

SUBMITTAL TRANSMITTAL

PROJECT APMP Test Pile Program SUBMITTAL NO. TRANS- 080b
 CONTRACTOR Kiewit Infrastructure W. CO CONTRACT NO. MOA C-2015088
 ORIGINATOR Tanner Vetsch
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 TO: Municipality of Anchorage SHEET 1 OF 30
 Port of Anchorage
 2000 Anchorage Port Road
 Anchorage, AK 99501
 ATTENTION: Scott Wharton

ITEM <u>MMO - FINAL Report</u> SUPPLIER/CONTRACTOR <input type="checkbox"/> Original Submittal <input type="checkbox"/> 3rd <input type="checkbox"/> Other <input checked="" type="checkbox"/> 2nd <input type="checkbox"/> 4th		REVIEW ACTION						
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No.	(Provide Itemized List of Contents in this Submittal)							
1.6.E	MMO - FINAL Report (Amended per Final Response Comments)							

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- (a) We have verified that the material or equipment contained in this submittal meets all the requirements specified or shown (no exceptions), and the submittal is required by the Contract Documents.
- (b) We have verified that the material or equipment contained in this submittal meets all the requirements specified or shown, except for the following deviations (list deviations; attach a separate sheet as necessary), and the submittal is required by the Contract Documents.

Corrections or Comments made relative to submittals during this review do not relieve the Contractor from compliance with the requirements of the Drawings and Specifications. This submittal is only for review of general conformance with the design concept of the Project and general compliance with the information given in the Contract Documents. The Contractor is responsible for confirming and correlating all quantities and dimensions; selecting fabrication processes and techniques of construction; coordinating his work with that of other trades; and performing his work in a safe and satisfactory manner.

CONTRACTOR Tanner Vetsch
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Final Project Report

Anchorage Port Modernization Project Test Pile Program Marine Mammal Observing Program

Submitted to:

Prepared in Consultation With:



2200 Columbia House Boulevard
Vancouver, Washington 98681
Contract No. C-20150888



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List of Acronyms

APMP	Anchorage Port Modernization Project
APU	Alaska Pacific University
ESA	Endangered Species Act
IHA	Incidental Harassment Authorization
MMPA	Marine Mammal Protection Act
MMOs	Marine Mammal Observers
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
POA	Port of Anchorage Administration
TPP	Test Pile Program

1.0 Introduction

This document presents the final report for monitoring and data collection of beluga whale (*Delphinapterus leucas*) and other marine mammal observations during project activities associated with the Anchorage Port Modernization Project (APMP) Test Pile Program (TPP). Kiewit was contracted by the Port of Anchorage (POA) to conduct the TTP. AECOM and its subcontractor Alaska Pacific University (APU) were part of the Kiewit team, responsible for marine mammal observation tasks.

The monitoring effort and data collection were conducted at three locations: 1) the Anchorage Public Boat Dock, 2) the North End, which is located just above shore level at the north end of the APMP, and 3) a roving observer with primary responsibility for the mandatory 100 m shutdown zone and areas immediately adjacent to TPP in-water activity that were not observable from other stations under all scenarios. Marine mammal monitoring was conducted by Marine Mammal Observers (MMOs) primarily from APU, during 19 non-consecutive days from 03 May through 21 June, 2016. Monitoring was conducted according to the conditions of the Incidental Harassment Authorization (IHA) issued to the POA on 4 March, 2016, Sections 4(f) and 5(b-c) and the Marine Mammal Monitoring and Mitigation Plan (updated 3 March, 2016) submitted to the POA by CH2M, their prime contractor for the APMP.

2.0 Monitoring Effort and Methods

2.1 Observation Stations

Monitoring was conducted by trained MMOs primarily from the Marine and Environmental Sciences program at APU, with additional MMOs provided by AECOM. In order to ensure full MMO coverage of the Level-B harassment and shutdown zones implemented in the IHA, we used two observation stations located at the northern and southern extents of the project area (Figure 2.1). One station was located at the Anchorage Public Boat Dock and the other at the North End of the Port, based on previous monitoring conducted for the Port (Cornick et al. 2011). The alignment, configuration, and height of these stations generally provided a wide sweeping view of the required monitoring area with good overlap between stations (Figures 2.2 - 2.3 a-b).

However, once the pile barge and crane arrived on scene and were positioned for driving, it was discovered that a portion of the nearshore areas where pile driving was to occur was obscured from view by the barges themselves, various other Port machinery, and topography. At the South Station, stacks of unloaded shipping containers and a barge, grounded off the Spenard Builders yard with the landing gate lofted high in the air, obscured the view to the north towards

the inshore side of the Coast Guard pier. At the North station the view of a small bight at the northern end of the existing Matson pier and ~500m south along the northern extent of that pier was also obscured.

As a result, an additional MMO (Rover) was stationed adjacent to TPP activities in order to monitor the 100m mandatory shutdown zone for all marine mammals, as well as portions of the beluga shutdown zones not observable from the North and South stations under all scenarios. By virtue of being directly adjacent to the driving location, the Rover was able to serve as primary contact between the pile drivers and the observers, manage decision making for the MMO teams, ensure the area immediately adjacent to the in-water activities was effectively monitored, and relayed specific information about TPP activities to both stations. This facilitated appropriate preparations and monitoring without having to involve construction staff in additional communications.

A team of four MMOs (3 observers, 1 Field Chief) was positioned at each of the two observation stations. Each morning the teams were provided with large format maps depicting the monitoring, take, and shutdown zones defined in the IHA (Table 2.1) and specific to the location of the particular pile being driven that date. These maps facilitated correctly determining if a marine mammal sighting was within a particular zone. We recommend a similar protocol for future monitoring, with each station staffed by 4 MMOs, rotating between active and resting periods, in order to avoid eye strain, particularly for shifts in excess of 6 hours. A minimum of 3 MMOs is needed at each station in order to accommodate any necessary rest.

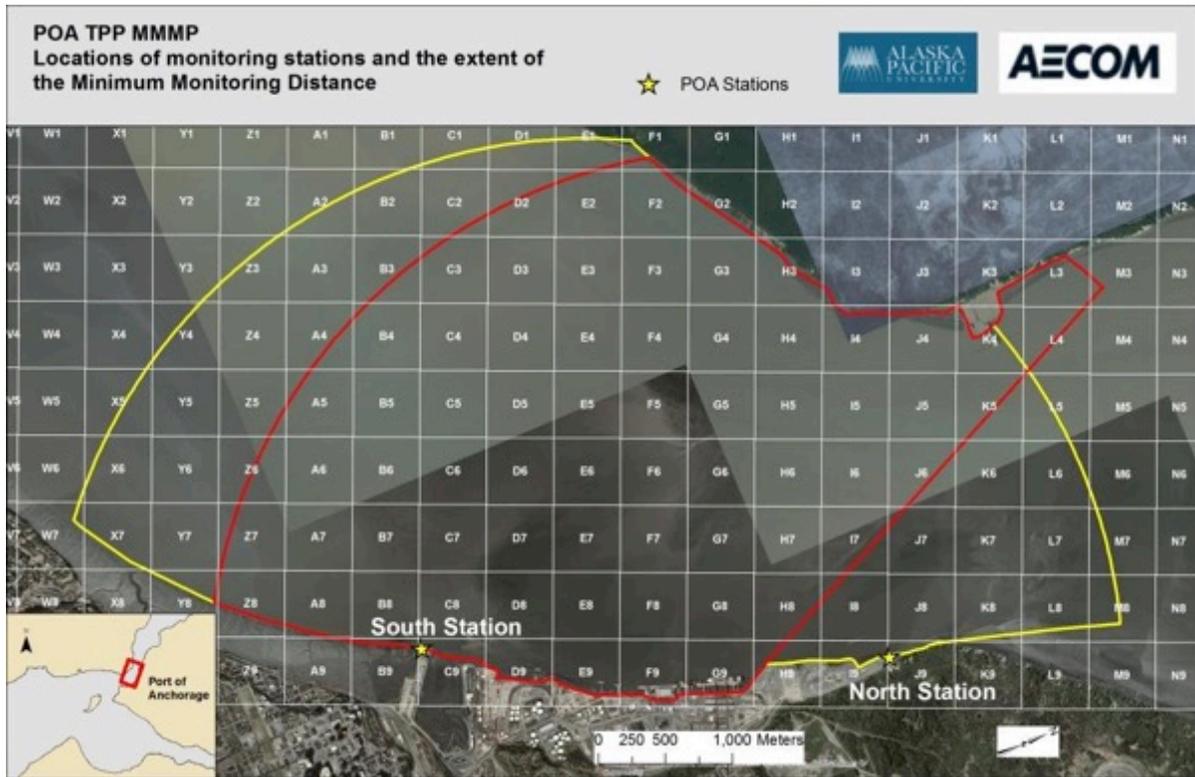


Figure 2.1. Aerial map of study area with 500 x 500 m grid overlay and extent of monitoring zones. The APMP footprint is enclosed within grid cells D9 – I9. Observation stations at Anchorage Public Boat Dock (South; grid cell C9) and POA (North; grid cell I9) are denoted by yellow stars.



