Application for a Marine Mammal Protection Act Incidental Harassment Authorization

Kodiak Ferry Terminal and Dock Improvements Project

State Project #68938

Submitted to:
Office of Protected Resources
National Marine Fisheries Service
1315 East-West Highway
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Acronyms and Abbreviations

ADEC	Alaska Department of Environmental Conservation
AMHS	Alaska Marine Highway System
BA	Biological Assessment
dB	decibels
dBA	A-weighted decibels
CFR	Code of Federal Regulations
DOT&PF	Alaska Department of Transportation and Public Facilities
DPS	Distinct Population Segment
eDPS	eastern Distinct Population Segment
EFH	Essential Fish Habitat
ESA	Endangered Species Act
FHWA	Federal Highway Administration
FR	*Federal Register*
Hz	Hertz
IHA	Incidental Harassment Authorization
kHz	kilohertz
km	kilometers
LOA	Letter of Authorization
MMO	Marine Mammal Observer
MMPA	Marine Mammal Protection Act
µPa	microPascals
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
PTS	Permanent Threshold Shift
rms	root mean square
SEL	Sound Exposure Levels
SPL	Sound Pressure Levels
TL	Transmission Loss
TTS	Temporary Threshold Shift
URS	URS Corporation

USACE	U.S. Army Corps of Engineers
USC	United States Code
wDPS	western Distinct Population Segment

1 DESCRIPTION OF ACTIVITIES

1.1 Introduction

The National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS) regulations governing the issuance of Incidental Harassment Authorizations (IHAs) and Letters of Authorization (LOAs) permitting the incidental, but not intentional, take of marine mammals under certain circumstances 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" to mean "to 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)). Section 216.104 sets out 14 specific items that must be addressed in requests for rulemaking and renewal of regulations pursuant to Section 101(a)(5) of the MMPA. The 14 items are addressed in Sections 1 through 14 of this Application for an IHA.

The Alaska Department of Transportation and Public Facilities (DOT&PF) requests an IHA for the take of small numbers of marine mammals by Level B harassment, and a very small number of Steller sea lions by Level A harassment, incidental to reconstructing the existing ferry terminal at Pier 1 in Kodiak, Alaska, referred to as the Kodiak Ferry Terminal and Dock Improvements project (State Project Number 68938). The DOT&PF requests that the IHA be valid for 1 year, from 30 September 2015 through 29 September 2016.

In 2013, the DOT&PF, in cooperation with the Federal Highway Administration (FHWA), initiated and completed informal Section 7 consultation under the Endangered Species Act (ESA) with NMFS in regard to the proposed Kodiak Ferry Terminal and Dock Improvements project at Pier 1 in Kodiak, Alaska (Figure 1-1, Figure 1-2). On 14 January 2013, correspondence was initiated between DOT&PF and NMFS regarding protected species. As part of informal Section 7 consultation, DOT&PF submitted a Finding of Effect Letter to NMFS on 09 May 2013 requesting concurrence that the project may affect, but is not likely to adversely affect the Steller sea lion (*Eumetopias jubatus*) and the humpback whale (*Megaptera novaeangliae*). Based on the letter and additional communication, NMFS issued a concurrence letter (PCTS# AKR-2013-9277) on 29 July 2013. NMFS concurred that the proposed action may affect, but is not likely to adversely affect humpback whales or the western Distinct Population Segment (wDPS) of Steller sea lions and their designated critical habitat. The concurrence letter noted the high ambient noise level in the project area and stated that monitoring for marine mammals within a 350-meter (1,148-foot) radius of the project, and cessation of project in-water construction activities if marine mammals entered the monitored area, would be sufficient to avoid adverse effect. In addition, NMFS agreed that implemented mitigation measures should include use of pile cushions during impact hammering, monitoring for 30 minutes before pile driving/drilling and extraction operations begin, and monitoring by trained or experienced observers.

In October 2014, DOT&PF and contractors mobilized to begin reconstructing Pier 1. However, construction was not initiated because Steller sea lions continually occupied the monitoring zone. Sea lions were attracted to commercial fishing vessels docking and off-loading catch at the seafood processing plant immediately adjacent to the ferry terminal (Figure 1-3). Construction was never able to begin, and DOT&PF eventually canceled the construction project for the year and postponed project implementation while seeking a solution. DOT&PF concluded that Steller sea lions would likely remain in the monitoring zone while the adjacent seafood processing plant was accepting deliveries from commercial fishing vessels. Although the seafood processing plant may close for a few weeks in some years in December, the plant does not shut down for a period of time long enough to allow reconstruction of Pier 1.

Therefore, the decision was made to request an IHA from NMFS to allow for harassment of Steller sea lions incidental to pile driving in order to reconstruct Pier 1. In addition, FHWA and DOT&PF will be conducting formal Section 7 consultation under the ESA concurrent with this IHA request.

This application was prepared on behalf of the DOT&PF by HDR, under a subcontract to R&M Consultants, Inc.

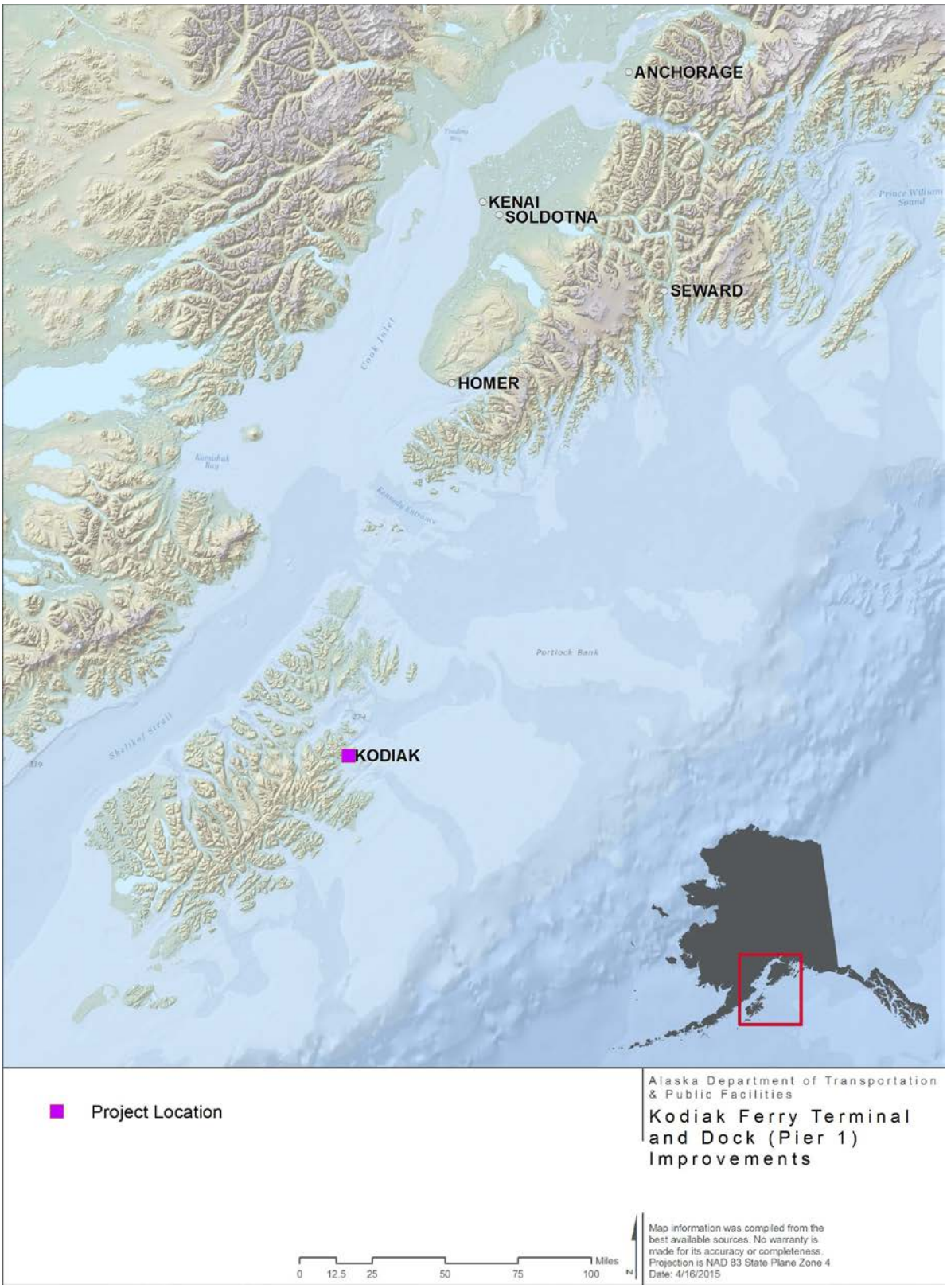

Figure 1-1. Site location and vicinity

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Figure 1-2. Kodiak harbor area

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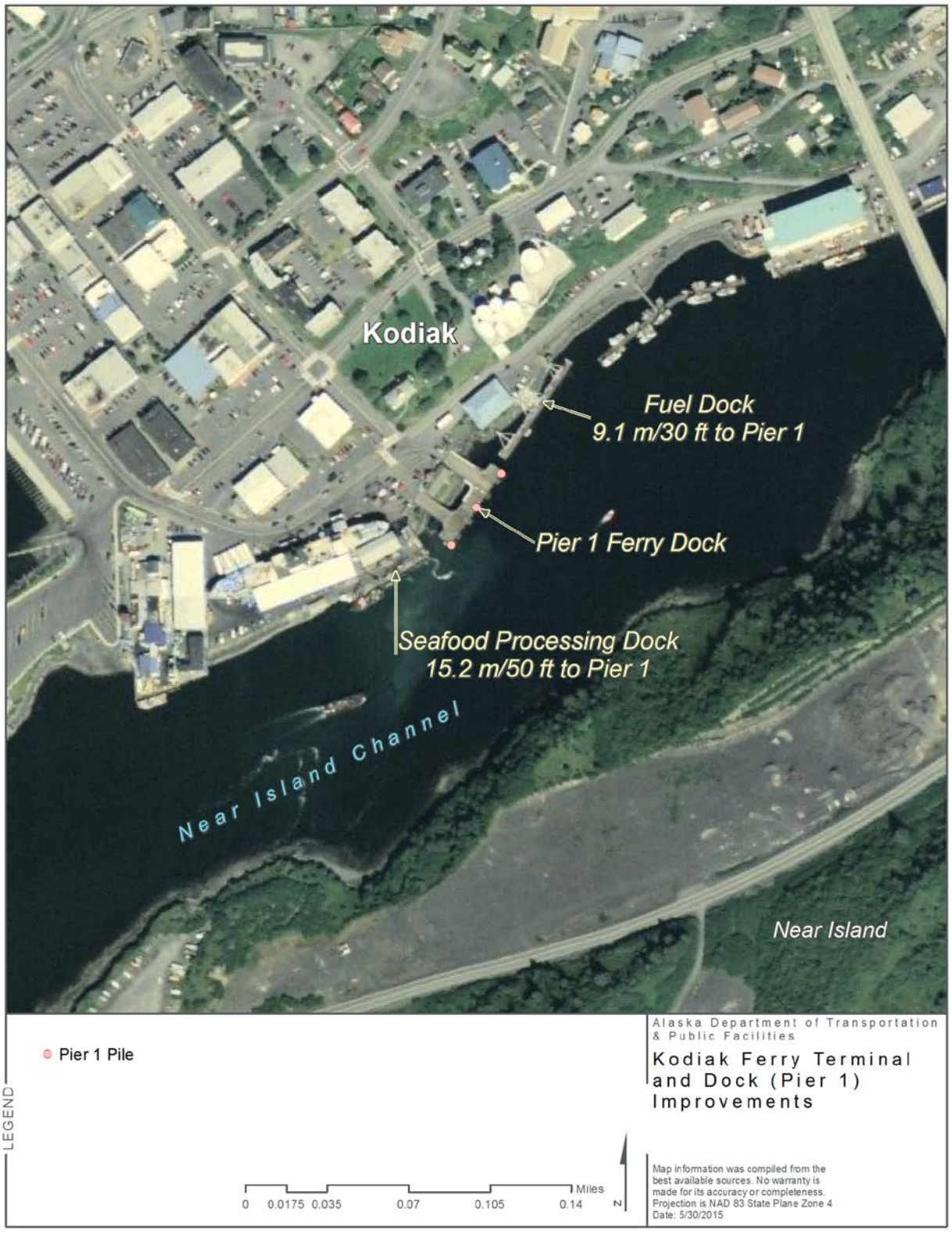

Figure 1-3. Pier 1 location and neighbors

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1.2 Project Purpose and Description

The Alaska Marine Highway System (AMHS) ferry M/V *Tustumena* docks at Pier 1 on its passage between Homer, Alaska, and the Aleutian Islands. Pier 1 is owned by the City of Kodiak and consists of a pile-supported, timber U-shaped dock. In addition to the ferry operations, the dock is used for transfer of fuel to an upland bulk fuel storage facility owned by Petro Marine/Harbor Enterprises, which also owns the marine fueling facility located north of Pier 1. Occasionally, the dock is also used for transfer of cargo. The existing infrastructure and support facilities at Pier 1 are in need of replacement because of their age and deteriorated condition.

The DOT&PF operates the AMHS to provide safe, reliable, and efficient transportation of people, goods, and vehicles while providing opportunities to develop and maintain a reasonable standard of living and high quality of life, including social, education, and health needs. The AMHS has been operating year-round since 1963, with regularly scheduled passenger and vehicle service to 33 communities in Alaska, plus Bellingham, Washington, and Prince Rupert, British Columbia. The AMHS fleet currently consists of 11 vessels, and additional ferries are planned. Routes in southcentral Alaska serve multiple communities in Prince William Sound, the Kenai Peninsula, and on Kodiak Island, including the community of Kodiak.

To maintain and improve service, the DOT&PF conducts construction, repair, and maintenance activities as part of regular operations. One of these projects is the upgrade of the ferry terminal dock at Pier 1, located on Kodiak Island and extending into the Near Island Channel, which is the subject of this IHA request.

The Pier 1 dock is approximately 50 years old and nearing the end of its service life. The purpose of the project is to replace the existing ferry terminal and dock at Pier 1 (Figure 1-4) with an updated, modern structure. Associated mooring and fender systems will be replaced with updated systems that will improve the M/V *Tustumena*'s mooring and cargo transfer options. The project will also improve efficiency and safety of loading and disembarking of AMHS foot passengers and vehicles. Reconstruction of the existing facilities with new pile-supported structures will increase the footprint of the existing dock from 1,128 square meters (12,150 square feet) to approximately 1,709 square meters (18,400 square feet), and this expanded dock area will provide additional staging and parking areas for vehicles and passengers (Figure 1-5). The increased dock footprint will result largely from widening the north side, where vehicles drive to access the ferry. The new dock face will be about 8.5 meters (28 feet) longer. A covered walkway will be constructed along the west side of the dock. A new fire protection and potable water line will supply the new dock, including a hydrant near the head of the dock. This hydrant will be connected to the buried main under Marine Way.

Proposed activities included as part of the Kodiak Ferry Terminal and Dock Improvements project (Pier 1 project) with potential to affect marine mammals include vibratory and impact pile-driving operations and use of a down-hole drill/hammer to install piles in bedrock. Such in-water activities could result in harassment to marine mammals as defined under the MMPA of 1972, as amended in 1994. Proposed project activities are described in detail in the following sections.

In this IHA application, the units of measure reported for construction activities are Imperial units, which are typically used in construction. Units of measure for scientific information, including acoustics, are metric. When appropriate, units are reported as both Imperial and metric.

Figure 1-4. Existing ferry terminal structure at Pier 1 in Kodiak, Alaska.

1.3 Project Activities

The proposed action for this IHA request includes removal of the old timber dock and piles and installation of the new dock, including mooring and fender systems. The existing decking, piles, and other dock materials will be removed. Temporary steel H-piles will be installed to support temporary false work structures (i.e., templates). The new dock will be supported by steel piles, and dock fenders will include steel piles and timber piles. The proposed Pier 1 project will require an estimated 120 days total of pile extraction and installation, including 80 days of vibratory extraction and installation, 60 days of down-hole drilling, and 22 days of impact hammering. Note that these estimates are the number of days when each activity may occur at some point during the day, and that the number of days is not additive. The total hours of pile installation for each activity is estimated in more detail later in this section.

1.3.1 Removal of Old Piles

The existing dock consists of approximately 156 vertical, 13-inch-diameter creosote-treated timber piles, 40 timber battered piles, and 14 16-inch-diameter steel fender piles. All piles, decking, and other existing dock materials will be removed. The exact method for pile extraction will be determined by the contractor. It is anticipated that when possible, existing piles will be extracted by directly lifting them with a crane. A vibratory hammer will be used only if necessary to extract piles that cannot be directly lifted. Removal of each old pile is estimated to require 5 minutes of vibratory hammer use. Under the worst-case scenario, if all old piles

were removed by using the vibratory hammer, it would require a total time of about 17.5 hours (Table 1-1). If the piles break below the waterline, the pile stubs will be removed with a clamshell bucket.

1.3.2 Installation of New Piles

The exact means and method for pile installation will be determined by the contractor; however, a few options are available within a general framework.

Temporary Piles

Temporary steel pipe or H-piles will be installed as part of a template to ensure proper placement and alignment during driving of the permanent steel piles. Temporary piles will be driven with a vibratory hammer 10-30 feet through the overburden sediment layer but are not expected to penetrate into the bedrock. A vibratory hammer will be used to remove the temporary piles, which will then be reinstalled at a new location. Individual temporary piles will be driven and removed an estimated 88 times. It is estimated that it will take 10 minutes of vibratory pile driving per temporary pile for installation and 5 minutes each for extraction, for a total of 15 minutes of vibratory pile driving per temporary pile. For 88 temporary piles, this is an estimated 22 hours of total time using active vibratory equipment (Table 1-1).

Table 1-1. Estimated number of hours required for pile extraction and installation, rounded up to the nearest hour

Pile Type	Number of Piles	Vibratory Hammer		Down-hole Drill		Impact Hammer	
		Number of piles	Hours required	Number of piles	Hours required	Number of piles	Hours required
13-inch timber extraction	196	196	16	0	0	0	0
16-inch steel extraction	14	14	2	0	0	0	0
Temporary steel H or pipe	88	88	15	0	0	0	0
Temporary steel H or pipe extraction	88	88	8	0	0	0	0
24-inch steel	88	88	15	88	440	88	2
18-inch steel	10	10	2	0	0	0	0
16-inch timber	8	8	2	0	0	0	0
Total Hours			60		440		2
Total Hours with 25% Contingency			75		550		3

Permanent Piles

The new terminal and dock will be supported by approximately 88 round, 24-inch-diameter steel piles. The 24-inch steel piles will be driven 10–30 feet through the sediment layer and 15 feet into the bedrock. Dock fenders will be supported atop 10 round, 18-inch-diameter steel piles. In addition, eight round, 16-inch timber piles, which are somewhat variable in size from about 16 inches at the butt (top) to about 12 inches at the tip (bottom), will be installed as fender piles along the north side of the dock. Both the steel and timber fender piles will be driven with a vibratory hammer approximately 22 feet embedment, or to refusal.

