Bangor Service Pier B710 Pile Replacement Project

Marine Mammal Monitoring Report

Naval Base Kitsap – Bangor
Silverdale, Washington

ON BEHALF OF:

REDSIDE CONSTRUCTION

PME CONSTRUCTION CORPORATION

PREPARED BY:

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ACRONYMNS AND ABBREVIATIONS

BSS	Beaufort Sea State
dB	decibel(s)
F	Fog - Weather Condition
ft	feet
km	kilometer(s)
kN	kiloneuton(s)
LOA	Letter of Authorization
LR	Light Rain – Weather Condition
m	meter(s)
mi	mile(s)
MC	Monitoring Coordinator
MMPA	Marine Mammal Protection Act
MMMP	Marine Mammal Monitoring Plan
MMO	Marine Mammal Observer
Navy	U.S. Department of the Navy
NAVBASE	U.S. Naval Base
NAVFAC	Naval Facilities Engineering Systems Command
NMFS	National Marine Fisheries Service
OC	Overcast – Weather Condition
PC	Partly Cloudy – Weather Condition
S	Sunny – Weather Condition
SR	Steady Rain – Weather Condition
U.S.	United States

INTRODUCTION

Harris Environmental Group, Inc. was sub-contracted by Redside Construction to provide Marine Mammal Observer (MMO) services at the Bangor Service Pier B710 Pile Replacement Project at U.S Naval Base (NAVBASE) Kitsap, Washington. Redside Construction was contracted with PME Construction Corporation to carry out the Naval Facilities Engineering Systems Command (NAVFAC) Northwest contract (N44255-21-F4338) entitled "Service Pier B710 Pile Replacement Project", or hereafter the "Service Pier Project" at Naval Base Kitsap – Bangor, Silverdale, Washington. This report summarizes the marine mammal monitoring effort implemented during pile driving activities, and estimates potential take to assist with the U.S. Department of the Navy (Navy) in their reporting to the National Marine Fisheries service (NMFS).

The purpose of the Service Pier Project was to remove and replace the existing five (5) 14-in steel fender piles on the southeast side of Service Pier B710 that support floating docks. The newly installed piles at the Service Pier consisted of five (5) 16-in. steel pipe piles ranging from 80 to 90 ft in length. The pile installation method consisted of the use of a vibratory hammer to drive all piles to design depth. Impact pile driving was allowed under the NMFS Letter of Authorization (LOA) and included in the Explosives Handling Wharf and Service Pier 2021-2022 Pile Replacement Projects Final Marine Mammal Monitoring Plan (MMMP, June 2021, Appendix B), but did not occur and no monitoring was conducted for that work activity. Demolition activities included the removal of approximately five (5) existing fendering piles, three (3) by direct pull method and two (2) by vibratory extraction.

The MMMP provided the protocols used for the duration of this project, in combination with the NMFS Letter of Authorization (LOA, July 2021 Appendix C) allowing for up to the specified number of Level B behavioral disturbance and Level A injury take for certain species of marine mammals. The MMMP and LOA were referenced for mitigation of harassment to marine mammals during in-water construction activities as well as daily and final take analysis. The take of Level A harassment that may result in direct injury or mortality of Pacific harbor seals (*Phoca vitulina*) was authorized by NMFS under the LOA and prohibited for all other marine mammal species described in Table 3 Authorized Level B takes, as well as the take of all other marine mammal species not directly mentioned, per the Marine Mammal Protection Act (MMPA).

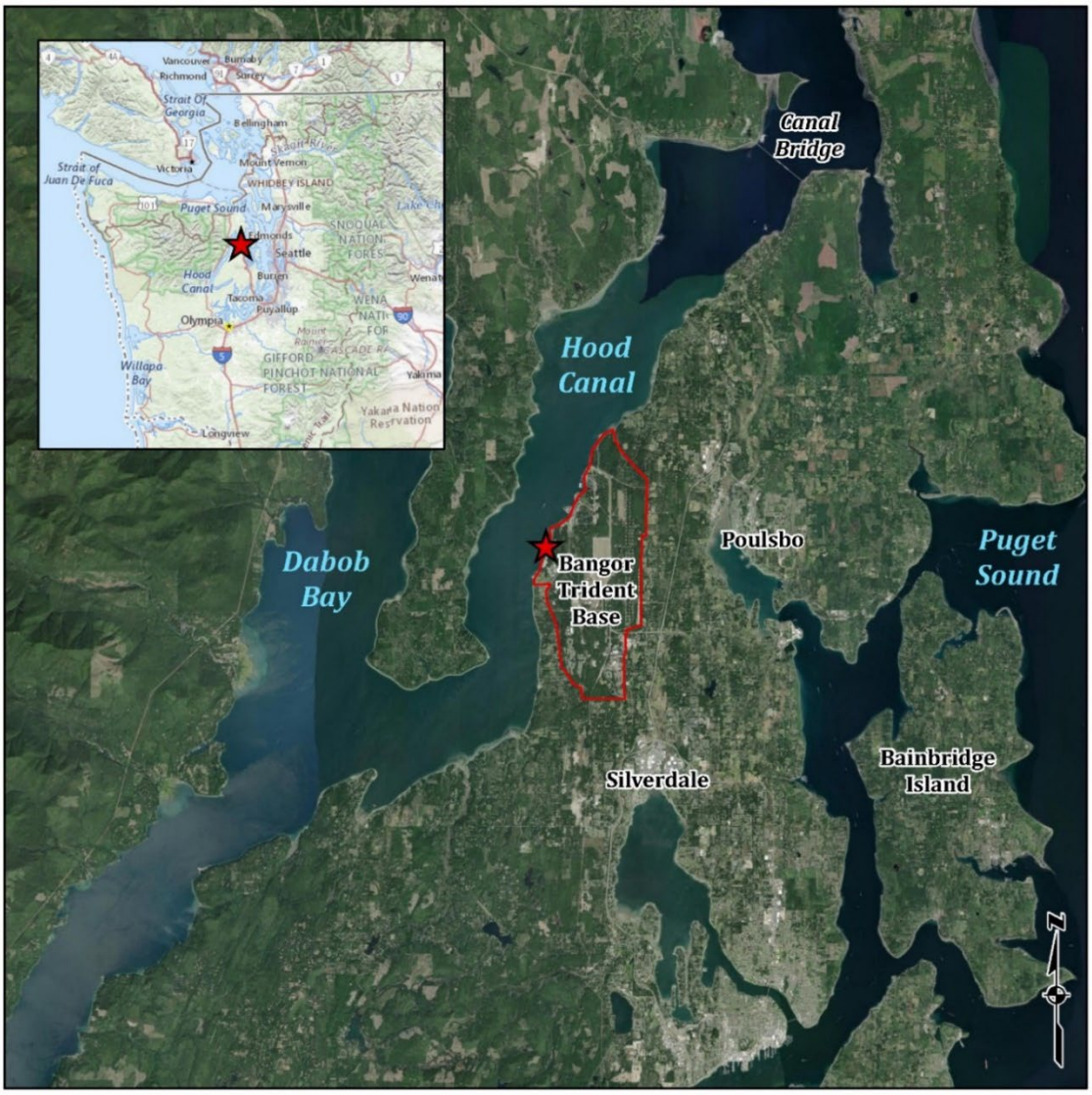
Under the LOA permit, the MMMP requires that a marine mammal monitoring report be prepared and submitted to NMFS within 90 work-days of the completion of marine mammal monitoring. This document is meant to assist the Navy in satisfying that requirement.

METHODS

PROJECT AREA

The Naval Base Kitsap - Bangor is located on the northwestern edge of the Kitsap Peninsula along the eastern shore of the waters of the Hood Canal, approximately 10 mi (16km) southwest of the Canal Bridge (Figure 1). The base is approximately 6 miles (9.7 km) northwest of Silverdale, WA in Kitsap County, and 4.5 miles (7.17km) west of Poulsbo, WA in Kitsap County. The project site of Service Pier B710 resides off the southwestern coastline portion of the nearly 7,000-acre base, just north of Carlson Spit and past the northern

terminus of Wahoo Road. The work referenced in this project was completed on the southeastern side of the service pier.



LEGEND Location of Project Site Location of Naval Base Kitsap	0 2.5 5 7.5 10 Kilometers 0 2 4 6 8 Miles	Produced By: L. Urreiztieta Harris Environmental Group 2022
Coordinate System: WGS 1984 UTM Zone: 10N Projection: Transverse Mercator GCS/Datum/Spheroid: WGS 1984 Scale: 1:2,000,000 (Inset: 1:5,000,000)	Service Layer Credits: USGS The National Map: National Boundaries Dataset, 3DEP Elevation Program, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National	HARRIS ENVIRONMENTAL GROUP INC.

OBSERVER MONITORING LOCATIONS

Pier B710 at the Naval Base Kitsap - Bangor is located along the western edge of the Kitsap Peninsula, which extends into the waters of the Puget Sound (Figure 1). One MMO was stationed on the access bridge to the east-southeast of the pier at the end of Wahoo Road, where they had vantage points of the monitoring zone immediate to the construction activity, to the west, and to the north. The second MMO was stationed on the beach to the south of the pier near a guard "shack" structure, where they had vantage points of the monitoring zone to the south, west, and the area immediate to the construction activity (see WP #2, Table 1, Figure 2).

At these locations the monitors were able to view the extent of the required monitoring area, while remaining in view of the pile being driven, pile-driving equipment, and the site supervisor. The required number of MMOs and their location for monitoring was based on in-water work activity (vibratory or impact pile driving), and the only work activity that occurred over the course of the project was vibratory pile driving. Stations were chosen to provide the best vantage points of the monitoring zone, while also taking into account the safety and security of the marine mammal monitor during varying environmental conditions that may occur due to on-going construction activity and weather. Monitoring locations changed in relation to the viewing or safety conditions for the monitor. Exact locations of observers for each observation are provided with observer data in Appendix D.

Table 1. Monitor locations ("Worker Positions") at Service Pier B710, Naval Base Kitsap - Bangor, Washington. Locations are provided in WGS 1984 coordinate system.

Location Name	Position Code	Latitude	Longitude	Northing (Y)	Easting (X)
Bridge	(WP #1)	47.730409	-122.741599	5286369	519375
South Shore	(WP #2)	47.729545	-122.743577	5286272	519227

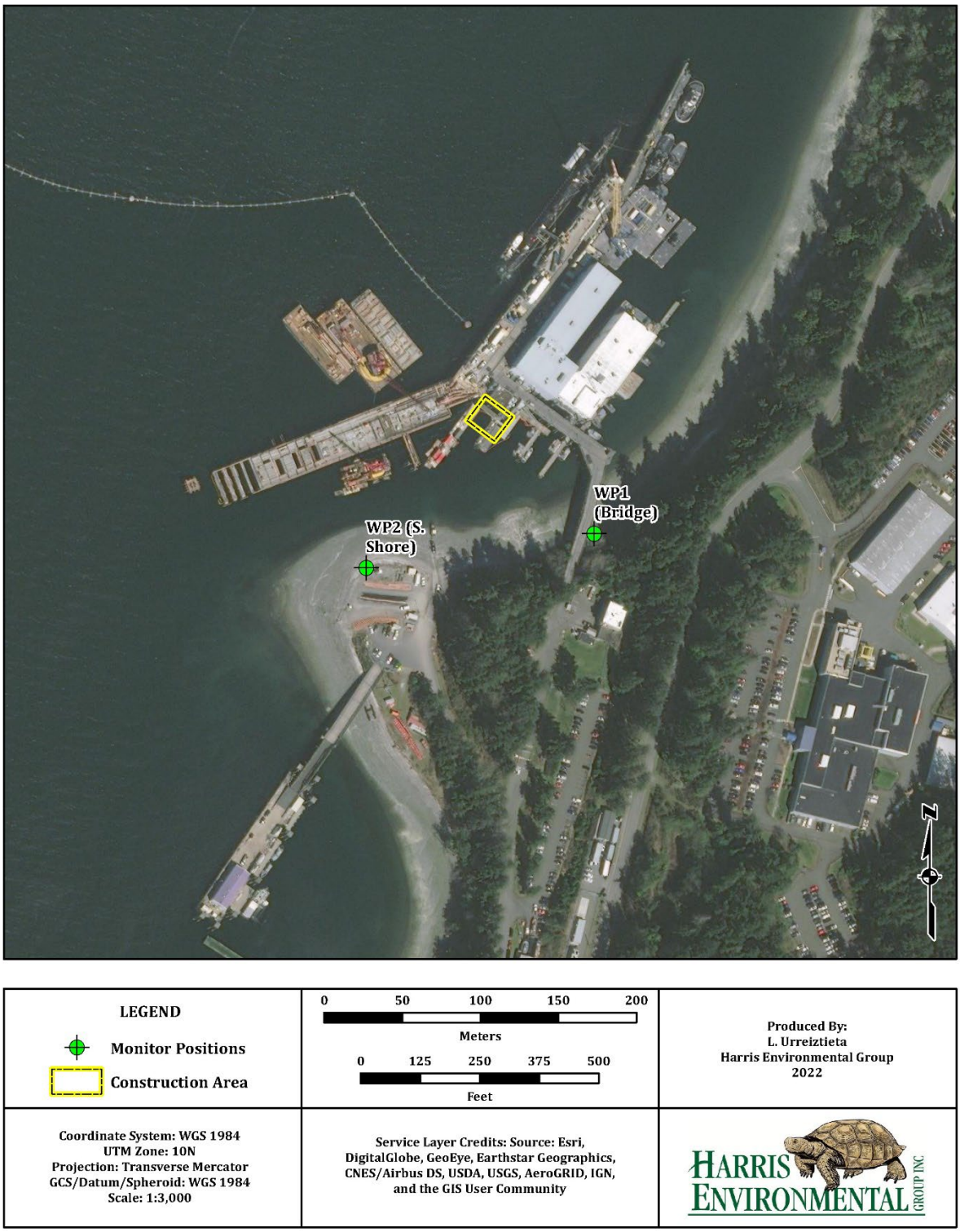


Figure 2. Monitor positions and construction area at Service Pier B710 Pile Replacement Project, Naval Base Kitsap - Bangor, Silverdale, Washington.

MONITORING AND SHUTDOWN ZONES

According to the Marine Mammal Protection Act (MMPA), the following definitions apply to each in-water construction monitoring zone designated under the LOA (Appendix C).

INJURY - LEVEL A HARASSMENT ZONE

The Level A zone was in place to represent the threshold for Level A take, defined in the MMPA as the following: "has the potential to injure a marine mammal or marine mammal stock in the wild".

Level A take was only authorized under the June 2021 LOA for harbor seals (Table 3), and observers carefully monitored the injury zone and shutdown zones to ensure that Level A take did not occur over the course of the project.

BEHAVIORAL DISTURBANCE - LEVEL B HARASSMENT ZONE

The Level B zone was in place to represent the threshold for Level B take, defined in the MMPA as the following: "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 take was only authorized under the June 2021 LOA for the animals included in Table 3.

MITIGATION - SHUTDOWN ZONE

Shutdown zones thresholds were established in the Monitoring Plan to reduce the potential for Level A take within the injury monitoring zone. Should a marine mammal approach or enter their respective shutdown zone established under the Monitoring Plan (Appendix B) for vibratory or impact pile driving, all pile driving activities would be halted (Figure 3).

For pinnipeds (seal, sea lion), the shutdown zone encompassed the extent of the Level A zone and an additional buffer area (Table 2, Figure 3), so that any pinniped entering their respective shutdown zone would result in a cessation of pile driving activities before entering the actual injury zone.

For cetaceans (harbor porpoise), the shutdown zone included the extent of the injury zone as well as the extent of the Level B zone that MMOs could practicably monitor, referred to in the Monitoring Plan as the Level B zone and hereafter as the "monitoring zone". Additionally, should any cetacean be detected within the Level B zone all pile driving activities would cease.

