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DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

RIN 0648-XA830

Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to a Wharf Construction Project

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Notice; issuance of an incidental harassment authorization.

SUMMARY: In accordance with the regulations implementing the Marine Mammal Protection Act (MMPA) as amended, notification is hereby given that we have issued an incidental harassment authorization (IHA) to the U.S. Navy (Navy) to incidentally harass, by Level B harassment only, six species of marine mammals during construction activities associated with a wharf construction project in Hood Canal, Washington.

DATES: This authorization is effective from July 16, 2012, through February 15, 2013.

ADDRESSES: A copy of the IHA and related documents are available by writing to Michael Payne, Chief, Permits and Conservation Division, Office of Protected Resources, National Marine Fisheries Service, 1315 East-West Highway, Silver Spring, MD 20910.

A copy of the application, including references used in this document, may be obtained by visiting the internet at: http://www.nmfs.noaa.gov/pr/permits/incidental.htm. For those members of the public unable to view these documents on the internet, a copy may be obtained by writing to the address specified above or telephoning the contact listed below (see FOR FURTHER INFORMATION CONTACT). A memorandum describing our adoption of the

Navy's Environmental Impact Statement (2011) and our associated Record of Decision, prepared pursuant to the National Environmental Policy Act, are also available at the same site. Documents cited in this notice may also be viewed, by appointment, during regular business hours, at the aforementioned address.

FOR FURTHER INFORMATION CONTACT: Ben Laws, Office of Protected Resources, NMFS, (301) 427-8401.

SUPPLEMENTARY INFORMATION:

Background

Sections 101(a)(5)(A) and (D) of the MMPA (16 U.S.C. 1361 et seq.) direct the Secretary of Commerce to allow, upon request, the incidental, but not intentional, taking of small numbers of marine mammals by U.S. citizens who engage in a specified activity (other than commercial fishing) within a specified geographical region if certain findings are made and either regulations are issued or, if the taking is limited to harassment, a notice of a proposed authorization is provided to the public for review.

Authorization for incidental takings shall be granted if NMFS finds that the taking will have a negligible impact on the species or stock(s), will not have an unmitigable adverse impact on the availability of the species or stock(s) for subsistence uses (where relevant), and if the permissible methods of taking and requirements pertaining to the mitigation, monitoring and reporting of such takings are set forth. NMFS has defined "negligible impact" in 50 CFR 216.103 as "...an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival."

Section 101(a)(5)(D) of the MMPA established an expedited process by which citizens of the U.S. can apply for an authorization to incidentally take small numbers of marine mammals by harassment. Section 101(a)(5)(D) establishes a 45-day time limit for NMFS review of an application followed by a 30-day public notice and comment period on any proposed authorizations for the incidental harassment of marine mammals. Within 45 days of the close of the comment period, NMFS must either issue or deny the authorization. Except with respect to certain activities not pertinent here, the MMPA defines "harassment" as: “any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild [Level A harassment]; or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering [Level B harassment].”

Summary of Request

We received an application on May 25, 2011 from the Navy for the taking of marine mammals incidental to pile driving in association with a wharf construction project in the Hood Canal at Naval Base Kitsap in Bangor, WA (NBKB). The Navy submitted a revised version of the application on August 11, 2011, and, responsive to discussions with us as well as new information about species in the area, submitted a final version deemed adequate and complete on November 3, 2011. The Navy submitted a final updated addendum to the IHA request on December 16, 2011.The wharf construction project is proposed to occur over multiple years; however, this IHA would cover only the initial year of in-water work associated with the project. Pile driving activities would occur only within an approved in-water work window from July 16, 2012, through February 15, 2013. Six species of marine mammals are known from the waters surrounding NBKB: Steller sea lions (Eumetopias jubatus), California sea lions (Zalophus

californianus), harbor seals (Phoca vitulina), killer whales (Orcinus orca; transient type only), Dall's porpoises (Phocoenoides dalli), and harbor porpoises (Phocoena phocoena). In addition, a single humpback whale (Megaptera novaeangliae) was observed in the Hood Canal during January and February, 2012; please note that these sightings occurred after the notice of proposed authorization for this project was published in the Federal Register. Therefore, descriptions of humpback whale occurrence in Puget Sound are included here.

These species may occur year-round in the Hood Canal, with the exception of the Steller sea lion, which is present only from fall to late spring (October to mid-April), and the California sea lion, which is not present during part of summer (late June through July). Although known to be historically abundant in the inland waters of Washington, no other confirmed documentation of humpback whales in Hood Canal is available. Additionally, while the Southern Resident killer whale (listed as endangered under the Endangered Species Act [ESA]) is resident to the inland waters of Washington and British Columbia, it has not been observed in the Hood Canal in over 15 years and was therefore excluded from further analysis.

Under the proposed action – which includes only the portion of the project that would be completed under this proposed 1-year IHA – a maximum of 195 pile driving days would occur. All piles would be driven with a vibratory hammer for their initial embedment depths, while select piles would be impact driven for their final 10-15 ft (3-4.6 m) for proofing, as necessary. Proofing involves striking a driven pile with an impact hammer to verify that it provides the required load-bearing capacity, as indicated by the number of hammer blows per foot of pile advancement. Sound attenuation measures (i.e., bubble curtain) would be used during all impact hammer operations.

For pile driving activities, the Navy used our current acoustic thresholds, outlined later in this document, for assessing impacts. The Navy used recommended spreading loss formulas (the practical spreading loss equation for underwater sounds and the spherical spreading loss equation for airborne sounds) and empirically-measured source levels from 30- to 66-in diameter steel pile driving events to estimate potential marine mammal exposures. Predicted exposures are outlined later in this document. The calculations predict that no Level A harassments would occur associated with pile driving or construction activities, and that as many as 18,225 Level B harassments may occur during the wharf construction project from sound produced by pile driving activity.

Description of the Specified Activity

NBKB is located on the Hood Canal approximately 20 miles (32 km) west of Seattle, Washington (see Figures 2-1 through 2-4 in the Navy's application). NBKB provides berthing and support services for OHIO Class ballistic missile submarines (SSBN), also known as TRIDENT submarines. The Navy's construction of the EHW-2 facility at NBKB is planned to support future program requirements for TRIDENT submarines berthed at NBKB. The Navy states that construction of EHW-2 is necessary because the existing EHW alone will not be able to support future TRIDENT program requirements. Under the MMPA, activities associated with the wharf construction project, including vibratory and impact pile driving operations and vibratory removal of falsework piles, have the potential to cause harassment of marine mammals within the waterways adjacent to NBKB. All in-water construction activities within the Hood Canal are only permitted during July 16-February 15 in order to protect spawning fish populations.

As part of the Navy's sea-based strategic deterrence mission, the Navy Strategic Systems Programs directs research, development, manufacturing, testing, evaluation, and operational support for the TRIDENT Fleet Ballistic Missile program. Development of necessary facilities for handling of explosive materials is part of these duties. The EHW-2 will consist of two components: (1) the wharf proper (or Operations Area), including the warping wharf; and (2) two access trestles. Please see Figures 1-1 and 1-2 of the Navy's application for conceptual and schematic representations of the EHW-2. Details regarding construction plans for the wharf were described in our Federal Register notice of proposed authorization (76 FR 79410; December 21, 2011; hereafter, the FR notice); please see that document or the Navy's application for construction details.

For the entire project, a total of up to 1,250 permanent piles ranging in size from 24- to 48-in diameter will be driven in-water to construct the wharf, with up to three vibratory rigs and one impact driving rig operating simultaneously. Construction will also require temporary installation of up to 150 falsework piles used as an aid to guide permanent piles to their proper locations. Falsework piles, which are removed upon installation of the permanent piles, will likely be driven and removed using a vibratory driver. It has not been determined exactly what parts or how much of the project will be completed during the first year; however, a maximum of 195 days of pile driving will occur. The analysis contained herein is based upon the maximum of 195 pile driving days, rather than any specific number of piles driven, and assumes that (1) all marine mammals available to be incidentally taken within the relevant area would be; and (2) individual marine mammals may only be incidentally taken once in a 24-hour period – for purposes of authorizing specified numbers of take – regardless of actual number of exposures in that period. Table 1 summarizes the number and nature of piles required for the entire project,

rather than what subset of piles may be expected to be driven during the first year of construction.

Table 1. Summary of piles required for wharf construction (in total)

Feature	**Quantity**
Total number of permanent in-water piles	Up to 1,250
Size and number of main wharf piles	24-in: 140 36-in: 157 48-in: 263
Size and number of warping wharf piles	24-in: 80 36-in: 190
Size and number of lightning tower piles	24-in: 40 36-in: 90
Size and number of trestle piles	24-in: 57 36-in: 233
Falsework piles	Up to 150, 18- to 24-in
Maximum pile driving duration	195 days (under 1-year IHA)

Pile installation will employ vibratory pile drivers to the greatest extent possible, and the Navy anticipates that most piles will be able to be vibratory driven to within several feet of the required depth. Pile drivability is, to a large degree, a function of soil conditions and the type of pile hammer. Recent experience at two other construction locations along the NBKB waterfront indicates that most piles should be able to be driven with a vibratory hammer to proper embedment depth. However, difficulties during pile driving may be encountered as a result of obstructions that may exist throughout the project area. Such obstructions may consist of rocks or boulders within the glacially overridden soils. If difficult driving conditions occur, increased usage of an impact hammer will be required. The Navy estimates that up to five piles may be proofed in a day, requiring a maximum total of 1,000 strikes from the impact hammer. Under a worst-case scenario (i.e., difficult subsurface driving conditions encountered), as many as three piles might require driving with an impact hammer to their full embedment depth. With proofing of two additional piles, this scenario would result in as many as 6,400 impact pile strikes in a day. Please see the FR notice (76 FR 79410; December 21, 2011) for more detail.

Impact pile driving during the first half of the in-water work window (July 16 to September 15) would only occur between 2 hours after sunrise and 2 hours before sunset to protect breeding marbled murrelets (Brachyramphus marmoratus; an ESA-listed bird under the jurisdiction of the U.S. Fish and Wildlife Service [USFWS]). Between September 16 and February 15, construction activities occurring in the water would occur during daylight hours (sunrise to sunset). Other construction (not in-water) may occur between 7 a.m. and 10 p.m., year-round.

Description of Sound Sources and Distances to Thresholds

An in-depth description of sound sources in general was provided in the FR notice (76 FR 79410; December 21, 2011). Significant sound-producing in-water construction activities associated with the project include impact and vibratory pile driving and vibratory pile removal.

Since 1997, we have used generic sound exposure thresholds as guidelines to estimate when harassment may occur. Current practice regarding exposure of marine mammals to sound defines thresholds as follows: cetaceans and pinnipeds exposed to sound levels of 180 and 190 dB root mean square (rms; note that all underwater sound levels in this document are referenced to a pressure of 1 μPa) or above, respectively, are considered to have been taken by Level A (i.e., injurious) harassment, while behavioral harassment (Level B) is considered to have occurred when marine mammals are exposed to sounds at or above 120 dB rms for continuous sound (such as will be produced by vibratory pile driving) and 160 dB rms for pulsed sound (produced by impact pile driving), but below injurious thresholds. For airborne sound, pinniped disturbance from haul-outs has been documented at 100 dB (unweighted) for pinnipeds in general, and at 90 dB (unweighted) for harbor seals (note that all airborne sound levels in this document are referenced to a pressure of 20 μPa).

Sound levels can be greatly reduced during impact pile driving using sound attenuation devices. The Navy is required to use sound attenuation devices for all impact pile driving, and has elected to use bubble curtains. Bubble curtains work by creating a column of air bubbles rising around a pile from the substrate to the water surface. The air bubbles absorb and scatter sound waves emanating from the pile, thereby reducing the sound energy. A confined bubble curtain contains the air bubbles within a flexible or rigid sleeve made from plastic, cloth, or pipe. Confined bubble curtains generally offer higher attenuation levels than unconfined curtains because they may physically block sound waves and they prevent air bubbles from migrating away from the pile.

