

# END OF CONSTRUCTION SEASON 2008 MARINE MAMMAL MONITORING REPORT

## CONSTRUCTION AND SCIENTIFIC MARINE MAMMAL MONITORING ASSOCIATED WITH THE PORT OF ANCHORAGE MARINE TERMINAL REDEVELOPMENT PROJECT



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## 1.0 INTRODUCTION AND PURPOSE

Located within the Municipality of Anchorage on the Knik Arm of Cook Inlet, the Port of Anchorage (Port) handles 90 percent of all consumer goods and cargo for 85 percent of the population of the State of Alaska (Figure 1). The Port is currently operating at or above sustainable practical capacity for the majority of the cargo types handled. Existing facilities and structures are substantially beyond reasonable design life and degraded to levels of marginal operation safety; many are functionally obsolete. The U.S. Department of Transportation, Maritime Administration (Maritime Administration) under a Memorandum of Understanding with the Municipality of Anchorage, owner and operator of the Port, is overseeing the rebuilding effort, the Port of Anchorage Marine Terminal Redevelopment Project (MTR Project). Integrated Concepts & Research Corporation (ICRC), prime contractor for the Maritime Administration, is managing the MTR construction.

The MTR Project will expand the upland and waterfront areas of the Port, replace aging and deteriorating docks and waterfront facilities, and install new Port and waterfront infrastructure to meet the current and anticipated future operational needs of the Port. The MTR Project expands the available working area of the Port by reclaiming approximately 135 acres of tideland and installing an open-cell sheet pile bulkhead to provide approximately 7,700 feet of new wharf (Figure 2). MTR Project construction is authorized under the 2007 U.S. Army Corps of Engineers (USACE) 404/10 Permit POA-2003-502-N (Appendix A), hereafter USACE 404/10 Permit.

The pile-driving equipment used for construction of the wharf generates sound waves within the water, which has the potential to present a physical hazard to marine mammals. The Port of Anchorage (POA) and the Maritime Administration applied for and received an Incidental Harassment Authorization (IHA) from the National Oceanic and Atmospheric Administration (NOAA), National Marine Fisheries Service (NMFS). The IHA (July 15, 2008 through July 14, 2009) (Appendix B) authorizes **Level B "Takes"** of marine mammals during MTR in-water construction activities. The regulations governing the issuance of an IHA allow the incidental, but not intentional, take of marine mammals under certain circumstances; these regulations are codified in 50 Code of Federal Regulations (CFR) Part 216, Subpart I (Sections 216.101-216.108). The Marine Mammal Protection Act (MMPA) defines **take** as "*harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal*" (16 United States Code [USC] Chapter 31, Section 1362 [13]).

The POA and Maritime Administration have implemented NMFS-approved marine mammal monitoring programs that are designed to minimize the number of takes and to collect information on marine mammal behavior in the vicinity of the Port. This report summarizes marine mammal sightings data for the 2008 construction season. This report is also required for compliance with the conditions of the USACE 404/10 Permit.

## **2.0 MTR IN-WATER PROJECT WORK 2008**

### **2.1 North Extension**

Construction activities for 2008 began in early June at the North Extension area and involved the following:

- In-water construction dredging to remove seafloor sediments prior to pile driving. This work was completed in 2008.
- In-water and out-of water placement of fill material. Work was initiated in 2008 and will continue in the 2009 construction season.
- Recovery and reuse of temporary liner rock. This work was completed in 2008.
- Figures 3(a) and 3(b) show photos of completion of the North Extension.

### **2.2 Barge Berth Construction**

Upon receipt of the IHA in mid-July 2008, in-water pile driving began in late July at the Barge Berth area and involved the following:

- In-water construction to complete the bulkhead structure for the Barge Berth area including installation of Open Cell Sheet Pile (OCSP) to provide the basic structure for a dry barge berth and a wet barge berth. An explanation of the procedure used for sheet pile installation is provided as Appendix C. Work was initiated in 2008 and will continue in the 2009 construction season.
- Land-based construction activities for the Barge Berth include the placement of fill material to bring the previously constructed surface to design grade (no in-water fill). Work was completed in 2008.
- Land-based vibracompaction to densify fill previously placed in-water. Work was initiated in 2008 and will continue in the 2009 construction season.

- In-water installation of ship fendering systems and out-of-water construction of mooring appurtenances at the dry barge berth. Work was initiated in 2008 and will continue in the 2009 construction season. Photos of the 2008 barge berth construction site are shown on Figures 4(a) and 4(b).

Initial field testing for analyzing pile driving impacts on fish was conducted during pile driving at the Barge Berth area. Also, an underwater noise survey was performed to determine sound levels and distances from the construction activity (see Section 6.0 - Other Port Activities).

### **3.0 SAFETY AND HARASSMENT ZONES**

As required by the USACE 404/10 Permit and the 2008 IHA, the POA and Maritime Administration have established safety and harassment zones at the Project site, which are monitored for the presence of marine mammals before, during, and after in-water work activities. If the safety and harassment zones are not visible because of fog, poor light, darkness, sea state, or any other reason, in-water construction activities shut down until the area is once again visible.

#### **3.1 Safety Zones**

Conservative safety zones have been established to prevent any physical harm to marine mammals in the Project area. When marine mammals are sighted either approaching the safety zones or surfacing within the safety zones, all in-water construction activities are suspended until the marine mammal has moved to a safe distance or has not been sighted within the safety zones for at least 15 minutes. The enforced safety zones are:

- 50 meters (m) from in-water Project activities that do not involve vibratory or impact pile driving (e.g., dredging, fill placement)
- 200 m from either vibratory or impact pile driving

In compliance with the stipulations of the IHA, no in-water impact pile driving is conducted within two hours of published low tide occurrence.

#### **3.2 Harassment Zones**

The harassment zones established for 2008 construction to limit the number of takes occurring by Level B Harassment are defined as:

- 350 m from impact pile driving
- 800 m from vibratory pile driving



These zones must be fully visible at all times during in-water pile-driving activities; therefore, should fog, snow, or other conditions cause poor visibility for the observers, in-water construction is shut down until full visibility returns.

Suspension of in-water pile driving when marine mammals approach or are sighted within these zones is encouraged, but not mandatory, *with the following exceptions*:

- No Level B takes of beluga whale calves are allowed when a beluga calf or calves are sighted approaching the harassment zones or are sighted within the harassment zones.
- To limit the number of takes and avoid exceeding the authorized take limit, when a group of five or more marine mammals is sighted approaching the harassment zones, in-water pile driving is suspended.

Once the allowable number of takes for a marine mammal species has been reached, the harassment zones are treated as exclusion zones.

Under the above conditions, in-water pile driving activities are suspended until the marine mammal(s) are sighted 1) outside of, and moving away from, the harassment zones or 2) have not been sighted within a harassment zone for at least 15 minutes.

### **3.3 Take Count**

Failure to shut down in-water construction activities before a marine mammal has been sighted within the safety and harassment zones constitutes a take; there are no exceptions. The 2008 IHA authorizes the POA and Maritime Administration to non-intentionally take 34 beluga whales, 20 harbor porpoises, 20 killer whales, and 20 harbor seals during MTR construction activities for the period of July 15, 2008 through July 14, 2009. An animal is considered taken if it enters the NMFS-determined harassment isopleths (i.e., 350 m for impact pile driving and 800 m for vibratory pile driving, including pile driving during the stabbing process) while in-water pile driving is ongoing. Construction observers are contractually required to keep an accurate take count of marine mammals sighted within the safety and harassment zones and report the take(s) on a NMFS-approved sighting form.

## **4.0 MARINE MAMMAL MONITORING PROGRAM**

The POA and the Maritime Administration are committed to ensure the protection of Cook Inlet beluga whales and other marine mammals by avoiding or minimizing impacts during construction activities of the MTR Project at the Port. During the environmental assessment process for the Project, NMFS met with the POA to discuss the declining population of the Cook

Inlet beluga whale and mitigation measures. In collaboration with the National Marine Mammal Laboratory (NMML) and NMFS, the POA and Maritime Administration currently implement three separate marine mammal monitoring programs:

- 1) The Construction Observer Marine Mammal Monitoring Program, which began in 2006, was established to protect marine mammals by enforcing shut-down criteria during in-water fill activities and pile driving and provides information on the behavior and locations of marine mammals.
- 2) The Scientific Marine Mammal Monitoring Program, which began in 2005, was specifically established at the request of NMFS to observe and assess whale movement, timing, group size, locations, and patterns one year prior to, during, and one year after MTR Project construction. This program is independent of the construction observer program. When on site, these observers collaborate with the construction observers to verify sightings and distances from construction.
- 3) The POA Opportunistic Marine Mammal Sighting Program encourages POA staff, subcontractors and Port visitors to voluntarily report sightings of beluga whales and other marine mammals. The POA started a voluntary beluga whale reporting program as early as 2004. A sighting form (Figure 5) is distributed at Port security checkpoints and at the POA badging office. Signs are also posted throughout the Port, (Figures 6(a) and 6(b)) that provide information on this program.

The Maritime Administration is responsible for the implementation of Programs 1 and 2 for the MTR Project. A summary of these programs for 2008 is provided in this report. The POA administers Program 3, which requires submittal of a separate annual report to the NMFS Alaska Regional Administrator detailing reported opportunistic marine mammal sightings.

The marine mammal monitoring area includes all water within the Knik Arm of Upper Cook Inlet visible from the site of the in-water construction activities located near and offshore of the Port harbor. During whale monitoring and data collection activities, emphasis is placed on documenting the frequency of whale presence within and near the construction area, and on evaluation of the responses of beluga whales to construction activities. Providing real-time information to the construction crew so that mitigation measures can be swiftly implemented enhances the shore-based protection program managed by the construction subcontractor.

#### **4.1 Construction Observer Marine Mammal Monitoring Program**

The Construction Observer Marine Mammal Monitoring Program (Program 1) requires construction observers be present at the Project site at all times during in-water construction activities and also 30 minutes prior to the commencement of in-water pile driving. One or more trained observers are placed at the Port at the best vantage points practicable to monitor the waters of Knik Arm. All sightings of marine mammals are documented by the construction observer on a NMFS-approved marine mammal sighting form (Figure 7 shows the 3-page sighting form). If a marine mammal is sighted within a designated harassment zone during pile driving, a take is recorded for *each* marine mammal present within the harassment zone. When applicable, if a marine mammal is sighted approaching the construction zone radii, the observers implement shut-down procedures for suspending in-water construction activity.

Each construction observer is trained in the detection, identification, and distance estimation of marine mammal species; equipped with binoculars and other proper viewing materials; and stationed at a location that provides optimal sight range. The observers have no other construction related task while monitoring. The construction subcontractor is responsible for submitting, and updating as necessary, a comprehensive marine mammal monitoring plan for NMFS review and approval prior to in-water work. For the 2008 construction season, the subcontractor provided a revised plan on 7 August 2008. The plan contains all the contractual and Permit requirements and describes the procedures the construction subcontractor will implement to comply with the conditions of the 2008 IHA and the USACE 404/10 Permit.

Conformance of the construction subcontractors with the plan is discussed at weekly construction meetings to ensure the procedures are working and to identify and implement any revisions necessary to improve the Plan. The construction observers understand the Permit requirements and are committed to ensuring that safety and harassment zones are monitored according to the conditions of the IHA. Construction observers strive to ensure their communication with the construction subcontractors, Port personnel, ICRC, and other regulatory personnel is clear and concise.

##### **4.1.1 Marine Mammal Sighting Form – Construction Observers**

A NMFS-approved sighting form is used by the construction observers to record the following information:

- Date, time of initial sighting to end of sighting, tidal stage, and weather condition (including Beaufort Sea State);
- Species, number, group composition (i.e., age class), distance to pile driving hammer, and behavior (e.g., group cohesiveness, direction of travel, etc.) of animals throughout duration of sighting;
- Any discrete behavioral reactions as well as how close marine mammal(s) approach pile driving hammer;
- The number (by species) of marine mammals that have been taken (i.e., entered the impact (350 m) or vibratory (800 m) harassment zones) or enter the 200 m shut down zone; and
- Pile driving activities occurring at the time of sighting and if and why shut down was or was not implemented.

Construction observers document what type of in-water work is being conducted at the time of each sighting. When a marine mammal is sighted, the marine mammal observer immediately notifies the construction personnel operating the pile-driving hammer (or other equipment) of the marine mammals' direction of travel and if a shut-down is necessary.

#### **4.2 Scientific Marine Mammal Monitoring Program - Alaska Pacific University**

In addition to the trained marine mammal observers responsible for monitoring the harassment zones and implementing shut-down procedures for in-water construction activities, an independent scientific beluga whale monitoring team from the Alaska Pacific University (APU) Environmental Science Marine Biology Department implements scientific monitoring. APU reports on 1) the frequency at which beluga whales are present in the Project footprint; 2) habitat use, behavior, direction of travel, and group composition; and 3) observed reactions or changes in behavior of marine mammals in response to in-water activities occurring at the time of sighting.

The APU observers monitor Knik Arm for beluga whales and other marine mammals eight hours per day/four days per week, during two tide cycles per observation day. APU observers work in collaboration with the construction observers to immediately communicate the presence of beluga whales or other marine mammals in the area. They participate in weekly construction

meetings to be informed of anticipated construction schedules and any changes during observation shifts. Observers are stationed at Cairn Point, directly above the Port (Figures 8(a) and 8(b)). This location is an ideal vantage point for monitoring.

APU's monitoring plan was approved by NMFS prior to implementation of their monitoring program. APU prepares a monthly marine mammal monitoring report that is provided to the POA and Maritime Administration.

#### **4.2.1 Marine Mammal Observation Log – APU Observers**

The form APU uses to record marine mammal sighting information was included in their NMFS-approved Plan and is provided as Figure 9.

### **5.0 SUMMARY OF 2008 IN-WATER CONSTRUCTION ACTIVITIES AND MARINE MAMMAL OBSERVATION**

ICRC provided oversight of a scientific marine mammal monitoring team and contractually required the MTR construction subcontractor to provide marine mammal observers at the construction site, as stipulated by Condition 5(e)(1) of the IHA and Special Condition 5(B)(a) of the USACE 404/10 Permit.

In-water construction and on-site marine mammal monitoring ended on December 2, when ice formation and poor visibility made further in-water fill placement and pile driving activities unfeasible; from December 3 through 23, construction work was conducted out of water (Figure 10). During the 2008 field season, 38 sheet-pile cells were completed (Figure 11).

#### **5.1 Recording Pile Driving Hours**

In August, at the request of NMFS, ICRC began recording the number of hours per day of in-water construction activities. In September, again at the request of NMFS, ICRC began recording the number of hours per day for each method of in-water pile driving: impact hammer, vibratory hammer, and stabbing. During the 2008 field season, 606.55 hours of in-water pile-driving took place between August 1 and November 30 (Table 1). Tables 2-5 provide pile-driving hours for August through November.

### **5.1.1 Comparison of Pile Driving Hours**

Between September 1 and November 30, construction activities related to in-water pile driving with an impact hammer took place on 48 days, for a total of 220.30 hours and an average of 4.59 *intermittent* hours per day; in-water pile driving with a vibratory-hammer took place on 32 days, for a total of 137.5 hours and an average of 4.29 *intermittent* hours per day; and stabbing took place on 26 days, for a total of 101 hours and an average of 3.88 *intermittent* hours per day (Tables 2-4).

*It is important to note that in-water pile driving is not conducted continuously for extended periods of time. Pile driving hammers are operated for short periods of time (from less than 1 minute to approximately 3.5 minutes within a one-hour period for vibratory hammers, and from approximately 3 to 20 minutes within a one-hour period, for impact hammers), followed by a period of down time to move and reset the hammer (from 1 or 2 minutes up to 15 minutes).* This process is described in Appendix C.

### **5.1.2 Construction Pile Driving Shutdowns**

In compliance with 5(a-c) of the IHA, 14 construction shutdowns were initiated during August, October, and November: 10 shutdowns were initiated because beluga whales either swam toward or surfaced within the Harassment Zone, and 4 shutdowns were initiated because the monitoring area was not clearly visible due to fog and falling snow (Tables 2, 3, and 5). No shutdowns were initiated in September (Table 4) or July (Table 6).

## **5.2 Construction Marine Mammal Monitoring 2008**

The construction contractor's marine mammal observers monitored the waters within and surrounding the Project footprint from July 24 through December 2 during in-water pile driving and fill placement activities. The observers recorded the location of the marine mammals on a grid map (page 3 of the sighting form), according to the distance of the animals from the construction site. The number of animals per sighting; the number of adults, juvenile, and calves; and the behavior of the marine mammals were also recorded. The individual sighting forms filled out by the construction observers were provided in the monthly reports to NMFS from August through November 2008.

From July through November 2008, the construction observers recorded 60 marine mammal sightings, during which 1 harbor seal and 431 beluga whales were observed (Table 1). Of the 431 beluga whales sighted, 231 were adults, 101 were juveniles, and 43 were calves; 56 whales

of unknown age were also sighted. The highest number of sightings (34) and number of marine mammals sighted (262) occurred in August. The fewest number of sightings for a 30-day period (3) were recorded in October, when only 10 marine mammals were sighted. Eight takes (of the 34-take maximum for Cook Inlet beluga whales permitted by the IHA from July 15, 2008 through July 14, 2009) were recorded during the 2008 field season: three on October 1 (during one sighting) and five on November 7 (during one sighting).

Throughout the 2008 field season, the process for documentation and reporting of marine mammal sightings was continually evaluated and improved by NMFS, ICRC, and the marine mammal observers. In October, ICRC revised the original NMFS-approved sighting form to improve readability and incorporate additional information requested by NMFS. As pile driving progressed southward, the location of the marine mammal observation site shifted as necessary to provide the best vantage point for observation.

### **5.3 Scientific Marine Mammal Monitoring 2008**

The Scientific Marine Mammal Monitoring Program was conducted by Alaska Pacific University from 24 June through 14 November 2008. APU observers monitored the waters of the Knik Arm of Upper Cook Inlet visible from the south-facing, on-shore monitoring station at Cairn Point on Elmendorf Air Force Base which directly overlooks the MTR Project. The monitoring and data collection efforts provided real-time information to the shore-based construction observation team at the Port. Observers monitored the waters of Knik Arm four days per week: eight hours per day in two four-hour shifts, a schedule that covered the full range of tidal cycles, as practicable. APU's Marine Mammal Monitoring Report for 2008 is provided as Appendix D.

## **6.0 OTHER PORT ACTIVITIES**

During 2008 construction activities, there were two additional studies conducted at the Port in support of the MTR Project that involved sampling noise levels from in-water pile driving.

### **6.1 Underwater Noise Survey**

To prevent and minimize adverse impacts to marine mammals and to comply with the stipulations of the USACE 404/10 Permit and the NMFS IHA, underwater noise surveys are required to measure the level of noise generated by existing Port operations and in-water construction activities, including pile driving, stabbing, dredging, vessel traffic, dockside activities, and other in-water operations associated with the MTR Project.

NMFS defined levels of harassment for marine mammals as Level A and Level B. The Level A (injury) threshold for impact noise is 180 decibels (dB) root mean square (RMS) for cetaceans and 190 dB RMS for pinnipeds. The current Level B harassment threshold for impact noise is 160 dB RMS for cetaceans and pinnipeds. The current Level B threshold for continuous (vibratory) noise is 120 dB RMS.

A preliminary underwater noise survey to calculate isopleths from vibratory and impact pile driving was conducted in October 2007, during a brief test pile-driving effort. This test was performed prior to actual Project in-water pile driving. The survey measured underwater sound levels associated with vibratory and impact driving of 14-inch, 90-foot long H-piles. The H-piles were initially driven using a vibratory hammer and then using an impact hammer. This preliminary data from the October 2007 study established the harassment zones for the 2008 construction season.

In August 2008, an Underwater Noise Survey Plan (UNSP) was submitted to NMFS for review and subsequently authorized for implementation during actual in-water construction pile driving. The UNSP describes the procedures used to conduct the noise survey during in-water pile driving activities and the survey team's coordination with beluga whale observers, construction crews, and other Port operations personnel. The noise survey was conducted over a 14-day period between September 19<sup>th</sup> and October 10, 2008, in order to appropriately capture representative underwater noise measurements for in-water pile driving activities and for existing Port operations. The results of the underwater noise survey were reported to the NMFS on 9 January 2009.