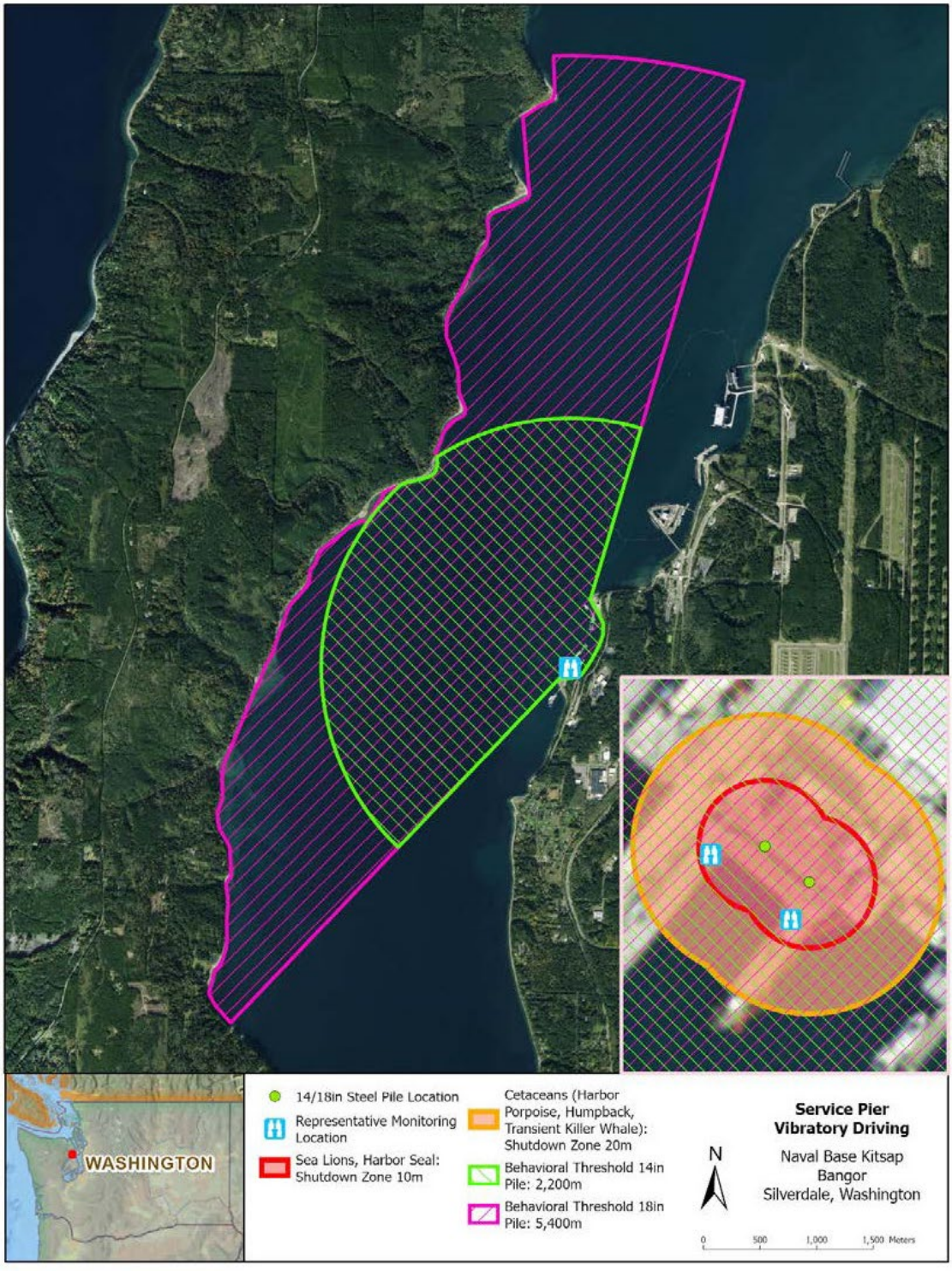


Figure 3. Marine mammal monitoring zones and example monitoring locations for vibratory pile driving at Service Pier B710 Pile Replacement Project, Naval Base Kitsap - Bangor, Silverdale, Washington. Source: Appendix B, Marine Mammal Monitoring Plan, Figure D-3.

BEHAVIORAL THRESHOLD - LEVEL B HARASSMENT ZONE

Level B take was estimated for those species granted authorized take under the LOA (see Appendix C). For this assessment, we used criteria from the LOA and MMMP (Appendix C, Appendix B) and the distance thresholds in Table 2 below to determine our recommended estimate of Level B take throughout the project.

Table 2. Monitoring and shutdown zone distances during vibratory pile driving of 14-inch and 18-inch steel piles.

Marine Mammal Group	Level B Behavioral Threshold	Level A Injury Threshold	Shutdown Zone
Cetaceans: Harbor Porpoise	2,200 meters 14-inch 5,400 meters 18-inch	3 meters 14-inch 17 meters 18-inch	minimum 20 meters
Humpback		2 meters 14-inch 12 meters 18-inch	
Transient killer whale		<1 meters 14-inch 1 meters 18-inch	
Harbor Seal		1 meters 14-inch 7 meters 18-inch	10 meters
Sea Lions		<1 meters 14-inch 1 meters 18-inch	

MONITORING PROTOCOLS

Two Marine Mammal Monitors (MMO) stationed on the pier or shore were required to implement the monitoring protocol during pile driving and installation activities as described within the MMMP (Appendix B), This differs slightly from the LOA 2021 permit, which requires a minimum of one MMO to be stationed at the active pile driving rig. We used the MMMP as described to inform the number of MMO required, as stated in the LOA Section 5. Monitoring, Part (c), "The Navy shall deploy additional observers to monitor disturbance zones according to the minimum requirements defined in the approved Marine Mammal Monitoring Plan, dated June 2021".

The LOA 2021 permit authorized take for Level B harassment for eleven (11) species (Table 3): humpback whale (*Megaptera novaeangliae*), minke whale (*Balaenoptera acutorostrata scammoni*), gray whale (*Eschrichtius robustus*), killer whale transient ecotype (*Orcinus orca*), killer whale resident ecotype (*Orcinus orca*), Dall's porpoise (*Phocoenoides dalli*), harbor porpoise (*Phocoena phocoena vomerina*), Steller sea lion (*Eumetopias jubatus*), California sea lion (*Zalophus californianus*), harbor seal (*Phoca vitulina richardii*), and northern elephant seal (*Mirounga angustirostris*).

Table 3. Authorized Level B and Level A takes

Species	Level B Takes Authorized	Level A Takes Authorized
Humpback whale (*Megaptera novaeangliae*)	4	0
Minke whale (*Balaenoptera acutorostrata scammoni*)	4	0
Gray whale (*Eschrichtius robustus*)	4	0
Killer whale - transient (*Orcinus orca*)	12	0
Killer whale - resident (*Orcinus orca*)	40	0
Dall's porpoise (*Phocoenoides dalli*)	146	0
Harbor porpoise (*Phocoena phocoena vomerina*)	2,142	0
Steller sea lion (*Eumetopias jubatus*)	357	0
California sea lion (*Zalophus californianus*)	5,831	0
Pacific Harbor seal (*Phoca vitulina richardii*)	4,680	119
Northern Elephant seal (*Mirounga angustirostris*)	2	0

PRE-ACTIVITY MONITORING

- Weather and visibility conditions were assessed continuously to ensure acceptable conditions for the scanning, detection, and identification of the species of concern within the designated monitoring zone. Pile driving activities were delayed or ceased when conditions did not allow for the MMO team to have visibility of the entire monitoring zone. In-water construction activities were limited to daylight hours only.
- Pre-monitoring for at least 15 minutes prior to pile-driving activities to visually scan the monitoring zone for presence of marine mammals. When no marine mammals were detected approaching or within their respective shutdown zone during this time, the construction contractor was given the all-clear to initiate pile-driving activities. Any marine mammal detected approaching or already within respective shutdown zones would result in a delay of onset of pile driving until either 15 minutes had passed without resighting the animal, or confirmation of the animal having left the construction zone.

DURING-ACTIVITY MONITORING

- Continuous scanning to monitor the zones during all pile-driving activities, adhering to the Monitoring Protocol.
- Pinnipeds detected within the monitoring zone or Level B behavioral threshold zone but remaining outside of the shutdown zone resulted in the collection of sighting information according to the Marine Mammal Observation Record Form (Monitoring Plan, Appendix B) and pile driving activities were neither delayed or ceased by the monitoring coordinator unless the animal approached or entered the shutdown zone.
- Detections of cetaceans within the Level B zone during all active pile driving would result in a cessation of pile driving activities, and sighting information collected according to the Marine Mammal Observation Record Form.
- If marine mammals approached or entered the Level A zone or shutdown zone during imminent or active pile driving, the Monitoring Coordinator or "MC" (see Data Collection Methods), would initiate a shutdown or "all-stop" to pile driving.
- The MMOs' survey effort for marine mammals was continuous during the entire construction day except for brief breaks during periods when construction was not active or imminent. All breaks in monitoring followed post- and pre-construction monitoring procedures, to account for all marine mammals visible within the monitoring zones.

POST-ACTIVITY MONITORING

- Monitoring efforts continued for 30 minutes after pile driving ceased (post-monitoring), as specified in the Monitoring Plan. This post-monitoring effort upon completion of pile driving was also implemented to ensure that no animals were present but undetected within the shutdown zone during active pile driving, and to observe for any potential signs of injury to animals.

DATA COLLECTION METHODS

MMOs used equipment standard to marine mammal monitoring, including a GPS unit, laser rangefinder, a clipboard for protocol, notes and data sheets, a marine mammal identification guide, and binoculars (8x42) to confirm species identity as necessary. MMOs utilized personal protective equipment necessary for working on a construction site, including a hard hat, safety glasses, high-visibility safety vest, steel-toed shoes, protective gloves, a face mask to reduce the potential for viral transmission whenever in close proximity to others, and a personal floatation device (as necessary).

All data were recorded using a mobile application developed via the Epicollect5 mobile data- gathering platform. This application included all of the data fields from the NMFS-approved Marine Mammal Observation Record Form included in the Marine Mammal Monitoring Plan (Appendix B), and allowed observers to efficiently record sightings, weather, and construction activity data and upload to cloud storage. Storing digital survey form data by cloud storage allows for the data to be securely backed up each day of work and removes the potential for paper record forms to become lost or destroyed. All data was downloaded daily and reviewed for completeness and accuracy.

The MMOs on site communicated via "radio" transmissions using the mobile app "Zello", and coordinated data entries to prevent multiple entries of the same animal at the same time. The app records voice and text

transmissions with a time stamp, and these were later used in the quality control of sighting events to confirm if new or repeated sightings were likely to have occurred, as well as aiding in the analysis of take events during project reporting.

Photography was not allowed on base at Naval Base Kitsap - Bangor due to it being a secure access area. MMOs were allowed use of their cell phones for data collection and communication purposes only.

Sighting data recorded during marine mammal monitoring included:

- Observer name and monitoring position (WP#1 and WP#2, see Table 1);
- Date & time of entry;
- GPS location of observer in latitude, longitude & easting, northing;
- Event code such as effort on, sighting, pre-monitoring, etc.;
- Environmental data such as wave height, swell direction, % glare, and weather conditions;
- Beaufort Sea State (BSS);
- Sighting data including species, number (1.0, 2.0, 2.1, 2.2, etc.), group size, age, etc.;
- Behavior code describing observed behavior and direction of travel, if any;
- Distance of marine mammal/s from observer and pile driving activities
- Mitigation efforts required, if any;
- Comments providing additional context, including descriptions of animal, behavioral response, or work activity.

Construction data recorded during marine mammal monitoring included:

- Pile driving start and end times;
- Construction type such as vibratory pile driving, dead pull, etc.;
- Mitigation codes such as delay onset of pile driving or shutdown pile driving if required.

All effort was made to balance scanning for incoming marine mammals and tracking individual harbor seals so as not to inflate the number of seals or miss other taxa. However, seals were accounted for in separate full data entries when they changed locations and especially if they moved into or outside of the monitoring zone, when new behaviors were observed, or if there was any uncertainty that it was the same animal seen previously.

The total number of animals observed for each observation/detection event was noted, and some entries included numbers of grouped animals if they moved together either within, or outside of, the monitoring zone. Animals that the MMOs were reasonably certain to be the same as detected previously were either included with the original detection with an extended observation time, or if their position or behavior changed considerably a new detection entry was assigned a "sighting number" that tied the animal to the previous detection (e.g., sighting "1.0", "1.1", etc.).

A qualified biologist with experience conducting marine mammal monitoring for in-water construction activities served as the dedicated Monitoring Coordinator (MC) leading monitoring efforts on-site on all pile-driving days, and assisted in producing daily summary reports for the contractor, Navy and NMFS.

REPORTING

The data was reviewed and prepared by the MC and the Monitoring Project Manager after monitoring efforts were completed each day, and again post-completion of in-water construction so as to provide additional quality assurance, and to ensure complete and accurate compliance with the MMMP. Daily summaries included a list of on-site MMOs, start and end times of monitoring efforts, weather conditions, a narrative of construction activities, and narrative summary of any authorized take or mitigation that may have occurred.

RESULTS

MONITORING EFFORT

Monitoring was concurrent with in-water pile driving work from 16 December through 4 January 2022. Two MMOs per day simultaneously monitored for a total of 10.55 hours over 4 days (Table 4), which included time periods of active pile driving activity and periods between pile driving events. Pile driving occurred on each day monitors were on site for the day, except for December 16th. MMOs were on-site and on standby for monitoring on that day, but construction delays precluded pile driving (Table 4).

Table 4. Summary of monitoring effort.

Date	Start Time (hh:mm)	End Time (hh:mm)	Total Time (hh:mm)	Total Time (hours)	Vibratory Drive Time (hours)
12/16/2021*	9:45	11:15	0:00*	0.00*	0.00
12/21/2021	9:00	14:20	5:20	5.33	0.58
12/22/2021	10:20	14:26	4:06	4.10	0.47
1/4/2022	10:45	11:52	1:07	1.12	0.27
Total Hours:				10.55	1.32

**Monitors were on-site and in standby for monitoring on the morning of 12/16, but construction delays resulted in no pile driving that day.*

We documented 1.32 hours of active pile driving construction time (Table 4), i.e., time devoted to driving individual piles except for brief equipment calibration, measurement, or testing-related pauses.

ENVIRONMENTAL CONDITIONS

Mild weather and sea state conditions were encountered on all days when monitoring occurred. Weather conditions were predominantly overcast or partly cloudy and visibility was most frequently described as good. Glare on the water was rarely encountered by the MMOs except for one instance just after 12 pm on December 22 where 10-25% of the field of view was affected by glare. An hour later the glare was reduced back down to 0-10% (Table 5). Beaufort Sea State (BSS) encountered typically ranged from BSS 2-3, with all wave heights recorded as light, between 0-3 feet in height (Table 6).

Table 5. Weather Parameters

	Visibility						
	Moderate (M)		Good (G)		Excellent (E)		Total
Count	3		50		0		53
% of Total	5.7%		94.3%		0.0%		100%
	Weather						
	OC	F	SR	LR	PC	S	Total
Count	33	0	2	6	12	0	53
% of Total	62.3%	0.0%	3.8%	11.3%	22.6%	0.0%	100%
	Glare						
	0-10	10-25	25-50	50-75	75-90	90-100	Total
Count	52	1	0	0	0	0	53
% of Total	98.1%	1.9%	0.0%	0.0%	0.0%	0.3%	100%

Table 6. Beaufort Sea State and Water Conditions

	Beaufort Sea State								
	BSS 0-1		BSS 2-3		BSS 4-5				Total
Count	4		30		19				53
% of Total	7.60%		56.6%		35.8%				100%
	Wave Height								
	Light		Moderate		Heavy				Total
Count	53		0		0				53
% of Total	100.0%		0%		0%				100%
	Direction of Swell								
	N	NE	E	SE	S	SW	W	NW	Total
Count	0	8	0	0	0	41	4	0	53
% of Total	0.0%	15.1%	0.0%	0.0%	0.0%	77.4%	7.5%	0.0%	100%

PILE DATA

PILE INSTALLATION

A total of five (5) 16 in. steel fender piles were installed. All piles were driven with an Ape 150 Vibratory Hammer APE Model 150 Vibratory Driver Extractor or "hammer" for approximately twenty (20) minutes average total after taking into consideration the stopping and restarting within the driving period. The vibratory driver force was 85 tons (757 kN), and no mechanical sound attenuation system was required or used as no impact pile driving occurred. The piles ranged in length from 80ft. to 90ft. The depth of water in which the piles were driven was approximately 30ft. to 40ft. The piles penetrated between 22ft. and 41ft of penetration.