Figure 2.2. Configuration of observation stations. Elevated platform provided maximum field of view of the water's surface.



Figure 2.3. Panoramic views of field of view from the North Station (panel a) and South Station (panel b).

Table 2.1. Required monitoring and Level-B harassment (take) zones for beluga whales and other marine mammals (as defined by NMFS, IHA issued to the Port of Anchorage, March 4, 2016). Red is mandatory shut down, orange is inferred Level-B harassment take, yellow is stated Level-B harassment take with the ability to continue pile driving operations; green is the overall “minimum required monitoring area.”

Pile Activity	Unattenuated Piles		Attenuated Piles	
	Belugas	Other marine mammals	Belugas	Other Marine Mammals
All activity – shut down		100 m		100 m
Impact	1,400		300 m	
Vibratory	4,000		900 m	
Level B Harassment Take				
Impact	1,400	1,400	1,400	1,400
Vibratory	4,000	4,000	4,000	4,000
Minimum radial distance for monitoring				
Impact	1,400 m			
Vibratory	4,000 m			
Non-Pile Driving Activities				
All operations cease if marine mammal within 10 m of vessel, machinery.				

2.2 Environmental Sampling Protocols

Environmental data pertaining to monitoring conditions were logged every 30 minutes during observation sessions, or when conditions changed (Table 2.2). These data were used to assess overall monitoring conditions and determine if observations were obstructed by environmental conditions.

Table 2.2. Attribute definitions and units for environmental data.

Data Attribute	Attribute Definition and Units
Overall Conditions	Poor, moderate, excellent
Weather Conditions	Sunny (S), partly cloudy (PC), light rain (LR), steady rain (SR), fog (F), overcast (OC), light snow (LS), snow (S)
Light Conditions	Light, twilight, dark
Air Temperature	Celsius
Wind Speed	Knots
Wind Direction	From the north (N), northeast (NE), east (E), southeast (SE), south (S), southwest (SW), west (W), northwest (NW)
Sea State	Beaufort scale
Cloud Cover	0-100%
Visibility	km; maximum sighting distance
Glare	Low, moderate, high
Ice Cover	0-100%
Ice Type	No ice, new, brash, pancake, floes
Other Activities	Boat traffic or other anthropogenic activities

2.3 Pile Driving

Pile driving activities were documented during observation sessions based on daily construction information provided by Kiewit during real-time communications with the Rover. Specific notations included whether the activity was impact or vibratory, unattenuated or attenuated, and type of attenuation, if applicable. “All clear” notice and start and stop times of all pile driving activity were recorded.

2.4 Marine Mammal Monitoring and Observations

Monitoring was conducted throughout the study period during all pile driving operations. MMOs arrived onsite ~1 hour before scheduled pile driving startup, and monitoring commenced 30 minutes before the scheduled pile driving startup. The Rover served as the primary point of contact between Kiewit and the observation stations to coordinate activity and notifications of marine mammal sightings and shutdown recommendations, as appropriate. Communication between the Rover, station MMOs, and Kiewit staff was maintained throughout observation periods via hand-held radios and cellular phone. MMOs at the observation stations rotated through 3 duty stations (2 observing, 1 recording data) and a rest period every 30 min in order

to minimize eye strain. MMOs were provided additional breaks during periods of TPP downtime as practicable. Monitoring shifts lasted between 3-10 hours.

All required harassment and shutdown zones were monitored continuously using binoculars (Bushnell 7x50 with internal compass and range-finding reticle or Nikon Monarch ATB 10x42). The South station was also equipped with Celestron 71008 SkyMaster 25x70 long-range binoculars mounted on a tripod in order to provide additional viewing power of the 4 km beluga whale shutdown zone for vibratory pile driving.

Beluga whales were classified by color (white, gray, or dark gray, which are classified as calves) and proximity (calves remain in close proximity to mothers, usually in direct contact). White beluga whales are typically adults and gray beluga whales are typically juveniles; however, there is considerable variation in the age at which beluga whales acquire their full white color. Therefore, color cannot be used reliably to determine age class beyond calves. Gray beluga whales (normally considered juveniles) have been reported closely associated with calves, suggesting that they may be reproductively mature (NMFS, unpublished data). Other marine mammals (harbor seals, Steller sea lions, harbor porpoises, killer whales) were classified as adult, juvenile or unknown; sex was noted if observable. Primary behavioral states of observed marine mammals were recorded, and secondary and/or abrupt behavioral changes were recorded, if applicable.

Attributes for data collection when beluga whales or other marine mammals were observed are summarized in **Table 2.3**. Locations were classified according to the grid-cell map using bearings obtained from sighting binoculars and distances from known landmarks estimated by eye (Figure 2.1). A surveyor's theodolite was used to mark GPS locations when animals were in view long enough to obtain a fix.

Other anthropogenic activity in the study area was also recorded. If a marine mammal was observed within 10m of any in-water project-related work other than pile driving (e.g., movement of the barge to the pile location, positioning the pile on the substrate, support watercraft activity), communication was initiated and appropriate action recommended (e.g., shutdown of pile driving, reduced watercraft speed).

Table 2.3. Attribute definitions and units for marine mammal data.

Data Attribute	Attribute Definition and Units
Initial Sighting Time	HH:MM
Final Sighting Time	HH:MM
Species	Beluga whale, harbor seal, harbor porpoise, Steller sea lion, killer whale, other
Grid Cell #	First, mid, last
Distance	From animal to noise source (initial, closest, final); meters
Number of Animals	Minimum, maximum, best count
Number of Animals in Each Class	White, gray, dark gray, unknown; adult, juvenile, pup; male, female, unknown
Initial and Final Heading	N, NE, NW, W, S, SE, SW, E
Number of Animals Entered H-Zone B	If applicable
Time Entered H-Zone B	HH:MM
Time Exited H-Zone B	HH:MM
Time Entered Shutdown Zone	HH:MM
Time Exited Shutdown Zone	HH:MM
Behavior	Traveling, diving, milling, resting, socializing, feeding suspected, feeding observed, spyhopping, mating suspected, bubbling, snorkeling, vocalizing, swimming towards site, directional change, other
Group Cohesion	Packed, loose, aligned, abreast, random
Changes in Behavior	Description, time, related to project activities or other
Project Activities	In-water work occurring or not; type of activity, attenuation, shutdown or delay

3.0 Results

3.1 Environmental Conditions

Environmental conditions during the observation periods are summarized in Table 3.1.

Overall conditions were excellent; however, on 18 May at ~0911 a storm front moved through the monitoring zone from south to north over a period of ~20 minutes during unattenuated vibratory pile driving. Observers at the South Station reported the onset of obscured visibility at the edge of the 4000m monitoring zone to the Rover at ~0919 and shutdown was recommended; Kiewit indicated that vibratory was near completion, so the decision was made to shutdown due to weather and prepare for impact pile driving. At that time MMOs initiated the 30-min post strike monitoring period. Visibility of the complete 4000m monitoring zone returned at ~0941, for a total shutdown period of 22 min. Post-strike monitoring was completed at 0949.

