

Marine Mammal Monitoring Plan
for the
Erickson Residence Marine Access Project

Juneau, Alaska

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(DRAFT Pending receipt of final permits)



Submitted to:
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Appendix A. Marine Mammal Observation Record

ACRONYMS AND ABBREVIATIONS

- ESA Endangered Species Act
- GPS global positioning system
- IHA Incidental Harassment Authorization
- MMMP Marine Mammal Monitoring Plan
- MMPA Marine Mammal Protection Act
- MSE Mechanically Stabilized Earth
- NMFS National Marine Fisheries Service
- NOAA National Oceanic and Atmospheric Administration
- PND PND Engineers, Inc.
- PTS permanent threshold shift
- SPL sound pressure level
- TTS temporary threshold shift

1 Introduction

The purpose of this Marine Mammal Monitoring Plan (MMMP) is to provide a protocol for monitoring affected species during the proposed construction of the Erickson Residence Marine Access project in Juneau, Alaska. This plan was developed to support the Incidental Harassment Authorization (IHA) application under the Marine Mammal Protection Act, Section 101(a)(5)(D) permitting. The IHA application provides a detailed discussion on the calculations for the proposed action.

A marine mammal monitoring program will be implemented at the start of specified construction activities and will follow the protocols outlined in this MMMP. The primary goals of the monitoring program are:

- To monitor the proposed shutdown and monitoring zones, to estimate the number of marine mammals exposed to noise at or exceeding established thresholds, and to document animal responses;
- To minimize impacts to the marine mammal species present in the project area by implementing mitigation measures including monitoring, ensuring the shutdown zones are clear of marine mammals, soft start, and shutdown procedures; and
- To collect data on takes, occurrence and behavior of marine mammal species in the project area and any potential impacts from the project.