The sequence for installing the permanent 24-inch piles begins with insertion through overlying sediment with a vibratory hammer for about 10 minutes per pile. Next, a hole will be drilled in the underlying bedrock by using a down-hole drill/hammer. A down-hole hammer is a drill bit that drills through the sediment and a pulse mechanism that functions at the bottom of the hole, using a pulsing bit to break up the harder materials or rock to allow removal of the fragments and insertion of the pile. The head extends so that the drilling takes place below the pile. Drill cuttings are expelled from the top of the pile as dust or mud. It is estimated that drilling piles through the layered bedrock will take about 5 hours per pile. Then, about five blows of an impact hammer will be used to confirm that piles are set into bedrock (proofed), for a maximum time expected of 1 minute of impact hammering per pile (Table 1-1). When the impact hammer is employed for proofing, a pile cap or cushion will be placed between the impact hammer and the pile.

All permanent 18-inch steel piles and timber piles will be driven into the marine sediment by using a vibratory hammer. It is anticipated to take about 10 minutes of vibratory driving to install each permanent 18-inch steel and timber pile (Table 1-1).

1.4 Project Schedule

Pile installation and extraction associated with the Pier 1 project will begin no sooner than 30 September 2015 and will be completed no later than 29 September 2016 (1 year following IHA issuance). To minimize impacts to pink salmon (*Oncorhynchus gorbuscha*) fry and coho salmon (*O. kisutch*) smolt, all in-water pile extraction and installation is planned to be completed by 30 April 2016 (FHWA 2013). If work cannot be completed by 30 April, ADF&G recommended that the DOT&PF refrain from impact pile installation without a bubble curtain from 01 May through 30 June within the 12-hour period beginning daily at the start of civil dawn (Marie 2015). ADF&G stated that this is the daily time period when the majority of juvenile salmon are moving through the project area, and a 12-hour quiet period may protect migrating juvenile salmon from excessive noise (Frost 2015). Impact pile installation would be acceptable without a bubble curtain from 01 May through 30 June in the evenings, beginning at 12 hours past civil dawn (Marie 2015). At this time, DOT&PF does not propose using bubble curtains. However, it is possible that in-water work may extend past 30 April in compliance with the mitigation for salmon as recommended by ADF&G.

About 60 hours of vibratory pile driving/extraction, 440 hours of down-hole drilling, and 2 hours of impact hammering are anticipated (Table 1-1). With a 25 percent contingency added to these time estimates to account for schedule delays due to weather or marine mammal shutdowns, total expected hours of vibratory pile driving (extraction and installation), down-hole drilling, and impact hammering are 75, 550, and 3 hours, respectively (Table 1-1).

Pile extraction and installation are expected to take place over a period of approximately 120 working days within a 4- to 6-month window beginning 30 September 2015. This IHA requests authorization for up to 1 year of construction activities in case unforeseen construction delays occur. Vibratory pile driving (extraction and installation) is expected to take place on approximately 80 days, down-hole drilling on approximately 60 days, and impact hammering on approximately 22 days (Table 1-2). These estimates are based on expected production rates. It is important to note that different types of pile installation or extraction may take place on the same day, so the numbers of days in Table 1-2 are not additive. Pile extraction and installation will be intermittent and staggered over an estimated 4- to 6-month period, depending on weather, construction and mechanical delays, marine mammal shutdowns, and other potential delays and logistical constraints.

Table 1-2. Estimated number of days (not additive) required for pile extraction and installation, rounded up to the nearest day

Pile Type	Number of Piles	Days Required		
		Vibratory Hammer	Down-hole Drill	Impact Hammer
13-inch timber extraction	196	5	0	0
16-inch steel extraction	14	1	0	0
Temporary steel pipe or H-pile	88	60	0	0
Temporary steel pipe or H-pile extraction	88	30	0	0
24-inch steel	88	60	60	22
18-inch steel	10	10	0	0
16-inch timber	8	10	0	0
Total Days		80	60	22

1.5 Applicable Permits/Authorizations

The following permits/authorizations are applicable to in-water work addressed by this application:

- U.S. Army Corps of Engineers (USACE), Department of Army permit, file number POA-2012-769, Near Island Channel, authorizes the replacement of Pier 1; the time limit for completing the work authorized ends on 31 January 2019. This permit will be modified as necessary following authorization of the requested incidental harassment by NMFS.

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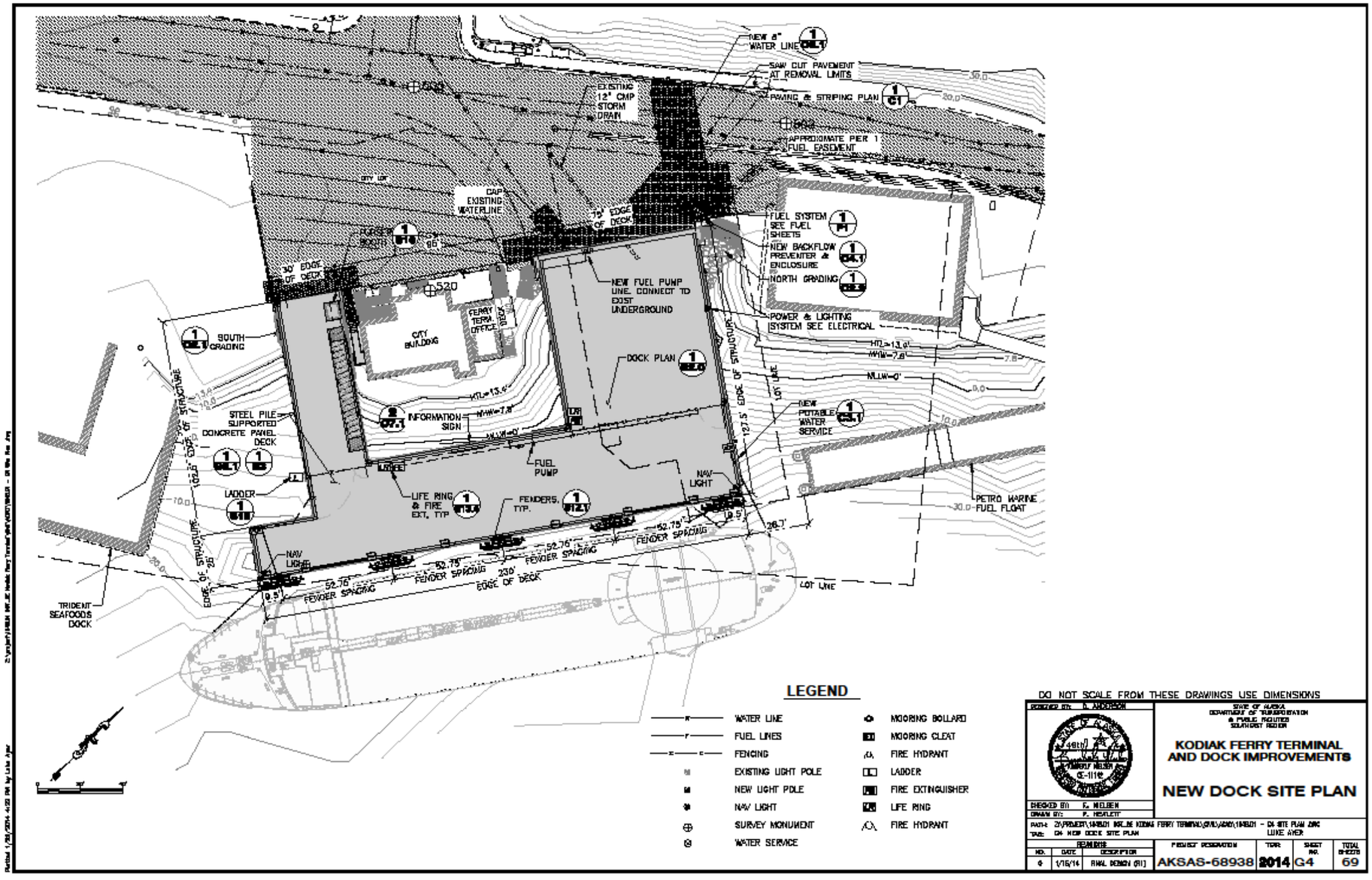

Figure 1-5. Plan view of the proposed new Pier 1 ferry terminal

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2 DATES, DURATION, AND GEOGRAPHICAL REGION OF ACTIVITIES

2.1 Dates and Durations of Activities

In-water work associated with the Kodiak Pier 1 Project will begin on 30 September 2015 or immediately after authorization under the MMPA is granted. It is critical to DOT&PF that authorization for this project is granted in an expedient manner. In-water work will be completed no later than 29 September 2016 (1 year following IHA issuance).

Removal of existing timber piles, installation of temporary piles and new permanent piles, and removal of temporary piles are expected to occur over approximately 120 working days over a period of 4 to 6 months. This IHA requests authorization for up to 1 year of construction activities in case unforeseen construction delays occur. Pile extraction, pile driving, and drilling will occur intermittently over the work period, for anything from minutes to hours at a time (Table 1-1). Timing in both instances will vary based on the weather, delays, substrate type (the rock is layered and is of varying hardness across the site, so some holes will be drilled quickly and others may take longer), and other factors. A production rate of two permanent piles per day, on days when pile installation occurs, is considered typical for a project of this type.

A 25 percent contingency has been added to the estimate of pile extraction and driving time to account for unknown substrate conditions (Table 1-1). Therefore, the project may require approximately 614 hours of pile extraction or driving. The days for pile driving and extraction will not always be successive, but will be staggered over a 4- to 6-month period, depending on weather, construction and mechanical delays, marine mammal shutdowns, and other potential delays and logistical constraints.

The number of hours of pile driving within any single day will vary. The take estimates provided in Section 6 are based upon the contingency-added estimates of days required for pile driving.

2.2 Geographical Setting

The Kodiak ferry terminal at Pier 1 is located in the City of Kodiak, Alaska, at 57°47'12.78"N, 152°24'09.73"W, on the northeastern corner of Kodiak Island, in the Gulf of Alaska (Figure 1-1). Pier 1 is an active ferry terminal and multi-use dock located in Near Island Channel, which separates downtown Kodiak from Near Island (Figure 1-2). The channel is approximately 200 meters (656 feet) wide in the project area. Pier 1 is situated between a marine fuel service floating dock to the northeast (Petro Marine Services) and a pile-supported dock owned by a shore-based seafood processor to the southwest. Pier 1 is separated from the seafood processing plant dock by only about 15 meters (50 feet; Figure 1-3).

2.2.1 Physical Environment

Kodiak Island is a large island on the south coast of Alaska, separated from the Alaska mainland by Shelikof Strait (Figure 1-1). Kodiak Island is the second largest island in the United States, with an area of 9,311.24 square kilometers (3,595.09 square miles). It is 160 kilometers (km; 100 miles) long and ranges in width from 16 to 96 km (10 to 60 miles). The City of Kodiak is the largest community on the island.

The City of Kodiak operates and maintains two harbors, St. Herman Harbor and St. Paul Harbor, to provide protected moorage for 650 vessels up to 46 meters (150 feet) in length

(Figure 1-2). Large vessels, including the two AMHS ferries, cruise ships, fuel barges, commercial fishing vessels, and cargo vessels are moored at the three deep-water piers, including Pier 1. Two inner-harbor docks in St. Herman Harbor and St. Paul Harbor are available for vessels up to 37 meters (120 feet). The AMHS ferry terminal building is located in the uplands area of Pier 1, which makes it the preferred berthing facility for the ferry.

As previously described, Pier 1 is situated immediately adjacent to a shore-based seafood processing plant (Figure 1-3). When in operation, the seafood processing plant receives numerous commercial fishing vessels daily for offloading and processing of catch.

2.2.2 Acoustical Environment

Baseline sound levels in the Kodiak harbor area are relatively high (NMFS 2013). Two boat harbors in Near Island Channel (Figure 1-2) house a number of commercial and recreational marine vessels that regularly travel the channel area. The channel is also a primary route for commercial and recreational vessels to access waters outside the Gulf of Alaska. The channel is traversed frequently by ferries, fishing vessels and tenders, barges, tug boats, recreational vessels, and charter fishing operations. High levels of vessel traffic are known to elevate the background levels of noise in the marine environment (see Section 6.3).

3 SPECIES AND ABUNDANCE OF MARINE MAMMALS

The marine waters near Kodiak Island support many species of marine mammals, including pinnipeds and cetaceans; however, the number of species regularly occurring near the project area is limited. Steller sea lions are the most common marine mammals in the project area (Figure 3-1), and are part of the wDPS that is listed as Endangered under the ESA. Harbor seals (*Phoca vitulina*), harbor porpoises (*Phocoena phocoena*), and killer whales (*Orcinus orca*) may also occur in the project area, but far less frequently and in lower abundance than Steller sea lions. Humpback whales, fin whales (*Balaenoptera physalus*), and gray whales (*Eschrichtius robustus*) occur in the nearshore waters around Kodiak Island), but are not expected to be found near the project area because of the narrow channel and boat traffic. Dall's porpoise (*Phocoenoides dalli*) generally inhabit more offshore habitats than the Near Island channel. The relatively large numbers of Steller sea lions in the area may serve as an additional deterrent for some marine mammals. This IHA application is limited to Steller sea lions, harbor seals, harbor porpoises, and killer whales, and assesses the potential impacts of the project on these four species (Table 3-1), which are discussed more fully in Section 4.

Figure 3-1. Steller sea lions hauled out on Dog Bay float in St. Herman Harbor.

Table 3-1. Marine mammals in the project area

Species or DPS	Abundance	Comments
Steller sea lion, wDPS	52,200[a]	Very common in the project area. Listed as Depleted under the MMPA, Endangered under the ESA.
Harbor seal	11,117[b]	May occur occasionally in the project area. No special status or ESA listing.
Harbor porpoise	31,046[c]	May occur occasionally in the project area. No special status or ESA listing.
Killer (Orca) whale	2,347 Resident 587 Transient[d]	Occurs occasionally in the project area. No special status or ESA listing.

[a] Abundance estimate for the wDPS.

[b] Abundance estimate for the South Kodiak stock.

[C] Abundance estimate for the Gulf of Alaska stock.

[d] Abundance estimate for the Eastern North Pacific Alaska Resident stock; the estimate for the transient population is for the Gulf of Alaska, Aleutian Islands, and Bering Sea transient stock.

Source for all population estimates: Allen and Angliss 2013, 2014.

Note: ESA = Endangered Species Act; MMPA = Marine Mammal Protection Act; wDPS = western Distinct Population Segment.

4 AFFECTED SPECIES STATUS AND DISTRIBUTION

4.1 Steller Sea Lion

4.1.1 Status and Distribution

Steller sea lions are found throughout the northern Pacific Ocean, including coastal and inland waters from Russia (Kuril Islands and the Sea of Okhotsk), east to Alaska, and south to central California (Año Nuevo Island). Steller sea lions are partitioned into two distinct DPSs separated at 144° W longitude (Cape Suckling, Alaska). Only the wDPS is considered in this application because the eastern DPS (eDPS) occurs outside the geographic area under consideration.

Steller sea lions were listed as threatened range-wide under the ESA on 26 November 1990 (55 *Federal Register* [FR] 49204). Steller sea lions were subsequently partitioned into the western and eastern DPSs in 1997 (Allen and Angliss 2010), with the wDPS being listed as endangered under the ESA and the eDPS remaining classified as threatened (62 FR 24345) until it was delisted in November 2013.

On 27 August 1993, NMFS published a final rule designating critical habitat for the Steller sea lion. Critical habitat is associated with breeding and haulout areas in Alaska, California, and Oregon (NMFS 1993). Steller sea lions are listed as depleted under the MMPA. Both DPSs are classified as strategic.

Steller sea lions have a worldwide population estimated at 120,000 to 140,000 animals, with approximately 93,000 in Alaska. The most recent comprehensive estimate (pups and non-pups) for abundance of the wDPS in Alaska is 52,209 sea lions, based on aerial surveys of non-pups conducted in June and July 2008–2011 and aerial and ground-based pup counts conducted in June and July 2009–2011 (Allen and Angliss 2014).

The wDPS of Steller sea lions declined approximately 75 percent from 1976 to 1990. Factors that may have contributed to this decline include (1) incidental take in fisheries, (2) legal and illegal shooting, (3) predation, (4) contaminants, (5) disease, and (6) climate change. Non-pup Steller sea lion counts at trend sites in the wDPS increased 11 percent during 2000–2004. These counts were the first region-wide increases for the wDPS since standardized surveys began in the 1970s, and were due to increased or stable counts in all regions except the western Aleutian Islands. During 2004-2008, western Alaska non-pup counts increased only 3 percent; eastern Gulf of Alaska (Prince William Sound area) counts were higher; counts from the Kenai Peninsula through Kiska Island, including Kodiak Island, were stable; and western Aleutian counts continued to decline (Allen and Angliss 2010). Aerial photographic surveys conducted from 2008 through 2012 of non-pups and a ground-based survey of pups from 2009 through 2012 provide the most recent abundance estimate of the wDPS. A total of 34,056 non-pups and 11,603 pups were counted, providing an abundance estimate of 45,659 (Allen and Angliss 2014).

The wDPS breeds on rookeries in Alaska from Prince William Sound west through the Aleutian Islands. Steller sea lions use 38 rookeries and hundreds of haul-out sites within their range in western Alaska (Allen and Angliss 2013). Steller sea lions are not known to migrate, but individuals may disperse widely outside the breeding season (late May to early July). At sea, Steller sea lions commonly occur near the 200-meter (656-foot) depth contour, but have been seen from near shore to well beyond the continental shelf (*as cited in* PND Engineers 2013).

4.1.2 Presence in Project Area

Steller sea lions are the most obvious and abundant marine mammals in the project area. The major natural Steller sea lion haulouts closest to the project area are located on Long Island and Cape Chiniak, which are approximately 4.6 nautical miles (8.5 kilometers) and 13.8 nautical miles (25.6 kilometers) away from the project site, respectively. Annual counts averaged 33 animals on Long Island from 2008 through 2010, and 119 animals at Cape Chiniak during the same time period (Table 4-1). The closest rookery is located on Marmot Island, approximately 30 nautical miles (55.5 kilometers) from the project site, which had average annual counts of 656 animals from 2008 through 2010 (*as cited in* NMFS 2013).

Table 4-1. Annual Steller sea lion counts at one rookery and two haulouts on northeastern Kodiak Island

Location	Designation	Distance (nm) from project	Year		
			2008	2009	2010
Marmot Island	Rookery	30	644	749	576
Long Island	Haulout	4	59	39	0
Cape Chiniak	Haulout	12	130	117	110

Many individual sea lions have become habituated to human activity in the Kodiak harbor area and utilize a man-made haulout float called Dog Bay float located in St. Herman Harbor, about 1,300 meters (4,300 feet) from the project site (Figure 1-2; Figure 3-1). This is not a federally recognized haulout and is not considered part of sea lion critical habitat. A section from an old floating breakwater, the float was relocated to Dog Bay in the year 2000 and intended to serve as a dedicated sea lion haulout. It serves its purpose of reducing sea lion-human conflicts in Kodiak's docks and harbors by providing an undisturbed haulout location and reducing the numbers of sea lions that haul out on vessel moorage floats.