Table 3.1. Summary of environmental conditions. Weather conditions are reported as % occurrence. All others are means.

	South Station	North Station	Rover Station
Overall Conditions Excellent (3), Moderate (2), Poor (1)	3 (1-3)	3 (1-3)	3 (1-3)
Weather Conditions Party Cloudy (PC), Overcast (OC), Sunny (S), Light Rain (LR)	1.3 % LR 24.5 % S 26.2 % OC 48.0 % PC	0.93 % LR 16.4 % OC 18.7 % S 64.0 % PC	1.4 % LR 8.1 % OC 33.8 % S 56.8 % PC
Light Conditions Daylight (1), Twilight (2), Dark (3)	1	1	1
Air Temperature (°C)	11.9 °C (5.6-22.9)	12.5 °C (4.1-19.9)	12.5 °C (7-22.9)
Wind Speed (Knots)	4.1 knots (0-13)	3.1 knots (0-10)	4.7 knots (0-15)
Wind Direction (Compass Heading)	204	198	217
Beaufort Sea State	1.6 (0-3)	1.1 (0-2)	1.1 (0-3)
Cloud Cover (%)	50.4 % (0-100)	45.10 % (0-100)	37.6 % (0-100)
Visibility (kilometers)	5.2 km (3-10)	4.9 km (4-5)	5.7 km (4-6)
Glare (%)	0.1 % (0-5)	2.8 % (0-35)	1.4 % (0-25)

3.2 Marine Mammal Observations

Beluga whale and other marine mammal observations are summarized in Tables 3.2 and 3.3. Received sound levels (RL) for marine mammal sightings were calculated by JASCO Applied Sciences using the following equation:

$$RL = SL - n \log(R)$$

where R is the distance between the pile and the sighted marine mammal (in meters), SL is the pile driving source level, and n is the transmission loss coefficient. The calculations applied the median measured source level and the appropriate transmission loss coefficient (Table 12 in Austin et al, 2016) for the pile and hammer that corresponded to the time of the sighting.

Marine mammal sightings occurred throughout the observation area (Figures 3.1-3.3). There were a total of 10 beluga whales observed, with 1 take (see Section 3.4). There were a total of 6 Steller sea lions observed, with 1 take, and 28 harbor seals observed with 7 takes. No other marine mammal species were observed.

There was only one sighting of a marine mammal in a “shut-down” zone – a beluga whale, observed twice within the “pending” shutdown zone for pile # 7 at 0809 and 0811 on 25 May. The observation occurred during a “30 min pre-strike” watch period that was subsequently extended for mechanical adjustments; thus the animal was last observed 2 hours 49 minutes prior to pile driving activity. No shut down was initiated.

At 1007 on 03 June, the North Station reported what appeared to be a floating dead whale, or perhaps debris shaped as such, on the far side of the Inlet (grid cells K4-F2) drifting south with the outgoing tide. Despite additional observations with 25x binoculars from the South Station, no positive identification was possible and the object was recorded as “unidentified” at 1037. At 1256 on 08 June a similarly shaped object was observed on the far side of the Inlet in H3, again moving south. No positive identification was made. On the morning of 10 June a NOAA Law Enforcement Officer visited the North station to inform MMOs that they had a report of a large floating dead cetacean in the upper Inlet. The MMOs were alerted to watch for the whale during regular observations. At 0848 a large object, with similar shape and appearance to that seen previously, was sighted outside of the monitoring zone ~9100m to the west. Over the next 20 minutes the object drifted rapidly north into the monitoring zone on the incoming tide. By 0908, multiple MMOs could clearly see buccal grooves on an inflated throat region with numerous sea birds roosting on the carcass of the floating dead whale. The sighting was reported to Kiewit for forwarding on to NOAA. A NOAA vessel inspecting the object later that morning confirmed it was a large dead cetacean, with positive identification pending analysis of skin samples taken on site. In retrospect, improved lighting conditions (sun behind observers and at a relatively lower angle than prior dates) associated with the earlier observation time of the 08 June sighting may have facilitated visual identification of this object as a dead whale floating on the far side of the inlet nearly 4000m away.

Primary marine mammal behaviors were limited to traveling and milling (Figure 3.4). Diving was observed as a secondary behavior on 3 occasions; once in a beluga whale and in two Steller sea lion observations. There were two events where an abrupt change in behavior was noted (see Section 3.4). No other behaviors were observed.

Table 3.2. Beluga whale observations.

Beluga Whales - All Stations													
Date	White (#)	Gray (#)	Dark Gray (#)	Unknown (#)	First Sighted	Sighting Duration (min)	Grid Cells Occupied	In-Water TPP Activity	Attenuation Method	Received Sound Level (dB re 1 μ Pa)	Entered Level-B	Shutdown	Takes (#)
3-May-16	0	2	0	0	20:52	1	J4	None	N/A	N/A	N	N/A	0
12-May-16	0	1	0	0	12:53	1	G2	None	N/A	N/A	N	N/A	0
25-May-16	0	1	0	0	8:09	2	F9	None	N/A	N/A	N	N/A	0
25-May-16	0	0	0	1	8:13	1	G9	None	N/A	N/A	N	N/A	0
25-May-16	0	1	0	0	8:31	23	D9, C9, B8, A8, A7	None	N/A	N/A	N	N/A	0
25-May-16	0	1	0	0	9:14	10	D9	None	N/A	N/A	N	N/A	0
25-May-16	0	1	0	0	9:58	8	I8, J8, K8, L9	None	N/A	N/A	N	N/A	0
25-May-16	0	1	0	0	10:19	9	J8, I9, H9	None	N/A	N/A	N	N/A	0
25-May-16	0	1	0	0	11:02	13	H8, I9, J8, K8	Vibratory	Bubble	125.7	Y	N	1
Totals	0	9	0	1							Total Takes		1

Table 3.3. Other marine mammal observations.

Other Marine Mammals - All Stations												
Date	Adults (#)	Juveniles/ Pups (#)	Unknown Age Class (#)	First Sighted	Sighting Duration (min)	Grid Cells Occupied	In-Water TPP Activity	Attenuation Method	Received Sound Level (dB re 1 µPa)	Entered Level-B	Shutdown	Takes (#)
<i>Harbor Seals</i>												
3-May-16	0	0	1	19:55	1	C8	Impact	Resonance	166.1	Y	N	1
6-May-16	0	0	1	9:01	1	I8	None	N/A		N	N/A	0
25-May-16	0	0	1	8:20	6	D4, E5, G5	None	N/A		N	N/A	0
26-May-16	0	0	1	10:21	2	A5	None	N/A		N	N/A	0
7-Jun-16	0	0	1	10:37	8	I6, G5, H7	None	N/A		Y	N/A	0
7-Jun-16	0	0	1	11:12	43	G8, B8, C8	None	N/A		Y	N/A	1
7-Jun-16	0	0	1	12:19	1	B9	Impact	None	156	N	N	0
7-Jun-16	0	0	1	12:29	63	C8, C9, C8	Impact	None	162.8	Y	N	1
7-Jun-16	0	0	1	13:16	2	J8, I9	None	N/A		Y	N/A	0
10-Jun-16	0	0	2	7:42	75	C8, C9	None	N/A		Y	N/A	0
10-Jun-16	0	0	1	9:26	3	B8, C8	None	N/A		Y	N/A	0
10-Jun-16	0	0	1	9:40	35	D8, C8, C9	Impact	None	Not Measured	Y	N	1
10-Jun-16	0	0	1	10:42	36	C9, C8, C9	None	N/A		Y	N/A	0
10-Jun-16	0	0	1	11:13	1	Z5	None	N/A		N	N/A	0
10-Jun-16	0	0	1	11:29	18	C9	None	N/A		Y	N/A	0
10-Jun-16	0	0	1	11:39	6	D8	None	N/A		Y	N/A	0
10-Jun-16	0	0	1	12:10	68	C9, C7, B7	Impact	None	Not Measured	Y	N	1
15-Jun-16	0	0	1	10:32	27	C9, B6, A6	None	N/A		N	N/A	0
16-Jun-16	0	0	1	11:32	16	J8, I8, G8	None	N/A		Y	N/A	0
16-Jun-16	0	0	1	12:20	1	G7	Impact	None	Not Measured	Y	N	1
21-Jun-16	0	0	1	12:03	38	C9	None	N/A		Y	N/A	0
21-Jun-16	0	0	1	12:16	12	I7, J8	None	N/A		N	N/A	0
21-Jun-16	0	0	1	12:38	1	J8	None	N/A		N	N/A	0
21-Jun-16	0	0	1	12:48	6	J9, J8	None	N/A		N	N/A	0
21-Jun-16	0	0	1	12:56	33	C9, C8	None	N/A		Y	N/A	0
21-Jun-16	0	0	1	13:24	5	B7	None	N/A		N	N/A	0
21-Jun-16	0	0	1	13:32	2	A5	None	N/A		N	N/A	1
Totals	0	0	28									7
<i>Steller Sea Lions</i>												
2-May-16	0	0	1	13:52	30	A3, C4, E4, I5, K5	None	N/A		Y	N/A	0
25-May-16	0	1	0	9:08	2	F9, G8	None	N/A		Y	N/A	0
25-May-16	0	0	1	9:16	1	I8	None	N/A		N	N/A	0
25-May-16	0	1	0	9:38	6	E9	None	N/A		Y	N/A	1
25-May-16	0	0	1	9:51	1	D8	None	N/A		N	N/A	0
25-May-16	1	0	0	9:58	6	A7, Y5	None	N/A		N	N/A	0
Totals	1	2	3									1