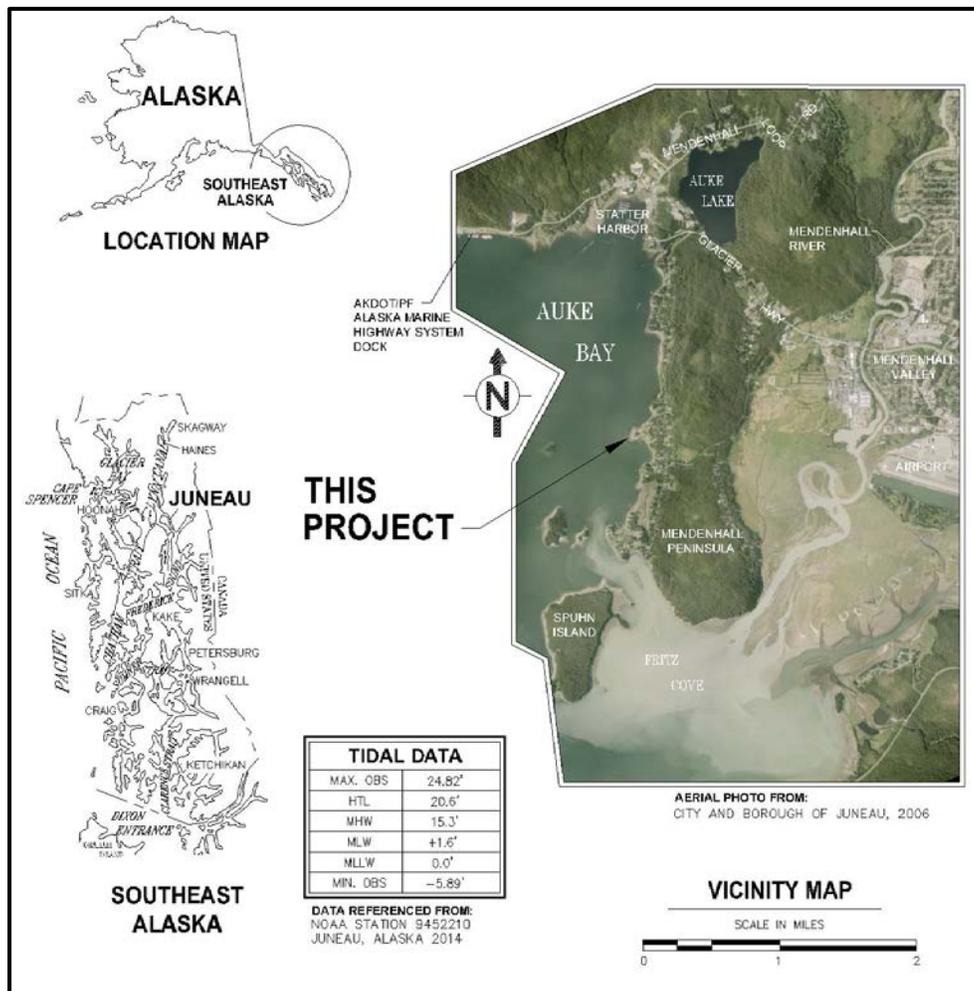


Figure 1. Project location within Auke Bay, Juneau, AK

2 Project Description

Jim Erickson is proposing to replace his private, deteriorated moorage facility within Auke Bay in Juneau, Alaska to provide a safer, more accessible and secure dock for the resident owner. A complete description of the region, project tasks, project materials, dates and duration, affected species, and anticipated impacts are included in the Erickson Residence Marine Access IHA application, to which this document is a companion. In general terms, this phase of the project will consist of installation of new commercial vessel moorage floats, including piles and utilities.

3 Species Covered Under IHA

Steller sea lions (*Eumetopias jubatus*), harbor seals (*Phoca vitulina*), humpback whales (*Megaptera novaeangliae*), harbor porpoises (*Phocoena phocoena*), Dall's porpoise (*Phocoenoides dalli*), killer whales (*Orcinus orca*) and California sea lions (*Zalophus californianus*) are covered under the Erickson Residence Marine Access IHA request.

Work will shut down if any other marine mammal enters an unauthorized harassment zone.

4 Methods

Under directives in the Marine Mammal Protection Act (MMPA) and the Endangered Species Act (ESA), this marine mammal monitoring and impacts minimization plan was tailored to the project to ensure appropriate documentation and compliance with applicable regulations. Monitoring will be conducted by qualified, trained marine mammal observers (hereafter, "observers"). Land- and vessel-based observers will be located on-site before, during, and after in-water construction activity at sites appropriate for monitoring marine mammals within and approaching the Level A and Level B harassment zones.

During observation periods, observers will continuously scan the area for marine mammals using binoculars and the naked eye. Observers will work shifts of a maximum of four consecutive hours followed by an observer rotation or a 1-hour break and will work no more than 12 hours in any 24-hour period. Observers will collect data including environmental conditions (e.g., sea state, precipitation, glare, etc.), marine mammal sightings (e.g., species, numbers, location, behavior, responses to construction activity, etc.), construction activity at the time of sighting, and number of marine mammal exposures (takes). Observers will conduct observations, meet training requirements, fill out data forms, and report findings in accordance with this MMMP.

Observers will implement mitigation measures including monitoring of the proposed shutdown and monitoring zones, ensuring shutdown zones are clear of marine mammals, and shutdown procedures. They will be in continuous contact with the construction personnel via two-way radio. A cellular phone with local service will be used as back-up communications and for safety purposes.

An employee of the construction contractor will be identified as the pile driving supervisor for observers at the start of each construction day. Observers will report directly to the pile driving supervisor when a shutdown is deemed necessary due to marine mammals approaching the relevant shutdown zones construction activity.

4.1 Observer Qualifications

Monitoring will be conducted by qualified, trained observers. In order for observers to be considered qualified, the following requirements must be met:

- Independent observers will be used (i.e., not construction personnel with the exception of the 33-ft/10-m shutdown zones which construction personnel may monitor);
 - At least one observers must have prior experience working as a marine mammal observer during construction activities;
 - Other observers may substitute education (degree in biological science or related field) or training for experience;
 - Where a team of three or more observers are required, a lead observer or monitoring coordinator must be designated. The lead observer must have prior experience working as a marine mammal observer during construction; and
 - Prior to construction observers CVs must be submitted for approval by NMFS.
- Visual acuity in both eyes (correction is permissible) sufficient for discernment of moving targets at the water's surface with ability to estimate target size and distance;
- Physical capability of performing essential duties, including sitting or standing for periods of up to four hours, using binoculars or other field aid, and documenting observations;
- Experience and ability to conduct field observations and collect data according to assigned protocols;
- Experience or training in the field identification of marine mammals and marine mammal behavior, including the ability to accurately identify marine mammals in Alaskan waters to species;
- Sufficient training, orientation or experience with the construction operation to provide for identification of concurrent activities and for personal safety during observations;
- Writing skills sufficient to prepare reports of observations; and
- Ability to communicate orally, by radio and in person, with project personnel to provide real-time information on marine mammals observed in the area and the appropriate mitigation response for the circumstances.