We note that on December 22, 2021 the driving time for Pile #2 was recorded as forty-four (44) minutes but included within this period were multiple pauses in driving due to slow or hard driving into the sediment. The piles ranged in length from 80ft. to 90ft. No mechanical sound attenuation system was used. The depth of water in which the piles were driven was approximately 30ft. to 40ft. The piles penetrated between 22ft. and 41ft of penetration. The LOA and MMMP allowed for the use of impact pile driving methods if conditions were not conducive to vibratory driving, but were not required or used during fender pile installation. However, the monitoring protocol for impact installation was included in the MMMP in case vibratory driving was not sufficient due to sediment conditions.

PILE REMOVAL

Five (5) 14in. steel fender piles were extracted by a crane or Ape 150 vibratory hammer. Average duration of piles removed using vibratory method was approximately three (3) minutes each, with a maximum of fifteen (15) minutes. The vibratory driver force was 85 tons (757 kN).

The original pile at location #1 was 45ft. in length and broken off at the mudline. The use of the vibratory hammer was not necessary, and the crane was able to extract the pile and haul it away. The pile formerly in location #2 was previously broken off and was laying at the bottom of the canal. A dive team rigged up the pile and it was removed by crane. The original pile at location #3 did not make contact with the bottom of the canal but was hanging from the existing dolphin piles and was removed. The original pile at location #4 was 60ft in length and 8ft depth below the mudline. It was extracted by vibratory hammer. The original pile at location #5 was 60ft in length and between 6-8ft depth below the mudline, and was extracted using the vibratory hammer.

MARINE MAMMAL SIGHTINGS

A total of 13 marine mammals were documented within 13 groups or detection events, with all detections within active vibratory driving periods and during all monitoring times summarized in Table 4 and presented in more detail (times, behaviors, distance to pile, etc.) in the Monitoring Data File, Appendix D. A total of 4 marine mammals were detected within 4 groups or detection events during pile driving (Table 7) and those that were detected within the monitoring zone during pile driving are discussed in the sections Marine Mammal Behaviors Observed and Marine Mammal Take Estimates.

The entirety of sighting detections were of harbor seals and California sea lions (Table 6, and see Appendix D for all observations).

Table 7. Summary of marine mammal species detected during vibratory pile driving and all monitoring.

	During Vibratory Driving		All Detections					
Species	Groups/ Detections	Animals	All Groups/ Detections	Total Animals	Mean Group Size	Min. Group Size	Max. Group Size	Closest Distance to Pile site (m)
California sea lion	1	1	3	3	1.0	1	1	140
Harbor seal	3	3	10	10	1.0	1	1	110
Total	4	4	13	13				

Harbor seals were observed to be alone (n = 10 of 10 detections) during all sightings. A minimum of 2, but likely 3 (based on discussions with observers on adjacent Seawolf pile driving project), confirmed individuals were noted by us as likely being resident to the project area, based on daily presence and behaviors. We observed up to 3 individuals on a single day. All harbor seal sightings occurred while the seals were in the water, with typical behaviors and instances of potential responses to pile driving described below under *Marine Mammal Behaviors Observed.*

California sea lions were always seen (n = 3 of 3 detections) as lone animals.

The majority of all detections (n = X of 13) were within the 2,200 m monitoring zone. There were six detections of pinnipeds in the Level B behavioral threshold zone, which is encompassed by the monitoring zone. (Figure 3). However, at no point during the project were cetaceans or pinnipeds detected within their respective shutdown zones during active pile driving; thus, no animals were detected within the Level A take/injury zones for which the shutdown zones encompassed. (Figure 3, and Table 2).

Sightings of marine mammals on the Orca Network were reviewed during and after active monitoring efforts to ensure that southern resident killer whales (SRKWs) were not near-to or within the project area during pile driving. Included below are sighting accounts from Orca Network relevant to the project area on days when pile driving occurred.

- Transient killer whale ecotypes (group size 2<) sighted at approximately 1600 on December 22, 2021 within Hood Canal, after pile driving and monitoring had completed for the day.
    - “BIGG'S/TRANSIENT ORCAS - Wed, Dec 22 - Hood Canal (T68Cs) - ~16:00 - Sighting tonight of presumed T68Cs from mp 6 heading towards Alderbrook. Approx. time ~4pm. -via Tisa Annette”

- Transient killer whale ecotypes (group size 2-4<) sighted on December 21, 2021 at 1533 in Dabob Bay and 1606 within the Hood Canal. The Hood Canal group was detected approximately one (1) mile south of Bangor Trident Navy Base. Both sightings occurred after pile driving and monitoring had completed for the day.
    - "BIGG'S/TRANSIENT ORCAS - Tue, Dec 21 - Hood Canal (T68Cs) - 16:06 - Orca sighting about a mile south of Bangor. I'm on the opposite side of the canal so couldn't get good pictures. At least 2. They were heading north. -Kerry Halvarson"
    - ORCAS – Tue, Dec 21 – Dabob Bay – "15:33 - Four Orcas were in Dabob Bay again, went north towards Broad Spit and have since gone south. My husband was out crabbing and they came to them, bumped the boat, spraying them and went under the boat. They had been sitting, getting ready to pull, when they showed up. We thought they had left the area by then. -Lynn Stewart"

MARINE MAMMAL BEHAVIORS OBSERVED

TYPICAL BEHAVIORS

California sea lion individuals were observed both during active pile driving and outside of pile driving periods with most frequent noted behavior being either swimming in a specific direction with purpose, or looking in several directions or at a single focus on most monitoring days. Other behaviors noted as having occurred on single occasions included chuffing or traveling in an obvious direction. No behavioral observations of interest were noted by MMOs, during or outside of active pile driving periods.

Harbor seals were frequently observed swimming to/from foraging areas and looking at the construction site or MMOs during both active pile driving and outside of pile driving periods. There did not seem to be any specific reaction in these cases, and we interpret the behavior to be the animal confirming the situation remained the same, i.e., that no new or immediate threat was posed from the human activity in its environment. A behavioral observation of interest for harbor seals is given below, and there were no potential responses to pile driving activities observed or recorded.

- December 22 at 1055 during vibratory pile driving, a single harbor seal at a distance of 15 m from MMO and 175 m from pile driving site dove immediately upon seeing the nearby MMO.

No other marine mammals were observed during monitoring efforts.

POTENTIAL BEHAVIORAL REACTIONS TO PILE DRIVING

There were no instances observed by MMOs where the behavior of an animal was seen to potentially indicate awareness and potential change in behavior due to pile driving activity.

MARINE MAMMAL TAKE ESTIMATES

MARINE MAMMAL DETECTIONS RESULTING IN LEVEL B TAKE

A total of 5 harbor seals were observed within the 2,200 m Level B behavioral threshold monitoring zone when pile driving was imminently, currently, or recently active (Table 7, Table 8), and detailed in detection events within Appendix D.

Similarly, 2 California sea lions were observed in the 2,200 m Level B behavioral threshold and monitoring zone during pile driving operations, or observed just prior or just after active pile driving, and could be reasonably assumed to be within the Level B harassment zones.

REFINED ESTIMATE OF TAKE

No marine mammals were detected within the Level A Take/Injury Zones during pile driving operations.

Using the MMMP and LOA (Appendices B and C, respectively), we reviewed the collected data (Appendix D, and Daily Reports, Appendix A) and estimated the total number of authorized Level B take on the project to be the following:

- 5 take of harbor seal;
- 2 take of California sea lion

No other marine mammal species given authorized Level B take were detected within the Level B behavioral threshold zone during pile driving activities.

Table 8. Level B takes for marine mammal species.

Species	Level B Takes Authorized	Level B Takes Actual	Level B Takes Remaining
California sea lion (Zalophus californianus)	5,831	2	5,829
Harbor seal (Phoca vitulina richardii)	4,680	5	4,675

NARRATIVE ACCOUNT OF LEVEL B TAKE

Below, we provide summaries and narrative descriptions of the Level B behavioral threshold zone take events per species, for the detection data presented in Appendix D. We describe the factors regarding take events, organized by the species for which the take occurred. These accounts are provided to contextualize our assessment of take, as well as actions performed to minimize or prevent take according to the MMMP (Appendix B)

CALIFORNIA SEA LIONS: LEVEL B TAKE TOTAL (2)

Three (3) detections of individual California sea lions occurred over two (2) days of monitoring for pile driving activities. The two (2) Level B take events recorded were of individual animals, and took into account their location in Level B zone at first sighting, velocity, and direction of travel. One take event occurred during active pile driving, and one occurred during post monitoring. Based on the information recorded, we can reasonably assume they were within the 2,200-meter Level B zone during active pile driving. See Appendix D for details regarding individual California sea lion take events.

HARBOR SEALS: LEVEL B TAKE TOTAL (5)

Over the course of the project (3 days active monitoring effort) there were at least two (2) distinct harbor seals consistently detected within the monitoring zone and Level B behavioral threshold zone. The assumed "resident" harbor seals are based on MMO observations regarding pelage, age class, behaviors, and simultaneous sightings used to distinguish between individual seals. Harbor seals detected outside of active pile driving times were included within the total recommended take count if they were detected within the pre- or post-monitoring periods, and could reasonably be assumed to have been within the Level B Zone (2,200 meters) during vibratory pile driving.

Based solely on sightings of confirmed harbor seals detected within the Level B zone, and being reasonably certain to not double count seals known to be in the Level B take zone twice in one day, we recommend a refined Level B take total of five (5) harbor seals. See Appendix D for details regarding individual harbor seal take events.

MITIGATION MEASURES

No marine mammals were observed approaching or within the mitigation-shutdown zone or Level A zone, and no mitigation measures were used. All animals sighted (harbor seals and California sea lions) within the Level B take behavioral threshold zone were recorded and pile driving was allowed to continue.

Weather conditions did not impact visibility of the monitoring zone, and no mitigation delays or shutdowns were required.

LITERATURE CITED

National Marine Fisheries Service. 2021. Letter of Authorization Naval Base Kitsap Bangor National Oceanic and Atmospheric Administration, National Marine Fisheries Service. June 2021 Version. 1315 East- West Highway, Silver Spring, Maryland, 20910. 8 Pages

US Navy. 2021. Explosives Handling Wharf and Service Pier 2021-2022 Pile Replacement Projects Final Marine Mammal Monitoring Plan Navy Region Northwest, Silverdale, WA. June 2021 Version. Naval Facilities Engineering Command Northwest, 1101 Tautog Circle, Silverdale, WA 98315. 38 pages.

NOAA Fisheries. Revised 2019. Marine Mammal Protection Act of 1972 as Amended through 2018. NOAA's National Marine Fisheries Service, 1315 East-West Highway, Silver Spring, Maryland 20910. 125 pages.

APPENDIX A: DAILY SUMMARY REPORT FORMS

Please see subsequent 9 pages for Marine Mammal Daily Summary forms, submitted after each day's monitoring at Naval Base Kitsap Bangor from 21 December, 2021, through 4 January, 2022.

Harris Environmental Group, Inc

Marine Mammal Daily Summary & Take Estimate

Marine Mammal Observer (MMO) Daily Log for

Service Pier B710 Pile Replacement Project— Service Pier, N-44255-07-D-2013

Naval Base Kitsap-Bangor, Silverdale, WA

Dates of MMO Effort: 12/21/2021 – Present		**Name:** Kelsey Sandoval, Glenn Johnson	
Marine Mammal Observer (MMO) Team and Locations (see data file for coordinates): Glenn Johnson—Lead, (MMO) at station WP 1 (upon pier or bridge depending on site conditions, closest to the pile driving). Suzanne Harkness—MMO at WP 2 (south position on beach).			
Survey Vessel (where applicable): N/A		**Captain (where applicable):** N/A	
Date:	12/21/2021		
Day Start Time:	0850 (arrival)	**Effort Start Time:**	0900
Day End Time:	1420 (departure)	**Effort End Time:**	1418
Weather:	Weather Conditions were Overcast throughout the day. Light wave height, and BSS (Beaufort Sea State) ranged from 2-4. Visibility was mostly Good.		
Activities Summary:	A vibratory hammer was used to extract and/or drive steel piles at the 3 of 5 pile locations for the project, with the old pile at pile locations 2 and 3 completely extracted (pile location 1 did not require vibratory hammer use, was completed the prior week), and the replacement pile was installed at pile locations 1, 2, and 3. Pile driving was intermittent throughout day, starting at 0936 and ending at 1347.		
Issues or Delays:	There were no issues or delays regarding pile driving activity today.		
Actions Taken:	No shutdown events or other mitigation actions were needed, as no animals approached or entered the designated shut down zone during pile driving.		
Other Comments:	Detections included two (2) harbor seals, and two (2) California sea lions near the project area. All animals were documented according to protocol, with one (1) of the California sea lions and both (2) harbor seals recorded as Level B take for presence during or around the time of vibratory pile driving.		

Table 1. Marine Mammal Takes for Service Pier Project—12/21/2021. "Level B Takes Authorized" from June, 2021 N.O.A.A./N.M.F.S. Letter of Authorization.

Species	*Level B Takes Authorized*	*Level B Takes Today*	*Level B Takes at Project to Date*	*Level B Takes Remaining*
Humpback whale (*Megaptera novaeangliae)*	**4**	0	0	4
Minke whale (*Balaenoptera acutorostrata scammoni*)	**4**	0	0	4
Gray whale (*Eschrichtius robustus*)	**4**	0	0	4
Killer whale - transient (*Orcinus orca*)	**12**	0	0	12
Killer whale - resident (*Orcinus orca*)	**40**	0	0	40
Dall's porpoise (*Phocoenoides dalli*)	**146**	0	0	146
Harbor porpoise (*Phocoena phocoena vomerina*)	**2,142**	0	0	2,142
Steller sea lion (*Eumetopias jubatus*)	**357**	0	0	357
California sea lion (*Zalophus californianus*)	**5,831**	1	1	5,830
Harbor seal (*Phoca vitulina richardii)*	**4,680**	2	2	4,678
N. Elephant seal (*Mirounga angustirostris)*	**2**	0	0	2

Table 2. Marine Mammal Takes for Service Pier Project—12/21/2021. "Level A Takes Authorized" from June 16, 2021 N.O.A.A./N.M.F.S. Letter of Authorization.