## **6.2 Fish Study Logistics Trial**

A Fish Study Plan and implementation of the approved plan is meant to fulfill the conditional regulatory requirements of the USACE 404/10 Permit to study impacts of in-water pile driving activities on fish. An initial Fish Study Plan was approved by NMFS in January 2008 with the understanding that implementing the plan would occur during regular Ship Creek Hatchery release of salmon smolt (approximately May/June); however the POA received the NMFS IHA in August authorizing pile driving whereby missing the windows of smolt release. Therefore, a limited program was initiated in August 2008 to test the feasibility of several aspects of the Study Plan involving anchoring a fish cage and taking sound measurement during pile driving. The Trial Fish Study was conducted between August 4 and 7, 2008. The objectives of the Study were to conduct preliminary logistics and equipment testing in the challenging environment of



Knik Arm. This preliminary work was done during 2008 construction to prepare for actual testing with live fish in 2009. The results of the test will be used to revise the previously approved Fish Study Plan and will be provided to NMFS for approval prior to implementation.

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**TABLES**

**Table 1. Cumulative Summary: In-water Pile-Driving Duration and Construction Observers Marine Mammal Sightings: July – November 2008  
Port of Anchorage Marine Terminal Redevelopment Project**

Month	Total Sightings	No. & Species of Marine Mammal	Age/Group Composition	No. of Animals in 200-Meter Safety Zone <sup>1</sup>	No. of Animals in Harassment Zone <sup>2</sup>	Shutdowns <sup>3</sup>	Takes	Total Days: In-Water Pile Driving <sup>4</sup>	Total Hours: In-Water Pile Driving <sup>5</sup>	Total Hours: In-Water Pile Driving with Impact Hammer <sup>6</sup>	Total Hours: In-Water Pile Driving with Vibratory Hammer <sup>7</sup>	Total Hours: In-Water Stabbing <sup>8</sup>
July	1	7 beluga whales	7 adults	7	0	0	0	Unknown	Unknown	Unknown	Unknown	Unknown
August	34	262 beluga whales	151 adults 46 juveniles 27 calves 38 age unknown	10	97	6	0	25	147.75	Unknown	Unknown	Unknown
September	12	1 harbor seal 50 beluga whales	14 adults 18 juveniles 0 calves 18 whales: age unknown 1 harbor seal: age unknown	7	19	0	0	22	125.75	32.75	70.50	22.50
October	3	10 beluga whales	6 adults 2 juveniles 2 calves	6	9	4	3	27	209.00	104.00	55.00	50.00
November	10	102 beluga whales <sup>8</sup>	53 adults 35 juveniles 14 calves	91	91	4	5	23	124.05	83.55	12.00	28.50
<b>Cumulative Totals</b>	<b>60</b>	<b>1 harbor seal 431 beluga whales</b>	<b>231 adult whales 101 juvenile whales 43 whale calves 56 whales: age unknown 1 harbor seal: age unknown</b>	<b>40</b>	<b>227</b>	<b>14</b>	<b>8</b>	<b>97</b>	<b>606.55</b>	<b>220.30</b>	<b>137.50</b>	<b>101.00</b>

1. Some of these marine mammals also entered the Harassment Zone.
2. Some of these marine mammals also entered the Safety Zone.
3. Includes shutdowns because of poor visibility of monitoring zones.
4. Total days of in-water pile driving not tracked in July; at the request of National Marine Fisheries Service (NMFS), tracking of total days of in-water pile driving began in August.
5. Total hours of in-water pile driving not tracked in July; at the request of NMFS, daily tracking of hours for in-water pile driving began in August.
6. Total hours of in-water pile driving with impact hammer not tracked in July and August; at the request of NMFS, daily tracking of hours for in-water pile driving with impact hammer began in September.
7. Total hours of in-water pile driving with vibratory hammer not tracked in July and August; at the request of NMFS, daily tracking of hours for in-water pile driving with vibratory hammer began in September.
8. Total hours of in-water stabbing with not tracked in July and August; at the request of NMFS, daily tracking of hours for in-water stabbing began in September.
9. Total number of whales sighted in November includes averaged numbers for three whale sightings and respective group compositions on 7 November. Reference: November Monthly Marine Mammal Report, Table 2, Footnotes 8 – 16.

**Table 2. Marine Mammal Observation and Project Activities Summary: November 2008** (revised 6 February 2009)  
**Construction-Site Monitoring Location — Port of Anchorage Marine Terminal Redevelopment Project**

Date	Project Activity at Time of Marine Mammal Sighting	Sighting Number <sup>1</sup>	No. of Marine Mammals	Group Composition <sup>2</sup>	No. of Animals in 200-meter Safety Zone <sup>3</sup>	No. of Animals in Harassment Zones	Initial Heading & Behavior <sup>4</sup>	Reaction <sup>5</sup>	Shutdown? (Y/N) Time of Shutdown	Takes <sup>6</sup>	No. of Hours: Impact Pile Driving – in Water	No. of Hours: Vibratory Pile Driving – in Water	No. of Hours: Stabbing – in Water
1 Nov.	N/A	No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	Yes: 7:30 – 11:34 a.m.; poor visibility due to fog <sup>7</sup>	N/A	0	0	4.00
2 Nov.	No in-water construction	#1 (of 2)	3 beluga whales	2 adults; 1 juvenile	3 (final sighting)	0 (initial sighting)	Traveling N along shoreline.	No reaction observed.	Yes: 9:10– 10:25 a.m.	0	5.00	0	0
	No in-water construction.	#2 (of 2)	7 beluga whales	6 adults 1 juvenile	7 (final sighting)	0 (initial sighting)	Cohesive group traveling SE; diving.	No reaction observed.	No	0			
3 Nov.	N/A	No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2.50	2.50	0
4 Nov.	N/A	No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	6.00	0	0
5 Nov.	N/A	No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	7.00	0	7.00
6 Nov.	N/A	No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	10.00	0	0
7 Nov.	No in-water construction.	#1 (of 6)	8 beluga whales	3 adults 5 juveniles	0	8	Traveling N, away from Project site; swimming & diving.	No reaction observed.	Yes: 9:10 – 10:25 a.m.	0	0	0	10.00
	Vibratory hammer	#2 (of 6)	5 beluga whales	5 adults	5	5	Swimming S.	Whales did not change course.	Yes: 3:54 – 4:45 p.m.	5			
	No in-water construction.	#3 (of 6)	39 beluga whales <sup>8</sup>	18 adults <sup>9</sup> 13 juveniles <sup>10</sup> 8 calves <sup>11</sup>	39	39	Traveling & swimming S.	No reaction observed.	No	0			
	No in-water construction.	#4 (of 6)	24 beluga whales <sup>12</sup>	9 adults <sup>13</sup> 11 juveniles <sup>14</sup> 4 calves <sup>15</sup>	24	24 (initial & final sightings)	Traveling & swimming S.	No reaction observed.	No	0			
	No in-water construction.	#5 (of 6)	3 beluga whales	3 adults	0	3	Swimming N; diving.	No reaction observed.	No	0			
	No in-water construction.	#6 (of 6)	4 beluga whales <sup>16</sup>	4 adults	4 (final sighting)	4 (initial sighting)	Traveling S; swimming & diving.	No deviation or behavior change.	No	0			
8 Nov.	N/A	No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	4.00	0
9 Nov.	N/A	No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	5.50	0	0
10 Nov.	N/A	No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	4.00	0	1.00
11 Nov.	Veterans Day:	Federal holiday – no work											
12 Nov.	N/A	No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	2.00

1 #1= first marine mammal sighting of the day; #2= second marine mammal sighting of the day, etc.  
2 Distribution of adults, juveniles, and calves.  
3 Shutdown Criteria in Safety & Harassment Zones: **50 m** from other in-water project activities; **200 m** from either vibratory or impact pile driving; **350 m** from impact pile driving, but only if 5 or more marine mammals are seen or if a calf/calves present; **800 m** from vibratory pile driving, but only if 5 or more (group) marine mammals are seen or if calf/calves present.  
4 In order of occurrence.  
5 Reaction of marine mammals to project construction activities and other activities in the Port.  
6 Per sighting: total number of animals observed within safety or harassment zones during pile driving.  
7 As required by stipulation 5(c)(3) of the Incidental Harassment Authorization issued 7-15-08.  
8 Observer entered "30+" on sighting form. To maintain consistency of data presentation in the summary tables, the plus sign was removed and the group composition was averaged, yielding a new total of **39** whales sighted.  
9 Observer entered "15-20 adults" on sighting form. To maintain consistency of data presentation in the summary tables, "**18**" (the average of 15-20) was used as the number of adults sighted.  
10 Observer entered "10-15 juveniles" on sighting form. To maintain consistency of data presentation in the summary tables, "**13**" (the average of 10-15) was used as the number of juveniles sighted.  
11 Observer entered "5-10 calves" on sighting form. To maintain consistency of data presentation in the summary tables, "**8**" (the average of 5-10) was used as the number of calves sighted.  
12 Observer entered "20+" on sighting form. To maintain consistency of data presentation in the summary tables, the plus sign was removed and the group composition was averaged, yielding a new total of **24** whales sighted.  
13 Observer entered "7-10 adults" on sighting form. To maintain consistency of data presentation in the summary tables, "**9**" (the average of 7-10) was used as the number of adults sighted.  
14 Observer entered "10-12 juveniles" on sighting form. To maintain consistency of data presentation in the summary tables, "**11**" (the average of 10-12) was used as the number of juveniles sighted.  
15 Observer entered "3-5 calves" on sighting form. To maintain consistency of data presentation in the summary tables, "**4**" (the average of 3-5) was used as the number of calves sighted.  
16 Observer entered "3-4" on sighting form. To maintain consistency of data presentation in the summary tables, the higher number in the range, "**4**," was used as the total number of whales sighted.

**Table 2. Marine Mammal Observation and Project Activities Summary: November 2008  
Construction-Site Monitoring Location — Port of Anchorage Marine Terminal Redevelopment Project**

Date	Project Activity at Time of Marine Mammal Sighting	Sighting Number <sup>1</sup>	No. of Marine Mammals	Group Composition <sup>2</sup>	No. of Animals in 200-meter (m) Safety Zone <sup>3</sup>	No. of Animals in Harassment Zones	Initial Heading & Behavior <sup>4</sup>	Reaction <sup>5</sup>	Shutdown? (Y/N) Time of Shutdown	Takes <sup>6</sup>	No. of Hours: Impact Pile Driving – in Water	No. of Hours: Vibratory Pile Driving – in Water	No. of Hours: Stabbing – in Water
13 Nov.	N/A	No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	2.00	2.00
14 Nov.	N/A	No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2.50	2.00	0
<b>15 Nov.</b>	No in-water construction.	# 1 (of 1)	1 beluga whale	1 juvenile	1 (final sighting)	0	Traveling S	No reaction observed	<b>No</b>	0	1.50	0	2.50
16 Nov.	N/A	No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2.00	0	0
17 Nov.	N/A	No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0
<b>18 Nov.</b>	No in-water construction.	# 1 (of 1)	8 beluga whales	3 adults 3 juveniles 2 calves	8	8	Traveling S: swimming & diving.	No observed reaction.	<b>No</b>	0	6.00	0	0
19 Nov.	No marine mammals sighted.	No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	6.50	0	0
20 Nov.	No marine mammals sighted.	No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	4.00	1.50	0
21 Nov.	No marine mammals sighted.	No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	7.00	0	0
22 Nov.	No marine mammals sighted.	No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	6.00	0	0
23 Nov.	No marine mammals sighted.	No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	.75	0	0
24 Nov.	No marine mammals sighted.	No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2.50	0	0
25 Nov.	No marine mammals sighted.	No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	4.80	0	0
26 Nov.	No marine mammals sighted.	No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0
27 Nov.	Thanksgiving:	Federal holiday - no work											
28 Nov.	No work												
29 Nov.	No work												
30 Nov.	No work												
	<b>NOVEMBER TOTALS</b>	<b>10</b>	<b>102</b>	<b>53 adults 35 juveniles 14 calves</b>	<b>91</b>	<b>91</b>	<b>N/A</b>	<b>N/A</b>	<b>4</b>	<b>5</b>	<b>83.55 hours (over 18 days)</b>	<b>12.00 hours (over 5 days)</b>	<b>28.50 hours (over 7 days)</b>

1 #1= first marine mammal sighting of the day; #2= second marine mammal sighting of the day, etc.

2 Distribution of adults, juveniles, and calves.

3 Shutdown Criteria in Safety & Harassment Zones: **50 m** from other in-water project activities; **200 m** from either vibratory or impact pile driving; **350 m** from impact pile driving, but only if 5 or more marine mammals are seen or if a calf/calves present; **800 m** from vibratory pile driving, but only if 5 or more (group) marine mammals are seen or if calf/calves present.

4 In order of occurrence.

5 Reaction of marine mammals to project construction activities and other activities in the Port.

6 Per sighting: total number of animals observed within safety or harassment zones during pile driving.

7 As required by stipulation 5(c)(3) of the Incidental Harassment Authorization issued 7-15-08.

8 Observer entered "30+" on sighting form. To maintain consistency of data presentation in the summary tables, the plus sign was removed and the group composition was averaged, yielding a new total of **39** whales sighted.

9 Observer entered "15-20 adults" on sighting form. To maintain consistency of data presentation in the summary tables, "**18**" (the average of 15-20) was used as the number of adults sighted.

10 Observer entered "10-15 juveniles" on sighting form. To maintain consistency of data presentation in the summary tables, "**13**" (the average of 10-15) was used as the number of juveniles sighted.

11 Observer entered "5-10 calves" on sighting form. To maintain consistency of data presentation in the summary tables, "**8**" (the average of 5-10) was used as the number of calves sighted.

12 Observer entered "20+" on sighting form. To maintain consistency of data presentation in the summary tables, the plus sign was removed and the group composition was averaged, yielding a new total of **24** whales sighted.

13 Observer entered "7-10 adults" on sighting form. To maintain consistency of data presentation in the summary tables, "**9**" (the average of 7-10) was used as the number of adults sighted.

14 Observer entered "10-12 juveniles" on sighting form. To maintain consistency of data presentation in the summary tables, "**11**" (the average of 10-12) was used as the number of juveniles sighted.

15 Observer entered "3-5 calves" on sighting form. To maintain consistency of data presentation in the summary tables, "**4**" (the average of 3-5) was used as the number of calves sighted.

16 Observer entered "3-4" on sighting form. To maintain consistency of data presentation in the summary tables, the higher number in the range, "**4**," was used as the total number of whales sighted.

**Table 3. Marine Mammal Observation and Project Activities Summary: October 2008  
Construction-Site Monitoring Location--Port of Anchorage Marine Terminal Redevelopment Project**

Date	Project Activity at Time of Marine Mammal Sighting	Sighting Number <sup>1</sup>	No. of Marine Mammals	Group Composition <sup>2</sup>	No. of Animals in 200-Meter (m) Safety Zone <sup>3</sup>	No. of Animals in Harassment Zones	Initial Heading & Behavior <sup>4</sup>	Reaction <sup>5</sup>	Shutdown? (Y/N) Time of Shutdown	Takes <sup>6</sup>	No. of Hours: Impact Pile Driving - In Water	No. of Hours: Vibratory Pile Driving - In Water	No. of Hours: Stabbing - In Water
1 Oct.	In-water pile driving with vibratory hammer	#1 (of 1)	3 beluga whales	3 adults	0	3	Traveling north as a cohesive group	No observable reaction	Yes: 9:55 – 10:16 a.m.	3	1.00	2.00	0
2 Oct.	N/A	No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0
3 Oct.		No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	4.50	0
4 Oct.		No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0
5 Oct.	Sunday – no work <sup>7</sup>												
6 Oct.	N/A	No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	6.00	1.00	5.00
7 Oct.	N/A	No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	8.50	0	8.00
8 Oct.		No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.00	1.00	2.00
9 Oct.	N/A	No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	Yes: 12:57 – 2:00 p.m.; poor visibility due to snow & fog <sup>8</sup>  Yes: 3:00 – 3:45 p.m.; poor visibility due to snow	N/A	5.00	2.00	0
10 Oct.	N/A	No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	5.50	0	0
11 Oct.		No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2.00	0	0.50
12 Oct.		No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	6.00
13 Oct.		No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	4.00	3.00	0
14 Oct.		No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	5.00	5.00	0
15 Oct.		No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	5.00	0	5.00
16 Oct.	N/A	No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	Yes: 10:30 a.m. – 12:30 p.m. poor visibility due to fog	N/A	4.00	0	4.00
17 Oct.	N/A	No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	4.00	3.50	1.00
18 Oct.	N/A	No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3.00	0	2.00
19 Oct.	N/A	No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	6.0	0
20 Oct.	N/A	No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3.00	0	4.50
21 Oct.	N/A	No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	10.00	4.00	0
22 Oct.	N/A	No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	9.00	0	0

<sup>1</sup> #1= first marine mammal sighting of the day; #2= second marine mammal sighting of the day, etc.

<sup>2</sup> Distribution of adults, juveniles, and calves.

<sup>3</sup> Shutdown Criteria for Safety and Harassment Zones: **50 m** from other in-water project activities; **200 m** from either vibratory or impact pile driving; **350 m** from impact pile driving, but only if 5 or more marine mammals are seen or if a calf/calves present; **800 m** from vibratory pile driving, but only if 5 or more (group) marine mammals are seen or if calf/calves present.

<sup>4</sup> In order of occurrence.

<sup>5</sup> Reaction of marine mammals to project construction activities and other activities in the Port.

<sup>6</sup> Per sighting: total number of animals observed within safety or harassment zones during in-water pile driving activities.

<sup>7</sup> This was the only Sunday in Oct. that project activities were not conducted; for the remainder of the month the work schedule was 7 days a week.

<sup>8</sup> As required by stipulation 5(c)(3) of the 2008 Incidental Harassment Authorization.

**Table 3. Marine Mammal Observation and Project Activities Summary: October 2008  
Construction-Site Monitoring Location--Port of Anchorage Marine Terminal Redevelopment Project**

Date	Project Activity at Time of Marine Mammal Sighting	Sighting Number <sup>1</sup>	No. of Marine Mammals	Group Composition <sup>2</sup>	No. of Animals in 200-Meter (m) Safety Zone <sup>3</sup>	No. of Animals in Harassment Zones <sup>3</sup>	Initial Heading & Behavior <sup>4</sup>	Reaction <sup>5</sup>	Shutdown? (Y/N) Time of Shutdown	Takes <sup>6</sup>	No. of Hours: Impact Pile Driving – In Water	No. of Hours: Vibratory Pile Driving – In Water	No. of Hours: Stabbing – In Water
23 Oct.	N/A	No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	8.50	4.00	2.50
24 Oct.	N/A	No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0
25 Oct.	N/A	No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	4.50	0	4.50
26 Oct.	N/A	No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	6.00	6.00	0
27 Oct.	N/A	No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3.00	0	0
<b>28 Oct.</b>	No in-water construction	#1 (of 1)	6 beluga whales	2 adults 2 juveniles 2 calves	6	6	Swimming south: milling, suspected feeding, & diving	none	<b>No</b>	N/A	0	0	4.00
29 Oct.	N/A	No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	5.00	0
30 Oct.	N/A	No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	6.00	6.00	0
<b>31 Oct.</b>	No in-water construction	#1 (of 1)	1 beluga whale	1 adult	0	0	Traveling northwest	No observable reaction	<b>No</b>	N/A	0	2.00	1.00
<b>OCTOBER TOTALS</b>		<b>3 marine mammal sightings</b>	<b>10 beluga whales sighted</b>	<b>6 adults 2 juveniles 2 calves</b>	<b>6 whales entered Safety Zone</b>	<b>9 whales entered Harassment Zones</b>	<b>N/A</b>	<b>N/A</b>	<b>4 shutdowns</b>	<b>3 takes</b>	<b>Total hours in-water impact pile driving: 104 Total days in-water impact pile driving: 21</b>	<b>Total hours in-water vibratory pile driving: 55 Total days in-water vibratory pile driving: 15</b>	<b>Total hours in-water stabbing: 50 Total days in-water stabbing: 14</b>

<sup>1</sup> #1= first marine mammal sighting of the day; #2= second marine mammal sighting of the day, etc.

<sup>2</sup> Distribution of adults, juveniles, and calves.

<sup>3</sup> **Shutdown Criteria for Safety and Harassment Zones:** **50 m** from other in-water project activities; **200 m** from either vibratory or impact pile driving; **350 m** from impact pile driving, but only if 5 or more marine mammals are seen or if a calf/calves present; **800 m** from vibratory pile driving, but only if 5 or more (group) marine mammals are seen or if calf/calves present.

<sup>4</sup> In order of occurrence.

<sup>5</sup> Reaction of marine mammals to project construction activities and other activities in the Port.

<sup>6</sup> Per sighting: total number of animals observed within safety or harassment zones during in-water pile driving activities.

<sup>7</sup> This was the only Sunday in Oct. that project activities were not conducted; for the remainder of the month the work schedule was 7 days a week.

<sup>8</sup> As required by stipulation 5(c)(3) of the 2008 Incidental Harassment Authorization.