4.2 Data Collection

Observers will use a National Marine Fisheries Service (NMFS)-approved Observation Record (Appendix A) which will be completed by each observer for each survey day and location. Observation Records will be used by observers to record the following:

- Date and time that permitted construction activity begins or ends;
- Weather parameters (e.g. percent cloud cover, percent glare, visibility) and sea state (the Beaufort Wind Force Scale will be used to determine sea-state);
- Species, numbers, and, if possible, sex and age class of observed marine mammals;
- Construction activities occurring during each sighting;
- Marine mammal behavior patterns observed, including bearing and direction of travel;
- Specific focus should be paid to behavioral reactions just prior to, or during, soft-start and shutdown procedures;
- Location of marine mammal, distance from observer to the marine mammal, and distance from pile removal activities to marine mammals;
- Record of whether an observation required the implementation of mitigation measures, including shutdown procedures and the duration of each shutdown.

4.3 Equipment

The following equipment will be required to conduct observations for this project:

- Appropriate Personal Protective Equipment;
- Portable radios and headsets for the observers to communicate with the pile driving supervisor and other observers;
- Cellular phone as backup for radio communication;
- Contact information for the other observers, pile driving supervisor, and NMFS point of contact;
- Daily tide tables for the project area;
- Watch or chronometer;
- Binoculars (quality 7 x 50 or better) or spotting scope with built-in rangefinder or reticles (rangefinder may be provided separately);
- Hand-held GPS unit, map and compass, or grid map to record locations of marine mammals;
- Copies of MMMP, IHA, and/or other relevant permit requirement specifications in sealed clear plastic cover;
- Notebook with pre-standardized monitoring Observation Record forms on waterproof paper; and

4.4 Shutdown and Monitoring Zones

Shutdown and monitoring zones have been established to delineate areas in which marine mammals may be exposed to injurious underwater sound levels due to in-water construction. Work which could cause noise levels to rise above non-permitted thresholds will shut down if marine mammals are approaching shutdown zones. Observers will also monitor and document activities in areas where animals could be subjected to noise levels at or above the permitted thresholds. The effective zones are summarized below and are discussed in detail in Section 5 of the IHA request.

Species with permitted Level B harassment under the IHA include Steller sea lions (*Eumetopias jubatus*), harbor seals (*Phoca vitulina*), humpback whales (*Megaptera novaeangliae*), harbor porpoises (*Phocoena phocoena*), Dall's porpoise (*Phocoenoides dalli*), killer whales (*Orcinus orca*), minke whales (*Balaenoptera acutorostrata*) and California sea lions (*Zalophus californianus*). Take of any other marine mammal is not permitted under the IHA, nor is take by activities not authorized by the IHA.

Determination of harassment radii was discussed fully in the IHA request. The effective radii are summarized in Tables 1 and 2 below. The following shall apply to monitoring and shutdown zones.

- During all in-water or over-water construction activities having the potential to affect marine mammals, a shutdown zone of 35 feet (10 meters) will be implemented to ensure that animals are not endangered by physical interaction with construction equipment. These activities could include, but are not limited to, the positioning of the pile on the substrate via a crane ("stabbing" the pile) or the slinging of construction materials via crane.
- The harassment zones will be monitored throughout the permitted in-water or over-water construction activity.
 - If a permitted marine mammal enters the monitoring zone, an exposure will be recorded and animal behaviors documented. However, permitted construction activities would continue without cessation unless the animal approaches or enters the shutdown zone.
 - If a marine mammal approaches or enters a shutdown zone, all permitted construction activities will be immediately halted until the marine mammal has left the shutdown zone.

- Take, in the form Level B harassment, of marine mammals other than permitted species is not authorized and will be avoided by shutting down construction activities before individuals of these species enter the Level B harassment zone.