Species	*Level A Takes Authorized*	*Level A Takes Today*	*Level A Takes at Project to Date*	*Level A Takes Remaining*
Humpback whale (*Megaptera novaeangliae)*	**0**	0	0	0
Minke whale (*Balaenoptera acutorostrata scammoni*)	**0**	0	0	0
Gray whale (*Eschrichtius robustus*)	**0**	0	0	0
Killer whale - transient (*Orcinus orca*)	**0**	0	0	0
Killer whale - resident (*Orcinus orca*)	**0**	0	0	0
Dall's porpoise (*Phocoenoides dalli*)	**0**	0	0	0
Harbor porpoise (*Phocoena phocoena vomerina*)	**0**	0	0	0
Steller sea lion (*Eumetopias jubatus*)	**0**	0	0	0
California sea lion (*Zalophus californianus*)	**0**	0	0	0
Harbor seal (*Phoca vitulina richardii)*	**119**	0	0	119
N. Elephant seal (*Mirounga angustirostris)*	**0**	0	0	0

Harris Environmental Group, Inc

Marine Mammal Daily Summary & Take Estimate

Marine Mammal Observer (MMO) Daily Log for

Service Pier B710 Pile Replacement Project— Service Pier, N-44255-07-D-2013

Naval Base Kitsap-Bangor, Silverdale, WA

Dates of MMO Effort: 12/21/2021 – Present		**Name:** Kelsey Sandoval, Glenn Johnson	
Marine Mammal Observer (MMO) Team and Locations (see data file for coordinates): Glenn Johnson—Lead, (MMO) at station WP 1 (upon pier, closest to the pile driving) and WP 3 (on the pier access bridge to the east-southeast of pier at end of Wahoo Rd.). David Bain—MMO at WP 2 (south position on beach).			
Survey Vessel (where applicable): N/A		**Captain (where applicable):** N/A	
Date:	12/22/2021		
Day Start Time:	1015 (arrival)	**Effort Start Time:**	1020
Day End Time:	1430 (departure)	**Effort End Time:**	1426
Weather:	Conditions included periods of Light Rain, Partly Cloudy, Overcast, then Rain again in the afternoon. Light wave height, and BSS (Beaufort Sea State) was 3-4. Visibility was Good.		
Activities Summary:	A vibratory hammer was used to extract and drive steel piles at the 4th and 5th pile locations, with the old pile at both locations completely extracted, and the replacement pile at location #4 driven to depth, while the new pile at location #5 was not driven to depth due to an obstruction. Pile driving was intermittent throughout the late morning and mid-afternoon, starting at 1043 and ending at 1348.		
Issues or Delays:	Other than an obstruction for pile #5, there were no issues or delays regarding pile driving activity today.		
Actions Taken:	No shutdown events or other mitigation actions were needed, as no animals approached or entered the shutdown zone during pile driving.		
Other Comments:	Detections included one (1) harbor seal near the project area during vibratory pile driving, and it was documented according to protocol as a single (1) Level B take.		

Table 1. Marine Mammal Takes for Service Pier Project—12/22/2021. "Level B Takes Authorized" from June, 2021 N.O.A.A./N.M.F.S. Letter of Authorization.

Species	*Level B Takes Authorized*	*Level B Takes Today*	*Level B Takes at Project to Date*	*Level B Takes Remaining*
Humpback whale (*Megaptera novaeangliae)*	**4**	0	0	4
Minke whale (*Balaenoptera acutorostrata scammoni*)	**4**	0	0	4
Gray whale (*Eschrichtius robustus*)	**4**	0	0	4
Killer whale - transient (*Orcinus orca*)	**12**	0	0	12
Killer whale - resident (*Orcinus orca*)	**40**	0	0	40
Dall's porpoise (*Phocoenoides dalli*)	**146**	0	0	146
Harbor porpoise (*Phocoena phocoena vomerina*)	**2,142**	0	0	2,142
Steller sea lion (*Eumatopias jubatus*)	**357**	0	0	357
California sea lion (*Zalophus californianus*)	**5,831**	0	1	5,830
Harbor seal (*Phoca vitulina richardii)*	**4,680**	1	3	4,677
N. Elephant seal (*Mirounga angustirostris)*	**2**	0	0	2

Table 2. Marine Mammal Takes for Service Pier Project—12/22/2021. "Level A Takes Authorized" from June, 2021 N.O.A.A./N.M.F.S. Letter of Authorization.

Species	*Level A Takes Authorized*	*Level A Takes Today*	*Level A Takes at Project to Date*	*Level A Takes Remaining*
Humpback whale (*Megaptera novaeangliae)*	**0**	0	0	0
Minke whale (*Balaenoptera acutorostrata scammoni*)	**0**	0	0	0
Gray whale (*Eschrichtius robustus*)	**0**	0	0	0
Killer whale - transient (*Orcinus orca*)	**0**	0	0	0
Killer whale - resident (*Orcinus orca*)	**0**	0	0	0
Dall's porpoise (*Phocoenoides dalli*)	**0**	0	0	0
Harbor porpoise (*Phocoena phocoena vomerina*)	**0**	0	0	0
Steller sea lion (*Eumetopias jubatus*)	**0**	0	0	0
California sea lion (*Zalophus californianus*)	**0**	0	0	0
Harbor seal (*Phoca vitulina richardii)*	**119**	0	0	119
N. Elephant seal (*Mirounga angustirostris)*	**0**	0	0	0

Harris Environmental Group, Inc

Marine Mammal Daily Summary & Take Estimate

Marine Mammal Observer (MMO) Daily Log for

Service Pier B710 Pile Replacement Project— Service Pier, N-44255-07-D-2013

Naval Base Kitsap-Bangor, Silverdale, WA

Dates of MMO Effort: 12/21/2021–01/04/2022		**Name:** Kelsey Sandoval	
Marine Mammal Observer (MMO) Team and Locations (see data file for coordinates): Kelsey Sandoval—Lead MMO at station WP 1 (on the pier access bridge to the east-southeast of pier at end of Wahoo Rd.). Suzanne Harkness—MMO at WP 2 (south position on beach).			
Survey Vessel (where applicable): N/A		**Captain (where applicable):** N/A	
Date:	01/04/2022		
Day Start Time:	1040 (arrival)	**Effort Start Time:**	1045
Day End Time:	1215 (departure)	**Effort End Time:**	1152
Weather:	Conditions were Partly Cloudy to Overcast. Light wave height, and BSS (Beaufort Sea State) was 1-2 in sheltered areas and 3-4 in open water. Visibility was Good.		
Activities Summary:	A vibratory hammer was used to drive one steel pile to depth. Pile driving started at 1110 and ended at 1122, with two short pauses for measurements. All five piles installed and pile driving is completed.		
Issues or Delays:	There were no issues or delays regarding pile driving activity today.		
Actions Taken:	No shutdown events or other mitigation actions were needed, as no animals approached or entered the shutdown zone during pile driving.		
Other Comments:	Detections included two (2) harbor seals and one (1) California sea lion near-to the project area during vibratory pile driving or post monitoring. All animals were recorded according to protocol, and no Level A or Level B take occurred.		

Table 1. Marine Mammal Takes for Service Pier Project—01/04/2022. "Level B Takes Authorized" from June, 2021 N.O.A.A./N.M.F.S. Letter of Authorization.

Species	*Level B Takes Authorized*	*Level B Takes Today*	*Level B Takes at Project to Date*	*Level B Takes Remaining*
Humpback whale (*Megaptera novaeangliae)*	**4**	0	0	4
Minke whale (*Balaenoptera acutorostrata scammoni*)	**4**	0	0	4
Gray whale (*Eschrichtius robustus*)	**4**	0	0	4
Killer whale - transient (*Orcinus orca*)	**12**	0	0	12
Killer whale - resident (*Orcinus orca*)	**40**	0	0	40
Dall's porpoise (*Phocoenoides dalli*)	**146**	0	0	146
Harbor porpoise (*Phocoena phocoena vomerina*)	**2,142**	0	0	2,142
Steller sea lion (*Eumetopias jubatus*)	**357**	0	0	357
California sea lion (*Zalophus californianus*)	**5,831**	0	1	5,830
Harbor seal (*Phoca vitulina richardii)*	**4,680**	0	3	4,677
N. Elephant seal (*Mirounga angustirostris)*	**2**	0	0	2

Table 2. Marine Mammal Takes for Service Pier Project—12/22/2021. "Level A Takes Authorized" from June, 2021 N.O.A.A./N.M.F.S. Letter of Authorization.

Species	*Level A Takes Authorized*	*Level A Takes Today*	*Level A Takes at Project to Date*	*Level A Takes Remaining*
Humpback whale (*Megaptera novaeangliae)*	**0**	0	0	0
Minke whale (*Balaenoptera acutorostrata scammoni*)	**0**	0	0	0
Gray whale (*Eschrichtius robustus*)	**0**	0	0	0
Killer whale - transient (*Orcinus orca*)	**0**	0	0	0
Killer whale - resident (*Orcinus orca*)	**0**	0	0	0
Dall's porpoise (*Phocoenoides dalli*)	**0**	0	0	0
Harbor porpoise (*Phocoena phocoena vomerina*)	**0**	0	0	0
Steller sea lion (*Eumetopias jubatus*)	**0**	0	0	0
California sea lion (*Zalophus californianus*)	**0**	0	0	0
Harbor seal (*Phoca vitulina richardii)*	**119**	0	0	119
N. Elephant seal (*Mirounga angustirostris)*	**0**	0	0	0

APPENDIX B: FINAL MARINE MAMMAL MONITORING PLAN

Please see subsequent 40 pages for Explosives Handling Wharf and Service Pier 2021-2022 Pile Replacement Projects Final Marine Mammal Monitoring Plan, June 2021.

Explosives Handling Wharf

and

Service Pier

2021-2022 Pile Replacement Projects

Final Marine Mammal Monitoring Plan

Marine Structure Maintenance and Pile Replacement Program

Navy Region Northwest

Silverdale, WA

June 2021

Naval Facilities Engineering Command Northwest

1101 Tautog Circle

Silverdale, WA 98315

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1 INTRODUCTION

The U.S. Department of the Navy (Navy) is conducting maintenance, pile replacement, and repair activities at marine waterfront structures over a 5-year period at six installations within Navy Region Northwest (Region). These installations, which are located in the Puget Sound region of Washington State, include: Naval Base (NAVBASE) Kitsap Bangor, NAVBASE Kitsap Bremerton, NAVBASE Kitsap Keyport, NAVBASE Kitsap Manchester, Zelatched Point, and Naval Station (NAVSTA) Everett. The specific installation location addressed in this plan is NAVBASE Kitsap Bangor. During the 2021-2022 in water work season, the Navy will be conducting two pile replacement projects at NAVBASE Bangor; one at the Explosives Handling Wharf 1 (EHW 1) and one at the Service Pier.

The first project is the NAVBASE Kitsap Bangor EHW 1 Pile Replacement. This project will consist of removing twelve (12) 24-inch concrete piles by cutting them at the mudline and replacing with sixteen (16) 30-inch concrete filled steel piles. The piles would be installed with a vibratory hammer until they are within three feet of final tip elevation and then would be impact driven to the final depth. A bubble curtain or other noise attenuation device shall be employed during impact installation of steel piles where water depths are greater than 0.67 meters (2 feet).

The second project is the NAVBASE Bangor Service Pier Pile Replacement. This project will replace up to ten (10) 14-inch steel fender piles with ten (10) 14-inch steel or 18- inch steel fender piles. Pile installation method will be vibratory unless sediment conditions require use of an impact hammer. A bubble curtain or other noise attenuation device shall be employed during impact installation of steel piles where water depths are greater than 0.67 meters (2 feet). One existing pile (to be replaced) is already broken and will be removed from the seafloor. Due to the condition of the other piles, they most likely will be cut unless it is determined it would be safe to use a vibratory equipment.

This monitoring plan has been developed to ensure compliance with the Letter of Authorization issued for this project by the National Marine Fisheries Service. The purpose of this plan is to provide a protocol for marine mammal monitoring that will occur during in-water construction scheduled to occur between July 16, 2021 and January 15, 2022. Visual marine mammal monitoring will be conducted before, during, and after pile driving activities where noise levels may behaviorally disturb marine mammals. Noise levels from pile driving were determined to exceed the behavioral and injury thresholds for marine mammals, and a zone surrounding piles being installed will be visually monitored and pile driving will be shut-down if marine mammals are in the injury zone. This measure will preclude physical harm to marine mammals. While use of an impact hammer is not anticipated during the Service Pier project, monitoring during impact installation is included in this plan as a contingency in case piles cannot be fully driven with a vibratory hammer due to unexpected sediment conditions.

The LOA also requires hydroacoustic monitoring when three or more steel piles are to be impact driven. Given the limited pile driving during the EHW1 project and the large amount of acoustic data from previous projects at the Bangor waterfront, the Navy has requested NMFS waive the requirement for acoustic monitoring during this project. Only two piles will be installed at the Service Pier, so hydroacoustic monitoring is not proposed for this project.

2 METHODS

2.1 Observer Qualifications

Monitoring will be conducted by qualified, trained marine mammal observers (hereafter, "observer"). An observer is a biologist with prior training and experience in conducting marine mammal monitoring or surveys, and who has the ability to identify marine mammal species and describe relevant behaviors that may occur in proximity to in-water construction activities. A trained observer will be placed at the best vantage point(s) practicable (e.g., from a small boat, the pile driving barge, on shore, or any other suitable location) to monitor for marine mammals and implement shutdown/delay procedures when applicable by calling for the shutdown to the hammer operator. The observers will have no other construction related tasks while conducting monitoring.

A dedicated monitoring coordinator will be on-site during all construction days. The monitoring coordinator will oversee marine mammal observers. The monitoring coordinator will serve as the liaison between the marine mammal monitoring staff and the construction contractor to assist in the distribution of information.

2.2 Data Collection

Observers will use a National Marine Fisheries Service (NMFS)-approved Marine Mammal Observation Record Form (Appendix A) which will be completed by each observer for each survey day.

- Name of Observer.
- Date and time that pile driving begins or ends
- Construction activities occurring during each sighting
- Weather parameters (e.g., percent cover, percent glare, visibility)
- Water conditions (e.g., tidal state [incoming (flood), slack (neither direction), or outgoing (ebb)], and sea state). The Beaufort Sea State Scale (Appendix B) will be used to determine sea-state.
- Species, numbers, and if possible, sex and age class of marine mammals
- Marine mammal behavior patterns observed, including bearing from observer and direction of travel. If possible, include the correlation to sound pressure levels for context.
- Distance from pile driving activities to marine mammals and distance from the marine mammal to the observation point
- Locations of all marine mammal observations
- Other human activity in the area. Record the hull numbers of fishing vessels if possible.

The monitoring coordinator will complete a Marine Mammal Observation Record Form (Appendix A) for each day of monitoring. The summary form compiles information collected on the individual sighting forms and provides additional details about construction activities during marine mammal monitoring. The summary form will be provided to the Navy each day following monitoring.

2.3 Equipment

The following equipment will be required to conduct marine mammal monitoring:

- A survey boat will include the following minimum equipment: a means to keep electrical equipment dry, a fixed marine radio for the Captain to communicate on marine channels independent of observers communicating on a dedicated channel, depth finder, measuring tape, and GPS units that track the constant movement of the vessel. Vessels will comply with all Coast Guard regulations and be able to pass a Coast Guard safety inspection.
- Hearing protection for biologists and boat operators working near heavy construction equipment
- At a minimum, portable marine radios with extra batteries and headsets for the observers to communicate with the monitoring coordinator, construction contractor, and other observer(s). Red and green flags can be added as back-up or in addition to the radios.
- Cellular phones and the contact information for the other observer(s), monitoring coordinator, and Navy point of contact.
- Nautical charts
- Daily tide tables for the project area
- Watch or Chronometer
- Binoculars (quality 7 x 50 or better, can have built-in rangefinders or reticles) and/or rangefinders
- Monitoring plan, IHA permit, and/or other relevant permit requirement specifications in sealed clear plastic cover
- Notebook with pre-standardized monitoring Marine Mammal Observation Record forms on non-bleeding paper (e.g., Rite-in-the-Rain)
- Marine mammal identification guides on waterproof paper
- Clipboard
- Pen/Pencil

2.4 Pile Driving Visual Monitoring and Shutdown Zones

During all pile driving, the Navy will visually monitor Injury and Behavioral Disturbance Zones as follows:

- An **Injury Monitoring Zone** shall be established and monitored to prevent injury to marine mammals from noise due to impact pile driving steel and physical interaction with construction equipment.
- During pile driving, a **Behavioral Disturbance Monitoring Zone** will be established that will encompass as much of the Behavioral Disturbance Zone (i.e., for impact driving, the zone where underwater sound pressure levels are estimated to be at or above 160 dB re 1 µPa and for vibratory driving, the zone where vibratory pile driving noise levels are estimated to be at or above 120 dB RMS) that can be practicably monitored from observer positions described in Section 2.5.

