Naval Base Kitsap-Bangor
Barge Mooring Project (Service Pier)

FINAL Marine Mammal Monitoring Report (2013)

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ACRONYMS AND ABBREVIATIONS

APE	American Piledriving Equipment
BSS	Beaufort sea state
BMP	Barge Mooring Project
cfm	cubic feet per minute
cm	centimeters
dB	decibel
ESA	Endangered Species Act
ft-lbs	foot-pounds
ft	foot/feet
GPS	global positioning system
IHA	Incidental Harassment Authorization
km	kilometers
m	meters
MC	monitoring coordinator
MMO	marine mammal observer
MMPA	Marine Mammal Protection Act
mph	miles per hour
NBK	Naval Base Kitsap
NMFS	National Marine Fisheries Service
PPE	personal protective equipment
RMS	root mean square
µPa	micropascal
SPL	sound pressure level
WRA	Waterfront Restricted Area

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Section 1 Introduction

This report summarizes the marine mammal monitoring effort implemented for the Barge Mooring Project (BMP) that occurred from 14 September 2013 to 25 September 2013 at Naval Base Kitsap (NBK) at Bangor Service Pier. The purpose of the BMP is to conduct pile installation and removal activities required to moor a new larger research barge. The barge will be equipped with upgraded technology necessary for Commander Submarine Development 5 (CSDS-5) to continue their mission (DoN 2013). The piles will also support the relocation of the existing Port Operations mooring floats.

The marine mammal monitoring performed for this project was intended to meet all requirements of applicable permits and consultations conducted to comply with the Marine Mammal Protection Act (MMPA) permit and Endangered Species Act (ESA). Marine mammal monitoring performed for this project followed procedures and requirements in the Barge Mooring Marine Mammal Monitoring Plan (Monitoring Plan; **Appendix A**). The Monitoring Plan included the requirement that a marine mammal monitoring report be prepared and submitted to the Navy. This document is meant to satisfy that reporting requirement.

Section 2 Methods

Project Area

NBK at Bangor, Washington, is located on the Hood Canal approximately 20 miles (32.19 kilometers [km]) due west of Seattle, Washington (**Figure 1**). NBK at Bangor provides berthing and support services to U.S. Navy submarines and other fleet assets. The BMP site was located on the eastern side of the NBK at Bangor Service Pier (**Figure 2**). Marine mammal monitoring was focused within this area and in the waters immediately adjacent to the Service Pier enclosure, where sound pressure levels associated with pile installation and removal activities could potentially be transmitted at levels that could affect marine mammals.

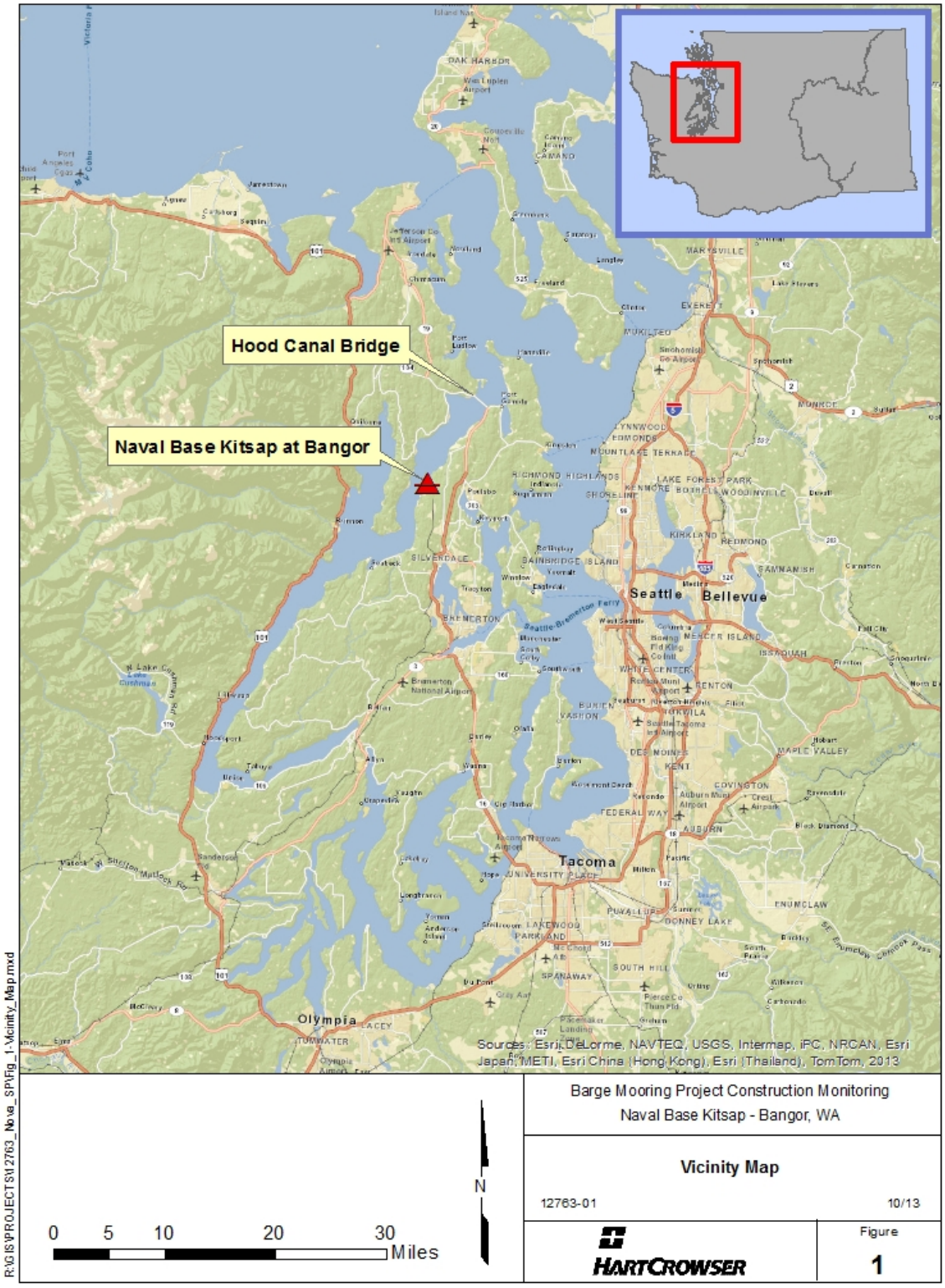


Figure 1. Vicinity Map

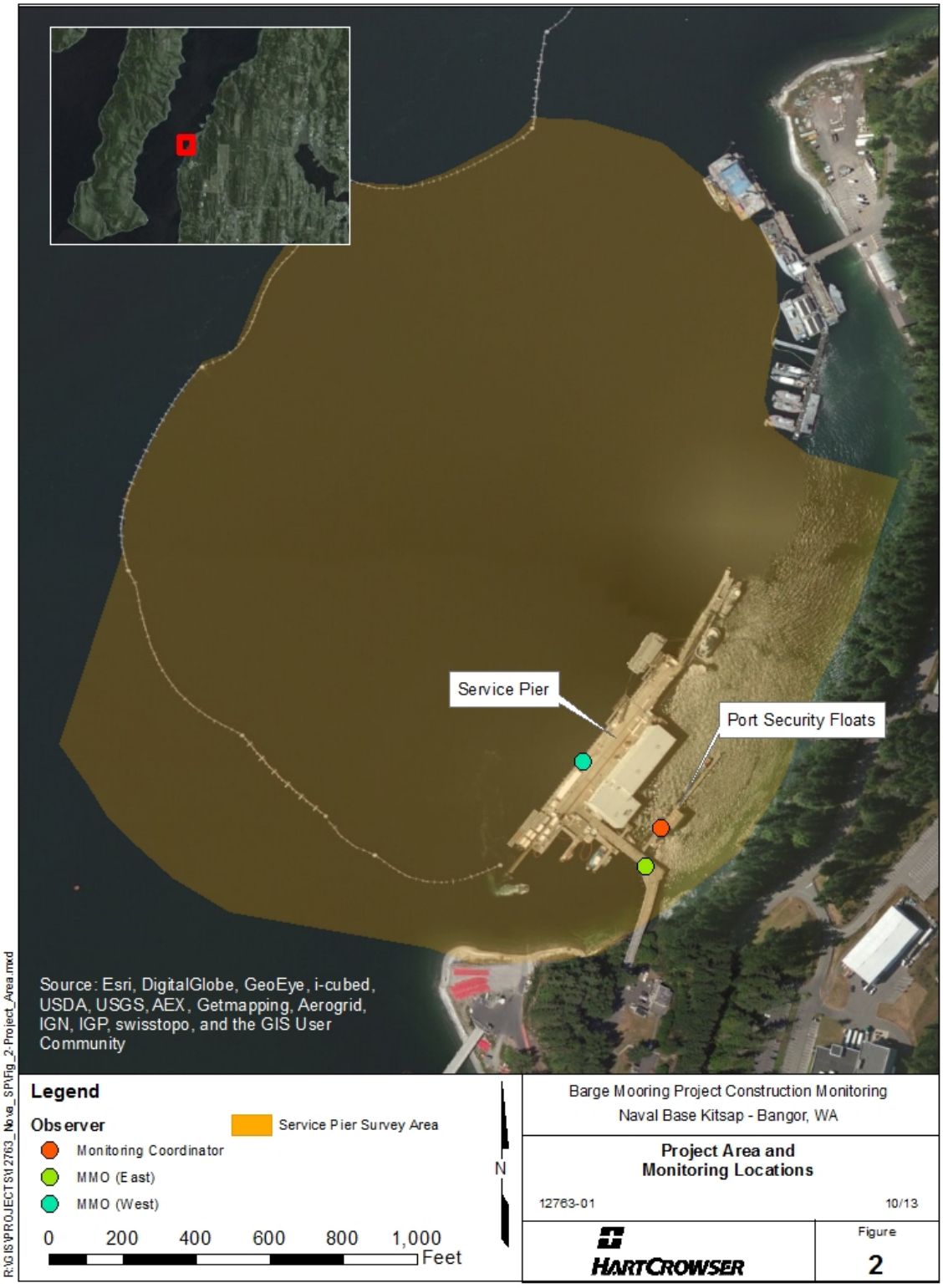


Figure 2. Project Area and Monitoring Locations

Project Staffing

Staff for the BMP (**Table 1**) included the Project Managers, the Monitoring Coordinator (MC), Marbled Murrelet Observers (MAMUs), and Marine Mammal Observers (MMOs). All MCs and MMOs were experienced in marine mammal identification, and had extensive knowledge of the biology and behavior of locally occurring marine species. With few exceptions, all MCs and MMOs had been observers at NBK at Bangor for the 2011 Test Pile Program, the 2011/2012 Explosives Handling Wharf 1 Pile Replacement Project, and/or the 2012/2013 Explosives Handling Wharf 2 construction monitoring efforts. All marine mammal observers were dedicated to that task and served no other function while conducting observations.

Table 1. Project Staff

Name	Role(s)	Company
Hans Hurn	Project Manager / MC	Hart Crowser
Jeff Barrett	Project Manager	Hart Crowser
Steve Hall	MAMU	Hart Crowser
Diane Hennessey	MAMU	Hart Crowser
Emily Duncanson	MMO/MAMU	Hart Crowser
Beth Sosik	MMO	Hart Crowser
Suzanne Faubl	MMO	Hart Crowser
Kerry Hosken	MMO	Hart Crowser
Paula von Weller	MMO	Hart Crowser
Nick Galvin	MMO	Hart Crowser

Marine Mammal Monitoring Platforms

The Monitoring Plan required that MMOs be positioned at the best practicable vantage points, taking into consideration security, safety, and space limitations on the waterfront. A minimum of three monitors were used for marine mammal monitoring: one MC dedicated to monitor the shutdown zone, and two monitors focused on observations on the disturbance zone (**Figure 2**). The location of the MC allowed him to effectively coordinate with both the marine mammal observers and the pile driving foreman.

Pier-based Monitoring. The MC was typically located on the floats adjacent to the piles being driven, and also served as an additional MMO as needed from that relatively stationary location. The MC was typically 5–20 meters (m; 16–66 feet [ft]) from the pile being driven, and at all times had a full view of the shutdown zone. The MC was positioned in close proximity to the construction foreman or in the foreman's line of sight, and each pile driving event was communicated between the foreman and MC. The MC would transmit the pile specifications and other details to the marine mammal observers, who monitored the same radio channel. The MC logged pile driving times and related construction activities for each pile. This served as the basis for marine mammal sightings data quality control.

Monitoring Summary

In total, the Navy completed 72 hours, 54 minutes of marine mammal surveys on nine construction days during the course of the BMP (**Table 2**).

Table 2. Summary of Construction Monitoring Effort

Date	Start Time (hh:mm)	End Time (hh:mm)	Total Time (hh:mm)
9/14/2013	10:15:00 AM	4:57:00 PM	6:42
9/16/2013	1:00:00 PM	5:10:00 PM	4:10
9/17/2013	7:30:00 AM	5:30:00 PM	10:00
9/18/2013	7:40:00 AM	4:59:00 PM	9:19
9/19/2013	7:35:00 AM	5:14:00 PM	9:39
9/20/2013	6:29:00 AM	9:29:00 AM	3:00
9/23/2013	8:00:00 AM	4:49:00 PM	8:49
9/24/2013	7:05:00 AM	6:10:00 PM	11:05
9/25/2013	7:20:00 AM	5:30:00 PM	10:10
TOTAL			**72:54**

Monitoring Zones

The monitoring plan described the shutdown and disturbance zones for pile installation and removal activities associated with the BMP. While the acoustic zones of influence varied among the different diameter piles and types of installation and removal methodologies, shutdown and disturbance zones were based on the modeled maximum zone of influence for all pile installation

and removal activities. Monitoring of these zones and the implementation of other minimization measures, such as the use of sound attenuation devices, were designed to reduce the impacts of underwater sound from pile driving and removal on marine mammals.

Shutdown Zone. The shutdown zone included all areas where the underwater sound pressure levels (SPLs) were anticipated to equal or exceed the Level A (injury) Harassment criteria for marine mammals (180 decibels referenced to 1 micropascal [dB re 1 μPa] isopleths for cetaceans; 190 dB re 1μPa isopleths for pinnipeds). For vibratory and impact pile installation and removal, monitoring was conducted for a 10-m (32.8-ft) shutdown zone (Level A Harassment) surrounding each pile for the presence of pinnipeds before, during, and after pile operations. The shutdown zone for cetaceans was 34 m; however, no cetaceans were observed near the shutdown zone. The shutdown zone was also monitored during other activities with the potential to affect marine mammals, including movement of a barge to the pile location, cutting of the piles, and the removal or insertion of a pile from the water column via a crane ("dead pull" and "stabbing," respectively).

Disturbance Zone. A disturbance zone was monitored within the floating security fence where underwater sound pressure levels were estimated to exceed the 160 dB root mean square (rms) behavioral disturbance zone during impact pile driving and the 120 dB rms behavioral disturbance zone during vibratory pile driving. However, all identifiable marine mammals, regardless of whether inside or outside the floating security fence, were recorded. Construction continued if animals were sighted within this zone; however, their presence and behavior were documented and the other MMOs were notified of their proximity to the injury zone along with their direction of travel, if possible.

Observer Monitoring Locations

In order to monitor disturbance and shutdown zones, MMOs were positioned at float and pier-based vantage points, taking into consideration security, safety, and space limitations of the NBK at Bangor waterfront. Three MMOs were located at different locations on the Service Pier and the floating Port Operations piers in positions that provided adequate visual coverage of the shutdown and disturbance zones. One of the observers, the MC, was solely dedicated to

monitoring the 10-m shutdown zone. One MMO was placed to maximize coverage of the disturbance zone on the landward side (east side) of the Service Pier. An additional MMO was stationed on the Hood Canal side (northwest side) of the Service Pier to monitor the disturbance zone.

Monitoring Techniques

Pile installation and removal activities occurred intermittently throughout each construction day. As a result, MMOs surveyed throughout the day, regardless of whether or not pile driving was occurring at that time in order to best characterize marine species occurrence and behavior in the area. Therefore, data gathered on construction days include observations made during construction and non-construction periods. Construction monitoring began at least 15 minutes prior to the initiation of pile driving (pre-construction monitoring) and ended 30 minutes after completion of all pile driving (post-construction monitoring). Pile driving was not initiated until the shutdown zone was clear of marine mammals. Observers recorded time, number of animals, behavior, distance and bearing to the animal(s), and distance to pile for each sighting using the standardized Marine Mammal Sighting form (**Appendix B**). This form was digitally reproduced, allowing MMOs to enter data directly into a database using handheld tablet computers. A sheet of data codes was supplied to each MMO as a reference to project-specific codes for construction type, weather, and marine mammal species and behavior (**Appendix B**). At the end of each day, all digitized sightings underwent a rigorous quality control process before being appended to the primary database. Other standard MMO equipment included personal protective equipment (PPE), binoculars with laser rangefinders, a GPS unit, a VHF radio, a clipboard, and a marine mammal identification guide. The required PPE for all observers while on site included a personal flotation device, hard hat, steel toe boots, protective eye wear, and hearing protection.