The literature presents a wide array of observed attenuation results for bubble curtains (e.g., WSF, 2009; WSDOT, 2008; USFWS, 2009; Caltrans, 2009). The variability in attenuation levels is due to variation in design, as well as differences in site conditions and difficulty in properly installing and operating in-water attenuation devices. As a general rule, reductions of greater than 10 dB cannot be reliably predicted (Caltrans, 2009).

Distance to Sound Thresholds

Pile driving generates underwater noise that can potentially result in disturbance to marine mammals in the project area. Please see the FR notice (76 FR 79410; December 21, 2011) for a detailed description of the calculations and information used to estimate distances to relevant threshold levels. Transmission loss, or the decrease in acoustic intensity as an acoustic pressure wave propagates out from a source, was estimated as so-called "practical spreading loss". This model follows a geometric propagation loss based on the distance from the pile, resulting in a 4.5 dB reduction in level for each doubling of distance from the source. In the model used here, the sound pressure level (SPL) at some distance away from the source (e.g.,

driven pile) is governed by a measured source level, minus the transmission loss of the energy as it dissipates with distance.

The intensity of pile driving sounds is greatly influenced by factors such as the type of piles, hammers, and the physical environment in which the activity takes place. A large quantity of literature regarding SPLs recorded from pile driving projects is available for consideration. In order to determine reasonable SPLs and their associated affects on marine mammals that are likely to result from pile driving at NBKB, studies with similar properties to the proposed action were evaluated. Sound levels associated with vibratory pile removal are assumed to be the same as those during vibratory installation (Caltrans, 2007) – which is likely a conservative assumption – and have been taken into consideration in the modeling analysis. Overall, studies which met the following parameters were considered: (1) Pile size and materials: Steel pipe piles (30-72 in diameter); (2) Hammer machinery: Vibratory and impact hammer; and (3) Physical environment: shallow depth (less than 100 ft [30 m]).

Representative data for pile driving SPLs recorded from similar construction activities in recent years were presented in the FR notice (76 FR 79410; December 21, 2011). As described previously in this document, sound attenuation measures, including bubble curtains, can be employed during impact pile driving to reduce the high source pressures. For the wharf construction project, the Navy intends to employ sound reduction techniques during impact pile driving, including the use of sound attenuation systems (e.g., bubble curtain). The calculations of the distances to the marine mammal sound thresholds were calculated for impact installation with the assumption of a 10 dB reduction in source levels from the use of sound attenuation devices, and the Navy used the mitigated distances for impact pile driving for all analysis in their application. The Navy will require the contractors to employ a bubble curtain with proven

performance of 10 dB attenuation and will require measures to ensure that the system is deployed properly.

All calculated distances to and the total area encompassed by the marine mammal sound thresholds are provided in Table 2. The Navy used source values (at 10 m) of 185 dB for impact driving (the mean SPL of the representative values, less 10 dB of sound attenuation from use of a bubble curtain) and 180 dB for vibratory driving (the worst-case value from the representative data). Use of the mean SPL of values for impact driving was considered appropriate because it matched values from projects where larger-size pile was used and, in addition, matched the value obtained from the Carderock project, which was located at the NBKB waterfront and involved similar pile materials, water depth, and bottom type. Use of the maximum value for vibratory driving was deemed appropriate because no data were available for larger size piles.

Under likely construction scenarios, up to three vibratory drivers would operate simultaneously with one impact driver. Although radial distance and area associated with the zone ensonified to 160 dB rms (the behavioral harassment threshold for pulsed sounds, such as those produced by impact driving) are presented in Table 2 for reference, this zone would be subsumed by the 120 dB rms zone produced by vibratory driving. Although animals may react differently to pulsed sound above 160 dB or non-pulsed sound above 120 dB, there is no practical distinction to be made as regards estimation of incidental take under the multi-rig operating scenario. Animals would not be considered to be taken multiple times if exposed to different types of sound above the thresholds for behavioral harassment. Thus, behavioral harassment of marine mammals associated with impact driving is not considered further here.

The use of multiple similar vibratory rigs that are operating together closely in space and time would not result in larger 120 dB or 180/190 dB isopleths for the hypothetical situation

presented here, in which a single vibratory driver produces SPLs of 180 dB rms at 10 m (based upon acoustic monitoring, discussed later, these levels are likely to be lower). For the 120 dB isopleths, sound fields produced would already be truncated by land in the Hood Canal, which has a maximum line-of-sight distance from pile driving locations of 13.8 km. That is, no increase in the size of the actual 120 dB isopleths would occur with multiple vibratory rigs operating simultaneously, because those isopleths as produced by a single rig are already truncated by land (according to predictions from proxy source levels and practical spreading loss – actual isopleth distances are likely to be smaller as shown from monitoring results). If three similar vibratory pile drivers operating simultaneously each had overlapping 180 dB isopleths, they would produce a combined SPL of approximately 185 dB due to the properties of decibel addition. However, since these drivers will actually be separated in space such that no overlap in 180 dB isopleths would occur, the operation of multiple rigs will not result in any changes to injury zones.

Table 2. Calculated Distance(s) to and Area Encompassed by Underwater Marine Mammal Sound Thresholds during Pile Installation

Threshold	**Distance**	**Area, km^2**
Impact driving, pinniped injury (190 dB)	4.9 m	< 0.001
Impact driving, cetacean injury (180 dB)	22 m	0.002
Impact driving, disturbance (160 dB)[2]	724 m	1.65
Vibratory driving, pinniped injury (190 dB)	2.1 m	< 0.001
Vibratory driving, cetacean injury (180 dB)	10 m	< 0.001
Vibratory driving, disturbance (120 dB)	13,800 m^3	41.4 (15.98)

[1] SPLs used for calculations were: 185 dB for impact and 180 dB for vibratory driving.

[2] Area of 160-dB zone presented for reference. Estimated incidental take calculated on basis of larger 120-dB zone.

[3] Hood Canal average width at site is 2.4 km (1.5 mi), and is fetch limited from N to S at 20.3 km (12.6 mi). Calculated range (over 222 km) is greater than actual sound propagation through Hood Canal due to intervening land masses. 13.8 km (8.6 mi) is the greatest line-of-sight distance from pile driving locations unimpeded by land masses, which would block further propagation of sound.

Hood Canal does not represent open water, or free field, conditions. Therefore, sounds would attenuate as they encounter land masses or bends in the canal. As a result, the calculated distance and areas of impact for the 120 dB threshold cannot actually be attained at the project area. See Figure 6-1 of the Navy's application for a depiction of the size of areas in which each underwater sound threshold is predicted to occur at the project area due to pile driving.

Pile driving can generate airborne sound that could potentially result in disturbance to marine mammals (specifically, pinnipeds) which are hauled out or at the water's surface. As a result, the Navy analyzed the potential for pinnipeds hauled out or swimming at the surface near NBKB to be exposed to airborne SPLs that could result in Level B behavioral harassment. A spherical spreading loss model (i.e., 6 dB reduction in sound level for each doubling of distance from the source), in which there is a perfectly unobstructed (free-field) environment not limited by depth or water surface, is appropriate for use with airborne sound and was used to estimate the distance to the airborne thresholds.

As was discussed for underwater sound from pile driving, the intensity of pile driving sounds is greatly influenced by factors such as the type of piles, hammers, and the physical environment in which the activity takes place. In order to determine reasonable airborne SPLs and their associated effects on marine mammals that are likely to result from pile driving at NBKB, studies with similar properties to the Navy's project, as described previously, were evaluated.

Based on in-situ recordings from similar construction activities, the maximum airborne sound levels that would result from impact and vibratory pile driving are estimated to be 97 dB

rms re 20 μPa at 160 m and 97 dB rms re 20 μPa at 13 m, respectively (Blackwell et al., 2004; Laughlin, 2010b). The Navy has analyzed the combined sound field produced under the multi-rig scenario and calculated the radial distances to the 90 and 100 dB airborne thresholds as 361 m and 114 m, respectively, equating to areas of 0.41 km^2 and 0.04 km^2, respectively. These distances are predicted to be significantly less for the vibratory driver alone, approximately 28 m (92 ft) and 9 m (30 ft), respectively.

All airborne distances are less than those calculated for underwater sound thresholds. Protective measures will be in place out to the distances calculated for the underwater thresholds, and the distances for the airborne thresholds will be covered fully by mitigation and monitoring measures in place for underwater sound thresholds. Construction sound associated with the project is not predicted to extend beyond the buffer zone for underwater sound that will be established to protect pinnipeds. No haul-outs or rookeries are located within the airborne harassment radii. See Figure 6-2 of the Navy's application for a depiction of the size of areas in which each airborne sound threshold is predicted to occur at the project area due to pile driving.

Acoustic Monitoring

In 2011, the Navy conducted acoustic monitoring as required by IHAs for repair work conducted at the existing EHW (EHW-1) (76 FR 30130; May 24, 2011) and for a test pile project (76 FR 25408; June 30, 2011) conducted in order to obtain geotechnical data in advance of the EHW-2 project. The two projects together involved impact driving of 24 to 48-in piles, vibratory installation of 16 to 48-in piles, and vibratory removal of 12 to 48-in piles. All piles were steel pipe piles. Primary objectives for the acoustic monitoring were to characterize underwater and airborne source levels for each pile size and hammer type and to verify distances to relevant threshold levels by characterizing site-specific transmission loss. Secondary objectives included

testing the effective attenuation performance for use of a bubble curtain and investigation of SPLs produced during soft starts. Select results are reproduced here; the interested reader may find the entire reports posted at http://www.nmfs.noaa.gov/pr/permits/incidental.htm.

Table 3. Acoustic monitoring results from 2011 activities at NBKB

Pile size (in)	Hammer type[1]	n[2]	Underwater			Airborne		Distances to threshold (m)[7]					
			RL[3]	SD[4]	TL[5]	RL[6]	SD	**190**	**180**	**160**	**120**	**100**	**90**
24	Impact	1 (2)	174	0.7	13.2	89	n/a	< 10	< 10	108	n/a	47	150
36	Impact	10 (17)/9	182	5.7	16.4	92	2.3	< 10	28	398	n/a	48	150
48	Impact	4 (8)	187	4.4	13.4	91	2.1	< 10/15	40	1,180	n/a	34	108
24	Vibratory	4 (7)/2	164	5.0	17.4	91	1.4	-	-	n/a	2,635	14	45
36	Vibratory (I)	23 (42)/30	162	4.3	15.1	93	2.9	-	-	n/a	6,082	20	64
36	Vibratory (R)	21 (36)	157	4.5									
48	Vibratory (I)	7 (14)/11	163	5.1	16.3	94	3.2	-	-	n/a	5,046	24	75
48	Vibratory (R)	8 (15)	155	4.5									
12	Vibratory (R)	6 (4)[8]	160	2.4	16.5	-	-	-	-	n/a	5,375	22	69
16	Vibratory (I)	8 (16)	159	4.7		-	-	-	-	n/a			
30	Vibratory (I)	44 (87)	165	4.5		-	-	-	-	n/a		44	138

[1]For vibratory hammer, I = installation and R = removal. Because of limited sample size for 24-in piles, all events were combined. All data for impact driving include use of bubble curtain.

[2]n = sample size, or number of measured pile driving events. For categories where two numbers are listed, sample size was different for underwater and airborne measurements. For underwater, each event may have up to two measurements because two hydrophones were deployed at different depths; however, both hydrophones did not produce usable data for all events. For airborne events, each event represents a single measurement. Information is presented as follows: # underwater events measured (total # measurements; maximum would be twice the total # events)/# airborne events measured (if different).

[3]Received level at 10 m, presented in dB re: 1 µPa rms.

[4]Standard deviation

[5]Transmission loss (log_{10}). Mean TL calculations for vibratory driving were not separated by I/R. A single mean TL value was calculated for 12/16/30-in piles.

[6]Received level at 15 m, presented in dB re: 20 µPa rms. Airborne measurements were combined for I/R events, as no difference in airborne SPLs would be expected. No near-source measurements were conducted for 12/16/30-in piles.