During all pile driving, the Navy will establish Shutdown Zones as follows:

- A **Shutdown Zone for cetaceans (harbor porpoise, humpback whale, and transient killer whale)** will include the Injury Zone and the portion of the Behavioral Disturbance Zone that can be practicably monitored from observer positions described in Section 2.5. If a cetacean approaches or enters the Shutdown Zone, pile driving will cease.
    - During impact installation of steel piles at **EHW 1**, the shutdown zone for harbor porpoise and transient killer whale will extend to a radius of 631 meters and will extend to a radius of 740 meters for humpback whale (Table 1).

- During impact installation of steel piles at the **Service Pier**, the shutdown zone for harbor porpoise, humpback and transient killer whale will extend to a radius of 400 m for 14-inch piles and 465 meters for 18-inch piles (Table 3).
- During vibratory pile driving at both **EHW 1 and Service Pier**, the Shutdown Zone for all cetaceans will include the injury zone. Additionally, pile driving will also cease for any cetaceans detected within the behavioral zone (Table 2 and 4).

- A **Shutdown Zone for pinnipeds (harbor seals and sea lions)** will include the Injury Zone. If a pinniped enters the Shutdown Zone, pile driving will cease, but if it enters only the Behavioral Disturbance Zone, a take would be recorded and behaviors documented. That pile would be completed without cessation, unless the animal approaches or enters the Shutdown Zone, at which point all pile driving activities will be halted.
  - During impact installation of steel piles at **EHW 1**, the Shutdown Zone radius for harbor seals is 160 meters and 10 meters for sea lions (Table 1). For vibratory pile driving, the radius of the Shutdown Zone is 20 meters for harbor seals and 10 meters for sea lions (Table 2).
  - During impact installation of steel piles at the **Service Pier**, the Shutdown Zone radius for harbor seals is 25 meters and 10 meters for sea lions (Table 3). For vibratory pile driving, the radius of the Shutdown Zone is 10 meters for both harbor seals and sea lions (Table 4).
- If marine mammals are seen outside the Behavioral Disturbance Zone, these animals will also be recorded (not as a take) and their location identified.
- Distances for all monitoring zones are provided in Table 1, 2, 3, and 4 below.

Table 1. NAVBASE Kitsap Bangor EHW 1 Monitoring and Shutdown Zones Distances during Impact Driving of 30-inch Steel Piles

Marine Mammal Group	*Behavior Threshold*	*Monitoring Zone*	*Injury Threshold*	*Shutdown Zone*
HF Cetaceans: Harbor Porpoise	**631 meters**	**740 meters**	**541 meters**	**631 meters**
LF Cetaceans: Humpback			**736 meters**	**740 meters**
MF Cetaceans: Transient killer whale			**10 meters**	**631 meters**
Harbor Seal			**158 meters**	**160 meters**
Sea Lions			**9 meters**	**10 meters**

Table 2. NAVBASE Kitsap Bangor EHW 1 Monitoring and Shutdown Zones Distances during Vibratory Driving of 30-inch Steel Piles

Marine Mammal Group	*Behavior Threshold*	*Monitoring Zone*	*Injury Threshold*	*Shutdown Zone*[1]
HF Cetaceans: Harbor Porpoise	**11,700 meters**	[1]	**37 meters**	**minimum 40 meters**
LF Cetaceans: Humpback			**25 meters**	
MF Cetaceans: Transient killer whale			**2 meters**	
Harbor Seal			**15 meters**	**20 meters**
Sea Lions			**11 meters**	**10 meters**

[1] The shutdown encompasses the injury zone. Additionally, a Behavioral Disturbance Monitoring Zone will be established that will encompass as much of the Behavioral Disturbance Zone that can be practicably monitored from observer positions described in Section 2.5. All pile driving shall cease should any cetaceans be detected within the behavioral disturbance zone.

Table 3. NAVBASE Kitsap Bangor Service Pier Monitoring and Shutdown Zones Distances during Impact Driving of 14 and 18-inch Steel Piles

Marine Mammal Group	*Behavior Threshold*	*Monitoring Zone*	*Injury Threshold*	*Shutdown Zone*
HF Cetaceans: Harbor Porpoise	**398 meters**	**400 meters 14-inch piles** **465 meters 18-inch piles**	**185 meters**	**400 meters 14-inch piles** **465 meters 18-inch piles**
LF Cetaceans: Humpback			**136 meters**	
MF Cetaceans: Transient killer whale			**3 meters**	
Harbor Seal			**25 meters**	**25 meters**
Sea Lions			**1.4 meters**	**10 meters**

Table 4. NAVBASE Kitsap Bangor Service Pier Monitoring and Shutdown Zones Distances during Vibratory Driving of 14 and 18-inch Steel Piles

Marine Mammal Group	*Behavior Threshold*	*Monitoring Zone*	*Injury Threshold*	*Shutdown Zone*[1]
HF Cetaceans: Harbor Porpoise	**2,200 meters 14-inch** **5,400 meters 18-inch**	[1]	**3 meters 14-inch** **17 meters 18-inch**	**minimum 20 meters**
LF Cetaceans: Humpback			**2 meters 14-inch** **12 meters 18-inch**	
MF Cetaceans: Transient killer whale			**<1 meters 14-inch** **1 meters 18-inch**	
Harbor Seal			**1 meters 14-inch** **7 meters 18-inch**	**10 meters**
Sea Lions			**<1 meters 14-inch** **1 meters 18-inch**	

[1] The shutdown encompasses the injury zone. Additionally, a Behavioral Disturbance Monitoring Zone will be established that will encompass as much of the Behavioral Disturbance Zone that can be practicably monitored from observer positions described in Section 2.5. All pile driving shall cease should any cetaceans be detected within the behavioral disturbance zone.

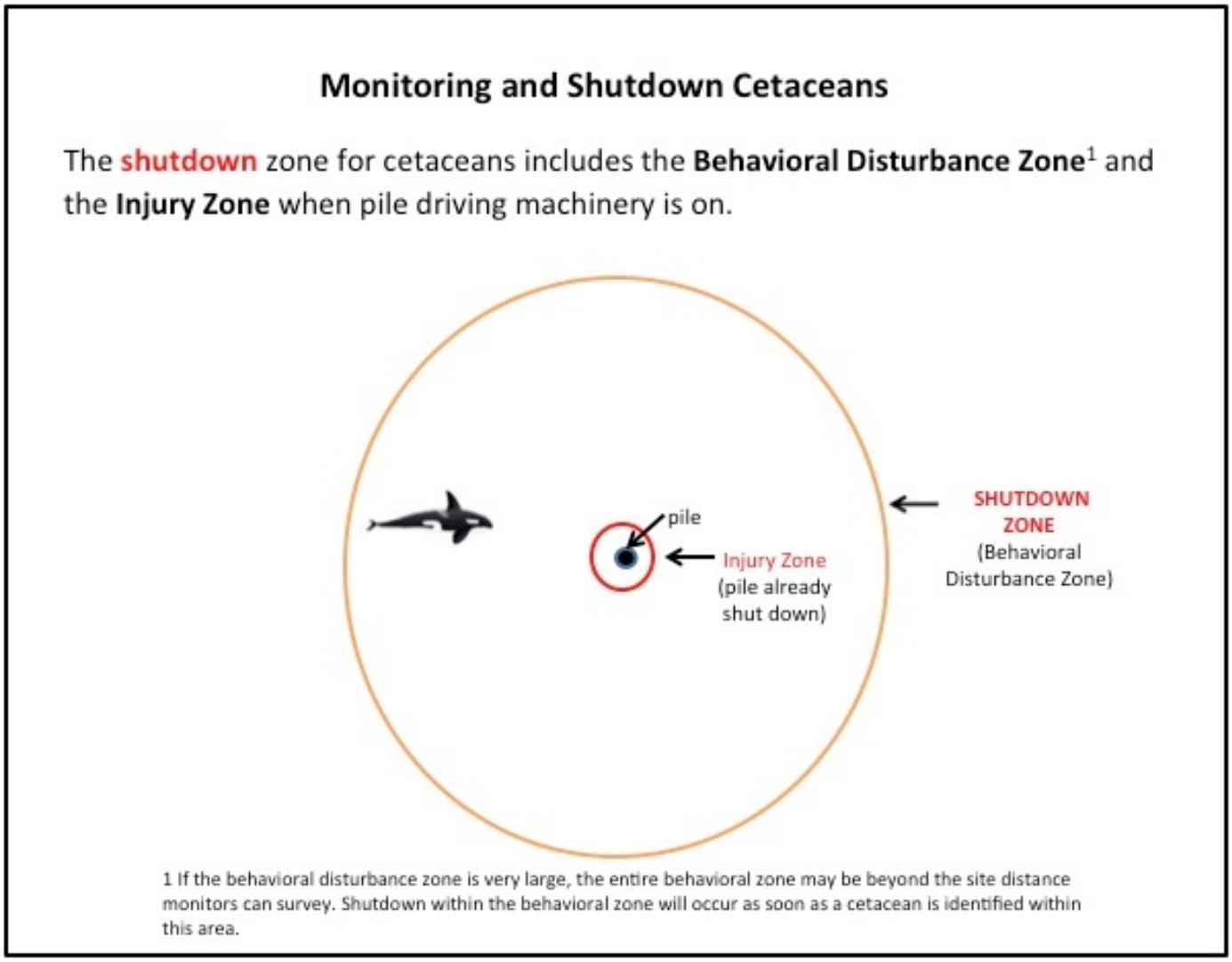

Figure 1. Monitoring and Shutdown for Cetaceans

Monitoring and Shutdown Pinnipeds

The **shutdown** zone for pinnipeds is the **Injury Zone** for pile driving. Shutdown will also occur within the behavioral zone if the pinniped is swimming toward the pile driving equipment that is turned on/in use, to avoid potential injury to a pinniped swimming toward the Injury Zone. If the pinniped is within the Behavioral Disturbance Zone, construction will be allowed to continue, and marine mammal monitors will **document behavior and location and will track** animal to ensure that it does not enter the shutdown zone.

Figure 2. Monitoring and Shutdown for Pinnipeds

2.5 Observer Monitoring Locations

When driving piles, to effectively monitor the Injury and Behavioral Disturbance Zones marine mammal observers will be positioned at the best practicable vantage points, taking into consideration security, safety, and space limitations at the waterfront. The minimum number and locations of monitors will be as follows for each project. **Any changes to the number and locations of monitors must pre-approved by a Navy environmental point of contact listed in Section 3 Interagency Notification.**

- During impact installation of steel piles at **EHW 1**, two observers will be positioned on the pier to monitor the Shutdown Zone and Behavioral Threshold areas. In addition to the two observers on the pier, one boat with an observer will be positioned at 500 meters to monitor the shutdown zones for all cetaceans (see Table 1), and the behavioral (Level B) zone for harbor seals and sea lions. Figure 3 depicts the representative monitoring locations of observers during impact driving. During vibratory pile driving, two observers will be positioned on the pier or shore to monitor the Shutdown Zones and a portion of the area exceeding the Behavioral Threshold (see Table 2). Figure 4 depicts the representative monitoring locations of observers during vibratory driving. Each monitoring location will have a minimum of one dedicated marine mammal observer (not including boat operators).
- During impact installation of steel piles at the **Service Pier**, two observers will be positioned on the pier to monitor the Shutdown Zone and Behavioral Threshold areas. In addition to the two observers on the pier, one boat with an observer will be positioned at 300 meters to monitor the shutdown zones for all cetaceans (see Table 3), and the behavioral (Level B) zone for harbor seals and sea lions. Figure 5 depicts the representative monitoring locations of observers during impact driving. During vibratory pile driving, two observers will be positioned on the pier or shore to monitor the Shutdown Zones and a portion of the area exceeding the Behavioral Threshold (see Table 4). Figure 6 depicts the representative monitoring locations of observers during vibratory driving. Each monitoring location will have a minimum of one dedicated marine mammal observer (not including boat operators).

2.6 Monitoring Techniques

The Navy will collect sighting data and behaviors of marine mammal species observed pre-, during, and post-driving period. 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), and monitoring platforms. The following survey methodology will be implemented for all monitoring activities:

- Observers will survey the Injury and Behavioral Disturbance Zones. Monitoring will take place 15 minutes prior to initiation through 30 minutes post-completion of pile driving to ensure there are no marine mammals present.
- In case of reduced visibility due to weather or sea state, the observers must be able to see the Shutdown Zones or pile driving will not be initiated until visibility in these zones improves to acceptable levels.
- The Injury and Behavioral Disturbance Monitoring Zones will be monitored throughout the time required to install a pile.
- Marine Mammal Observation Record forms (Appendix A) will be used to document observations.
- Any survey boats engaged in marine mammal monitoring will maintain speeds equal to or less than 10 knots.

- Observers will be trained and experienced marine mammal observers in order to accurately verify species sighted.
- Observers will use binoculars and the naked eye to search continuously for marine mammals.

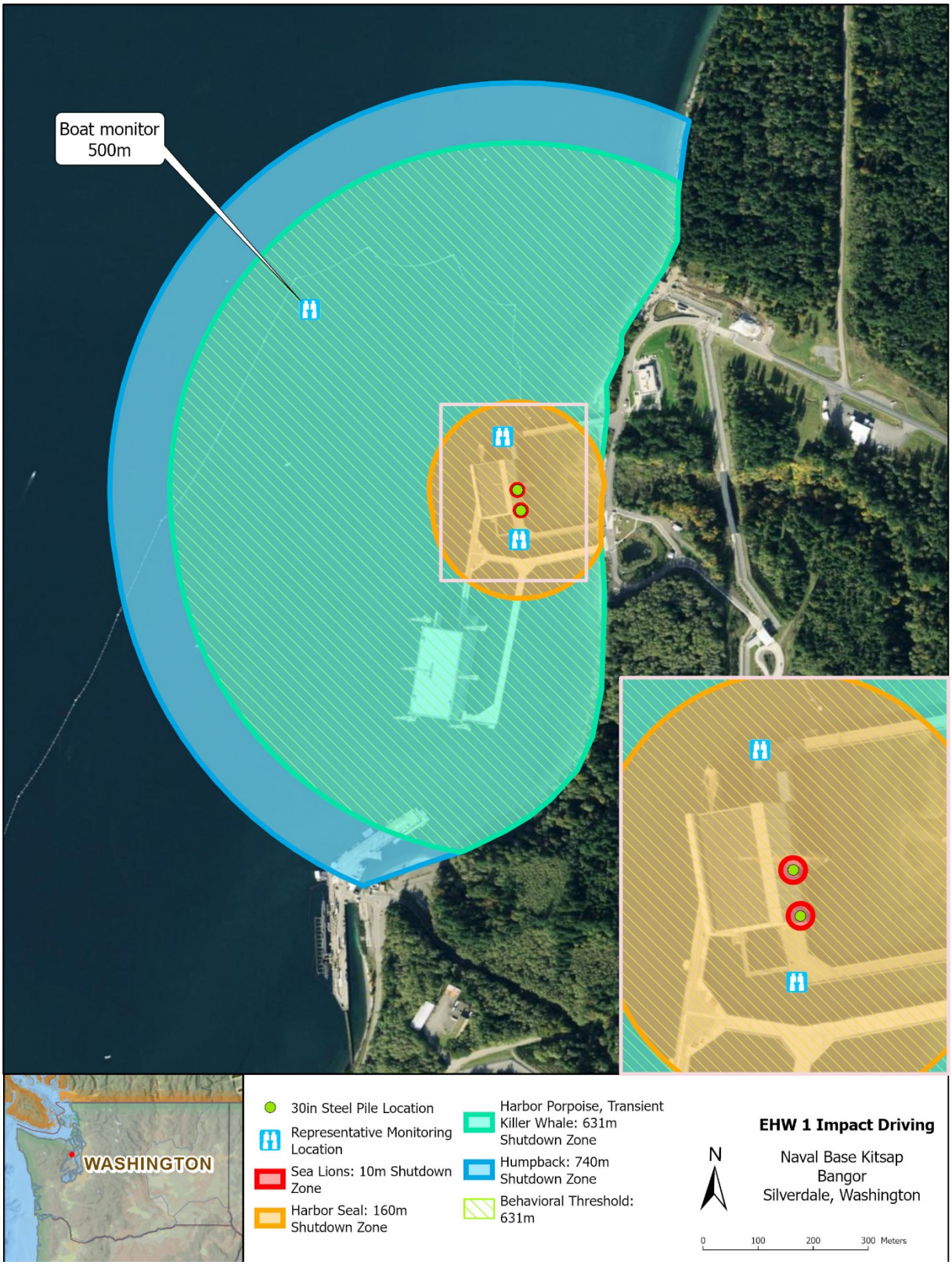

Figure 3. Example of Marine Mammal Visual Monitoring Zone at EHW 1 with Representative Monitoring Locations Indicated for Impact Driven 30" Steel Piles