To minimize the probability of multiple observers counting a single animal (and thereby potentially overestimating takes), sightings were tracked on a continuous basis by an observer on one monitoring platform, and then “handed off” to an observer if the animal(s) headed in the direction of another monitoring platform. Observers kept detailed sighting data and, whenever possible, indicated in their field notes if an animal was a re-sight.

Every attempt was made to protect marine mammals from Level A (injury) Harassment via the use of sound attenuation devices (during impact pile driving) and continuous monitoring of the behavioral harassment and near-field injury zones. Monitoring coverage of the Level A shutdown zone was consistently excellent. Coverage of the Level B (behavioral) harassment zone during vibratory pile driving/removal was good, but not 100%, due to the large area involved, the presence of construction barges and vessels, and the limited number of monitors. The efficacy of visual detection of marine mammals depended on several factors, including the observer's ability to detect the animal, the environmental conditions (visibility and sea state), and the position of the monitoring platforms. Given the location of the marine mammal monitors, the effectiveness in identifying an animal increased the closer such an animal was to the pile being driven. If a marine mammal was sighted within or approaching the shutdown zone during pile driving activities, pile driving operations would be halted.

Visual Monitoring Protocol

Marine mammal monitoring protocols for the BMP are detailed in **Appendix A**.

No injured, sick, or dead marine mammals were observed during marine mammal monitoring for the BMP.

Piles and Pile Driving Equipment

Pile Descriptions. During the BMP, 16 steel piles were driven by vibratory and impact hammers. Production piles ranged in diameter from 20 to 48 inches (0.51 to 1.22 m) (**Appendix C**). All 16 piles were driven with a vibratory hammer. Of these 16, three were subsequently driven with an impact hammer.

Pile Driving Equipment. Pile driving equipment was provided and operated by NOVA pile driving crews. One vibratory hammer (American Piledriving Equipment [APE] 400) and one impact hammer (APE D260) were used during the project.

The APE 400 has a drive force of 361 tons. The APE D260 impact hammer was rated for 644,963 foot-pounds (ft-lbs). A sound attenuation bubble curtain was utilized during all impact driving events.

Section 3 Results

The MC logged pile driving times and related construction activities for each pile, which served as the basis for marine mammal sightings data quality control (**Appendix D**).

Marine Mammal Sightings

Marine mammal sightings include those made during pile driving activities and those made during down time (non-construction periods). Observers typically surveyed for marine mammals during the entire construction day.

A total of 213 sightings of 257 individual animals were made during primary marine mammal surveys of the BMP (**Table 3; Appendix D**). Of the marine mammal species observed during the BMP, harbor seals were the most abundantly seen species. Most marine mammals sightings were of individual animals, with mean group sizes near one for all species observed.

Table 3. Total Number of Unique Animals and Sightings by Species

Species	Total # of Animals	Total # of Sightings	Mean Group Size
California Sea Lion	34	31	1.1
Harbor Seal	219	178	1.2
Unknown Marine Mammal	4	4	1
Total	**257**	**213**	1.2

Marine Mammal Sightings During Pile Installation and Removal Activities. Pile installation and removal activities included installation and removal by vibratory and impact hammers including soft start. Therefore, there were three types of construction: vibratory pile driving (V), impact pile driving (I), and soft start impact (SSI) pile driving. Soft starts were intended to provide an opportunity for nearby marine animals to voluntarily leave the area, and thus avoid

potential harassment or injury. Two marine mammal species were observed during pile driving: harbor seal, and California sea lion.

A total of 51 sightings of 67 marine mammals were made during marine mammal surveys of pile installation and removal activities (impact and vibratory pile driving; **Table 4).** Resightings are not included in this table. Harbor seals were the most frequently sighted species during impact and vibratory pile driving, accounting for 84% of all sightings. California sea lions were the only other marine mammal species observed during pile installation or removal, with 16% of all observations. No animals of any species were observed during soft start pile driving.

Table 4. Summary of Unique Marine Mammal Sightings During Pile Installation and Removal Activities (Primary Surveys)

Species	Total # of Animals	Total # of Sightings	Construction Type*	
			V	I
California Sea Lion	10	8	10	-
Harbor Seal	57	43	54	3
Total	**67**	**51**	**64**	**3**

*V= Vibratory Driving; I= Impact Driving

Observed Exposures (Takes)

Injury and behavioral harassment takes were calculated based on marine mammals sighted during impact and vibratory pile driving for the BMP. Takes were calculated by: (1) measuring sighting distance to the pile for all animals observed during pile driving activities; and (2) comparing this distance to underwater and airborne injury and behavioral harassment thresholds on a per-species and per-pile basis. Distance to pile was estimated (typically verified using laser rangefinders) and recorded by observers on field data sheets. Whenever possible, observers noted if an animal was likely a resighting (**Appendix D**) and communicated with nearby observers in the field to "hand off" sightings of the same animal(s). Takes are reported as the number of individuals observed and as the number of sightings within a given zone.

There were no sightings within the Level A Injury zone during the BMP. During pile driving activities, the closest marine mammal was sighted 55 m from the pile. The total number of observed Level B Harassment takes for marine mammal during the BMP is summarized in **Table**

5. Animal resightings are included in the table; that is, each resighting was treated as a take event, to provide a conservative estimate of takes.

Table 5. Summary of Observed Level B Harassment Takes

Species	Takes During Vibratory Driving	Takes During Impact Driving	Total Takes	Takes Per Day	Allowed Takes
California Sea Lion	11	-	11	1.22	220
Harbor Seal	63	4	67	7.22	340

No exceedances of any of the IHA-authorized (Incidental Harassment Authorization) Level B harassment take numbers occurred during the BMP (NMFS 2013). No killer whales were observed during construction (or at any other time) during the BMP.

Takes were also calculated on a per-pile basis (all sightings divided by the total number of production piles driven) and summarized in Table 6. Values are higher for harbor seals as expected, given their higher observed abundance in the construction area.

Table 6. Summary of Level B Harassment Takes Per Pile

Species	Takes Per Pile
California Sea Lion	0.69
Harbor Porpoise	-
Harbor Seal	4.13
Steller Sea Lion	-

Extrapolated Exposures (Takes)

The calculated behavioral harassment zone during vibratory pile driving, defined as the marine area within the average distance to the 120 dB isopleth during the BMP, covered 16.1 km^2. Only a subset of this area was consistently monitored (the area inside the Service Pier fence, or 0.3 km^2). It is therefore appropriate to estimate the number of potential Level B marine mammal takes that may have occurred in the ensonified, but unmonitored, zone. IHA application marine mammal density numbers were used to develop this extrapolation (DoN 2013b). Extrapolated takes were calculated by multiplying the IHA application estimated density of marine mammals observed (total sightings per km^2 per hour) by the total unmonitored area inside the Level B

harassment zone (15.8 km^2). This product was then multiplied by the total time (days) of vibratory pile driving during BMP to arrive at the estimated numbers of takes in the unmonitored zone (**Table 7**).

A summary of all observed and extrapolated takes during the BMP is provided in **Table 8.**

Table 7. Extrapolated Takes in the Unmonitored Area of the Level B Harassment Zone

Species	Density Estimate (lHA)a	Unmonitored Level B Harassment Zone (Area, km^2)	Abundance in the Unmonitored Area	Total Vibratory Driving Days	Extrapolated Takes (Estimated)
California Sea Lion	0.28	15.8	4.424	9	40
Harbor Porpoise	0.149		2.354		21
Harbor Seal	1.06		16.748		150
Transient Killer Whale	0.001		0.0158		-

a) Densities obtained from the Incidental Harassment Authorization Application (DoN 2013b)

Table 8. Summary of Observed and Extrapolated Takes

Species	Observed Takes - Vibratory Driving	Extrapolated Takes – Vibratory Driving	Observed Takes - Impact Driving	Total Takes	Allowed Takes
California Sea Lion	11	40	-	51	220
Harbor Porpoise	-	16	-	16	40
Harbor Seal	63	150	4	217	340
Transient Killer Whale	-	-	-	-	

Marine Mammal Mitigation Procedures: Construction Delays and Shutdowns

If a marine mammal was observed in or approaching the shutdown zone, ongoing construction was to be stopped, and imminent construction was to be delayed. During the BMP there were no construction shutdowns due to a marine mammal nearing or entering the shutdown zone during pile driving activities.

Marine Mammal Sightings and Environmental Conditions

Favorable weather persisted throughout construction, and shutdowns due to reduced visibility (i.e., rough water conditions or fog and rain) were not required at any time. Most marine mammal sightings were made in calm conditions with low wave height (Figures 3a and 3b). Approximately 95% of marine mammal sightings were made during Beaufort sea state (BSS) conditions of 0–1 (winds at or below 3 knots; see **Appendix A** for the Beaufort scale). All construction and marine mammal surveys occurred during sea states of BSS 4 (winds at or below 16 knots) or below. Favorable weather conditions (cloudy and sunny) occurred on 58% of construction days; 79% of all sightings occurred under those conditions. Weather that produced reduced visibility (fog and rain), but not to levels that substantively impeded monitoring, occurred on 42% of construction days; 21% of all sightings occurred under those conditions.

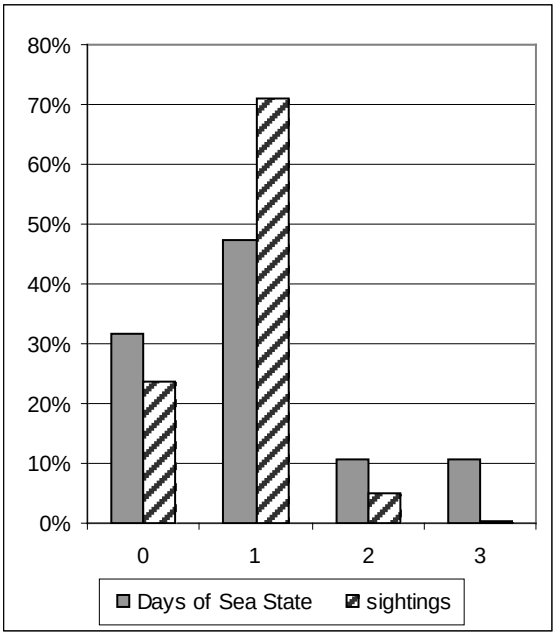


Figure 3a. Sightings by Sea State

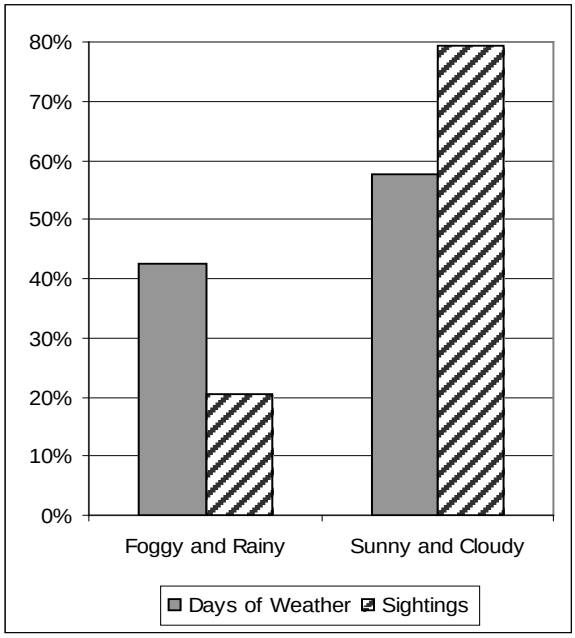


Figure 3b. Sightings by Weather Condition

Marine Mammal Behavior

Quantitative Analysis. Observers typically searched for marine mammals continuously. When animals were observed, data were recorded continuously from the beginning of pre-watch until the end of the monitoring effort for the day (see **Table 2** for a summary of the monitoring effort).

Behavior was recorded during both construction and non-construction periods (**Appendix D**). The number of observed animals and the number of observed behaviors is not necessarily the same due to: (1) instances where multiple animals were observed exhibiting the same behavior; and (2) situations where individual animals performed multiple behaviors during a single observation.

Surveys of the disturbance and shutdown zones occurred throughout the project, before, during and after all pile driving events. California sea lions and harbor seals were the most frequently observed marine mammal species observed during the project. There was one sighting of an unknown marine mammal hauled out on a float along the fence. This sighting did not occur during pile installation or removal. The observer recorded it as either a California or Steller sea lion. Although not a marine mammal, a North American beaver (*Castor canadensis)* was observed swimming the shoreline. In some instances, observers were not able to accurately identify marine mammals to species due to distance and the very short duration the animal was visible; these sightings are listed as unknown.

California Sea Lion. There were no California sea lions observed during pre-construction monitoring (**Figure 4a**). For behavioral observations during construction activities, California sea lions were frequently observed "swimming" (45%, n=28), "diving" (24%, n=15), "hauled out" (8%, n=5), and "travel" (8%, n=5). During post-construction monitoring, California sea lions were observed "swimming" (75%, n=3), and "diving" (25%, n=1).

When analyzed by specific construction event type, California sea lions were frequently observed "swimming" (49%, n=25), "diving" (25%, n=13), and "looking" (8%, n=4) during construction events other than pile driving (**Figure 4b**). During vibratory pile driving, California sea lions were most frequently observed "swimming" (40%, n=6), "diving" (20%, n=3), and traveling (13%, n=2). There were no California sea lions observed during soft start impact or impact driving.

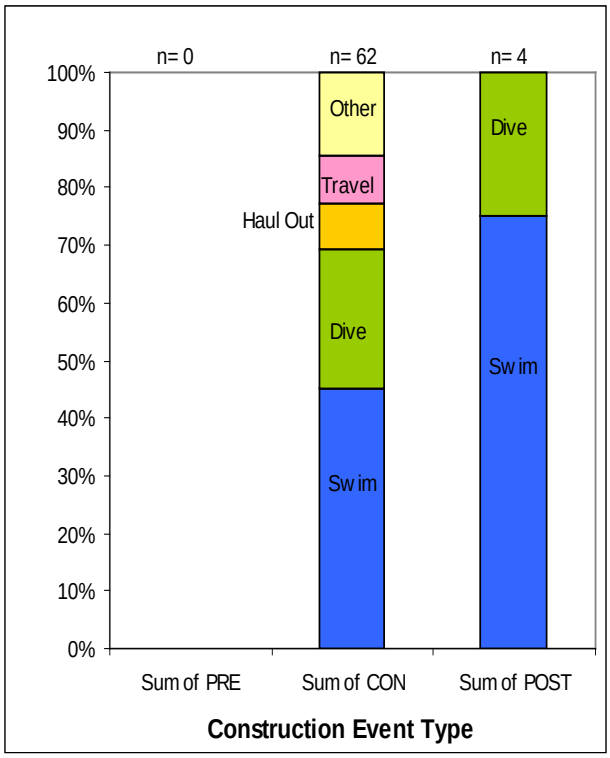
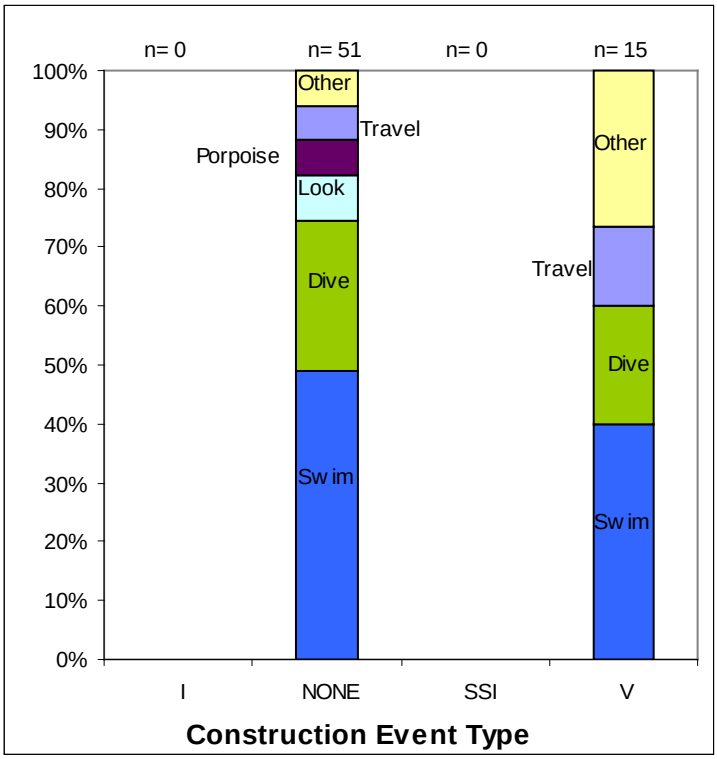


Figure 4a. California Sea Lion Behaviors Before, During and After Construction



I = Impact; SSI = Soft Start Impact; V = Vibratory

Figure 4b. California Sea Lion Behaviors By Construction Type

Harbor Seal. During pre-construction monitoring, harbor seals were most frequently observed "swimming" and "diving" (each 33%, n=2; **Figure 5a**). During construction, harbor seals were most frequently observed "swimming" (38%, n=223), "diving" (24%, n=140), "looking" (10%, n=56) and "milling" (9%, n=52). During post-construction monitoring, harbor seals were most frequently observed "swimming" (53%, n=9) and "diving" (29%, n=5).