[7]Indicated thresholds are in dB rms and correspond with those described previously under Description of Sound Sources and Distances to Thresholds. Combined values for mean distance to threshold were calculated for I/R events and for airborne sound. Values were calculated using interpolated TL values and SPL measurements at multiple distances from the source. A dash indicates that mean source level was below the relevant threshold. For impact driving of 48-in piles, mean distance to the 190 dB threshold was calculated as being < 10 m for measurements taken at the mid-depth hydrophone and 15 m for measurements taken at the deep hydrophone. For all others, mean of the mean values taken at mid-depth and deep hydrophone is presented.

[8]These six events were measured in two episodes; i.e., three separate events were measured to provide a mean in each of two episodes.

Comparison of Predictions and Measurements

The project activities involve impact driving of 24- to 48-in steel piles and vibratory driving of 18- to 48-in steel piles. As shown by the empirical data collected during 2011 activities, the proxy value selected for impact driving (185 dB for impact driving with use of bubble curtain) is generally accurate, although SPLs from driving of 48-in piles may be somewhat louder than expected. This may be because data show that realized performance from the bubble curtain may be somewhat less than the expected 10 dB, although testing performed in 2011 was likely inadequate due to restrictions on the number of unattenuated pile strikes. No further testing will be performed because of similar restrictions placed on impact pile driving by the USFWS due to potential impacts to the marbled murrelet, an ESA-listed bird species. The selected proxy value for vibratory driving (180 dB) appears to be very conservative, with the highest SPLs recorded for vibratory driving being 165 dB at 10 m. Site-specific propagation loss appears to be generally greater than practical spreading loss, although the values are variable and sometimes less than practical spreading.

Impact driving is unlikely to exceed the injury threshold for pinnipeds (190 dB rms) at 10 m. The mean received level at 10 m for 36-in piles was 182 dB rms, while the mean for 48-in piles was 187 dB rms (with measurements from only four events). Vibratory driving is not likely to produce sound levels exceeding the thresholds for Level A harassment (i.e., 180/190 dB rms). The actual distance to the 120 dB rms behavioral harassment threshold is likely to be significantly smaller than predicted as the largest observed mean distance to threshold was 6,082 m for 36-in piles.

Mean distances to airborne thresholds were smaller than those predicted for the multi-rig pile driving scenario. Observed distances for 2011 activities were smaller than the least distance to an available haul-out area. However, regardless of actual distance to threshold, it is likely that

any animal exposed to airborne sound that may result in behavioral harassment would also be exposed to underwater sound above behavioral harassment thresholds, even if hauled-out during pile removal activity. We recognize that swimming pinnipeds may be exposed to airborne sound that may cause behavioral harassment if they raise their heads above water within the relevant zone; however, for purposes of take estimation these are accounted for through estimation of incidental take resulting from underwater sound. An animal is considered to be 'available' for incidental take by behavioral harassment only once per 24-hour period, regardless of source.

Comments and Responses

We published a notice of receipt of the Navy's application and proposed IHA in the Federal Register on December 21, 2011 (76 FR 79410). NMFS received comments from the Marine Mammal Commission (Commission). The Commission's comments, and our responses, are provided here. We have determined that the mitigation measures described here will effect the least practicable impact on the species or stocks and their habitats.

Comment 1: The Commission recommends that we require the Navy to measure in-air sound levels as a function of distance from the vibratory and impact hammers and make concurrent observations of marine mammal behavioral responses to in-air sound produced by pile driving and removal activities.

Response: We concur with the Commission's recommendation. As originally proposed, the Navy will measure airborne sound levels associated with representative scenarios of project activities. The specifics of the monitoring protocol are described in detail in the Navy's Acoustic Monitoring Plan. The Navy will make concurrent observations of behavioral reactions and, if possible, relate these to approximate received levels of sound in order to better understand what levels of sound might result in behavioral harassment given the context present

at the time of the observation. The Commission also notes that they would welcome the opportunity to consult with us to (1) identify the types of activities that have the potential to take marine mammals by exposure to in-air sounds, (2) determine the best scientific basis for identifying exposure thresholds of concern, and (3) develop research strategies for gathering the information needed to set more reliable thresholds. We look forward to working with the Commission to better understand these issues.

The Commission also encourages us to simply specify that the authorized number of takes of pinnipeds by Level B harassment, although based upon the predicted footprint of underwater sound, could occur by exposure to underwater and/or airborne sound when the animals are within an area that is ensonified to both 160 dB or 120 dB underwater (pulsed/non-pulsed sounds, respectively) and 90/100 dB in-air (harbor seals and other pinnipeds, respectively), rather than attempting to predict these takes separately. We agree with that recommendation, and reflect the recommendation in our amendment of the take authorization. Pinnipeds, whether hauled-out or looking with head above water in the project vicinity, may be exposed to both airborne and underwater sound levels that could cause behavioral reactions indicating harassment. We consider exposure of the same individual to different stimuli that may potentially result in harassment – whether airborne or underwater sound or pulsed or non-pulsed sound – within the same 24-hour period to be a single incidence of take.

Comment 2: The Commission recommends that we require the Navy to re-estimate the number of in-water and in-air takes using the overall density of harbor seals in Hood Canal (i.e., 3.74 animals/km^2) or to use a different density estimate if monitoring data indicate one that is appropriate.

Response: We disagree with the Commission's recommendation and feel that the density estimate used for estimating potential incidental take is sufficiently conservative. As described in greater detail in the FR notice of proposed authorization (76 FR 79410; December 21, 2011), the Navy's density estimate relies on work showing that, of an estimated 1,088 seals resident to the Hood Canal, approximately 35 percent will be in the water at any given time (Huber et al., 2001; Jeffries et al., 2003), producing a density estimate of 1.31 seals/km^2. The Commission contends that this will result in an underestimate of take, because essentially all of the seals may enter the water over the matter of hours during which pile driving may occur in a day. It is possible that greater than 35 percent of seals could enter the water during the course of pile driving activity. However, remembering that the population estimate of 1,088 seals represents the entirety of Hood Canal (291 km^2 vs. the 41.4 km^2 predicted area of effect), it is unlikely that all of these animals would be exposed to elevated levels of sound from the project, even over the course of multiple days. No data exist regarding fine-scale harbor seal movements within the project area on time durations of less than a day, thus precluding an assessment of ingress or egress of different animals through the action area. As such, it is impossible, given available data, to determine exactly what number of individuals above 35 percent may potentially be exposed to underwater sound. There are no existing data that would indicate that the proportion of individuals entering the water within the predicted area of effect during pile driving would be dramatically larger than 35 percent; thus, the Commission's suggestion that 100 percent of the population be used to estimate density would likely result in a gross exaggeration of potential take.

In addition, there are a number of factors indicating that the density we used should not result in an underestimate of take. Hauled-out harbor seals are necessarily at haul-outs, and no

significant harbor seal haul-outs are located within or near the action area. Harbor seals observed in the vicinity of the NBKB shoreline are rarely hauled-out (for example, in formal surveys during 2007-08, approximately 86 percent of observed seals were swimming), and when hauled-out, they do so opportunistically (i.e., on floating booms rather than established haul-outs). Harbor seals are typically unsuited for using manmade haul-outs at NBKB, which are used by sea lions. Primary harbor seal haul-outs in Hood Canal are located at significant distance (20 km or more) from the action area in Dabob Bay or further south (see Figure 4-1 in the Navy's application), meaning that animals casually entering the water from haul-outs or flushing due to some disturbance at those locations would not likely be exposed to underwater sound from the project; rather, only those animals embarking on foraging trips and entering the action area may be exposed. Moreover, because the Navy is unable to determine from field observations whether the same or different individuals are being exposed, each observation will be recorded as a new take, although an individual theoretically would only be considered as taken once in a given day.

There are two final factors that support the conservatism of the 1.31 density estimate: (1) limited surveys conducted during construction in Hood Canal during off days in 2011 produced an uncorrected density estimate of approximately 0.55 seals/km^2; and (2) although authorized to incidentally take 1,668 seals (corrected for actual number of pile driving days) during two projects conducted in Hood Canal in 2011, the total estimate of actual take (observed takes and observations extrapolated to unobserved area) was only 187 seals.

Comment 3: The Commission recommends that we require the Navy to measure in-situ sound levels for 30 days after the initiation of major pile-driving scenarios and then provide the analytical results (i.e., sound levels as a function of distance) within an additional 15 days; if the Navy is unable to meet the 15-day analysis deadline, then require the Navy to use maximum

distances to the Level A harassment thresholds of 190 dB re 1 μPa (i.e., 20 m for 36- and 48-in piles) and 180 dB re 1 μPa (i.e., 200 m for 36-in and 120 m for 48-in piles) from the test pile program until the in-situ sound measurement data have been analyzed and the distances to thresholds verified for EHW-2.

Response: Because of difficulties implementing similar measures required under previous IHAs issued for activities conducted in 2011, which we have discussed at length with the Navy, we have determined that a requirement to adjust zones within 15 days of the completion of a 30-day acoustic monitoring period is impracticable in this situation. The Commission cites two projects in which adjustment of zones are required within a short timeframe; however, we do not believe that these projects offer comparable context as they are in a more sensitive environment (the Arctic) and are for activity with a larger footprint of more intense effect (seismic surveys). Given that the Navy is unable to meet the 15-day analysis deadline recommended by the Commission, we partially accept the Commission's alternative recommendation to use maximum distances to Level A harassment thresholds from empirical measurements completed in 2011. We will require the Navy to implement a 20 m shutdown zone around all pile driving for pinnipeds, but will require only an 85 m shutdown zone for cetaceans. The rationale for this reduction from the recommendation is described in detail under the "Mitigation" section, later in this document. However, although unable to meet the recommended 15-day analysis timeframe, the Navy (in addition to implementing the precautionary zones described here) will complete analysis of acoustic monitoring data and adjust zones as necessary no later than 90 days following the completion of the acoustic monitoring period.

Comment 4: The Commission recommends that we require the Navy to conduct in-situ sound measurements if and when vibratory hammers are used concurrently and to use that information to ensure that it (1) expands appropriately the size of the Level B harassment zone for in-water sounds, (2) monitors the entire expanded zone, and (3) estimates the resulting number of takes accurately.

Response: As originally proposed, the Navy will be required to conduct acoustic monitoring for representative pile driving scenarios, including the multi-rig scenario (simultaneous use of three vibratory and one impact rig) comprising the maximum production of sound. These data will enable understanding of the size of the actual Level B harassment zone which, in concert with observational data, will produce a record of actual incidental take. As described frequently, it is not practicable for the Navy to monitor the entire Level B harassment zone. However, although the size of the Level B harassment zone may fluctuate based on the number of drivers in use if the zone is in fact smaller than the predicted zone, it is not possible for the predicted zone to grow as it is defined not by the predicted sound pressure levels but by the contours of the Hood Canal shoreline. The properties of decibel addition and the way that addition of multiple driving rigs is likely to affect the sound field were described in greater detail earlier in this document, under "Distance to Sound Thresholds".

Comment 5: The Commission recommends that we require the Navy to implement soft-start procedures after 15 minutes if pile driving or removal was delayed or shut down because of the presence of a marine mammal within or approaching the shutdown zone.

Response: We disagree with this recommendation. The Commission cites several reasons why pinnipeds may remain in a shutdown zone after shutdown and yet be undetected by observers during the 15 minute clearance period (e.g., perception and availability bias). While

this is possible in theory, we find it extremely unlikely that an animal could remain undetected in such a small zone and under typical conditions in Hood Canal. The shutdown zone for pinnipeds has a 20 m radial distance, while typical observation conditions in the Hood Canal are excellent. We believe the possibility of a pinniped remaining undetected in the shutdown zone, in relatively shallow water, for greater than 15 minutes is discountable. A requirement to implement soft start after every shutdown or delay less than 30 minutes in duration would be impracticable, resulting in significant construction delays and therefore extending the overall time required for the project, and thus the number of days on which disturbance of marine mammals could occur.

Comment 6: The Commission recommends that we require the Navy to develop a monitoring strategy that ensures it will be able to detect and characterize marine mammal responses to the pile driving and removal activities as a function of sound levels and distance from the pile driving and removal sites.