Table 1. Effective Shutdown and Monitoring Zones – Underwater Sources

Source	Shutdown Zone – Permitted Species					Shutdown Zone ¹
	Low-Frequency Cetaceans (Humpback Whale)	Mid-Frequency Cetaceans (Killer Whale)	High-Frequency Cetaceans (Dall’s and Harbor Porpoise)	Phocid Pinnipeds (Harbor Seal)	Otariid Pinnipeds (Steller and California Sea Lions)	Non-Permitted Species
Vibratory Timber Pile Removal	35 ft (10 m)	35 ft (10 m)	35 ft (10 m)	35 ft (10 m)	35 ft (10 m)	4,460 ft (1,360 m)
Vibratory Pile Driving (12.75-inch)	35 ft (10 m)	35 ft (10 m)	35 ft (10 m)	35 ft (10 m)	35 ft (10 m)	7,070 ft (2,155 m)
Vibratory Pile Driving (20-inch)	60 ft (20 m)	35 ft (10 m)	85 ft (30 m)	35 ft (15 m)	35 ft (10 m)	3.55 miles (5.41 km)
Drilling	250 ft (75 m)	35 ft (10 m)	345 ft (105 m)	150 ft (45 m)	35 ft (10 m)	7.5 miles (12.1 km)
Impact Pile Driving 12.75-inch	130 ft (40 m)	35 ft (10 m)	165 ft (50 m)	ft (20 m)	65 ft (10 m)	445 ft (135 m)
Impact Pile Driving 20-inch	435 ft (135 m)	35 ft (10 m)	515 ft (160 m)	230 ft (75 m)	35 ft (10 m)	3,280 Ft (1,000 m)

*Since many Level A harassment zones are smaller than the conservative 35-foot (10-meter) shutdown zone to prevent physical injury, the conservative shutdown zone will be implemented for all in-water activities.

Table 2. Effective Shutdown and Monitoring Zones – Airborne Sources

Airborne Noise		
Source	Shutdown Zone (Pinnipeds Only)	Monitoring Zone Pinnipeds Only
Vibratory Pile Driving	35 ft (10 m)	35 ft (10 m)
Impact Pile Driving	35 ft (10 m)	495 feet (150 m)

*Since Level A harassment thresholds do not exist for airborne noise, the 10-meter shutdown zone will be implemented for all hauled out marine mammals.

¹ Shut down zones are calculated zones, however these zones are limited as shown in Figure 2 due to the presence of land masses. Shutdown zones for non-permitted species are the same as the monitoring zones for permitted species.

4.5 Authorized Take Numbers

Shutdown measures must be implemented if the number of any allotted marine mammal takes reaches the limit under the IHA and if such marine mammals are sighted within the vicinity of the project area and are approaching their respective Level A or Level B harassment monitoring zone.

4.6 Observer Monitoring Locations

In order to observe the shutdown and monitoring zones effectively, observers will be positioned at the best practicable vantage points, taking into consideration security, safety, access, and space limitations. A minimum of 3 observers will be stationed at locations that provide adequate visual coverage for shutdown and monitoring zones during pile driving and drilling activities. Observer locations must be identified that (1) have an unobstructed view of the work being conducted and (2) unobstructed view of all the water within the Level A Zone (if applicable) and as much of the Level B zone as possible). Primary observation locations are depicted in Figure 2. Other stations will be utilized as needed when the view is blocked by construction equipment, staged materials, vessels, fog, or other obstructions or to ensure observer safety.

Monitoring zone identification may be based on fixed points and structure-defined areas incorporating the zone radii or greater area, rather than exact measurements. Marine mammal researchers and monitoring personnel typically use spotting scopes and binoculars to enhance visibility and reticle binoculars and laser range finders to gauge distance of animals from viewing stations. However, the Auke Bay site provides challenges for these technologies. Reticle binoculars require an open-water backdrop (open horizon) to determine the angle for calculating distance to an object, and the observer must always know height above the subject viewed to make an accurate distance estimate. Limiting factors such as structures, moving boats, or fog can interfere with spotting scope or laser rangefinder distance measurements. For these reasons, we propose using monitoring zones defined by structures (such as ramps, docks, land features, and pilings) of precisely known geographic locations that approximately correspond to the calculated perimeters from circular project site monitoring zones. This practical adaptation will provide for much more precise counting of animals in a particular section of Auke Bay without introducing ambiguous estimates of distance from construction equipment.

4.6.1 Pile Driving and Removal

During pile driving activities a minimum of three observers will be on duty, during drilling a minimum of four observers will be on duty, and during pile removal a minimum of 2 observers will be on duty. The primary potential observer stations are at the construction site and two roving stations from vessels as pictured in Figure 2. Other stations will be utilized as needed when the view is blocked by construction equipment, staged materials, vessels, fog, or other obstructions or to ensure observer safety.