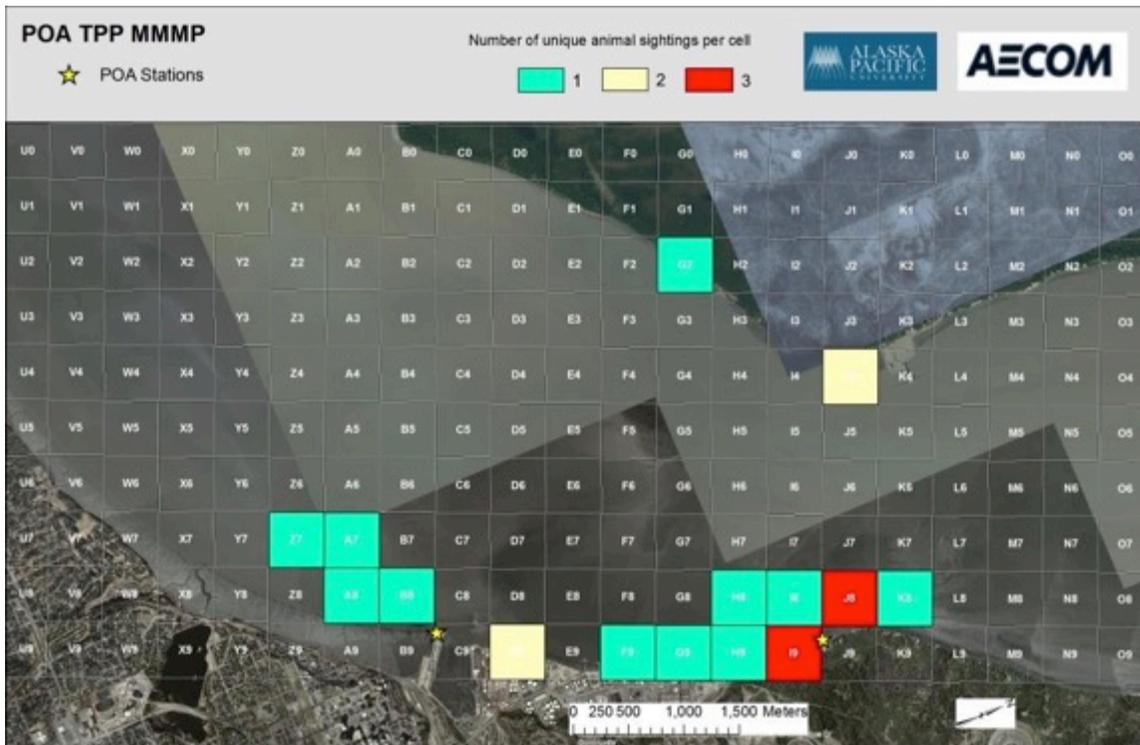


Figure 3.1. Distribution of beluga whale observations. Shaded cells represent all grid cells where animals were observed. Green = one observation in the cell, yellow = two observations in the cell, and red = three observations in the cell. Observations may be of the same or multiple individuals.

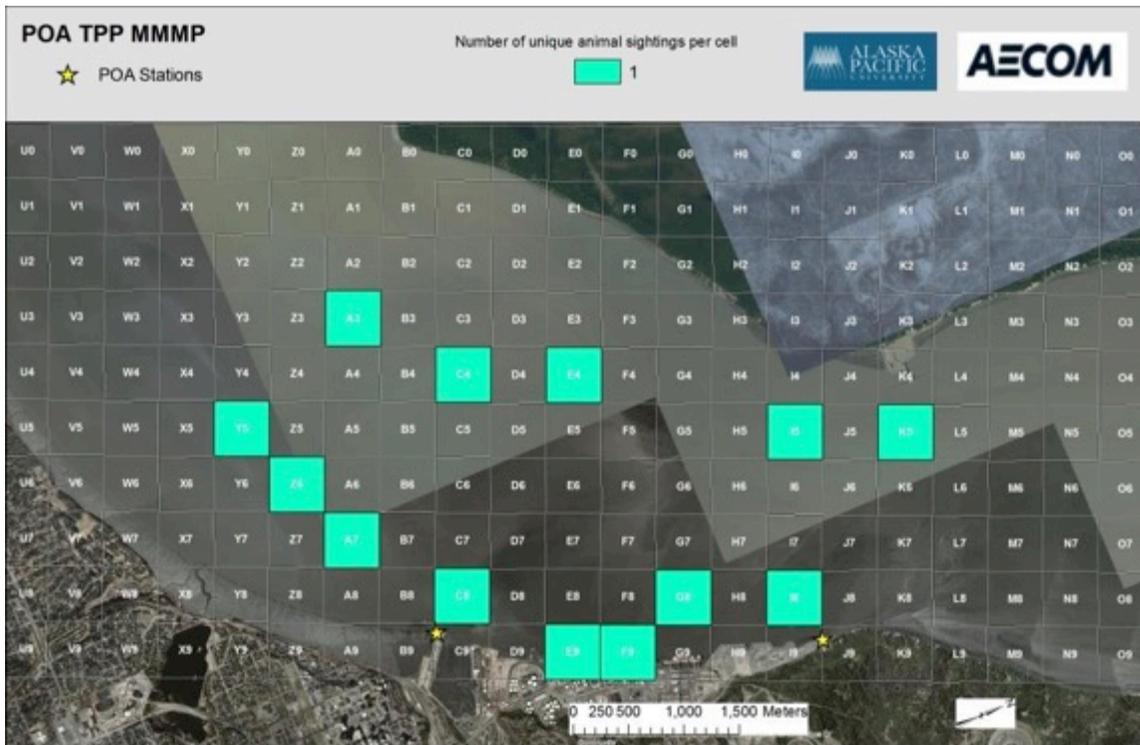


Figure 3.2. Distribution of Steller sea lion observations. Shaded cells represent all grid cells where animals were observed. Green = one observation in the cell. Observations may be of the same or multiple individuals.