Response: We believe that the Navy, in consultation with NMFS, has developed such a strategy. The Commission states that the goal is not simply to employ a strategy that ensures monitoring out to a certain distance, but rather to employ a strategy that provides the information necessary to determine if the construction activities have adverse effects on marine mammals and to describe the nature and extent of those effects. We agree with that statement, and note that the Navy does not simply monitor within defined zones, ignoring occurrences outside those zones. The mitigation strategy is designed to implement shutdown of activity only for marine mammal occurrence within designated zones, but all observations of marine mammals, and any observed behavior, whether construed as a reaction to project activity or not, are recorded, regardless of distance to project activity. This information is coupled with acoustic monitoring data (i.e., sound levels recorded at multiple defined distances from the activity) to draw

conclusions about the impact of the activity on marine mammals. Additionally, the larger monitoring effort conducted by the Navy in deeper waters of Hood Canal during their 2011 project monitoring was an important piece of the Navy's overall monitoring strategy for the ongoing suite of actions at NBKB and may reasonably be used as a reference for the current activities. Using that information, as well as the results of a more limited deep-water component of the monitoring program for 2012, we can gain an acceptable understanding of marine mammal occurrence and behavior within the Level B harassment zone in deeper waters beyond the waterfront restricted area, which is intensively monitored. It is unclear what aspects of the monitoring goals or strategy the Commission deems inadequate.

Comment 7: The Commission recommends that we complete an analysis of the impact of the proposed activities together with the cumulative impacts of all the other pertinent risk factors (including but not limited to the Navy's concurrent EHW-1 repair project) impacting marine mammals in the Hood Canal area prior to issuing the proposed incidental harassment authorization.

Response: Section 101(a)(5)(D) of the MMPA requires NMFS to make a determination that the harassment incidental to a specified activity will have a negligible impact on the affected species or stocks of marine mammals, and will not result in an unmitigable adverse impact on the availability of marine mammals for taking for subsistence uses. Neither the MMPA nor NMFS' implementing regulations specify how to consider other activities and their impacts on the same populations. However, consistent with the 1989 preamble for NMFS' implementing regulations (54 FR 40338; September 29, 1989), the impacts from other past and ongoing anthropogenic activities are incorporated into the negligible impact analysis via their

impacts on the environmental baseline (e.g., as reflected in the density/distribution and status of the species, population size and growth rate, and ambient noise).

In addition, cumulative effects were addressed in the Navy's Environmental Impact Statement and in the biological opinion prepared for this action. These documents, as well as the relevant Stock Assessment Reports, are part of NMFS' Administrative Record for this action, and provided the decision-maker with information regarding other activities in the action area that affect marine mammals, an analysis of cumulative impacts, and other information relevant to the determination made under the MMPA.

Comment 8: The Commission recommends that we encourage the Navy to combine future requests for incidental harassment authorizations for all activities that would occur in the same general area and within the same year rather than segmenting those activities and their associated impacts by requesting separate authorizations.

Response: We agree with the Commission's recommendation and have encouraged the Navy to do so.

Comment 9: The Commission recommends that we adopt a policy to provide an additional opportunity for public review and comment before amending authorizations if any substantive changes are made to them after they have been issued or if the information on which a negligible impact determination is based is significantly changed in a way that indicates the likelihood of an increased level of taking or impacts not originally considered.

Response: We disagree with the Commission's contention that the referenced IHA modifications constituted a substantive change. The modifications involved small increases to the amount of incidental take of harbor porpoise authorized for two projects conducted in 2011 at NBKB in response to new information about harbor porpoise occurrence and habitat use at

NBKB. In our findings for the referenced modification, we determined that authorization of the incidental taking, by Level B harassment only, of increased numbers of harbor porpoise did not alter the original scope of activity analyzed, the monitoring and mitigation measures implemented, or the impact analysis in a manner that materially affected the basis for our original findings. The increased level of authorized take for harbor porpoise remained a small number, by any definition of that term. The Inland Washington stock of harbor porpoise is not listed under the ESA, nor is it considered depleted or designated as a strategic stock under the MMPA. The increase in takings was considered negligible in comparison with the overall population of the stock. The modifications reflected a more complete understanding of harbor porpoise presence and use of habitat in the Hood Canal, but constituted a negligible increase in impacts to the stock. We believe that those modifications were within the scope of analysis supporting the determinations for the original IHAs, and that those original findings remained valid. Nevertheless, we thank the Commission for the recommendation and will consider it in the future for situations where substantive changes are required.

Description of Marine Mammals in the Area of the Specified Activity

There are seven marine mammal species, four cetaceans and three pinnipeds, which may inhabit or transit through the waters nearby NBKB in the Hood Canal. These include the transient killer whale, harbor porpoise, Dall's porpoise, Steller sea lion, California sea lion, harbor seal, and humpback whale. While the Southern Resident killer whale is resident to the inland waters of Washington and British Columbia, it has not been observed in the Hood Canal in over 15 years, and therefore was excluded from further analysis. The Steller sea lion and humpback whale are the only marine mammals that may occur within the Hood Canal that are listed under the ESA; the humpback whale is listed as endangered and the eastern distinct

population segment (DPS) of Steller sea lion is listed as threatened. All marine mammal species are protected under the MMPA. The FR notice (76 FR 79410; December 21, 2011) summarizes the population status and abundance of these species and provides detailed life history information. A description of the humpback whale is provided here, as the recent sighting of an individual of that species occurred after the FR notice was published.

Humpback Whale

Species Description – The humpback whale is a baleen whale, and a member of the Balaenopterid family (rorquals), with a worldwide distribution in all ocean basins. Similar to all baleen whales, adult females are larger than adult males, reaching lengths of up to 60 ft (18 m). Their body coloration is primarily dark grey, but individuals have a variable amount of white on their pectoral fins and belly. This variation is so distinctive that the pigmentation pattern on the undersides of their flukes is used to identify individual whales. Humpback whales are known for their long pectoral fins, which can be up to 15 ft (4.6 m) in length and provide significant maneuverability. In the summer, most humpback whales are found in high latitude or highly biologically productive feeding grounds. In the winter, they congregate in subtropical or tropical waters for mating.

In the North Pacific, there are at least three separate populations: (1) CA/OR/WA stock, which winters in coastal Central America and Mexico and migrates to areas ranging from the coast of California to southern British Columbia in summer/fall; (2) Central North Pacific stock, which winters in the Hawaiian Islands and migrates to northern British Columbia/Southeast Alaska and Prince William Sound west to Kodiak; and (3) Western North Pacific stock, which winters near Japan and probably migrates to waters west of the Kodiak Archipelago (the Bering Sea and Aleutian Islands) in summer/fall. Though there is some mixing between these

populations, they are considered distinct stocks. The stock structure of humpback whales is defined based on feeding areas, as distinct populations have a high degree of fidelity to specific feeding areas. Humpback whales found in inland Washington waters are members of the CA/OR/WA stock. Carretta et al. (2011) described distinct feeding populations in the eastern Pacific, and the waters off northern Washington may be an area of mixing between the CA/OR/WA stock and British Columbia/Alaska whales, or whales in northern Washington and southern British Columbia may be a distinct feeding population and a separate stock.

Status – Humpback whales were listed as endangered under the Endangered Species Preservation Act of 1966 because of declines due to commercial whaling. This protection was transferred to the ESA in 1973. Because of this listing, it is therefore designated as depleted and classified as a strategic stock under the MMPA. The recovery plan for humpback whales was finalized in November 1991 (NMFS, 1991). Critical habitat has not been designated for this species.

Humpback whales are increasing in abundance through much of their range, including the CA/OR/WA stock. In the North Pacific, humpback abundance was estimated at fewer than 1,400 whales in 1966, after heavy commercial exploitation. The current abundance estimate for the North Pacific is about 20,000 whales in total. Carretta et al. (2011) reported the best estimate for the CA/OR/WA stock as 2,043 individuals, based on mark-recapture estimates by Calambokidis et al. (2009). However, this estimate excludes some whales in Washington. Population trends from mark-recapture estimates have shown an overall long-term increase of approximately 7.5 percent per year for the CA/OR/WA stock (Calambokidis, 2009).

Distribution – The worldwide population of humpback whales is divided into various northern and southern ocean populations (Mackintosh, 1965). Geographical overlap of these

populations has been documented only off Central America (Acevedo and Smultea, 1995; Rasmussen et al., 2004, 2007). The humpback whale is one of the most abundant cetaceans off the Pacific coast of Costa Rica during the winter breeding season of northern hemisphere humpbacks.

Humpback whales were one of the most common large cetaceans in the inland waters of Washington prior to the early 1900s (Scheffer and Slipp, 1948). However, sightings became infrequent in Puget Sound and the Georgia Basin through the late 1990s, and prior to 2003 the presence of only three individual humpback whales was confirmed (Falcone et al., 2005). However, in 2003 and 2004, thirteen individuals were sighted in the inland waters of Washington, mainly during the fall (Falcone et al., 2005). Records available for 2001 to 2011 include observations in the Strait of Juan de Fuca; the Gulf Islands and the vicinity of Victoria, British Columbia; Admiralty Inlet; the San Juan Islands; and Puget Sound (Orca Network, 2012).

In Hood Canal, several humpback whale sightings were recorded beginning on January 27, 2012 (Orca Network, 2012). Review of the sightings information indicates the sightings are of a single individual. The last reported sighting was on February 17, 2012, and the individual has almost certainly departed the Hood Canal. Prior to these sightings, there have been no confirmed reports of humpback whales entering Hood Canal (Calambokidis, 2012). No other reports of humpback whales in the Hood Canal were found in the Orca Network database, the scientific literature, or agency reports. Construction of the Hood Canal Bridge occurred in 1961 and could have contributed to the lack of historical sightings (Calambokidis, 2010). Only a few records of humpback whales near Hood Canal are in the Orca Network database, but these are north of the Hood Canal Bridge.

Behavior and Ecology – Humpback whales travel great distances during their seasonal migrations from high latitude feeding grounds to tropical and subtropical breeding grounds. One of the more closely studied routes is between Alaska and Hawaii, where humpbacks have been observed making the 3,000 mi (4,830 km) trip in as few as 36 days. During the summer months, humpbacks spend the majority of their time feeding and building up fat reserves (blubber) that they will live off of during the winter breeding season. Humpbacks filter feed on tiny crustaceans (mostly krill), plankton, and small fish and are known to consume up to 3,000 lb (1,360 kg) of food per day. Several hunting methods involve using air bubbles to herd, corral, or disorient fish. One highly complex variant, called bubble netting, is unique to humpbacks and is often performed in groups with defined roles for distracting, scaring, and herding before whales lunge at prey corralled near the surface. While on their winter breeding grounds, humpback whales congregate and engage in mating activities. Humpbacks are generally polygynous, with males exhibiting competitive behavior including aggressive and antagonistic displays. Breeding usually occurs once every 2 years, but sometimes occurs twice in 3 years.

Although the humpback whale is considered a primarily coastal species, it often traverses deep pelagic areas while migrating (Clapham and Mattila, 1990; Norris et al., 1999; Calambokidis et al., 2001). During migration, humpbacks stay near the surface of the ocean, and tend to generally prefer shallow waters. During calving, humpbacks are usually found in the warmest waters available at that latitude. Calving grounds are commonly near offshore reef systems, islands, or continental shores. Humpback feeding grounds are in cold, productive coastal waters.

Humpback whales are often sighted singly or in groups of two or three, but while on breeding and feeding grounds they may occur in groups larger than twenty (Leatherwood and

Reeves, 1983; Jefferson et al., 2008). The diving behavior of humpback whales is related to time of year and whale activity (Clapham and Mead, 1999). In summer feeding areas, humpbacks typically forage in the upper 120 m of the water column, with a maximum recorded dive depth of 500 m (Dolphin, 1987; Dietz et al., 2002). On winter breeding grounds, humpback dives have been recorded at depths greater than 100 m (Baird et al., 2000). The CA/OR/WA stock winters in coastal Central America and Mexico, and the stock migrates to areas ranging from the coast of California to southern British Columbia in summer and fall.