When analyzed by construction event type, harbor seals were only observed "swimming" or "diving" (each, 50%, n=3) during impact pile driving (**Figure 5b**). Observations of harbor seals during soft-start impact construction periods were either "other" (50%, n=1), which in this particular case was resting, or diving (50%, n=1). During periods of non-construction activity, harbor seals were most frequently observed "swimming" (37%, n=171) and "diving" (23%, n=108). During vibratory pile driving, harbor seals were most frequently observed "swimming" (47%, n=60) and "diving" (28%, n=35).

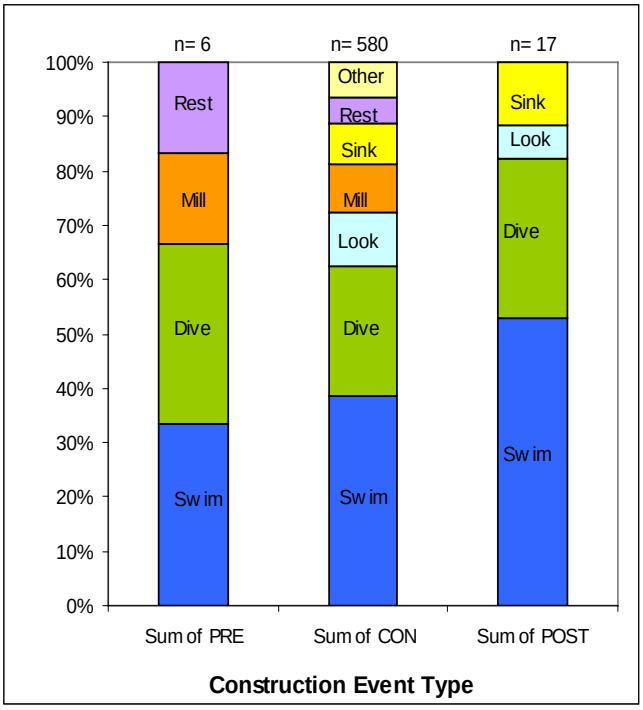
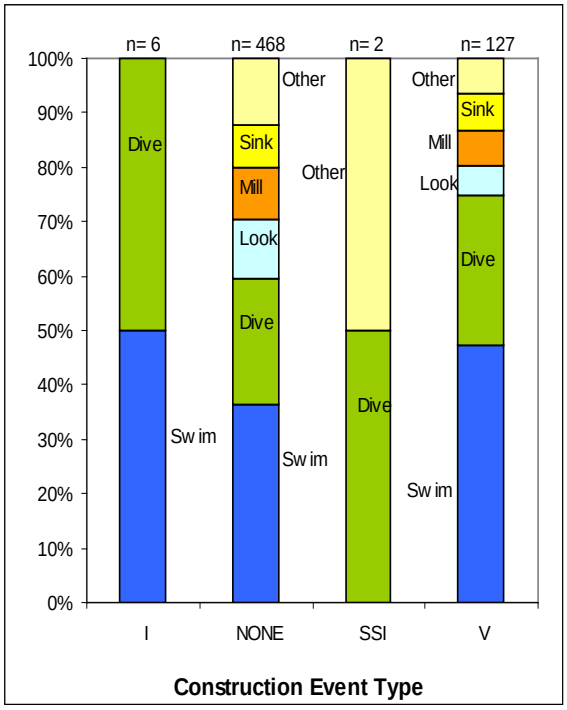


Figure 5a. Harbor Seal Behaviors Before, During, and After Construction



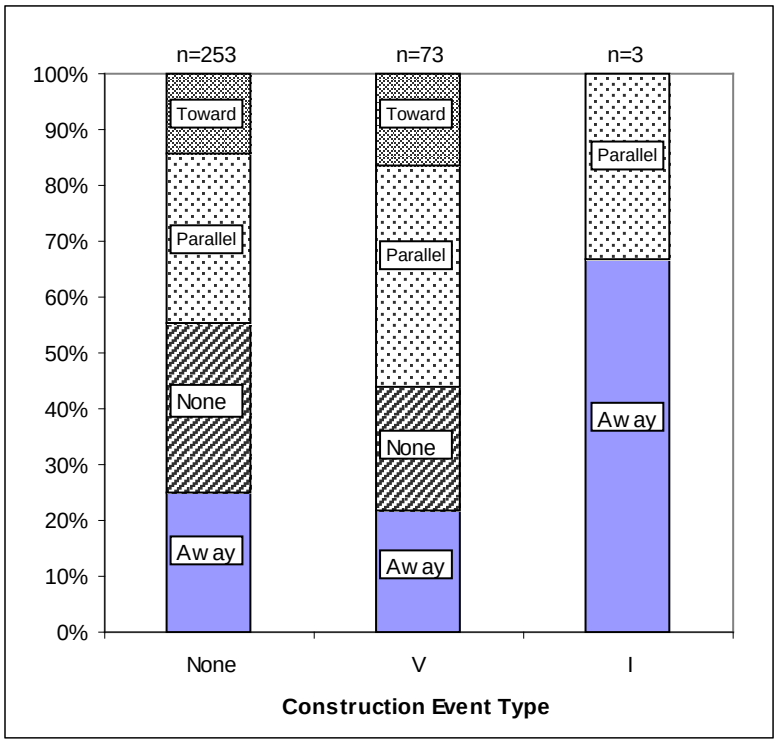
I = Impact; SSI = Soft Start Impact; V = Vibratory

Figure 5b. Harbor Seal Behaviors By Construction Type

Other Marine Mammals Sighted. Over the course of the monitoring project, observers were not able to identify the species for four marine mammal sightings. These sightings are all listed as "unknown" in the list of sightings (**Appendix D**). Three of these sightings were potentially individual harbor porpoise and the fourth was potentially a Steller or California sea lion. The three possible harbor porpoise sightings were made with the animals 100 m to 800 m from the observer. The cetacean sightings could have been sightings of Navy assets as mammal security boats were present within the secure area; however, the distances between the observer and the unknown cetaceans made positive identification difficult. The unknown pinniped was observed flushing from its haul out on the floats along the security fence during a non-construction period.

Summary of Quantitative Analysis. During periods of construction other than pile driving events, marine mammals were most frequently observed swimming parallel to or having no relative motion toward the pile (each 30%, n=77; **Figure 6**). During vibratory pile driving, marine mammals were most frequently observed moving parallel (40%, n=29). There was also a

slight increase in the percentage of animals that moved toward the pile during vibratory pile driving (16%, n=12) compared to non-pile driving periods (14%, n=36; **Figure 6**). There were only three sightings during impact driving events, and the animals were observed moving away (66%, n=2) or parallel (33%, n =1).



V = Vibratory; I = Impact

Figure 6. Relative Motion of Marine Mammals by Construction Event

California Sea Lion. California sea lion sightings in the disturbance zone were frequent, although there were no California sea lions observed during pre-construction monitoring. Observations made of this species during construction monitoring were frequently "swimming" and "diving." These two behaviors were also those exhibited the most during non-construction periods and vibratory pile driving activity.

Harbor Seal. Harbor seals were by far the most frequently sighted marine mammal species during the BMP. Harbor seals displayed a wide range of behaviors, but were more likely to be observed "swimming" than "diving" during construction monitoring periods. Harbor seal

observations during no-construction activity and vibratory pile driving were predominantly of "swimming" mammals, with the second most frequent being "diving" behavior.

Qualitative Behavioral Observations. MMOs made a number of qualitative observations on the movements and distribution of animals, and on the potential effects of pile driving activities on marine mammal behavior during the BMP. Understanding that subjective observations can be a useful adjunct to quantitative measurements, the MMOs were asked on a daily basis whether they had observed any behaviors consistent with injury, distress, or high speed flight from the construction area. For the BMP, observers did not report any such observations. In many cases, individual animals did not exhibit any change in behavior with the onset of pile driving. Based on these qualitative observations, the MMOs generally felt that the behaviors of harbor seals and California sea lions did not indicate adverse reaction to in-water construction activities. This is consistent with the quantitative analysis presented above.

Section 4 Recommendations

1. There were four sightings where observers were not able to identify the species of the marine mammal. The observers that sighted these animals thought that they could potentially be harbor porpoise and a Steller sea lion. To accurately identify these sightings for future projects in the area, it may be beneficial to have a vessel stationed on the west side of the Service Pier to reduce the distance to these animals.
2. There was a large amount of overlap between the observation areas of the landward pier-based MMO and the MC. It may have been more effective to have this MMO walk a transect along the Service Pier, stopping intermittently to survey areas of the waterfront.

Section 5 List of Preparers

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Section 6 References

Department of Navy (DoN), 2013a. Marine Mammal Monitoring Plan. Construction of Barge Mooring, Naval Base Kitsap, Bangor. Silverdale, Washington.

DoN, 2013b. Incidental Harassment Authorization Application for the U.S. Navy Barge Mooring Project Conducted on Naval Base Kitsap, Bangor. Silverdale, Washington.

National Marine Fisheries Service (NMFS), 2013. Incidental Harassment Authorization to Naval Base Kitsap Bangor to harass marine mammals incidental to a barge mooring project in the Hood Canal, Washington. Issued July 10, 2013.

APPENDIX A

Marine Mammal Monitoring Plan
Construction of Barge Mooring
Naval Base Kitsap, Bangor

Marine Mammal Monitoring Plan

Construction of Barge Mooring
Naval Base Kitsap, Bangor

Prepared for: Commander Submarine Development Squadron FIVE

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1 Introduction

The United States Navy (Navy), Commander Submarine Development Five (CSDS-5) will install mooring for a new research barge at the Naval Base Kitsap, Bangor Service Pier. Up to 20 steel piles ranging in size from 18-inch diameter to 48-inch diameter are required to efficiently moor a new larger research barge equipped with upgraded technology necessary for CSDS-5 to continue their mission. These piles would also support the relocation of existing Port Operations mooring floats to the south side of the Service Pier trestle. These actions will collectively be referred to as the Barge Mooring Project.

The purpose of this plan is to provide protocol for marine mammal monitoring that will occur during vibratory and impact pile driving scheduled to occur over approximately 20 days between July16 and September 30, 2013. Visual monitoring will be conducted before, during and after pile driving activities within areas that are estimated to exceed thresholds for marine mammal injury and disturbance. A shutdown zone will be monitored to preclude physical harm to marine mammals. This monitoring plan was developed in coordination with the National Marine Fisheries Service (NMFS) to ensure compliance with the incidental harassment authorization (IHA) issued for the in-water construction of the Barge Mooring Project.

2 Project Location

The location of the Barge Mooring Project is on the eastern side of the Naval Base Kitsap, Bangor Service Pier.

The calculated distances to the underwater thresholds and area exceeding the threshold during pile driving 48-inch piles during the project is shown Table 1. Table 2 lists the distances and areas exceeding airborne thresholds. Figures depicting a graphic representation of the areas exceeding the thresholds at the project site due to pile driving are presented in the Barge Mooring project IHA application.

Table 1: Calculated Distance(s) to and Area(s) Encompassed by the Underwater Marine Mammal Noise Thresholds during Pile Driving 48-inch Steel Piles

Species	Threshold	Distance in (m)	Distance in (km)	Actual Area in (km^2)
Pinnipeds	Vibratory Driving Injury (190 dB rms)	1	0.001	0.00000314
Cetaceans	Vibratory Driving Injury (180 dB rms)	3	0.003	0.0000283
All Marine Mammals	Vibratory Driving Disturbance (120 dB rms)	29,286*	29.286	16.1
Pinnipeds	Impact Driving Injury (190 dB rms)	7	0.007	0.000154
Cetaceans	Impact Driving Injury (180 dB rms)	34	0.034	.00363
All Marine Mammals	Impact Driving Disturbance (160 dB rms)	736	0.736	1.702

All sound levels expressed in dB re 1 µPa rms. dB = decibel; rms = root-mean-square; µPa = microPascal; Practical spreading loss (15 log, or 4.5 dB per doubling of distanced) used for calculations. Sound pressure levels used for calculations were: 196 dB rms re1 µPa @ 10m for impact and 172 dB rms re1 µPa @ 10m for vibratory. 8 db of attenuation was applied to source sound pressure levels. *Range calculated is greater than what would be realistic. Hood Canal average width at site is 2.4 km, and is fetch limited from N to S at 20.3 km.

Table 2: Calculated Distances (m) to and the Area(s) Encompassed by the Marine Mammal Airborne Noise Thresholds from Pile Driving 48-inch Steel Piles

Species	Threshold	Airborne Behavioral Disturbance		
		Distance (m)	Distance (km)	Area (km^2)
Pinnipeds (except harbor seal)	100 dB rms (vibratory disturbance)	19	0.019	0.001134
Harbor seal	90 dB rms (vibratory disturbance)	60	0.06	0.01131
Pinnipeds (except harbor seal)	100dB rms (impact disturbance)	42	0.042	0.005542
Harbor seal	90 dB rms (impact disturbance)	134	0.134	0.05641

All sound pressure levels are reported re 20 µPa rms (unweighted). Airborne ranges based on a spherical spreading model

3 Methods

3.1 Observer Qualifications

Monitoring will be conducted by qualified, trained marine mammal observers (MMOs). All MMOs will be biologists with prior training and experience in conducting marine mammal monitoring or surveys, and who have the ability to identify marine mammal species and describe relevant behaviors that may occur in proximity to in-water construction activities. MMOs 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 pile driver operator. The MMOs will have no other construction related tasks while conducting monitoring.

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

3.2 Data Collection

MMOs will use a NMFS-approved Marine Mammal Sighting Form (Appendix A) which will be completed by each observer for each survey day. The following information will be collected on the sighting form.

- The date and time that pile driving begins and ends and method of installation will be recorded for each pile.
- Time and duration of marine mammal sighting.
- Construction activities occurring during each marine mammal 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) during each sighting. 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.
- Occurrence of pile driving delay or shutdown due to marine mammal presence in shutdown zones.
- 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 also complete a Marine Mammal Monitoring Summary 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.

3.3 Equipment

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

- Hand-held GPS units;
- Hearing protection for biologists and boat operators working near heavy construction equipment;
- Portable marine radios and headsets for the observers to communicate with the monitoring coordinator, construction contractor, and other observer(s);
- Cellular phones, without a camera (one per boat/observing location), and the contact information for the other observer(s), monitoring coordinator, and NMFS point of contact;
- Green flags (one per boat/observing location) as back-up for radio communication;
- Red flags (one per boat/observing location) as back-up for radio communication;
- Nautical charts;
- Daily tide tables for the project area within the Hood Canal;
- Watch or Chronometer;
- Binoculars with built-in rangefinder or reticles – (quality 7 x 50 or better);
- 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;
- Large zip-lock bags;
- Clipboard;
- Pen / Pencil;
- If boat based monitors are used, a survey boat (with flying bridge for elevated observations) will include:
  - covered cabin areas to keep electrical equipment dry,
  - a fixed marine VHF radio,
  - depth finder,
  - measuring tape,
  - navigational plotting equipment,
  - both fixed and hand-held GPS Units,

- and all safety equipment as required by U.S. Coast Guard regulations.

3.4 Shutdown and Disturbance Zones

The acoustic modeling results are presented within the IHA request. Acoustic zones of influence vary between the different diameter piles and type of pile driver (impact or vibratory). The Navy established monitoring zones – shutdown and disturbance zones - based on the maximum zone of influence for all pile driving activities.

Shutdown Zone

The shutdown zone shall include all areas where the underwater sound pressure levels (SPLs) are anticipated to equal or exceed the Level A (injury) Harassment criteria for marine mammals (180 dB isopleths for cetaceans; 190 dB isopleths for pinnipeds). For impact and vibratory pile installation and removal, monitoring will be conducted within a 10 meter shutdown zone (Level A harassment) surrounding each pile for the presence of pinnipeds before, during, and after pile operations. The shutdown zone for cetaceans is 34 meters; however cetaceans are not expected to occur in this area due to the presence of the floating security fence.

Disturbance Zone

A disturbance zone will be monitored within the floating security fence where underwater sound pressure levels are estimated to exceed the 160 dB rms behavioral disturbance zone during impact pile driving and the120 dB rms behavioral disturbance zone during vibratory pile driving. Construction would continue if animals sighted within this zone; however their presence and behavior would be documented and the other MMOs would be notified of their proximity to the injury zone and their direction of travel if possible. Should any marine mammal approach or enter the shutdown down, all work would be halted until it has left the injury zone or 30 minutes has passed without redetection of the animal.

3.5 Observer Monitoring Locations

In order to effectively monitor the shutdown and disturbance zones, marine mammal observers will be positioned at the best practicable vantage point(s), taking into consideration security, safety, and space limitations at the waterfront, in order to properly monitor these zones. A minimum of three MMOs are anticipated to be present during all pile driving activities. The exact positioning of the MMOs will vary dependent upon the location of the piles being driven.

Two MMOs will be located at different locations on the Service Pier, the floating Port Operations piers, a small vessel, or the pile driving barge in the locations that would provide adequate visual coverage of the shutdown and disturbance zones. One of these observers will be solely dedicated to monitoring the 10 meter zone. The other observer would be placed to maximize coverage of the disturbance zone on the land side of the Service Pier.

An additional MMO will be stationed on the Hood Canal side (northwest side) of the Service Pier to monitor the disturbance zone. Visibility during the project timeframe is expected to be good and it is anticipated that the MMO will be able to adequately monitor the area within the floating security fence.