Counts of sea lions hauled out on the Dog Bay float provide an index of the number of Steller sea lions in the harbor area. Because this float is not considered an official haulout by NMFS, few standardized surveys to count sea lions have been conducted (Wynne 2015a). Surveys from 2004 through 2006 indicated peak winter (October–April) counts ranging from 27 to 33 animals (Wynn et al. 2011). Counts from February 2015 during a site visit by HDR biologists ranged from approximately 28 to 45 sea lions on the float (Figure 3-1; only part of float is shown). During this visit, age classes of sea lions included juveniles, subadults, and adults, including about five mature bulls. More than 100 sea lions were counted on the Dog Bay float at times in spring 2015, although the mean number was much smaller (Wynne 2015b).

Abundant and predictable sources of food for sea lions in the Kodiak area include fishing gear, fishing boats and tenders, and the many seafood processing facilities that accept transfers of fish from offloading vessels. Sea lions have become accustomed to depredating fishing gear and raiding fishing vessels during fishing and offloading (Figure 4-1), and they follow potential sources of food around the harbors and docks, waiting for opportunities to feed. When vessels are offloading fish at the docks of processing facilities, the sea lions rear out of the water to look over the gunnels for fish on the deck; if the vessel is a stern trawler, they charge up the stern ramp or codend to gain access to the deck (Speckman 2015; Ward 2015; Wynne 2015a). Sea lions have killed dogs and have dragged humans into the water (Wynne 2015a). There is some evidence that the mature bulls have developed the most aggressive behaviors (Wynne 2015a).

The number of sea lions in the immediate project area varies depending on the season and presence of commercial fishing vessels unloading their catch at the seafood processing plant dock immediately adjacent to Pier 1. During the February 2015 site visit by HDR biologists, from zero up to about 25 sea lions were seen at one time in the Pier 1 project area. About 22 of those sea lions were subadults that were clearly foraging on schooling fishes in the area and were not interacting with the fishing vessels offloading at the seafood processing plant at the time. The stern trawler offloading at the processing plant dock during this period was attended by three mature bull sea lions, which constantly swam back and forth behind the stern watching for an opportunity to gain access. This particular trawler had slid a vertical steel plate into position forward of the stern ramp, preventing sea lions from boarding the vessel.

At least four other seafood processing facilities are present in Kodiak and operate concurrently with the one located next to Pier 1. All are visited by sea lions looking for food, and all are successfully raided by sea lions with regularity (Wynne 2015a). Sea lions also follow and raid fishing vessels. The seafood processing facility adjacent to the Pier 1 project site is therefore not the only source of food for Kodiak sea lions that inhabit the harbor area. Furthermore, sea lions in a more "natural" situation do not generally eat every day, but tend to forage every 1–2 days and return to haulouts to rest between foraging trips (Merrick and Loughlin 1997; Rehburg et al. 2009). The foraging habits of sea lions using the Dog Bay float and Kodiak harbor area are not documented, but it is reasonable to assume that, given the abundance of readily available food, not every sea lion in the area visits the seafood processing plant adjacent to Pier 1 every day. Based on numbers at the Dog Bay float and sea lion behavior, it is estimated that about 40 unique individual sea lions likely pass by the project site each day (Speckman 2015; Ward 2015; Wynne 2015a). See Section 6.5.1 for a more detailed analysis.

The possibility exists that some of the sea lions frequenting the Kodiak harbor area are hearing-impaired or deaf (Wynne 2014). Sea lions can depredate fishing nets and gear, and the damage and lost income can be significant for fishermen. Fishermen have been known to protect their gear and catches by using "seal bombs" in an effort to disperse sea lions away from fishing gear. Sound levels produced by seal bombs are well above levels that are known to cause Temporary Threshold Shift (TTS, temporary loss of hearing) and Permanent Threshold Shift (PTS, partial or full loss of hearing) in marine mammals (Wynne 2014). The use of seal bombs requires appropriate permits from the Bureau of Alcohol, Tobacco, Firearms and Explosives. Seal bombs may be used as long as such use does not result in mortality or serious injury of a marine mammal; however, seal bombs should not be used on any ESA-listed species (Laws 2015). Although no studies have been published that document hearing-impaired sea lions in the area, this possibility is important to note as it pertains to mitigation measures that will be effective for this project.

Sea lions in the Kodiak harbor area are habituated to fishing vessels and are skilled at gaining access to fish (Figure 4-1). It is likely that some of the same animals follow local vessels to the nearby fishing grounds and back to town. It is also likely that hearing-impaired or deaf sea lions are among the sea lions that attend the seafood processing facility adjacent to the Pier 1 construction site. It is not known how a hearing-impaired or deaf sea lion would respond to typical mitigation efforts at a construction site such as ramping up of pile-driving equipment. It is also unknown whether a hearing-impaired or deaf sea lion would avoid pile-driving activity, or whether such an animal might approach closely, even within the Level A harassment zone, without responding to or being impacted by the noise level.

Figure 4-1. Steller sea lions on and near a commercial fishing vessel delivering catch to the seafood processing plant adjacent to Pier 1

4.1.3 Life History

Steller sea lions are opportunistic predators, feeding primarily on a wide variety of fishes and cephalopods including walleye pollock (*Theragra chalcogramma*), Atka mackerel (*Pleurogrammus monopterygius*), Pacific herring (*Clupea pallasi*), capelin (*Mallotus villosus*), Pacific sand lance (*Ammodytes hexapterus*), Pacific cod (*Gadus macrocephalus*), salmon (*Oncorhynchus* spp.), and squid (*Teuthida* spp.; Wynne et al. 2011; *as cited in* PND Engineers 2013).

About three-quarters of all Steller sea lions haul out on and pup in U.S. territory (Marine Mammal Commission 2000). Typically, females give birth to a single pup sometime between May and July (Wynne 2012). Females stay with their pups for about 1 week after birth. As the pups grow older, the females will stay with their pups during the day and forage at night. Mating occurs approximately 2 weeks after a female gives birth. Weaning occurs prior to the next year's breeding season (Loughlin 2009).

4.1.4 Acoustics

The hearing capability of Steller sea lions has been documented to be fairly similar to the hearing range of California sea lions, with slight variations in males and females (Kastelein et al. 2005; Mulsow and Reichmuth 2008). Figure 4-2 and Figure 4-3 display in-water and in-air audiograms for California sea lions (Nedwell et al. 2004). An audiogram shows the lowest level of sounds that the animal can hear (hearing threshold) at different frequencies (pitch). The y-axis of the audiogram is sound levels expressed in decibels (dB; either in-air or in-water) and

the x-axis is the frequency of the sound expressed in kilohertz (kHz). Kastelein et al. (2005) documented that the best hearing range for Steller sea lions was 1 to 16 kHz.

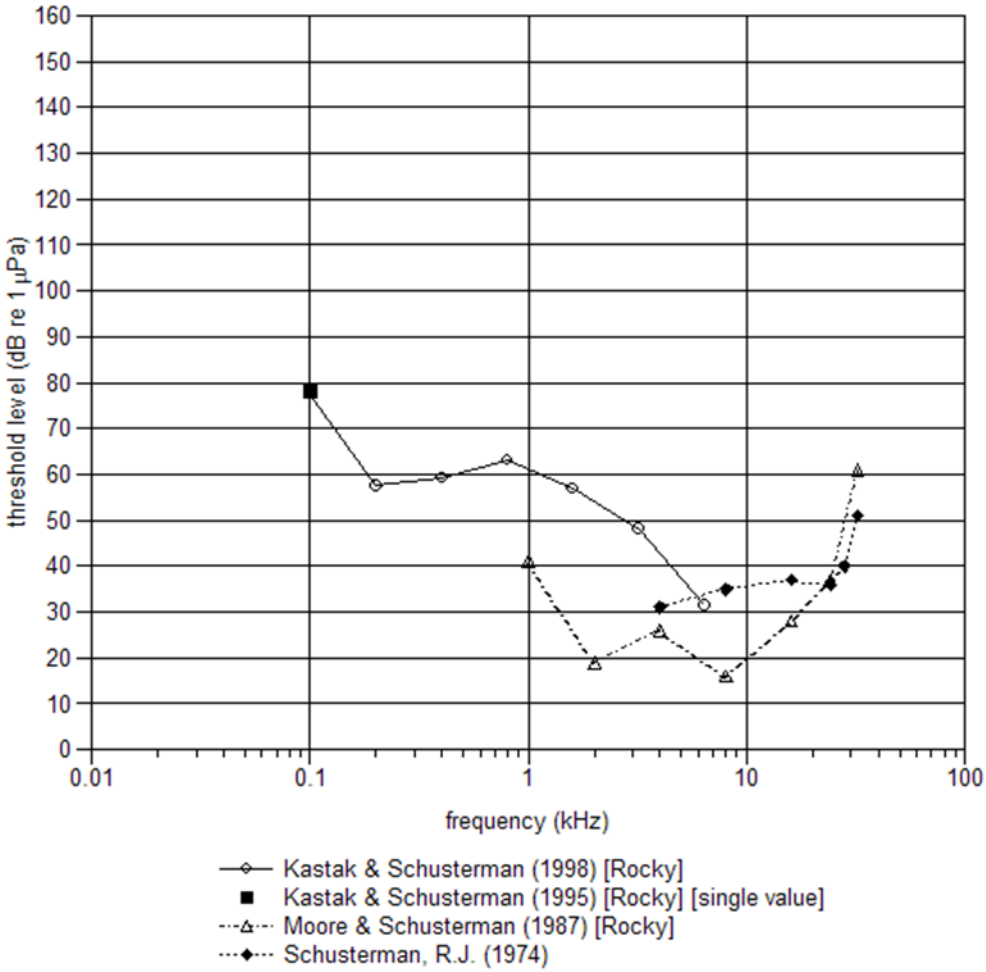

Figure 4-2. California sea lion in-air audiogram (taken from Nedwell et al. 2004)

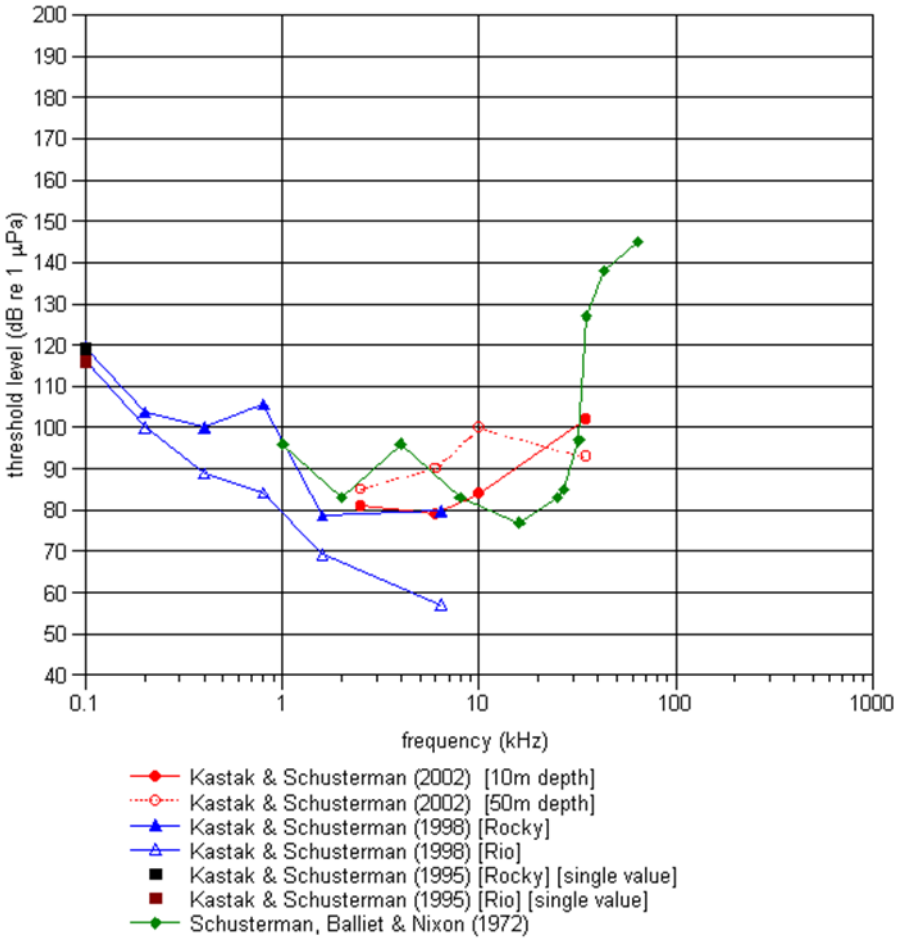

Figure 4-3. California sea lion in-water audiogram (taken from Nedwell et al. 2004)

4.2 Harbor Seal

4.2.1 Status and Distribution

Harbor seals range from Baja California north along the west coasts of Washington, Oregon, California, British Columbia, and Southeast Alaska; west through the Gulf of Alaska, Prince William Sound, and the Aleutian Islands; and north in the Bering Sea to Cape Newenham and the Pribilof Islands. Distribution of the South Kodiak stock extends from East Cape (northeast coast of Kodiak Island) south to South Cape (Chirikof Island), including Tugidak Island, and up the southwest coast of Kodiak Island to Middle Cape.

In 2010, harbor seals in Alaska were partitioned into 12 separate stocks based largely on genetic structure (Allen and Angliss 2010). Only the South Kodiak stock is considered in this application because other stocks occur outside the geographic area under consideration.

Harbor seals are listed neither as depleted under the MMPA nor as threatened or endangered under the ESA. The status of all 12 stocks of harbor seals identified in Alaska relative to their Optimum Sustainable Population size is unknown. The South Kodiak stock of harbor seals is not classified as strategic.

The current statewide abundance estimate for Alaskan harbor seals is 152,602, based on aerial survey data collected during 1998–2007 (Allen and Angliss 2010). The abundance estimate for the South Kodiak stock is 11,117, with a minimum estimate of 10,645 (Allen and Angliss 2010). Harbor seals have declined dramatically in some parts of their range over the past few decades, while in other parts their numbers have increased or remained stable over similar time periods.

A significant portion of the harbor seal population within the South Kodiak stock is located at and around Tugidak Island off the southwest of Kodiak Island. Sharp declines in the number of seals present on Tugidak were observed between 1976 and 1998. Although the number of seals on Tugidak Island has stabilized and shows some evidence of increase since the decline, the population in 2000 remained reduced by 80 percent compared to the levels in the 1970s (Jemison et al. 2006). The current population trend for this stock is unknown.

Harbor seals haul out on rocks, reefs, beaches, and drifting glacial ice (Allen and Angliss 2014). They are non-migratory; their local movements are associated with tides, weather, season, food availability, and reproduction, as well as sex and age class (Allen and Angliss 2014; Boveng et al. 2012; Lowry et al. 2001; Swain et al. 1996).

4.2.2 Presence in Project Area

Although the number of harbor seals on eastern Kodiak haulouts has been increasing steadily since the early 1990s (Kodiak Seafood and Marine Science Center 2015), sightings are rare in the project area. Several harbor seals tagged at Uganik Bay (Northwest Kodiak Island) dispersed as far north as Anchorage and as far south as Chignik, but none were found near Kodiak (Kodiak Seafood and Marine Science Center 2015). Harbor seals are expected to be encountered occasionally in the project area, although no data exist to quantify harbor seal attendance. For the purposes of this IHA application, we conservatively estimate an average of 1 harbor seal may visit the project area every 2 days.

4.2.3 Life History

Harbor seals forage on fish and invertebrates (Orr et al. 2004), including capelin, eulachon, cod, pollock, flatfish, shrimp, octopus, and squid (Wynne 2012). They are opportunistic feeders that forage in marine, estuarine, and, occasionally, freshwater habitat, adjusting their foraging behavior to take advantage of prey that is locally and seasonally abundant (Baird 2001; Bjørge 2002; *as cited in* Payne and Selzer 1989). Depending on prey availability, research has demonstrated that harbor seals conduct both shallow and deep dives during hunting (Tollit et al. 1997).

Harbor seals mate around the same time that the previous year's pups are weaned. The gestation period is approximately 10.5 months. Pups are born in Alaska over a 10-week period between May and July. Pups nurse for about 4 weeks and begin to catch solid foods toward the end of the nursing period (Burns 2009).

4.2.4 Acoustics

Harbor seals respond to underwater sounds from approximately 1 to 180 kHz, with the functional high-frequency limit around 60 kHz and peak sensitivity at about 32 kHz (Kastak and Schusterman 1995). Hearing ability in the air is greatly reduced (by 25 to 30 dB); harbor seals respond to sounds from 1 to 22.5 kHz, with a peak sensitivity of 12 kHz (Kastak and Schusterman 1995). Figure 4-4 is an in-air audiogram and Figure 4-5 is an in-water audiogram for the harbor seal (taken from Nedwell et al. 2004).