Acoustics – Humpback whales, like all baleen whales, are considered low-frequency cetaceans. Functional hearing for low-frequency cetaceans is estimated to range from 7 Hz to 22 kHz (Southall et al., 2007). During the winter breeding season, males sing complex songs that can last up to 20 minutes and be heard at great distance, and may sing for hours, repeating the song several times. All males in a population sing the same song, but that song continually evolves over time.

Potential Effects of the Specified Activity on Marine Mammals

We have determined that pile driving, as outlined in the project description, has the potential to result in behavioral harassment of marine mammals that may be present in the project vicinity while construction activity is being conducted. Pile driving could potentially harass those pinnipeds that are in the water close to the project site, whether exposed to airborne or underwater sound. The FR notice (76 FR 79410; December 21, 2011) provides a detailed description of marine mammal hearing and of the potential effects of these construction activities on marine mammals.

Anticipated Effects on Habitat

The proposed activities at NBKB would not result in permanent impacts to habitats used directly by marine mammals, such as haul-out sites, but may have potential short-term impacts to food sources such as forage fish and salmonids. There are no rookeries or major haul-out sites within 10 km (6.2 mi), foraging hotspots, or other ocean bottom structures of significant biological importance to marine mammals that may be present in the marine waters in the vicinity of the project area. Therefore, the main impact issue associated with the proposed activity would be temporarily elevated sound levels and the associated direct effects on marine mammals, as discussed previously in this document. The most likely impact to marine mammal habitat occurs from pile driving effects on likely marine mammal prey (i.e., fish) near NBKB and minor impacts to the immediate substrate during construction activity associated with the EHW-2 project. The FR notice (76 FR 79410; December 21, 2011) describes these potential impacts in greater detail.

Mitigation

In order to issue an incidental take authorization (ITA) under Section 101(a)(5)(D) of the MMPA, we must, where applicable, set forth the permissible methods of taking pursuant to such activity, and other means of effecting the least practicable impact on such species or stock and its habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and on the availability of such species or stock for taking for certain subsistence uses (where relevant).

A combination of predictions – based on proxy values and practical spreading loss – and measured values for zones of influence (ZOIs; see "Estimated Take by Incidental Harassment") were used to develop mitigation measures for pile driving activities at NBKB. The ZOIs effectively represent the mitigation zone that would be established around each pile to prevent

Level A harassment to marine mammals, while providing estimates of the areas within which Level B harassment might occur. In addition to the measures described later in this section, the Navy would employ the following standard mitigation measures:

(a) Conduct briefings between construction supervisors and crews, marine mammal monitoring team, acoustical monitoring team, and Navy staff prior to the start of all pile driving activity, and when new personnel join the work, in order to explain responsibilities, communication procedures, marine mammal monitoring protocol, and operational procedures.

(b) Comply with applicable equipment sound standards and ensure that all construction equipment has sound control devices no less effective than those provided on the original equipment.

(c) For in-water heavy machinery work other than pile driving, if a marine mammal comes within 10 m, operations shall cease and vessels shall reduce speed to the minimum level required to maintain steerage and safe working conditions. This type of work could include the following activities: (1) movement of the barge to the pile location; (2) positioning of the pile on the substrate via a crane (i.e., stabbing the pile); (3) removal of the pile from the water column/substrate via a crane (i.e., deadpull); or (4) the placement of sound attenuation devices around the piles. For these activities, monitoring would take place from 15 minutes prior to initiation until the action is complete.

Monitoring and Shutdown for Pile Driving

The following measures would apply to the Navy's mitigation through shutdown and disturbance zones:

Shutdown Zone – For all pile driving activities, the Navy will establish a shutdown zone intended to contain the area in which SPLs equal or exceed the 180/190 dB rms acoustic injury

criteria. The purpose of a shutdown zone is to define an area within which shutdown of activity would occur upon sighting of a marine mammal (or in anticipation of an animal entering the defined area), thus preventing injury, serious injury, or death of marine mammals. Predictions indicate (and empirical measurements generally confirm) that radial distances to the 190-dB threshold will typically be less than 10 m for impact pile driving or, in the case of vibratory pile driving, would not exist because source levels are lower than the threshold. However, shutdown zones for pinnipeds will conservatively be set at a minimum 20 m during impact pile driving and 10 m during vibratory pile driving. For impact pile driving, the distance corresponds with the largest distance to the 190 dB threshold measured during 2011 acoustic monitoring. These precautionary measures are intended to further reduce any possibility of injury to pinnipeds by incorporating a buffer to the 190-dB threshold within the shutdown area.

For cetaceans, the distance to the shutdown zone corresponding to the 180-dB threshold will be set at 85 m for impact pile driving and 10 m for vibratory pile driving. There is little risk of injury to cetaceans, as none have ever been observed entering the port security barrier (PSB) delineating the waterfront restricted area (WRA) at NBKB. Cetaceans are capable of passing underneath this barrier, which lies at variable distances from the construction site but is approximately 500 m distant in the direction of the deeper waters of Hood Canal where cetaceans might be expected to occur, but have not been observed to do so. It is unknown whether cetaceans do not enter the WRA because of the physical presence of the PSB, the lack of attraction to shallower-water habitats, or another reason. For impact pile driving, the mean of all data points is approximately 64 m to threshold; however, the maximum value recorded was 200 m. While it may be argued that a precautionary approach similar to that employed for the 190-dB zone is warranted, in which the shutdown zone encompasses the largest measured value, it is our

view that use of such a large zone for cetaceans would distract from biological monitors' primary task of ensuring that no pinnipeds (the only animals expected to occur within the WRA) are exposed to sounds that may result in injury. As described previously, no cetaceans are expected – and none have ever been observed – so close to the construction area. Therefore, while some degree of precaution is warranted for cetaceans, the larger zone (200 m) would detract from the Navy's ability to effectively mitigate the possibility of pinniped injury while conferring no additional benefit on cetaceans. In order to determine a reasonable shutdown zone for cetaceans during impact pile driving, we examined the available data, which show two clusters at 20 m and under (9 of 22 data points) and between 50-120 m (11 of 22 data points). The mean of this second cluster is found at 85 m; this distance encompasses approximately 65 percent of measurements. We emphasize again that establishment of this zone is intended only as a precautionary measure as no cetaceans have been observed within the WRA.

Disturbance Zone – Disturbance zones are typically defined as the area in which SPLs equal or exceed 160 or 120 dB rms (for pulsed or non-pulsed sound, respectively). Because the 120 dB zone would always subsume the 160 dB zone under the multi-rig scenario considered here, the 160 dB harassment zone is not considered further. Disturbance zones provide utility for monitoring conducted for mitigation purposes (i.e., shutdown zone monitoring) by establishing monitoring protocols for areas adjacent to the shutdown zones. Monitoring of disturbance zones enables observers to be aware of and communicate the presence of marine mammals in the project area but outside the shutdown zone and thus prepare for potential shutdowns of activity. However, the primary purpose of disturbance zone monitoring is for documenting incidents of Level B harassment; disturbance zone monitoring is discussed in greater detail later (see Monitoring and Reporting). As with any such large action area, it is impossible to guarantee that

all animals would be observed or to make comprehensive observations of fine-scale behavioral reactions to sound.

When the size of a disturbance zone is sufficiently large as to make monitoring of the entire area impracticable (as in the case of the zone for vibratory pile driving, predicted to encompass an area of 41.4 km^2), the disturbance zone may be defined as some area that may reasonably be monitored or, alternatively, is a de facto zone defined by the distance that monitors are capable of observing from defined deployment locations. In this situation, the bulk of monitoring (as described in the Navy's Marine Mammal Monitoring Plan) will be focused within the WRA and on the shutdown zones. One observer will be designated specifically to monitor shutdown zones for each active pile driving rig, with one additional observer tasked with monitoring additional areas outside of the shutdown zones but within the WRA. It is unlikely that observers stationed within the WRA will be able to effectively monitor any area outside of the WRA, due to distance from the observer as well as the physical presence of the PSB. However, during the period of acoustic monitoring, a vessel will be stationed outside of the WRA and will carry a biological monitor. This period will occur for no less than 30 days and is expected to provide verification of assumptions regarding the distribution and frequency of occurrence of animals in the deeper waters of Hood Canal that have been developed from literature, past monitoring and reports, and marine mammal monitoring conducted at NBKB in 2011.

In order to document observed incidences of harassment, monitors record all marine mammal observations, regardless of location. The observer's location, as well as the location of the pile being driven, is known from a GPS. The location of the animal is estimated as a distance from the observer, which is then compared to the location from the pile. If acoustic monitoring is

being conducted for that pile, a received SPL may be estimated, or the received level may be estimated on the basis of past or subsequent acoustic monitoring. It may then be determined whether the animal was exposed to sound levels constituting incidental harassment in post-processing of observational and acoustic data, and a precise accounting of observed incidences of harassment created. Therefore, although the predicted distances to behavioral harassment thresholds are useful for estimating incidental harassment for purposes of authorizing levels of incidental take, actual take may be determined in part through the use of empirical data. That information may then be used to extrapolate observed takes to reach an approximate understanding of actual total takes.

Monitoring Protocols – Monitoring would be conducted before, during, and after pile driving activities, with minimum 20 m/85 m shutdown zones surrounding each pile for pinnipeds and cetaceans, respectively. In addition, observers shall record all incidences of marine mammal occurrence, regardless of distance from activity, and shall document any behavioral reactions in concert with distance from piles being driven. Observations made outside the shutdown zone will not result in shutdown; that pile segment would be completed without cessation, unless the animal approaches or enters the shutdown zone, at which point all pile driving activities would be halted. Please see the Marine Mammal Monitoring Plan (available at http://www.nmfs.noaa.gov/pr/permits/incidental.htm), developed by the Navy in agreement with us, for full details of the monitoring protocols.

Detailed observations outside the WRA, as defined by the PSB, are likely not possible, and it would be impossible for the Navy to account for all individuals occurring within the full disturbance zone with any degree of certainty. Monitoring will take place from 15 minutes prior to initiation through 30 minutes post-completion of pile driving activities. Pile driving activities

include the time to remove a single pile or series of piles, as long as the time elapsed between uses of the pile driving equipment is no more than 30 minutes.

The following additional measures apply to visual monitoring:

(1) Monitoring will be conducted by qualified observers. A minimum of one observer shall be employed to observe shutdown zones for each active pile driving rig, in addition to one observer tasked with monitoring the area outside of the shutdown zones. For the multi-rig scenario using three vibratory drivers and one impact driver simultaneously, this would result in a minimum total of five observers. In addition, at least one observer shall be positioned on the acoustic monitoring vessel outside the WRA for as long as that vessel is present, but for no less than 30 days. Qualified observers are trained biologists, with the following minimum qualifications:

- Visual acuity in both eyes (correction is permissible) sufficient for discernment of moving targets at the water's surface with ability to estimate target size and distance; use of binoculars may be necessary to correctly identify the target;
- Advanced education in biological science, wildlife management, mammalogy, or related fields (bachelor's degree or higher is required);
- Experience and ability to conduct field observations and collect data according to assigned protocols (this may include academic experience);
- Experience or training in the field identification of marine mammals, including the identification of behaviors;
- Sufficient training, orientation, or experience with the construction operation to provide for personal safety during observations;

- Writing skills sufficient to prepare a report of observations including but not limited to the number and species of marine mammals observed; dates and times when in-water construction activities were conducted; dates and times when in-water construction activities were suspended to avoid potential incidental injury from construction sound of marine mammals observed within a defined shutdown zone; and marine mammal behavior; and
- Ability to communicate orally, by radio or in person, with project personnel to provide real-time information on marine mammals observed in the area as necessary.

Trained observers will be placed at the best vantage point(s) practicable, as defined in the Navy's Marine Mammal Monitoring Plan, to monitor for marine mammals and implement shutdown or delay procedures when applicable by calling for the shutdown to the equipment operator.