**Table 4. Marine Mammal Observation and Project Activities Summary: September 2008  
Construction-Site Monitoring Location--Port of Anchorage Marine Terminal Redevelopment Project**

Date	Project Activity at Time of Sighting	Sighting Number <sup>1</sup>	No. of Marine Mammals Sighted	Group Composition <sup>2</sup>	No. of Animals in 200-meter (m) Safety Zone <sup>3</sup>	No. of Animals in Harassment Zones	Initial Heading & Behavior <sup>4</sup>	Reaction <sup>5</sup>	Shutdown? (Y/N) Time of shutdown	Takes <sup>6</sup>	No. of Hours: Impact Pile Driving - in Water	No. of Hours: Vibratory Pile Driving - in Water	No. of Hours Stabbing - in Water
1 Sept.	Labor Day - no work												
2 Sept.	No in-water work at time of sighting.	#1 (of 1)	2 beluga whales	1 adult 1 juvenile	0	2	Traveling north; swimming close together	No observable reaction.	No	0	0	8.00	0
3 Sept.	N/A	No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	1.00	1.00
4 Sept.	No in-water work at time of sighting.	#1 (of 1)	4 beluga whales	4 adults	0	4	Traveling south. Milling; swimming; diving; Drifted apart in pairs for awhile, then came together.	No observable reaction.	No	0	0	5.25	0
5 Sept.	No in-water work at time of sighting.	#1 (of 1)	6 beluga whales	4 adults 2 juveniles	0	0	Feeding	No observable reaction.	No	0	0	6.25	0
6 Sept.	No in-water work at time of sighting.	#1 (of 1)	7 beluga whales	4 adults 3 juveniles	7	0	Swimming slowly south	No observable reaction.	No	0	0	8.50	0
7 Sept.	Sunday - no work												
8 Sept.	No in-water work at time of sighting.	#1 (of 1)	4 beluga whales	4 unknown age <sup>7</sup>	0	0	Traveling northwest; swimming	No observable reaction.	No	0	0	0	0
9 Sept.	N/A	No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	5.50	0	0
10 Sept.	N/A	No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	4.00	0	0
11 Sept.	N/A	No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2.50	0	0
12 Sept.	N/A	No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3.75	0	0
13 Sept.	No in-water work at time of sighting.	#1 (of 4)	1 harbor seal	N/A	0	1	Traveling north; diving 3-4 min. at a time; swimming	No reaction.	<b>No</b>	0	0	0	7.50
	Stabbing: out of water	#2 (of 4)	4 beluga whales	4 unknown age <sup>7</sup>	0	0	Traveling north; swimming	No observable reaction.	<b>No</b>	0			
	Stabbing: out of water	#3 (of 4)	5 beluga whales	5 unknown age <sup>7</sup>	0	0	Traveling north; swimming diving	No observable reaction.	<b>No</b>	0			
	Pile driving with vibratory hammer	#4 (of 4)	5 beluga whales	5 unknown age <sup>7</sup>	0	0	Traveling north; swimming; diving; feeding suspected	No observable reaction.	<b>No</b> (no marine mammals nearing or within safety or harassment or zones)	0			
14 Sept.	Sunday - no work												
15 Sept.	No in-water work at time of sighting.	#1 (of 2)	6 beluga whales	6 juveniles	0	6	Traveling south; swimming	No observable reaction.	<b>No</b>	0	1.50	4.00	3.50
	No in-water work at time of sighting.	#2 (of 2)	6 beluga whales	6 juveniles	0	6	Traveling north	No observable reaction.	<b>No</b>	0			

- 1 #1= first marine mammal sighting of the day; #2= second marine mammal sighting of the day, etc.
- 2 Distribution of adults, juveniles, and calves.
- 3 **Shutdown Criteria for Safety and Harassment Zones:** 50 m from other in-water Project activities; 200 m from either vibratory or impact pile driving; 350 m from impact pile driving, but only if 5 or more marine mammals are seen or if a calf/calves present; 800 m from vibratory pile driving, but only if 5 or more (group) marine mammals are seen or if calf/calves present.
- 4 In order of occurrence.
- 5 Reaction of marine mammals to Project construction activities and other activities in the Port.
- 6 Per sighting: total number of animals observed within the safety or harassment zones.
- 7 Age of whales was not able to be determined due to sighting distance: 3.22 kilometers from Project footprint.

**Table 4. Marine Mammal Observation and Project Activities Summary: September 2008  
Construction-Site Monitoring Location--Port of Anchorage Marine Terminal Redevelopment Project**

Date	Project Activity at Time of Sighting	Sighting Number <sup>1</sup>	No. of Marine Mammals Sighted	Group Composition <sup>2</sup>	Animals in 200-meter (m) Safety Zone	Animals in Harassment Zones <sup>3</sup>	Initial Heading & Behavior <sup>4</sup>	Reaction <sup>5</sup>	Shutdown? (Y/N) Time of Shutdown	Takes <sup>6</sup>	No. of Hours: Impact Pile Driving - in Water	No. of Hours: Vibratory Pile Driving in Water	No. of Hours: Stabbing -in Water
16 Sept.	N/A	No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3.00	5.00	0
17 Sept.	N/A	No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	5.00	0
18 Sept.	N/A	No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	4.00	0	0
19 Sept.	N/A	No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0
20 Sept.	N/A	No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	8.00
21 Sept.	Sunday - no work												
22 Sept.	N/A	No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	12.00	0
23 Sept.	N/A	No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	7.50	0
24 Sept.	N/A	No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0
25 Sept.	N/A	No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	5.00	0	0
26 Sept.	N/A	No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	2.50
27 Sept.	N/A	No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	5.00	0
28 Sept.	Sunday - no work												
<b>29 Sept.</b>	Vibratory pile driving	#1 (of 1)	1 beluga whale	1 adult	0	0	Traveling southwest; diving	No observable reaction.	<b>No</b> (whale was not in safety or harassment zones)	0	0	3.00	0
30 Sept.	N/A	No marine mammals sighted.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3.50	0	0
<b>SEPTEMBER TOTALS</b>		<b>12 marine mammal sightings</b>	<b>51 marine mammals sighted</b>	<b>1 harbor seal 14 adult whales 18 juvenile whales 0 whale calves 18 whales of unknown age<sup>7</sup></b>	<b>7 whales entered the Safety Zone</b>	<b>1 harbor seal &amp; 18 whales entered the Harassment Zones</b>	<b>N/A</b>	<b>N/A</b>	<b>No shutdowns during September</b>	<b>No takes during September</b>	<b>Total hours in-water pile driving with impact hammer: 32.75 Total days in-water pile driving with impact hammer: 9</b>	<b>Total hours in-water pile driving with vibratory hammer: 70.5 Total days in-water pile driving with vibratory hammer: 12</b>	<b>Total hours in-water stabbing: 22.5 Total days in-water stabbing: 5</b>

1 #1= first marine mammal sighting of the day; #2= second marine mammal sighting of the day, etc.

2 Distribution of adults, juveniles, and calves.

3 **Shutdown Criteria for Safety and Harassment Zones:** 50 m from other in-water Project activities; 200 m from either vibratory or impact pile driving; 350 m from impact pile driving, but only if 5 or more marine mammals are seen or if a calf/calves present; 800 m from vibratory pile driving, but only if 5 or more (group) marine mammals are seen or if calf/calves present.

4 In order of occurrence.

5 Reaction of marine mammals to Project construction activities and other activities in the Port.

6 Per sighting: total number of animals observed within the safety or harassment zones.

7 Age of whales was not able to be determined due to sighting distance: 3.22 kilometers from Project footprint.

**Table 5. Marine Mammal Observations and Project Activities Summary: August 2008  
Construction Observers--Port of Anchorage Marine Terminal Redevelopment Project**

Date	Project Activity at time of marine mammal sighting	Sighting Number <sup>1</sup>	No. of Beluga Whales <sup>2</sup>	Group Composition <sup>3</sup>	No. of Animals in 200-m Safety Zone <sup>4</sup>	No. of Animals in Harassment Zone	Initial Heading and Behavior <sup>5</sup>	Reaction <sup>6</sup>	Shutdown (Y/N) Time of shutdown	Takes <sup>7</sup>	No. of Hours: In-Water Project Work <sup>8</sup>
1 Aug.	N/A	No marine mammal sightings	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	5.00
2 Aug.	N/A	No marine mammal sightings	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	5.50
3 Aug.	Sunday - no work.									0	
4 Aug.	N/A	No marine mammal sightings	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	5.75
5 Aug.	N/A	No marine mammal sightings	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	6.00
6 Aug.	N/A	No marine mammal sightings	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	7.00
7 Aug.	N/A	No marine mammal sightings	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	4.50
8 Aug.	N/A	No marine mammal sightings	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	4.50
9 Aug.	N/A	No marine mammal sightings	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	4.50
10 Aug.	Sunday - no work.									0	
11 Aug.	N/A	No marine mammal sightings	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	4.50
12 Aug.	N/A	No marine mammal sightings	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	5.25
13 Aug.	N/A	No marine mammal sightings	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	8.00
14 Aug.	No in-water work at time of initial sighting.	#1	9	6 adults; 3 juveniles	0	0	Traveling NW	N/A	<b>No</b>	0	5.75
	In-water vibratory pile driving.	#2	16	8 adults; 5 juveniles; 3 calves	0	0	Traveling S, whales about 50 meters apart	No observable reaction.	<b>Yes: 10:40 - 11:06 AM;</b> Group first sighted 1200 m outside the 800-m harassment zone-work shut down before group reached the 800-m harassment zone.	0	
15 Aug.	No in-water work at time of initial sighting.	#1	4	2 adults; 1 juvenile; 1 calf	0	4	Traveling S to W; slow surfacing; diving	No observable reaction.	<b>No</b>	0	4.50
	No in-water work at time of initial sighting.	#2	4	2 adults; 1 juvenile; 1 calf	0	4	Swimming N; diving	No observable reaction.	<b>No</b>	0	
16 Aug.	No in-water work at time of initial sighting.	#1	16	13 adults; 3 juveniles	0	16	Traveling S; slow surfacing; juveniles in rear	No observable reaction.	<b>No</b>	0	7.00
17 Aug.	Sunday - no work.										
18 Aug.	No in-water work at time of initial sighting.	#1	4	4 adults	0	4	Traveling N ; swimming; diving	No observable reaction.	<b>No</b>	0	6.00

1 #1= first marine mammal sighting of the day; #2= second marine mammal sighting of the day, etc.

2 Beluga whales were the only marine mammal species sighted by the observers during August.

3 Distribution of adults, juveniles, and calves.

4 Shutdown criteria for Safety & Harassment Zones: **50 meters** from other in-water non-pile-driving activities; **200 m** from either **impact or vibratory** pile driving; **350 m** from impact pile driving if 5 or more animals seen or if a calf/calves are present; **800 meters** from **vibratory hammer** if 5 or more animals seen or if calf/calves present.

5 In order of occurrence.

6 Reaction of marine mammals to Project construction activities or Port activities.

7 Per sighting: total number of animals observed within safety or harassment zones during in-water pile driving.

8 During August, only total in-water hours were recorded. In September, at the request of NMFS, hours of in-water impact pile driving, hours of in-water vibratory pile driving, and hours of in-water stabbing will be recorded separately.

**Table 5. Marine Mammal Observations and Project Activities Summary: August 2008  
Construction Observers--Port of Anchorage Marine Terminal Redevelopment Project**

Date	Project Activity at time of marine mammal sighting	Sighting Number <sup>1</sup>	No. of Beluga Whales <sup>2</sup>	Group Composition <sup>3</sup>	No. of Animals in 200-m Safety Zone <sup>4</sup>	No. of Animals in Harassment Zone	Initial Heading and Behavior <sup>5</sup>	Reaction <sup>6</sup>	Shutdown (Y/N) Time of shutdown	Takes <sup>7</sup>	No. of Hours: In-Water Project Work <sup>8</sup>
<b>18 Aug.</b> <i>Continued</i>	No in-water work at time of initial sighting.	#2	11	7 adults; 1 juvenile; 3 calves	0	11	Swimming S, close together; calves close to mothers; diving; swimming diving	Whales split into two groups because of barge in area.	No	0	
	Out-of-water stabbing.	#3	4	4 adults	0	4	Swimming S; diving; slow surfacing	No observable reaction.	Yes: 10:52 - 11:30 AM	0	
	Out-of-water stabbing.	#4	6	4 adults; 2 juveniles	0	6	Traveling S; swimming	Group did not dive when near observers.	Yes: 10:52 - 11:30 AM	0	
	No in-water work at time of initial sighting.	#5	9	6 adults; 2 juveniles; 1 calf	0	0	Swimming NE; diving; very slow surfacing	No observable reaction.	No	0	
	No in-water work at time of initial sighting.	#6	9	7 adults; 2 juveniles	0	0	Traveling N; swimming	Group split up when boat approached.	No	0	
	No in-water work at time of initial sighting.	#7	4	3 adults; 1 juvenile	0	4	Traveling N; swimming; milling; feeding	No observable reaction.	No	0	
	No in-water work at time of initial sighting.	#8	3	3 adults	0	0	Traveling NW; slow surfacing (loosely grouped); milling; 2 dives; suspected feeding	No observable reaction.	No	0	
<b>19 Aug.</b>	In-water work, but no vibratory or impact pile driving.	#1	14	9 adults; 3 juveniles; 2 calves	0	14	Traveling S; swimming; slow surfacing; subgroups of 4, then 1, then 1, then 8	Animals went right past both areas of construction seemingly unaffected.	Yes: 9:57 - 10:21 AM	0	6.50
	Fill placement.	#2	9	7 adults; 1 juveniles; 1 calf	0	0	Traveling N; swimming; diving; slow surfacing; moving in different directions; milling	Seemed unaffected by any noise in the Port.	No	0	
	No in-water work at time of initial sighting.	#3	12	7 adults; 3 juveniles; 2 calves	0	0	Traveling S; milling and feeding W & SW of Port docks	May have reacted to Port dredging barge-split into groups.	No	0	
<b>20 Aug.</b>	Stabbing.	#1	3	2 adults; 1 calf	0	0	Traveling NW. Calf swam close to 1 adult; other adult stayed close by	No observed response to any noise in Port.	No (whales did not enter safety or harassment zones)	0	8.50
	Out-of-water stabbing.	#2	6	4 adults; 1 juvenile; 1 calf	0	6	Traveling S, 1 adult swimming in a different pattern than rest of group	No observable reaction.	Yes: 10:40 - 11:00 AM	0	
	No in-water work at time of initial sighting.	#3	6	6 adults	0	0	Traveling S; swimming; milling; surfacing; feeding	No observable reaction.	No	0	
<b>21 Aug.</b>	Out-of-water stabbing.	#1	45	30 adults 5 juveniles 10 calves	0	0	Traveling SW; feeding	Leader was 100 yards ahead of rest of group. Mammals seemed to pay no attention to work going on.	Yes: 11:30 - 11:40 AM	0	8.50

1 #1= first marine mammal sighting of the day; #2= second marine mammal sighting of the day, etc.

2 Beluga whales were the only marine mammal species sighted by the observers during August.

3 Distribution of adults, juveniles, and calves.

4 Shutdown criteria for Safety & Harassment Zones. 50 meters from other in-water non-pile-driving activities; 200 m from either impact or vibratory pile driving; 350 m from impact pile driving if 5 or more animals seen or if a calf/calves are present; 800 meters from vibratory hammer if 5 or more animals seen or if calf/calves present.

5 In order of occurrence.

6 Reaction of marine mammals to Project construction activities or Port activities.

7 Per sighting: total number of animals observed within safety or harassment zones during in-water pile driving.

8 During August, only total in-water hours were recorded. In September, at the request of NMFS, hours of in-water impact pile driving, hours of in-water vibratory pile driving, and hours of in-water stabbing will be recorded separately.

**Table 5. Marine Mammal Observations and Project Activities Summary: August 2008  
Construction Observers--Port of Anchorage Marine Terminal Redevelopment Project**

Date	Project Activity at Time of Marine Mammal Sighting	Sighting Number <sup>1</sup>	No. of Beluga Whales <sup>2</sup>	Group Composition <sup>3</sup>	No. of Animals in 200-m Safety Zone <sup>4</sup>	No. of Animals in Harassment Zone	Initial Heading and Behavior <sup>5</sup>	Reaction <sup>6</sup>	Shutdown (Y/N) Time of Shutdown	Takes <sup>7</sup>	No. of Hours: In-Water Project Work <sup>8</sup>
21 Aug. <i>Continued</i>	No in-water work at time of initial sighting.	#2	4	1 adult; 3 juveniles	4	0	Traveling SW; feeding	No observable reaction.	No	0	
	No in-water work at time of initial sighting.	#3	30	30 unknown		0	Traveling NE	No observable reaction.	No	0	
22 Aug.	No in-water work at time of initial sighting.	#1	2	1 adult; 1 calf	0	2	Traveling N	No observable reaction.	No	0	7.50
	No in-water work at time of initial sighting.	#2	2	1 adult; 1 juvenile	0	2	Traveling N	No observable reaction.	No	0	
	No in-water work at time of initial sighting.	#3	1	1 adult	0	1	Traveling N	No observable reaction.	No	0	
	No in-water work at time of initial sighting.	#4	1	1 adult	0	0	Traveling NW	No observable reaction.	No	0	
	Out-of-water stabbing.	#5	8	8 unknown	0	8	Traveling S	No observable reaction.	No	0	
23 Aug.	Out-of-water stabbing.	#1	5	5 juveniles	0	5	Traveling N	No observable reaction.	No	0	7.00
24 Aug.	Sunday-no work.										
25 Aug.	No in-water work at time of initial sighting.	#1	3	1 adult; 2 juveniles	3	0	Traveling N; diving; swimming; feeding	No observable reaction.	No	0	4.00
26 Aug.	No in-water work at time of initial sighting.	#1	3	2 adults; 1 juvenile	3	0	Traveling S fast in tight formation	No observable reaction.	No	0	4.00
	No in-water work at time of initial sighting.	#2	1	1 adult	0	0	Traveling S: diving & surfacing twice	No observable reaction.	No	0	
27 Aug.	N/A	No marine mammal sightings	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	3.00
28 Aug.	No in-water work at time of initial sighting.	#1	3	3 adults	0	3	Traveling S, close together	No observable reaction.	No	0	7.00
29 Aug.	No in-water work at time of initial sighting.	#1	3	3 adults	0	0	Traveling N	No observable reaction.	No	0	8.00
	No in-water work at time of initial sighting.	#2	2	2 adults	0	2	Traveling N; swimming	No observable reaction.	No	0	
30 Aug.	Labor Day Weekend - no work.										
31 Aug.	Sunday - no work.										
<b>AUGUST TOTALS</b>		<b>34 sightings</b>	<b>262 beluga whales</b>	<b>151 adults 46 juveniles 27 calves 38 age unknown</b>	<b>10 belugas in safety zone</b>	<b>97 belugas in harassment zones</b>	<b>N/A</b>	<b>N/A</b>	<b>6 shutdowns</b>	<b>0 Takes</b>	<b>147.75 total hours of in-water work</b>

1 #1= first marine mammal sighting of the day; #2= second marine mammal sighting of the day, etc.

2 Beluga whales were the only marine mammal species sighted by the observers during August.

3 Distribution of adults, juveniles, and calves.

4 Shutdown criteria for Safety & Harassment Zones: 50 meters from other in-water non-pile-driving activities; 200 m from either impact or vibratory pile driving; 350 m from impact pile driving if 5 or more animals seen or if a calf/calves are present; 800 meters from vibratory hammer if 5 or more animals seen or if calf/calves present.

5 In order of occurrence.

6 Reaction of marine mammals to Project construction activities or Port activities.

7 Per sighting: total number of animals observed within safety or harassment zones during in-water pile driving.

8 During August, only total in-water hours were recorded. In September, at the request of NMFS, hours of in-water impact pile driving, hours of in-water vibratory pile driving, and hours of in-water stabbing will be recorded separately.

**Table 6. Marine Mammal Observation and Project Activities Summary:  
 Port of Anchorage Marine Terminal Redevelopment Project  
 Construction-Site Monitoring Location — July 2008**

<b>Date</b>	24 July <sup>1</sup>
<b>Project Activity at Time of Marine Mammal Sighting</b>	No in-water work
<b>Sighting Number<sup>2</sup></b>	#1 (of 1)
<b>No. of Marine Mammals</b>	7 beluga whales
<b>Group Composition<sup>3</sup></b>	7 adults
<b>Behavior</b>	Traveling close, one body-length apart
<b>Reaction<sup>4</sup></b>	No observable reaction
<b>No. of Animals in 200-Meter (m) Safety Zone<sup>5</sup></b>	7
<b>No. of Animals in Harassment Zones</b>	0
<b>Shutdown? (Y/N)<sup>6</sup></b>	No
<b>Time of Shutdown</b>	
<b>Takes<sup>7</sup></b>	0

No marine mammal sightings 25-31 July.