Figure 1 depicts representative location of the three MMO monitors during pile driving.

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Naval Base Kitsap, Bangor Barge Mooring Project

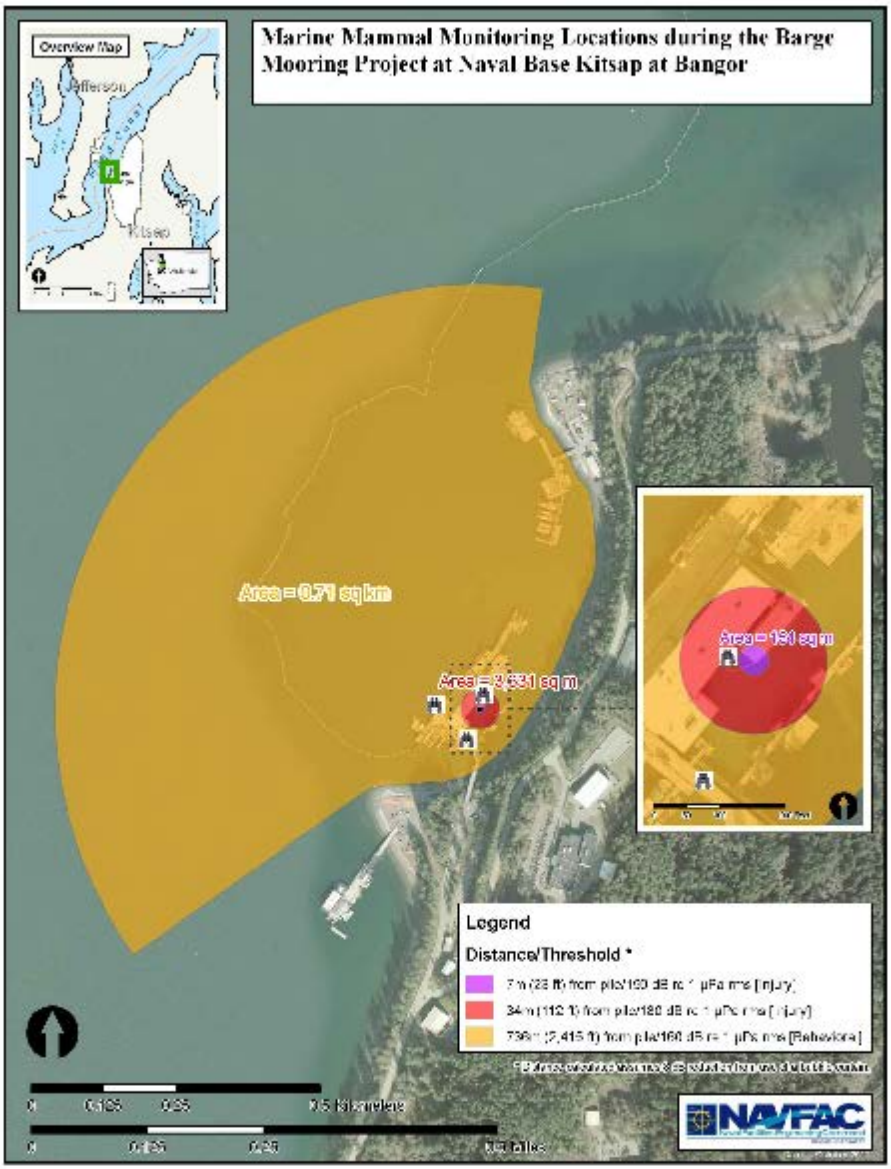

Figure 1. Representative Marine Mammal Observer Locations during Pile Driving

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Marine Mammal Monitoring Plan

3.6 Monitoring Techniques

It should be recognized that although marine mammals will be protected from Level A (injury) harassment by the utilization of a sound attenuation devices and observers monitoring the near-field injury zones, mitigation will not be one hundred percent effective at all times in locating marine mammals within the disturbance zone (Level B [behavioral] harassment zone). This is largely due to the size of the disturbance zone area. However, 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. Monitoring of the shutdown and disturbance zones will take place from 15 minutes prior to initiation through 30 minutes post-completion of all pile installation and removal activities.

3.6.1 Visual Survey Protocol – Pre-Activity Monitoring

The shutdown zone will be monitored for 15 minutes prior to commencing pile driving using the following survey methodology:

- If marine mammal(s) are present within or approaching the shutdown zone prior to pile driving, the start of pile installation/removal 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 the shutdown zone (i.e., the zone is deemed clear of marine mammals), the observers will raise a green flag and radio the monitoring coordinator/construction contractor that pile driving activities can commence.
- If marine mammal(s) are present within the disturbance 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 disturbance zone.
- In case of fog or reduced visibility, 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.

3.6.2 Visual Survey Protocol – During Activity Monitoring

The shutdown and disturbance zones will be monitored throughout all pile driving activities using the following survey methodology:

- If a marine mammal is observed within or entering the disturbance zone during pile driving exposure 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, at which point all pile driving activities will be halted. The observers shall immediately radio to alert the monitoring coordinator/construction contractor and raise a red flag. This action will require an immediate "all-stop" on pile operations.
- However, under certain construction circumstances where initiating the shutdown and clearance procedures (which could include a delay of 15 min or more) would result in an imminent concern for human safety the shutdown provision may be waived.
- Once a shutdown has been initiated, pile driving activities 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.

- Once marine mammals are no longer detected within the shutdown zone (i.e., the zone is deemed clear of marine mammals), the observer will raise a green flag and radio the monitoring coordinator/construction contractor that activities can re-commence;
- If marine mammals are detected outside the shutdown zone, the observers will continue to monitor these individuals and record their behavior, but pile driving and other in-water construction may proceed. Any marine mammals detected outside the shutdown zone after pile driving is initiated shall likewise continue to be monitored and their behaviors recorded.

3.6.3 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 in Section 4.0 should be following regarding notifying the appropriate authorities. Survey results will be recorded on the Marine Mammal Sighting form (Appendix A).

4 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 N0l1hwest 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 MMPA 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.

5 Monitoring Reports

A draft report will be sent to NMFS within 90 working days of the completion of marine mammal monitoring. A final report will be prepared and submitted to the NMFS within 30 working days following receipt of comments on the draft report from the 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

- 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 shutdown was or was not 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 and if they occurred before or after implementation of the soft start.
    - Distance to the animal from the source during soft start.
  - If possible, the correlation to underwater or airborne sound levels occurring at the time of this observable behavior.
  - Actions performed to minimize impacts to marine mammals.
  - Times when pile extraction 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 safety zones.
  - A refined take estimate based on the number of marine mammals observed during the course of construction.

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Appendix A: Marine Mammal Sighting Form and Marine Mammal Monitoring Summary Form

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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 o	m or km	/ / __ calves	opening closing parallel none Behavior Code:	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 o	m or km	/ / __ calves	opening closing parallel none Behavior Code:	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 o	m or km	/ / __ calves	opening closing parallel none Behavior Code:	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 o	m or km	/ / __ calves	opening closing parallel none Behavior Code:	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 o	m or km	/ / __ calves	opening closing parallel none Behavior Code:	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 o	m or km	/ / __ calves	opening closing parallel none Behavior Code:	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	

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 Form last revised October 10, 2012. POC-DoN, NAVFAC NW, Balla Holden

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Marine Mammal Monitoring Plan

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

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
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
OTH	Other

Mitigation Codes

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

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 the total glare of observers' area of responsibility. Determine if observer coverage is covering 90 degrees or 180 degrees and document daily. Then assess total glare for that area. This will provide needed information on 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 or swell, but in inland waters the wave height (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.

Daily Marine Mammal Monitoring Summary Form	Date:
Project: Barge Mooring Project-Naval Base Kitsap, Bangor	
Location: Naval Base Kitsap, Bangor Service Pier	
Construction Start Date:	
Construction Activities Completed: *Brief text summarizing daily construction activities that required marine mammal monitoring. Include any delays and the cause of the delay. The purpose is to provide an update on the project's progress. Example text- Work resumed today after a two day delay due to equipment failur0e. Two 24-inch piles were installed using vibratory methods. One these piles required proofing with the impact hammer.*	

Activities Monitored	Number	Size	Daily Total	Total Completed	Number Remaining
Steel Pile installation-Vibratory					
Steel Pile Installation- Impact					
Steel Pile Removal-Vibratory					

Marine Mammal Monitoring								
Date	Species	# of Individuals sighted	# in Disturbance Zone	# in Shutdown zone	# Mitigation Delays / Shutdowns	If Shut down- How far was each animal when shutdown occurred?	Activity Type (Impact or Vibratory)	Behavior before/during/after Shutdown

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Marine Mammal Monitoring Plan

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 SS	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.	

Beaufort SS	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.	

Beaufort SS	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 Form

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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:	

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Marine Mammal Monitoring Plan

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:	
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 B

Marine Mammal Sighting Form and Data Codes

Marine Mammal Observation Record Form

Lat: _____ **Long:** _____ **Page** ____ **of** ____

Project Name: _____ **Monitoring Location:** _____

Observer: _____ (Pier Location, Vessel-Based, Land Location, other) **Time Effort Initiated:** _____

Date: _____ **Vessel Name:** _____ **Time Effort Completed:** _____

Sighting Data

Event Code	Pile Number	Sighting Number (1 or 1.1 if resight)	Start/End time	Sighting cue	Species	Dist/Dir to Animal (from Observer) (m)	Dist to Pile (btwn animal & pile) (m)	# of Animals Group Size (best/min/max) # of Juveniles	Relative (to pile) Motion/Behavior Code (see code sheet)	Const Type During Sighting	Mitigation Type?	Visibility	% Glare	Weather Cond	Sea State and Wave Ht	Swell Dir	Behavior Change/Response to Activity/Comments
CON PRE POST WC MD MS			: : : :					/ / ___ juveniles	away toward parallel none	SSV SSI V I DB ST None OTHER	DE SD None	B P M G E			0-3ft 4-6ft 6+ft	N S W E	
CON PRE POST WC MD MS			: : : :					/ / ___ juveniles	away toward parallel none	SSV SSI V I DB ST None OTHER	DE SD None	B P M G E			0-3ft 4-6ft 6+ft	N S W E	
CON PRE POST WC MD MS			: : : :					/ / ___ juveniles	away toward parallel none	SSV SSI V I DB ST None OTHER	DE SD None	B P M G E			0-3ft 4-6ft 6+ft	N S W E	
CON PRE POST WC MD MS			: : : :					/ / ___ juveniles	away toward parallel none	SSV SSI V I DB ST None OTHER	DE SD None	B P M G E			0-3ft 4-6ft 6+ft	N S W E	
CON PRE POST WC MD MS			: : : :					/ / ___ juveniles	away toward parallel none	SSV SSI V I DB ST None OTHER	DE SD None	B P M G E			0-3ft 4-6ft 6+ft	N S W E	
CON PRE POST WC MD MS			: : : :					/ / ___ juveniles	away toward parallel none	SSV SSI V I DB ST None OTHER	DE SD None	B P M G E			0-3ft 4-6ft 6+ft	N S W E	
CON PRE POST WC MD MS			: : : :					/ / ___ juveniles	away toward parallel none	SSV SSI V I DB ST None OTHER	DE SD None	B P M G E			0-3ft 4-6ft 6+ft	N S W E	
CON PRE POST WC MD MS			: : : :					/ / ___ juveniles	away toward parallel none	SSV SSI V I DB ST None OTHER	DE SD None	B P M G E			0-3ft 4-6ft 6+ft	N S W E	

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

Sighting Codes

(Sighting Cue & 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, flipper, 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)"]
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 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

Event Codes

Code	Activity Type
CON	Construction
PRE	Pre Watch
POST	Post Watch
WC	Weather Change
MD	Mitigation Delay
MS	Mitigation Shutdown

Marine Mammal Species

Code	Species
CASL	California Sea Lion
HSEA	Harbor Seal
STSL	Steller Sea Lion
HPOR	Harbor Porpoise
DPOR	Dall's Porpoise
ORCA	Orca
HUMP	Humpback Whale
UNLW	Unknown Large Whale
OTHR	Other
UNKW	Unknown

Construction Type

Code	Activity Type
SSV	Soft Start (Vibratory)
SSI	Soft Start (Impact)
V	Vibratory Pile Driving
I	Impact Pile Driving
DB	Dead Blow
ST	Stabbing
NONE	No Pile Driving
OTH	Other

Mitigation Codes

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

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 the total glare of observers' area of responsibility. This will provide needed information on what percentage of the field of view was poor due to glare.

Weather conditions

Code	Species
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 or swell, but in inland waters the wave height (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 C

All In-Water Noise-Producing Events During the Barge Mooring Project

Appendix C
All In-Water Noise-Producing Events during the Barge Mooring Project

	Impact pile driving construction event
	Soft start impact pile driving event
	Vibratory construction event

Date	Latitude	Longitude	Time Effort Initiated (hh:mm)	Time Effort Completed (hh:mm)	Event Code	Pile Number	Start Time	End Time	Const Type	Comments
9/14/2013	47.73112	122.7412	10:15	16:57	PRE	NA	10:15:00	10:30:00	NONE	
9/14/2013	47.73112	122.7412	10:15	16:57	CON	VO-01	15:51:40	16:19:09	V	Broke off pile
9/14/2013	47.73112	122.7412	10:15	16:57	CON	VO-01	16:25:57	16:27:39	V	
9/14/2013	47.73112	122.7412	10:15	16:57	POST	NA	16:27:00	16:57:00	NONE	
9/16/2013	47.73112	122.7412	13:00	17:10	PRE	NA	13:00:00	13:15:00	NONE	
9/16/2013	47.73112	122.7412	13:00	17:10	CON	P20-3	16:14:18	16:15:34	V	
9/16/2013	47.73112	122.7412	13:00	17:10	CON	P20-3	16:16:24	16:17:17	V	
9/16/2013	47.73112	122.7412	13:00	17:10	CON	P20-3	16:18:55	16:21:04	V	
9/16/2013	47.73112	122.7412	13:00	17:10	CON	P20-3	16:22:59	16:26:37	V	
9/16/2013	47.73112	122.7412	13:00	17:10	CON	P20-3	16:31:06	16:39:53	V	
9/16/2013	47.73112	122.7412	13:00	17:10	POST	NA	16:40:00	17:10:00	NONE	
9/17/2013	47.73112	122.7412	7:30	17:30	PRE	NA	7:30:00	7:45:00	NONE	
9/17/2013	47.73112	122.7412	7:30	17:30	CON	P20-4	8:48:57	8:50:02	V	
9/17/2013	47.73112	122.7412	7:30	17:30	CON	P20-4	8:52:27	8:54:35	V	
9/17/2013	47.73112	122.7412	7:30	17:30	CON	P20-4	8:55:00	9:16:44	V	
9/17/2013	47.73112	122.7412	7:30	17:30	CON	P20-4	9:18:42	9:33:03	V	
9/17/2013	47.73112	122.7412	7:30	17:30	CON	P20-1	11:44:49	11:45:13	V	
9/17/2013	47.73112	122.7412	7:30	17:30	CON	P20-1	13:03:03	13:05:34	V	
9/17/2013	47.73112	122.7412	7:30	17:30	CON	P20-1	13:06:29	13:09:39	V	
9/17/2013	47.73112	122.7412	7:30	17:30	CON	P20-1	13:10:49	13:16:54	V	
9/17/2013	47.73112	122.7412	7:30	17:30	CON	P20-1	13:20:59	13:35:11	V	
9/17/2013	47.73112	122.7412	7:30	17:30	CON	P20-2	16:25:05	16:26:54	V	
9/17/2013	47.73112	122.7412	7:30	17:30	CON	P20-2	16:34:57	16:38:16	V	