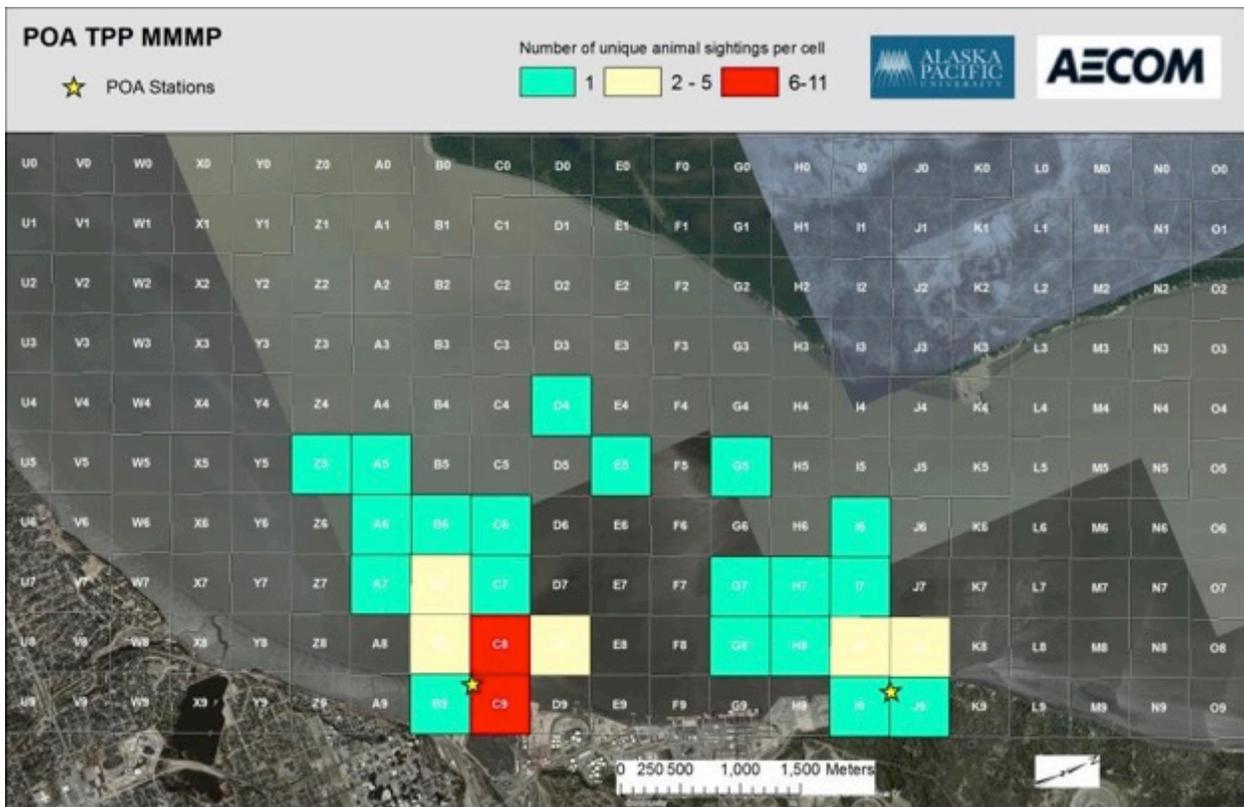


Figure 3.3. Distribution of harbor seal observations. Shaded cells represent all grid cells where animals were observed. Green = one observation in the cell, yellow = 2-5 observations in the cell, and red = 6-11 observations in the cell. Observations may be of the same or multiple individuals.

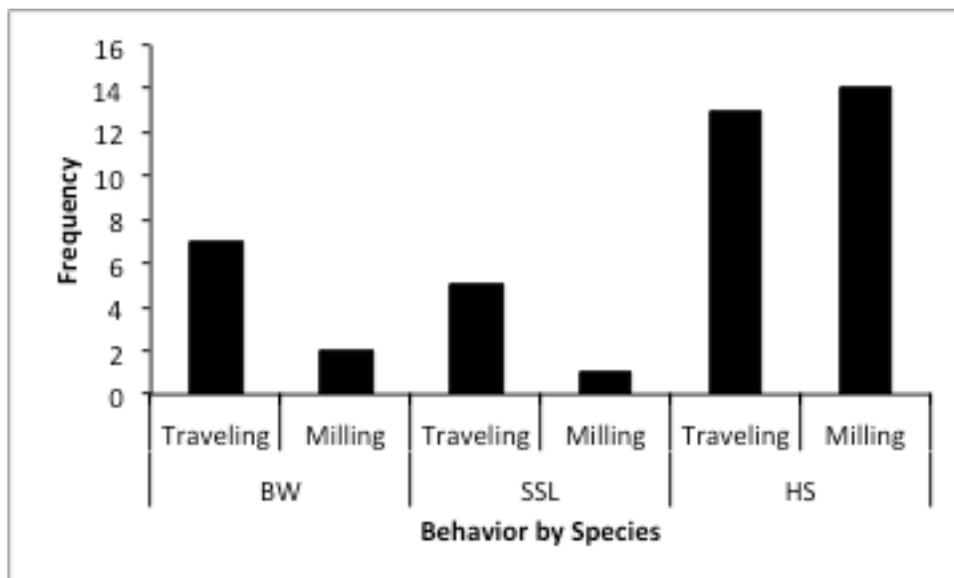


Figure 3.4. Frequency of primary marine mammal behaviors by species. BW = beluga whale, SSL = Steller sea lion, HS = harbor seal.

3.3 Sighting Rates and Detectability

Observations were conducted over 19 field days with a total of 85.3 hours of effort. Daily and cumulative sighting rates for each marine mammal species observed are summarized in Table 3.4. There were insufficient data to perform detectability analyses.

Table 3.4. Daily and cumulative sighting rates. Total effort is calculated as the total hours of active monitoring (total on-site time – stand down periods).

Date	Start	End	Total Effort (hr) excluding breaks	Beluga whale groups observed	Beluga whale sighting rate (groups/hour)	Harbor seals observed	Harbor seal sighting rate (individuals/hour)	Steller sea lions observed	Steller sea lion sighting rate (individuals/hour)
2-May	10:06	15:17	3.7	0	0	0	0.00	1	0.27
3-May	8:45	21:07	7.9	1	0.13	1	0.13	0	0.00
6-May	6:15	11:45	3.0	0	0	1	0.33	0	0.00
7-May	9:10	11:52	1.7	0	0	0	0.00	0	0.00
12-May	10:47	16:51	4.8	1	0.21	0	0.00	0	0.00
13-May	7:13	9:16	2.1	0	0	0	0.00	0	0.00
18-May	7:20	13:04	4.8	0	0	0	0.00	0	0.00
19-May	7:09	12:18	4.7	0	0	0	0.00	0	0.00
25-May	8:05	15:10	6.2	7	1.13	1	0.16	5	0.80
26-May	8:41	16:07	6.7	0	0	1	0.15	0	0.00
1-Jun	4:47	11:09	5.9	0	0	0	0.00	0	0.00
3-Jun	6:30	14:32	7.8	0	0	0	0.00	0	0.00
7-Jun	9:04	13:32	6.2	0	0	5	0.81	0	0.00
8-Jun	12:00	14:02	2.0	0	0	0	0.00	0	0.00
9-Jun	13:50	16:56	4.1	0	0	0	0.00	0	0.00
10-Jun	7:31	13:39	6.4	0	0	9	1.41	0	0.00
15-Jun	10:30	11:30	1.0	0	0	1	1.00	0	0.00
16-Jun	10:05	13:00	2.9	0	0	2	0.69	0	0.00
21-Jun	12:00	15:27	3.5	0	0	7	2.03	0	0.00
Cumulative Totals			85.3	9	0.11	28	0.33	6	0.07

3.4 Marine Mammal Takes

Marine mammal takes are summarized in Table 3.5. A brief narrative follows for each event including observations noted, a description of sighting conditions, in-water activity, location, behavior, and behavioral changes reported when applicable. There was 1 Level-B beluga whale take, 1 Level-B Steller sea lion take, and 7 Level-B harbor seal takes. Take limits were not reached for any species.

On 3 May 1 unknown age and sex harbor seal surfaced in the Level-B harassment zone in grid cell C8, ~900 m from TPP activity (pile #9; impact with resonance-based attenuation; Figure 3.5). The seal immediately submerged and was not re-sighted. TPP activity was not shut down because the seal did not enter the 100 m shutdown zone for other marine mammals. Sighting conditions at the time of the take were rated as excellent – overcast skies, light wind (2.5 kts), sea state of 1, 5+ km visibility, with no glare.