<sup>1</sup> First day of in-water work: 2008 field season.

<sup>2</sup> #1= first marine mammal sighting of the day; #2= second marine mammal sighting of the day, etc.

<sup>3</sup> Distribution of adults, juveniles, and calves.

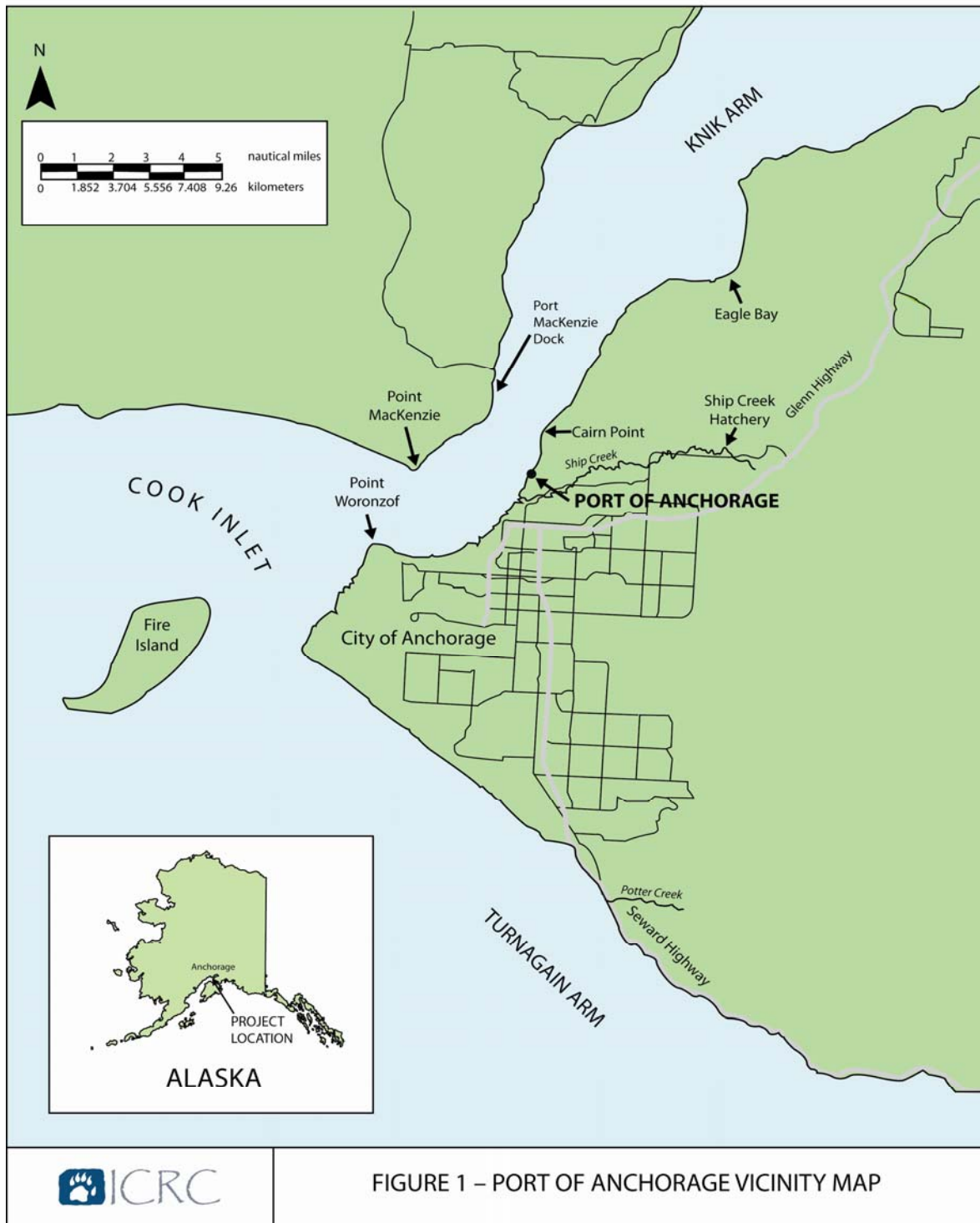
<sup>4</sup> Reaction of marine mammals to project construction activities and other activities in the Port.

<sup>5</sup> Per sighting: total number of animals observed within safety or harassment zones during in-water pile driving.

<sup>6</sup> **Shutdown Criteria:** 50 m from other in-water project activities; 200 m from either vibratory or impact pile driving; 350 m from impact pile driving, but only if 5 or more marine mammals are seen or if a calf/calves present; 800 m from vibratory pile driving, but only if 5 or more (group) marine mammals are seen or if calf/calves present.

<sup>7</sup> Number of animals sighted in Safety or Harassment Zone while in-water work in progress.

## **FIGURES**





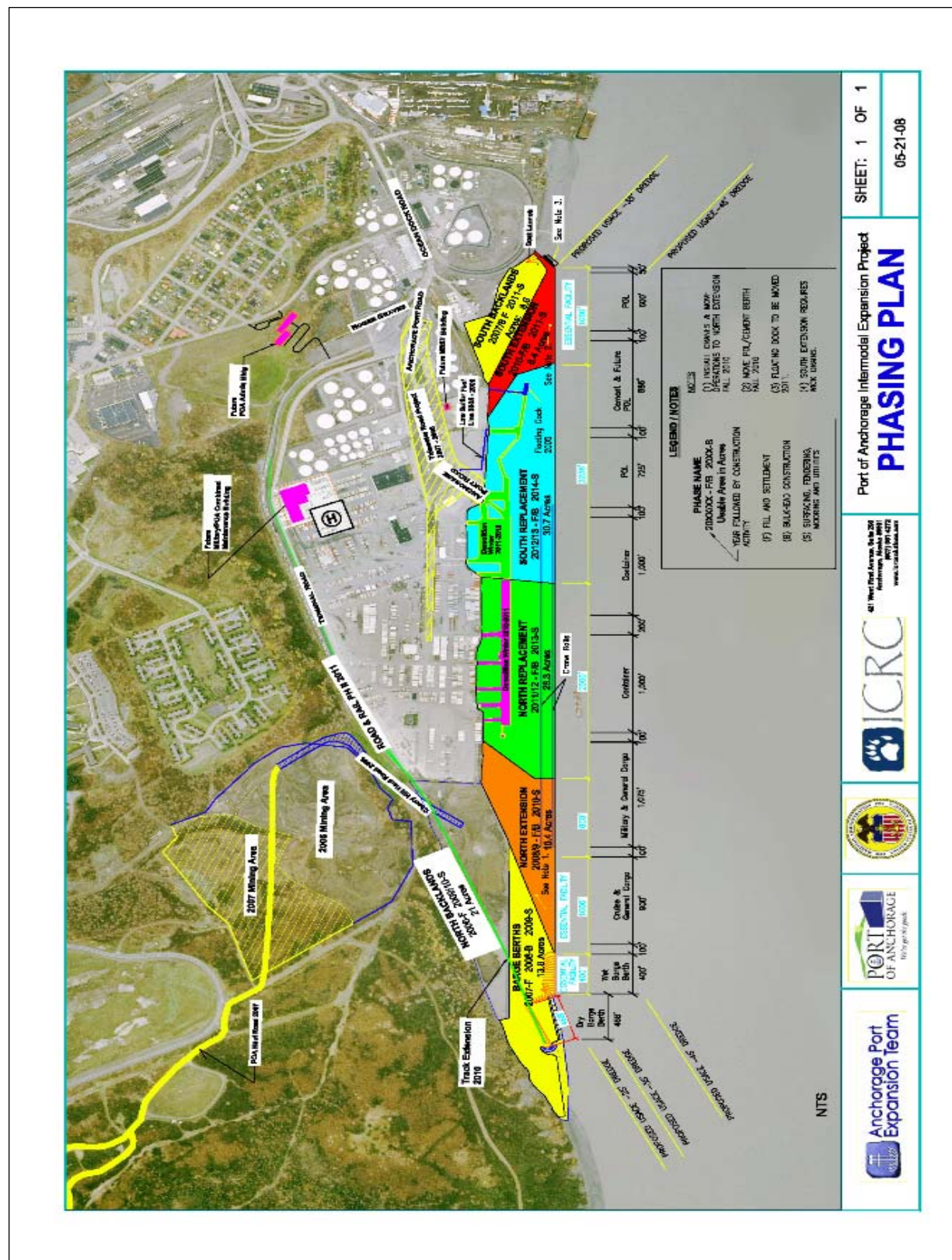


Figure 2 – Project Phasing Plan



Figure 3(a). North Extension facing north.



Figure 3(b). North Extension south end



Figure 4(a). Barge Berth construction site, Port of Anchorage. August 2008.



Figure 4(b). Barge Berth Construction 2008  
APU Observation Station visible (orange) on Cairn Point Bluff

## Port of Anchorage Beluga Whale Sighting Notification Form



If you are a Port of Anchorage employee, tenant, contractor, or visitor, we request that you please complete this form every time you see a beluga whale (or any other marine mammal) in Cook Inlet.

Date: _____ Time : _____
Name of observer: _____ Phone: _____ Agency or company affiliation: _____ Number of whales: _____ Observer's location: _____ Distance of whale from observer: _____ meters (or _____ miles)
Whale behavior (mark with X): <input type="checkbox"/> traveling in a straight line <input type="checkbox"/> slow surfacing <input type="checkbox"/> not traveling <input type="checkbox"/> other behavior (describe) <input type="checkbox"/> moving in multiple directions
To the best of your ability, please indicate your location at the time of the sighting and the approximate location of the whale(s) on the back of this form (site map).

Return completed form to POA: Leo M. Carroll, Special Projects Administrator  
E-mail [CarrollLM@muni.org](mailto:CarrollLM@muni.org) - or - Fax: 277-5636



2000 Anchorage Port Road  
Anchorage, Alaska 99501  
(907) 343-6200

POA Sighting Control Number (*intentionally left blank*): \_\_\_\_\_

Figure 5. POA Marine Mammal Sighting Form



Figure 6(a). Beluga whale sign at Anchorage Small Boat Harbor, September 2007.



Figure (6)b. Beluga whale sign at Port of Anchorage Security Checkpoint Two, Sept. 2007.

Project Construction Subcontractor – Marine Mammal Sighting Form Marine Terminal Redevelopment Construction 2008								
Date of Observation: _____ Name & Affiliation of Observer: _____								
Location of Observation Station: Sighting #: _____ (1 <sup>st</sup> sighting of the day is Sighting # 1)								
Time of Initial Sighting ↓	Time of Last Sighting ↓	Harassment Zones in View (circle) ↓	Species (circle) ↓	No. of Marine Mammals Sighted ↓		How Many ↓	Initial Heading (circle) ↓	Final Heading (circle) ↓
		None Some (< 50%) Most (> 50%) All (100%)	beluga whale harbor seal harbor porpoise killer whale other _____	Inside harassment zones	Outside harassment zones	Adults ____ Juveniles _ Calves ____	N NE E SE S SW W NW	N NE E SE S SW W NW
Tidal stage at time of sighting (circle): low slack low ebb low flood high slack high ebb high flood								
Distances of marine mammal(s) from in-water noise source (meters): Initial Distance = _____ Closest Distance = _____ Final Distance = _____								
In-water Project activities at time of sighting. Check boxes that apply: <input type="checkbox"/> no in-water activity <input type="checkbox"/> soft start <input type="checkbox"/> vibratory hammer <input type="checkbox"/> impact hammer <input type="checkbox"/> stabbing with vibratory/impact hammer <input type="checkbox"/> stabbing without vibratory/impact hammer								
<b>SHUT DOWN DURING IN-WATER CONSTRUCTION ACTIVITIES</b>								
<ul style="list-style-type: none"> <li>■ When marine mammals are sighted approaching the project site <b>OR</b></li> <li>■ When marine mammals are sighted within the following established harassment zones (from point of in-water noise source):                             <ul style="list-style-type: none"> <li>➤ <b>50 meters</b> from <b>other in-water Project activities</b> (non pile-driving work)</li> <li>➤ <b>200 meters</b> from either <b>vibratory or impact pile driving</b></li> <li>➤ <b>350 meters</b> from <b>impact pile driving</b>, <u>but only if 5 or more (Group) marine mammals are seen</u></li> <li>➤ <b>800 meters</b> from <b>vibratory pile driving</b>, <u>but only if 5 or more (Group) marine mammals are seen</u></li> <li>➤ When a <b>beluga calf or calves</b> are sighted approaching the Project site or are sighted within any of the harassment zones.</li> </ul> </li> <li>■ Project activities were shut down from _____ to _____ (time).</li> <li>■ Project activities were NOT shut down. <b>EXPLANATION REQUIRED Use Notes section on page two.</b></li> </ul> <p style="color: red; font-size: small;">Failure to shut down in-water construction activities <b>before</b> a marine mammal has been sighted within harassment zones under the circumstances listed above constitutes a "TAKE." <b>THERE ARE NO EXCEPTIONS.</b> You MUST keep an accurate "take" count of marine mammals sighted within harassment zones during in-water pile driving (including pile driving during the stabbing process) and submit this total take count to your supervisor. Count "one take" per each mammal (six beluga whales seen within harassment zones in one sighting during in-water pile driving = six takes).</p> <p style="text-align: center;"><b>TAKE COUNT THIS SIGHTING:</b> _____</p>								

Figure 7. Construction Observers Marine Mammal Sighting Form

To the best of your ability mark your location and the approximate location of marine mammal (mammals) on the attached map.

**BEHAVIOR OF MARINE MAMMAL:** 1= initial behavior 2= a change in behavior

- |                      |                                  |                                     |             |
|----------------------|----------------------------------|-------------------------------------|-------------|
| ( ) traveling        | ( ) diving                       | ( ) resting                         | ( ) milling |
| ( ) swimming         | ( ) swimming toward construction | ( ) swimming away from construction | ( ) fleeing |
| ( ) feeding observed | ( ) feeding suspected            | ( ) mating                          | ( ) other   |

**Describe any behavior patterns:** \_\_\_\_\_

**Describe initial group cohesion (orientation; how far apart):** \_\_\_\_\_

**Describe end group cohesion:** \_\_\_\_\_

**ADDITIONAL INFORMATION:**

- **Animal behavior** \_\_\_\_\_
- **Distance to in-water noise source** \_\_\_\_\_
- **Describe in-water stabbing phases** \_\_\_\_\_
- **Locations in relation to the port and to the sound source during observation period** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- **Note the time and the construction activity taking place during the change in marine mammal behavior** \_\_\_\_\_  
\_\_\_\_\_

**Notes:**







Figure 8a. Cairn Point Marine Mammal Monitoring Station on Elmendorf AFB.



Figure 8b. Cairn Point Marine Mammal Monitoring Station overlooking Knik Arm.





POA Land-Based Surveys of Marine Mammals: Beluga whales ( <i>Delphinapterus leucas</i> )										Alaska Pacific University															
Station:			Date (dd/mm/yy):			Observer(s):		Pg ___ of ___		Verified Entered by: _____ Sheet #: _____															
Shift Start Time (hh:mm):			Shift End Time (hh:mm):			Optic:																			
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APU Sighting Form (page 3)



Figure 10. Out-of-water construction activities at barge berth site: constructing the tail walls of sheet-pile cells. View facing east.



Figure 11(a). Sheet pile cells, barge berth construction site, low tide. View facing north.



Figure 11(b). Sheet pile cells, barge berth construction site, high tide. Dec. 11, 2008. View facing north. APU Observation Station on bluff in background.

## APPENDICES



**APPENDIX A**

**USACE 404/10 Permit: POA-2003-502-N**

## DEPARTMENT OF THE ARMY PERMIT

Permittee: Port of Anchorage

Permit No.: POA-2003-502-N

Issuing Office: U.S. Army Engineer District, Alaska

**NOTE:** The term "you" and its derivatives, as used in this permit, means the permittee or any future transferee. The term "this office" refers to the appropriate district or division office of the Corps of Engineers having jurisdiction over the permitted activity or the appropriate official of that office acting under the authority of the commanding officer.

You are authorized to perform work in accordance with the terms and conditions specified below.

### Project Description:

This permit authorizes work necessary for the construction of the Marine Terminal Redevelopment (Port Expansion) Project to expand, reorganize and improve the existing facilities at the Port of Anchorage to replace functionally obsolete structures; increase POA capacity, efficiency, and security; and accommodate the needs of the U.S. military for rapid deployment. The project involves the construction of a new open cell sheet pile (OCSP) dock in the tidelands west, northwest, and southwest of the existing dock. This permit authorizes the following work:

1. The discharge of fill material over 20.5 acres of wetlands associated with the development of the Cherry Hill and North End Runway borrow pits;
2. The dredging of approximately 258,000 cubic yards of sediment over approximately 21 acres necessary for the construction of the expanded dock and the discharge of the material at the existing Port of Anchorage maintenance dredging disposal site;
3. The discharge of approximately 9,663,420 cubic yards of clean fill material over 111 acres of intertidal and nearshore subtidal waters of Knik Arm necessary for the construction of the expanded dock.

All work will be performed in accordance with the attached plan, 9 sheets, dated July 2007.

### Project Location:

The Port of Anchorage is located in the Knik Arm of Upper Cook Inlet, within section 31, T. 14 N., R. 3 W.; and sections 6 & 7, T. 13 N., R. 3 W.; Seward Meridian; Latitude 61° 15' N., Longitude 149° 52' W.; in Anchorage, Alaska. The gravel extraction sites are located within sections 5 & 6, T. 13 N., R. 3 W.; and within sections 27, 28, 33, and 34, T. 14 N., R. 3 W.; Seward Meridian; on Elmendorf Air Force Base, northeast of the Port of Anchorage. Construction dredge material will be disposed at the designated maintenance dredging disposal area, located approximately 3,000 feet west of the existing dock.

### Permit Conditions:

#### General Conditions:

1. The time limit for completing the work authorized ends on **August 31, 2014**. If you find that you need more time to complete the authorized activity, submit your request for a time extension to this office for consideration at least one month before the above date is reached.
2. You must maintain the activity authorized by this permit in conformance with the terms and conditions of this permit. You are not relieved of this requirement if you abandon the permitted activity, although you may make a good faith transfer to a third party in compliance with General Condition 4 below. Should you wish to cease to maintain the authorized activity or should you desire to abandon it without a good

faith transfer, you must obtain a modification of this permit from this office, which may require restoration of the area.

3. If you discover any previously unknown historic or archeological remains while accomplishing the activity authorized by this permit, you must immediately notify this office of what you have found. We will initiate the Federal and State coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

4. If you sell the property associated with this permit, you must obtain the signature of the new owner in the space provided and forward a copy of the permit to this office to validate the transfer of this authorization.

5. If a conditioned water quality certification has been issued for your project, you must comply with the conditions specified in the certification as special conditions to this permit. For your convenience, a copy of the certification is attached if it contains such conditions.

6. You must allow representatives from this office to inspect the authorized activity at any time deemed necessary to ensure that it is being or has been accomplished in accordance with the terms and conditions of your permit.

**Special Conditions:**

**I. Navigation:**

*The following conditions are to preserve free navigation, prevent navigational hazards, and to protect the interests of the United States in existing and future federal projects [(33 CFR Part 320.4(o)(3)].*

1. Your use of the permitted activity must not interfere with the public's right to free navigation on all navigable waters of the United States.
2. You must install and maintain, at your expense, any safety lights and signals prescribed by the United States Coast Guard (USCG), through regulations or otherwise, on your authorized facilities. The USCG may be reached at the following address and telephone number: Commander (DPW), 17th Coast Guard District, P.O. Box 25517, Juneau, Alaska 99802; (907) 463-2269.
3. The permittee understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration, of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.
4. Appropriate and practicable mitigation measures shall be employed as needed to minimize adverse affects to federal dredging operations, adjacent properties, and/or flow patterns of waters of the U.S. from temporary changes in sedimentation patterns during the construction phases of the project. The Port of Anchorage shall cooperate with adjacent industrial businesses (e.g., barge terminals) to ensure that all appropriate and practicable mitigation measures are implemented during construction to both minimize and compensate for adverse affects to their operations.

**II. Cultural Resources**

*The following two conditions are to ensure compliance with Section 106 of the National Historic Preservation Act and at the request of the applicant.*

1. Procedures for managing inadvertent discoveries of cultural resources or skeletal remains shall be employed as described in the Cultural Resources Monitoring Plan for Cherry Hill and North End Material Extraction report (Anchorage Port Expansion Team, April 2006, or approved revisions).
2. Prior to ground disturbing activities, POA shall photograph and document site conditions of and around the trees of interest identified by representatives of the Native Village of Eklutna (Anchorage

Port Expansion Team, Cultural Resources Survey: Port of Anchorage Haul Road, Appendix D; October, 2006.).