Date	Latitude	Longitude	Time Effort Initiated (hh:mm)	Time Effort Completed (hh:mm)	Event Code	Pile Number	Start Time	End Time	Const Type	Comments
9/17/2013	47.73112	122.7412	7:30	17:30	CON	P20-2	16:38:48	16:43:32	V	
9/17/2013	47.73112	122.7412	7:30	17:30	CON	P20-2	16:46:42	17:00:53	V	
9/17/2013	47.73112	122.7412	7:30	17:30	POST	NA	17:00:00	17:30:00	NONE	
9/18/2013	47.73112	122.7412	7:40	16:59	PRE	NA	7:40:00	7:55:00	NONE	
9/18/2013	47.73112	122.7412	7:40	16:59	CON	P2	8:38:44	8:39:33	V	
9/18/2013	47.73112	122.7412	7:40	16:59	CON	P2	8:42:47	8:44:45	V	
9/18/2013	47.73112	122.7412	7:40	16:59	CON	P2	8:45:49	8:55:38	V	
9/18/2013	47.73112	122.7412	7:40	16:59	CON	P2	8:58:51	9:04:32	V	
9/18/2013	47.73112	122.7412	7:40	16:59	CON	P2	9:07:19	9:36:55	V	
9/18/2013	47.73112	122.7412	7:40	16:59	CON	P3	13:38:10	13:38:54	V	
9/18/2013	47.73112	122.7412	7:40	16:59	CON	P3	13:44:53	13:46:51	V	
9/18/2013	47.73112	122.7412	7:40	16:59	CON	P3	13:50:30	13:58:19	V	
9/18/2013	47.73112	122.7412	7:40	16:59	CON	P3	14:01:30	14:22:57	V	
9/18/2013	47.73112	122.7412	7:40	16:59	CON	P4	15:48:54	15:49:44	V	
9/18/2013	47.73112	122.7412	7:40	16:59	CON	P4	15:51:16	15:55:53	V	
9/18/2013	47.73112	122.7412	7:40	16:59	CON	P4	15:58:43	16:29:44	V	
9/18/2013	47.73112	122.7412	7:40	16:59	POST	NA	16:29:00	16:59:00	NONE	
9/19/2013	47.73112	122.7412	7:35	17:14	PRE	NA	7:35:00	7:50:00	NONE	
9/19/2013	47.73112	122.7412	7:35	17:14	CON	P6	8:37:24	8:37:55	V	Hammer slipped off
9/19/2013	47.73112	122.7412	7:35	17:14	CON	P6	9:21:28	9:21:38	V	Hammer slipped off
9/19/2013	47.73112	122.7412	7:35	17:14	CON	P6	9:52:43	9:52:47	V	
9/19/2013	47.73112	122.7412	7:35	17:14	CON	P6	9:55:32	9:55:41	V	
9/19/2013	47.73112	122.7412	7:35	17:14	CON	P6	9:56:14	9:56:18	V	
9/19/2013	47.73112	122.7412	7:35	17:14	CON	P6	9:56:25	9:56:30	V	
9/19/2013	47.73112	122.7412	7:35	17:14	CON	P6	9:57:27	9:57:31	V	
9/19/2013	47.73112	122.7412	7:35	17:14	CON	P6	9:57:42	9:57:46	V	
9/19/2013	47.73112	122.7412	7:35	17:14	CON	P6	9:59:20	9:59:30	V	
9/19/2013	47.73112	122.7412	7:35	17:14	CON	P6	10:01:12	10:03:30	V	
9/19/2013	47.73112	122.7412	7:35	17:14	CON	P6	10:05:43	10:07:24	V	
9/19/2013	47.73112	122.7412	7:35	17:14	CON	P6	10:09:08	10:12:03	V	
9/19/2013	47.73112	122.7412	7:35	17:14	CON	P6	10:15:30	10:21:24	V	

Date	Latitude	Longitude	Time Effort Initiated (hh:mm)	Time Effort Completed (hh:mm)	Event Code	Pile Number	Start Time	End Time	Const Type	Comments
9/19/2013	47.73112	122.7412	7:35	17:14	CON	P5	12:04:19	12:07:35	V	
9/19/2013	47.73112	122.7412	7:35	17:14	CON	P5	12:08:40	12:13:34	V	
9/19/2013	47.73112	122.7412	7:35	17:14	CON	P5	12:14:12	12:16:05	V	
9/19/2013	47.73112	122.7412	7:35	17:14	CON	P5	12:19:54	12:21:32	V	
9/19/2013	47.73112	122.7412	7:35	17:14	CON	P5	12:22:27	12:47:42	V	
9/19/2013	47.73112	122.7412	7:35	17:14	CON	P1	15:55:22	15:58:26	V	
9/19/2013	47.73112	122.7412	7:35	17:14	CON	P1	16:03:37	16:05:22	V	
9/19/2013	47.73112	122.7412	7:35	17:14	CON	P1	16:07:44	16:20:06	V	
9/19/2013	47.73112	122.7412	7:35	17:14	CON	P1	16:31:00	16:44:32	V	
9/19/2013	47.73112	122.7412	7:35	17:14	POST	NA	16:44:00	17:14:45	NONE	
9/20/2013	47.73112	122.7412	6:29	9:29	PRE	NA	6:29:00	6:44:00	NONE	
9/20/2013	47.73112	122.7412	6:29	9:29	PRE	NA	6:30:09	6:45:16	NONE	
9/20/2013	47.73112	122.7412	6:29	9:29	CON	P24-2	6:44:48	6:44:50	V	
9/20/2013	47.73112	122.7412	6:29	9:29	CON	P24-2	6:44:53	6:46:52	V	
9/20/2013	47.73112	122.7412	6:29	9:29	CON	P24-2	6:47:45	6:48:45	V	vibe out
9/20/2013	47.73112	122.7412	6:29	9:29	CON	P24-2	6:49:14	6:49:30	V	vibe out
9/20/2013	47.73112	122.7412	6:29	9:29	CON	P24-2	6:57:43	6:58:55	V	
9/20/2013	47.73112	122.7412	6:29	9:29	CON	P24-2	6:59:50	7:01:39	V	
9/20/2013	47.73112	122.7412	6:29	9:29	CON	P24-3	7:43:50	7:45:55	V	
9/20/2013	47.73112	122.7412	6:29	9:29	CON	P24-3	7:48:03	7:49:17	V	
9/20/2013	47.73112	122.7412	6:29	9:29	CON	P24-1	8:52:56	8:55:39	V	
9/20/2013	47.73112	122.7412	6:29	9:29	CON	P24-1	8:57:59	8:58:26	V	
9/20/2013	47.73112	122.7412	6:29	9:29	POST	NA	8:59:00	9:29:00	NONE	
9/23/2013	47.73112	122.7412	8:00	16:49	PRE	NA	8:00:00	8:15:00	NONE	
9/23/2013	47.73112	122.7412	8:00	16:49	CON	C1	9:21:59	9:34:58	NONE	diver in water, cutting torch not working
9/23/2013	47.73112	122.7412	8:00	16:49	CON	C1	9:37:06	9:41:56	NONE	diver in water, cutting torch not working
9/23/2013	47.73112	122.7412	8:00	16:49	CON	C1	9:56:09	10:01:23	NONE	diver in water, cutting torch not working

Date	Latitude	Longitude	Time Effort Initiated (hh:mm)	Time Effort Completed (hh:mm)	Event Code	Pile Number	Start Time	End Time	Const Type	Comments
9/23/2013	47.73112	122.7412	8:00	16:49	CON	C1	10:09:19	10:12:55	NONE	diver in water, cutting torch not working
9/23/2013	47.73112	122.7412	8:00	16:49	CON	C1	10:27:14	11:21:11	NONE	diver in water, cutting on and off
9/23/2013	47.73112	122.7412	8:00	16:49	CON	C1	11:24:02	11:25:14	NONE	dead pull
9/23/2013	47.73112	122.7412	8:00	16:49	CON	C2	12:24:01	13:04:31	NONE	diver in water, cutting on and off
9/23/2013	47.73112	122.7412	8:00	16:49	CON	C2	13:08:12	13:18:03	NONE	Dead pull
9/23/2013	47.73112	122.7412	8:00	16:49	CON	C3	13:45:12	14:36:44	NONE	diver in water, cutting on and off
9/23/2013	47.73112	122.7412	8:00	16:49	CON	C3	14:43:13	14:54:39	NONE	dead pull
9/23/2013	47.73112	122.7412	8:00	16:49	CON	C4	15:20:18	16:16:11	NONE	diver in water, cutting on and off
9/23/2013	47.73112	122.7412	8:00	16:49	CON	C4	16:17:34	16:19:06	NONE	dead pull
9/23/2013	47.73112	122.7412	8:00	16:49	POST	NA	16:19:00	16:49:00	NONE	
9/24/2013	47.73112	122.7412	7:05	18:10	PRE	NA	7:05:00	7:20:00	NONE	
9/24/2013	47.73112	122.7412	7:05	18:10	CON	C5	7:48:39	8:18:40	NONE	diver in water, cutting on and off
9/24/2013	47.73112	122.7412	7:05	18:10	CON	C5	8:20:27	8:23:06	NONE	dead pull
9/24/2013	47.73112	122.7412	7:05	18:10	CON	C6	8:30:59	9:02:13	NONE	diver in water, cutting on and off
9/24/2013	47.73112	122.7412	7:05	18:10	CON	C6	9:02:14	9:03:38	NONE	dead pull
9/24/2013	47.73112	122.7412	7:05	18:10	CON	C7	9:29:35	9:43:43	NONE	diver in water, cutting on and off
9/24/2013	47.73112	122.7412	7:05	18:10	CON	C7	9:44:13	9:58:27	NONE	diver in water, cutting on and off
9/24/2013	47.73112	122.7412	7:05	18:10	CON	C7	10:00:23	10:10:31	NONE	dead pull
9/24/2013	47.73112	122.7412	7:05	18:10	CON	C8	10:38:42	11:29:26	NONE	diver in water, cutting on and off
9/24/2013	47.73112	122.7412	7:05	18:10	CON	C8	11:29:32	11:38:58	NONE	dead pull
9/24/2013	47.73112	122.7412	7:05	18:10	CON	1S	16:06:43	16:08:23	V	
9/24/2013	47.73112	122.7412	7:05	18:10	CON	1S	16:11:02	16:11:13	V	OUT

Date	Latitude	Longitude	Time Effort Initiated (hh:mm)	Time Effort Completed (hh:mm)	Event Code	Pile Number	Start Time	End Time	Const Type	Comments
9/24/2013	47.73112	122.7412	7:05	18:10	CON	1S	16:24:09	16:24:53	V	
9/24/2013	47.73112	122.7412	7:05	18:10	CON	1S	16:26:20	16:27:39	V	
9/24/2013	47.73112	122.7412	7:05	18:10	CON	1S	16:28:13	16:29:39	V	
9/24/2013	47.73112	122.7412	7:05	18:10	CON	1S	16:31:36	16:35:33	V	
9/24/2013	47.73112	122.7412	7:05	18:10	CON	1S	16:36:10	16:37:00	V	
9/24/2013	47.73112	122.7412	7:05	18:10	CON	1S	16:41:11	16:52:39	V	
9/24/2013	47.73112	122.7412	7:05	18:10	CON	P24-3	17:34:01	17:35:06	V	
9/24/2013	47.73112	122.7412	7:05	18:10	CON	P24-2	17:39:22	17:40:11	V	
9/24/2013	47.73112	122.7412	7:05	18:10	POST	NA	17:40:30	18:10:00	NONE	
9/25/2013	47.73112	122.7412	7:20	17:30	PRE	NA	7:20:00	7:50:00	NONE	
9/25/2013	47.73112	122.7412	7:20	17:30	CON	2S	8:43:52	8:46:34	V	
9/25/2013	47.73112	122.7412	7:20	17:30	CON	2S	8:48:47	8:54:04	V	
9/25/2013	47.73112	122.7412	7:20	17:30	CON	2S	8:56:58	9:13:08	V	
9/25/2013	47.73112	122.7412	7:20	17:30	CON	3S	11:45:51	11:47:17	V	
9/25/2013	47.73112	122.7412	7:20	17:30	CON	3S	11:51:21	11:55:07	V	
9/25/2013	47.73112	122.7412	7:20	17:30	CON	3S	11:58:13	12:08:42	V	
9/25/2013	47.73112	122.7412	7:20	17:30	CON	3S	14:51:21	14:51:23	SSI	
9/25/2013	47.73112	122.7412	7:20	17:30	CON	3S	14:53:33	14:53:34	SSI	
9/25/2013	47.73112	122.7412	7:20	17:30	CON	3S	14:54:25	14:54:26	SSI	
9/25/2013	47.73112	122.7412	7:20	17:30	CON	3S	14:55:55	15:07:04	I	
9/25/2013	47.73112	122.7412	7:20	17:30	CON	3S	15:10:16	15:11:47	I	
9/25/2013	47.73112	122.7412	7:20	17:30	CON	2S	15:55:34	15:55:35	SSI	
9/25/2013	47.73112	122.7412	7:20	17:30	CON	2S	15:56:50	15:57:18	SSI	
9/25/2013	47.73112	122.7412	7:20	17:30	CON	2S	16:00:11	16:00:14	SSI	
9/25/2013	47.73112	122.7412	7:20	17:30	CON	2S	16:00:51	16:00:54	SSI	
9/25/2013	47.73112	122.7412	7:20	17:30	CON	2S	16:01:26	16:03:13	I	
9/25/2013	47.73112	122.7412	7:20	17:30	CON	1S	16:33:54	16:33:56	SSI	
9/25/2013	47.73112	122.7412	7:20	17:30	CON	1S	16:34:25	16:34:27	SSI	
9/25/2013	47.73112	122.7412	7:20	17:30	CON	1S	16:34:52	16:34:54	SSI	
9/25/2013	47.73112	122.7412	7:20	17:30	CON	1S	16:35:19	16:43:58	I	
9/25/2013	47.73112	122.7412	7:20	17:30	POST	NA	16:43:58	17:13:58	NONE	

APPENDIX D

Barge Mooring Project
Marine Mammal Sightings

Appendix D
Barge Mooring Project Marine Mammal Sightings

- Harbor seal sighting (HSEA)
- California sea lion sighting (CASL)
- Other sighting (OTHR)
- Unknown sighting (UNKW)

Date	Lat	Long	Event Code	Pile Number	Obs. Start Time	Obs. End Time	Species	Dist to animal(m)	Dir to animal	Dist to pile	Best num of animals	Number of juveniles	Behavior Code	Behavior 2	Behavior 3	Const. Type	Visibility	% Glare	Weather	Sea State	Wave height	Comments
9/14/2013	47.73112	122.74121	CON	NA	10:35:02	10:35:04	CASL	250	210	240	1	0	TR-N			NONE	G		F	1	0-3 ft	
9/14/2013	47.73112	122.74121	CON	NA	10:35:02	10:35:04	CASL	250	210	240	1	0	TR-N			NONE	G		F	1	0-3 ft	
9/14/2013	47.73112	122.74121	CON	NA	10:49:15	11:05:22	HSEA	260	210	250	2	0	PL	MI	RE	NONE	G		F	1	0-3 ft	
9/14/2013	47.73112	122.74121	CON	NA	10:49:15	11:05:22	HSEA	260	210	250	2	0	PL	MI	RE	NONE	G		F	1	0-3 ft	
9/14/2013	47.73112	122.74121	CON	NA	12:05:53	12:06:00	HSEA	230	250	220	2	0	MI	SL	PL	NONE	G		F	1	0-3 ft	
9/14/2013	47.73112	122.74121	CON	NA	12:05:53	12:06:00	HSEA	230	250	220	2	0	MI	SL	PL	NONE	G		F	1	0-3 ft	
9/14/2013	47.73112	122.74121	CON	NA	12:29:58	12:30:39	HSEA	220	240	210	2	0	RE	SW-S		NONE	G		F	1	0-3 ft	
9/14/2013	47.73112	122.74121	CON	NA	12:29:58	12:30:39	HSEA	220	240	210	2	0	RE	SW-S		NONE	G		F	1	0-3 ft	
9/14/2013	47.73112	122.74121	CON	NA	12:56:22	12:56:37	HSEA	230	240	220	1	0	RE	MI		NONE	G	0	F	1	0-3 ft	
9/14/2013	47.73112	122.74121	CON	NA	12:56:22	12:56:37	HSEA	230	240	220	1	0	RE	MI		NONE	G		F	1	0-3 ft	
9/14/2013	47.73112	122.74121	CON	NA	13:37:35	13:37:43	HSEA	240	280	230	1	0	RE	SI		NONE	G		F	1	0-3 ft	
9/14/2013	47.73112	122.74121	CON	NA	13:37:35	13:37:43	HSEA	240	280	230	1	0	RE	SI		NONE	G		F	1	0-3 ft	
9/14/2013	47.73112	122.74121	CON	NA	13:43:19	13:46:46	HSEA	240	280	230	1	0	RE	LO	DI	NONE	G		F	1	0-3 ft	
9/14/2013	47.73112	122.74121	CON	NA	13:43:19	13:46:46	HSEA	240	280	230	1	0	RE	LO	DI	NONE	G		F	1	0-3 ft	
9/14/2013	47.73112	122.74121	CON	NA	13:43:19	13:46:46	HSEA	240	280	230	1	0	RE	LO	DI	NONE	G		F	1	0-3 ft	
9/14/2013	47.73112	122.74121	CON	NA	14:04:21	14:04:31	HSEA	250	280	240	1	0	RE	SI		NONE	G		F	1	0-3 ft	
9/14/2013	47.73112	122.74121	CON	NA	14:04:21	14:04:31	HSEA	250	280	240	1	0	RE	SI		NONE	G		F	1	0-3 ft	
9/14/2013	47.73112	122.74121	CON	NA	15:31:50	15:32:02	CASL	510	270	480	1	0	SW-N			NONE	E		S	1	0-3 ft	
9/14/2013	47.73112	122.74121	CON	NA	15:31:50	15:32:02	CASL	510	270	480	1	0	SW-N			NONE	E		S	1	0-3 ft	
9/14/2013	47.73112	122.74121	CON	NA	15:44:24	15:44:29	HSEA	110	180	120	1	0	SW-N	DI		NONE	E	10	S	1	0-3 ft	
9/14/2013	47.73112	122.74121	CON	NA	15:44:24	15:44:29	HSEA	110	180	120	1	0	SW-N	DI		NONE	E	10	S	1	0-3 ft	
9/14/2013	47.73112	122.74121	CON	NA	15:51:10	15:51:31	CASL	210	270	200	1	0	TR-N	DI		NONE	E	10	S	1	0-3 ft	
9/14/2013	47.73112	122.74121	CON	NA	15:51:10	15:51:31	CASL	210	270	200	1	0	TR-N	DI		NONE	E	10	S	1	0-3 ft	
9/14/2013	47.73112	122.74121	CON	VO-01	15:56:52	16:17:37	HSEA	460	270	440	2	0	HO	MI	DI	V	E	10	S	1	0-3 ft	One HO and one in water. HO sealion stayed on float for 18 minutes
9/14/2013	47.73112	122.74121	CON	VO-01	15:56:52	16:17:37	HSEA	460	270	440	2	0	HO	MI	DI	V	E	10	S	1	0-3 ft	One HO and one in water. HO sealion stayed on float for 18 minutes
9/14/2013	47.73112	122.74121	OTHR	NA	16:28:54	16:35:28	HSEA	460	270	430	1	1	HO			OTHER	E	10	S	1	0-3 ft	
9/14/2013	47.73112	122.74121	CON	NA	16:28:54	16:35:28	HSEA	460	270	430	1	1	HO			NONE	E	10	S	1	0-3 ft	
9/14/2013	47.73112	122.74121	POST	NA	16:42:28	16:43:48	CASL	430	255	410	2	0	SW-S			NONE	E	10	S	1	0-3 ft	
9/14/2013	47.73112	122.74121	POST	NA	16:42:28	16:43:48	CASL	430	255	410	2	0	SW-S			NONE	E	10	S	1	0-3 ft	
9/16/2013	47.73112	122.74121	CON	NA	15:01:02	15:01:05	HSEA	20	280	15	1	0	PL	MI	DI	NONE	E	0	OC	1	0-3 ft	
9/16/2013			CON	NA	15:07:12	15:07:15	CASL	50	240	6	1		SW-SE			NONE	G	5	R	1	0-3 ft	