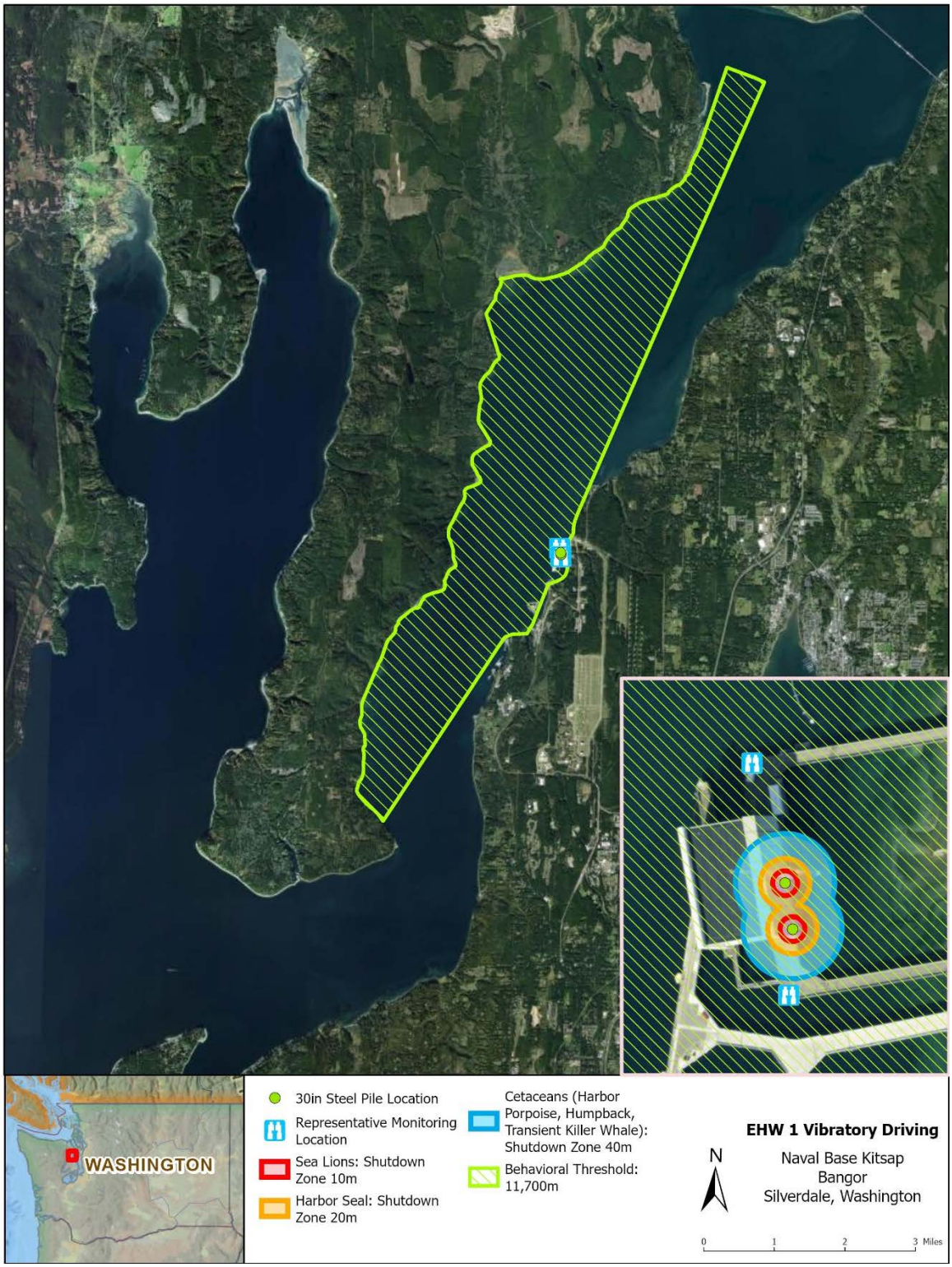

Figure 4. Example of Marine Mammal Visual Monitoring Zone at EHW 1 with Representative Monitoring Locations Indicated for Vibratory 30" Driven Piles

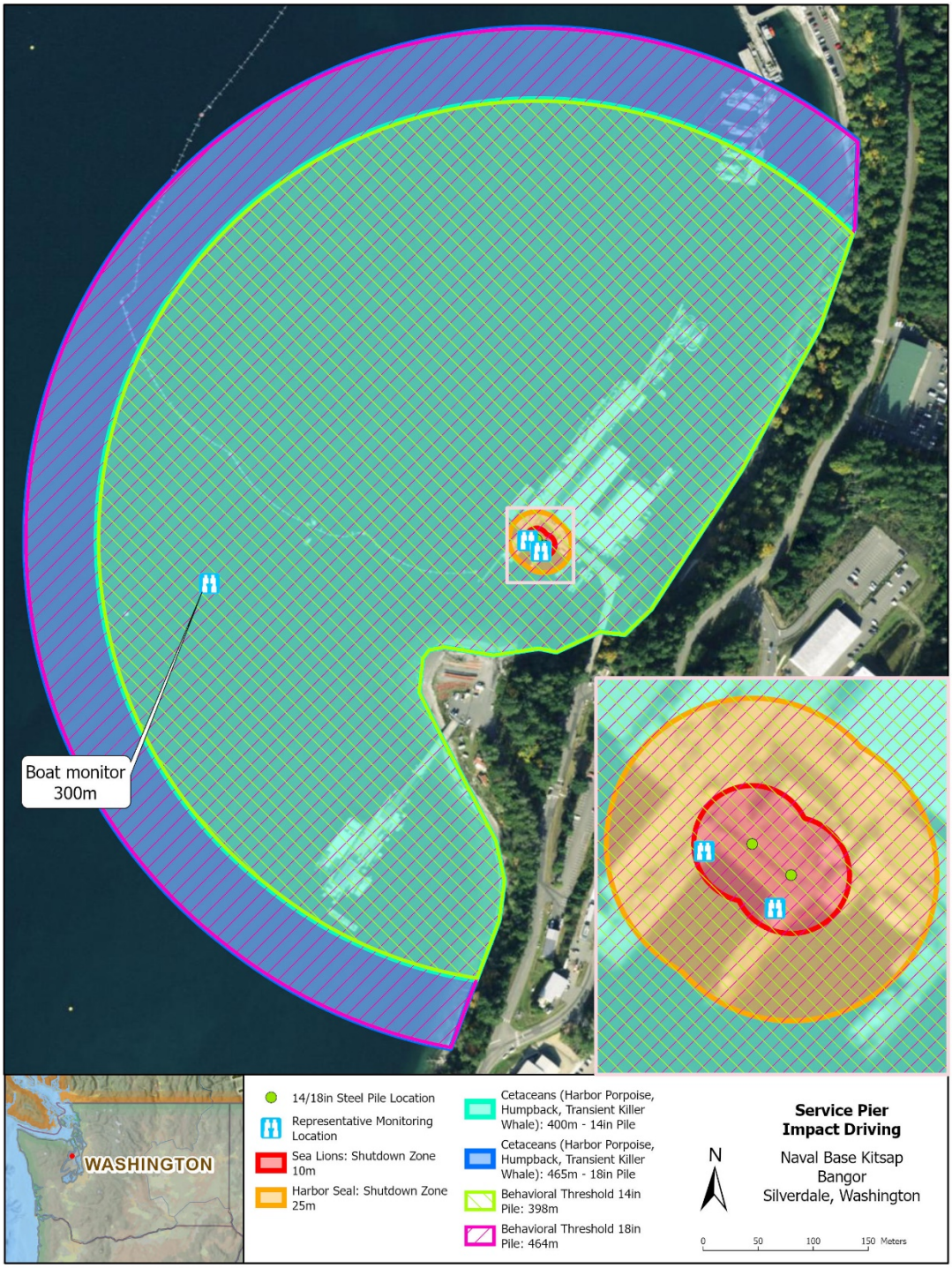

Figure 5. Example of Marine Mammal Visual Monitoring Zone at the Service Pier with Representative Monitoring Locations Indicated for Impact Driven 14" and 18" Steel Piles

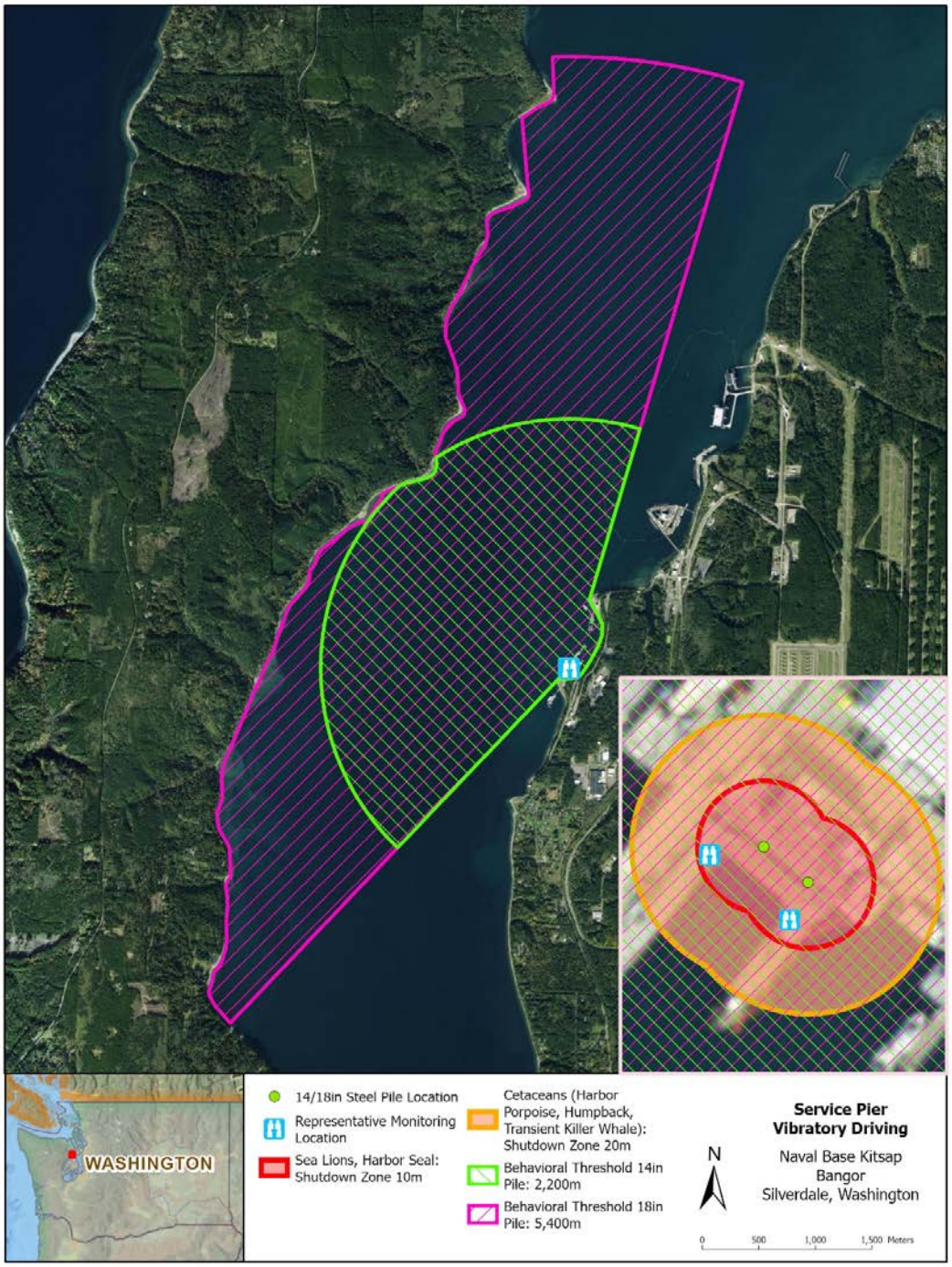

Figure 6. Example of Marine Mammal Visual Monitoring Zone at the Service Pier with Representative Monitoring Locations Indicated for Vibratory 14" and 18" Driven Piles

2.6.1 Visual Survey Protocol – Pre-Activity Monitoring

The following survey methodology will be implemented prior to commencing pile driving:

- Visual surveys of the Injury and Behavioral Zone will occur for at least 15 minutes prior to the start of construction.
- If marine mammal(s) are present within or approaching a Shutdown Zone prior to pile driving, the start of these activities will be delayed until the animal(s) leave the Shutdown Zone voluntarily and have been visually confirmed beyond the Shutdown Zone, or 15 minutes has elapsed without re-detection of the animal.
- If marine mammal(s) are not detected within a Shutdown Zone (i.e., the zone is deemed clear of marine mammals), the observers will inform the monitoring coordinator/construction contractor that pile driving can commence.
- If a marine mammal approaches or enters the Shutdown Zone, pile driving will be delayed until the animal(s) leave the zone. If pinnipeds (s) are present within the Behavioral Disturbance Monitoring Zone, pile driving would not need to be delayed, but observers would monitor and document, to the extent practical, the behavior of marine mammals that remain in the zone.

2.6.2 Visual Survey Protocol – During Activity Monitoring

The Injury and Behavioral Disturbance Monitoring Zones will be monitored throughout pile driving. The following survey methodology will be implemented during pile driving:

- If a cetacean approaches or enters the Shutdown Zone for cetaceans, pile driving will cease until the animal(s) leave the zone. If a pinniped enters the Shutdown Zone for pinnipeds, pile driving will cease until the animal(s) leave the zone. If a pinniped is observed within or entering the Behavioral Disturbance Zone during pile driving, a take would be recorded, behaviors documented, and the Shutdown Zone monitor alerted to the position of the animal. However, that pile segment would be completed without cessation, unless the animal approaches or enters the Shutdown Zone for pinnipeds, at which point all pile driving activities will be halted. The observers shall immediately radio to alert the monitoring coordinator/construction contractor. This action will require an immediate “all-stop” on pile operations.
- Once a shutdown has been initiated, pile driving and other in-water construction activities will be delayed until the animal has voluntarily left the Shutdown Zone and has been visually confirmed beyond the Shutdown Zone, or 15 minutes have passed without re-detection of the animal (i.e., the zone is deemed clear of marine mammals). The monitoring coordinator will inform the construction contractor that activities can re-commence.
- If shutdown and clearance procedures would result in an imminent concern for human safety, as determined by the construction contractor, the Navy Point of Contact will be notified immediately. The Navy POC will notify NMFS within 24 hours.