**III. Borrow Pits:**

*The following condition is to prevent and minimize impacts to nesting migratory birds. Under the Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703), it is illegal to "take" migratory birds, their eggs, feathers or nests.*

1. To prevent impacts to nesting migratory birds, no vegetation clearing, fill placement, excavation, stockpiling, grading or other disturbing construction activities at the material extraction sites shall be conducted between 1 May and 15 July, except at sites that have been sufficiently disturbed or altered to the extent that suitable nesting habitat has been eliminated (e.g., covered or otherwise removed) prior to 1 May. If disturbing construction activities in areas containing potential nesting habitat are proposed after 1 May, the Port of Anchorage shall submit a plan to the Corps that demonstrates how compliance with the MBTA will be ensured. This plan must be coordinated with the USFWS and approved by the Corps prior to commencement of work that would potentially affect nesting habitat between 1 May and 15 July.

*The following two conditions are necessary to prevent and minimize impacts to wetlands and aquatic organisms*

2. The POA will establish a buffer between ground disturbing activities at the gravel extraction sites and adjacent wetland areas as necessary to prevent hydrological disturbances from development activities. Additionally, a buffer area shall be established around the Triangle/Fish Lake wetland complex and delineated onsite with silt fencing and signage and verified as adequate by the Corps prior to commencing extraction activities within 600 feet of the wetland complex. The extent and/or distance of the buffer boundaries shall be determined onsite based on vegetation, topography and hydrology as necessary to prevent an adverse disturbance to the wetland complex. The POA shall install and monitor a series of groundwater wells or piezometers in the western portion of the North End Borrow Pit to assure that gravel mining activities do not adversely affect adjacent wetland hydrology.
3. POA shall, to the extent practicable, limit disturbances to wetlands and open water areas where wood frogs are present to periods of time other than those known for breeding and tadpole growth (1 April to 15 July).

**IV. Beluga Whales:**

*The following conditions are to prevent and minimize adverse impacts to marine mammals and to ensure compliance with the Marine Mammal Protection Act.*

1. The POA has submitted petitions for an Incidental Harassment Authorization (IHA) for the 2007 construction season and a Letter of Authorization (LOA) for construction seasons 2008-2012 (Anchorage Port Expansion Team, Final Petition; January 2007) for Small Take Authorizations from the NOAA/NMFS under the Marine Mammal Protection Act (MMPA) for the incidental and unintentional taking of marine mammals. The conditions of the IHA and LOA Small Take Authorizations under the MMPA will be carried as special conditions of this DA permit unless otherwise noted by the Corps. The POA shall comply with the interim mitigation measures listed below to minimize project related adverse impacts to beluga whales. Upon receipt of the IHA and/or LOA MMPA authorizations, the Corps will reevaluate the terms or conditions of this permit and modify any conflicting conditions, if necessary.
  - A. The POA shall measure and evaluate construction and operationally generated noise introduced in Knik Arm at the Port of Anchorage. The applicant shall develop a 'Sound Index' to accurately represent noise levels associated with Port of Anchorage operations and construction activities, which must specifically include noise levels generated from pile driving, dockside activities, vessel traffic in the channel, dredging, and docking activities. The evaluation shall characterize current baseline operational noise levels at the Port of Anchorage and develop an engineering report that identifies structural and/or operational noise reduction measures, if necessary, to minimize the baseline operational noise levels at the expanded port to the maximum extent practicable. The final report will be provided to the NMFS two years prior to construction completion.

The Port of Anchorage Sound Index will be collaborated with the concurrent beluga whale monitoring program to correlate construction and operationally generated noise exposures with beluga whale presence, absence, and any altered behavior observed during construction and operations (i.e., a dose-response analysis). An annual review of beluga observations and noise exposure data shall be provided to NMFS no later than 1 Feb annually. The annual review shall also identify relevant technological advances in sound attenuation. The POA shall employ practicable noise minimization measures identified in the annual reports in subsequent POA construction activities.

- B. In collaboration with the NMFS, the Port of Anchorage shall continue to develop and maintain a beluga monitoring program to estimate the frequency at which beluga whales are present in the project footprint; characterize habitat use and behavior of belugas near the Port during ice free months; map sound levels and distance attenuation related to POA background noise and expansion activity; and to characterize and assess the impacts of received noise from the POA on beluga whale behavior and movements. POA shall consult with NMFS to develop the program and shall include the following:
- a. Include visual observations (shore-based and opportunistic vessel observations) to monitor beluga movements, timing, group size, locations, identifiable behaviors and patterns, and use of the area in the vicinity of the Project during operations through the construction period. The POA will also provide one year of post-construction monitoring in continued consultation with NOAA/NMFS.
  - b. Include a passive acoustic monitoring plan to correlate with visual observations. The POA shall install hydrophones (or employ other effective methodologies) necessary to detect and localize passing whales and to determine the proportion of belugas missed from visual surveys.
  - c. The POA will employ a marine mammal observation team, separate from the construction contractor observer activities, for the duration of all construction activities.
- C. The Port of Anchorage shall establish and enforce safety radii and shut down standards around the in-water pile driving areas. Initially, the safety radii requiring shut down shall be for any whale observed within 650 meters of pile driving. The Port of Anchorage shall conduct on-site underwater noise surveys to verify the 190, 180 and 160 dB re 1  $\mu$ Pa rms isopleths from in-water pile driving activities for the POA expansion. Safety zones appropriate to the POA site conditions and equipment will then be empirically determined and implemented. The 160 dB re 1  $\mu$ Pa rms safety zone should be in force unless the POA obtains authorization under the section 101 (a) of the Marine Mammal Protection Act for the incidental and unintentional taking of marine mammals; in which case the safety zones should be those provided within the authorization. The safety zone around pile driving areas shall be monitored for the presence of marine mammals before, during, and after any pile driving activity. If the safety radius is obscured by fog or poor lighting conditions, pile driving will cease until the entire safety radius is visible.
- D. Prior to the start of seasonal pile driving activities, the POA will require construction supervisors and crews, the marine-mammal monitoring team, the acoustical monitoring team, and all project managers to attend a briefing. The purpose of the briefing will be to establish the responsibilities of each party, define the chains of command, discuss communication procedures, provide an overview of monitoring purposes, and review operational procedures.
- E. The Port of Anchorage shall formally notify the NMFS prior to the seasonal commencement of pile driving and provide weekly monitoring reports. A summary monitoring report will be submitted at the end of annual construction activities and a final report will be submitted at the end of the one year post construction monitoring season.
- F. The POA will establish daily "soft start" or "ramp up" procedures for pile-driving activities. The soft start technique will be used at the beginning of each piling installation to allow any marine mammal that may be in the area to leave before pile driving activities reach full energy. The soft start procedure will require contractors to initiate noise from vibratory hammers for 15 seconds at

reduced energy followed by a 1-minute waiting period. This procedure will be repeated two additional times. If an impact hammer is used, contractors will be required to provide an initial start of 3 strikes at 40-percent energy, followed by a 1-minute waiting period, then two subsequent 3-strike sets. If marine mammals are sighted within the safety zone prior to pile driving or during the soft start, the contractor will delay pile-driving continuation until the mammal has moved outside the safety zone. Pile installation will resume only after a qualified observer confirms that the marine mammal has moved outside the safety zone or after 15 minutes have elapsed since the marine mammal was last sighted.

- G. The POA will erect whale-notification signage in the waterfront viewing areas near the Ship Creek Public Boat Launch and within the secured Port entrance that is visible to all Port users. This signage will provide information on the beluga whale and notification procedures for reporting beluga whale sightings to the NMFS. The POA will consult with the NMFS to establish the signage criteria.
  - H. During in-water construction activities, the POA shall ensure that construction contractors delegate supervisory responsibility to include on-site construction personnel to observe, record, and report marine mammal sightings and response actions taken, to include shut down or delay.
  - I. The POA shall establish a long-term, formalized marine-mammal sighting and notification procedure for all Port users, visitors, tenants, or contractors prior to and after construction activities. The notification procedure shall clearly identify roles and responsibilities for reporting all marine mammal sightings. The POA will forward documentation of all reported marine mammal sightings to the NMFS.
2. In-water impact pile-driving, excluding work when the entire pile is out of the water due to shoreline elevation or tidal stage, shall not occur within two hours of either side of each low tide.

#### **V. Fish**

*The following conditions are necessary to minimize impacts to anadromous fish populations.*

1. The Port of Anchorage shall either avoid pile driving activities between 15 May and 15 August or conduct an on-site fish study to analyze the impacts of vibratory and impact hammer sheet pile driving activities on salmonids at various distances and measured sound pressure levels. The study plan shall be developed in consultation with local representatives of the U.S. Fish and Wildlife Service, the National Marine Fisheries Service, the Environmental Protection Agency, and approved by the Corps. The study plan should include a live cage fish study and hydroacoustic monitoring to assess the impacts of pile driving on the health and behavior of fish groups and individuals. The study plan shall be completed by 1 January 2008 and initiated in the 2008 construction season. The results shall be analyzed following the completion of the 2008 construction season and coordinated with the Corps and the aforementioned resource agencies. Based on the results of the study, this condition may be modified and/or supplemented to minimize adverse impacts to salmonids (including timing restrictions).
2. No in water fill placement or pile driving activities shall occur within a one week period following smolt releases from the Ship Creek Hatchery. The Port shall coordinate with hatchery staff to ensure compliance with this condition.
3. In-water sheet piles shall be driven with a vibratory hammer to the maximum extent possible (i.e., until desired depth is achieved and/or to refusal, prior to using an impact hammer).
4. The final design shall, wherever possible, incorporate end-of-phase construction joints that provide potential refuge habitat areas for salmonids in the non-structural voids. Although the spacing, size, and configuration of these structural joints will be dictated by stability and construction requirements, void spaces within these joints shall be developed to maximize the potential salmonid refuge value of the space. The design of the refuge area within the void space shall be approved by the Corps, in consultation with other federal resource agencies. The refuge area shall be monitored by the Port of Anchorage between 15 May and 15 August for a minimum of 2 years following construction to determine the extent and nature of use by salmonids. Based on the monitoring observations, this condition may be modified to improve the functional value of refuge areas if necessary.

**VI. Design Coordination:**

*The following three conditions are to prevent and minimize adverse impacts to public safety and security and to protect the interests of the United States in existing and future federal projects:*

1. A final analysis of the global and internal structural stability of the open cell sheet pile structure under static and seismic conditions shall be submitted to the Corps of Engineers a minimum of two months prior to sheetpile installation activities of 2008. The analysis shall state the assumptions made, data used, computational analyses performed, modeling input criteria used and output results generated (where modeling is applicable) that led to the final analysis. Additionally, to the maximum extent practicable, the final analysis shall, at minimum, include the following:
  - a. Test the borrow source(s) to confirm the stability model input and determine the densification requirements. Provide your Quality Assurance Plan and the acceptance criteria for validating the densification of the backfill.
  - b. For each soil profile, run static stability models with six feet of over dredge below the design project depth and at a water elevation of -5 ft. MLLW.
  - c. Submit a plan that describes the proposed piezometer placements and all other instrumentation to be used to confirm how consolidation (and associated strength gain) is expected to occur, and to what degree. Additionally, the POA will submit annual reports of actual findings.
  - d. Conduct a parametric sensitivity analysis, investigating strength, modulus, and geometry, with the model for seismic loading to determine if the model is sensitive to small changes in input parameters. The study shall further evaluate possible failure modes, to include toe heave.
  - e. Define the target Factor of Safety for internal stability and model each construction phase area. All engineering parameters and design calculations for internal stability evaluation shall be included in the design analysis.
  - f. Further evaluate earthquake loading by considering a minimum of five accelograms, with no more than two being synthetic, and refined target design response spectra criteria in the analysis. Specifically, develop design target spectra based on deterministic spectra for MCE scenario earthquakes from the Castle Mountain fault and Megathrust sources using  $M_{max}$  and closest distance parameters. Use a suite of ground motion attenuation models that are appropriate for the region and source. Combine this suite of models either by a weighting or enveloping procedure to develop final target spectra and match the selected accelograms to the target spectra. Review the latest information on USGS Alaska seismic hazard maps to assist in the selection of parameters and ground motion attenuation models. The development of the final suite of design ground motions shall be conducted by a professional engineering seismologist experienced with current practice for developing design ground motions for critical facilities.
  - g. In light of the large strains predicted during an MCE, include laboratory residual shear strength tests in your analysis to investigate potential material responses.
  - h. Develop compatible designs for adjacent cells with different seismic performance objectives.
2. The POA shall submit Open Cell Sheetpile design modifications to the Corps for review.
3. The POA shall submit as-built drawings of the OCSP structures, approved and stamped by the Engineer-of-Record, following completion of construction phases and the overall structure.

**VII. Fill Material:**

*The following conditions are required to minimize adverse impacts of the discharge on special aquatic sites and other waters outside of the project area [33 CFR 320.4 (r), 40 CFR 230.5 (j) and 40CFR 230 Subpart H, including parts 230.71, 230.72, 230.73, 230.75]*

1. Fill material shall consist of clean fill, free of unsuitable material (e.g., trash, debris, asphalt, etc.), and free of toxic pollutants.

2. All fill material shall be stabilized as necessary to prevent erosion and encroachment of fill material outside the authorized footprint before, during, and after construction. No fill or construction materials shall be stockpiled on adjacent mudflats outside of the authorized project boundary.

**VIII. Compensatory Mitigation:**

*The following conditions are required to compensate for resource losses important to the human and aquatic environment. (33 CFR 320.4(r) and 40 CFR Parts 230.41 and 230.42)]*

1. The Port of Anchorage shall provide funding equivalent to the monetary value of the debits of the authorized project impacts, as determined by the Anchorage Debit Credit Methodology, in accordance to the attached Memorandum of Agreement (MOA) concerning compensatory mitigation for the overall project. Compensatory mitigation funds from the account will be allocated primarily for construction related costs of selected mitigation projects, as specified in the MOA. In addition to the funding requirements, the Port of Anchorage shall provide for the project management actions necessary to obtain any applicable permits and/or authorizations, the preparation of necessary engineered designs, and monitoring of all selected mitigation projects as necessary.
2. In addition to the mitigation requirements specified above, the Port of Anchorage shall conduct a feasibility study to identify the most practicable and beneficial aquatic habitat restoration, enhancement, creation, and preservation projects available in the Lower Ship Creek watershed and estuary. The projects identified in this study will be used by the Corps, under consultation with a mitigation advisory committee (consisting of federal, state, and local resource agencies and other applicable stakeholders, as appropriate) to determine which project(s) shall be implemented and funded as part of the compensatory mitigation requirements of this permit. The content of the final feasibility study plan shall be approved by the Corps to ensure compliance with this requirement.

**Special Information:**

Any condition incorporated by reference into this permit by General Condition 5, remains a condition of this permit unless expressly modified or deleted, in writing, by the District Engineer or his authorized representative.

**Further Information:**

1. Congressional Authorities: You have been authorized to undertake the activity described above pursuant to:
  - (X) Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403).
  - (X) Section 404 of the Clean Water Act (33 U.S.C. 1344).
  - ( ) Section 103 of the Marine Protection, Research, and Sanctuaries Act of 1972 (33 U.S.C. 1413).
2. Limits of this authorization.
  - a. This permit does not obviate the need to obtain other Federal, State, or local authorization required by law.
  - b. This permit does not grant any property rights or exclusive privileges.
  - c. This permit does not authorize any injury to the property or rights of others.
  - d. This permit does not authorize interference with any existing or proposed Federal project.
3. Limits of Federal Liability. In issuing this permit, the Federal Government does not assume any liability for the following:
  - a. Damages to the permitted project or uses thereof as a result of other permitted or unpermitted activities or from natural causes.



- b. Damages to the permitted project or uses thereof as a result of current or future activities undertaken by or on behalf of the United States in the public interest.
  - c. Damages to persons, property, or to other permitted or unpermitted activities or structures caused by the activity authorized by this permit.
  - d. Design or construction deficiencies associated with the permitted work.
  - e. Damage claims associated with any future modification, suspension, or revocation of this permit.
4. Reliance on Applicant's Data: The determination of this office that issuance of this permit is not contrary to the public interest was made in reliance on the information you provided.
5. Reevaluation of Permit Decision. This office may reevaluate its decision on this permit at any time the circumstances warrant. Circumstances that could require a reevaluation include, but are not limited to, the following:
- a. You fail to comply with the terms and conditions of this permit.
  - b. The information provided by you in support of your permit application proves to have been false, incomplete, or inaccurate (See 4 above).
  - c. Significant new information surfaces which this office did not consider in reaching the original public interest decision.

Such a reevaluation may result in a determination that it is appropriate to use the suspension, modification, and revocation procedures contained in 33 CFR 325.7 or enforcement procedures such as those contained in 33 CFR 326.4 and 326.5. The referenced enforcement procedures provide for the issuance of an administrative order requiring you to comply with the terms and conditions of your permit and for the initiation of legal action where appropriate. You will be required to pay for any corrective measures ordered by this office, and if you fail to comply with such directive, this office may in certain situations (such as those specified in 33 CFR 209.170) accomplish the corrective measures by contract or otherwise and bill you for the cost.

6. Extensions. General Condition 1 establishes a time limit for the completion of the activity authorized by this permit. Unless there are circumstances requiring either a prompt completion of the authorized activity or a reevaluation of the public interest decision, the Corps will normally give favorable consideration to a request for an extension of this time limit.

Your signature below, as permittee, indicates that you accept and agree to comply with the terms and conditions of this permit.

  
(PERMITTEE) AND TITLE

8-19-07  
(DATE)

This permit becomes effective when the Federal official, designated to act for the Secretary of the Army, has signed below.

  
KEVIN J. WILSON  
COLONEL, CORPS OF ENGINEERS  
DISTRICT COMMANDER

10 Aug 2007  
(DATE)

When the structures or work authorized by this permit are still in existence at the time the property is transferred the terms and conditions of this permit will continue to be binding on the new owner(s) of the property. To validate the transfer of this permit and the associated liabilities associated with compliance with its terms and conditions have the transferee sign and date below.

\_\_\_\_\_  
(TRANSFEREE)

\_\_\_\_\_  
(DATE)

**APPENDIX B**

**NOAA/NMFS 2008 Incidental Harassment Authorization**

RECEIVED

JUL 17 2008



UNITED STATES DEPARTMENT OF COMMERCE  
National Oceanic and Atmospheric Administration  
NATIONAL MARINE FISHERIES SERVICE  
Silver Spring, MD 20910

JUL 15 2008

Governor William J. Sheffield  
Port Director  
Port of Anchorage  
2000 Anchorage Port Road  
Anchorage, Alaska 99501

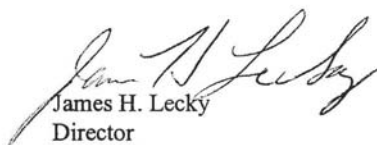
Dear Mr. Sheffield:

Enclosed is an Incidental Harassment Authorization (IHA) issued to the Port of Anchorage and U.S. Department Maritime Administration, under the authority of Section 101(a)(5)(D) of the Marine Mammal Protection Act (16 U.S.C. 1361 *et seq.*). This Authorization allows for incidental take, by Level B harassment only, of Cook Inlet beluga whales (*Delphinapterus leucas*), harbor porpoises (*Phocoena phocoena*), killer whales (*Orcinus orca*), and harbor seals (*Phoca vitulina*), incidental to the Port of Anchorage Marine Terminal Redevelopment Project.

You are required to comply with the conditions contained in the IHA. In addition, you must cooperate with any Federal, state or local agency monitoring the impacts of your activities. Please note the reporting requirements outlined in Condition 6. All reports must be submitted to the NMFS Alaska Regional Office and Office of Protected Resources, Headquarters, before any future requests for an incidental take authorization, under section 101(a)(5), can be processed. The IHA requires monitoring by individuals trained in marine mammal observation during all times in-water pile driving is taking place. Reports, sighting sheets, and methodologies employed during marine mammal monitoring and acoustic surveys must be in the form of those approved by NMFS prior to issuance of this Authorization. All marine mammal observers must complete the NMFS approved sighting forms to the maximum extent practicable.

If you have any questions concerning the IHA or its requirements, please contact Jaclyn Daly or Jolie Harrison, NMFS, Office of Protected Resources, at (301) 713-2289.