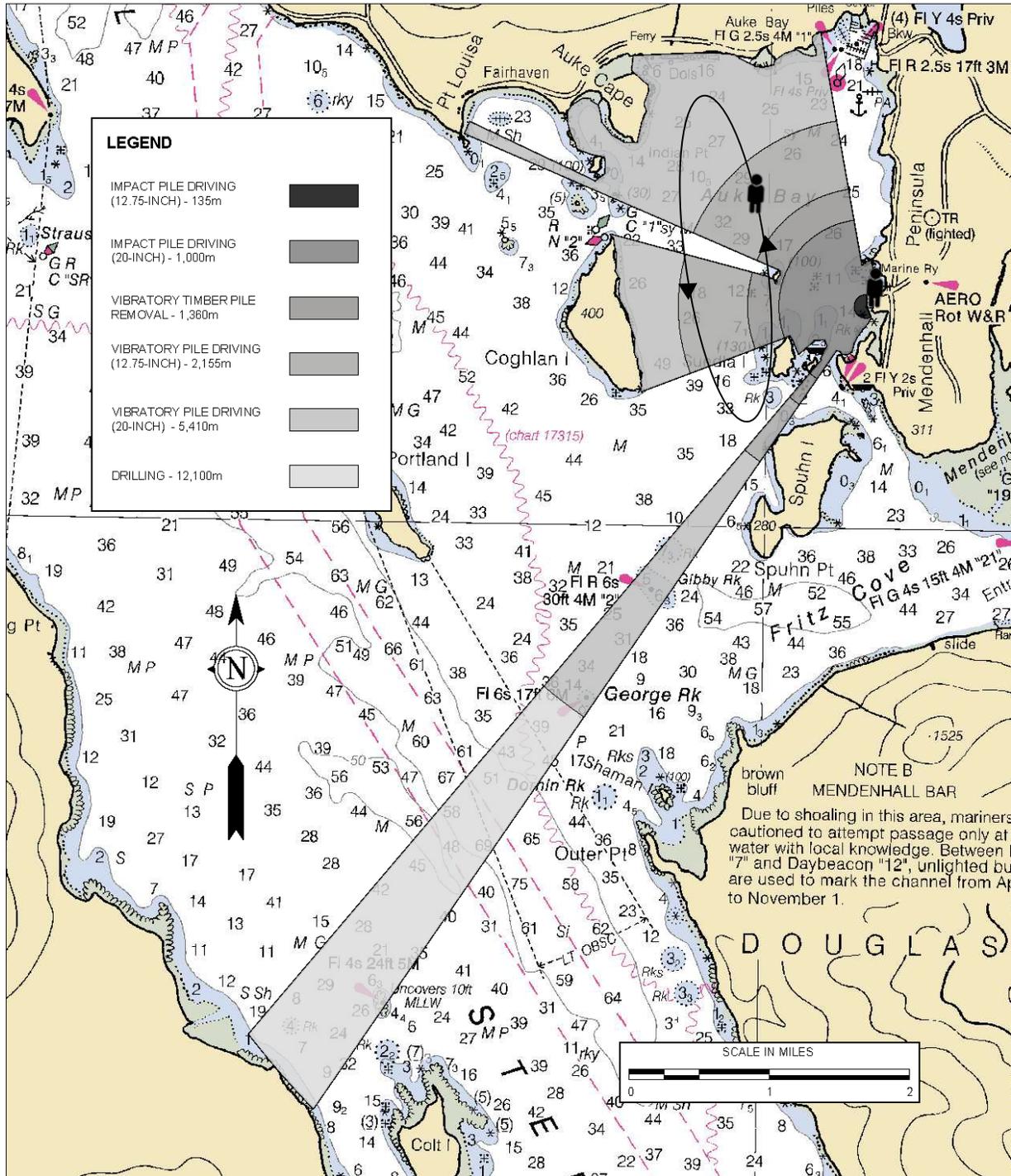


Figure 2. Primary Potential Observer Locations²

² Bathymetry from: NOAA 17316 Lynn Canal from Icy Strait to Point Sherman

4.7 Monitoring Techniques

Sighting data will be collected including the behaviors of marine mammal species that are observed in the shutdown and monitoring zones during construction. All observers will be qualified and trained in marine mammal identification and behaviors, as described in Section 4.1. NMFS requires that the observers have no other construction-related tasks while conducting monitoring.