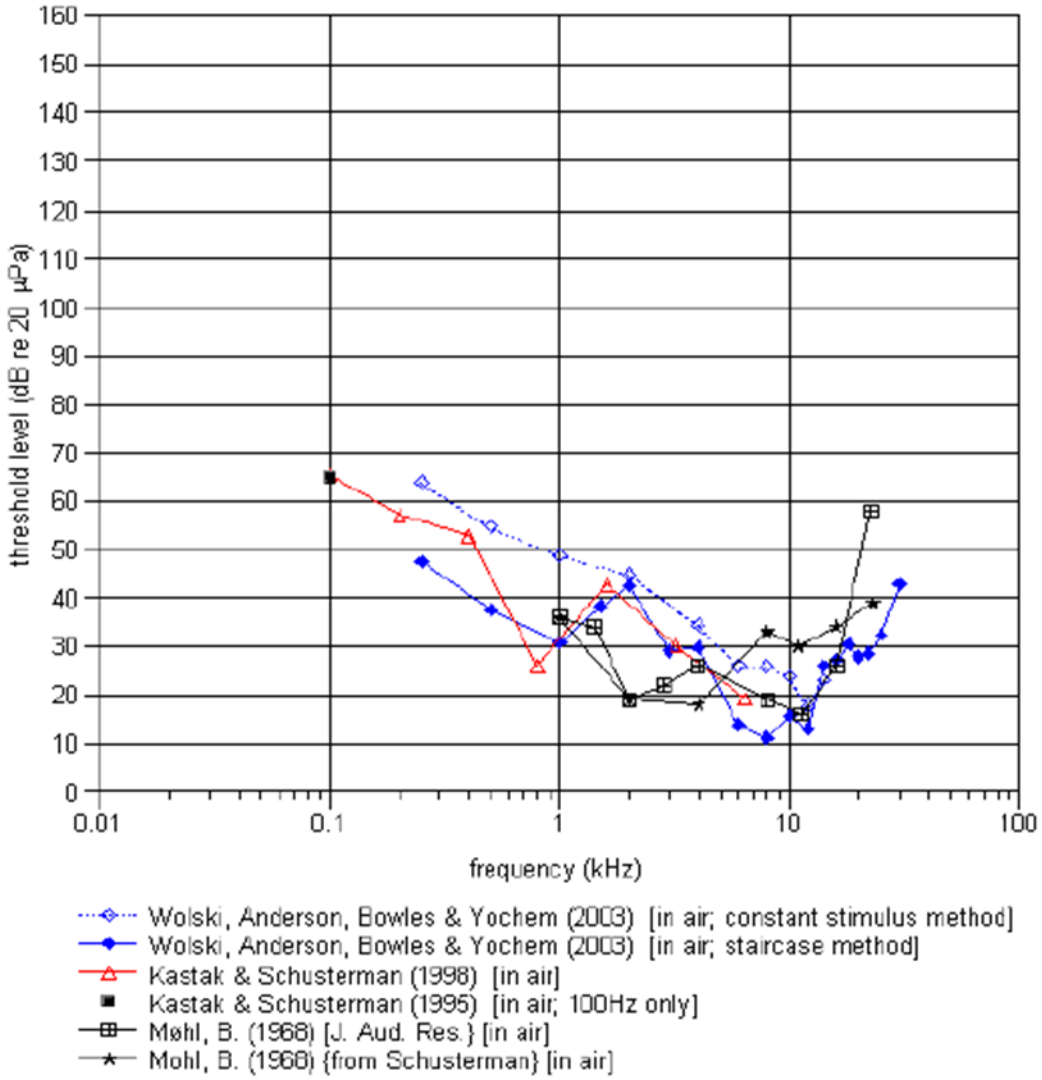

Figure 4-4. Harbor seal in-air audiogram (taken from Nedwell et al. 2004)

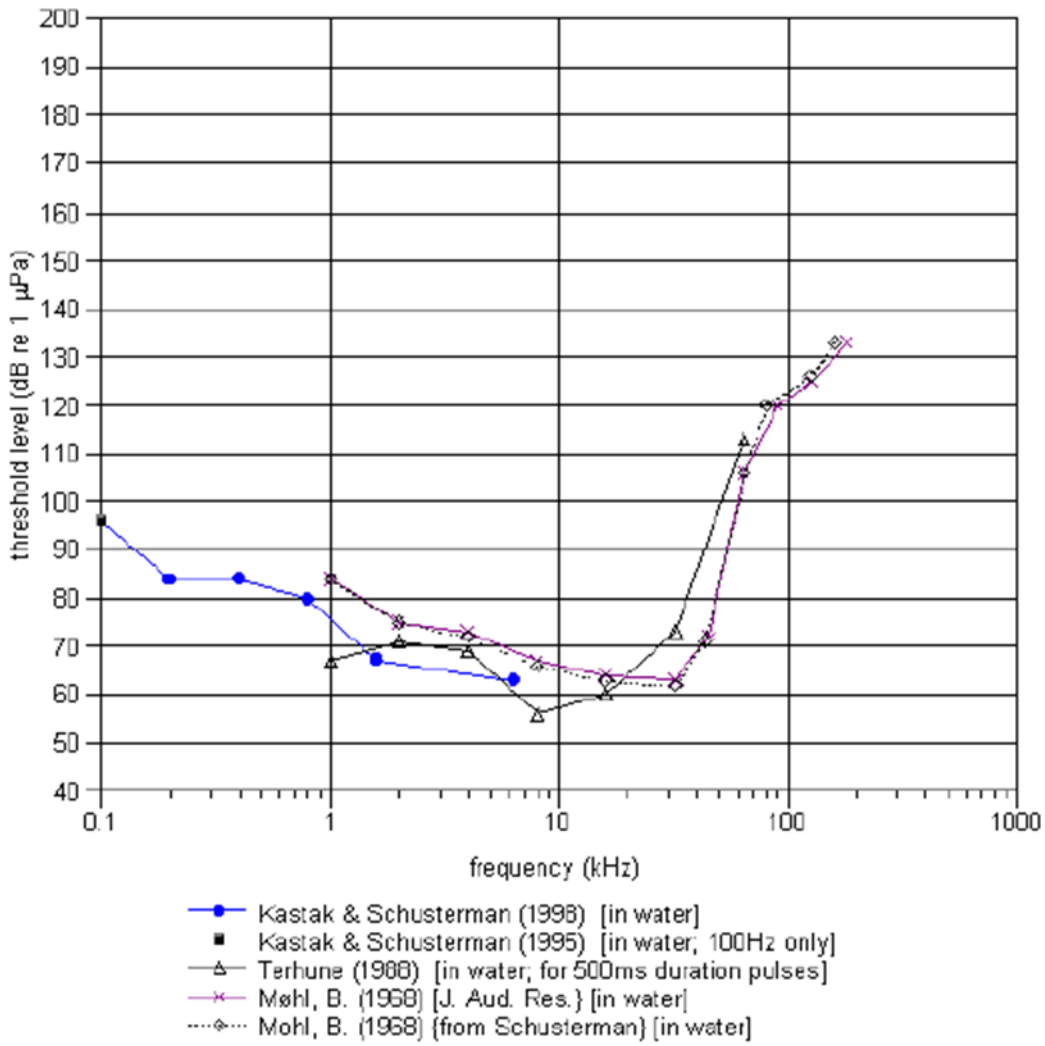

Figure 4-5. Harbor seal in-water audiogram (taken from Nedwell et al. 2004)

4.3 Harbor Porpoise

4.3.1 Status and Distribution

In the eastern North Pacific Ocean, the harbor porpoise ranges from Point Barrow, along the Alaska coast, and down the west coast of North America to Point Conception, California. Harbor porpoises frequent primarily coastal waters in the Gulf of Alaska and Southeast Alaska (Dahlheim et al. 2000), and occur most frequently in waters less than 100 meters (328 feet) deep (Hobbs and Waite 2010). The Gulf of Alaska stock ranges from Cape Suckling to Unimak Pass.

In Alaska, harbor porpoises are currently divided into three stocks, based primarily on geography: the Bering Sea stock, the Southeast Alaska stock, and the Gulf of Alaska stock. In areas outside of Alaska, studies have shown that stock structure is more finely scaled than is reflected in the Alaska Stock Assessment Reports. However, no data are yet available to define stock structure for harbor porpoises on a finer scale in Alaska (Allen and Angliss 2014). Only

the Gulf of Alaska stock is considered in this application because the other stocks occur outside the geographic area under consideration.

Harbor porpoises are neither designated as depleted under the MMPA nor listed as threatened or endangered under the ESA. Because the most recent abundance estimate is 14 years old and information on incidental harbor porpoise mortality in commercial fisheries is not well understood, the Gulf of Alaska stock of harbor porpoise is classified as strategic. Population trends and status of this stock relative to optimum sustainable population size are currently unknown.

The Gulf of Alaska stock is currently estimated at 31,046 individuals, with a minimum population estimate of 25,987 (Allen and Angliss 2013). No reliable information is available to determine trends in abundance.

4.3.2 Presence in Project Area

Harbor porpoises commonly frequent nearshore waters, but are rarely if ever noted in the Kodiak channel (K. Wynne, pers. comm.). Harbor porpoises are expected to be encountered rarely in the project area, although no data exist to quantify harbor porpoise attendance. For the purposes of this IHA application, we conservatively estimate an average of 1 harbor porpoise may visit the project area every 2 days.

4.3.3 Life History

Harbor porpoises forage in waters less than 200 meters (656 feet) to bottom depth on small pelagic schooling fish such as herring, cod, pollock, octopus, smelt, and bottom-dwelling fish, occasionally feeding on squid and crustaceans (Bjørge and Tolley 2009; Wynne et al. 2011).

Calving occurs from May to August; however, this can vary by region. Harbor porpoises mate approximately 1.5 months after calving, with a gestation period of 10.5 months. Calves begin to forage on solid food within a few months of birth and are weaned before they are a year old (Bjørge and Tolley 2009).

4.3.4 Acoustics

The harbor porpoise has the highest upper-frequency limit of all odontocetes investigated. Kastelein et al. (2002) found that the range of best hearing was from 16 to 140 kHz, with a reduced sensitivity around 64 kHz. Maximum sensitivity (about 33 decibels referenced to 1 micropascal (dB re 1 µPa) occurred between 100 and 140 kHz. This maximum sensitivity range corresponds with the peak frequency of echolocation pulses produced by harbor porpoises (120–130 kHz). Figure 4-6 is an audiogram for the harbor porpoise (taken from Nedwell et al. 2004).

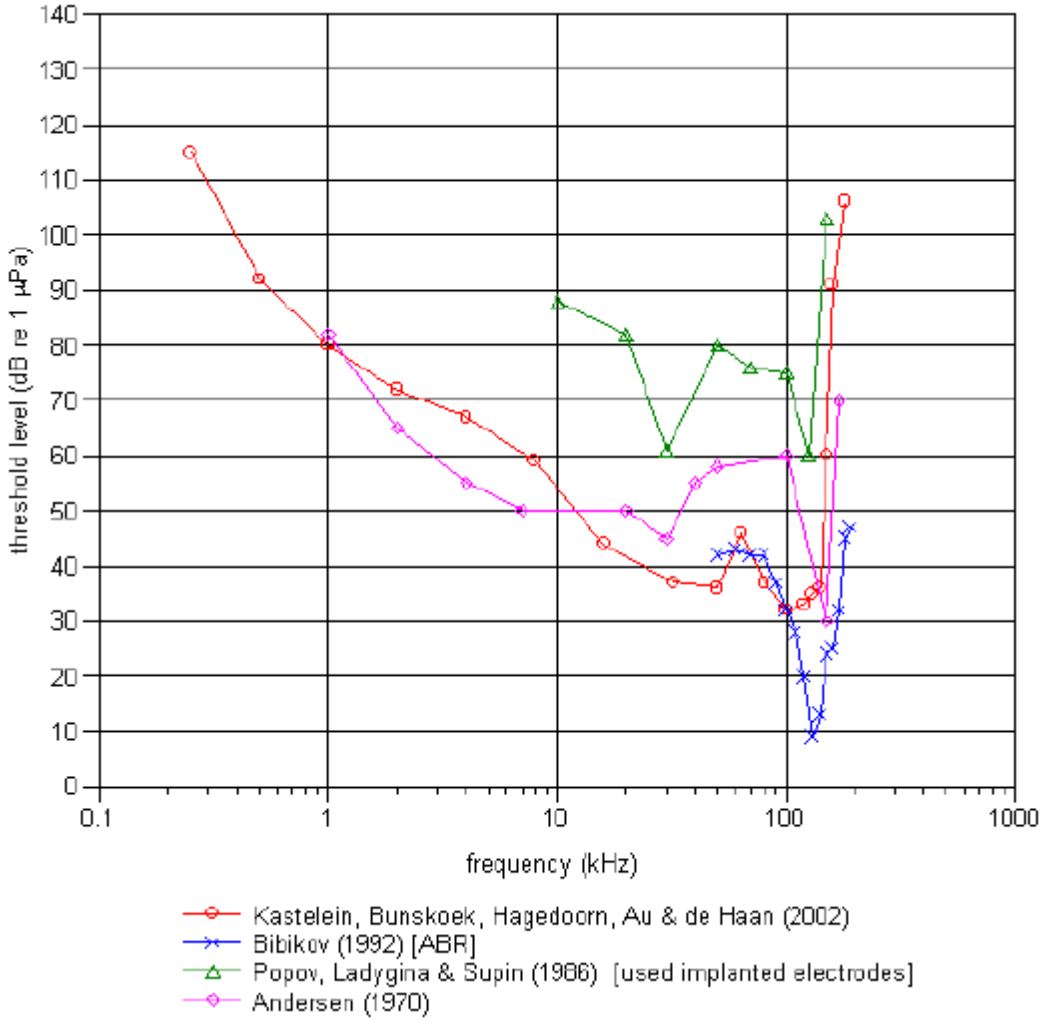

Figure 4-6. Harbor porpoise in-water audiogram (taken from Nedwell et al. 2004)

4.4 Killer Whale

4.4.1 Status and Distribution

Killer whales have been observed in all oceans and seas of the world, but the highest densities occur in colder and more productive waters found at high latitudes (NOAA 2015). Killer whales are found throughout the North Pacific, and occur along the entire Alaska coast, in British Columbia and Washington inland waterways, and along the outer coasts of Washington, Oregon, and California (NOAA 2015).

Based on data regarding association patterns, acoustics, movements, and genetic differences, eight killer whale stocks are now recognized within the Pacific U.S. Exclusive Economic Zone, seven of which occur in Alaska: (1) the Alaska Resident stock; (2) the Northern Resident stock; (3) the Southern Resident stock; (4) the Gulf of Alaska, Aleutian Islands, and Bering Sea Transient stock; (5) the AT1 Transient stock; (6) the West Coast transient stock, occurring from California through southeastern Alaska; and (7) the Offshore stock. Only the Alaska Resident stock and the Gulf of Alaska, Aleutian Islands, and Bering Sea Transient stock are considered in this application because other stocks occur outside the geographic area under consideration.

Neither the Alaska Resident stock nor the Gulf of Alaska, Aleutian Islands, and Bering Sea Transient stock of killer whales is designated as depleted under the MMPA or listed as threatened or endangered under the ESA. Neither stock is classified as strategic.

The Alaska Resident stock occurs from southeastern Alaska to the Aleutian Islands and Bering Sea. Although the Gulf of Alaska, Aleutian Islands, and Bering Sea Transient stock occupies a range that includes all of the U.S. Exclusive Economic Zone in Alaska, few individuals have been seen in southeastern Alaska. The transient stock occurs primarily from Prince William Sound through the Aleutian Islands and Bering Sea.

The Alaska Resident stock of killer whales is currently estimated at 2,347 individuals, and the estimate of the Gulf of Alaska, Aleutian Islands, and Bering Sea Transient stock is 587 individuals (Allen and Angliss 2013). The Gulf of Alaska component of the transient stock is estimated to include 136 of the 587 individuals. The abundance estimate for the Alaska Resident stock is likely underestimated because researchers continue to encounter new whales in the Gulf of Alaska and western Alaskan waters. At present, reliable data on trends in population abundance for both stocks are unavailable.

4.4.2 Presence in Project Area

Transient killer whales are seen periodically in waters of Kodiak Harbor, with photo-documentation since at least 1993 (Kodiak Seafood and Marine Science Center 2015). One pod known to visit Kodiak Harbor includes an adult female and adult male that have distinctive dorsal fins that make repeated recognition possible. This, as well as their easy visibility from shore, has led to their "popularity" in Kodiak, where their presence is often announced on public radio. They have been repeatedly observed and photographed attacking Steller sea lions.

The Kodiak killer whales appear to specialize in preying on Steller sea lions commonly found near Kodiak's processing plants, fishing vessels, and docks. This pod kills and consumes at least four to six Steller sea lions per year from the Kodiak harbor area, primarily from February through May (Kodiak Seafood and Marine Science Center 2015, Wynne 2015b).

Resident killer whales are rarely sighted in the project area and are expected to be encountered only rarely. Transient killer whales are expected to be encountered in the project area occasionally, although no data exist to quantify killer whale attendance. For the purposes of this IHA application and based on the known range and behavior of the Alaska Resident stock and the Gulf of Alaska, Aleutian Islands, and Bering Sea Transient stocks, it is reasonable to estimate that 6 individual whales (a small pod) may enter the project area twice a month from February through May.

4.4.3 Life History

Distinct ecotypes of killer whales include transients that hunt and feed primarily on marine mammals and residents that forage primarily on fish. Transient killer whales feed primarily on harbor seals, Dall's porpoises, harbor porpoises, and sea lions. Resident killer whale populations in the eastern North Pacific feed mainly on salmonids, showing a strong preference for Chinook salmon (NOAA 2015).

Transient type whales are often found in long-term stable social units (pods) of fewer than 10 whales, smaller than resident social groups. Resident-type killer whales occur in larger pods of whales that are seen in association with one another more than 50 percent of the time (NOAA 2015). The pods represent collections of matrilines, their fundamental social unit.

Killer whales of different populations have distinct calls and whistles. In resident killer whales of the eastern North Pacific, each pod possesses a unique repertoire of discrete calls that are learned and culturally transmitted among individuals. These calls are used to maintain group cohesion.

4.4.4 Acoustics

The hearing of killer whales is well developed. Szymanski et al. (1999) found that they responded to tones between 1 and 120 kHz, with the most sensitive range between 18 and 42 kHz. Their greatest sensitivity was at 20 kHz, which is lower than many other odontocetes, but it matches peak spectral energy reported for killer whale echolocation clicks. Figure 4-7 is an audiogram for the killer whale (taken from Nedwell et al. 2004).

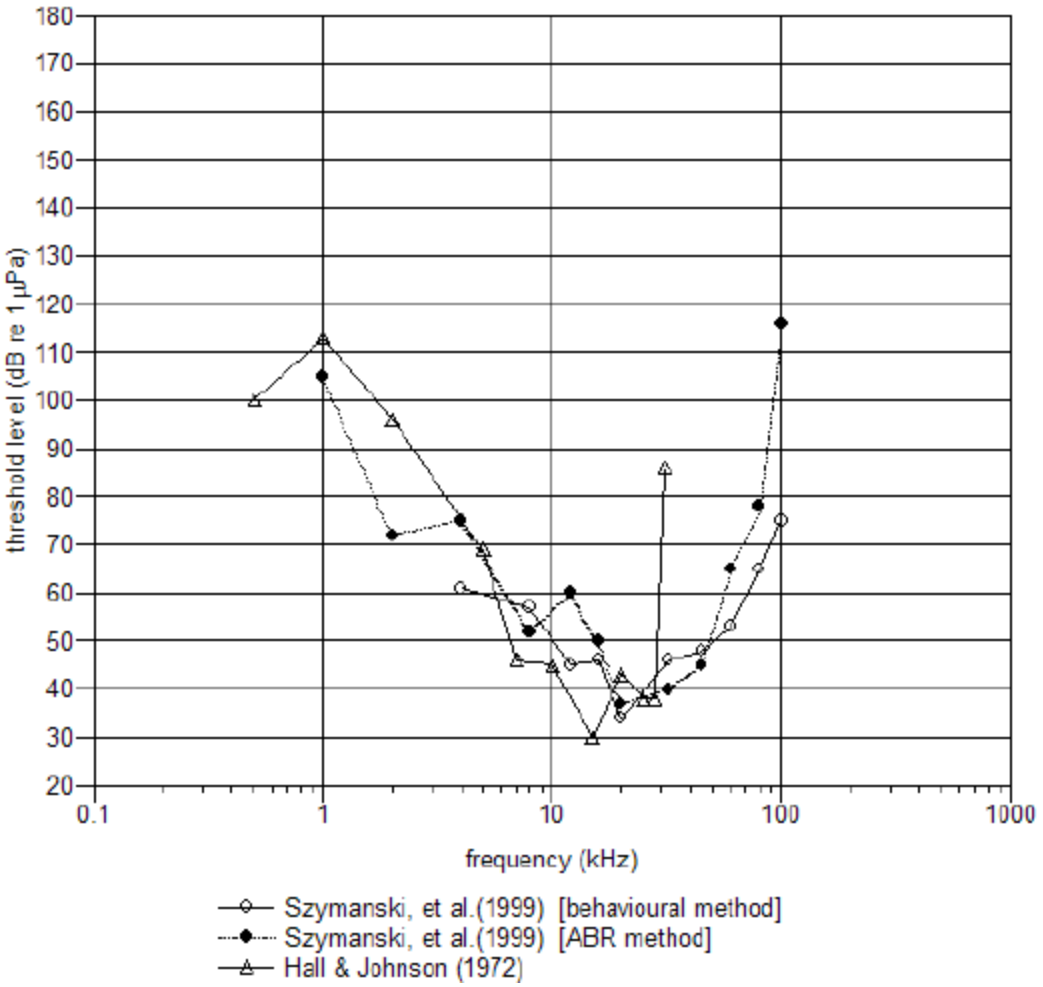

Figure 4-7. Killer whale in-water audiogram (taken from Nedwell et al. 2004)

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5 TYPE OF INCIDENTAL TAKE AUTHORIZATION REQUESTED

5.1 Incidental Harassment Authorization

Under Section 101(a)(5)(D) of the MMPA, the DOT&PF requests an IHA for the take of small numbers of marine mammals by Level B behavioral harassment, and a very small number of Steller sea lions from the wDPS by Level A harassment, incidental to reconstruction of the ferry terminal at Pier 1 in Kodiak, Alaska. The DOT&PF requests an IHA for incidental take of marine mammals described within this application for 1 year, commencing on 30 September 2015 (or the issuance date, whichever is later). The DOT&PF is not requesting an LOA at this time because the activities described herein are expected to be completed within 1 year from the date of authorization, and are not expected to rise to the level of serious injury or mortality, which would require an LOA.