Sincerely,

  
James H. Lecky  
Director  
Office of Protected Resources

Enclosure



DEPARTMENT OF COMMERCE

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

NATIONAL MARINE FISHERIES SERVICE

Incidental Harassment Authorization

The Port of Anchorage (Port) and the Department of Transportation Maritime Administration (MARAD) are hereby authorized under section 101(a)(5)(D) of the Marine Mammal Protection Act (16 U.S.C. 1371(a)(5)(D)) and 50 CFR 216.107, to harass marine mammals incidental to Port of Anchorage Marine Terminal Redevelopment Project.

1. This Authorization is valid from July 15, 2008, through July 14, 2009.
2. This Authorization is valid only for the Port of Anchorage Marine Terminal Redevelopment Project as described in the IHA application.
3. The holder of this Authorization is restricted to the following number and manner of take:
  - (a) The taking, by Level B harassment only, is limited to no more than 34 Cook Inlet beluga whales (*Delphinapterus leucas*), 20 harbor porpoises (*Phocoena phocoena*), 20 killer whales (*Orcinus orca*), and 20 harbor seals (*Phoca vitulina*). An animal should be considered taken if it enters the NMFS determined harassment isopleths (i.e., 350m for impact pile driving and 800m for vibratory pile driving).
  - (b) The taking by injury or death of the species listed in (a), or the taking by Level B harassment, injury or death of any other species of marine mammal, is prohibited and may result in the modification, suspension or revocation of this Authorization.
  - (c) The taking of any marine mammal in a manner prohibited under this Authorization must be reported immediately to the NMFS Alaska Regional Office at (907) 271-5006, and the Office of Protected Resources (NMFS), Headquarters, at (301) 713-2289.
4. The holder of this Authorization is required to cooperate with NMFS and any other Federal, state or local agency monitoring the impacts of the activity on marine mammals. The holder or designees must notify the Regional Administrator, Alaska, at least 2 weeks prior to the seasonal commencement of in-water pile driving.

## 5. Mitigation and Monitoring

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

### (a) *Scheduling of construction activities during low use period of beluga whales around the Port*

In-water impact pile driving shall not occur two hours either side of low tide meaning two hours before low tide until two hours after low tide. For example, if low tide is at 1pm, impact pile driving will not occur from 11am to 3pm. These tidal restrictions are not applicable to vibratory pile driving.

### (b) *Establishment of safety zones and shut-down requirements*

NMFS acknowledges that shut-down of reduced energy vibratory pile driving during the “stabbing” phase of sheet pile installation may preclude shut-down from occurring due to safety concerns as the sheet pile may break free if it is not installed to a proper depth which could result in a safety and navigational hazard. Therefore, the following shut-down requirements apply to all in-water pile driving activities except those during the “stabbing” phase of the installation process.

#### (1) Safety Zones

No in-water pile driving (impact or vibratory) shall occur if any marine mammal is located within 200m of the pile hammer in any direction. If any marine mammal is sighted within this 200m safety zone prior to pile-driving, the hammer operator (or other authorized individual) will delay pile-driving until the animal has moved outside the safety zone or the animal is not resighted within 15 minutes.

#### (2) Shut-Down for Large Groups

To reduce the chance of the Port reaching or exceeding authorized take and to minimize harassment to beluga whales, if a group of more than 5 beluga whales is sighted within the Level B harassment isopleths, in-water pile driving shut down is required.

#### (3) Shut-down for Beluga Whale Calves

If a beluga whale calf is sighted within or approaching a harassment zone, any type of in-water pile driving shall cease and shall not be resumed until the calf is confirmed to be outside of the harassment zone and on a path away from such zone. If the calf or group with a calf is not resighted within 15 minutes, pile driving may resume.

(4) If maximum authorized take is reached or exceeded, any marine mammal entering into the harassment isopleths will trigger mandatory in-water pile driving shut down.

(5) For Port operated in-water heavy machinery work other than pile driving (i.e., dredging, dump scowles, tug boats used to move barges, barge mounted hydraulic excavators, or clamshell equipment used to place or remove material), if a marine mammal comes within 50 m, operations will cease and vessels will slow to a reduced speed while still maintaining control of the vessel and safe working conditions.

(c) *“Soft start” and delays to in-water pile driving activities*

(1) A “soft start” technique shall be used at the beginning of each day's in-water pile driving activities or if pile driving has ceased for more than one hour to allow any marine mammal that may be in the immediate area to leave before piling driving reaches full energy. The soft start requires contractors to initiate noise from vibratory hammers for 15 seconds at reduced energy followed by 1-minute waiting period. The procedure will be repeated two additional times. If an impact hammer is used, contractors will be required to provide an initial set of three strikes from the impact hammer at 40 percent energy, followed by a one minute waiting period, then two subsequent 3–strike sets.

(2) If marine mammals are sighted within or approaching the safety or harassment zones prior to commencement of pile driving, operations shall be delayed until the animals move outside the zones in order to avoid take exceedence.

(3) Pile driving shall not occur when weather conditions restrict clear, visible detection of all waters within harassment zones. Such conditions that can impair sightability include, but are not limited to, fog and rough sea state.

(d) *Public Outreach*

(1) The Port of Anchorage shall continue to employ use of a long-term, formalized marine-mammal sighting and notification procedures for all port users, visitors, tenants, or contractors prior to and after construction activities. The notification procedure shall clearly identify roles and responsibilities for reporting all marine mammal sightings. The Port shall forward documentation of all reported marine mammal sightings to the NMFS.

(2) The Port of Anchorage shall continue to post whale-notification signage at the port and in the waterfront viewing areas near the Ship Creek Public Boat Launch and within the secured Port entrance that is visible to all Port users. This signage will provide information on the beluga whale and notification procedures for reporting beluga whale sightings to the NMFS.

(e) *Monitoring*

(1) Marine Mammal Monitoring

Prior to the start of seasonal pile driving activities, the Port of Anchorage shall require construction supervisors and crews, the marine mammal monitoring team, the acoustical monitoring team, and all project managers to attend a briefing on responsibilities of each party, defining chains of command, discussing communication procedures, providing overview of monitoring purposes, and reviewing operational procedures regarding beluga whales.

Monitoring for marine mammals will take place concurrent with all pile driving activities and 30 minutes prior to pile driving commencement. One to two trained observer(s) will be placed at the Port at the best advantage point(s) practicable to monitor for marine mammals and will implement shut-down/delay procedures when applicable. The observer(s) will have no other construction related tasks while conducting monitoring. Each observer will be properly trained in marine mammal species detection, identification and distance estimation and will be equipped with binoculars. At time of each sighting, the pile hammer operator must be immediately notified that there are beluga whales in the area, their location and direction of travel, and if shut-down is necessary.

In addition, the Port shall employ a marine mammal monitoring team separate from the construction contractor observer activities, for the duration of all construction activities. This monitoring team; however, is not required to be present during all in-water pile driving operations. The Port and separate marine mammal monitoring team shall remain in contact to alert each other to marine mammal presence.

Marine mammal monitoring at the Port shall commence 30 minutes prior to and during all times in-water pile driving is taking place. Marine mammal sightings and all associated information will be logged on NMFS approved data sighting sheets. The following data must be collected during a marine mammal sighting on the NMFS approved marine mammal sighting data sheets:

- Date, time of initial sighting to end of sighting, tidal stage, and weather condition (including Beaufort Sea State);
- Species, number, group composition (i.e., age class), distance to pile driving hammer, and behavior (e.g., group cohesiveness, direction of travel, etc) of animals throughout duration of sighting;
- Any discrete behavioral reactions as well as how close marine mammal(s) approach pile driving hammer;



- The number (by species) of marine mammals that have been taken (i.e., entered the impact (350m) or vibratory (800m) harassment zones) or enter the 200 m shut down zone; and
- Pile driving activities occurring at the time of sighting and if and why shut down was or was not implemented.

(2) Acoustic Monitoring

(a) The Port shall carry out a one-time acoustic monitoring study upon commencement of in-water pile driving. The study will confirm or identify harassment isopleths for all types of piles used, including open-cell sheet piles and 36-inch steel piles, and the “stabbing” process. The acoustic study proposal shall be approved by NMFS prior to the start of seasonal in-water pile driving.

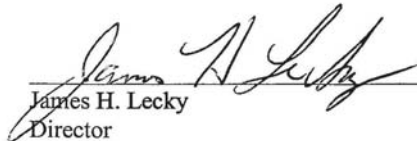
(b) The Port will also install hydrophones (or employ other effective methodologies) necessary to detect and localize, to the maximum extent practicable, passing whales and to determine the proportion of beluga whales missed from visual surveys. This study shall characterize sound levels around the Port related to and in absence of all construction activities.

6. Reporting

The holder of this authorization is required to submit a series of acoustic and marine mammal monitoring reports to the Office of Protected Resources and the Alaska Regional Administrator, NMFS. A monthly marine mammal report containing all sighting data sheets shall be submitted the 10th day of each month to NMFS OPR and NMFS AKR for the previous months sightings. Included with the reports will be the schedule of pile driving hours, by type (i.e., impact or vibratory), for that month. A final report summarizing all sighting data must be submitted to NMFS no later than 90 days after expiration of this IHA. This final report shall estimate the frequency in which marine mammals were present within the project footprint, characterize habitat use and behavior of marine mammals at and around the Port of Anchorage, characterize sound levels around the Port related to and in absence of all construction activities; and address and analyze impacts of construction related noise on marine mammal presence, behavior, and habitat use. The acoustic study report (as required in Condition 5(e)(2)(a)) identifying sound propagation and harassment isopleths for impact and vibratory pile driving will be due to NMFS 45 days after completion of the survey.

7. In the unanticipated event that any cases of marine mammal injury or mortality are judged to have possibly resulted from the Marine Terminal Redevelopment Project, the holder of this IHA is required to cease all activities immediately and report the incident to NMFS (see 3(c) above) and the local stranding network. Project activities shall then be postponed until NMFS is able to review the circumstances and work with the Port of Anchorage and MARAD to determine whether modifications to the activities are appropriate and necessary.

8. A copy of this Authorization must be in the possession of all contractors and marine mammal monitors operating under the authority of this Incidental Harassment Authorization.

  
\_\_\_\_\_  
James H. Lecky  
Director  
Office of Protected Resources  
National Marine Fisheries Service

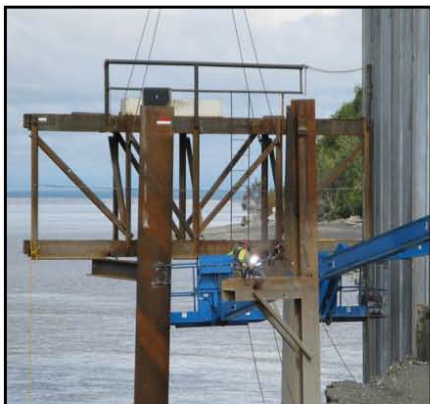
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Date

## **APPENDIX C**

### **Sheet Pile Installation Procedure**

### Open Cell Sheet Pile Installation Procedure for the Port of Anchorage Marine Terminal Redevelopment Project

The open cell system consists of U-shaped cells constructed of vertical, flat sheet-pile walls. The face of the cell is curved and the "legs" of the cell are referred to as tail walls. The following procedure is typically used for the installation of open cell sheet pile:



1. Temporary pile and template.

1. Temporary steel-pipe piles are driven into the sea bed or fill slope. The temporary piles are 30 inches in diameter; they are usually driven 5 to 10 feet into the sea bed or fill. Generally, the construction follows a step process and the temporary piles are placed adjacent to a recently completed cell. Temporary piles are driven using a vibratory hammer.



2. Walkway and template.

2. A steel template, shaped according to the face curvature of the cell, is placed on the temporary piles. This template is leveled and then welded to the temporary piles. Walkways extending from the fill to the template are installed to allow personnel access. The walkway also serves as a template for the initial portion of the tail wall. Tail walls are constructed perpendicular to the face of the cell, and act as soil anchors for the cell.



3a. Crane picking up sheet pile.

3. A sheet pile is picked up by crane and threaded onto the wye connector of the adjacent cell (already completed) or into the previous sheet pile. The sheet pile is threaded until the tip (bottom) of the sheet reaches the fill or sea bed (to ensure a proper fit and to make sure that the bottom of the sheet pile is in-line with the design location). Then the crane lifts the sheet pile several feet and allows the sheet pile to drop. The momentum of the sheet pile drives the tip into the embankment or sea bed sediments. (This is the procedure that gives rise to the term "stabbing".)

### Open Cell Sheet Pile Installation Procedure



3b. Placing the sheet pile.



3c. Close-up of sheet pile being threaded.



3d. Wye connector.



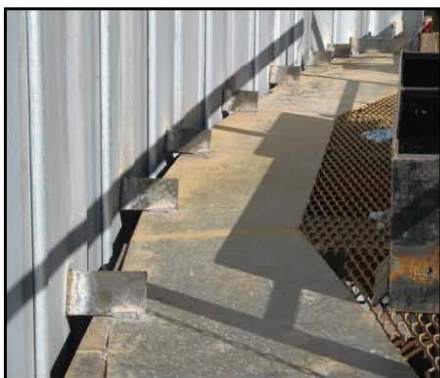
3e. Sheet pile "knuckles" interlocked.



4. Hairpin weight used to set the sheet pile.

4. In areas where difficult driving conditions are encountered, the initial drop may not embed the tip of the sheet pile deep enough. If this is the case, a hairpin weight (a steel weight approximately 3 feet long, shaped like a hairpin so it can be set over the top of the sheet pile) is placed over the individual sheet pile, then raised and dropped to drive the sheet pile in further. In circumstances where driving conditions are very difficult, the vibratory or impact hammer may be used (i.e., vibratory or impact pile driving).

## Open Cell Sheet Pile Installation Procedure



5. Temporary welds hold sheets to template.



6. Template with a full set of sheet pile. Template curvature matches design curvature of cell face.



7a. Vibratory hammer driving the sheet pile.

5. Once the sheet pile has been placed, temporary welds are used to secure the sheet to the template to maintain the alignment. (Depending on the length of the sheets and existing tide, current, and wind conditions, temporary welds may not be used on every sheet pile.)

6. The next sheet is threaded onto the interlock of the previous sheet and the previous steps are repeated. This procedure continues until one-half of a cell face (8 or 9 sheet pile) or a full set of 17 sheet pile and the connecting wye are in place.

7. Once a set of sheet pile is in place, the sheets are driven using either a vibratory hammer or an impact hammer. The type of hammer used depends on subsurface conditions and the effort required to advance the sheet pile to final elevation. The difference between the top of adjacent sheets can be no more than 5 feet at any time. This means that the sheets will be methodically driven in a stair-step pattern and the hammer will move back and forth along the cell until all sheets are driven to depth. This stair-step driving pattern results in short periods of driving. For the vibratory hammer, driving is in progress from less than 1 and up to 8 minutes (averaging 1.5 minutes) followed by a 1- to 5-minute period with no driving, while the vibratory hammer is moved and reset. Actual driving time is determined by local soil conditions. Wye connector piles are always driven by vibratory hammer due to their shape.

## Open Cell Sheet Pile Installation Procedure



7b. Impact hammer driving sheet pile.

7. (cont.) Under conditions where the impact hammer is being used, driving takes place from less than 1 to up to 17 minutes (averaging 6 minutes), followed by a period of no driving, while the hammer is moved and reset (between 3 and 15 minutes). Where driving conditions allow, two or three adjacent sheet pile may be driven simultaneously (The grips on the vibratory hammer allow one or two sheets to be driven at a time. The grips on the impact hammer allow up to three sheets to be driven at a time.) Depending on the length of the sheet pile being driven and the underlying materials, either hammer or both hammers may be used on any one sheet pile or group of sheet pile.



8. Tail walls.

8. Tail wall sheet piles are also set and driven as described in the preceding steps. Tail wall piles are generally set and driven concurrently with the adjoining face sheets.



9. Template and soldier piles are moved to begin the next cell.

9. Once a cell is completed, the template and temporary piles are removed and then set up again for the next adjacent cell and the process is repeated. Multiple templates are used so the process can proceed in a leapfrog fashion and/or be conducted at different locations simultaneously.

**APPENDIX D**  
**Scientific Marine Mammal Monitoring Report for 2008**  
**By Alaska Pacific University**



**Distribution, Habitat Use and Behavior  
of Cook Inlet Beluga Whales and Other Marine Mammals  
at the Port of Anchorage  
Marine Terminal Redevelopment Project  
June – November, 2008**

**Scientific Marine Mammal Monitoring Report for 2008**

*Prepared for*

United States Department of Transportation  
Maritime Administration  
400 Seventh Street, N.W.  
Washington, DC 20590

*and*

Port of Anchorage  
2000 Anchorage Port Road  
Anchorage, AK 99501

*and*

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421 West First Avenue, Suite 200  
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*Prepared by:*

Leslie A. Cornick, Ph.D.  
Lindsey Saxon-Kendall



Department of Environmental Science  
Alaska Pacific University  
4101 University Drive  
Anchorage, Alaska 99508

January 2009

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## **1.0 Introduction**

This report summarizes the Scientific Marine Mammal Monitoring Program conducted June 24 – November 14, 2008 in support of the Port of Anchorage Marine Terminal Redevelopment Project (MTRP). The program was developed in consultation with Integrated Concepts & Research Corporation (ICRC), based on the stipulations of the Marine Mammal Protection Act (MMPA) as administered by the National Oceanic and Atmospheric Administration (NOAA), National Marine Fisheries Service (NMFS). The monitoring program was designed to meet the scientific monitoring objectives set forth by NMFS, within the project scope agreed upon by the Port of Anchorage (POA), ICRC, NMFS, and the U.S. Department of Transportation, Maritime Administration (MARAD). The MARAD is the federal funding agency for all work associated with the MTRP, including this monitoring program. The scientific monitoring program was conducted by student observers from the Alaska Pacific University (APU) Marine Biology program.

This document presents information on Cook Inlet beluga whale (*Delphinapterus leucas*) and other marine mammal presence, habitat use, and behavior around the Port of Anchorage (Port) during Phase II of the MTRP during the summer and fall of 2008.

In addition to monitoring and data collection efforts, APU observers provided real-time information to the shore-based marine mammal observers working with the construction crew at the Port (marine mammal sightings, proximity of animals to the construction site). Data collected during 2008 are being added to existing data previously collected by LGL Alaska Research Associates, Inc. (LGL), to establish patterns of beluga whale distribution, habitat use, and behavior in the area of Upper Cook Inlet surrounding the MTRP footprint. During marine mammal monitoring and data collection activities, the particular emphasis was on documenting the presence of beluga whales within and near the construction area and evaluating, as practicable, the potential responses of beluga whales to construction activities. Providing real-time information to construction crews so that mitigation measures could be swiftly implemented enhanced the shore based protection program managed by the construction contractor.

## **2.0 Program Objectives**

The Scientific Marine Mammal Monitoring Program was developed to address the following objectives:

1. Estimate the frequency at which beluga whales and other marine mammals are present in and adjacent to the MTR project footprint.
2. Characterize habitat use, movements and behavior of beluga whales during ice-free months in Knik Arm, Upper Cook Inlet, in proximity to the Port.
3. Observe, analyze and document potential changes in the behavior of beluga whales in response to in-water construction work, including pile driving and fill placement.
4. Inform the Construction Person-in-Charge (PIC) of the proximity of beluga whales to the MTRP construction area, so that in-water construction activities may be shut down if:
  - a. any number of beluga whales approach within the safety zone of 200 m (656 ft) during impact or vibratory pile driving
  - b. a group of whales (five or more) or a calf or calves approach within 350 m (1,148 ft) during impact pile driving activities
  - c. a group of whales (five or more) or a calf or calves approach within 800 m (2,624 ft) during vibratory pile driving

APU field observers, under the direction of Associate Professor Dr. Leslie Cornick, staffed the shore-based monitoring station at Cairn Point, Elmendorf Air Force Base (EAFB). Data were collected as many as four days per week, in 4-hour shifts up to a maximum of 32 hours per week. Ms. Lindsey Kendall, APU Master of Science in Environmental Science (MSES) candidate, acted as field supervisor and trainer, as well as an additional point of contact for observers during their shifts.

### **3.0 Methods**

#### **3.1 Study Area and Observation Station**

The study area included all waters of the Knik Arm of Upper Cook Inlet visible from the south-facing, on-shore monitoring station at Cairn Point, EAFB near Anchorage, Alaska (Figure 3.1). The station directly overlooks the MTRP construction area. At least two observers were on site during all observations shifts. An observation platform at the site provided height above sea level near the shoreline. The added height of the platform maximized the probability of detecting beluga whales in and around the Port. The selection of Cairn Point for the observation station was based on the results of whale monitoring conducted by LGL (Prevel Ramos *et al.* 2006). Cairn Point proved to be the

best place for sighting whales in the construction area and associated safety zones. The POA received a right of entry from EAFB to access Cairn Point for the purpose of conducting marine mammal monitoring activities. APU observers cooperated with POA and EAFB personnel and underwent all necessary training to ensure compliance with POA and EAFB safety and security policies.