On 25 May 1 gray beluga whale surfaced in the Level-B harassment zone in grid cell H8, ~1300 m from TPP activity (pile #7; vibratory with air bubble curtain attenuation; Figure 3.6). The closest distance fixed with the theodolite was ~238m. The animal was traveling north and tracked for 13 min alongshore. It left the monitoring zone in grid cell I9 and continued traveling until it was no longer in view. It was last sighted in grid cell K8 at 1115. TPP activity was not shut down because the whale did not enter the 900 m shutdown zone for attenuated vibratory pile driving. There were no abrupt changes in behavior. Sighting conditions at the time of the take were rated as excellent – partly cloudy skies, moderate wind (5 kts), sea state of 1, 5+ km visibility, with no glare.

On 25 May at 0938 a large juvenile (sub-adult) Steller sea lion was observed traveling and milling ~100m to west of POL#2 dock in grid cell E9 during a pre-strike scanning period (Figure 3.6). This individual was moving towards the dock at an oblique angle and dove, resurfacing twice less than a minute later within about 60m away. About this time a small workboat used by the project left the stern of the pile barge and began to travel to the south at approximately 6-7 kts (a small wake was produced). Kiewit estimated the speed at ~4-5 kts (Daily Report CN-SUB-052a). As the workboat approached POL#2, the SSL surfaced off its port beam, roughly 20m away. The SSL swam rapidly alongside the boat and as it dove, it was headed to the front of the bow of the boat. A few seconds later the SSL surfaced just ahead of the bow within 3 m, and at that point both the skipper and the passengers noticed the SSL as it dove beneath the bow within 1m. The workboat then proceeded to the Coast Guard dock. Shortly thereafter the workboat returned to the pile barge. On this return trip, the workboat appeared to travel

somewhat faster than before, approaching planing speed, as the wake was initially large as it left the dock but then diminished slightly as it increased speed. The boat's route crossed with the sea lion's path as it swam off the port side, passing either within 1m or directly over the spot where the sea lion had been surface swimming, and then it dove a few seconds (<3) before course intersection. In both events the sea lion abruptly changed its direction of travel and dove rapidly at vessel approach. This sighting was not initially recorded as a take, but upon further review, due to the abrupt change in behavior during both encounters, the sighting was reclassified as a take. Sighting conditions at the time of the take were rated excellent (6+km visibility) with partly cloudy to sunny skies, no glare, sea state 1, and a south wind at 4-5 kts.

On 07 June a single harbor seal was observed traveling and then milling at the edge of the Level-B Harassment zone (grid cell C8) at 1112 (Figure 3.7). Unattenuated impact pile driving commenced at 1139; at that time the seal was inside the Level-B zone and the take was recorded. The seal left the Level-B zone at 1148 and went out of view at 1155. There were no abrupt changes in behavior. Sighting conditions at the time of the take were rated as excellent – partly cloudy skies, moderate wind (5-6 kts), sea state of 1-2, 5+ km of visibility, with no glare.

On 07 June another single harbor seal was observed in the same general area (grid cell C8) at 1229 during unattenuated impact pile driving, which ended at 1302 (Figure 3.7). It left the Level-B Harassment zone at 1322, and was still in view at 1332 when the 30 min post scan was completed. This may have been the same animal that was described in the previous sighting given the location; however, because there was more than 10 min between observations it was recorded as a separate sighting. There were no abrupt changes in behavior. Sighting conditions at the time of the take were rated as excellent – partly cloudy skies, moderate wind (5-6 kts), sea state of 1-2, 5+ km of visibility, with no glare.

On 10 June a single harbor seal was observed at 0940 inside the Level-B Harassment zone (grid cell D8) during unattenuated impact pile driving (Figure 3.8). It continued to mill inside the Level-B zone until it went out of view at 1015. There were no abrupt changes in behavior. Sighting conditions at the time of the take were rated as excellent – partly cloudy skies, moderate wind (5-6 kts), sea state of 1-2, 5+ km of visibility, with no glare.

On 10 June another single harbor seal was observed milling in the same general area in grid cell C9 at 1210 during unattenuated impact pile driving (Figure 3.8). This animal exhibited an abrupt behavioral change at 1311, moving NW, and then changed direction again at 1315 and moved S away from the Level-B zone. It was not apparent whether the animal was responding to a specific stimulus. It left the Level-B zone at 1311 and went out of view at 1318. This may

have been the same animal that was described in the previous sighting given the location; however, because there was more than 10 min between observations it was recorded as a separate sighting. Sighting conditions at the time of the take were rated as excellent – partly cloudy skies, moderate wind (5-6 kts), sea state of 1-2, 5+ km of visibility, with no glare.

On 16 June a single harbor seal was observed inside the Level-B Harassment zone (grid cell G7) at 1220 during unattenuated impact pile driving (Figure 3.9). It immediately submerged and went out of view, and was not re-sighted. Sighting conditions at the time of the take were rated as excellent – sunny skies, light wind (2.4 kts), sea state of 1, 5+ km of visibility, with no glare.

On 21 June a single harbor seal was observed inside the Level-B Harassment zone (grid cell C8) at 1332, 2 min before the start of unattenuated impact pile driving (Figure 3.10). It immediately submerged and went out of view. Because of the timing of the observation and the MMO's inability to determine if the animal had left the Level-B zone it was recorded as a take. Sighting conditions at the time of the take were rated as excellent – sunny skies, moderate wind (5-7 kts), sea state of 2, 5+ km of visibility, with no glare.

Table 3.5. Summary of marine mammal takes with rationale.

Date	Station reporting observation	Initial sighting time	Final sighting time	Time entered take zone	Time exited take zone	Take location (Grid Cell)	Pile number	Activity type	Rationale for take
<i>Beluga whale</i>									
5/25/16	North	11:02	11:15	11:02	11:15	H8	7 Loc 5	Vibratory, Bubble attenuation	Appeared within Take zone during project activity
<i>Steller sea lion</i>									
5/25/16	Rover	9:38	9:44	9:38	9:44	E9	7 Loc 5	Non-pile driving project activity	Approach by project boat within less than 10 m on two occasions resulting in a dive reaction and a change in direction.
<i>Harbor seal</i>									
5/3/16	South	19:55	19:55	19:55	-	C8	8 Loc 6	Impact with resonance attenuation	Observed once in take zone during project activity
6/7/16	South	11:12	11:55	11:12	11:48	C8	1 Loc 5	Impact w/no attenuation	Observed 5 times in take zone during project activity. Initially seen outside of take zone during project activity, moved into take zone where observed 5 times; remained in area during post scan period
6/7/16	South	12:29	13:32	12:50	13:22	C8	1 Loc 5	Impact w/no attenuation	Observed multiple times in take zone continuously for both piles TWO TAKES?
6/10/16	South	9:40	10:15	9:48	10:15	D8	9 & 8 Loc 6	Restrike: Impact w/no attenuation	Observed before and after activity in take zone; moved away from sound w/in 2 min of end of pile drive.
6/10/16	South	12:10	13:18	12:10	13:11	C9	10 Loc 6	Restrike: Impact w/no attenuation	Observed once in take zone during project activity
6/16/16	South	12:20	12:20	12:20	12:20	G7	3 Loc 1	Restrike: Impact w/no attenuation	Observed once in take zone 2 min prior to project activity; presumed to be in area at onset of driving.
6/21/16	South	13:32	13:32	13:32	13:32	C8	2 Loc 5	Restrike: Impact w/no attenuation	