Date	Lat	Long	Event Code	Pile Number	Obs. Start Time	Obs. End Time	Species	Dist to animal(m)	Dir to animal	Dist to pile	Best num of animals	Number of juveniles	Behavior Code	Behavior 2	Behavior 3	Const. Type	Visibility	% Glare	Weather	Sea State	Wave height	Comments
9/16/2013			CON	NA	15:18:00	15:20:44	HSEA	150	270	230	2		SW-N			NONE	G	5	R	1	0-3 ft	could distinguish two seals swimming together but there may be more
9/16/2013			CON	NA	15:30:45	15:32:18	CASL	30	280	120	2		SW-N			NONE	G	5	R	1	0-3 ft	
9/16/2013			CON	NA	15:36:22	15:36:24	HSEA	50	270	110	1		SW-N			NONE	G	5	R	1	0-3 ft	
9/16/2013			CON	NA	15:47:58	15:50:59	CASL	70	200	150	1		SW-SE	DI		NONE	G	0	R	1	0-3 ft	
9/16/2013			CON	NA	15:55:56	15:57:38	CASL	30	180	80	1		SW-SE			NONE	G	0	R	1	0-3 ft	mammal swam beneath pier and out of sight
9/16/2013			CON	NA	15:59:00	15:59:10	CASL	99	300	150	1		SW-W	DI		NONE	G	0	R	1	0-3 ft	
9/16/2013			POST	NA	16:54:41	17:03:44	CASL	150	270	220	1		SW-N	DI		NONE	G	0	F	1	0-3 ft	
9/16/2013	47.73112	122.74121	POST	NA	17:06:55	17:07:00	HSEA	300	215	310	1	0	SW-N	SW-S		NONE	E	0	L	1	0-3 ft	
9/17/2013	47.73112	122.74121	PRE	NA	7:36:26	7:37:38	HSEA	60	190	60	1	0	MI	RE	DI	NONE	E	0	L	1	0-3 ft	
9/17/2013			PRE	NA	7:37:50	7:38:19	HSEA	60	290	100	1		SW-S			NONE	G	0	OC	1	0-3 ft	
9/17/2013	47.73112	122.74121	CON	NA	7:40:46	8:07:24	HSEA	80	190	80	4	0	LO	MI	DI	NONE	E	0	OC	1	0-3 ft	3-4 harbor seals milling, possibly feeding off of Carderock point.
9/17/2013	47.73112	122.74121	CON	NA	7:45:12	7:48:23	OTHR	25	90	30	1	0	TR-N			NONE	E	0	OC	1	0-3 ft	Beaver cruising 1m from shore
9/17/2013			CON	NA	7:56:40	7:56:52	HSEA	80	200	150	2		SW-SE			NONE	G	0	OC	1	0-3 ft	
9/17/2013			CON	NA	8:13:00	8:13:59	HSEA	250	200	330	2		SW-W			NONE	G	0	OC	1	0-3 ft	
9/17/2013	47.73112	122.74121	CON	NA	8:24:08	8:24:58	HSEA	80	110	80	2	0	MI			NONE	E	0	OC	1	0-3 ft	
9/17/2013			CON	NA	8:30:01	8:34:04	HSEA	200	180	240	2		PL			NONE	G	0	OC	1	0-3 ft	animals' fins were out of the water; appeared to be interacting with each other
9/17/2013			CON	NA	8:38:07	8:38:27	CASL	200	190	220	1		SW-NW	LO	SW-E	NONE	G	0	OC	1	0-3 ft	animal changed direction when security boat passed to the north
9/17/2013			CON	P20-4	8:59:20	9:10:03	HSEA	180	190	240	1		SW-E	DI	RE	V	G	0	OC	1	0-3 ft	animal dove when security boat passed to north
9/17/2013			CON	P20-4	9:17:09	9:23:30	CASL	200	190	220	1		SW-W	DI		V	G	0	OC	1	0-3 ft	animal surfaced immediately after vibration ceased
9/17/2013			CON	P20-4	9:21:58	9:47:52	CASL	200	190	220	1		SW-W	SW-E	DI	V	G	0	OC	1	0-3 ft	
9/17/2013			CON	P20-4	9:29:14	9:30:02	CASL	200	190	220	2		SW-W			V	G	0	OC	1	0-3 ft	
9/17/2013			CON	NA	10:00:00	10:00:27	HSEA	180	180	200	3		RE	DI		NONE	G	0	OC	1	0-3 ft	all animals resting and drifting toward east on north side of spit
9/17/2013			CON	NA	10:10:11	10:10:25	CASL	120	320	180	1		SW-E	DI		NONE	G	0	OC	1	0-3 ft	
9/17/2013			CON	NA	10:20:58	10:26:30	CASL	130	190	200	1		SW-SW	SW-SE	DI	NONE	G	0	OC	1	0-3 ft	

Date	Lat	Long	Event Code	Pile Number	Obs. Start Time	Obs. End Time	Species	Dist to animal(m)	Dir to animal	Dist to pile	Best num of animals	Number of juveniles	Behavior Code	Behavior 2	Behavior 3	Const. Type	Visibility	% Glare	Weather	Sea State	Wave height	Comments
9/17/2013			CON	NA	10:30:13	10:51:15	HSEA	150	270	230	1		SW-S	SW-SE	DI	NONE	G	0	OC	1	0-3 ft	doubked back several times, continued swimming SE and dove under at perimeter fence
9/17/2013			CON	NA	11:22:29	11:23:00	HSEA	100	230	180	1		SW-SE			NONE	G	0	OC	1	0-3 ft	
9/17/2013	47.73112	122.74121	CON	NA	11:23:06	11:24:02	HSEA	30	185	30	1	0	SW-S			NONE	E	0	OC	1	0-3 ft	
9/17/2013	47.73112	122.74121	CON	NA	11:24:05	11:25:20	HSEA	100	200	100	1	0	MI			NONE	E	0	OC	1	0-3 ft	
9/17/2013			CON	NA	11:27:39	11:27:45	CASL	70	230	150	1		LO	SW-E	DI	NONE	G	0	OC	1	0-3 ft	
9/17/2013			CON	NA	11:31:50	11:35:00	HSEA	150	340	120	1		SW-S	LO	DI	NONE	G	0	OC	1	0-3 ft	
9/17/2013	47.73112	122.74121	CON	NA	11:38:54	11:39:02	HSEA	30	85	35	1	0	SW-S			NONE	E	0	OC	1	0-3 ft	
9/17/2013	47.73112	122.74121	CON	NA	11:43:40	11:44:28	HSEA	100	200	100	2	0	MI			NONE	E	0	OC	1	0-3 ft	
9/17/2013			CON	NA	11:46:00	11:47:01	CASL	400	240	480	1		SW-N	HO		NONE	G	0	OC	1	0-3 ft	animal hauled out on perimerer fence and vocalized [8 in to N from SW corner]
9/17/2013			CON	NA	11:48:24	11:48:29	CASL	50	180	120	1		LO	DI		NONE	G	0	OC	1	0-3 ft	animal dove beneath the small metal building near south end of pier
9/17/2013			CON	NA	12:01:05	12:01:10	HSEA	60	190	140	1		SW-S	DI		NONE	G	0	OC	1	0-3 ft	
9/17/2013	47.73112	122.74121	CON	NA	12:01:25	12:01:33	HSEA	100	200	100	1	0	MI	DI		NONE	E	0	OC	1	0-3 ft	
9/17/2013			CON	NA	12:07:39	12:17:48	HSEA	100	340	150	1		SW-SE	LO	SW-SW	NONE	G	0	OC	1	0-3 ft	
9/17/2013			CON	NA	12:32:02	12:33:46	HSEA	180	230	250	1		SW-N	DI		NONE	G	0	OC	1	0-3 ft	
9/17/2013			CON	NA	12:38:20	12:38:23	HSEA	60	350	150	1		SW-N	DI		NONE	G	0	OC	1	0-3 ft	
9/17/2013			CON	NA	12:45:00	12:45:09	CASL	80	190	160	1		SW-N	DI		NONE	G	0	OC	1	0-3 ft	
9/17/2013			CON	NA	12:55:41	12:56:12	HSEA	170	190	200	3		SW-E	LO	DI	NONE	G	0	OC	1	0-3 ft	
9/17/2013			CON	NA	13:01:27	13:01:34	HSEA	130	190	240	1		SW-SE	DI		NONE	G	0	OC	1	0-3 ft	
9/17/2013			CON	NA	13:03:42	13:03:52	HSEA	30	270	110	1		SW-N	DI		NONE	G	0	OC	1	0-3 ft	animal dove whn motorized vessel approached from north
9/17/2013			CON	P20-1	13:06:43	13:07:00	HSEA	130	200	200	2		SW-N	DI		V	G	0	OC	1	0-3 ft	
9/17/2013			CON	NA	13:09:56	13:10:04	HSEA	80	200	100	1		SW-SW	DI		NONE	G	0	OC	1	0-3 ft	
9/17/2013			CON	P20-1	13:21:38	13:25:44	HSEA	150	300	200	1		SW-N	DI	SW-NE	V	G	0	OC	1	0-3 ft	
9/17/2013			CON	P20-1	13:29:31	13:29:36	HSEA	80	190	160	1		LO	DI		V	G	0	OC	1	0-3 ft	
9/17/2013	47.73112	122.74121	CON	NA	13:39:46	13:40:12	HSEA	60	180	60	1	0	SW-NE			NONE	E	0	OC	1	0-3 ft	
9/17/2013	47.73112	122.74121	CON	NA	13:43:38	13:45:36	HSEA	35	90	40	1	0	FO	SW-W		NONE	E	0	OC	1	0-3 ft	
9/17/2013	47.73112	122.74121	CON	NA	13:45:47	13:47:02	HSEA	100	200	100	1	0	SW-W			NONE	E	0	OC	1	0-3 ft	
9/17/2013	47.73112	122.74121	CON	NA	14:01:27	14:01:57	HSEA	90	195	105	2	0	SW-NW	MI	DI	NONE	E	0	OC	1	0-3 ft	after vibe finished. rig off for lunch break
9/17/2013			CON	NA	14:20:30	14:20:44	HSEA	100	330	130	1	0	SW-E			NONE	G	0	OC	1	0-3 ft	
9/17/2013	47.73112	122.74121	CON	NA	14:25:12	14:28:38	HSEA	35	150	50	2	0	MI	LO	DI	NONE	E	0	OC	1	0-3 ft	rig back on no constr.
9/17/2013			CON	NA	14:27:36	14:27:44	HSEA	50	190	100	2		LO	SI		NONE	G	0	OC	1	0-3 ft	
9/17/2013	47.73112	122.74121	CON	NA	14:31:20	14:31:29	HSEA	25	95	30	1	1	SW-SW			NONE	E	0	OC	1	0-3 ft	
9/17/2013	47.73112	122.74121	CON	NA	14:45:24	14:45:27	HSEA	100	200	100	1	1	MI	SW-S	DI	NONE	E	0	OC	1	0-3 ft	

Date	Lat	Long	Event Code	Pile Number	Obs. Start Time	Obs. End Time	Species	Dist to animal(m)	Dir to animal	Dist to pile	Best num of animals	Number of juveniles	Behavior Code	Behavior 2	Behavior 3	Const. Type	Visibility	% Glare	Weather	Sea State	Wave height	Comments
9/17/2013	47.73112	122.74121	CON	NA	14:58:58	15:04:29	HSEA	80	200	80	1	0	FO	MI	SW-N	NONE	E	0	OC	1	0-3 ft	Cruising north along the shore. Chasing fish?
9/17/2013			CON	NA	15:25:28	15:25:29	HSEA	60	350	100	1		SW-SW	DI	SW-N	NONE	G	0	PC	1	0-3 ft	animal swam to south perimeter fence then doubled back and swam to north perimeter
9/17/2013			CON	NA	15:40:42	15:46:05	HSEA	60	200	130	1		LO	SW-N	SI	NONE	G	0	PC	1	0-3 ft	
9/17/2013	47.73112	122.74121	CON	NA	15:53:32	15:53:34	HSEA	50	190	50	1	0	SW-W	DI		NONE	E	0	OC	1	0-3 ft	
9/17/2013	47.73112	122.74121	CON	NA	15:58:43	15:59:10	HSEA	80	190	80	1	0	SW-NE			NONE	E	0	OC	1	0-3 ft	
9/17/2013	47.73112	122.74121	CON	NA	16:09:52	16:09:58	HSEA	20	80	25	1	1	SW-W	DI		NONE	E	0	OC	1	0-3 ft	
9/17/2013			CON	NA	16:12:35	16:12:46	HSEA	40	190	120	1		SW-E	DI		NONE	G	0	PC	1	0-3 ft	
9/17/2013	47.73112	122.74121	CON	NA	16:23:05	16:23:26	HSEA	80	200	80	1	0	SW-N			NONE	E	0	OC	1	0-3 ft	
9/17/2013			CON	NA	16:43:40	16:43:49	HSEA	150	200	210	1		SW-S	DI		NONE	G	10	PC	1	0-3 ft	
9/17/2013			CON	P20-2	16:56:03	16:56:37	HSEA	100	300	150	1		SW-N	DI		V	G	10	S	1	0-3 ft	
9/17/2013			POST	NA	17:06:00	17:06:14	HSEA	60	200	120	1		SW-N	DI		NONE	G	10	S	1	0-3 ft	
9/18/2013			PRE	NA	7:49:50	7:50:09	HSEA	120	225	180	1		SW-S	DI		NONE	G	0	PC	1	0-3 ft	
9/18/2013			CON	NA	7:59:05	7:59:41	HSEA	110	185	165	2		SW-S	LO	DI	NONE	G	0	PC	1	0-3 ft	
9/18/2013	47.73112	122.74121	CON	NA	7:59:58	8:00:54	HSEA	80	200	90	1	0	SW-SW			NONE	E	0	PC	1	0-3 ft	
9/18/2013	47.73112	122.74121	CON	NA	8:01:08	8:01:47	HSEA	80	230	90	1	0	MI	DI		NONE	E	0	PC	1	0-3 ft	
9/18/2013			CON	NA	8:06:08	8:06:57	CASL	200	90	175	1		SW-S	DI		NONE	G	0	PC	1	0-3 ft	
9/18/2013	47.73112	122.74121	CON	NA	8:22:26	8:31:52	HSEA	80	200	90	1	0	SW-S	MI		NONE	E	0	PC	1	0-3 ft	
9/18/2013			CON	NA	8:35:42	8:36:02	HSEA	280	190	270	1		MI	DI		NONE	G	0	PC	1	0-3 ft	
9/18/2013			CON	P2	8:42:46	8:43:17	HSEA	280	190	265	1		MI	DI		V	G	0	PC	1	0-3 ft	surfaced before vibe started, remained up for appx. 20 sec of vibe
9/18/2013			CON	P2	8:54:01	8:54:18	HSEA	190	350	170	1		SW-SW	SI		V	G	0	PC	1	0-3 ft	
9/18/2013	47.73112	122.74121	CON	P2	8:55:00	8:55:32	CASL	90	210	95	1	0	TR-N			V	E	0	PC	1	0-3 ft	
9/18/2013			CON	P2	8:58:00	8:58:30	HSEA	170	275	210	1		SW-SW	SI		V	G	0	PC	1	0-3 ft	
9/18/2013			CON	P2	9:01:41	9:01:48	CASL	245	185	230	1		SW-W	DI		V	G	0	PC	1	0-3 ft	
9/18/2013			CON	NA	9:04:38	9:04:51	UNKW	330	275	400	1		SW-W	PO		NONE	G	0	PC	1	0-3 ft	possible HPOR, seen before and during vibe.
9/18/2013			CON	P2	9:08:14	9:08:30	HSEA	140	345	125	1		SW-SE	SI		V	G	0	PC	1	0-3 ft	
9/18/2013			CON	P2	9:19:30	9:20:22	HSEA	260	320	295	1		SW-SE	DI		V	G	0	PC	1	0-3 ft	
9/18/2013			CON	P2	9:20:11	9:20:22	UNKW	180	315	240	1		SW-S	PO		V	G	0	PC	1	0-3 ft	possible HPOR
9/18/2013			CON	P2	9:23:23	9:23:51	HSEA	75	335	130	2		SW-SE	DI		V	G	0	PC	1	0-3 ft	
9/18/2013	47.73112	122.74121	CON	NA	9:49:14	9:49:17	CASL	100	230	100	1	0	TR-N			NONE	E	0	PC	1	0-3 ft	
9/18/2013			CON	NA	9:51:40	9:52:49	CASL	45	245	100	1		PO	SW-N	LO	NONE	G	0	PC	1	0-3 ft	lost sight heading N toward D-pier.
9/18/2013	47.73112	122.74121	CON	NA	9:59:37	9:59:59	HSEA	130	240	130	1	0	SW-S			NONE	E	0	PC	1	0-3 ft	
9/18/2013	47.73112	122.74121	CON	NA	10:06:04	10:06:44	HSEA	90	220	90	1	0	SW-E			NONE	E	0	PC	1	0-3 ft	
9/18/2013			CON	NA	10:10:50	10:10:57	HSEA	550	285	600	1		SW-S	LO	SI	NONE	G	0	PC	1	0-3 ft	
9/18/2013	47.73112	122.74121	CON	NA	10:12:22	10:12:32	HSEA	15	190	30	1	0	SW-E	LO	SW-NE	NONE	E	0	PC	1	0-3 ft	Animal swam beneath bridge and out of sight
9/18/2013			CON	NA	10:16:44	10:17:08	HSEA	550	295	600	1		SW-S	LO	DI	NONE	G	0	PC	1	0-3 ft	