Monitoring of shutdown and observation zones will take place from 30 minutes prior to initiation through 30 minutes post-completion of all permitted activities.

Observation generally necessitates that daylight is sufficient for observers to visualize the entirety of the monitoring zones, so observations will commence and be completed during daylight hours.

4.7.1 Pre-Activity Monitoring

The following monitoring methodology will be implemented prior to commencing permitted activities:

- Prior to the start of permitted activities, observers will monitor the shutdown and monitoring zones for 15 minutes (for pinnipeds) and 30 minutes (for cetaceans). They will ensure that no marine mammals are present within the shutdown zone before permitted activities begin.
- The shutdown zone will be cleared when marine mammals have not been observed within the zone for that 15-minute period. If a marine mammal is observed within the shutdown zone, a soft-start cannot proceed until the animal has left the zone or has not been observed for 15 minutes (for pinnipeds) and 30 minutes (for cetaceans).
- When all applicable shutdown zones are clear, the observers will radio the pile driving supervisor. Permitted activities will not commence until the pile driving supervisor receives verbal confirmation the zones are clear.
- If permitted species are present within the monitoring zone, work will not be delayed, but observers will monitor and document the behavior of individuals that remain in the monitoring zone.
- In case of fog or reduced visibility, observers must be able to see the entirety of shutdown and monitoring zones before permitted activities can be initiated.

4.7.2 Soft Start Procedures

Soft start procedures will be used prior to periods of vibratory pile driving to allow marine mammals to leave the area prior to exposure to maximum noise levels.

- For vibratory hammers, the contractor shall run the vibratory hammer for no more than 30 seconds followed by a quiet period of at least 60 seconds without vibratory removal of piles. The process shall be repeated twice more within 10 minutes before beginning vibratory removal operations that last longer than 30 seconds.
- For other heavy equipment operating from barges or nearshore, the equipment will be idled for 15 minutes prior to operation.
- If work ceases for more than 30 minutes, soft start procedures must recommence prior to performing additional work.

4.7.3 During-Activity Monitoring

The following monitoring methodology will be implemented during permitted activities:

- If permitted species are observed within the monitoring zone during permitted activities, an exposure will be recorded and behaviors documented. Work will not stop unless an animal enters or appears likely to enter the shutdown zone.

4.7.4 Inclement Weather

During inclement weather or periods of limited visibility, work that has begun with a fully cleared observation zone may continue. In those cases, an assumed rate of observation similar to the daily average rate of observation will be used to estimate the number of sightings to be reported during those periods. This method will only be used if the full observation zone was visible during the start of work and no shutdowns greater than 30 minutes have occurred. Total exposures must be recorded and extrapolated based upon the total observed exposures and the percentage of the Level B harassment zone that was not visible.

4.7.5 Shutdown

If a marine mammal enters or appears likely to enter the shutdown zone:

- The observers shall immediately radio or call to alert the pile driving supervisor.
- All permitted activities will be immediately halted.
- In the event of a shutdown of pile installation or removal operations, permitted activities may resume only when:
 - The animal(s) within or approaching the shutdown zone has been visually confirmed beyond or heading away from the shutdown zone, or 15 minutes (for pinnipeds) or 30 minutes (for cetaceans) have passed without re-detection of the animal;
 - Observers will then radio or call the pile driving supervisor that activities can re-commence.

4.7.6 Breaks in Work

During an in-water construction delay, the shutdown and monitoring zones will continue to be monitored. No exposures will be recorded for permitted species in the monitoring zone if there are no concurrent permitted construction activities.

If permitted activities cease for more than 30 minutes and monitoring has not continued, pre-activity monitoring and soft start procedures must recommence. This includes breaks due to scheduled or unforeseen construction practices or breaks due to permit-required shutdown. Following 15 minutes (for pinnipeds) or 30 minutes (for cetaceans) of monitoring, work can begin according to the pre-activity monitoring protocols. Work cannot begin if an animal is within the shutdown zone or if visibility is not clear throughout the shutdown and monitoring zones.

4.7.7 Post-Activity Monitoring

Monitoring of the shutdown and monitoring zones will continue for 30 minutes following completion of vibratory pile driving. A post-monitoring period is not required for other in-water construction. These surveys will record observations, focusing on observing and reporting unusual or abnormal behavior of marine mammals. Observation Record forms will be used to document observed behavior.