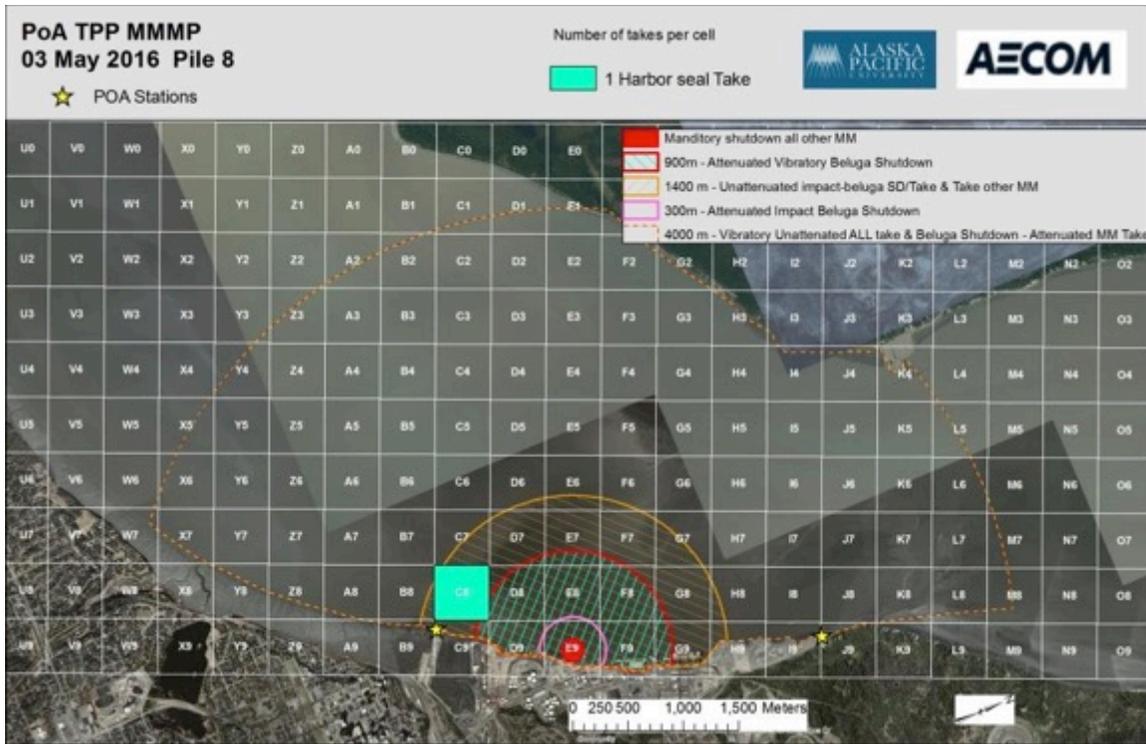


Figure 3.5. Location of marine mammal take 03 May 2016.

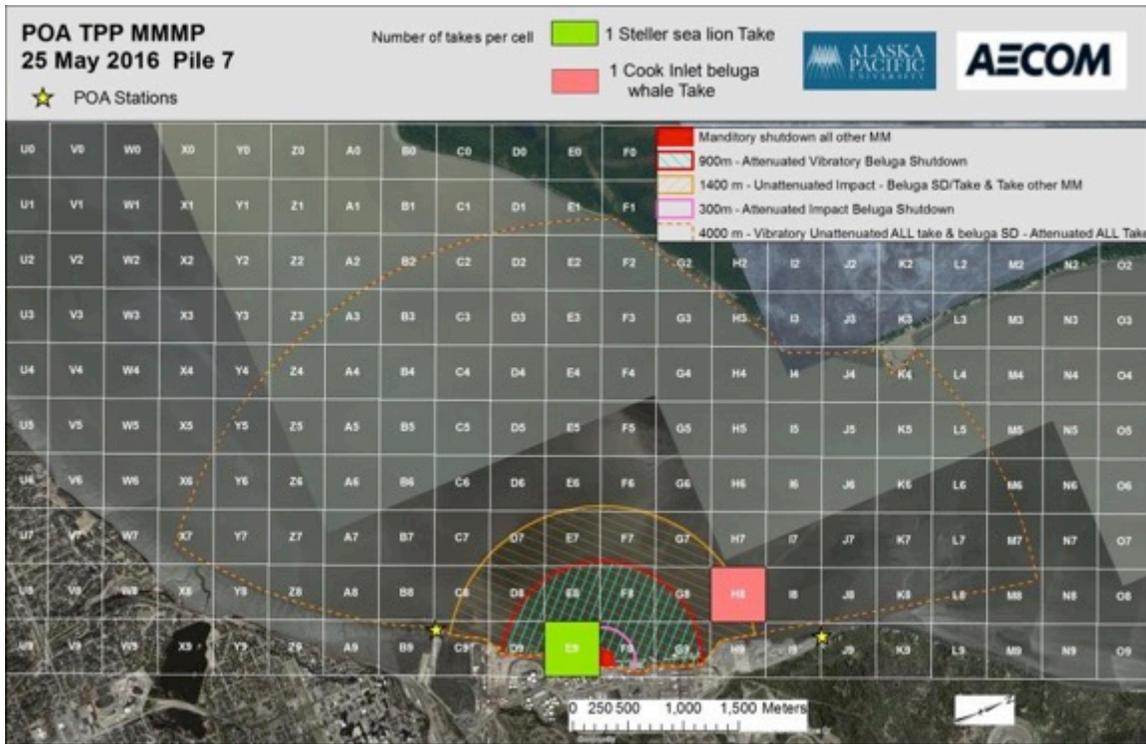


Figure 3.6. Locations of marine mammal takes 25 May, 2016.

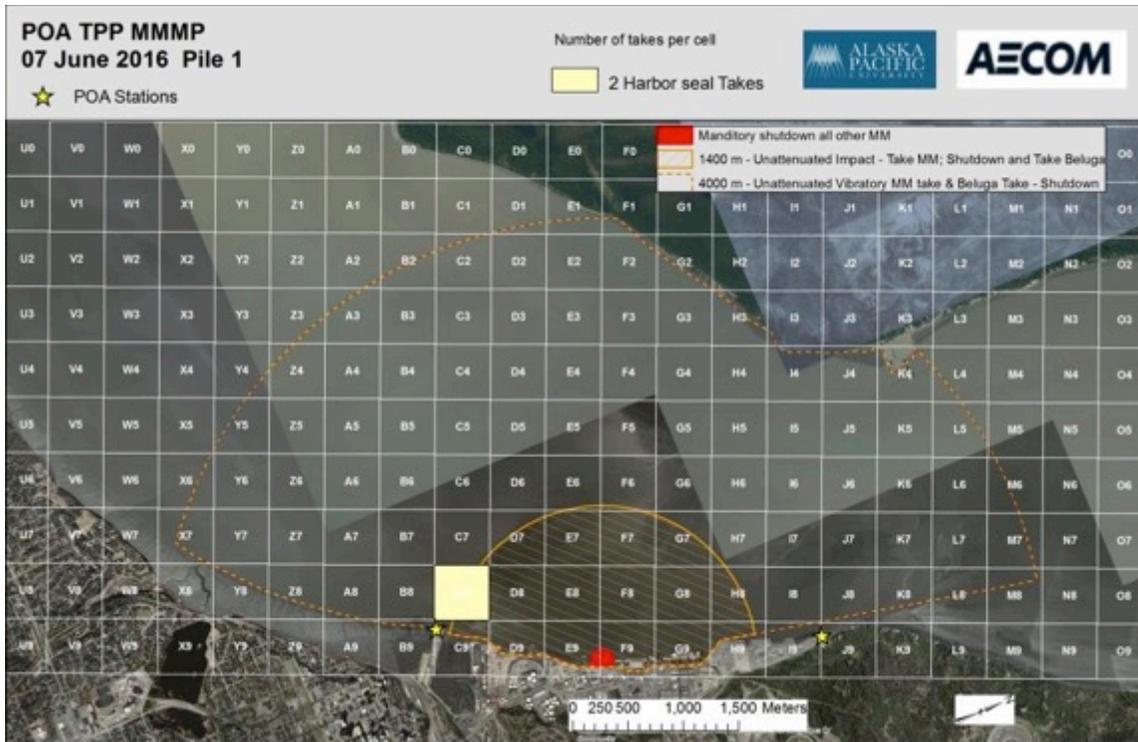


Figure 3.7. Locations of marine mammal takes 07 June, 2016.