5.2 Take Authorization Request

The DOT&PF requests the issuance of an IHA from 30 September 2015 through 29 September 2016 for Level B take (behavioral harassment) of Steller sea lions from the wDPS, harbor seals, harbor porpoises, and transient killer whales, and for a small number of Level A takes (potential injury harassment) of Steller sea lions from the wDPS that may occur during the reconstruction of the ferry terminal dock at Pier 1 in Kodiak, Alaska.

The methodology described in Section 6 estimates potential noise exposures of marine mammals resulting from pile extraction and pile driving in the marine environment. Results from this approach tend to provide an overestimation of exposures because all animals are assumed to be available to exposure when piles are being extracted or driven, and the formulas used to estimate transmission loss use idealized parameters, which are unrealistic in nature. Additionally, this approach assumes that all exposed individuals are “taken,” contributing to an overestimation of “take.”

The analysis for the Kodiak Pier 1 ferry terminal upgrade predicts 3,388 potential exposures (see Section 6 for estimates of exposures by species) to pile extraction and vibratory hammer, down-hole drill, and impact hammer pile driving over the course of the project that could be classified as Level B harassment as defined under the MMPA. An additional 30 potential exposures of Steller sea lions that could be classified as Level A harassment are also requested. The DOT&PF’s mitigation measures for the project, described in Section 11, include monitoring of mitigation zones prior to the initiation of pile driving, “soft starts” or ramp-up procedures designed to allow marine mammals to leave the project area before noise levels reach the threshold for harassment, the use of pile caps when using impact hammers, and sequencing work when possible to drive the piles nearest the seafood processing plant when the plant is less busy or not operating. The plant is generally less busy after 15 November and shuts down for a few weeks in late December and early January. These mitigation measures decrease the likelihood that marine mammals will be exposed to sound pressure levels that would cause Level B and Level A harassment, although the amount of that decrease cannot be quantified.

The DOT&PF does not expect that 3,388 Level B harassment incidents and 30 Level A harassment incidents will result from project activities. However, to allow for uncertainty regarding the exact mechanisms of the physical and behavioral effects, and as a conservative approach, the DOT&PF is requesting authorization for Level B harassment of 3,388 marine mammals and for Level A harassment of 30 Steller sea lions over the course of 1 year in this IHA application. As described in Section 6.5.1, most incidents are expected to result from repeated exposures of a small number of individuals.

5.3 Method of Incidental Taking

Pile extraction and installation activities as outlined in Section 1 and Section 2 have the potential to disturb or displace small numbers of marine mammals. Specifically, the proposed activities may result in take in the form of Level B or Level A harassment from underwater sounds generated from vibratory pile driving/extraction, down-hole drilling and impact hammering of piles, and impact hammering to proof piles. See Section 11 for more details on the impact reduction and mitigation measures proposed.

Detectable effects of the project on Steller sea lion habitat are not expected (see Section 9). Indirect effects to prey would be insignificant and discountable due to recolonization and the temporary nature of the activity, and are expected to be undetectable as well. The proposed project is not expected to lead to any increases in ferry or other marine vessel traffic in the region; therefore, ship strikes were not evaluated.

6 TAKE ESTIMATES FOR MARINE MAMMALS

The NMFS application for IHAs requires applicants to determine the number of marine mammals that are expected to be incidentally harassed by an action and the nature of the harassment (Level A or Level B). Project construction activities as outlined in Sections 1 and 2 have the potential to take marine mammals, primarily through in-water pile extraction using a vibratory hammer and vibratory and impact hammer installation of permanent piles. As further described in Section 6.3.1, noise generated by the down-hole drill may also reach levels that result in take as defined under the MMPA. Other activities are not expected to result in take as defined under the MMPA. In-water pile extraction and installation activities will temporarily increase the local underwater and airborne noise environment in the vicinity of Pier 1. Research suggests that increased noise may impact marine mammals in several ways and depends on many factors (see Section 7).

6.1 Airborne and Underwater Sound Descriptors

Sound is a physical phenomenon consisting of minute vibrations that travel through a medium, such as air or water. Sound is generally characterized by several variables, including frequency and intensity. Frequency describes the sound's pitch and is measured in Hertz (Hz), while intensity describes the sound's loudness and is measured in decibels. Decibels are measured using a logarithmic scale.

The method commonly used to quantify airborne sounds consists of evaluating all frequencies of a sound according to a weighting system reflecting that human hearing is less sensitive at low frequencies and extremely high frequencies than at the mid-range frequencies. This is called A-weighting, and the decibel level measured is called the A-weighted sound level (dBA). A filtering method to reflect the hearing of marine mammals such as whales has not been developed for regulatory purposes. Therefore, sound levels underwater are not weighted and measure the entire frequency range of interest. In the case of marine construction work, the frequency range of interest is 10 to 10,000 Hz.

Underwater sounds are described by a number of terms that are commonly used and specific to this field of study (Table 6-1). Two common descriptors are the instantaneous peak sound pressure level (SPL) and the root-mean-square SPL (dB rms) during the pulse or over a defined averaging period. The peak sound pressure is the instantaneous maximum or minimum overpressure observed during each pulse or sound event and is presented in Pascals (Pa) or dB referenced to a pressure of one microPascal (dB re 1 µPa). The rms level is the square root of the energy divided by a defined time period. All sound levels throughout this report are presented in dB re 1 µPa.

Table 6-1. Definitions of some common acoustical terms

Term	Definition
Decibel, dB	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure. The reference pressure for water is 1 microPascal (µPa) and for air is 20 µPa (approximate threshold of human audibility).
Sound Pressure Level, SPL	Sound pressure is the force per unit area, usually expressed in microPascals (or 20 microNewtons per square meter [m^2]), where 1 Pascal is the pressure resulting from a force of 1 Newton exerted over an area of 1 m^2. The sound pressure level is expressed in decibels as 20 times the logarithm to the base 10 of the ratio between the pressure exerted by the sound to a reference sound pressure. Sound pressure level is the quantity that is directly measured by a sound level meter.
Frequency, Hz	Frequency is expressed in terms of oscillations, or cycles, per second. Cycles per second are commonly referred to as Hertz (Hz). Typical human hearing ranges from 20 Hz to 20,000 Hz.
Peak Sound Pressure (unweighted), dB re 1 µPa	Peak sound pressure level is based on the largest absolute value of the instantaneous sound pressure over the frequency range from 20 Hz to 20,000 Hz. This pressure is expressed in this report as dB re 1 µPa.
Root-Mean-Square (rms), dB re 1 µPa	The rms level is the square root of the energy divided by a defined time period. For pulses, the rms has been defined as the average of the squared pressures over the time that comprises that portion of waveform containing 90 percent of the sound energy for one impact pile-driving impulse.
Ambient Noise Level	The background sound level, which is a composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.

Transmission loss (TL) underwater is the decrease in acoustic intensity as an acoustic pressure wave propagates out from a source. TL parameters vary with frequency, temperature, sea conditions, current, source and receiver depth, water chemistry, water depth, bottom composition and topography, and any underwater objects in the area.

Spreading loss is typically between 10 dB (cylindrical spreading) and 20 dB (spherical spreading), typically referred to as 10 log and 20 log, respectively. Cylindrical spreading occurs when sound energy spreads outward in a cylindrical fashion bounded by the bottom sediment and water surface, such as shallow water, resulting in a 3-dB reduction per doubling of distance. Spherical spreading occurs when the source encounters little to no refraction or reflection from boundaries (e.g., bottom, surface), such as in deep water, resulting in a 6-dB reduction per doubling of distance.

6.2 Applicable Noise Criteria

NMFS recently published draft updated acoustic threshold levels that identify the received levels, or thresholds, above which individual marine mammals are predicted to experience changes in their hearing sensitivity (either temporary or permanent) for all underwater anthropogenic sound sources (NOAA 2013). As these are still just draft guidelines, this application uses the currently applicable NMFS "do-not-exceed" criteria for exposure of marine mammals to various underwater sound sources (Table 6-2):

- **Level A Harassment: injury by impulse** (e.g., impact pile driving, down-hole drilling) **and continuous** (i.e., vibratory pile driving) **sounds**: NMFS has a "do-not-exceed" exposure criterion set at an SPL value of 180 dB re 1 µPa rms for cetaceans and 190 dB re 1 µPa rms for pinnipeds.
- **Level B Harassment: harassment by impulse sounds**: (e.g., impact pile driving, down-hole drilling) is set at an SPL value of 160 dB re 1 µPa rms.
- **Level B Harassment: harassment by non-pulsed/continuous noise**: (e.g., vibratory pile driving) is set at an SPL value of 120 dB re 1 µPa rms.

Level A harassment is defined as "Any act of pursuit, torment, or annoyance which has the potential to injure a marine mammal or marine mammal stock in the wild." Level B harassment is defined as "Any act of pursuit, torment, or annoyance which has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including but not limited to migration, breathing, nursing, breeding, feeding or sheltering."

Table 6-2. Summary of underwater acoustic criteria for exposure of marine mammals to noise from continuous and pulsed sound sources

Species	Underwater Noise Thresholds (dB re 1µPa)			
	Vibratory Pile-Driving Disturbance Threshold	Impact Pile-Driving Disturbance Threshold	Injury Threshold	Frequency Range
Cetaceans	120 dB rms	160 dB rms	180 dB rms	7 Hz to 20 kHz (Low) 150 Hz to 20 kHz (Mid) 200 Hz to 20 kHz (High)
Pinnipeds	120 dB rms	160 dB rms	190 dB rms	75 Hz to 20 kHz

Although NMFS's current underwater acoustic criteria provide the framework for noise-impact assessment under the MMPA, to date, no research supports the contention that pinnipeds or odontocetes respond significantly to continuous sounds from vibratory pile driving as low as the 120-dB threshold. For example, Southall et al. (2007) reviewed studies that documented behavioral responses of harbor seals to continuous sounds under various conditions. They concluded that those studies, though limited, suggest that exposures between 90 dB and 140 dB re 1 µPa rms generally do not appear to elicit responses that result in significant changes to essential behaviors (e.g., foraging, resting, and migration).

For airborne sound exposure of hauled-out pinnipeds, NMFS uses "do-not-exceed" criteria for Level B harassment of 90 dB re 20 µPa for harbor seals and 100 dB re 20 µPa for all other pinnipeds, including Steller sea lions. These criteria do not differentiate among sound types.

6.3 Description of Noise Sources

For the purposes of this IHA application, the sound field in the project area is the existing ambient noise plus additional construction noise from the proposed project. The primary component of the project expected to affect marine mammals is the sound generated by vibratory hammering and down-hole drilling, with impact hammering adding a minor component. Direct pull and clamshell removal of old timber piles do not produce noise levels expected to impact marine mammals, although, depending on conditions, these may require vibratory hammer removal. Vibratory hammers produce constant sound when operating, and produce vibrations that liquefy the sediment surrounding the pile, allowing it to penetrate to the required seating depth or to be removed.

After vibratory hammering has installed the pile through the overburden to the top of the bedrock layer, the vibratory hammer will be removed, and the down-hole drill will be inserted through the pile. The head extends below the pile and the drill rotates through soils and rock. The drilling/hammering takes place below the sediment layer and, as the drill advances, below the bedrock layer as well. Underwater noise levels are relatively low because the impact is taking place below the substrate rather than at the top of the piling, which limits transmission of noise through the water column. Additionally, there is a drive shoe welded on the bottom of the pile and the upper portion of the bit rests on the shoe, which aids in advancement of the pile as drilling progresses. When the proper depth is achieved, the drill is retracted and the pile is left in place. Down-hole drilling is considered a pulsed noise due to periodic impacts from the drill below ground level (PND Engineers 2013).

An impact hammer is a steel device that works like a piston, producing a series of independent strikes to drive the pile. Impact hammering typically generates the loudest noise associated with pile driving, but for the Pier 1 project, use will be limited to a few blows per permanent 24-inch pile.

Several factors are expected to minimize the potential impacts of pile-driving and drilling noise associated with the project:

- The soft sediment marine seafloor and shallow waters in the proposed project area
- Land forms across the channel that will block the noise from spreading
- The relatively high background noise level in the project area

Sound will dissipate relatively rapidly in the shallow waters over soft seafloors in the project area (NMFS 2013). St. Herman Harbor (Figure 1-2), where the Dog Bay float is located, is protected from the Pier 1 construction noise by land projections and islands, which will block and redirect sound. Near Island and Kodiak Island, on either side of Near Island Channel, prevent the sound from travelling underwater to the north, south, and southeast, restricting the noise to the channel itself.

6.3.1 Underwater Noise Levels

The project includes direct pulling and possibly vibratory removal of 13-inch timber and 16-inch steel piles, vibratory installation and removal of temporary steel pipe or H-piles, vibratory installation and down-hole drilling of permanent 24-inch steel pipe piles, and vibratory

installation of 18-inch steel pipe piles and 16-inch timber piles (16 inches is the typical butt/top dimension, and these are typically around 12-inches in diameter at the pile tip/bottom). Each 24-inch pile will also be subject to a few blows from an impact hammer for proofing. No data are available for vibratory removal of piles, so it will be conservatively assumed that vibratory removal of piles will produce the same source level as vibratory installation.

Vibratory extraction and installation of timber piles will be estimated to generate 152 dB rms at 16 meters (Laughlin 2011; Table 6-3). Vibratory extraction of 16-inch steel piles will be conservatively estimated to generate the same sound as installation of 24-inch piles (162 dB rms at 10 meters; Table 6-3).

Little information is available for sound generated during vibratory installation or removal of steel H-piles; however, ICF Jones & Stokes and Illingworth & Rodkin, Inc. (2009) reported that the typical noise level during vibratory hammering was 147 dB rms at 10 meters for 10-inch steel H-piles and 150 dB rms at 10 meters for 12-inch steel H-piles. Vibratory installation and removal of temporary steel pipe or H-piles will therefore be estimated to generate 150 dB rms at 10 meters (Table 6-3).

Vibratory installation of a 24-inch steel pile generated 162 dB rms measured at 10 meters (Laughlin 2010a). Vibratory installation of 12-inch and 36-inch steel piles generated 150 and 170 dB rms at 10 meters, respectively (Maine Department of Transportation and Eastport Port Authority 2014), further supporting the intermediate estimate of 162 dB rms for driving 24-inch steel piles (Table 6-3).

Vibratory installation of 18-inch steel piles will be conservatively estimated to generate the same sound as driving of 24-inch piles (162 dB rms at 10 meters). No data are available for the vibratory installation of 12-inch timber piles; therefore, vibratory installation of 12-inch timber piles will also be conservatively estimated to generate the same sound level as installation of 24-inch steel piles (Table 6-3).

Dazey et al. (2012) measured sound levels generated by down-hole drilling and found the average calculated source SPL to be 133 dB rms. URS (2011) reported that down-hole drilling methods generate pulses with a maximum sound source level of 165 dB (re 1 µPa at 1 meter) at 200 Hz. The 160-dB isopleth (Level B harassment for pulsed noise sources) for a down-hole drill was estimated to be 3 meters during a project in Australia that included installation of piles (URS 2011). Down-hole drilling will therefore be estimated to generate 160 dB rms at 3 meters (Table 6-3).

Impact driving of 24-inch steel piles is commonly assumed to generate 189 dB rms measured at 10 meters (WSDOT 2010). Laughlin (2006) reported that use of Micarta caps resulted in 7- to 8-dB reductions in sound level. A conservative reduction of 6 dB therefore yields an estimate of 183 dB rms at 10 meters if pile caps are used (Table 6-3).

Table 6-3. Conservative estimates for underwater sound levels (decibels) generated during pile extraction and installation

Method, pile type	Sound Level		
	Peak	rms[a]	SEL
Vibratory Hammer			
Timber pile extraction	--	152 (16 meters)	--
Steel pile extraction		162	
Temporary steel pipe or H-piles	--	150	--
24-inch steel piles	190	162	170
18-inch steel piles	190	162	170
16-inch timber piles	190	162	170
Down-hole Drill			
24-inch steel piles	--	160 (3 meters)	--
Impact Hammer			
24-inch steel piles			
Without caps	212	189	181
With caps	--	183	--

[a] Distance from the noise source is 10 meters unless otherwise specified.
Note: SEL = sound exposure level.

6.3.2 Airborne Noise Levels

Pinnipeds can be affected by in-air noise when they are hauled out. Loud noises can cause hauled-out pinnipeds to panic back into the water, leading to disturbance and possible injury. As previously described, the project includes direct pulling and possibly vibratory removal of 13-inch timber and 16-inch steel piles, vibratory driving and removal of temporary steel pipe or H-piles, vibratory driving and down-hole drilling to install permanent 24-inch hollow steel piles, and vibratory driving of 18-inch steel and 12- to 16-inch timber piles. Each 24-inch-diameter permanent pile will also be subject to a few blows from an impact hammer for proofing.

No in-air data are available for vibratory removal or installation of piles, so it is conservatively assumed that vibratory removal of piles will produce the same source level as vibratory installation. Vibratory extraction of 13-inch timber and 16-inch steel piles will therefore be estimated to generate the same sound as installation of 18-inch steel piles as described below (87.5 dB rms at 15 meters; Table 6-4).

No unweighted in-air data are available for vibratory installation of steel H-piles; therefore, vibratory driving of the temporary steel pipe or H-piles will be conservatively estimated to generate the same sound as installation of 18-inch steel piles as described below (87.5 dB rms at 15 meters; Table 6-4). Similarly, no unweighted in-air data are available for vibratory installation of 24-inch steel piles; however, in-air measurements during vibratory installation of 30-inch steel piles averaged 96.5 dB rms at 15 meters (Laughlin 2010b). Vibratory installation of 24-inch steel piles will therefore be conservatively estimated to generate 96.5 dB rms at 15 meters (Table 6-4).

In-air measurement during vibratory installation of an 18-inch steel pile was 87.5 dB rms at 15 meters (Laughlin 2010b). No unweighted in-air data are available for vibratory installation of 12-

inch timber piles; therefore, vibratory installation of 12-inch timber piles will be conservatively estimated to generate the same sound as installation of 18-inch steel piles (Table 6-4).