Date	Lat	Long	Event Code	Pile Number	Obs. Start Time	Obs. End Time	Species	Dist to animal(m)	Dir to animal	Dist to pile	Best num of animals	Number of juveniles	Behavior Code	Behavior 2	Behavior 3	Const. Type	Visibility	% Glare	Weather	Sea State	Wave height	Comments
9/18/2013	47.73112	122.74121	CON	NA	10:25:23	10:25:40	HSEA	90	210	100	1	0	SW-N	LO		NONE	E	0	PC	1	0-3 ft	
9/18/2013			CON	NA	10:26:38	10:26:53	HSEA	450	180	430	2		SW-N	DI		NONE	G	0	PC	1	0-3 ft	
9/18/2013	47.73112	122.74121	CON	NA	10:31:18	10:33:53	HSEA	15	200	40	1	0	SW-E	TR-W	SW-W	NONE	E	0	PC	1	0-3 ft	animal swam to bridge then turned 180 degrees and swam back out to harbor
9/18/2013			CON	NA	10:35:49	10:36:31	HSEA	90	290	150	1		SW-SW	LO	SI	NONE	G	0	PC	1	0-3 ft	
9/18/2013	47.73112	122.74121	CON	NA	10:36:30	10:43:18	HSEA	15	240	40	1	0	SW-E	SW-W		NONE	E	0	PC	1	0-3 ft	animal doubled back in from harbor, swam under bridge, then turned west just south of pier and returned to harbor and hung out near spit
9/18/2013	47.73112	122.74121	CON	NA	10:53:15	10:53:47	HSEA	90	240	100	1	0	SW-E	TR-W	SW-W	NONE	E	0	PC	1	0-3 ft	animal swam east past spit then doubled back toward harbor
9/18/2013			CON	NA	11:06:14	11:06:23	HSEA	40	355	95	1		SW-S	LO	DI	NONE	E	0	PC	1	0-3 ft	
9/18/2013	47.73112	122.74121	CON	NA	11:22:30	11:22:38	HSEA	80	240	70	1	0	SW-N	DI		NONE	E	0	PC	1	0-3 ft	
9/18/2013			CON	NA	11:38:02	14:15:39	CASL	800	270	860	1		HO			V	E	0	PC	1	0-3 ft	on perimeter fence. hauled out prior to vibe. Did not move during vibes.
9/18/2013			CON	NA	11:51:40	11:51:49	HSEA	75	310	140	1		SW-E	DI		NONE	E	0	S	1	0-3 ft	
9/18/2013			CON	NA	11:56:32	12:14:29	HSEA	250	270	310	2		LO	FL	SI	NONE	E	0	S	1	0-3 ft	resurfaced four times more
9/18/2013	47.73112	122.74121	CON	NA	12:01:30	12:01:55	HSEA	70	200	60	1	0	SW-E			NONE	E	0	PC	1	0-3 ft	
9/18/2013			CON	NA	12:30:17	12:38:33	HSEA	180	315	220	1		SW-SE	LO	SI	NONE	E	0	S	1	0-3 ft	resurfaced 3 more times, lost sight S of floating fence
9/18/2013	47.73112	122.74121	CON	NA	12:57:34	12:58:55	HSEA	100	190	120	1	0	SW-S			NONE	E	0	PC	1	0-3 ft	
9/18/2013	47.73112	122.74121	CON	NA	13:06:30	13:10:13	HSEA	80	200	80	1	0	MI	RE	SW-S	NONE	E	0	S	1	0-3 ft	
9/18/2013			CON	NA	13:21:23	13:21:59	CASL	90	220	120	1		PO	SW-N		NONE	E	15	S	1	0-3 ft	
9/18/2013			CON	NA	13:33:29	13:36:06	HSEA	80	290	130	1		MI	LO	DI	NONE	E	15	S	1	0-3 ft	resurfaced further S
9/18/2013	47.73112	122.74121	CON	P3	13:44:27	13:47:38	HSEA	80	210	120	1	0	MI	SW-N	DI	V	E	0	S	1	0-3 ft	
9/18/2013	47.73112	122.74121	CON	P3	13:53:17	13:55:37	HSEA	100	260	120	1	0	SW-E	DI	SW-N	V	E	0	S	1	0-3 ft	
9/18/2013	47.73112	122.74121	CON	P3	14:02:54	14:02:56	HSEA	80	200	110	1	0	SW-N	DI		V	E	0	S	1	0-3 ft	
9/18/2013			CON	P3	14:17:13	14:17:34	HSEA	55	350	55	1		SW-NE	LO	SI	V	E	15	S	1	0-3 ft	
9/18/2013			CON	NA	14:29:20	14:29:45	HSEA	650	355	640	1		SW-SE	DI	LO	NONE	E	15	S	1	0-3 ft	
9/18/2013			CON	NA	14:36:53	14:37:43	HSEA	510	355	530	1		SW-E	DI		NONE	E	15	S	1	0-3 ft	
9/18/2013			CON	NA	14:41:32	14:41:51	HSEA	505	345	515	1		SW-W	SI		NONE	E	15	S	1	0-3 ft	
9/18/2013			CON	NA	14:48:40	14:48:51	HSEA	40	250	100	1		LO	SI		NONE	E	15	S	1	0-3 ft	
9/18/2013	47.73112	122.74121	CON	NA	14:52:25	14:52:56	HSEA	80	200	100	1	0	SW-N	DI		NONE	E	0	S	1	0-3 ft	
9/18/2013	47.73112	122.74121	CON	NA	14:54:24	14:54:30	HSEA	70	220	90	2	0	SW-N	DI		NONE	E	0	S	1	0-3 ft	

Date	Lat	Long	Event Code	Pile Number	Obs. Start Time	Obs. End Time	Species	Dist to animal(m)	Dir to animal	Dist to pile	Best num of animals	Number of juveniles	Behavior Code	Behavior 2	Behavior 3	Const. Type	Visibility	% Glare	Weather	Sea State	Wave height	Comments
9/18/2013			CON	NA	14:57:31	15:02:12	HSEA	240	240	390	1		SW-N	DI	SW-NE	NONE	E	15	S	1	0-3 ft	resurfaced 2 more times heading N/NE
9/18/2013			CON	NA	15:12:13	15:11:20	HSEA	250	250	310			SW-S	DI		NONE	E	15	S	1	0-3 ft	
9/18/2013	47.73112	122.74121	CON	NA	15:15:23	15:16:01	HSEA	20	165	60	1	1	SW-NW	DI		NONE	E	0	S	1	0-3 ft	
9/18/2013	47.73112	122.74121	CON	NA	15:18:21	15:26:27	HSEA	80	200	115	1	0	SW-N	DI	SW-S	NONE	E	0	S	1	0-3 ft	back and forth between sandy point and wooden walkway
9/18/2013	47.73112	122.74121	CON	NA	15:41:58	15:42:01	HSEA	80	200	125	1	0	SW-N	MI	DI	NONE	E	0	S	1	0-3 ft	
9/18/2013			CON	NA	15:43:09	15:43:31	HSEA	110	350	75	1		FL	SI		NONE	E	15	S	1	0-3 ft	
9/18/2013			CON	P4	15:44:52	16:59:00	CASL	800	270	850	1		HO			V	E	15	S	1	0-3 ft	on perimeter fence
9/18/2013	47.73112	122.74121	CON	P4	15:50:40	15:55:45	HSEA	80	200	125	1	0	SW-S	DI	SW-S	V	E	0	S	1	0-3 ft	
9/18/2013			CON	P4	15:51:16	15:56:50	HSEA	230	340	200	1		SW-N	FL	DI	V	E	15	S	1	0-3 ft	surfared just as vibe ended, dove then swam back toward rig as vibe back on. Seen agin appx 500m N of rig floating on surface, milling. Dove soon after vibe off
9/18/2013			CON	P4	16:05:15	16:05:33	HSEA	130	315	130	1		SW-SE	LO	DI	V	E	15	S	1	0-3 ft	
9/18/2013	47.73112	122.74121	CON	P4	16:05:40	16:05:47	HSEA	80	200	125	2	0	SW-NW			V	E	0	S	1	0-3 ft	
9/18/2013			CON	P4	16:13:04	16:13:28	HSEA	380	330	370	1		SW-N	SI		V	E	15	S	1	0-3 ft	
9/18/2013	47.73112	122.74121	CON	P4	16:20:40	16:20:45	HSEA	75	210	120	1	0	SW-N			V	E	0	S	1	0-3 ft	
9/18/2013			POST	NA	16:37:01	16:37:24	HSEA	80	295	120	1		SW-N	DI		NONE	E	15	S	1	0-3 ft	
9/19/2013	47.73112	122.74121	CON	NA	7:49:12	7:55:26	HSEA	85	210	185	3	0	SW-S	DI	SW-N	NONE	M	0	F	0	0-3 ft	
9/19/2013	47.73112	122.74121	CON	NA	8:07:31	8:07:42	HSEA	85	210	185	2	0	MI			NONE	M	0	F	0	0-3 ft	
9/19/2013			CON	NA	8:08:31	8:08:50	HSEA	460	340	400	2		SW-S	SI		NONE	M	0	F	0	0-3 ft	
9/19/2013	47.73112	122.74121	CON	NA	8:11:43	8:12:13	HSEA	85	210	185	3	0	SW-N			NONE	M	0	F	0	0-3 ft	
9/19/2013	47.73112	122.74121	CON	P6	8:37:31	8:37:50	HSEA	40	170	120	1	0	SW-W	DI		V	P	0	F	0	0-3 ft	
9/19/2013	47.73112	122.74121	CON	NA	8:59:35	9:03:49	HSEA	40	30	40	2	0	SW-SW	DI	SW-W	NONE	P	0	F	0	0-3 ft	
9/19/2013	47.73112	122.74121	CON	NA	9:18:25	9:21:24	HSEA	55	220	165	1	0	SW-E	RE	SW-NE	NONE	G	0	F	0	0-3 ft	
9/19/2013			CON	NA	9:24:58	9:26:36	CASL	20	300	100	1		BR	SW-SW	DI	NONE	P	0	F	0	0-3 ft	quick breath then dove. Spotted again just inside of perimeter fence heading south.
9/19/2013	47.73112	122.74121	CON	NA	9:47:24	9:48:03	HSEA	80	200	160	2	0	LO	SW-S	SW-E	NONE	G	0	F	0	0-3 ft	
9/19/2013			CON	P6	10:02:09	10:02:30	HSEA	25	340	100	1		FL	SW-E		V	M	0	F	0	0-3 ft	
9/19/2013	47.73112	122.74121	CON	NA	10:08:09	10:08:11	HSEA	80	210	165	1	0	SW-S			NONE	G	0	F	0	0-3 ft	
9/19/2013			CON	P6	10:09:44	10:10:07	HSEA	45	185	90	1		MI	SI		V	G	0	S	0	0-3 ft	
9/19/2013	47.73112	122.74121	CON	P6	10:17:40	10:24:33	HSEA	80	195	160	2	0	SW-S	MI		V	G	0	F	0	0-3 ft	
9/19/2013	47.73112	122.74121	CON	P6	10:18:50	10:25:00	HSEA	80	205	160	1	0	SW-S	SW-N	SW-S	V	G	0	F	0	0-3 ft	
9/19/2013	47.73112	122.74121	CON	NA	10:26:42	10:27:28	HSEA	15	180	75	1	0	SW-E	DI		NONE	G	0	F	0	0-3 ft	
9/19/2013			CON	NA	10:56:02	10:56:29	HSEA	680	330	780	1		SW-NE	DI		NONE	B	0	S	1	0-3 ft	