(2) Prior to the start of pile driving activity, the shutdown zone will be monitored for 15 minutes to ensure that it is clear of marine mammals. Pile driving will only commence once observers have declared the shutdown zone clear of marine mammals; animals will be allowed to remain in the shutdown zone (i.e., must leave of their own volition) and their behavior will be monitored and documented. The shutdown zone may only be declared clear, and pile driving started, when the entire shutdown zone is visible (i.e., when not obscured by dark, rain, fog, etc.).

(3) If a marine mammal approaches or enters the shutdown zone during the course of pile driving operations, activity will be halted and delayed until either the animal has voluntarily left and been visually confirmed beyond the shutdown zone or 15 minutes have passed without re-detection of the animal. Monitoring will be conducted throughout the time required to drive a pile. Under certain construction circumstances where initiating the shutdown and clearance procedures would result in an imminent concern for human safety, to be determined by the on-

site construction supervisor in consultation with the lead observer, the shutdown provision may be waived.

(4) All shutdown zones will be established as described. However, in-situ acoustic monitoring will be utilized to determine the actual distances to these threshold zones, and the size of the shutdown zones will be adjusted accordingly based on received SPLs. We have determined that real-time adjustment of zones is impracticable, considering the resources required to implement such a measure, the nature of the activity, and the existence of empirical data from 2011 acoustic monitoring upon which precautionary zones may be based. Zones shall be adjusted as necessary upon provision of the draft acoustic monitoring report from contractors to the Navy, no later than 90 days from the end of the acoustic monitoring period. However, the precautionary shutdown zone established for pinnipeds (i.e., 20 m) would not be decreased.

Sound Attenuation Devices

Bubble curtains shall be used during all impact pile driving. Testing of the device, accomplished by comparing measurements of attenuated and unattenuated strikes, is not possible because of requirements in place to protect marbled murrelets (an ESA-listed bird species under the jurisdiction of the USFWS). In the absence of testing, the Navy shall ensure, through whatever means possible (e.g., requirements in contract language regarding the device selected for use and measures ensuring proper deployment of the device), that the device is capable of achieving mean performance of 10 dB attenuation although a high degree of performance variability may be expected.

Timing Restrictions

The Navy has set timing restrictions for pile driving activities to avoid in-water work when ESA-listed fish populations are most likely to be present. The in-water work window for

avoiding negative impacts to fish species is July 16-February 15. The initial months (July to September) of the timing window overlap with times when Steller sea lions are not expected to be present within the project area and California sea lions may be expected to be less numerous.

Soft-start

The use of a soft-start procedure is believed to provide additional protection to marine mammals by warning, or providing marine mammals a chance to leave the area prior to the hammer operating at full capacity. The wharf construction project will utilize soft-start techniques (ramp-up and dry fire) for impact and vibratory pile driving. The soft-start requires contractors to initiate sound from vibratory hammers for fifteen seconds at reduced energy followed by a 30-second waiting period. This procedure is repeated two additional times. For impact driving, contractors will be required to provide an initial set of three strikes from the impact hammer at 40 percent energy, followed by a 30-second waiting period, then two subsequent three strike sets.

Daylight Construction

Impact pile driving during the first half of the in-water work window (July 16 to September 15) would only occur between 2 hours after sunrise and 2 hours before sunset to protect breeding marbled murrelets. Vibratory pile driving and other construction activities occurring in the water between July 16 and September 15 could occur during daylight hours (sunrise to sunset). Between September 16 and February 15, construction activities occurring in the water would occur during daylight hours (sunrise to sunset).

Mitigation Effectiveness

It should be recognized that although marine mammals would be protected from Level A harassment by the utilization of a bubble curtain and monitoring of the near-field injury zones,

monitoring is not likely to be 100 percent effective at all times in locating marine mammals in the waters surrounding the shutdown zone and may not be 100 percent effective in detecting animals even within the shutdown zone. The efficacy of visual detection depends on several factors including the observer's ability to detect the animal, the environmental conditions (visibility and sea state), the behavior and depth of the animal, and monitoring platforms.

All observers employed for mitigation activities would be experienced biologists with training in marine mammal detection and behavior. Based on the specialized training required of observers and the small shutdown zones, we expect that visual mitigation will be highly effective. Trained observers have specific knowledge of marine mammal physiology, behavior, and life history, which may improve their ability to detect individuals or help determine if observed animals are exhibiting behavioral reactions to construction activities. In addition, conditions at NBKB – relatively calm wind and sea conditions throughout most of the year – are conducive to effective visual monitoring.

We have carefully evaluated the applicant's mitigation measures and considered a range of other measures in the context of ensuring that we prescribe the means of effecting the least practicable impact on the affected marine mammal species and stocks and their habitat. Our evaluation of potential measures included consideration of the following factors in relation to one another: (1) the manner in which, and the degree to which, the successful implementation of the measure is expected to minimize adverse impacts to marine mammals; (2) the proven or likely efficacy of the specific measure to minimize adverse impacts as planned; and (3) the practicability of the measure for applicant implementation, including consideration of personnel safety, and practicality of implementation.

Based on our evaluation of the applicant's proposed measures, as well as other measures considered or recommended by NMFS biologists, the Navy, and the Commission, we have determined that these mitigation measures provide the means of effecting the least practicable impact on marine mammal species or stocks and their habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance.

Monitoring and Reporting

In order to issue an ITA for an activity, section 101(a)(5)(D) of the MMPA states that we must, where applicable, set forth "requirements pertaining to the monitoring and reporting of such taking". The MMPA implementing regulations at 50 CFR 216.104 (a)(13) indicate that requests for ITAs must include the suggested means of accomplishing the necessary monitoring and reporting that would result in increased knowledge of the species and of the level of taking or impacts on populations of marine mammals that are expected to be present in the proposed action area. Please see the Navy's Marine Mammal and Acoustic Monitoring Plans for full details of the requirements for monitoring and reporting.

Acoustic Measurements

Within the first 30 days of pile driving, the Navy will capture a representative acoustic sample of the major pile driving scenarios under the modeled conditions (impact hammer and vibratory driving, smaller [24-in to 36-in] and larger [48-in] piles, plumb and batter piles). All measurements will be made with the sound attenuation measures discussed previously in place. Maximum sound pressure levels, as well as approximate distances to relevant thresholds, will be measured and documented. Airborne acoustic monitoring will also be conducted during impact and vibratory pile driving. Acoustic monitoring will be conducted in accordance with the Acoustic Monitoring Plan developed by the Navy and approved by us. Please see that plan,

available at http://www.nmfs.noaa.gov/pr/permits/incidental.htm, for full details of the required acoustic monitoring.

Some details of the methodology include:

- For underwater recordings, a stationary hydrophone system with the ability to measure SPLs at mid-water depth and approximately 1 m from the bottom, (taking tidal changes into account) will be placed at a distance of 10 m from the source. The hydrophone will be deployed so as to maintain a constant distance of 10 m from the pile.

- For airborne recordings, reference recordings will be attempted at approximately 50 ft (15.2 m) from the source via a stationary hydrophone. However, other distances may be utilized to obtain better data if the pile driving signal cannot be isolated clearly due to other sound sources (e.g., barges or generators). The best professional judgment of the contractor employed to implement the monitoring will be sufficient to ensure the monitoring objectives are achieved.

- Each hydrophone (underwater) and microphone (airborne) will be calibrated prior to the start of the action and will be checked at the beginning of each day of monitoring activity. Unattended hydrophones located in the far-field will be checked regularly to ensure that equipment failure or other technical difficulty, such as strumming, does not render measurements unusable. Other hydrophones and microphones would be placed at other distances and/or depths and moved as necessary to determine the distance to the thresholds for marine mammals. At a minimum, one attended platform will be located in the far-field (i.e., outside the WRA) for the duration of acoustic monitoring.

Visual Marine Mammal Observations

The Navy will collect sighting data and behavioral responses to construction for marine mammal species observed in the region of activity during the period of activity. All observers will be trained in marine mammal identification and behaviors and are required to have no other construction-related tasks while conducting monitoring.

The Navy will monitor the shutdown zone and disturbance zone within the WRA before, during, and after pile driving as described under mitigation and in the Marine Mammal Monitoring Plan. There will, at all times, be at least one observer stationed at an appropriate vantage point to observe the shutdown zones associated with each operating hammer and at least one additional observer stationed to observe waters outside the shutdown zones but within the WRA. In addition, at least one marine mammal observer would be stationed on a vessel conducting acoustic monitoring outside the WRA, for as long as such monitoring is conducted but for a minimum of 30 days. The Navy estimates that representative acoustic sampling may occur in approximately 30 days. Based on our requirements, the Marine Mammal Monitoring Plan would include the following procedures for pile driving:

(1) MMOs would be located at the best vantage point(s) in order to properly see the entire shutdown zone and as much of the disturbance zone as possible.

(2) During all observation periods, observers will use binoculars and the naked eye to search continuously for marine mammals.

(3) If the shutdown zones are obscured by fog or poor lighting conditions, pile driving at that location will not be initiated until that zone is visible.

(4) The shutdown and disturbance zones around the pile will be monitored for the presence of marine mammals before, during, and after any pile driving or removal activity.

Individuals implementing the monitoring protocol will assess its effectiveness using an adaptive approach. Monitoring biologists will use their best professional judgment throughout implementation and seek improvements to these methods when deemed appropriate. Any modifications to protocol will be coordinated between us and the Navy.

Data Collection

We require that observers use approved data forms. Among other pieces of information, the Navy will record detailed information about any implementation of shutdowns, including the distance of animals to the pile and description of specific actions that ensued and resulting behavior of the animal, if any. We require that, at a minimum, the following information be collected on the sighting forms:

(1) Date and time that pile driving begins or ends;

(2) Construction activities occurring during each observation period;

(3) Weather parameters identified in the acoustic monitoring (e.g., percent cover, visibility);

(4) Water conditions (e.g., sea state, tide state);

(5) Species, numbers, and, if possible, sex and age class of marine mammals;

(6) Marine mammal behavior patterns observed, including bearing and direction of travel, and if possible, the correlation to SPLs;

(7) Distance from pile driving activities to marine mammals and distance from the marine mammals to the observation point;

(8) Locations of all marine mammal observations; and

(9) Other human activity in the area.

Reporting

A draft report will be submitted within 90 days of the completion of the first 30 days of acoustic measurements and marine mammal monitoring. The report will also provide descriptions of any problems encountered in deploying sound attenuating devices and actions taken to solve these problems, any adverse responses to construction activities by marine mammals, and a complete description of all mitigation shutdowns and the results of those actions. A final report would be prepared and submitted within 30 days following resolution of comments on the draft report. Within 90 days of the end of the in-water work period, a draft comprehensive report on all marine mammal monitoring conducted under the IHA will be submitted to NMFS. The report will include marine mammal observations pre-activity, during-activity, and post-activity during pile driving days. A final report will be prepared and submitted within 30 days following resolution of comments on the draft report. Required contents of the monitoring reports are described in more detail in the relevant plans.

Estimated Take by Incidental Harassment

With respect to the activities described here, the MMPA defines "harassment" as: “any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild [Level A harassment]; or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering [Level B harassment].”

All anticipated takes would be by Level B harassment, involving temporary changes in behavior. It is unlikely that injurious or lethal takes would occur even in the absence of the planned mitigation and monitoring measures; however, implementation of these measures is expected to minimize the possibility of such takes to discountable levels.

If a marine mammal responds to a stimulus by changing its behavior (e.g., through relatively minor changes in locomotion direction/speed or vocalization behavior), the response may or may not constitute taking at the individual level, and is unlikely to affect the stock or the species as a whole. However, if a sound source displaces marine mammals from an important feeding or breeding area for a prolonged period, impacts on animals or on the stock or species could potentially be significant (Lusseau and Bejder, 2007; Weilgart, 2007). Given the many uncertainties in predicting the quantity and types of impacts of sound on marine mammals, it is common practice to estimate how many animals are likely to be present within a particular distance of a given activity, or exposed to a particular level of sound. This practice potentially overestimates the numbers of marine mammals taken. For example, during the past ten years, killer whales have been observed within the project area twice. On the basis of that information, an estimated amount of potential takes for killer whales is presented here. However, while a pod of killer whales could potentially visit again during the project timeframe, and thus be taken, it is more likely that they would not. Although incidental take of killer whales and Dall's porpoises was authorized for 2011 activities at NBKB on the basis of past observations of these species, no such takes were recorded and no individuals of these species were observed. Similarly, estimated actual take levels (observed takes extrapolated to the remainder of unobserved but ensonified area) were significantly less than authorized levels of take for the remaining species.