No unweighted in-air data are available for down-hole drilling to secure 24-inch piles into bedrock. Sound will be substantially muted because the drill will be located within and below the pile shaft and drilling/hammering will begin at least 10–30 feet below the marine floor. Airborne sound will be conservatively estimated to be the same as from impact hammering (98 dB rms at 15 meters; Table 6-4).

Magnoni et al. (2014) found that unweighted in-air measurements during impact installation of 24-inch steel piles ranged from 97 to 98 dB rms at 15 meters. The source level for impact driving 24-inch steel piles is therefore assumed to be 98 dB rms at 15 meters (Table 6-4).

Table 6-4. Conservative estimates for airborne sound levels (decibels) that would be generated during pile extraction and driving

Method, pile type		Sound level		
		Peak	rms[a]	SEL
Vibratory Hammer				
	Timber pile extraction	--	87.5	--
	Steel pile extraction		87.5	
	Temporary steel pipe or H-piles	--	87.5	--
	24-inch steel piles	--	96.5	--
	18-inch steel piles	--	87.5	--
	12-inch timber piles	--	87.5	--
Down-hole Drill				
	24-inch steel piles	--	98	--
Impact Hammer				
	24-inch steel piles	--	98	--

[a] Distance from the noise source is 15 meters.
Note: SEL = sound exposure level.

6.3.3 Ambient Noise

Ambient noise is background noise that may include many sources from multiple locations (Richardson et al. 1995). In general, ambient noise levels in the marine environment are variable over time due to a number of biological, physical, and anthropogenic (e.g., man-made) sources. Ambient noise can vary with location, time of day, tide, weather, season, and frequency on scales ranging from a second to a year. Underwater sound levels in the project area include physical noise, biological noise, and anthropogenic noise. Physical noise includes waves at the water surface, currents, moving rock, sediments and silts, and atmospheric noise. Biological noise includes sounds produced by marine mammals, fish, seabirds, and invertebrates. Anthropogenic noise includes vessels (small and large), shore-based processing plants, marine fueling facilities, ferry and barge cargo loading/unloading operations, maintenance dredging, aircraft overflights, construction noise, and other sources, which produce varying noise levels and frequency ranges (Table 6-5).

Table 6-5. Representative noise levels of anthropogenic sources of sound commonly encountered in marine environments

Noise Source	Frequency Range (Hz)	Underwater Noise Level (dB rms re 1 µPa)	Reference
Small vessels	250–1,000	151 dB at 1 meter	Richardson et al. (1995)
Tug docking gravel barge	200–1,000	149 dB at 100 meters	Blackwell and Greene (2002)
Container ship	100–500	180 dB at 1 meter	Richardson et al. (1995)
Dredging operations	50–3,000	120–140 dB at 500 meters; 156.9 dB at 30 meters	URS (2007); SFS (2009)

The Pier 1 project area is frequented by fishing vessels and tenders; the M/V *Tustumena* and other ferries, barges, tugboats; and other commercial and recreational vessels that use the channel to access harbors and city docks, fuel docks, processing plants where fish catches are offloaded, and other commercial facilities. At the seafood processing plant, to the southwest of Pier 1, fish are offloaded by vacuum hose straight into the processing plant from the vessels' holds, and vessels raft up three and four deep to the dock during peak fishing seasons. On the northeast side of Pier 1 is the Petro Marine fuel dock, which services a range of vessel sizes, including larger vessels that can be accommodated by docking at Pier 1. Two boat harbors exist in Near Island Channel, which house a number of commercial and recreational marine vessels. The channel is also a primary route for local vessel traffic to access waters outside the Gulf of Alaska.

High levels of vessel traffic are known to elevate background levels of noise in the marine environment. For example, continuous sounds for tugs pulling barges have been reported to range from 145 to 166 dB re 1 µPa rms at 1 meter from the source (Miles et al. 1987; Richardson et al. 1995; Simmonds et al. 2004).

Ambient underwater noise levels in the Pier 1 project area are both variable and relatively high, and are expected to mask some sounds of drilling, pile installation, and pile extraction.

6.4 Distances to Sound Thresholds and Areas

6.4.1 Underwater Noise

Vibratory and impact pile driving and down-hole drilling will generate underwater noise that potentially could harass marine mammals, if present in the project area. Sound propagation and the distances to the sound isopleths defined by NMFS for Level A and Level B harassment of marine mammals were estimated using an underwater acoustic calculator that was developed by NMFS. The source levels for proposed pile-driving activities were estimated by using the results of measurements from similar projects in different areas.

The calculator uses a practical spreading model to predict sound levels at various distances from the source, and to predict the distances at which injury and harassment thresholds will be reached. The formula for transmission loss is TL = X log10 (R/10), where R is the distance from the source assuming the near-source levels are measured at 10 meters. This TL model, based on the default practical spreading loss assumption, was used to predict underwater sound levels generated by pile installation from this project.

In the absence of reliable data, NMFS typically recommends a default practical spreading loss of 15 dB per tenfold increase in distance. However, for this analysis for the Pier 1 project area, a TL of 18Log(R/10) (i.e., 18-dB loss per tenfold increase in distance) was used for vibratory pile driving and a 17Log TL(R/10) function was used for impact driving (Table 6-6; Illingworth & Rodkin 2014). TL values were based on measured attenuation rates in Hood Canal in the State of Washington (Illingworth & Rodkin 2013), where the marine environment is assumed to be similar to marine conditions in the Pier 1 project area. Illingworth & Rodkin (2013, 2014) have applied these same TL values to a test pile project proposed at the Port of Anchorage, and other researchers have measured similar attenuation rates for pile-driving projects (Caltrans 2012). Field measurements of TL can be as high as 22 to 29 dB per tenfold increase in distance in some locations (e.g., Knik Arm, Alaska; Blackwell 2005), and the use of these values is therefore considered a conservative application.

Distances to the harassment isopleths vary by marine mammal type and pile extraction/driving tool (Table 6-6). The Level B harassment isopleth during impact pile driving is 225 meters when pile caps are used; 1,136 meters during vibratory pile driving; and 3 meters during down-hole drilling (Table 6-6; Figure 6-1). The Level B harassment monitoring zone for vibratory pile driving will be rounded up to 1,150 meters for the Pier 1 project. Level A harassment of Steller sea lions would occur only within 4 meters if pile caps are used during impact hammering, or within 9 meters if pile caps are not used (Table 6-6; Figure 6-2).

Table 6-6. Distances in meters from Pier 1 construction activity to NMFS' Level A and Level B harassment thresholds (isopleths) for different pile installation and extraction methods and pile types, assuming a 125-dB background noise level

Method, pile type	Level A		Level B
	Pinnipeds	Cetaceans	Pinnipeds and Cetaceans
Vibratory Hammer			
Timber pile extraction	<1	<1	506
Steel H-piles	<1	<1	167
24-inch steel piles	<1	1	1136
18-inch steel piles	<1	1	1136
16-inch timber piles	<1	1	1136
Down-hole Drill			
24-inch steel piles	<1	<1	3
Impact Hammer			
With caps			
24-inch steel piles	4	15	225
Without caps			
24-inch steel piles	9	34	508

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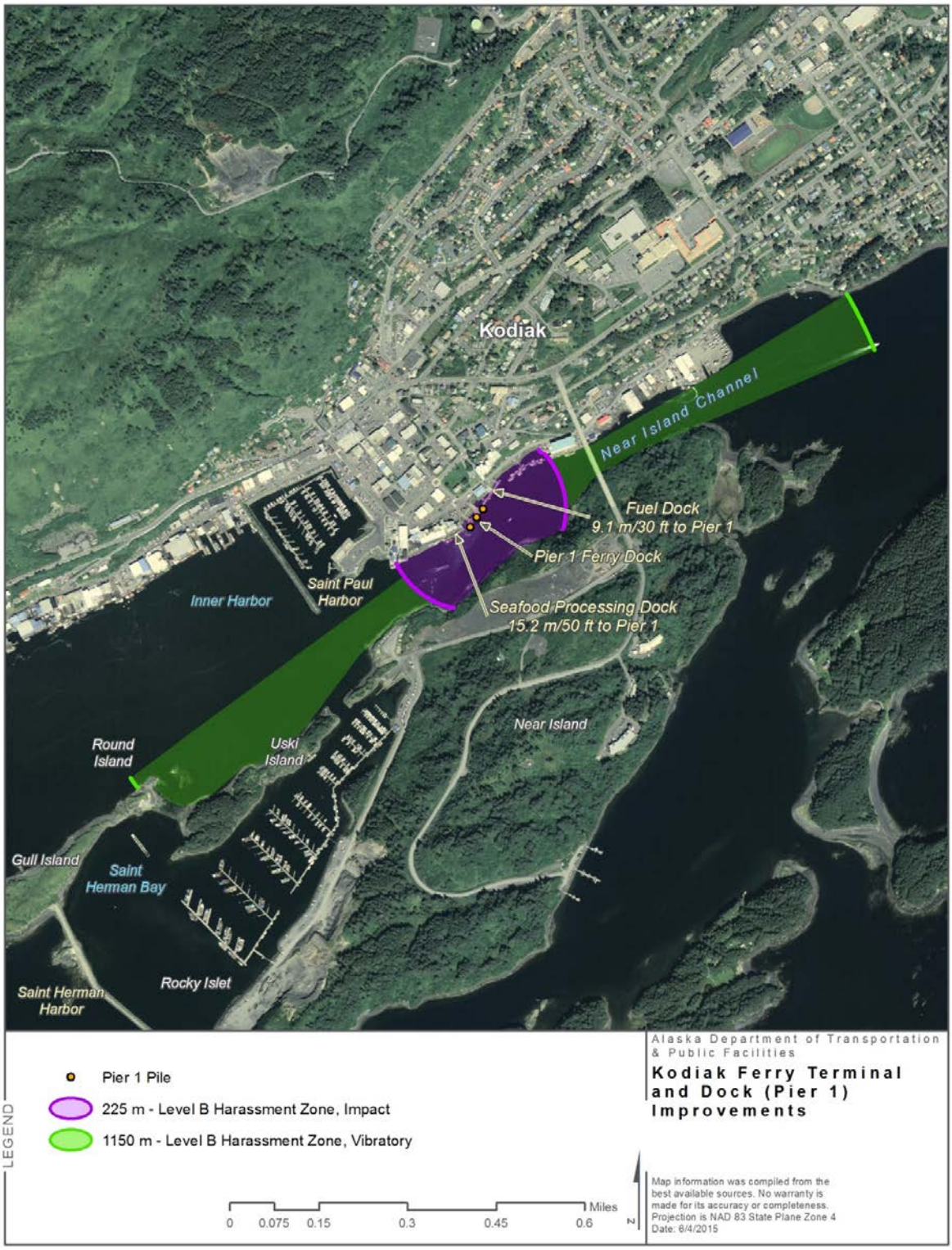

Figure 6-1. Distances to the underwater 125 dB rms (vibratory noise, rounded to 1,150 meters) and 160 dB rms (impact noise) Level B isopleths

Note that the distance to the underwater 160 dB rms down-hole drilling Level B isopleth is 3 meters and is not depicted in this figure due to scale and clarity. Harassment zones are based on vectors radiating from the sound source where landforms and solid dock structures do not block sound and are illustrated accordingly.

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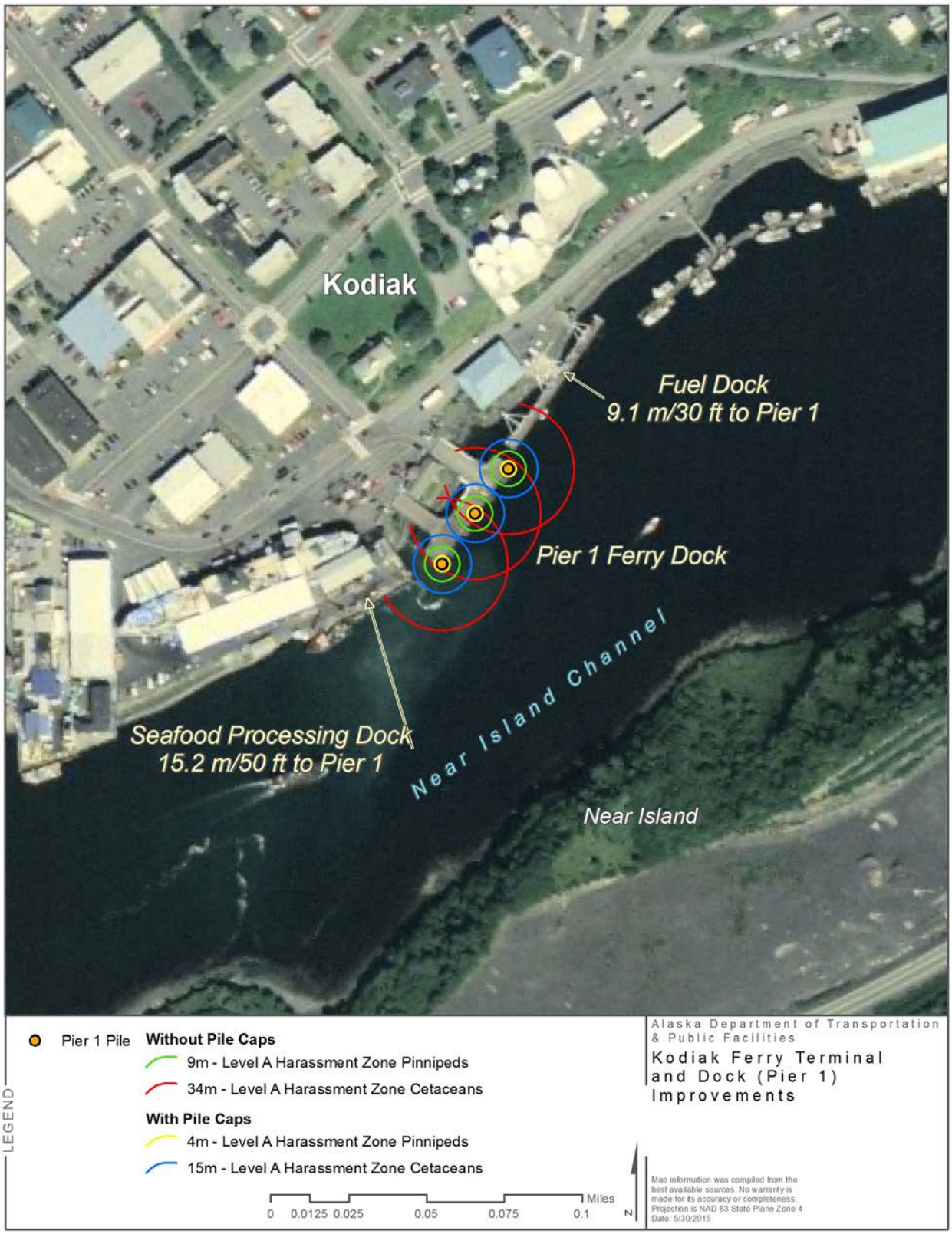

Figure 6-2. Distances to the underwater sound isopleths for Level A harassment for impact pile driving for cetaceans and pinnipeds

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6.4.2 Airborne Noise

The NMFS practical spreading model with sound transmission loss of 6.0 dB per doubling distance (20Log TL(R/10); WSDOT 2010) was used to estimate the distance at which airborne sound would attenuate to NMFS thresholds for each pile removal and installation method (Table 6-7). Regardless of the pile installation or extraction method, all estimates for distances that airborne sound could travel and exceed the harassment threshold for in-air disturbance fall far short of the 1,300 meters to the nearest known pinniped haulout, the Dog Bay float. Therefore, airborne noise is not considered further in this application, and no incidental take for airborne noise is requested.

Table 6-7. Distances (meters) from Pier 1 construction activity where airborne sound will attenuate to NMFS threshold for Level B harassment

Method, pile type	Harbor Seals	Steller Sea Lions
Vibratory Hammer		
Timber and steel pile extraction	12 m	4 m
Temporary steel pipe or H-piles	12 m	4 m
24-inch steel piles	32 m	10 m
18-inch steel piles	12 m	4 m
16-inch timber piles	12 m	4 m
Down-hole Drill		
24-inch steel piles	38 m	12 m
Impact Hammer		
24-inch steel piles	38 m	12 m

6.5 Estimated Takes

6.5.1 Steller Sea Lions

Incidental take was estimated for Steller sea lions by assuming that, within any given day, about 40 unique individual Steller sea lions may be present at some time during that day within the Level B harassment zone during active pile extraction or installation. This estimate was derived from the following information, which is explained in more detail in Section 4.1.2.

Population estimates of pinnipeds are generally made when the animals are hauled out and available to be counted. Steller sea lions hauled out on the Dog Bay float are believed to represent the Kodiak Harbor population. Aerial surveys from 2004 through 2006 indicated peak winter (October–April) counts at the Dog Bay float ranging from 27 to 33 animals (Wynn et al. 2011). Counts in February 2015 during a site visit by HDR biologists ranged from approximately 28 to 45 Steller sea lions. More than 100 Steller sea lions were counted on the Dog Bay float at times in spring 2015, although the mean number was much smaller (Wynne 2015b). Together, this information may indicate a maximum population of about 120 Steller sea lions that uses the Kodiak harbor area.

Steller sea lions in a more “natural” situation do not generally eat every day, but tend to forage every 1–2 days and return to haulouts to rest between foraging trips (Merrick and Loughlin 1997; Rehburg et al. 2009). On any given day, this means that a maximum of about 60 Steller sea lions from the local population may be foraging. At least four other seafood processing facilities are present in Kodiak and operate concurrently with the one located next to Pier 1, and

all are visited by local Steller sea lions looking for food (Wynne 2015a). Kodiak Steller sea lions also follow and raid fishing vessels, and catch wild food. The seafood processing facility adjacent to the Pier 1 project site is not the only source of food for local Steller sea lions that inhabit the harbor area. The foraging habits of Steller sea lions using the Dog Bay float and Kodiak harbor area are not documented, but it is reasonable to assume that, given the abundance of readily available food, not every Steller sea lion in the area visits the seafood processing plant adjacent to Pier 1 every day. If about half of the foraging Steller sea lions visit the seafood processing plant adjacent to Pier 1, it is estimated that about 30 unique individual Steller sea lions likely pass through the Pier 1 project area each day and could be exposed to Level B harassment. To be conservative, exposure is estimated at 40 unique individual Steller sea lions per day.

It is assumed that Steller sea lions may be present every day, and also that take will include multiple harassments of the same individual(s) both within and among days.

Expected durations of pile extraction and driving were estimated in Section 1.4 and are summarized again in Table 6-8. For each pile extraction or installation activity, the calculation for Steller sea lion exposures to underwater noise is therefore estimated as:

Exposure estimate = number of animals/day * number of days of activity

An estimated total of 3,200 Steller sea lions (40 sea lions/day * 80 days of pile installation or extraction) could be exposed to noise at the Level B harassment level during vibratory and impact pile driving (Table 6-8). The expected take from exposure to noise from down-hole drilling is expected to be very low because of the low noise levels produced by this type of pile installation, and the 3-meter distance to the Level B isopleth. Potential exposure at the Level B harassment level for down-hole drilling is estimated at 60 Steller sea lions, roughly one every one to two days.