Date	Lat	Long	Event Code	Pile Number	Obs. Start Time	Obs. End Time	Species	Dist to animal(m)	Dir to animal	Dist to pile	Best num of animals	Number of juveniles	Behavior Code	Behavior 2	Behavior 3	Const. Type	Visibility	% Glare	Weather	Sea State	Wave height	Comments
9/19/2013			CON	NA	11:16:17	11:20:36	HSEA	700	305	760	2	1	SW-S	SI		NONE	B	0	S	1	0-3 ft	Spotted again just inside of perimeter fence heading south.
9/19/2013	47.73112	122.74121	CON	NA	11:20:13	11:20:19	HSEA	150	290	300	1	0	SW-N			NONE	G	0	S	0	0-3 ft	
9/19/2013	47.73112	122.74121	CON	NA	11:31:23	11:32:17	HSEA	85	220	140	1	0	SW-N	DI		NONE	E	0	S	0	0-3 ft	
9/19/2013	47.73112	122.74121	CON	NA	11:57:58	11:58:09	HSEA	90	230	140	1	0	LO	DI		NONE	E	0	S	0	0-3 ft	
9/19/2013	47.73112	122.74121	CON	P5	12:09:00	12:09:30	HSEA	75	215	125	6	0	SW-W			V	E	0	S	0	0-3 ft	
9/19/2013	47.73112	122.74121	CON	P5	12:24:25	12:33:41	HSEA	80	195	140	1	0	SW-S	SW-N	DI	V	E	0	S	0	0-3 ft	
9/19/2013	47.73112	122.74121	CON	P5	12:25:42	12:34:14	HSEA	130	235	170	2	0	SW-N	DI		V	E	0	S	0	0-3 ft	
9/19/2013	47.73112	122.74121	CON	P5	12:42:15	12:43:44	HSEA	150	220	195	2	0	SW-N	DI		V	E	0	S	0	0-3 ft	
9/19/2013			CON	P6	12:47:32	12:47:41	HSEA	55	190	90	1		SW-NE	LO	DI	V	B	0	F	1	0-3 ft	
9/19/2013			CON	NA	13:19:35	13:19:42	HSEA	105	270	190	1		SW-S	SI		NONE	M	0	F	0	0-3 ft	
9/19/2013			CON	NA	13:48:01	13:48:12	HSEA	50	270		1		SW-N	DI		NONE	M	0	S	0	0-3 ft	
9/19/2013			CON	NA	13:49:32	13:50:04	HSEA	1	55	105	1		SW-N	DI		NONE	B	0	S	0	0-3 ft	
9/19/2013			CON	NA	14:01:38	14:12:39	HSEA	60	180	110	2		SW-SW	DI		NONE	M	5	S	0	0-3 ft	
9/19/2013			CON	NA	14:11:22	14:14:01	HSEA	40	220	90	1		SW-N	DI		NONE	M	0	S	0	0-3 ft	
9/19/2013			CON	NA	14:14:06	14:14:08	CASL	30	270	80	1		SW-NW	CH	DI	NONE	M	5	S	0	0-3 ft	
9/19/2013			CON	NA	14:20:47	14:24:58	HSEA	120	290	170	1		SW-SW	DI	SW-W	NONE	M	5	S	0	0-3 ft	
9/19/2013	47.73112	122.74121	CON	NA	14:24:28	14:32:30	HSEA	30	190	45	2	0	SW-NE	LO	RE	NONE	E	0	S	0	0-3 ft	
9/19/2013			CON	NA	14:30:06	14:30:17	HSEA	10	200	60	1		SW-E	DI		NONE	M	0	S	0	0-3 ft	
9/19/2013	47.73112	122.74121	CON	NA	14:36:34	14:39:24	HSEA	20	115	30	1	0	MI	SW-SW	DI	NONE	E	0	S	0	0-3 ft	
9/19/2013			CON	NA	14:51:50	14:52:04	HSEA	120	310	170	1		SW-NW	DI		NONE	G	5	S	0	0-3 ft	
9/19/2013	47.73112	122.74121	CON	NA	14:53:43	14:53:51	HSEA	65	250	80	1	0	SW-S	DI		NONE	E	0	S	0	0-3 ft	
9/19/2013			CON	NA	15:04:00	15:07:32	HSEA	130	290	180	1		RE	DI	SW-S	NONE	G	0	S	0	0-3 ft	
9/19/2013	47.73112	122.74121	CON	NA	15:09:01	15:09:08	HSEA	40	190	55	1	0	SW-NE	DI		NONE	E	0	S	0	0-3 ft	
9/19/2013			CON	NA	15:26:22	15:27:04	HSEA	300	230	350	1		SW-N	DI		NONE	G	5	S	0	0-3 ft	
9/19/2013	47.73112	122.74121	CON	NA	15:26:52	15:35:17	HSEA	45	200	60	1	0	MI	SI	SW-S	NONE	E	0	S	0	0-3 ft	
9/19/2013			CON	NA	15:42:15	15:42:30	HSEA	100	190	120	1		SW-S	DI		NONE	G	10	S	0	0-3 ft	
9/19/2013	47.73112	122.74121	CON	NA	15:42:28	15:42:49	HSEA	60	160	70	1	0	SW-E	SW-NE	DI	NONE	E	0	S	0	0-3 ft	
9/19/2013			CON	NA	15:47:01	15:48:02	CASL	380	250	430	1		SW-N	DI		NONE	G	0	S	0	0-3 ft	animal is swimming fast just inside perimeter fence
9/19/2013			CON	P1	16:35:24	16:35:32	HSEA	200	340	250	1		SW-N	SI		V	G	0	S	0	0-3 ft	
9/19/2013			CON	P1	16:42:58	16:43:07	HSEA	250	280	300	1		SW-NW	SI		V	G	0	S	0	0-3 ft	
9/19/2013			POST	NA	17:10:24	17:10:34	HSEA	89	350		1		SW-N	DI		NONE	G	0	S	0	0-3 ft	
9/20/2013			CON	P24-2	6:57:46	6:57:48	HSEA	35	270		1	1	SW-S	DI		V	E	0	PC	1	0-3 ft	
9/20/2013			CON	P24-2	7:00:23	7:00:28	HSEA	150	180	120	1	1	LO	SI		V	E	0	PC	1	0-3 ft	
9/20/2013			CON	NA	7:04:36	7:04:42	HSEA	250	270		1		SW-W	LO	DI	NONE	E	0	PC	1	0-3 ft	
9/20/2013			CON	NA	7:23:56	7:24:14	HSEA	170	220		1	1	RE	LO	SI	NONE	E	0	PC	1	0-3 ft	
9/20/2013			CON	NA	7:26:04	7:26:11	HSEA	120	0		1		SW-NE	SI		NONE	E	0	PC	1	0-3 ft	
9/20/2013			CON	NA	7:28:42	7:28:56	HSEA	120	240		1		MI	LO	DI	NONE	E	0	PC	1	0-3 ft	
9/20/2013	47.73112	122.74121	CON	NA	7:28:56	7:29:00	HSEA	60	180	50	1	0	SW-N	DI		NONE	E	0	S	0	0-3 ft	
9/20/2013			CON	NA	7:33:29	7:33:34	HSEA	30	270		1	1	RE	SI		NONE	E	0	PC	1	0-3 ft	
9/20/2013			CON	NA	7:35:43	7:35:49	HSEA	80	250		1	1	RE	SI		NONE	E	0	PC	1	0-3 ft	

Date	Lat	Long	Event Code	Pile Number	Obs. Start Time	Obs. End Time	Species	Dist to animal(m)	Dir to animal	Dist to pile	Best num of animals	Number of juveniles	Behavior Code	Behavior 2	Behavior 3	Const. Type	Visibility	% Glare	Weather	Sea State	Wave height	Comments
9/20/2013			CON	NA	7:46:53	7:47:01	HSEA	50	270		1	1	LO	SI		NONE	E	0	PC	1	0-3 ft	
9/20/2013			CON	NA	7:52:24	7:52:28	HSEA	100	270		1	1	RE	SI		NONE	E	0	PC	1	0-3 ft	
9/20/2013			CON	NA	7:54:51	8:07:42	HSEA	250	240		2	2	PL	SL	DI	NONE	E	0	PC	1	0-3 ft	
9/20/2013			CON	NA	8:06:03	8:06:13	HSEA	160	200		1		RE	SI		NONE	E	0	PC	1	0-3 ft	
9/20/2013			POST	NA	9:26:55	9:27:29	HSEA	25	290		1	1	SW-NE	DI		NONE	E	0	OC	0	0-3 ft	
9/23/2013	47.73112	122.74121	CON	NA	12:42:42	12:43:46	HSEA	60	290	45	1	0	LO	SI		NONE	E	0	OC	3	0-3 ft	cutting
9/23/2013	47.73112	122.74121	CON	NA	8:04:22	8:04:59	HSEA	120	200	125	3	0	MI	PL		NONE	E	0	PC	0	0-3 ft	cutting
9/23/2013	47.73112	122.74121	CON	NA	8:23:52	8:25:10	HSEA	120	200	125	2	0	MI	LO		NONE	E	0	PC	0	0-3 ft	
9/23/2013	47.73112	122.74121	CON	NA	9:43:57	9:44:30	HSEA	140	210	135	1	1	PL	SL		NONE	E	0	PC	0	0-3 ft	cutting
9/23/2013	47.73112	122.74121	CON	NA	9:47:43	9:49:08	HSEA	140	210	135	2	0	MI	PL		NONE	E	0	PC	0	0-3 ft	cutting
9/23/2013	47.73112	122.74121	CON	NA	15:52:10	15:56:20	HSEA	120	200	120	1	0	SW-S	DI		NONE	G	0	L	2	0-3 ft	
9/23/2013	47.73112	122.74121	CON	1S	16:05:07	16:09:17	HSEA	200	220	195	1	0	SW-NW	DI		V	G	0	L	2	0-3 ft	
9/23/2013	47.73112	122.74121	CON	1S	16:27:59	16:30:00	CASL	225	205	220	1	0	TR-N			V	G	0	L	2	0-3 ft	
9/23/2013	47.73112	122.74121	CON	1S	16:32:00	16:32:21	HSEA	125	230	120	1	0	SW-S	DI		V	G	0	L	2	0-3 ft	
9/23/2013	47.73112	122.74121	CON	1S	16:36:20	16:36:26	HSEA	240	220	235	1	0	SW-S	DI		V	G	0	OC	2	0-3 ft	
9/23/2013	47.73112	122.74121	CON	1S	16:51:15	16:51:50	HSEA	160	200	160	2	0	SW-N	SW-S		V	G	0	OC	1	0-3 ft	
9/23/2013	47.73112	122.74121	CON	NA	17:03:31	17:08:51	HSEA	180	270	180	1	0	SW-N	DI		NONE	G	0	OC	1	0-3 ft	
9/23/2013	47.73112	122.74121	CON	NA	17:11:18	17:12:10	HSEA	200	240	200	1	0	SW-NW	DI		NONE	G	0	OC	1	0-3 ft	
9/23/2013	47.73112	122.74121	CON	NA	17:19:32	17:20:13	HSEA	275	225	275	2	0	SW-S			NONE	G	0	OC	1	0-3 ft	
9/23/2013	47.73112	122.74121	CON	NA	17:36:17	17:36:55	HSEA	125	210	120	1	0	SW-N			NONE	G	0	OC	0	0-3 ft	
9/23/2013	47.73112	122.74121	CON	P24-2	17:39:55	17:40:06	HSEA	160	200	155	1	0	SW-N			V	G	0	OC	0	0-3 ft	
9/23/2013	47.73112	122.74121	POST	NA	17:58:11	18:02:11	HSEA	130	220	130	1	0	SW-N	DI	SW-S	NONE	G	0	OC	0	0-3 ft	
9/24/2013			CON	NA	14:18:02	14:18:25	HSEA	65	280	155	1		SW-S	LO	DI	NONE	G	0	PC	1	0-3 ft	
9/24/2013			CON	NA	14:38:50	17:30:42	CASL	850	315	780	2		HO			V	G	0	R	1	0-3 ft	on perimeter fence. 2nd CASL haul out observed 1538 - 5 fence sections between the two. 2nd CASL 8 fence sections at 16:31.
9/24/2013			CON	NA	14:43:13	14:43:20	HSEA	75	255	150	1		SW-N	SI		NONE	G	0	R	1	0-3 ft	
9/24/2013			CON	NA	14:52:18	14:52:50	HSEA	45	275	130	1		SP	SW-S	DI	NONE	G	0	R	1	0-3 ft	
9/24/2013			CON	NA	14:55:35	14:56:10	HSEA	105	210	165	1		SW-S	SI		NONE	G	0	R	1	0-3 ft	
9/24/2013			CON	NA	15:30:34	15:30:57	HSEA	120	210	170	1		SW-S	SI		NONE	G	0	R	1	0-3 ft	
9/24/2013			CON	NA	15:32:48	15:33:09	HSEA	25	240	85	1		SW-SE	LO	DI	NONE	G	0	R	1	0-3 ft	was eating something orange-brown in color. pile in air
9/24/2013			CON	NA	15:36:11	15:36:59	HSEA	80	200	150	1		FL	LO	DI	NONE	G	0	R	1	0-3 ft	pile in air
9/24/2013			CON	NA	15:46:52	15:47:07	HSEA	115	210	130	1		FL	DI		NONE	M	0	R	1	0-3 ft	pile in air
9/24/2013			CON	NA	15:49:45	15:52:10	UNKW	800	320	820	1		FL	SI		NONE	G	0	R	1	0-3 ft	stabbing pile
9/24/2013			CON	NA	16:10:25	16:10:41	HSEA	140	330	160	1		SW-NW	LO	SI	NONE	G	5	R	1	0-3 ft	surfaced after vibe of
9/24/2013			CON	NA	16:18:23	16:20:25	HSEA	35	195	100	1		HO	DI		NONE	G	5	R	1	0-3 ft	laying on orange floaing containment boom.
9/24/2013			CON	NA	16:23:54	16:24:24	HSEA	30	200	100	1		LO	SI		NONE	G	5	R	1	0-3 ft	sunk just before vibe on
9/24/2013			CON	1S	16:26:21	16:26:34	HSEA	30	250	110	1		SW-SE	LO	DI	V	G	5	R	1	0-3 ft	

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9/24/2013			CON	1S	16:26:56	17:19:18	HSEA	20	260	90	2		HO	DI		V	G	5	R	1	0-3 ft	swam up to, laying on orange floaing containment boom. one swimming SE away from rig 80m dove, resurfaced, dove. During vibe/off/vibe/off
9/24/2013			CON	NA	16:35:52	16:36:12	HSEA	20	300	100	1		SW-E	DI		NONE	G	10	OC	1	0-3 ft	surfaced during vibe, dove vibe off
9/24/2013			CON	NA	16:39:27	16:39:35	HSEA	40	265	120	1		SW-E	DI		NONE	G	10	OC	1	0-3 ft	surafced after vibe off
9/24/2013			CON	1S	16:44:09	16:44:26	HSEA	85	255	170	1		SW-N	DI		V	G	10	OC	1	0-3 ft	
9/24/2013			CON	1S	16:46:40	16:50:19	HSEA	135	240	205	1		SW-N	LO	DI	V	G	10	OC	1	0-3 ft	resurfaced further N 190m, dove again still swim N
9/24/2013			CON	NA	16:53:23	16:57:13	HSEA	135	260	205	1		SW-N	DI		NONE	G	10	OC	1	0-3 ft	surfaced after vibe off. Resurfaced 210m, dove still swim N
9/24/2013			CON	NA	17:11:43	17:15:02	CASL	300	210	360	1		PO	SW-N		NONE	G	10	OC	0	0-3 ft	swimming north inside perimeter fence. Out of range N.
9/24/2013			CON	NA	17:39:10	17:39:51	HSEA	90	240	140	1		SW-N	SI		NONE	G	10	OC	0	0-3 ft	sank just before vibe on
9/24/2013			POST	NA	17:57:24	17:57:42	HSEA	110	315	125	1		SW-N	SI		NONE	G	5	OC	0	0-3 ft	
9/25/2013	47.73112	122.74121	CON	NA	8:38:41	8:39:25	HSEA	220	200	250	1	0	SW-S	DI		NONE	E	0	PC	1	0-3 ft	
9/25/2013	47.73112	122.74121	CON	2S	8:45:15	8:45:51	HSEA	150	240	180	1	0	MI	SW-N		V	E	0	PC	1	0-3 ft	
9/25/2013			CON	NA	9:14:06	9:22:13	UNKW	400	240	450	1		PO	HO	FL	NONE	M	0	OC	2	0-3 ft	Unsure if Steller or CA sea lion. Hauled out on perimeter fence and returned to water when boat passed.
9/25/2013	47.73112	122.74121	CON	NA	10:44:00	10:44:11	HSEA	105	15	40	1	1	SW-N	DI		NONE	E	0	PC	2	0-3 ft	
9/25/2013	47.73112	122.74121	CON	NA	11:35:57	11:37:25	HSEA	60	200	80	1	1	RE	DI	MI	NONE	E	0	PC	2	0-3 ft	
9/25/2013			CON	NA	11:47:37	11:50:00	UNKW	100	300	150	1		TR-NW			NONE	M	0	PC	2	0-3 ft	possible HPOR
9/25/2013	47.73112	122.74121	CON	3S	11:52:36	11:54:04	HSEA	20	200	80	1	1	RE	DI		V	E	0	PC	2	0-3 ft	
9/25/2013	47.73112	122.74121	CON	NA	11:57:11	11:57:15	HSEA	30	200	80	1	1	SW-N	DI		NONE	E	0	PC	2	0-3 ft	
9/25/2013			CON	NA	13:43:03	13:43:15	HSEA	40	240	90	1		LO	SI		NONE	G	0	PC	2	0-3 ft	
9/25/2013	47.73112	122.74121	CON	NA	13:50:13	13:51:16	HSEA	10	120	50	1	1	FO			NONE	E	0	PC	1	0-3 ft	
9/25/2013	47.73112	122.74121	CON	NA	13:55:20	13:55:34	HSEA	20	190	70	1	1	SW-N	RE		NONE	E	0	PC	1	0-3 ft	
9/25/2013			CON	NA	14:08:01	14:08:32	HSEA	50	200	100	1		LO	SI		NONE	G	0	PC	2	0-3 ft	
9/25/2013	47.73112	122.74121	CON	NA	14:12:33	14:13:21	HSEA	25	100	40	1	1	SW-N	RE		NONE	E	0	PC	1	0-3 ft	
9/25/2013	47.73112	122.74121	CON	NA	14:21:51	14:23:46	HSEA	15	90	45	1	1	MI	RE	DI	NONE	E	0	PC	1	0-3 ft	
9/25/2013	47.73112	122.74121	CON	NA	14:27:18	14:28:05	HSEA	15	70	55	1	1	RE	DI		SSI	E	0	PC	1	0-3 ft	
9/25/2013	47.73112	122.74121	CON	NA	14:48:31	14:48:42	HSEA	30	50	60	1	1	MI			NONE	E	0	PC	1	0-3 ft	
9/25/2013	47.73112	122.74121	CON	NA	14:50:00	14:50:15	HSEA	50	200	110	1	1	MI	DI		NONE	E	0	PC	1	0-3 ft	
9/25/2013	47.73112	122.74121	CON	3S	14:56:00	15:00:00	HSEA	250	225	300	1	1	SW-S	DI		I	E	0	PC	1	0-3 ft	
9/25/2013			CON	3S	14:56:52	14:57:03	HSEA	150	200	220	1		SW-S	DI		I	G	0	PC	2	0-3 ft	

Date	Lat	Long	Event Code	Pile Number	Obs. Start Time	Obs. End Time	Species	Dist to animal(m)	Dir to animal	Dist to pile	Best num of animals	Number of juveniles	Behavior Code	Behavior 2	Behavior 3	Const. Type	Visibility	% Glare	Weather	Sea State	Wave height	Comments
9/25/2013			CON	3S	15:06:47	15:07:00	HSEA	300	270	370	1		SW-S	DI		I	G	0	PC	1	0-3 ft	
9/25/2013			CON	NA	15:15:52	15:16:03	HSEA	150	270	220	1		SW-N	DI		NONE	G	0	PC	2	0-3 ft	
9/25/2013			CON	NA	15:23:03	15:23:09	HSEA	80	340	100	1		SW-E	DI		NONE	M	0	PC	2	0-3 ft	
9/25/2013			CON	NA	15:29:01	15:29:05	HSEA	130	230	200	1		LO	SI		NONE	G	0	PC	1	0-3 ft	
9/25/2013			POST	NA	17:06:24	17:06:57	HSEA	60	280		1		LO	SI		NONE	G	5	PC	2	0-3 ft	