The project area is not believed to be particularly important habitat for marine mammals, nor is it considered an area frequented by marine mammals, although harbor seals are year-round residents of Hood Canal and sea lions are known to haul-out on submarines and other man-made objects at the NBKB waterfront (although typically at a distance of a mile or greater from the project site). Therefore, behavioral disturbances that could result from anthropogenic sound

associated with these activities are expected to affect only a relatively small number of individual marine mammals, although those effects could be recurring over the life of the project if the same individuals remain in the project vicinity.

The Navy has requested authorization for the potential taking of small numbers of Steller sea lions, California sea lions, harbor seals, transient killer whales, Dall's porpoises, and harbor porpoises in the Hood Canal that may result from pile driving during construction activities associated with the wharf construction project described previously in this document. The humpback whale is not expected to occur in the project area. The takes requested are expected to have no more than a minor effect on individual animals and no effect at the population level for these species. Any effects experienced by individual marine mammals are anticipated to be limited to short-term disturbance of normal behavior or temporary displacement of animals near the source of the sound.

Marine Mammal Densities

For all species, the best scientific information available was used to construct density estimates or estimate local abundance. Of available information deemed suitable for use, the data that produced the most conservative (i.e., highest) density or abundance estimate for each species was used. For harbor seals, this involved published literature describing harbor seal research conducted in Washington and Oregon as well as more specific counts conducted in Hood Canal (Huber et al., 2001; Jeffries et al., 2003). Killer whales are known from two periods of occurrence (2003 and 2005) and are not known to preferentially use any specific portion of the Hood Canal. Therefore, density was calculated as the maximum number of individuals present at a given time during those occurrences (London, 2006), divided by the area of Hood Canal. The best information available for the remaining species in Hood Canal came from surveys

conducted by the Navy at the NBKB waterfront or in the vicinity of the project area. These consist of three discrete sets of survey effort, which were described in detail in the FR notice. Please see that document for an in-depth discussion (76 FR 79410; December 21, 2011).

The cetaceans, as well as the harbor seal, appear to range throughout Hood Canal; therefore, the analysis in this proposed IHA assumes that harbor seal, transient killer whale, harbor porpoise, and Dall's porpoise are uniformly distributed in the project area. However, it should be noted that there have been no observations of cetaceans within the WRA security barrier; the barrier thus appears to effectively prevent cetaceans from approaching the shutdown zones (please see Figure 2-2 of the Navy's application; the WRA security barrier, which is not denoted in the figure legend, is represented by a thin gray line and is roughly 500 m from the project site). Although the Navy will implement a precautionary shutdown zone for cetaceans, anecdotal evidence suggests that cetaceans are not at risk of Level A harassment at NBKB even from louder activities (e.g., impact pile driving). The remaining species that occur in the project area, Steller sea lion and California sea lion, do not appear to utilize most of Hood Canal. The sea lions appear to be attracted to the man-made haul-out opportunities along the NBKB waterfront while dispersing for foraging opportunities elsewhere in Hood Canal. California sea lions were not reported during aerial surveys of Hood Canal (Jeffries et al., 2000), and Steller sea lions have only been documented at the NBKB waterfront.

Description of Take Calculation

The take calculations presented here rely on the best data currently available for marine mammal populations in the Hood Canal. The methodology for estimating take was described in detail in the FR notice (76 FR 79410; December 21, 2011). The ZOI impact area is the estimated range of impact to the sound criteria. The distances specified in Table 2 were used to calculate

ZOI around each pile. All impact pile driving take calculations were based on the estimated threshold ranges using a bubble curtain with 10 dB attenuation as a mitigation measure. The ZOI impact area took into consideration the possible affected area of the Hood Canal from the pile driving site furthest from shore with attenuation due to land shadowing from bends in the canal. Because of the close proximity of some of the piles to the shore, the narrowness of the canal at the project area, and the maximum fetch, the ZOIs for each threshold are not necessarily spherical and may be truncated. Although mean distances to thresholds as determined during acoustic monitoring in 2011 may differ somewhat – primarily in that the distances to the 120 dB threshold are likely to be much smaller for vibratory removal – we have maintained the take estimated based on predicted distances, as analyzed in the notice of proposed authorization. Therefore, these take estimates are likely to be conservative.

For sea lions, as described previously, the surveys offering the most conservative estimates of abundance do not have a defined survey area and so are not suitable for deriving a density construct. Instead, abundance is estimated on the basis of previously described opportunistic sighting information at the NBKB waterfront, and it is assumed that the total amount of animals known from NBKB haul-outs would be 'available' to be taken in a given pile driving day. Thus, for these two species, take is estimated by multiplying abundance by days of activity (195 days). While pile driving can occur any day throughout the in-water work window, and the analysis is conducted on a per day basis, only a fraction of that time (typically a matter of hours on any given day) is actually spent pile driving.

The exposure assessment methodology is an estimate of the numbers of individuals exposed to the effects of pile driving activities exceeding relevant thresholds. Of note in these exposure estimates, mitigation methods other than the use of a sound attenuation device (i.e.,

visual monitoring and the use of shutdown zones) were not quantified within the assessment and successful implementation of this mitigation is not reflected in exposure estimates. Results from acoustic impact exposure assessments should be regarded as conservative estimates.

Airborne Sound – No incidents of incidental take resulting solely from airborne sound are likely, as even the larger distances to the harassment thresholds seen in acoustic monitoring from 2011 would not reach any areas where pinnipeds may haul out (although predicted distances to the 90 dB threshold using proxy values would reach the nearest portion of the PSB). The shortest distance to the PSB (where harbor seals and the occasional California sea lion may haul-out) is approximately 180 m, but is generally greater than 500 m at the project site. Submarines docked at Delta Pier, where California and Steller sea lions are known to haul-out, are approximately 1.2 km from the project site. We recognize that it is possible that airborne sound could reach portions of the PSB where seals may haul-out, and that pinnipeds in the water could be exposed to airborne sound that may result in behavioral harassment when looking with heads above water. However, these animals would previously have been 'taken' as a result of exposure to underwater sound above the behavioral harassment thresholds, which are in all cases larger than those associated with airborne sound. Thus, the behavioral harassment of these animals is already accounted for in these estimates of potential take. Multiple incidents of exposure to sound above NMFS' thresholds for behavioral harassment are not believed to result in increased behavioral disturbance, in either nature or intensity of disturbance reaction. Therefore, although we initially proposed the authorization of incidental take resulting from airborne sound for harbor seals, we no longer believe that such authorization is warranted.

The derivation of density or abundance estimates for each species, as well as further description of the rationale for each take estimate, was described in detail in the FR notice (76

FR 79410; December 21, 2011). Total take estimates, and numbers of take per species to be authorized, are presented in Table 4.

California Sea Lion

California sea lions are present in Hood Canal during much of the year with the exception of mid-June through August. California sea lions occur regularly in the vicinity of the project site from September through mid-June. With regard to the range of this species in Hood Canal and the project area, it is assumed on the basis of waterfront observations (Agness and Tannenbaum, 2009; Tannenbaum et al., 2009, 2011) that the opportunity to haul out on submarines docked at Delta Pier is a primary attractant for California sea lions in Hood Canal, as they have rarely been reported, either hauled out or swimming, elsewhere in Hood Canal (Jeffries, 2007). Female California sea lions are rarely observed north of the California/Oregon border; therefore, only adult and sub-adult males are expected to be exposed to project impacts. The ZOI for vibratory pile driving encompasses areas where California sea lions are known to haul-out; assuming that 26 individuals could be taken per day of pile driving provides an estimate of 5,070 takes for that activity. Table 4 depicts the number of estimated behavioral harassments.

Steller Sea Lion

Steller sea lions were first documented at the NBKB waterfront in November 2008, while hauled out on submarines at Delta Pier (Bhuthimethee, 2008; Navy, 2010) and have been periodically observed since that time. Steller sea lions typically occur at NBKB from November through April; however, the first October sightings of Steller sea lions at NBKB occurred in 2011. Based on waterfront observations, Steller sea lions appear to use available haul-outs (typically in the vicinity of Delta Pier, approximately one mile south of the project area) and habitat similarly to California sea lions, although in lesser numbers. On occasions when Steller

sea lions are observed, they typically occur in mixed groups with California sea lions also present, allowing observers to confirm their identifications based on discrepancies in size and other physical characteristics.

The time period from November through April coincides with the time when Steller sea lions are frequently observed in Puget Sound. Only adult and sub-adult males are likely to be present in the project area during this time; female Steller sea lions have not been observed in the project area. Since there are no known breeding rookeries in the vicinity of the project site, Steller sea lion pups are not expected to be present. By May, most Steller sea lions have left inland waters and returned to their rookeries to mate. Although sub-adult individuals (immature or pre-breeding animals) will occasionally remain in Puget Sound over the summer, observational data have indicated that Steller sea lions are present only from October through April and not during the summer months.

Steller sea lions are known only from haul-outs over one mile from the project area. The ZOI for vibratory pile driving encompasses areas where Steller sea lions are known to haul-out; assuming that one individual could be taken per day of pile driving provides an estimate of 195 takes, the level of take which was proposed for authorization (76 FR 79410; December 21, 2011). However, in consultation with the Navy, we now believe that the available abundance information does not necessarily reflect the nature of Steller sea lion occurrence at NBKB (i.e., the take estimation assumes that only one animal would be present per day). Actual observational data show that, while their occurrence is concentrated near Delta Pier, they occur in groups of one to four individuals. As a result, it is more likely that more than one exposure would occur in a day. In order to reflect this, we believe it warranted to authorize take at the

level of two individuals per day of pile driving, for a total of 390 takes. Table 4 depicts the number of estimated behavioral harassments.

Harbor Seal

Harbor seals are the most abundant marine mammal in Hood Canal, and they can occur anywhere in Hood Canal waters year-round. During most of the year, all age and sex classes could occur in the project area throughout the period of construction activity. As there are no known regular pupping sites in the vicinity of the project area, harbor seal neonates are not expected to be present during pile driving. Otherwise, during most of the year, all age and sex classes could occur in the project area throughout the period of construction activity. Harbor seal numbers increase from January through April and then decrease from May through August as the harbor seals move to adjacent bays on the outer coast of Washington for the pupping season. The main haul-out locations for harbor seals in Hood Canal are located on river delta and tidal exposed areas at various river mouths, with the closest haul-out area to the project area being 10 mi (16 km) southwest of NBKB (London, 2006). Please see Figure 4-1 of the Navy's application for a map of haul-out locations in relation to the project area. Table 4 depicts the number of estimated behavioral harassments.

Humpback Whales

One humpback whale has recently been documented in Hood Canal. This individual was originally sighted on January 27, 2012 and was last reported on February 23, 2012, indicating that the animal has almost certainly left the area. Although known to be historically abundant in the inland waters of Washington, no other confirmed documentation of humpback whales in Hood Canal is available. Their presence has likely not occurred in several decades, with the last known reports being anecdotal accounts of three humpback sightings from 1972-82. We consider

it extremely unlikely that any humpback whales would be present during the project timeframe. Therefore, the likelihood of incidental take of humpback whales is discountable and none is authorized.

Killer Whales

Transient killer whales are uncommon visitors to Hood Canal. Resident killer whales have not been observed in Hood Canal, but transient pods (six to eleven individuals per event) were observed in Hood Canal for lengthy periods of time (59-172 days) in 2003 (January-March) and 2005 (February-June), feeding on harbor seals (London, 2006). These whales used the entire expanse of Hood Canal for feeding. Based on this data, the density for transient killer whales in the Hood Canal for January to June is 0.038/km^2 (eleven individuals divided by the area of the Hood Canal [291 km^2]). Because the timeframe of known transient killer whale occurrence in Hood Canal only partially overlaps the construction period (January to mid-February), the days of total activity (or days of potential exposure) portion of the formula is reduced to 45 for killer whales. Table 4 depicts the number of estimated behavioral harassments.