5 Reporting

5.1 Injured or Dead Marine Mammal

If an injured, sick, or dead marine mammal is discovered, a representative will notify NMFS and provide the species or description of the animal(s), condition of the animal or carcass, location, date and time of first discovery, observed behaviors (if alive), and photograph or video (if available). Notifications are to be made to both the NMFS Office of Protected Resources (301-427-8401) and the Alaska Regional Stranding Coordinator (877-925-7773).

- If the marine mammal's condition is a direct result of the project, notification will be made and work will stop until NMFS is able to review the circumstances of the prohibited take.
- If 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, scavenger damage), the incident shall be reported within 24 hours of the discovery. Construction activities may continue while NMFS reviews the circumstances of the incident and makes a final determination on the cause of the reported injury or death.
- If cause of death is unclear, the incident shall immediately be reported. Construction activities may continue while NMFS reviews the circumstances of the incident and makes a final determination on the cause of the reported injury or death. NMFS will work with the owner to determine whether additional mitigation measures or modifications to the activities are appropriate.

Care should be taken in handling dead specimens, if encountered, to preserve biological materials in the best possible state for later analysis of cause of death. In preservation of biological materials from a dead animal, the finder (i.e. observer) has the responsibility to ensure that evidence associated with the specimen is not unnecessarily disturbed.

Reports will be made to the Office of Protected Resources and the Alaska Regional Stranding Coordinator.

5.2 Annual Report

A comprehensive annual marine mammal monitoring report documenting marine mammal observations will be submitted to NMFS at the end of the in-water work season. The draft comprehensive marine mammal monitoring report will be submitted to NMFS within 90 calendar days of the end of the in-water work period for each phase. The report will include marine mammal observations (pre-activity, during-activity, and post-activity) during permitted activities. A final comprehensive report will be prepared and submitted to NMFS within 30 calendar days following resolution of comments on the draft report from NMFS.

At a minimum the reports shall include:

- General data:
 - Date and time of activity
 - Water conditions (e.g., sea-state)
 - Weather conditions (e.g., percent cover, percent glare, visibility)
- Specific pile driving data:
 - Description of the pile removal being conducted (pile locations, pile size and type), and times (onset and completion) when pile removal occurs.
 - The construction contractor and/or marine mammal monitoring staff will coordinate to ensure that vibratory pile removal times and strike counts are accurately recorded. The duration of soft start procedures should be noted as separate from the full power duration.

- Description of in-water construction activity not involving pile driving (location, type of activity, onset and completion times)
- Pre-activity observational survey-specific data:
 - Date and time survey is initiated and terminated
 - Description of any observable marine mammals and their behavior in the immediate area during monitoring
 - Times when in-water construction is delayed due to presence of marine mammals within shutdown zones.
- During-activity observational survey-specific data:
 - Description of any observable marine mammal behavior within monitoring zones or in the immediate area surrounding the monitoring zones, including the following:
 - Distance from animal to vibratory pile removal sound source.
 - Reason why/why not shutdown implemented.
 - If a shutdown was implemented, behavioral reactions noted and if they occurred before or after implementation of the shutdown.
 - If a shutdown was implemented, the distance from animal to sound 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 sound source during soft start.
- Post-activity observational survey-specific data:
 - Results, which include the detections and behavioral reactions of marine mammals, the species and numbers observed, sighting rates and distances,
 - Refined exposure estimate based on the number of marine mammals observed. This may be reported as a rate of take (number of marine mammals per hour or per day), or using some other appropriate metric.

Appendix A. Marine Mammal Observation Record

MARINE MAMMAL OBSERVATION RECORD

Project Name: Statter Harbor Improvements

Monitoring Location: _____

Date: _____

Time Effort Initiated: _____

Time Effort Completed: _____

Page of

Time	Visibility	Glare	Weather Condition	Wave Height	BSS	Wind	Swell
:	B-P-M-G-E	%	S-PC-L-R-F-OC-SN-HR	Lt/Mod/Hvy		N S E W	N S E W
:	B-P-M-G-E	%	S-PC-L-R-F-OC-SN-HR	Lt/Mod/Hvy		N S E W	N S E W
:	B-P-M-G-E	%	S-PC-L-R-F-OC-SN-HR	Lt/Mod/Hvy		N S E W	N S E W
:	B-P-M-G-E	%	S-PC-L-R-F-OC-SN-HR	Lt/Mod/Hvy		N S E W	N S E W
:	B-P-M-G-E	%	S-PC-L-R-F-OC-SN-HR	Lt/Mod/Hvy		N S E W	N S E W
:	B-P-M-G-E	%	S-PC-L-R-F-OC-SN-HR	Lt/Mod/Hvy		N S E W	N S E W