2.6.3 Visual Survey Protocol – Post-Activity Monitoring

Monitoring of the Shutdown Zones will continue for 30 minutes following completion of pile driving. These surveys will record marine mammal observations, and will focus on observing and reporting unusual or abnormal behavior of marine mammals. During these surveys, if any injured, sick, or dead marine mammals are observed, procedures outlined below in Section 3.0 should be followed.

3 INTERAGENCY NOTIFICATION

In the event that the Navy needs to modify terms of this monitoring plan, the NMFS representative will be promptly contacted for discussion of the requested modification. In the unanticipated event that the specified activity clearly causes the take of a marine mammal in a manner prohibited by this IHA, such as an injury (Level A harassment), serious injury, or mortality, Navy shall immediately cease the specified activities and report the incident to the Chief of the Permits and Conservation Division (301-427-8425), Office of Protected Resources, NMFS, and the Northwest Regional Stranding Coordinator (206-526-6550), NMFS. The report must include the following information:

- Time and date of the incident
- Description of the incident
- Environmental conditions (e.g., wind speed and direction, Beaufort sea state, cloud cover, and visibility)
- Description of all marine mammal observations in the 24 hours preceding the incident
- Species identification or description of the animal(s) involved
- Fate of the animal(s) and
- Photographs or video footage of the animal(s)

Activities shall not resume until NMFS is able to review the circumstances of the prohibited take. NMFS will work with Navy to determine what measures are necessary to minimize the likelihood of further prohibited take and ensure Marine Mammal Protection Act compliance. Navy may not resume their activities until notified by NMFS.

In the event that Navy discovers an injured or dead marine mammal, and the lead observer determines that the cause of the injury or death is unknown and the death is relatively recent (e.g., in less than a moderate state of decomposition), Navy shall immediately report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS, and the Northwest Regional Stranding Coordinator, NMFS. The report will include the same information as listed above. Activities may continue while NMFS reviews the circumstances of the incident. The Navy will work with NMFS to determine whether additional mitigation measures or modifications to the activities are appropriate.

In the event that Navy discovers an injured or dead marine mammal, and the lead observer determines that the injury or death is not associated with or related to the activities authorized in the IHA (e.g., previously wounded animal, carcass with moderate to advanced decomposition, or scavenger damage), the Navy shall report the incident to the Chief of Permits and Conservation Division, Office of Protected Resources, NMFS, and the Northwest Regional Stranding Coordinator, NMFS, within 24 hours of the discovery. Navy shall provide photographs or video footage or other documentation of the stranded animal sighting to NMFS.

Care should be taken in handling dead specimens to preserve biological materials in the best possible state for later analysis of cause of death, if that occurs. In preservation of biological materials from a dead animal, the finder (i.e., marine mammal observer) has the responsibility to ensure that evidence associated with the specimen is not unnecessarily disturbed. The Navy will prepare a Chain of Custody Record (Appendix C) to document handling of specimens.

Primary points of contact for the Navy are:

1. Tyler Yasenak – (360) 315-2452; tyler.yasenak@navy.mil
2. Scott Horowitz – (360) 476-6082; scott.horwitz@navy.mil
3. Tiffany Selbig – (360) 315-2531; tiffany.selbig@navy.mil

The Navy primary point of contact will contact NMFS. The primary points of contact at NMFS are:

1. Modification to protocol – (360) 753-5835
2. Chief of the Permits and Conservation Division – (301-427-8425)
3. Northwest Regional Stranding Coordinator – (206-526-6550)

4 MONITORING REPORTS

A separate monitoring report will be prepared for each project; one for the EHW 1 Pile Replacement and one for Service Pier Pile Replacement. A draft of each report is due to NMFS within 90 work days of the completion of marine mammal monitoring. The report shall interpret the data collected during monitoring and provide a narrative analysis of the data. The contractor will provide the Navy a draft report 45 days after completion of pile driving activities. This will give the Navy time to review the document and allow the contractor to make revisions prior to Navy submitting the report to NMFS. A final report will be prepared for each project and submitted to the NMFS within 30 days following receipt of comments on the draft report from NMFS. At a minimum, the report shall include:

- General data:
  - Date and time of activities
  - Water conditions (e.g., sea-state, tidal state)
  - Weather conditions (e.g., percent cover, visibility)
- Specific pile data:
  - Description of the pile driving activities including the size and type of pile
  - The installation methods used for each pile and the duration each method was used per pile
  - Impact or vibratory hammer force used to drive/extract piles
  - Detailed description of the sound attenuation system, including the design specifications
  - Depth of water in which the pile was driven
  - Depth into the substrate that the pile was driven
- Specific pile removal data:
  - Description of the pile removal activities being conducted
    - Size and type of piles
    - The machinery used for removal
    - Duration each pile removal method was used
  - The vibratory driver force
- Pre-activity observational survey-specific data:

- Dates and time survey is initiated and terminated
- Description of any observable marine mammal behavior in the immediate area during monitoring
- If possible, the correlation to underwater sound levels occurring at the time of the observable behavior
- Actions performed to minimize impacts to marine mammals.

- During-activity observational survey-specific data:
  - Description of any observable marine mammal behavior within monitoring zones or in the immediate area surrounding monitoring zones including the following:
    - Distance from animal to source
    - Reason why/why not shutdown implemented
    - If a shutdown was implemented, behavioral reactions noted and if they occurred before or after implementation of the shutdown
    - If a shutdown is implemented, the distance from animal to source at the time of the shutdown
    - Behavioral reactions noted during soft starts[1] and if they occurred before or after implementation of the soft start
    - Distance to the animal from the source during soft start
  - Actions performed to minimize impacts to marine mammals
  - Times when pile driving is stopped due to presence of marine mammals within the Shutdown Zones and time when pile driving resumes
- Post-activity observational survey-specific data:
  - Results, which include the detections of marine mammals, species and numbers observed, sighting rates and distances, behavioral reactions within and outside of monitoring zones
  - A refined take estimate based on the number of marine mammals observed during the course of construction

[1] The objective of a soft-start is to provide a warning and/or give animals in close proximity to pile driving a chance to leave the area prior to a vibratory or impact driver operating at full capacity thereby, exposing fewer animals to loud underwater and airborne sounds.

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Appendix A

Marine Mammal Observation Record Form

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APPENDIX A
MARINE MAMMAL OBSERVATION RECORD FORM

Project Name: ____________________________

Monitoring Location______________________________
(Pier Location, Vessel based, Land Location, other)

Page ___________ of _____________

Date: ______________________________

Vessel Name: ____________________________

Time Effort Initiated:_______________

Time Effort Completed:_____________

Sighting Data

Event Code	Sighting Number (1 or 1.1 if resight)	Time/Duration watching sighting (Start/End time if continuous)	WP # (every time a sighting is made)	Observer	Sighting cue	Species	Dist/ Dir to Animal (from Observer)	Dist to Pile (btwn animal & pile)	# of Animals Group Size (min/max/best)# of Calves	Relative Motion/and Behavior Code (see code sheet)	Const Type During Sighting	Miti gation used during sighting?	Miti gation Type?	Visibility	% Glare	Weath Cond	Sea State and Wave Ht	Swell Dir	Behavior Change/ Response to Activity/Comments
		: : : :					m or km °	m or km	/ / ___ calves	opening closing parallel none	PRE POST SSV SSI V I PC DP ST NONE	Y N	DE SD	B P M G E			Light Mod Heavy	N or S W or E	
		: : : :					m or km °	m or km	/ / ___ calves	opening closing parallel none	PRE POST SSV SSI V I PC DP ST NONE	Y N	DE SD	B P M G E			Light Mod Heavy	N or S W or E	
		: : : :					m or km °	m or km	/ / ___ calves	opening closing parallel none	PRE POST SSV SSI V I PC DP ST NONE	Y N	DE SD	B P M G E			Light Mod Heavy	N or S W or E	
		: : : :					m or km °	m or km	/ / ___ calves	opening closing parallel none	PRE POST SSV SSI V I PC DP ST NONE	Y N	DE SD	B P M G E			Light Mod Heavy	N or S W or E	
		: : : :					m or km °	m or km	/ / ___ calves	opening closing parallel none	PRE POST SSV SSI V I PC DP ST NONE	Y N	DE SD	B P M G E			Light Mod Heavy	N or S W or E	
		: : : :					m or km °	m or km	/ / ___ calves	opening closing parallel none	PRE POST SSV SSI V I PC DP ST NONE	Y N	DE SD	B P M G E			Light Mod Heavy	N or S W or E	
		: : : :					m or km °	m or km	/ / ___ calves	opening closing parallel none	PRE POST SSV SSI V I PC DP ST NONE	Y N	DE SD	B P M G E				N or S W or E	

Sighting #=chronological number of sightings, If resight of same animal, then 1.1, 1.2, etc. WP (Waypoint)=GPS recording of lat/long, time/date stamp. Critical for vessel observers.

Sighting Codes
(Sighting Cue & Behavior Codes)

Behavior codes

Code	Behavior	Definition
BR	Breaching	Leaps clear of water
CD	Change Direction	Suddenly changes direction of travel
CH	Chuff	Makes loud, forceful exhalation of air at surface
DI	Dive	Forward dives below surface
DE	Dead	Shows decomposition or is confirmed as dead by investigation
DS	Disorientation	An individual displaying multiple behaviors that have no clear direction or purpose
FI	Fight	Agonistic interactions between two or more individuals
FO	Foraging	Confirmed by food seen in mouth
MI	Milling	Moving slowly at surface, changing direction often, not moving in any particular direction
PL	Play	Behavior that does not seem to be directed towards a particular goal; may involve one, two or more individuals
PO	Porpoising	Moving rapidly with body breaking surface of water
SL	Slap	Vigorously slaps surface of water with body, flippers, tail etc.
SP	Spyhopping	Rises vertically in the water to "look" above the water
SW	Swimming	General progress in a direction. Note general direction of travel when last seen [Example: "SW (N)" for swimming north]
TR	Traveling	Traveling in an obvious direction. Note direction of travel when last seen [Example: "TR (N)" for traveling north]
UN	Unknown	Behavior of animal undetermined, does not fit into another behavior
Pinniped only		
EW	Enter Water (from haul out)	Enters water from a haul-out for no obvious reason
FL	Flush (from haul out)	Enters water in response to disturbance
HO	Haul out (from water)	Hauls out on land
RE	Resting	Resting onshore or on surface of water
LO	Look	Is upright in water "looking" in several directions or at a single focus
SI	Sink	Sinks out of sight below surface without obvious effort (usually from an upright position)
VO	Vocalizing	Animal emits barks, squeals, etc.
Cetacean only		
LG	Logging	Resting on surface of water with no obvious signs of movement

Sighting Codes (continued)

Marine Mammal Species

Code	Marine Mammal Species
CASL	California Sea Lion
HSEA	Harbor Seal
STSL	Steller Sea Lion
HPOR	Harbor Porpoise
DPOR	Dall's Porpoise
ORCA	Killer Whale
HUMP	Humpback Whale
UNLW	Unknown Large Whale
RIVO	River Otter (not a marmam)
OTHR	Other
UNKW	Unknown

Event

Code	Activity Type
E ON	Effort On
E OFF	Effort Off
PRE	Pre Watch
POST	Post Watch
SSV	Soft start-vibratory
SSI	Soft start-impact
WC	Weather Condition/Change
S	Sighting
M-DE	Mitigation Delay
M-SD	Mitigation Shutdown

Construction Type

Code	Activity Type
SSV	Soft Start (Vibratory)
SSI	Soft Start (Impact)
V	Vibratory Pile Driving (installation and extraction)
I	Impact Pile Driving
PC	Pneumatic Chipping
DP	Dead pull
ST	Stabbing
NONE	No Pile Driving

Mitigation Codes

Code	Activity Type
DE	Delay onset of Pile Driving
SD	Shut down Pile Driving

Sighting Codes (continued)

Visibility

Code	Distance Visible
B	Bad (<0.5km)
P	Poor (0.5 – 1.5km)
M	Moderate (1.5 – 10km)
G	Good (10 - 15km)
E	Excellent (<15km)

Glare

Percent glare should be total glare of observers' area of responsibility. Are they covering 90 degrees or 180 degrees? Total glare for that area and write that area down on the datasheet so we know later what percentage of the field of view was poor due to glare.

Weather Conditions

Code	Weather Condition
S	Sunny
PC	Partly Cloudy
L	Light Rain
R	Steady Rain
F	Fog
OC	Overcast

Sea State and Wave Height

Use Beaufort Sea State Scale for Sea State Code. This refers to the surface layer and whether it is glassy in appearance or full of white caps. In the open ocean, it also takes into account the wave height, but in inland waters the wave heights (swells) may never reach the levels that correspond to the correct surface white cap number. Therefore, include wave height for clarity.

Code	Wave Height
Light	0 – 3 ft
Moderate	4 – 6 ft
Heavy	>6 ft

Swell Direction

Swell direction should be where the swell is coming from (S for coming from the south). If possible, record direction relative to fixed location (pier). Choose this location at beginning of monitoring project.

Appendix B

Beaufort Sea State Scale

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APPENDIX B
BEAUFORT SEA STATE SCALE

US Navy and Beaufort Sea State Codes (http://ioc.unesco.org and http://www.wrh.noaa.gov/pqr/info/beaufort.php)

Beaufort Sea State	Wind Speed (knots)	Wind Description	Wave Height (ft) Beaufort	Sea State – Beaufort	Notes Specific to On-water Seabird Observations	Photos Indicating Beaufort Sea State
0	<1	Calm	0	Calm; like a mirror	Excellent conditions, no wind, small or very smooth swell. You have the impression you could see anything.	
1	1-3	Light air	¼ < ½	Ripples with appearance of scales; no foam crests	Very good conditions, surface could be glassy (Beaufort 0), but with some lumpy swell or reflection from forests, glare, etc.	

APPENDIX B
BEAUFORT SEA STATE SCALE (continued)

Beaufort Sea State	Wind Speed (knots)	Wind Description	Wave Height (ft) Beaufort	Sea State – Beaufort	Notes Specific to On-water Seabird Observations	Photos Indicating Beaufort Sea State
2	4-6	Light breeze	½ – 1 (max 1)	Small wavelets; crests with glassy appearance, not breaking	Good conditions, no whitecaps; texture/lighting contrast of water make murrelets hard to see. Surface could also be glassy or have small ripples, but with a short, lumpy swell, thick fog, etc.	
3	7-10	Gentle breeze	2 – 3 (max 3)	Large wavelets; crests begin to break; scattered whitecaps	Fair conditions, scattered whitecaps, detection of murrelets definitely compromised; a hit-or-miss chance of seeing them owing to water choppiness and high contrast. This could also occur at lesser wind with a very short wavelength, choppy swell.	

