murrelets and Common Murres on the outer coast of Washington, Summer 1997 through winter 1998-1999. Unpubl. report for Washington Dept. of Fish and Wildlife, Mill Creek, WA.

Thorensen, A. C. 1989. "Diving times and behavior of pigeon guillemots and marbled murrelets off Rosario Head, Washington," Western Birds, vol. 20, pp. 33-37.

Trickey, J.S., S. Baumann-Pickering, A. Širović, J.A. Hildebrand, A. M. Brewer, A.J. Debich, S. Herbert, A.C. Rice, B. Thayre, S.M. Wiggins. 2015. Passive Acoustic Monitoring for Marine Mammals in the Northwest Training Range Complex July 2013 – April 2014. Marine Physical Laboratory, Scripps Institution of Oceanography, University of California San Diego. MPL TM-557. 44 p.

U.S. Department of the Navy (Navy). 2014a. Northwest Training and Testing Draft Environmental Impact Statement/ Overseas Environmental Impact Statement. U.S. Pacific Fleet, Pearl Harbor, HI and Navy System Commands (Naval Sea Systems Command and Naval Air Systems Command), as Represented By Naval Sea Systems Command, Washington Navy Yard, DC. January 2014.

U.S. Department of the Navy (Navy). 2014b. Supplement to the Draft Environmental Impact Statement/Overseas Environmental Impact Statement For Northwest Training and Testing Activities. U.S. Pacific Fleet, Pearl Harbor, HI and Navy System Commands (Naval Sea Systems Command and Naval Air Systems Command), as Represented By Naval Sea Systems Command, Washington Navy Yard, DC. December 2014.

U.S. Department of the Navy (Navy). 2014c. Letter of Authorization application to NMFS Office of Protected Resources Permits And Conservation Division (F/PR1) of 7 November 2014. U.S. Pacific Fleet, Pearl Harbor, HI and Navy System Commands (Naval Sea Systems Command and Naval Air Systems Command), as Represented By Naval Sea Systems Command, Washington Navy Yard, DC.

U.S. Department of the Navy (Navy). 2015a. Northwest Training and Testing Draft Final Environmental Impact Statement/ Overseas Environmental Impact Statement. Version 2. U.S. Pacific Fleet, Pearl Harbor, HI and Navy System Commands (Naval Sea Systems Command and Naval Air Systems Command), as Represented By Naval Sea Systems Command, Washington Navy Yard, DC.

U.S. Department of the Navy (Navy). 2015b. Biological Evaluation to NOAA Fisheries Office of Protected Resources ESA Interagency Cooperation Division (F/PR5) of 9 January 2015 and subsequent consultation documents. U.S. Pacific Fleet, Pearl Harbor, HI and Navy System Commands (Naval Sea Systems Command and Naval Air Systems Command), as Represented By Naval Sea Systems Command, Washington Navy Yard, DC.

U.S. Department of the Navy (Navy). 2015c. Biological Evaluation to Washington Fish and Game and U.S. Fish and Wildlife Service Lacey Washington of 9 January 2015 and subsequent consultation documents. U.S. Pacific Fleet, Pearl Harbor, HI and Navy System Commands (Naval Sea Systems Command and Naval Air Systems Command), as Represented By Naval Sea Systems Command, Washington Navy Yard, DC.

U.S. Department of the Navy (Navy). 2015d. Essential Fish Habitat Analysis to NMFS West Coast Region of day month year. U.S. Pacific Fleet, Pearl Harbor, HI and Navy System Commands (Naval Sea Systems Command and Naval Air Systems Command), as Represented By Naval Sea Systems Command, Washington Navy Yard, DC.