Event Code	Sight # (1 or 1.1 if re- sight)	Time/Dur (Start/End time if cont.)	WP/ Grid #/ DIR of travel	Zone/ Radius/ Impact Pile #?	Obs- erver	Sighting Cue	Species	Group Size	Behavior Code (see code sheet)	Construction Type	Mitigation Type	Exposure Type (A/B)	Behavior Change/ Response to Activity/Comments/Human Activity/Vessel Hull # or Name/ Visibility Notes
E ON PRE/POST CON S M OR E OFF		:	Grid N or S W or E			BL BO BR DF SA OTHER		Min: Max: Best:		SSV SSI V DR I DP ST OWC NOWC / NONE	SS/BC DE SD None		
E ON PRE/POST CON S M OR E OFF		:	Grid N or S W or E			BL BO BR DF SA OTHER		Min: Max: Best:		SSV SSI V DR I DP ST OWC NOWC / NONE	SS/BC DE SD None		
E ON PRE/POST CON S M OR E OFF		:	Grid N or S W or E			BL BO BR DF SA OTHER		Min: Max: Best:		SSV SSI V DR I DP ST OWC NOWC / NONE	SS/BC DE SD None		
E ON PRE/POST CON S M OR E OFF		:	Grid N or S W or E			BL BO BR DF SA OTHER		Min: Max: Best:		SSV SSI V DR I DP ST OWC NOWC / NONE	SS/BC DE SD None		
E ON PRE/POST CON S M OR E OFF		:	Grid N or S W or E			BL BO BR DF SA OTHER		Min: Max: Best:		SSV SSI V DR I DP ST OWC NOWC / NONE	SS/BC DE SD None		
E ON PRE/POST CON S M OR E OFF		:	Grid N or S W or E			BL BO BR DF SA OTHER		Min: Max: Best:		SSV SSI V DR I DP ST OWC NOWC / NONE	SS/BC DE SD None		
E ON PRE/POST CON S M OR E OFF		:	Grid N or S W or E			BL BO BR DF SA OTHER		Min: Max: Best:		SSV SSI V DR I DP ST OWC NOWC / NONE	SS/BC DE SD None		
E ON PRE/POST CON S M OR E OFF		:	Grid N or S W or E			BL BO BR DF SA OTHER		Min: Max: Best:		SSV SSI V DR I DP ST OWC NOWC / NONE	SS/BC DE SD None		

Marine Mammal Observation Record – Sighting 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
AWA	Approach Work	
LWA	Leave Work Area	
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

Sea State and Wave Height: Use Beaufort Sea State Scale for Sea State. 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.

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.

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.

Wind Direction: Wind direction should also be where the wind is coming from.



Event

Code	Activity Type
E ON	Effort On
E OFF	Effort Off
PRE	Pre-Construction Watch
POST	Post-Construction Watch
CON	Construction (see types)
S	Sighting
M	Mitigation (see types)
OR	Observer Rotation

Sighting Cues

Code	Distance Visible
BL	Blow
BO	Body
BR	Breach
DF	Dorsal Fin
SA	Surface Activity
OTHR	Other

Marine Mammal Species

Code	Marine Mammal Species
HSEA	Harbor Seal
STSL	Steller Sea Lion
HPBK	Humpback Whale
OTT	Sea Otter
STEID	Steller's Eider
OTHR	Other

Construction Type

Code	Activity Type
V	Vibratory Pile Driving (installation and extraction)
I	Impact Pile Driving
DP	Dead pull
ST	Stabbing
DR	Drilling
OWC	Over-Water Construction
NOWC	No Over-Water Construction
NONE	No Construction

Mitigation Codes

Code	Activity Type
SS	Soft Start
BC	Bubble Curtain
DE	Delay onset of In-Water Work
SD	Shut down In-Water Work

Visibility

Code	Distance Visible
B	Bad (<0.5km)
P	Poor (0.5 – 0.9km)
M	Moderate (0.9 – 3km)
G	Good (3 - 10km)
E	Excellent (>10km)

Weather Conditions

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

Wave Height

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