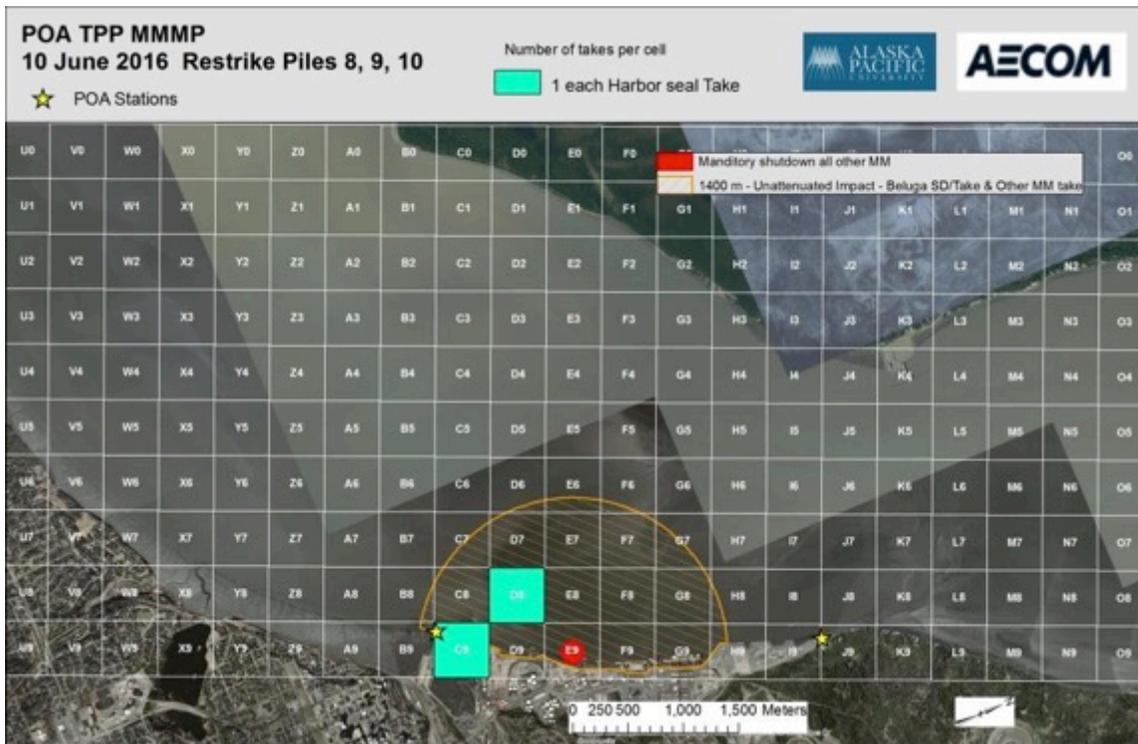


Figure 3.8. Locations of marine mammal takes 10 June, 2016.

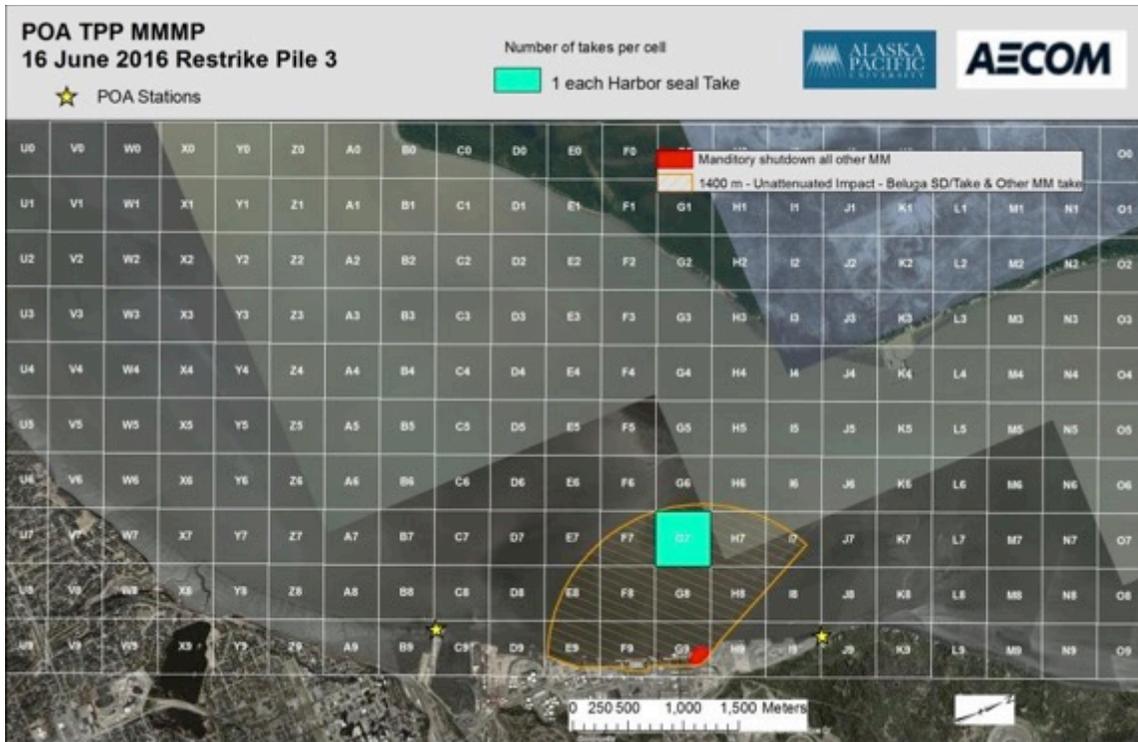


Figure 3.9. Location of marine mammal take 16 June, 2016.

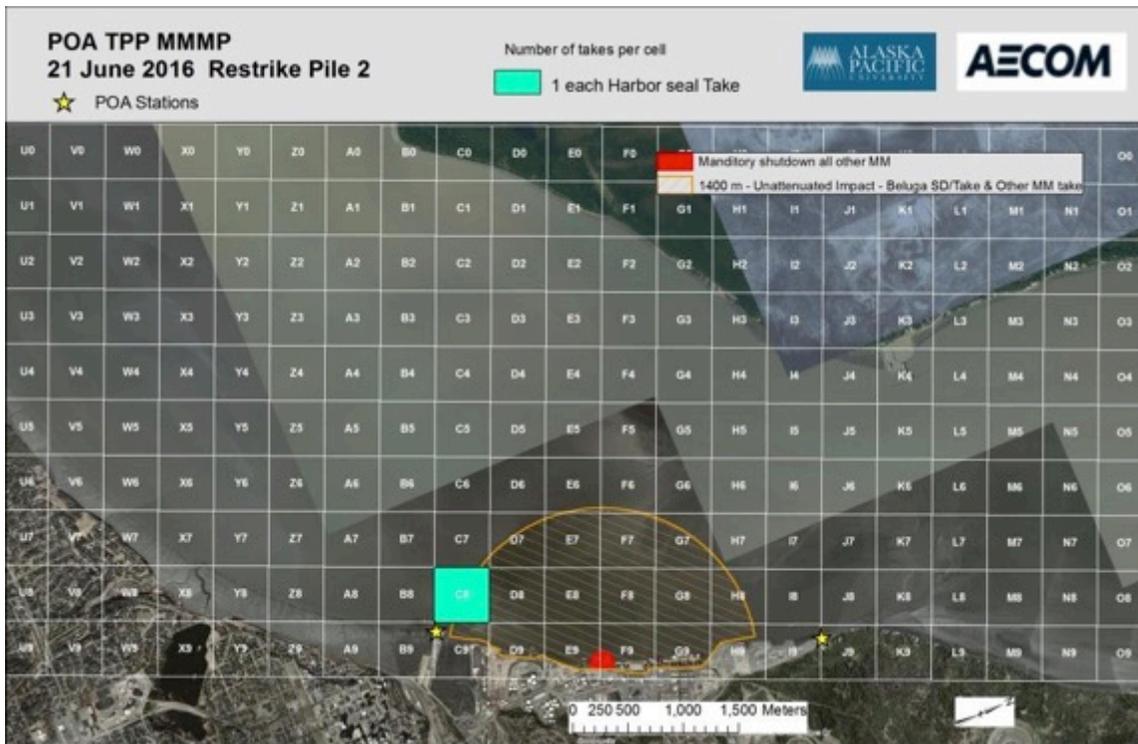


Figure 3.10. Location of marine mammal take 21 June, 2016

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