APPENDIX B
BEAUFORT SEA STATE SCALE (continued)

Beaufort Sea State	Wind Speed (knots)	Wind Description	Wave Height (ft) Beaufort	Sea State – Beaufort	Notes Specific to On-water Seabird Observations	Photos Indicating Beaufort Sea State
4	11-16	Moderate breeze	3 ½ – 5 (max 5)	Small waves becoming longer, numerous whitecaps	Whitecaps abundant, sea chop bouncing the boat around, etc.	
5	17-20	Fresh breeze	6 – 8 (max 8)	Moderate waves, taking longer form; many whitecaps; some spray		

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Appendix C

Chain of Custody Record

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Chain of Custody Record

Date and Time of Collection:	Duty Station:	Collection By:

Source of Specimen (Person and/or Location): Found At:	Project Name:

Item No:	Description of Specimen (Include Species and Tag Number):

Item No:	From: (Print Name, Agency)	Release Signature:	Release Date:	Delivered via: FEDEX U.S. Mail In Person Other:
	To: (Print Name, Agency)	Receipt Signature:	Receipt Date:	

Chain of Custody Record

Item No:	From: (Print Name, Agency)	Release Signature:	Release Date:	Delivered via: FEDEX U.S. Mail In Person Other:
	To: (Print Name, Agency)	Receipt Signature:	Receipt Date:	
Item No:	From: (Print Name, Agency)	Release Signature:	Release Date:	Delivered via: FEDEX U.S. Mail In Person Other:
	To: (Print Name, Agency)	Receipt Signature:	Receipt Date:	
Item No:	From: (Print Name, Agency)	Release Signature:	Release Date:	Delivered via: FEDEX U.S. Mail In Person Other:
	To: (Print Name, Agency)	Receipt Signature:	Receipt Date:	
Item No:	From: (Print Name, Agency)	Release Signature:	Release Date:	Delivered via: FEDEX U.S. Mail In Person Other:
	To: (Print Name, Agency)	Receipt Signature:	Receipt Date:	

APPENDIX C: LETTER OF AUTHORIZATION

Please see subsequent 8 pages for National Marine Fisheries service Letter of Authorization, July 2021.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
1315 East-West Highway
Silver Spring, Maryland 20910

LETTER OF AUTHORIZATION

The U.S. Navy (Navy) is hereby authorized under section 101(a)(5)(A) of the Marine Mammal Protection Act (MMPA; 16 U.S.C. 1371(a)(5)(A)) to take marine mammals incidental to construction activities at Naval Base Kitsap Bangor, Washington, subject to the provisions of the MMPA and the Regulations Governing Taking of Marine Mammals Incidental to U.S. Navy Marine Structure Maintenance and Pile Replacement in Washington (50 CFR Part 218, Subpart C) (Regulations).

1. This Letter of Authorization (LOA) is valid from July 16, 2021, through January 15, 2022.

2. This LOA is valid only for take incidental to the specified construction activities at Naval Base Kitsap Bangor, Washington, and described in the preamble to the Regulations and in the Explosives Handling Wharf and Service Pier 2021-2022 Pile Replacement Projects Final Marine Mammal Monitoring Plan, dated June 2021.

3. General Conditions

   (a) A copy of this LOA and the approved Marine Mammal Monitoring Plan, dated June 2021, must be in the possession of Navy, its designees, and work crew personnel operating under the authority of this LOA.

   (b) The species authorized for taking are listed in Table 1. The taking, by Level B harassment only, is limited to the species and numbers listed in Table 1.

   (c) The taking by Level A harassment, serious injury, or death of any of the species listed in Table 1 or any taking of any other species of marine mammal is prohibited and may result in the modification, suspension, or revocation of this IHA. Any taking exceeding the authorized amounts listed in Table 1 is prohibited and may result in the modification, suspension, or revocation of this IHA.

   (d) The Navy shall conduct briefings for construction supervisors and crews, the 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, the marine mammal monitoring protocol, and operational procedures.

   (e) The Navy must adhere to the requirements described in the approved Marine Mammal Monitoring Plan, dated June 2021.

4. Mitigation Measures

The holder of this Authorization is required to implement the following mitigation measures:

(a) For all pile driving activity, the Navy shall implement a minimum shutdown zone of a 10 m radius around the pile. If a marine mammal comes within or approaches the shutdown zone, such operations shall cease.

(b) For all pile driving activity, the Navy shall implement shutdown zones with radial distances as identified in Table 2. If a marine mammal comes within or approaches the shutdown zone, such operations shall cease.

(c) For all pile driving activity, the Navy shall designate monitoring zones with radial distances as identified in Table 2. If any cetacean is observed outside the shutdown zone, but within the designated monitoring zone, such operations shall cease.

(d) The Navy shall deploy marine mammal observers as indicated in the NMFS-approved Marine Mammal Monitoring Plan, dated June 2021.

(e) For all pile driving activities, a minimum of one observer shall be stationed at the active pile driving rig or in reasonable proximity in order to monitor the shutdown zone.

(f) Prior to the start of pile driving on any day, the Navy shall take measures to ensure that southern resident killer whales are not located within the vicinity of the project area, including, but not limited to, contacting and/or reviewing the latest sightings data from the Orca Network and/or Center for Whale Research, including passive acoustic detections, to determine the location of the nearest marine mammal sightings.

(g) Monitoring shall take place from fifteen minutes prior to initiation of pile driving activity through thirty minutes post-completion of pile driving activity. Pre-activity monitoring shall be conducted for fifteen minutes to ensure that the shutdown zone is clear of marine mammals, and pile driving may commence only if observers have declared the shutdown zone clear of marine mammals during this period. In the event of a delay or shutdown of activity resulting from marine mammals in the shutdown zone, the marine mammals shall be allowed to remain in the shutdown zone (*i.e.*, must leave of their own volition) and their behavior shall be monitored and documented. Monitoring shall occur throughout the time required to drive a pile. A determination that the shutdown zone is clear cannot be made unless the observer(s) have good visibility of the shutdown zone during the entire fifteen-minute observation period (*i.e.*, the entire shutdown zone must be visible to the naked eye and unobscured by dark, rain, fog, poor lighting conditions, etc.).

(h) If a marine mammal approaches or enters the shutdown zone, the Navy shall halt

all pile driving activities at that location. If pile driving is halted or delayed due to the presence of a marine mammal, the activity may not commence or resume until either the animal has voluntarily left and been visually confirmed beyond the shutdown zone or fifteen minutes have passed without re-detection of the animal.

(i) If a species for which authorization has not been granted, or a species for which authorization has been granted but the authorized takes are met, is observed approaching or within the monitoring zone, the Navy must halt pile driving activities immediately using delay and shutdown procedures. Activities must not resume until the animal has been confirmed to have left the area or the fifteen-minute observation period has elapsed

(j) The Navy shall use soft start techniques for impact pile driving. Soft start for impact drivers requires contractors to provide an initial set of three strikes at reduced energy, followed by a thirty-second waiting period, then two subsequent reduced energy three-strike sets. Soft start shall be implemented at the start of each day's impact pile driving and at any time following cessation of impact pile driving for a period of thirty minutes or longer.

(k) The Navy shall employ a bubble curtain (or other sound attenuation device with proven typical performance of at least 8 decibels effective attenuation) during impact pile driving of steel piles in water depths greater than 2 feet[1]. In addition, the Navy shall implement the following performance standards:

(i) The bubble curtain must distribute air bubbles around 100 percent of the piling perimeter for the full depth of the water column.

(ii) The lowest bubble ring shall be in contact with the mudline for the full circumference of the ring, and the weights attached to the bottom ring shall ensure 100 percent mudline contact. No parts of the ring or other objects shall prevent full mudline contact.

(iii) The Navy shall require that construction contractors train personnel in the proper balancing of air flow to the bubblers, and shall require that construction contractors submit an inspection/performance report for approval by the Navy within 72 hours following the performance test. Corrections to the attenuation device to meet the performance standards shall occur prior to impact driving.

5. Monitoring

[1] The Regulations require use of sound attenuation devices during impact pile driving of steel piles greater than 14" diameter. However, the Navy's Monitoring Plan, dated June 2021, includes a commitment to use bubble curtains during impact driving of all steel piles in water depths greater than 2 feet. This commitment is reflected in the distances provided in Table 2.

The holder of this Authorization is required to conduct monitoring and reporting in accordance with the approved Monitoring Plan, dated June 2021.

(a) Monitoring shall be conducted by trained observers, who shall have no other assigned tasks during monitoring periods. Trained observers shall be placed at the best vantage point(s) practicable to monitor for marine mammals and implement shutdown or delay procedures when applicable through communication with the equipment operator. The Navy shall adhere to the following additional observer qualifications:

(i) Independent observers (i.e., not construction personnel) are required.

(ii) At least one observer must have prior experience working as an observer.

(iii) Other observers may substitute education (degree in biological science or related field) or training for experience.

(iv) Where a team of three or more observers are required, one observer shall be designated as lead observer or monitoring coordinator. The lead observer must have prior experience working as an observer.

(b) Trained observers shall receive a general environmental awareness briefing conducted by Navy staff. At a minimum, training shall include identification of the marine mammals that may occur in the project vicinity and relevant mitigation and monitoring requirements. All observers shall have no other construction-related tasks while conducting monitoring.

(c) The Navy shall deploy additional observers to monitor disturbance zones according to the minimum requirements defined in the approved Marine Mammal Monitoring Plan, dated June 2021. These observers shall collect sighting data and behavioral responses to pile driving for marine mammal species observed in the region of activity during the period of activity, and shall communicate with the shutdown zone observer as appropriate with regard to the presence of marine mammals. All observers shall be trained in identification and reporting of marine mammal behaviors.

(d) During each in-water work period, the Navy shall update NMFS every two months on the progress of ongoing projects.

(e) For shutdown zone monitoring, the Navy shall report on implementation of shutdown or delay procedures, including whether the procedures were not implemented and why (when relevant).

6. Reporting

The holder of this Authorization is required to submit information to NMFS as follows:

(a) The Navy must submit a summary report to NMFS not later than 90 days following the end of construction activity covered by this LOA. The Navy shall provide a final report within 30 days following resolution of comments on the draft report. The report must contain the following information:

(i) Date and time that monitored activity begins or ends;

(ii) Construction activities occurring during each observation period;

(iii) Weather parameters (*e.g.*, wind speed, percent cloud cover, visibility);

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

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

(vi) Description of any observable marine mammal behavior patterns, including bearing and direction of travel and distance from pile driving activity;

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

(viii) Description of implementation of mitigation measures (*e.g.*, shutdown or delay);

(ix) Locations of all marine mammal observations; and

(x) Other human activity in the area.

(b) The Navy must submit a comprehensive summary report addressing activities conducted under all LOAs issued pursuant to the Regulations to NMFS not later than ninety days following the conclusion of marine mammal monitoring efforts conducted pursuant to the Regulations.

(c) In the event that a live marine mammal is found stranded, whether on shore or in or on any structure or vessel, the following steps shall be taken:

(i) Project personnel who discover the marine mammal shall immediately notify the most appropriate onsite personnel with relevant expertise (e.g., marine mammal observers) as well as the Navy (if non-Navy project personnel initially discover the animal).

(ii) The Navy shall then immediately notify the West Coast Regional Stranding Coordinator, NMFS, (866-767-6114) and, in consultation with the Stranding Coordinator, shall immediately notify the most appropriate

qualified individual (i.e., biologist or veterinarian) to respond to the event.

(iii) In the interim, or in the event that no qualified individual other than onsite marine mammal observers is available to respond to the event, the Navy shall manage the event response and shall take action to prevent any further deterioration of the animal's condition, to the extent possible. Appropriate action may be specific to the event. At minimum, the Navy should provide shade for the animal (if possible), shall not move the animal or cause the animal to move, and shall suspend project activity until the situation is resolved.

(iv) The Navy shall report the incident to the Office of Protected Resources (OPR), NMFS, (301-427-8401) within 48 hours after discovery.

(d) In the unanticipated event that the specified activity clearly causes the take of at least one marine mammal in a prohibited manner, the Navy shall immediately cease such activity and report the incident to OPR and the West Coast Regional Stranding Coordinator, NMFS. Activities shall not resume until NMFS is able to review the circumstances of the prohibited take. NMFS will work with the Navy to determine what measures are necessary to minimize the likelihood of further prohibited take and ensure MMPA compliance. The Navy may not resume their activities until notified by NMFS. The report must include the following information:

(i) Time, date, and location (latitude/longitude) of the incident;

(ii) Description of the incident;

(iii) Environmental conditions (*e.g.*, wind speed and direction, Beaufort sea state, cloud cover, visibility);

(iv) Description of all marine mammal observations in the 24 hours preceding the incident;

(v) Species identification or description of the animal(s) involved;

(vi) Fate of the animal(s); and

(vii) Photographs or video footage of the animal(s). Photographs may be taken once the animal(s) have been moved from the waterfront area.

(e) In the event that the Navy discovers an injured or dead marine mammal and determines that the cause of the injury or death is unknown and the death is relatively recent (*e.g.*, in less than a moderate state of decomposition), the Navy shall immediately report the incident to OPR and the West Coast Regional Stranding Coordinator, NMFS. The report must include the information identified

in paragraph (6)(c) of this LOA. Activities may continue while NMFS reviews the circumstances of the incident. NMFS will work with the Navy to determine whether additional mitigation measures or modifications to the activities are appropriate.

(f) In the event that the Navy discovers an injured or dead marine mammal and determines that the injury or death is not associated with or related to the specified activities (*e.g.*, previously wounded animal, carcass with moderate to advanced decomposition, scavenger damage), Navy shall report the incident to OPR and the West Coast Regional Stranding Coordinator, NMFS, within 24 hours of the discovery. The Navy shall provide photographs or video footage or other documentation of the stranded animal sighting to NMFS. Photographs may be taken once the animal has been moved from the waterfront area.

7. This Authorization may be modified, suspended or revoked if the Holder fails to abide by the conditions prescribed herein (including, but not limited to, failure to comply with monitoring or reporting requirements), or if NMFS determines: (1) the authorized taking is likely to have or is having more than a negligible impact on the species or stocks of affected marine mammals or (2) the prescribed measures are likely not or are not effecting the least practicable adverse impact on the affected species or stocks and their habitat.

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Catherine Marzin
Acting Director,
Office of Protected Resources,
National Marine Fisheries Service.

Table 1. Authorized Take by Harassment

Species	Level B harassment[1]	Level A harassment[1]
Humpback whale	4[2]	0
Minke whale	4[2]	0
Gray whale	4[2]	0
Killer whale (transient)	12[2]	0
Killer whale (resident)	40[2]	0
Dall's porpoise	146[2]	0
Harbor porpoise	2,142	0
Steller sea lion	357	0
California sea lion	5,831	0
Harbor seal	4,680	119
Elephant seal	2[2]	0

[1]Values represent the total amount of take that may be authorized over the five-year period of effectiveness of the Regulations, and the amount of take expected to occur incidental to the activities conducted during the period of validity of this LOA may be less than these totals.

[2]These values represent the total amount of take that may be authorized over the five-year period of effectiveness of the Regulations at all U.S. Navy facilities covered by the Regulations. During 2021-22, these values represent the combined total of takes authorized through this LOA as well as through the separate LOA issued for construction activities planned to occur at Naval Base Kitsap Manchester.

Table 2. Minimum Shutdown and Monitoring Zones (meters)

Pile size, type, and method	Minimum shutdown zones					Minimum monitoring zone[1]
	Phocid	Otariid	Low-frequency	Mid-frequency	High-frequency	
30-in steel, impact	160	10	740	630	630	630[2]
30-in steel, vibratory	20	10	40	40	40	[3]
14/18-in steel, impact[5]	25	10	400/465	400/465	400/465	400/465
14/18-in steel, vibratory	10	10	20	20	20	[4]

[1]Observation of any cetacean within these zones requires shutdown of pile driving activity.

[2]The estimated Level A harassment zone for low-frequency cetaceans exceeds the estimated Level B harassment zone. Therefore, while the shutdown requirement described in 4(c) of this LOA applies to the monitoring zone for mid- and high-frequency cetaceans, the de facto minimum monitoring zone is equivalent to the largest shutdown zone (*i.e.*, the 740-m zone for low-frequency cetaceans).

[3]The estimated Level B harassment zone is 11,700 meters. Pursuant to Section 2.5 of the Marine Mammal Monitoring Plan, two observers will be positioned on the pier or shore. Observers at these locations will monitor the Level B harassment zone to the maximum extent possible based on daily visibility conditions.

[4]The estimated Level B harassment zone for 14-in steel piles is 2,200 meters and for 18-in steel piles is 5,400 meters. Pursuant to Section 2.5 of the Marine Mammal Monitoring Plan, two observers will be positioned on the pier or shore. Observers at these locations will monitor the Level B harassment zone to the maximum extent possible based on daily visibility conditions.

[5]If 14-in steel piles are used, the cetacean shutdown zones and minimum monitoring zone is 400 m. If 18-in steel piles are used, the zones are 465 m.

APPENDIX D: OBSERVER DATA FILES

Please see attached for external Observation Form Data File.