Dall's Porpoise

Dall's porpoises may be present in the Hood Canal year-round and could occur as far south as the project site. Their use of inland Washington waters, however, is mostly limited to the Strait of Juan de Fuca. One individual has been observed by Navy staff in deeper waters of Hood Canal. Table 4 depicts the number of estimated behavioral harassments.

Harbor Porpoise

Harbor porpoises may be present in the Hood Canal year-round; their presence had previously been considered rare. During waterfront surveys of NBKB nearshore waters from 2008-10 only one harbor porpoise had been observed. However, during monitoring of Navy

actions in 2011, several sightings indicated that their presence may be more frequent in deeper waters of Hood Canal than had been believed on the basis of existing survey data and anecdotal evidence. Subsequently, the Navy conducted dedicated vessel-based line transect surveys on days when no construction activity occurred (due to security, weather, etc.) and made regular observations of harbor porpoise groups. Please note that, due to the availability of corrected trackline distances for harbor porpoise surveys conducted in 2011, that density estimate has been revised from 0.250 animals/km^2 to 0.231 animals/km^2 for survey data through September 28, 2011.

Potential takes could occur if individuals of these species are present in the vicinity when pile driving is occurring. Individuals that are taken could exhibit behavioral changes such as increased swimming speeds, increased surfacing time, or decreased foraging. Most likely, individuals may move away from the sound source and be temporarily displaced from the areas of pile driving. Potential takes by disturbance would likely have a negligible short-term effect on individuals and not result in population-level impacts.

Table 4. Number of Potential Incidental Takes of Marine Mammals within Various Acoustic Threshold Zones

Species	Density/ Abundance	Underwater		Airborne	Total Proposed Authorized Takes
		Impact injury threshold[1]	Vibratory disturbance threshold (120 dB)[2]	Impact disturbance threshold[3]	
California sea lion	26.2[4]	0	5,070	0	**5,070**
Steller sea lion	1.2[4]	0	390	0	**390**
Harbor seal	1.31	0	10,530	0	**10,530**
Killer whale	0.038	0	90	N/A	**90**
Dall's porpoise	0.014	0	195	N/A	**195**
Harbor porpoise	0.231	0	1,950	N/A	**1,950**

Total	**0**	**18,225**	**0**	**18,225**

[1] Acoustic injury threshold for impact pile driving is 190 dB for pinnipeds and 180 dB for cetaceans.

[2] The 160-dB acoustic harassment zone associated with impact pile driving would always be subsumed by the 120-dB harassment zone produced by vibratory driving. Therefore, takes are not calculated separately for the two zones.

[3] Acoustic disturbance threshold is 100 dB for sea lions and 90 dB for harbor seals. We believe that any animal subject to levels of airborne sound that may result in harassment – whether hauled-out or in the water – would likely also be exposed to underwater sound above behavioral harassment thresholds within the same day. Therefore, no take authorization specific to airborne sound is warranted.

[4] Figures presented are abundance numbers, not density, and are calculated as the average of average daily maximum numbers per month. Abundance numbers are rounded to the nearest whole number for take estimation.

Negligible Impact and Small Numbers Analysis and Determination

NMFS has defined "negligible impact" in 50 CFR 216.103 as "...an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival." In making a negligible impact determination, NMFS considers a variety of factors, including but not limited to: (1) the number of anticipated mortalities; (2) the number and nature of anticipated injuries; (3) the number, nature, intensity, and duration of Level B harassment; and (4) the context in which the take occurs.

Pile driving activities associated with the wharf construction project, as outlined previously, have the potential to disturb or displace marine mammals. Specifically, the proposed activities may result in take, in the form of Level B harassment (behavioral disturbance) only, from airborne or underwater sounds generated from pile driving. No mortality, serious injury, or Level A harassment is anticipated given the methods of installation and measures designed to minimize the possibility of injury to marine mammals and Level B harassment will be reduced to the level of least practicable adverse impact. Specifically, vibratory hammers, which do not have significant potential to cause injury to marine mammals due to the relatively low source levels

produced (less than 190 dB), will be the primary method of installation. Also, no impact pile driving will occur without the use of a sound attenuation system (e.g., bubble curtain), and pile driving will either not start or be halted if marine mammals approach the shutdown zone. The pile driving activities analyzed here are similar to other nearby construction activities within the Hood Canal, including two recent projects conducted by the Navy at the same location (test pile project and EHW-1 pile replacement project) as well as work conducted in 2005 for the Hood Canal Bridge (SR-104) by the Washington Department of Transportation, which have taken place with no reported injuries or mortality to marine mammals.

The numbers of authorized take for Steller and California sea lions and for Dall's porpoises would be considered small relative to the relevant stocks or populations (each less than two percent) even if each estimated taking occurred to a new individual – an extremely unlikely scenario. The proposed numbers of authorized take for harbor seals, transient killer whales, and harbor porpoises are somewhat higher relative to the total stocks. However, these numbers represent the instances of take, not the number of individuals taken. That is, it is likely that a relatively small subset of Hood Canal harbor seals, which is itself a small subset of the regional stock, would be harassed by project activities. While the available information and formula estimate that as many as 10,530 exposures of harbor seals to stimuli constituting Level B harassment could occur, that number represents some portion of the approximately 1,088 harbor seals resident in Hood Canal (approximately 7 percent of the regional stock) that could potentially be exposed to sound produced by pile driving activities on multiple days during the project. No rookeries are present in the project area, there are no haul-outs other than those provided opportunistically by man-made objects, and the project area is not known to provide foraging habitat of any special importance. Repeated exposures of individuals to levels of sound

that may cause Level B harassment are unlikely to result in hearing impairment or to significantly disrupt foraging behavior. Thus, even repeated Level B harassment of some small subset of the overall stock is unlikely to result in any significant realized decrease in viability for Hood Canal harbor seals, and thus would not result in any adverse impact to the stock as a whole. Similarly, for killer whales, the estimated number of takes represents a single group of eleven whales that could potentially be exposed to sound on multiple days, if present. In fact, if a group of transient killer whales was present in the Hood Canal during the project (which is in itself unlikely, as such groups have appeared only twice since 2003), such a group would be able to simply leave the project area and forage elsewhere in Hood Canal or Puget Sound if the acoustic behavioral harassment caused by the project disturbed the group to a sufficient degree. However, it is difficult to quantify such a group's willingness to remain in the presence of behavioral harassment or, alternatively, to depart the project area. As such, NMFS proposes to authorize the take presented in Table 4, which represents the take of a single pod (approximately 11) that might be taken repeatedly over multiple days if they stayed in the area. The possible repeated exposure of a small group of individuals to levels associated with Level B harassment in this area is expected to have a negligible impact on the stock.

For harbor porpoises, the situation relative to the regional stock (where estimated take is approximately 18 percent) is less clear as little is known about their use of Hood Canal. Sightings information from opportunistic waterfront surveys as well as designed surveys of nearshore waters had previously indicated that harbor porpoises rarely occurred in NBKB waters. In addition, although no systematic survey work for harbor porpoises has occurred in Hood Canal, anecdotal evidence and expert opinion received through personal communication had confirmed that harbor porpoises were expected to occur infrequently and in low numbers in

the project area. Recent Navy surveys have indicated that harbor porpoises are present in greater numbers than had been believed. It is unclear from the limited information available what relationship this occurrence, recorded only during the fall of 2011, may hold to the regional stock or whether similar usage of Hood Canal may be expected to recur throughout the project timeframe. Nevertheless, the estimated take of harbor porpoises is likely an overestimate (as it is based on information that may not hold true throughout the project timeframe) and should be considered to present a negligible impact on the stock. Harbor porpoise sightings to date have occurred only at significant distance from the project area (both inside and outside of the predicted 120-dB zone).

We have determined that the impact of the previously described wharf construction project may result, at worst, in a temporary modification in behavior (Level B harassment) of small numbers of marine mammals. No mortality or injuries are anticipated as a result of the specified activity, and none will be authorized. Additionally, animals in the area are not expected to incur hearing impairment (i.e., TTS or PTS) or non-auditory physiological effects. For pinnipeds, the absence of any major rookeries and only a few isolated and opportunistic haul-out areas near or adjacent to the project site means that potential takes by disturbance would have an insignificant short-term effect on individuals and will not result in population-level impacts. Similarly, for cetacean species the absence of any known regular occurrence adjacent to the project site means that potential takes by disturbance will have an insignificant short-term effect on individuals and will not result in population-level impacts. Due to the nature, degree, and context of behavioral harassment anticipated, the activity is not expected to impact rates of recruitment or survival.

The negligible impact determination is also supported by the likelihood that, given sufficient "notice" through mitigation measures including soft start, marine mammals are expected to move away from a sound source that is annoying prior to its becoming potentially injurious, and the likelihood that marine mammal detection ability by trained observers is high under the environmental conditions described for Hood Canal, enabling the implementation of shutdowns to avoid injury, serious injury, or mortality. As a result, no take by injury or death is anticipated, and the potential for temporary or permanent hearing impairment is very low and would be avoided through the incorporation of the described mitigation measures.

While the number of marine mammals potentially incidentally harassed would depend on the distribution and abundance of marine mammals in the vicinity of the survey activity, the number of potential harassment takings is estimated to be small relative to regional stock or population number, and will be mitigated to the lowest level practicable through incorporation of the mitigation and monitoring measures mentioned previously in this document. This activity is expected to result in a negligible impact on the affected species or stocks. The Eastern DPS of the Steller sea lion is listed as threatened under the ESA; no other species for which take authorization is requested are either ESA-listed or considered depleted under the MMPA.

Based on the analysis contained herein of the likely effects of the specified activity on marine mammals and their habitat, and taking into consideration the implementation of the mitigation and monitoring measures, we find that the wharf construction project will result in the incidental take of small numbers of marine mammals, by Level B harassment only, and that the total taking from the activity will have a negligible impact on the affected species or stocks.

Impact on Availability of Affected Species or Stock for Taking for Subsistence Uses

No tribal subsistence hunts are held in the vicinity of the project area; thus, temporary behavioral impacts to individual animals will not affect any subsistence activity. Further, no population or stock level impacts to marine mammals are anticipated or authorized. As a result, no impacts to the availability of the species or stock to the Pacific Northwest treaty tribes are expected as a result of the activities. Therefore, no relevant subsistence uses of marine mammals are implicated by this action.

Endangered Species Act (ESA)

There is one ESA-listed marine mammal species with known occurrence in the project area: the Eastern DPS of the Steller sea lion, listed as threatened. Because of the potential presence of Steller sea lions, the Navy engaged in a formal consultation with the NMFS Northwest Regional Office under Section 7 of the ESA. We also initiated separate consultation with our Northwest Regional Office because of our proposal to authorize the incidental take of Steller sea lions. The Biological Opinion associated with that consultation concluded that the proposed action is not likely to jeopardize the continued existence of the Steller sea lion or the humpback whale, and includes an Incidental Take Statement for the Steller sea lion. The Steller sea lion does not have critical habitat in the action area.

National Environmental Policy Act (NEPA)

The Navy has prepared an Environmental Impact Statement and issued a Record of Decision for this project. We acted as a cooperating agency in the preparation of that document, and have reviewed the EIS and the public comments received and determined that preparation of any additional NEPA analysis is not necessary. We subsequently adopted the Navy's EIS and issued our own Record of Decision. The Navy EIS is available for public review at www.nbkeis.com.

Authorization

As a result of these determinations, we have issued an IHA to the Navy to conduct the described activities in the Hood Canal from the period of July 16, 2012, through February 15, 2013, provided the previously described mitigation, monitoring, and reporting requirements are incorporated.

Dated: July 11, 2012.

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Helen M. Golde,

Acting Director,

Office of Protected Resources,

National Marine Fisheries Service.

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