### **3.2 Sampling Effort**

Marine mammal monitoring was conducted up to 4 days per week in 4 hour shifts up to 32 hours per week, covering the full range of tidal cycles as practicable during hours of access to the observation station (Monday through Friday 07:00 – 19:00, Saturday 10:00 – 18:00). Observation start and end times were adjusted accordingly as daylight hours decreased. A total of 611.50 hours of observation was completed from June 24 through November 14, 2008. Monthly totals are summarized in Table 3.1. Monitoring days were scheduled to provide a sample of beluga whale use of the area under varying conditions (e.g., noise, vessel traffic, environmental conditions), while accommodating the logistical, safety and security concerns of POA, EAFB, ICRC and APU.

*Table 3.1. Summary of Observational Effort by Month.*

	Days	Hours
June	4	27.67
July	19	150.17
August	17	120.50
September	14	133.83
October	22	128.00
November	10	51.33
<b>Total</b>	<b>86</b>	<b>611.50</b>



**Figure 3.1.** Map of study area with 500 x 500 m grid overlay. Grid cells encompassing the project footprint are D9 – I9. Cairn Point observation station is in grid cell J9.



### **3.3 Sampling Protocols**

#### **3.3.1 Environmental Conditions**

Environmental data pertaining to sighting conditions were logged hourly during observation sessions. These conditions included air temperature, wind speed, sea state (Beaufort scale), glare (when present), percent cloud cover and precipitation.

#### **3.3.2 Port of Anchorage Activities**

The number and type of vessels at the Port were documented during monitoring sessions throughout the observation period. Project activities, including pile driving, dredging and in-water fill placement, were noted at regular intervals during all observation periods in order to facilitate examination of beluga whale occurrence and behavior with respect to these activities.

#### **3.3.3 Beluga Whale Observations**

Beluga whale observations were conducted following the method described by Prevel Ramos *et al.* (2006). Observers conducted 10-minute scan samples of the study area with the naked eye and using Bushnell 7 x 50 binoculars with an internal compass. If beluga whales were observed, the following sighting information was documented on a marine mammal monitoring form (Appendix I): date, time, number of whales sighted, age class (adult, sub-adult, calf; estimated by color), heading, activity, location and group swimming formation (Funk *et al.* 2005).

In addition to basic sighting information (date, time and number of whales), detailed data were collected as feasible and practicable regarding the locations, movements, and behavior of beluga whales near the Port according to the protocol developed by Funk *et al.* (2005). A grid-cell mapping system was used, with distances estimated by eye, to estimate beluga whale distribution and location. Focal group sampling was used to document the behavior of whales. In addition to this scientific monitoring program, the construction contractor conducting in-water work at the Port was required to have shore-based observers to watch for marine mammals and implement shut-down procedures as necessary. The POA requested that all POA staff and users report observations of marine mammal activity at the Port.

Other marine mammals were also recorded during the scan samples described above. However, beluga whales were by far the most frequently observed, and were the only marine mammals present in the study area long enough to document behavior and movements.

### **3.3.4 Theodolite Tracking**

A tripod-mounted surveyor's theodolite (Topcon DT-200) connected to a laptop computer was used to track beluga whale movement patterns following Prevel Ramos *et al.* (2006). In short, horizontal (azimuth) and vertical (declination) readings from the theodolite were used to calculate the position of whales. Accurate assessment of whale group locations was facilitated by precise measurement of height and location of the station and input of tide tables to account for tidal variation during the sample. Tide tables were derived from J Tides (<<http://www.arachnoid.com/JTides>>) a tidal prediction program that incorporates a worldwide database of tide and current reporting stations. The Anchorage (Knik Arm) NOAA reporting station located at the POA was used for the purposes of this study.

Fixes of multiple objects provided information about distance between objects (e.g., whales) and orientation (toward, away or neutral). Location and other data were captured by instantaneous download into *Pythagoras* software (free download and information available at <http://www.tamug.edu/mmrp/pythagoras/>) for calculation of position, movement, and distance in real time, as well as time stamping of horizontal and vertical angle-fix information, input of other observations (e.g., group size, behavior, and environmental parameters), and rapid, real-time longitude-latitude position and movement pattern calculations. GIS-compatible whale tracks were calculated to estimate distances between whales and shore.

### **3.3.5 500m x 500m Grid**

In order to maintain sighting consistency and allow for simplified display of spatial data with respect to the Project footprint, APU also continued to employ a grid system (500m x 500m grids) to monitor the locations and movements of beluga whales in Knik Arm (Funk *et al.* 2005). Observers used a combination of compass bearings taken from binoculars and landmarks to place whale groups in grid cells during each sampling interval. Grid cell locations were updated as the whales moved through the area. The MTR Project footprint is located within cells D9 to I9 of the grid.

### **3.3.6 Group Size, Composition and Behavioral Sampling**

When whales were sighted during scan samples, detailed focal group behavior was sampled continuously until whales were out of view (Martin and Bateson 1986, Mann 2000). Behavioral state (traveling, milling, resting, feeding), swimming formation, inter-individual distance/group spread and noteworthy behavioral events (e.g., spy hopping, vocalizations, rapid chases) were documented for each group.

### **3.4 Data Entry and Analysis**

All observations including marine mammal activity, environmental conditions and vessel activity were documented on standardized datasheets (Appendix I). Data were then checked for accuracy and entered into SPSS v. 15 for Windows and/or Microsoft Excel for Windows for storage and analysis.

#### **3.4.1 Environmental Conditions**

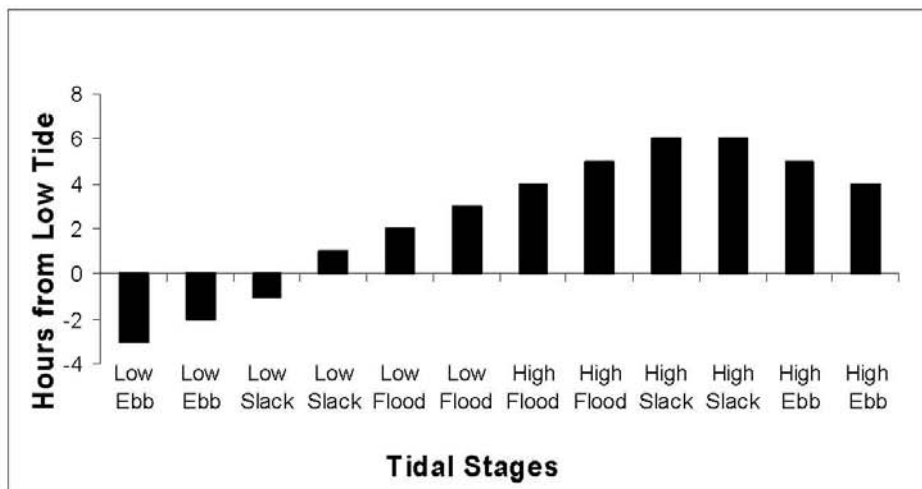
Environmental conditions were summarized for each month in order to characterize the predominant viewing conditions.

#### **3.4.2 Temporal Distribution**

Beluga whale sightings were summarized by time of day, month, tidal stage and season (summer and fall). One-way ANOVA or chi-squared goodness of fit tests were used to examine differences in mean durations of whale sightings (ANOVA) and number of groups and total number of whales (chi-squared) across time of day, tidal stage and season. Alpha levels were set at  $p < .05$ . All values are reported as mean  $\pm$  1 standard error unless otherwise noted.

Sampling intervals were classified into their observational hour by the start time of the interval. Observational hours were defined as each hour on the hour from 08:00 – 19:00 in order to encompass the entire range of effort hours.

Tidal stages derived from J-Tides were verified, and if necessary corrected, based on the NOAA Tides and Currents website ([www.tidesandcurrents.noaa.gov](http://www.tidesandcurrents.noaa.gov)). Tide data from the Anchorage (Knik Arm) NOAA reporting station located at the Port (station ID 9455920) were used for the purposes of this study. Daily tidal heights were classified into six stages, each two hours long and defined as hours before (-) or after (+) low tide (Figure 3.2).



*Figure 3.2 Classification of daily tidal cycles into six stages of two hours each. The stages are defined as hours from low tide.*

### 3.4.3 Spatial Distribution

Sightings were summed for all grid cell locations where beluga whales were sighted during the observation period and classified according to whether the whales were observed outside, adjacent to or within the MTRP footprint (grid cells D9 – I9). Habitat use of whales in each location was calculated as number of groups sighted, total number of whales and total observation time.

Habitat use and movement were mapped using ArcGIS ArcInfo 9.3 to display whale track lines obtained from theodolite fixes and translated in Pythagoras. Habitat use was determined by overlapping track lines with grid cells and summing the total number of whales per group within each grid cell. Beluga sightings during tidal stages were determined by overlapping track lines with grid cell and correlating the time of day whales were observed with the tidal stage.

### 3.4.4 Group Size and Structure; Behavior

Mean group size and structure were analyzed for all sightings and according to whether the whales were observed outside, adjacent to or within the project footprint. Behavioral states were summarized for all whale groups observed and unusual behaviors noted.

### 3.4.5 Other Marine Mammals

Sightings of other marine mammals were rare, and were summarized by month and location within the study area. Brief descriptions of behavior are provided as applicable.

## 4.0 Results

### 4.1 Environmental Conditions

Monthly environmental conditions are summarized in Table 4.1. Overall sighting conditions during the entire study period were moderate to excellent, with only 8 days of poor overall conditions. Beaufort sea state was most often rated as a 1 or a 2<sup>1</sup>. Glare sufficient to obstruct sightings was present during 32 days of observations. However, glare was most often reported in the months with the highest number of whale sightings (Aug – Sep), suggesting that glare did not substantially affect the results.

**Table 4.1. Environmental Conditions by Month.**

Month	Overall Conditions	Primary Sea State	Mean Wind Speed (km/hr)	Temperature (°C)	Mean Visibility (km)	Mean Cloud Coverage (%)
June	Moderate	1	6.6	16.1	10	67
July	Excellent	1	3.3	15.2	10	84
August	Excellent	1	2.1	15.9	10	75
September	Excellent	2	2.7	11.3	10	77
October	Excellent	2	3.3	2.1	10	59
November	Moderate	2	3.1	-2.0	8	83

*Overall conditions and primary sea state are reported as most frequently observed. Wind speed, temperature, visibility and % cloud cover are reported as means.*

### 4.2 Temporal Distribution of Beluga Whales

#### 4.2.1 Beluga whale sightings by time of day

Monitoring shifts ranged from as early as 08:00 to as late as 19:00, with shifts scheduled as either morning (usually 08:00 to 12:00) or afternoon (either 12:00 – 16:00 or 14:00 – 19:00). Effort hours were largely evenly distributed across this time range, with some tapering of the earliest morning and latest afternoon hours in November as light levels decreased. The fewest effort hours occurred during the period of 12:00 – 13:00, which was the hour when shift changes were often occurring.

<sup>1</sup> The Beaufort Sea state scale is defined as: 0 = mirror-like; 1 = ripples without foam crest; 2 = small wavelets, crests do not break; 3 = large wavelets, scattered white caps; 4 = small waves, fairly frequent white caps.

Beluga whale sightings by time of day are summarized in Figure 4.1. Sightings occurred during all observation periods, with peaks in the total number of whales sighted in the late morning (10:00 – 12:00) and late afternoon (4:00 – 5:00). The greatest number of groups was also seen in the late morning (10:00 – 12:00). The lack of sightings during the 12:00 and 13:00 hours is likely an artifact of reduced effort during that period due to observer shift changes. There was a significant peak in the duration of sightings during the 13:00 and 14:00 periods ( $F_{9,64} = 2.898, p = .01$ ).

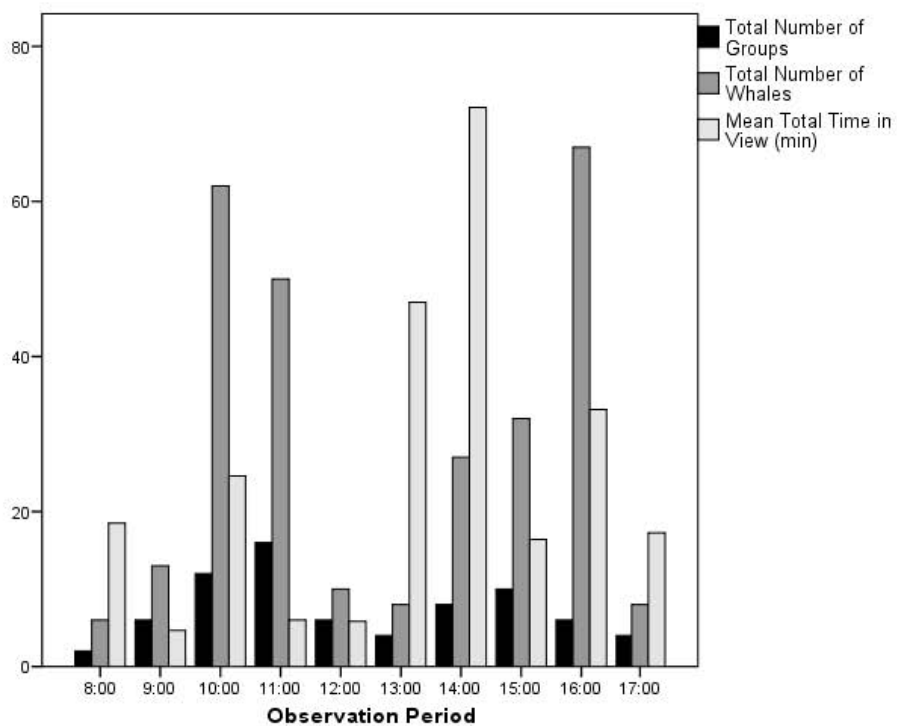
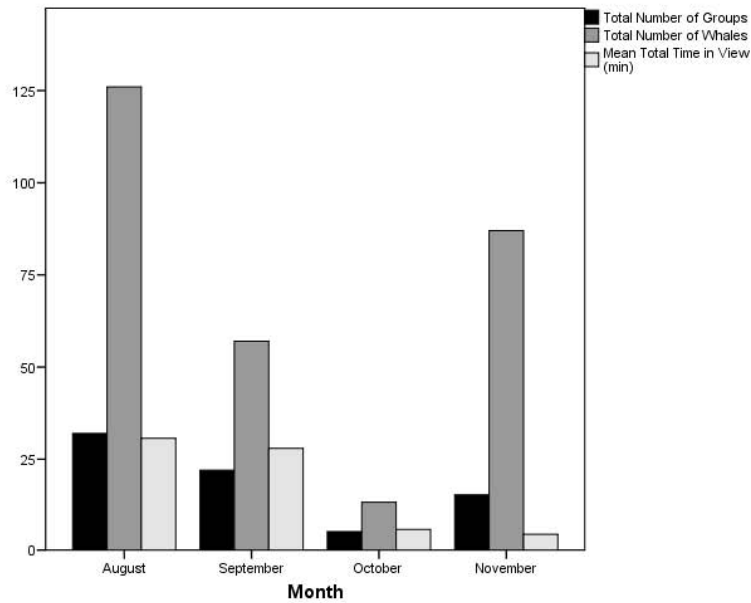


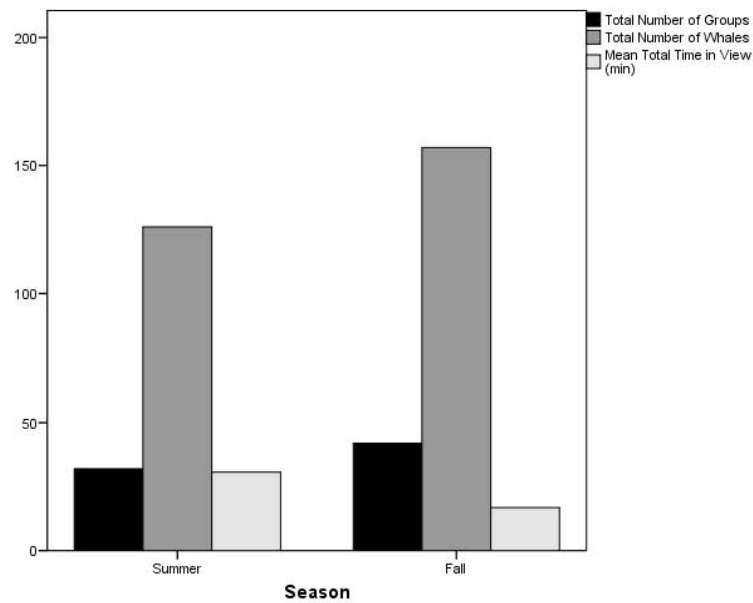
Figure 4.1. Beluga whale observations by time of day.

#### 4.2.2 Beluga whale sightings by month and season

The vast majority of beluga whales were observed during the month of August (Fig. 4.2), with another peak in November due to two large groups that were observed near the end of the observation period. No whales were observed during June or July. This translates to a seasonal trend of slight increase in beluga whales in the fall (Sep – Nov) over the summer (Jun – Aug), however, this trend is not statistically significant (Fig. 4.3).

**Figure 4.2. Beluga whale observations by month.**



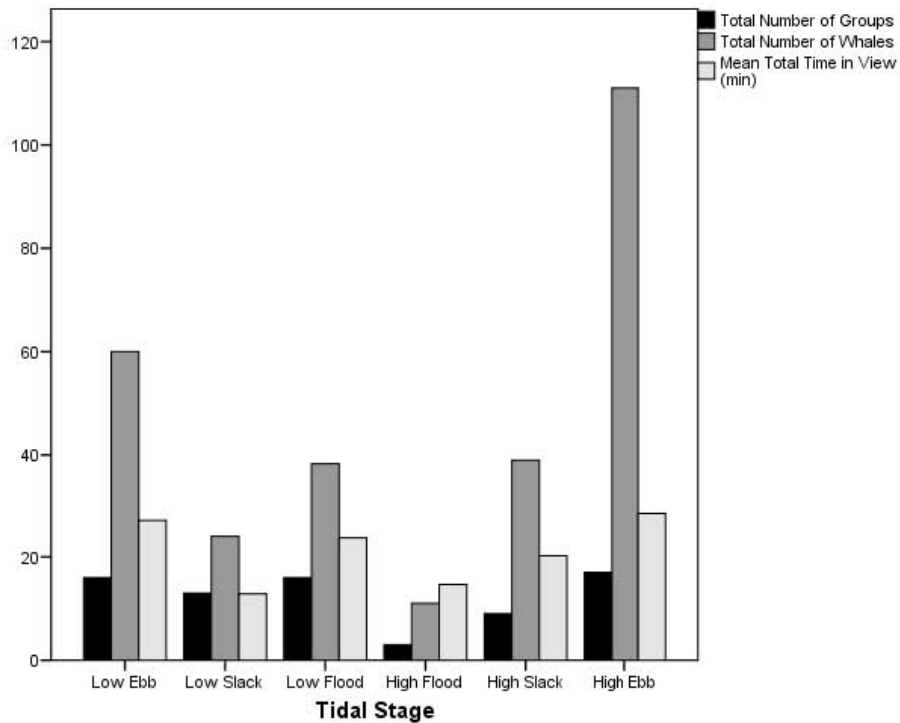


**Figure 4.3. Beluga whale observations by season.**

#### 4.2.3 Beluga whale sightings by tidal stage

Whale sightings (number of groups) were evenly distributed across ebb and slack tidal stages, with the exception of very few sightings during high flood stages (Figure 4.4). There were no significant differences in the mean time whales were in view across any of the tidal stages. The greatest total number of whales were observed during low and high ebb tides, however 72 of the 111 whales observed during high ebb were in November, including two large groups ( $n = 57$ ) traveling south on November 7.