The attraction of sea lions to the nearby seafood processing plant increases the possibility of individual Steller sea lions occasionally entering the Level A harassment zone before they are observed and before pile driving can be shut down. Although marine mammal observers will be present at all times during pile installation, it is possible that sea lions could approach quickly and enter the Level A harassment zone, even as pile driving activity is being shut down. This likelihood is increased by the high level of sea lion activity in the area, with Steller sea lions following vessels and swimming around vessels at the neighboring dock. A single sea lion could be taken each day that impact pile driving occurs. Therefore, the DOT&PF requests an additional 22 Level A takes plus a roughly 30 percent contingency of 8 additional takes, for a total of 30 takes for Level A harassment. Potential for Level A harassment of Steller sea lions is estimated to only occur during impact hammering due to the very small Level A harassment zones for all other construction activities (Table 6-8).

Table 6-8. Numbers of potential exposures of Steller sea lions to Level A and Level B harassment noise from pile driving based on predicted underwater noise levels resulting from project activities

	Vibratory and Impact	Down-hole Drill	Impact Hammer
	Level B	Level B	Level A
Number of Days	80 days	60 days	22 days
Number of Steller Sea Lion Exposures	3,200	60	30

6.5.2 Harbor Seals

Harbor seals are expected to be encountered in low numbers, if at all, within the project area. However, based on the known range of the South Kodiak stock, and occasional sightings during monitoring of projects at other locations on Kodiak Island, the DOT&PF requests 40 Level B takes (1 take every other day) of harbor seals by exposure to underwater noise over the duration of construction activities. No Level A take is requested under this authorization.

6.5.3 Harbor Porpoises

Harbor porpoises are expected to be encountered in low numbers, if at all, within the project area. However, based on the known range of the Gulf of Alaska stock and occasional sightings during monitoring of projects at other locations on Kodiak Island, the DOT&PF requests 40 Level B takes (1 take every other day) of harbor porpoises by exposure to underwater noise over the duration of construction activities. No Level A take is requested under this authorization.

6.5.4 Killer Whales

Killer whales are expected to be in the Kodiak harbor area sporadically from January through April and to enter the project area in low numbers. Based on the known range and behavior of the Alaska Resident stock and the Gulf of Alaska, Aleutian Islands, and Bering Sea Transient stocks, it is reasonable to estimate that 6 individual whales may enter the project area twice a month from February through May (Section 4.4.2). The DOT&PF therefore requests 48 Level B takes (6 killer whales/visit * 2 visits/month * 4 months) of killer whales by exposure to underwater noise over the duration of construction activities. No Level A take is requested under this authorization.

6.6 All Marine Mammal Takes Requested

The analysis for the Kodiak Pier 1 project predicts 3,260 potential exposures of Steller sea lions, 40 potential exposures of harbor seals, 40 potential exposures of harbor porpoises, and 48 potential exposures of killer whales to noise from pile driving or extraction over the course of the project that could be classified as Level B harassment under the MMPA. Up to 30 Steller sea lions could be exposed to noise levels that could be classified as Level A under the MMPA. The DOT&PF requests 3,418 takes of these marine mammals (Table 6-9).

Table 6-9. Summary of the estimated numbers of marine mammals potentially exposed to Level A and Level B harassment noise levels

Species	Level A Injury Threshold Cetaceans (180 dB)	Level A Injury Threshold Pinnipeds (190 dB)	Level B Harassment Threshold (160 dB)	Airborne Disturbance Threshold[a] (90 dB harbor seal; 100 dB sea lion)	Total
Steller sea lion	NA	30	3,260	0	**3,290**
Harbor seal	NA	0	40	0	**40**
Harbor porpoise	0	NA	40	NA	**40**
Killer whale	0	NA	48	NA	**48**
Total	0	30	3,388	0	**3,418**

[a] No known haulouts occur within the vicinity of the Pier 1 project. Therefore, pile driving will not exceed in-air disturbance threshold for hauled-out pinnipeds.
NA indicates Not Applicable.

7 DESCRIPTION OF POTENTIAL IMPACTS OF THE ACTIVITY TO MARINE MAMMALS

The ability to hear and transmit sound (echolocation/vocalization) is vital for marine mammals to perform several life functions. Marine mammals use sound to gather and understand information about their current environment, including detecting prey and predators. They also use sound to communicate with one another. The distance a sound travels through the water depends highly on existing environmental conditions (sea floor topography and ambient noise levels) and characteristics of the sound (source levels and frequency; Richardson et al. 1995). Impacts to marine mammals can vary among species based on their sensitivity to sound and their ability to hear different frequencies. The Pier 1 project may impact marine mammals behaviorally and physiologically from temporary increases in underwater and airborne noises during reconstruction activities. The level of impact on marine mammals from construction activities will vary depending on the species of marine mammal, the distance between the marine mammal and the construction activity, the intensity and duration of the construction activity, and environmental conditions.

7.1 Potential Effects of Pile Driving on Marine Mammals

7.1.1 Zones of Noise Influence

Behavioral and physiological changes that may result from increased noise levels include changes in intolerance levels; masking of natural sounds; behavioral disturbances; and temporary or permanent hearing impairment, or non-auditory physical effects (Richardson et al. 1995). Richardson et al. (1995) has suggested four zones to assess potential effects of noise on marine mammals.

Zone of Hearing Loss, Discomfort, or Injury

This is the area within which the received sound level is high enough to cause discomfort or tissue damage to auditory or other systems. An animal may experience temporary loss of hearing (TTS), or partial or full hearing loss (PTS). Marine mammals exposed to high received sound levels may experience non-auditory physiological effects such as increased stress, neurological effects, bubble formation, resonance effects, and other types of organ or tissue damage. Permanent injury to marine mammals (PTS) will be considered Level A harassment and be applicable at 180 dB for cetaceans and 190 dB for pinnipeds (Figure 6-2). TTS is not considered injurious and will constitute a Level B take.

Zone of Masking

This is the area within which noise is strong enough to interfere with the detection of other sounds, including communication calls, prey or predator sounds, and other environmental sounds. Masking is considered Level B harassment and is usually considered 160 dB for impact noise and 120 dB for continuous noise.

Zone of Responsiveness

This is the area within which marine mammals reacts behaviorally or physiologically from exposure to increased noise levels. The level of effect is dependent on acoustical characteristics of the noise, the current physical and behavioral state of the animals, ambient noise levels and environmental conditions, and the context of the sound (e.g., if it sounds similar to a predator; Richardson et al. 1995; Southall et al. 2007). Behavioral effects that are temporary may indicate that the animal has simply heard a sound and the effect may not be

long term (Southall et al. 2007). Behavioral and physiological effects described here will be considered Level B harassment.

Zone of Audibility

This is the area within which the animal might hear the noise; it is the most extensive of the four zones. Marine mammals as a group have functional hearing ranges of 10 Hz to 180 kHz, with thresholds of best hearing near 40 dB (Ketten 1998; Southall et al. 2007). Marine mammals can typically be divided into three groups that have consistent patterns of hearing sensitivity: small odontocetes (e.g., harbor porpoise), medium-sized odontocetes (e.g., killer whale), and pinnipeds (e.g., Steller sea lion and harbor seal). Difficulties in human ability to determine the audibility of a particular noise for other species has so far precluded development of applicable criteria for the zone of audibility. This zone does not fall in the sound range of a "take" as defined by NMFS.

7.2 Assessment of Acoustic Impacts

Behavioral and physiological impacts from noise exposure differ among species. Differences in response have also been documented between age and sex classes. Younger animals are often more sensitive to noise disturbance, and noise can therefore have a greater effect (NRC 2003).

7.2.1 Zone of Hearing Loss, Discomfort, or Injury

Temporary or permanent reduction in hearing sensitivity may result from high received sound levels. The level of hearing loss depends on the sound frequency, intensity, and duration. PTS and TTS may reduce an animal's ability to avoid predators, communicate with others, or forage effectively.

Kastak and Schusterman (1996) tested in-air auditory thresholds by exposing a harbor seal inadvertently to broadband construction noise for 6 days, with intermittent exposure averaging 6 to 7 hours per day. When the harbor seal was tested immediately upon cessation of the noise, a TTS of 8 dB at 100 Hz was evident. Following 1 week of recovery, the harbor seal's hearing threshold was within 2 dB of its original level.

Pure-tone sound detection thresholds were obtained in-water for harbor seals before and immediately following exposure to octave-band noise (Kastak et al. 1999). Test frequencies ranged from 100 Hz to 2 kHz and octave-band sound exposure levels (SELs) were approximately 60 to 75 dB SEL. Each harbor seal was trained to dive into a noise field and remain stationed underwater during a noise-exposure period that lasted a total of 20–22 minutes. The average threshold shift relative to baseline thresholds for the harbor seals following noise exposure was 4.8 dB, and the average shift following the recovery period was 20.8 dB (Kastak et al. 1999). Therefore, PTS and TTS as a result of the proposed project are not expected to occur in any marine mammal species, because source levels of pile driving are lower than those in the above-referenced TTS studies, and implementation of proposed mitigation measures will help avoid potential close approach of animals to activities that could result in Level A takes (i.e., injury/mortality).

Kastelein et al. (2013) determined that the hearing threshold was lower when a harbor porpoise was exposed to multiple strike sounds than when it was exposed only to a single strike sound. Using a psychophysical technique, a harbor porpoise's hearing thresholds were obtained for a series of five pile-driving sounds (inter-pulse interval 1.2 to 1.3 seconds) recorded at 100 and 800 meters from the pile-driving site, and played back in a pool. The 50 percent detection threshold SELs for the first sound of the series (no masking) were 72 (100 meters) and 74 (800

meters) decibels referenced to 1 microPascal squared second. Multiple sounds in succession (series) caused a 5-dB decrease in hearing threshold.

7.2.2 Zone of Masking

Marine mammal signals may be masked by increased noise levels or overlapping frequencies. Research has indicated that the majority of vibratory activity falls within 400 and 2,500 Hz (Blackwell 2005; URS 2007). The frequency range of Steller sea lions' vocalization is unknown; however, Steller sea lions have been documented producing low-frequency vocalizations (Kastelein et al. 2005). Harbor seals produce social calls at 500 to 3,500 Hz and clicks from 8 to 150 kHz (reviewed in Richardson et al. 1995). Harbor porpoises produce acoustic signals in a very broad frequency range, <100 Hz to 160 kHz (Verboom and Kastelein 2004). Killer whales produce whistles between 1.5 and 18 kHz, and pulsed calls between 500 Hz and 25 kHz. Echolocation clicks are far above the frequency range of the sounds produced by vibratory pile driving.

The Pier 1 project area is within an existing active harbor area, and therefore marine mammals in the project area have likely become habituated to increased noise levels. Implementation of the proposed mitigation measures will reduce impacts on marine mammals (Section 11), with any minor masking occurring at close proximity to the sound source, if at all.

7.2.3 Zone of Responsiveness

Responses from marine mammals in the presence of pile-driving activity might include a reduction of acoustic activity, a reduction in the number of individuals in the area, and avoidance of the area. Of these, temporary avoidance of the noise-impacted area is the most common response. Avoidance responses may be initially strong if the marine mammals move rapidly away from the source or weak if movement is only slightly deflected away from the source. Noise from pile driving could potentially displace marine mammals from the immediate proximity of pile-driving activity; however, they will likely return after pile driving is completed, as demonstrated by a variety of studies about temporary displacement of marine mammals by industrial activity (reviewed in Richardson et al. 1995). Any masking event that could possibly rise to Level B harassment under the MMPA will occur concurrently within the zones of behavioral harassment already estimated for vibratory and impact pile driving, and have already been taken into account in the exposure analysis.

Marine mammals in the Kodiak area, especially Steller sea lions, are exposed to a variety of vessel and industrial sounds and maintain a presence in the area. This suggests some level of habituation to anthropogenic sounds and activity. Steller sea lions are especially habituated in this location because of the presence of commercial fishing vessels and fish processing plants with available food resources.

7.2.4 Habituation and Sensitization

Repeated or sustained disruption of important behaviors (such as feeding, resting, traveling, and socializing) is more likely to have a demonstrable impact than a single exposure (Southall et al. 2007). However, it is likely that marine mammals exposed to repetitious construction sounds will become habituated, desensitized, and tolerant after initial exposure to these sounds, as demonstrated by behavior of Steller sea lions in the Kodiak harbor area. Marine mammals residing in and transiting this area are routinely exposed to sounds louder than 120 dB, and continue to use this area; therefore, they do not appear to be harassed by these sounds, or they have become habituated.

7.3 Conclusions Regarding Impacts to Species or Stocks

Incidental take is expected to result only in short-term changes in behavior, such as avoidance of the project area, changes in swimming speed or direction, and changes in foraging behavior. These takes would be unlikely to have any impact on recruitment or survival, and therefore, would have a negligible impact on the wDPS of Steller sea lions or the affected stocks of harbor seals, harbor porpoises, or killer whales. Implementation of mitigation measures proposed in Section 11 is likely to avoid most potential adverse underwater impacts to individual marine mammals from pile-driving activities. Impacts to individual Steller sea lions, harbor seals, harbor porpoises, and killer whales are expected to be small and of short duration. Nevertheless, some level of impact is unavoidable. The expected level of unavoidable impact (defined as an acoustic or harassment "take") is described in Section 6.

Level A and Level B take of Steller sea lions will likely include multiple (estimated as daily) takes of the same individual(s), resulting in estimates of take (as percentage of the wDPS) that are high compared to actual take that will occur. Estimates of Level B take of harbor seals, harbor porpoises, and killer whales are also small percentages of affected stocks.

8 DESCRIPTION OF POTENTIAL IMPACTS TO SUBSISTENCE USES

Alaska Natives have traditionally harvested subsistence resources in the Kodiak area for many hundreds of years, particularly Steller sea lions and harbor seals. No traditional subsistence hunting areas are within the project vicinity, however; the nearest haulouts for Steller sea lions and harbor seals are the Long Island and Cape Chiniak haul-outs and the Marmot Island rookery, many miles away (see Section 4.1.2).

An estimated 163 harbor seals were harvested in seven communities on Kodiak Island in 2011; approximately 36 of these were harvested near the City of Kodiak, where 32.5 percent of the Alaska Native households harvested harbor seals (ADF&G 2012). The number of harbor seals harvested near the City of Kodiak from 1992 to 2011 ranged from 7 to 71 individuals per year, with an annual average of 21.8 harbor seals (Table 8-1).

In 2011, an estimated 20 Steller sea lions were harvested on Kodiak Island, and two of them were harvested near the City of Kodiak (ADF&G 2012). Between 1992 and 2011, the number of Steller sea lions harvested per year ranged from 0 to 13 sea lions near the City of Kodiak, with an average number of 1.9 Steller sea lions harvested per year (Table 8-1). These numbers have been adjusted for under-reported harvest.

There is no reported subsistence harvest of killer whales or harbor porpoises in Alaska (Allen and Angliss 2014).

All project activities will take place within the immediate vicinity of the Pier 1 site, and therefore the Pier 1 project will not have an adverse impact on the availability of marine mammals for subsistence use at locations farther away. No disturbance or displacement of sea lions or harbor seals from traditional hunting areas by activities associated with the Pier 1 project is expected. No changes to availability of subsistence resources will result from Pier 1 project activities.

Table 8-1. Estimated Subsistence Harvest numbers for Harbor Seals and Steller sea lions in the City of Kodiak from 1992 to 2011

Species	Steller Sea Lion	Harbor Seal
1992	0	36.9
1993	12.7	7
1994	1.1	7.6
1995	2.2	8.8
1996	3	9
1997	3	13
1998	1	11
2000	2.4	26.4
2001	2.5	17.5
2002	2.5	17.5
2003	0	38
2004	0	25.5
2005	0	10.8
2006	0	10.8
2007	0	23.6
2008	0	71.3
2011	1.6	35.7

Note: Years 1999, 2009, 2010 were not reported in source
Source: ADF&G 2012

9 DESCRIPTION OF POTENTIAL IMPACTS TO MARINE MAMMAL HABITAT

9.1 Effects of Project Activities on Steller Sea Lion Habitat

On 27 August 1993, NMFS published a final rule designating critical habitat for the Steller sea lion. Critical habitat is associated with breeding and haulout areas in Alaska, California, and Oregon (NMFS 1993). Steller sea lion critical habitat is defined by a 20-nautical-mile (37-km) radius (straight line distance) encircling a major haulout or rookery. The project area occurs within critical habitat for two major haulouts (Figure 4-3). The major haulout at Long Island is located approximately 4 nautical miles (7.4 km) east of the project site. The major haulout at Cape Chiniak is located approximately 12 nautical miles (22.2 km) east of the project site. The closest rookery is on the southeast corner of Marmot Island, which is approximately 30 nautical miles (55.6 km) from the project area. The critical habitat surrounding the rookery at Marmot Island does not overlap with the project area. Steller sea lions haul out on a man-made float in St. Herman Harbor about 0.8 mile (1,300 meters) west of the proposed project area (Figure 3-1). This is not a federally recognized haulout used to define critical habitat.

Construction activities will likely have temporary impacts on Steller sea lion habitat through increases in underwater and airborne sound from pile removal and installation. Other potential temporary impacts include changes in prey species distribution. Best management practices and mitigation used to minimize potential environmental effects from project activities are described in Section 11.

Project-related disturbances will not be detectable at the haulouts, and the level of disturbance and habitat alteration in the project area would be insignificant and discountable, especially when considered in relation to the activity already taking place in the project area and the apparent tolerance of the Steller sea lions in the area. The large set of floats in St. Herman harbor is the most reliable place to find Steller sea lions and is adjacent to industrial activity and near-constant vessel traffic.

Detectable effects of the proposed erosion control riprap placement on Steller sea lions and their habitat are not expected. Steller sea lions do not haul out in the area where the riprap will be placed. The riprap is expected to reduce erosion of the unprotected beach along the project site, and will therefore likely improve water quality in the area in the long term. Indirect effects to prey would be insignificant and discountable due to the temporary nature of the activity, and are expected to be undetectable to Steller sea lions.

9.2 Effects of Project Activities on Habitat for Other Marine Mammals

Harbor seals, harbor porpoises, and killer whales are infrequent visitors to the project area; their habitat will not be affected by the proposed project. Harbor seals are opportunistic feeders whose diet varies with season and location. Harbor porpoises forage primarily on Pacific herring, other schooling fish, and cephalopods (Leatherwood et al. 1982). Killer whales occasionally occur in Near Island Channel and typically hunt Steller sea lions.

9.3 Effects of Project Activities on Marine Mammal Prey Habitat

Essential Fish Habitat (EFH) has been designated within the project area for the Alaska stocks of Pacific salmon, walleye pollock, Pacific cod, yellowfin sole (*Limanda aspera*), arrowtooth flounder (*Atheresthes stomias*), rock sole (*Lepidopsetta spp.*), flathead sole (*Hippoglossoides elassodon*), sculpin (Cottidae), skate (Rajidae), and squid (Teuthoidea). On 30 April 2013, informal EFH consultation was initiated, and NMFS determined that the project would not adversely affect EFH and did not offer any EFH conservation recommendations or require further consultation (FHWA 2013).

Fish populations in the project area that serve as marine mammal prey could be affected by noise from in-water pile driving. The frequency range in which fish generally perceive underwater sounds is 50 to 2,000 Hz, with peak sensitivities below 800 Hz (Popper and Hastings 2009). Fish behavior or distribution may change, especially with strong and/or intermittent sounds that could potentially harm fish. High underwater SPLs have been documented to alter behavior; cause hearing loss; and injure or kill individual fish by causing serious internal injury (Hastings and Popper 2005).