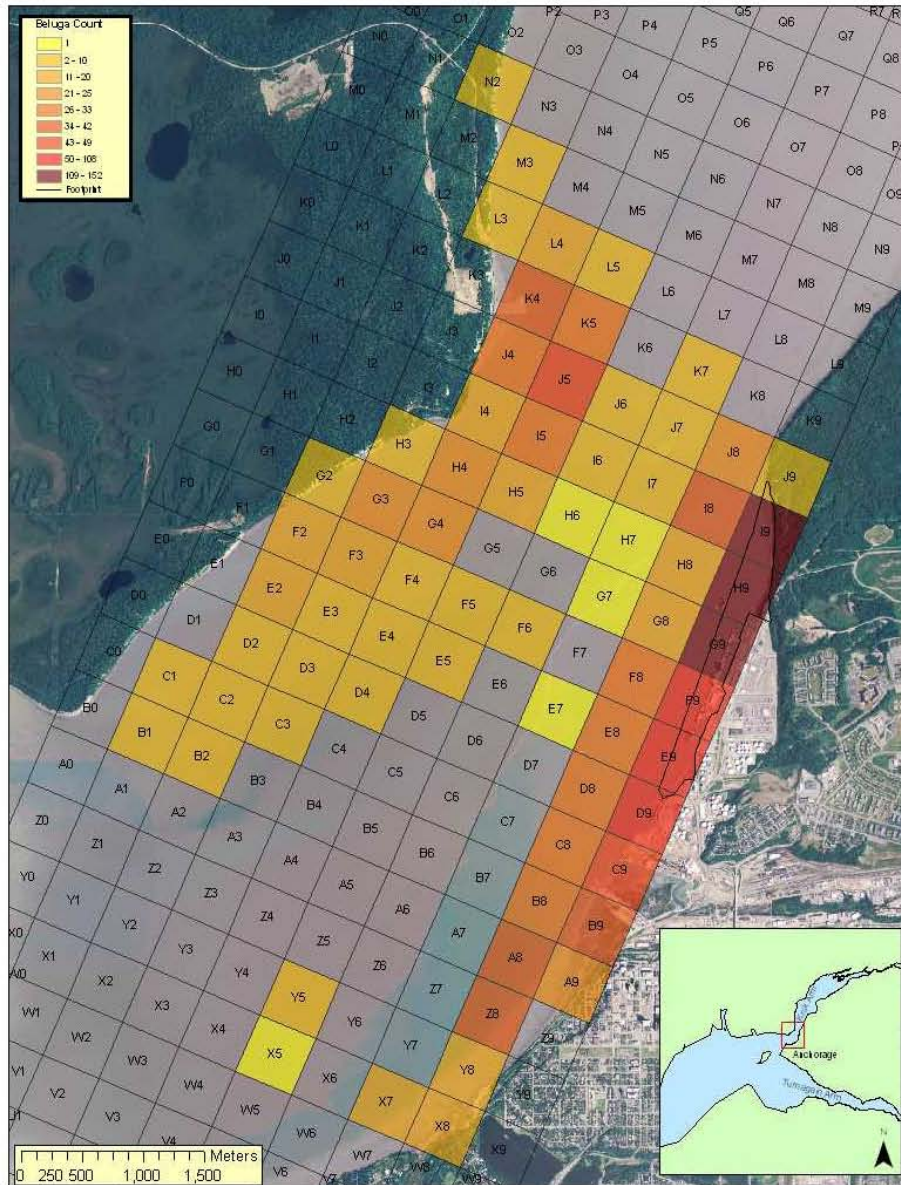
**Figure 4.4. Beluga whale sightings by tidal stage.**

### 4.3 Spatial Distribution of Beluga Whales

#### 4.3.1 Spatial distribution relative to the MTRP footprint

Twenty-five of the sightings, approximately 34% of the total sightings, were observed in grid cells within the MTRP footprint, and another 5 sightings were adjacent to the project footprint. The total time belugas spent within or adjacent to the MTRP footprint was approximately 12.27 hours (736 minutes), ~ .02 % of the total observation time.

However, the greatest concentration of whale observations (184 out of 283 individual whales, 65%) occurred within or adjacent to the MTRP footprint (Fig. 4.5).



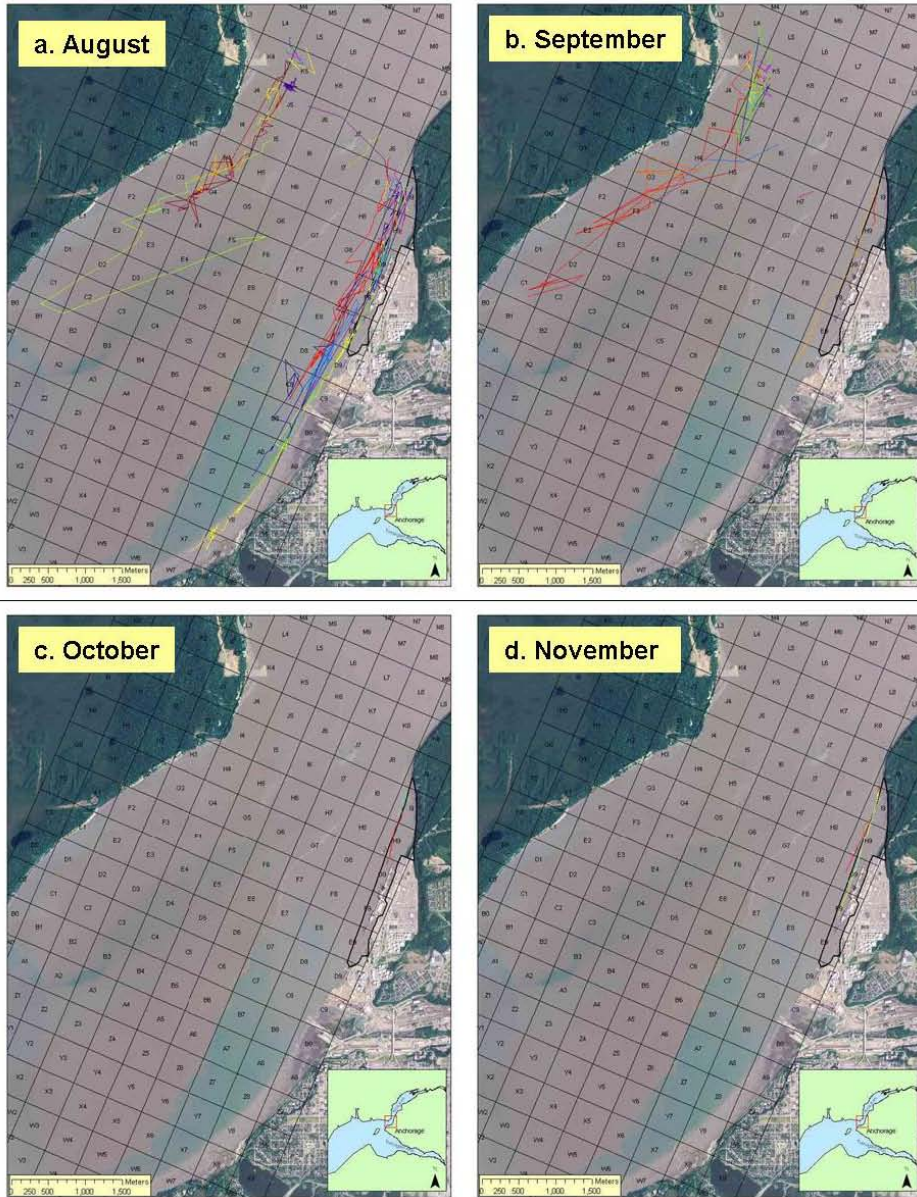
**Figure 4.5. Spatial distribution of beluga whales. MTRP footprint is outlined in black within grid cells E9 – J9. Cells are color coded by the total number of whales observed during the entire study period Jun 24 – Nov 14, 2008.**

#### **4.3.2 Spatial distribution and movements by month**

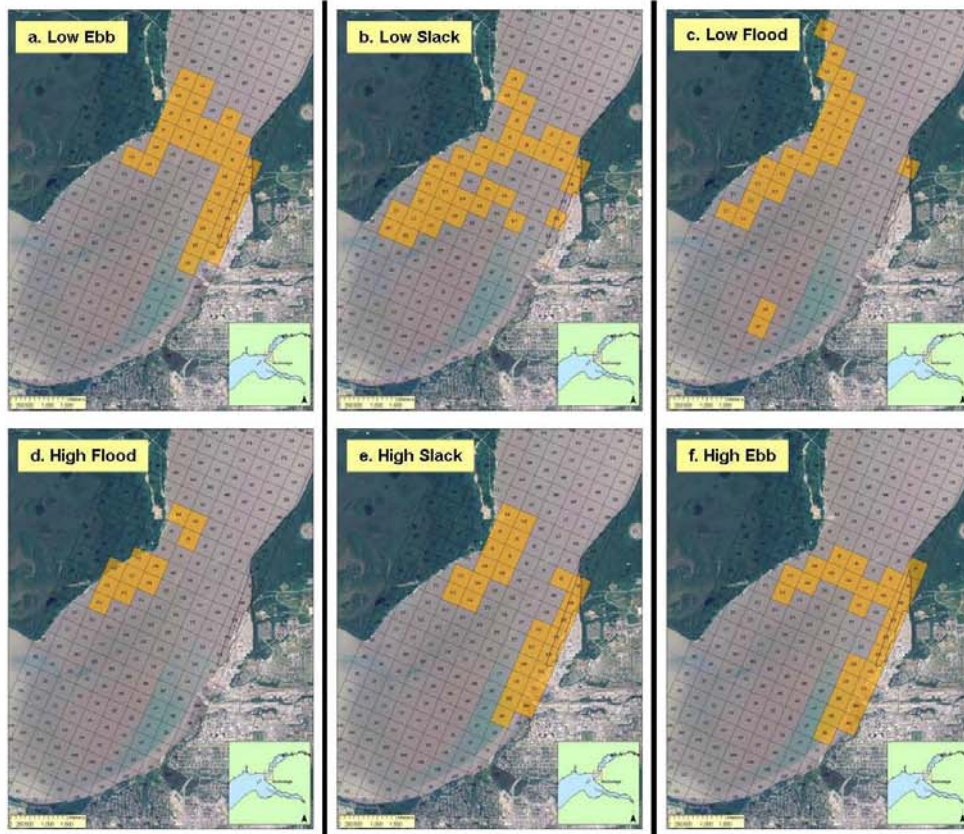
Overall track lines indicate beluga whales moved through the study area adjacent to the shorelines (Fig. 4.6). In August, beluga whales were observed near both shores of Knik Arm, but more frequently on the eastern shoreline, within or adjacent to the MTRP footprint. September track lines indicate whales traveled more frequently on the west side of Knik Arm near Port MacKenzie. In October and November beluga whales traveled on the east side of Knik Arm, within or adjacent to the MTRP footprint.

#### **4.3.3 Spatial distribution by tidal stage**

Spatial distribution by tidal cycle was primarily along the shore (Fig. 4.7). During low ebb and slack tides, beluga whales were fairly evenly distributed across the mouth of Knik Arm, with increased presence on the eastern shoreline during low ebb tides, and on the western shoreline during low slack tides. They were heavily concentrated on the western shoreline during low flood tides. Very few observations occurred during high flood tides, and were concentrated on the western shoreline near Port MacKenzie. High slack tide observations were also few and were split between both eastern and western shores. The majority of sightings during high ebb tides occurred in November, when substantial numbers of whales ( $n = 72$ ) were observed traveling south along the eastern shoreline within and adjacent to the MTRP footprint.



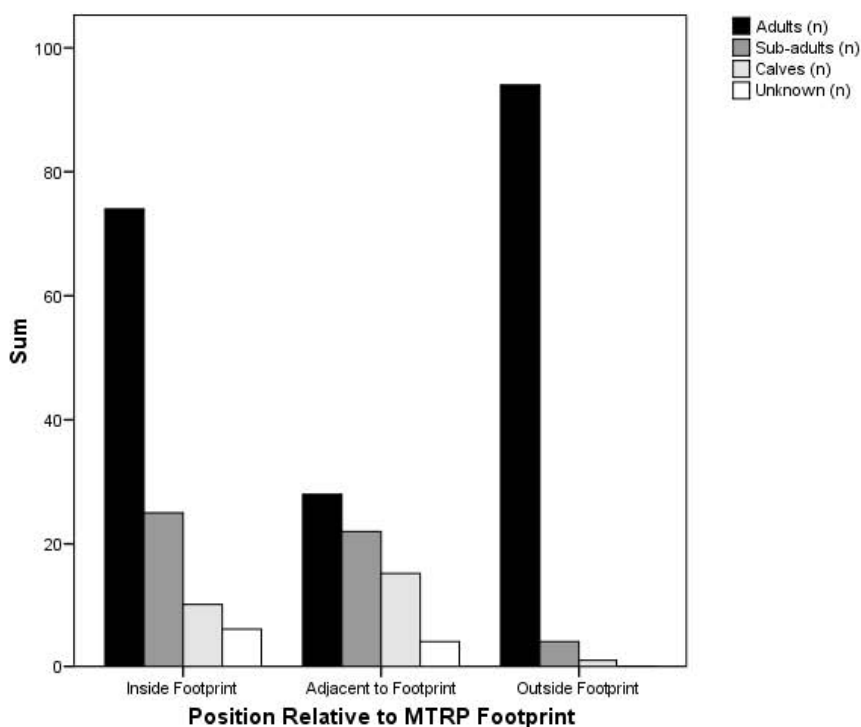
**Figure 4.6. Movement of beluga whale groups by month. Each colored track line represents one beluga whale group, and does not reflect group size or composition. MTRP footprint is outlined in black.**



**Figure 4.7. Spatial distribution of beluga whales across tidal stages. MTRP footprint is outlined in black.**

#### 4.4 Group Size and Structure of Beluga Whales

A total of 196 adults, 51 sub-adults, 26 calves and 10 animals of unknown age class were observed during the period June 24 – November 14, 2008 (Figure 4.8). Mean group size was  $3.82 \pm .60$  individuals. Only nine groups contained identified calves, and groups with calves were larger on average ( $12.89 \pm 3.43$  individuals) than those without. All but one group containing calves were sighted within or adjacent to the MTRP footprint.



**Figure 4.8. Number of beluga whales in each age class relative to appearance within the MTRP footprint.**

#### 4.5 Movements and Behavior of Beluga Whales

Whales were primarily observed moving north through the study area during the late summer and early fall, and traveling south during the late fall. Two large groups ( $n = 57$ ) were observed moving south through the study area in mid-November. Confirmed diving was observed periodically ( $n = 18$ ), and feeding was suspected on three occasions but never confirmed. No unusual behavioral events (e.g., abrupt directional

changes, rapid descents) were observed during the study period. Milling was the only other observed behavior (n = 10).

Forty-two of the 54 groups with more than one individual were tightly packed and moving in a unified pattern. The remainder were either traveling in a loosely packed group (n = 5) or were milling in dense (n = 2) or dispersed (n = 4) groups. All but one group with calves were traveling, and of those all but one were densely packed. The remaining group with calves was milling in a dispersed group.

#### **4.5.1 Responses to pile driving**

There were no observed behavioral changes (e.g., abrupt behavioral changes, rapid descents) or other indicators of response to pile driving or other in-water construction.

### **4.6 Discussion and Summary – Beluga Whales**

#### **4.6.1 Temporal Distribution**

Peaks in beluga whale sightings in August and September are consistent with previous observations (Hobbs et al. 2005, Markowitz and McGuire 2007), indicating that beluga whales continue to move through Knik Arm in response to movements of their primary prey. The peak in November is consistent with an increase in late fall observations in 2007 (Cornick and Saxon-Kendall 2008). This second year of consistent November observations suggests that ice-free conditions in Knik Arm continue to persist beyond those of previous years, and beluga whales appear to be remaining in the study area until forced to move into the lower Cook Inlet by the intrusion of ice. Ice-free conditions could provide increased foraging opportunity before winter, increased protection for calves from predation or both.

#### **4.6.2 Spatial Distribution**

Spatial use patterns are consistent with those reported by Markowitz and McGuire (2007), specifically a high degree of use of the area within and adjacent to the MTRP footprint. However, Markowitz and McGuire's (2007) observational effort was focused primarily around the Port and the construction zone, so their observations did not capture the whales' substantial habitat use along the western shoreline of Knik Arm. This section of the study area would include known foraging areas around the Little Susitna River and other potential foraging areas on the side of Knik Arm opposite the MTRP footprint.

#### **4.6.3 Group Size, Structure and Behavior**

Mean group size during 2008 (~4 whales) was comparable to 2007 (~ 4 whales) and 2006 (~ 3 whales; Markowitz and McGuire 2007). However, the mean size of groups with calves was larger in 2008 than in 2006 (12 and 10 whales, respectively). Group dispersion during 2008 was comparable to 2006 and 2007, with the majority of groups of greater than one individual being tightly spaced.

Observed beluga whale behavior was also consistent with previous observations, with whales primarily traveling through the study area to and from likely foraging areas further up Knik Arm (e.g., Fish Creek, Eagle River, Eklutna). As in previous years, whales were observed following tidal cycles through the study area, moving into Knik Arm on the rising tide and back out on the falling tide, putting them primarily in the study area during low slack and ebb tides.

#### **4.6.4 Responses to pile driving**

No unusual behavioral changes or abrupt changes of direction or pattern of movements was observed during the study period, during pile driving or any other in-water construction activities. However, shore-based observations are not able to capture any responses that may occur beneath the surface, particularly vocal responses, and so we cannot definitively state that there were no responses.

#### **4.7 Other Marine Mammals**

Two harbor seals (*Phoca vitulina*) were observed during the entire period from June 24 – November 14, 2008; one on July 8 at 16:30 near the dredging activity (Grid Cell I8), the other on September 2 at 16:25 in Grid Cell J9. In both cases, the seals surfaced briefly and were not observed again. No other marine mammals (except beluga whales) were sighted by APU observers during the study period.

#### **5.0 Summary**

Overall, beluga whale habitat use, movement and behavior during the June 24 – November 14, 2008 study period were all consistent with observations by LGL in 2006 (Markowitz and McGuire 2007) and APU in 2007 (Cornick and Saxon-Kendall 2008). Beluga whales move into Knik Arm during the late summer and early fall, following their primary prey and providing increased predation protection for calves. Beluga whales appear to be responding to later ice-free conditions in the area, remaining well into November for the second year. Thus far, no obvious behavioral, habitat use or



movement changes have been observed that can be attributed to in-water construction activities at the Port.

## 6.0 Acknowledgements

We would like to acknowledge the contributions of several people to the successful completion of APU's second year performing marine mammal monitoring for the MTR Project. Laurie Butler, Sam Cunard and everyone at ICRC provided APU with excellent logistical support. Eight APU students worked as observers during 2008 and also assisted with data entry. The opportunity provided by ICRC and MARAD is a significant enhancement to their training in the APU Marine Biology Program.

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Concepts and Research Corporation, the Port of Anchorage, and the U.S.  
Department of Transportation Maritime Administration.

Appendix I

Scientific Marine Mammal Monitoring Annual Report 2008

POA Land-Based Surveys of Marine Mammals: Beluga whales (*Delphinapterus leucas*)

Alaska Pacific University

Station:	Date (dd/mm/yy):	Observer(s):	Pg __ of __
Shift Start Time (hh:mm):		Shift End Time (hh:mm):	Optic:

Verified _____
Entered by _____
Sheet # _____

Sampling Round	Best Sample <input type="checkbox"/>	Time (hh:mm)	Count				Harbor Seal	Harbor Porpoise	Steller Sea Lion	Killer Whale	Other	Magnetic Compass Bearing 001-360°	Grid Cell	Group #	Group Code	Activity		Direction	Previously Counted Y/N/U		In-water Construction Activity		Start/End/Arrive/Leave (S/E/A/L)	Comments	Comments on the Reverse <input type="checkbox"/>	
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**POA Land-Based Surveys of Marine Mammals: Environmental Conditions**

**Alaska Pacific University**

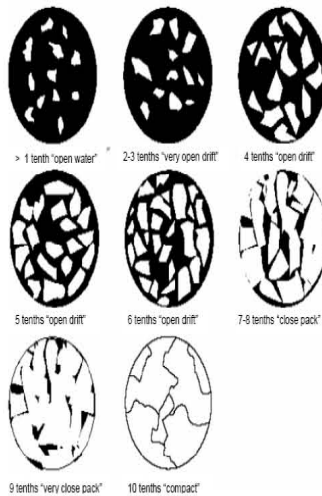
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Verified _____
Entered by _____
Sheet # _____

Time (hh:mm)	Air Temp. (°C)	Precip Code 00-none 01-fog 02-rain 03-snow	Wind Dir. (99 if null)	Wind Speed (km/hr, nearest whole number)	Cloud Cover (%)	Vis. Dis. (km)	See Far Shore	Glare	Central Glare Bearing 001-360°	Swell (ht in m)	Sea State (Beaufort)	White Caps	Sea Ice Concentration (tenths 00-10)	Overall Conditions	# of vessels (hourly)	Comments	Comments on Reverse
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Sea Ice Concentration (tenths 00-10)

Sea State	Description
0	Sea like mirror
1	Ripples but without foam crests
2	Small wavelets
3	Large wavelets, perhaps scattered white horses
4	Small wavelets, fairly frequent white horses



Types of Vessels	
Ship	Skiff
Tug boat	Dredge
Barge	Coast Guard
Tug & barge	Other
Dredge	

Overall Conditions	
1	Poor
2	Moderate
3	Excellent