In general, impacts to marine mammal prey species are expected to be minor and temporary. The area likely impacted by the proposed project is relatively small compared to the available habitat around Kodiak Island. The most likely impact to fish from the proposed project will be temporary behavioral avoidance of the immediate area, although any behavioral avoidance of the disturbed area will still leave significantly large areas of fish and marine mammal foraging habitat around Kodiak Island. Therefore, the impacts on marine mammal prey during the proposed project are expected to be negligible.

10 DESCRIPTION OF POTENTIAL IMPACTS FROM LOSS OR MODIFICATION OF HABITAT TO MARINE MAMMALS

Descriptions of the proposed project impacts on habitat were discussed in Section 9. The effects of the proposed project on marine mammal habitats are expected to be short-term and minor. One potential impact on marine mammals, especially Steller sea lions, associated with the project could be a temporary loss of habitat because of elevated noise levels. Displacement of Steller sea lions by noise would not be permanent and would not have long-term effects. The proposed project is not expected to have any habitat-related effects that could cause significant or long-term consequences for individual marine mammals or their populations, because pile driving and other noise sources will be temporary and intermittent. Also, as noted in Section 4.1.2, it is also unknown whether a hearing-impaired or deaf Steller sea lion would avoid pile-driving activity, or whether such an animal might approach closely, even within the Level A harassment zone, without responding to or being impacted by the noise level.

Another essential feature of Steller sea lion critical habitat pertinent to the project is adequate food resources. It is expected that most fish are able to move away from the proposed activity to avoid harm, and will still be available to Steller sea lions and other marine mammals. The quantity, quality, and availability of adequate food resources are therefore not likely to be reduced (due to the small area affected, mobility of fish, anticipated recolonization, and the temporary nature of the project).

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11 MITIGATION MEASURES

The exposures outlined in Section 6 represent the maximum potential number of marine mammals that could be exposed to acoustic sources reaching Level A and Level B harassment levels. The DOTP&F proposes to employ a number of mitigation measures to minimize the number of marine mammals potentially affected. Mitigation measures will include those that address all phases of construction in general, those that are specific to physical pile removal and installation, those that pertain to Level A and Level B harassment zones, and those that involve observation of marine mammals and actions designed specifically to minimize the number of Steller sea lions in the immediate project area. Marine mammal monitoring and mitigation methods are described in more detail in the Marine Mammal Monitoring and Mitigation Plan (Appendix A).

Minimizing the number of Steller sea lions in the immediate project area may be difficult because of the close proximity of Pier 1 to the adjacent seafood processing plant and its dock. Sea lions are especially numerous when the seafood plant is in operation and off-loading fish from commercial vessels (Figure 4-1). When possible, construction will be sequenced so that work on the portion of Pier 1 closest to the seafood processing plant dock will be carried out primarily when the plant is not in operation. This will help minimize the number of Steller sea lions approaching the Level A harassment zone.

11.1 All Construction Activities

The DOT&PF does not generally specify means and methods to be employed by the Contractor. However, all construction will be performed in accordance with *Environmental Commitments and Mitigation Measures* previously committed to during the consultation and permitting process in 2013:

- All exposed project slopes and fills that are susceptible to erosion would be stabilized in accordance with the project-specific water quality control plan.
- If undocumented cultural, archeological, or historical sites are discovered during project construction, any work that might impact these sites would be stopped and the State Historic Preservation Officer would be contacted.
- If contaminated or hazardous materials are encountered during construction, all work in the vicinity of the contaminated site would be stopped until the Alaska Department of Environmental Conservation (ADEC) is contacted and a corrective action plan is approved by ADEC and implemented.
- Advance public notice of construction activities would be provided to reduce construction impacts on local residents, ferry travelers, adjacent businesses, and other users of Pier 1.
- The Contractor shall provide and maintain a spill cleanup kit on-site at all times.
- The Contractor shall prepare specific Best Management Practices that shall be used to maintain water quality.
- Work in waters of the U.S. will be conducted in accordance with the terms and conditions of the USACE permit obtained for the project and any subsequent modifications to this authorization (Permit File Number POA-2012-769).

- Fill material shall consist of rock fill and riprap that is free of fine sediments to the extent practical, to reduce the suspended materials entering the water column during tidal cycles. Fill material shall also be free of invasive marine and terrestrial vegetation species.
- To minimize impacts to pink salmon (*Oncorhynchus gorbuscha*) fry and coho salmon *(O. kisutch*) smolt, work would be conducted in accordance with ADF&G recommendations. ADF&G recommended that the Contractor will refrain from impact pile installation without a bubble curtain from 01 May through 30 June within the 12-hour period beginning daily at the start of civil dawn (Marie 2015). ADF&G stated that this is the daily time period when the majority of juvenile salmon are moving through the project area, and a 12-hour quiet period may protect migrating juvenile salmon from excessive noise (Frost 2015). Impact pile installation would be acceptable with a bubble curtain during the time period from 01 May through 30 June during the 12-hour period beginning at civil dawn. Impact pile installation would also be acceptable, without a bubble curtain, from 01 May through 30 June in the evenings, beginning at 12 hours past civil dawn (Marie 2015).
- A qualified Wildlife Observer would be present 30 minutes prior to and during pile-driving/drilling and extraction activities. If a protected species enters the established observation area, pile-driving activities would be stopped until the animal moves outside of the observation area.

11.2 Pile Removal and Installation

The DOT&PF estimates that noise pressure levels from the project will potentially result in 30 exposures of Steller sea lions to Level A harassment noise levels, with the remaining exposures of Steller sea lions, harbor seals, harbor porpoises, and killer whales limited to Level B harassment. Pile removal and installation mitigation measures include:

- Direct pull will be used to remove piles to minimize noise levels as much as possible. The vibratory hammer will be used only when needed.
- The preliminary project design included more than 160 permanent piles, and was later revised to significantly reduce the number of piles required.
- The project was designed with relatively small-diameter piles, which will avoid the elevated noise impacts associated with larger piles.
- The vibratory hammer and down-hole drilling methods will be used to install piles; the impact hammer will be used only to ensure the piles are secure in bedrock.
- Pile caps will be used during all impact pile-driving activities.
- Before driving efforts occur, the Contractor will employ a soft start or ramp-up procedures to minimize impacts.
    - If a marine mammal is present within the Level A harassment zone, ramping up will be delayed until the animal(s) leaves the Level A harassment zone. Activity will begin only after the Wildlife Observer has determined, through sighting, that the animal(s) has moved outside the Level A harassment zone.
    - If a Steller sea lion, harbor seal, harbor porpoise, or killer whale is present in the Level B harassment zone, ramping up will begin and a Level B take will be documented. Ramping up will occur when these species are in the Level B

harassment zone whether they entered the Level B zone from the Level A zone, or from outside the project area.

- o If any marine mammal other than Steller sea lions, harbor seals, harbor porpoises, or killer whales is present in the Level B harassment zone, ramping up will be delayed until the animal(s) leaves the zone. Ramping up will begin only after the Wildlife Observer has determined, through sighting, that the animal(s) has moved outside the harassment zone.

- Wildlife Observers will be employed as described in Section 11.4.

11.3 Harassment Zones

Modeling results for Level A harassment zones discussed in Section 6 were used to develop mitigation measures for pile-driving and demolition activities. These include:

- During pile installation and removal, the shutdown zone shall include all areas where the underwater SPLs are anticipated to equal or exceed the Level A (injury) harassment criteria for Steller sea lions and harbor seals (190 dB rms isopleth), and for harbor porpoises and killer whales (180 dB rms isopleth). During all pile installation and removal activities, regardless of predicted SPLs, a conservative 4-meter (13-foot) shutdown zone will be in effect for Steller sea lions and harbor seals, and a conservative 15-meter (50-foot) shutdown zone will be in effect for harbor porpoises and killer whales. This mandatory 4-meter shut down zone will avoid all take during down-hole drilling.

- During impact pile installation, the Level B harassment zone shall extend to 225 meters for Steller sea lions, harbor seals, harbor porpoises, and killer whales. This 225-meter distance will serve as a shutdown zone for all other marine mammals (humpback whale, Dall's porpoise, gray whale, fin whale, or any other) to avoid Level B take. Level B take of humpback whales, Dall's porpoises, gray whales, and fin whales is not requested and will be avoided by shutting down before individuals of these species enter the Level B zone.

- During vibratory pile installation and removal, the Level B harassment zone shall extend to 1,150 meters (3,773 feet) for Steller sea lions, harbor seals, harbor porpoises, and killer whales. This 1,150-meter (3,773-foot) distance will serve as a shutdown zone for all other marine mammals (humpback whale, Dall's porpoise, gray whale, fin whale, or any other) to avoid Level B take. Level B take of humpback whales, Dall's porpoises, gray whales, and fin whales is not requested and will be avoided by shutting down before individuals of these species enter the Level B zone.

- The Level A and Level B harassment zones will be monitored throughout the time required to install or extract a pile. If a harbor seal, harbor porpoise, or killer whale is observed entering the Level B harassment zone, a Level B exposure will be recorded and behaviors documented. That pile segment will be completed without cessation, unless the animal approaches the Level A shutdown zone. Pile installation or extraction will be halted immediately before the animal enters the Level A zone. Level A take of harbor seals, harbor porpoises, and killer whales is not requested and will be avoided by shutting down before individuals of these species enter the Level A zone.

- If a Steller sea lion is observed entering the Level B harassment zone, a Level B exposure will be recorded and behaviors documented. That pile segment will be completed without cessation. If the individual approaches the Level A harassment zone,

pile installation will be halted, to try to avoid Level A exposure. However, as discussed in Section 6.5.1, it is possible that Level A exposure of sea lions will occur, despite best efforts to avoid Level A exposure. If a Steller sea lion is observed entering the Level A harassment zone, shutdown will occur immediately, and a Level A exposure will be recorded and behaviors documented. Sea lion behaviors will be recorded at all times during monitoring.

11.4 Marine Mammal Observation and Protection

Monitoring plans are discussed in detail in Section 13 and in the Marine Mammal Monitoring and Mitigation Plan (Appendix A). Monitoring activities will include and require:

- Trained or experienced observers will be present during all pile installation, down-hole drilling, and pile extraction operations.
- Monitoring for marine mammals will take place for at least 30 minutes prior to pile installation, down-hole drilling, and pile extraction operations.
- Observers must be able to positively identify the marine mammals in the area and have prior training or expertise in monitoring and surveying marine mammals, with credentials available for review.
- Observers must maintain verbal contact with construction personnel to immediately call for a halt of pile-driving operations to avoid exposures as described in Section 11.3.
- NMFS will be provided with a report of all marine mammal sightings during the project.

11.5 Other Mitigation Measures

Site visits to the Pier 1 area and discussions with local stakeholders have resulted in potential mitigation measures that require further consideration and assessment.

Currently, vessels making deliveries to the seafood processing plant tie up at the dock on their starboard sides, with their sterns to the northeast toward the Pier 1 dock. If delivering vessels were able to tie up on their port sides, with their sterns toward the southwest, away from Pier 1, the distance between the area of attraction for sea lions (the stern, where fish may be available) and Pier 1 would be reduced by the length of the vessel (up to 100 feet or more). Initial discussions with the seafood processing plant indicated that reversing the typical docking orientation of delivering vessels may be an option during the short periods of time when impact pile driving is planned. Further discussions and coordination are anticipated.

At certain busy times during the year, multiple vessels may wait in line for their turn to make fish deliveries to the processing plant. Often, the vessels “raft up” out from the processing plant dock by tying up to one another, port to starboard, into the channel. This additional activity and presence of multiple sources of food at once can increase the number of sea lions attracted to the processing plant and the Pier 1 area. If alternative dock space were available in another place, such as at Pier 2 or Oscar’s Dock, both City of Kodiak-owned facilities, vessel captains may choose to tie up in a less-congested area, reducing the attraction of sea lions to the processing plant and Pier 1. Further discussions of this potential mitigation measure are also anticipated.

11.6 USACE Requirements

The DOT&PF has obtained a USACE, Department of Army permit, file number POA-2012-769, Near Island Channel, which authorizes the replacement of Pier 1; the time limit for completing the work authorized ends on 31 January 2019. The FHWA and DOT&PF will conduct formal Section 7 consultation under the ESA on behalf of the USACE. It is expected that a USACE permit modification may be required following completion of Section 7 consultation and approval of this IHA request to incorporate changed conditions and mitigation measures.

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12 MEASURES TO REDUCE IMPACTS TO SUBSISTENCE USERS

The proposed project is not known to occur in a subsistence hunting area. It is an urbanized area with regular boat traffic. However, DOT&PF plans to provide advance public notice of construction activities to reduce construction impacts on local residents, ferry travelers, adjacent businesses, and other users of Pier 1 (FHWA 2013). This will include notification to local Alaska Native tribes that may have members who hunt marine mammals for subsistence. Of the marine mammals considered in this IHA application, only harbor seals and sea lions are used for subsistence in the project area. If any tribes express concerns regarding project impacts to subsistence hunting of marine mammals, further communication between DOT&PF will take place, including provision of any project information, and clarification of any mitigation and minimization measures that may reduce impacts to marine mammals.

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13 MONITORING AND REPORTING

Monitoring measures will be implemented along with the mitigation measures (Section 11) to reduce impacts to marine mammals to the lowest extent practicable during construction, as discussed in detail in the Marine Mammal Monitoring and Mitigation Plan (Appendix A). The monitoring plan will focus on visual observations. It should be noted that the titles Protected Species Observers (PSOs), Marine Mammal Observers (MMOs), and Wildlife Observers (WOs) are intended to be synonymous for consultation, documentation, and construction purposes.

Trained Wildlife Observers will collect sighting data and behavioral responses to construction for Steller sea lions, harbor seals, harbor porpoises, and killer whales observed within the harassment zones during construction. The project will be shut down if any other marine mammal species is observed within or entering the 225-meter (738-foot) Level B harassment zone during impact pile installation or the 1,150-meter (3,773-foot) Level B harassment zone during vibratory pile installation or extraction. In-water work will remain shut down until marine mammals for which no take has been authorized have left the harassment zones. All Wildlife Observers will be trained in marine mammal identification and behaviors. NMFS requires that Wildlife Observers have no other construction-related tasks while conducting monitoring. The Wildlife Observers will monitor the Level A and Level B harassment zones before, during, and after activities considered likely to generate sound levels reaching or exceeding harassment levels.

13.1 Observations

One Wildlife Observer will begin observations 30 minutes prior to the start of pile installation or extraction, and will continue to observe for 20 minutes after completion of pile installation or extraction. A second Wildlife Observer will be available to observe during alternate shifts of 4–6 hours each day to prevent fatigue. Each Wildlife Observer will also provide scheduled breaks to the other Wildlife Observer during the 4- to 6-hour shifts. When not providing a break, the alternate Wildlife Observer will conduct visual surveys of the greater Kodiak harbor area, including the Dog Bay haulout, to monitor the general distribution of sea lions (e.g., to monitor changes in the number of sea lions at the haulout, which may influence the number of individual sea lions in the project vicinity).

Wildlife Observers will understand their roles and responsibilities before beginning field work. Each Wildlife Observer will be trained and provided with reference materials to ensure standardized and accurate observations and data collection. A clear authorization and communication system will be in place to ensure Wildlife Observers and construction crew members understand their respective roles and responsibilities. Harsh weather such as high sea state, high winds, fog, heavy rain, or snowfall may result in canceling pile-driving activities due to poor visibility.

Before the proposed project commences, the Wildlife Observers and DOT&PF authorities will meet to determine the most appropriate observation platform(s) for monitoring during pile installation and extraction. Considerations will include:

- Heights and locations of the observation platforms, to maximize fields of view and distances
- Ability to see the entire harassment zones

- Safety of the Wildlife Observers, construction crews, and other people present at the project
- Minimizing interference with project activities

Specific aspects and protocols of observations will also include:

- Monitoring distances will be measured with range finders.
- Distances to animals will be based on the best estimate of the Wildlife Observer, relative to known distances to objects in the vicinity of the Wildlife Observer.
- Bearings to animals will be determined by using a compass.
- Pre-Activity Monitoring:
  - The Level A and Level B harassment zones will be monitored for 30 minutes prior to in-water pile installation or extraction.
  - If a marine mammal is present within the Level A harassment zone, ramping up will be delayed until the animal(s) leaves the zone. Activity will begin only after the Wildlife Observer has determined that, through sighting, the animal(s) has moved outside the Level A harassment zone.
  - If any marine mammal other than Steller sea lions, harbor seals, harbor porpoises, or killer whales is present in the Level B harassment zones, ramping up will be delayed until the animal(s) leaves the zone. Ramping up will begin only after the Wildlife Observer has determined that, through sighting, the animal(s) has moved outside the harassment zone.
- Post-Activity Monitoring
  - Monitoring of the Level A and Level B harassment zones will continue for 20 minutes following the completion of the activity.

13.2 Data Collection

NMFS requires that the Wildlife Observers use NMFS-approved sighting forms (see Appendix A). NMFS requires that the following information is collected on the sighting forms:

- Date and time that pile installation or removal begins or ends
- Construction activities occurring during each observation period
- Weather (wind, precipitation, fog)
- Tide state and water currents
- Visibility
- Species, numbers, and if possible sex and age class of marine mammals
- Marine mammal behavior patterns observed, including bearing and direction of travel, and if possible, the correlation to SPLs
- Distance from pile-driving activities to marine mammals

- Other human activity in the area

13.3 Reporting

A draft report will be submitted to NMFS within 90 calendar days of the completion of marine mammal monitoring. A final report will be prepared and submitted to NMFS within 30 days following receipt of comments on the draft report from NMFS. To the extent practicable, the Wildlife Observers will record behavioral observations that may make it possible to determine if the same or different individuals are being "taken" as a result of project activities over the course of a day.

In general, reporting will include:

- Descriptions of any observable marine mammal behavior in the Level A and Level B harassment zones
- Descriptions of underwater and airborne sound levels occurring at the time of the observable behavior
- Actions performed to minimize impacts to marine mammals
- Times when work was stopped and resumed due to the presence of marine mammals
- Results, which include the detections of marine mammals, species and numbers observed, sighting rates and distances, and behavioral reactions within the Level A and Level B harassment zones
- A refined take estimate based on the number of Steller sea lions, harbor seals, harbor porpoises, and killer whales observed during the course of construction

See Appendix A for more detail.

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14 SUGGESTED MEANS OF COORDINATION

To minimize the likelihood that impacts will occur to the species, stocks, and subsistence use of marine mammals, all project activities will be conducted in accordance with all federal, state, and local regulations. To further minimize potential impacts from the planned project, the DOT&PF will continue to cooperate with NMFS and other appropriate federal agencies (e.g., U.S. Fish and Wildlife Service, USACE, FHWA), and the State of Alaska.

The DOT&PF will cooperate with other marine mammal monitoring and research programs taking place in the Kodiak area to coordinate research opportunities when feasible. The DOT&PF will also assess mitigation measures that can be implemented to eliminate or minimize any impacts from these activities. The DOT&PF will make available its field data and behavioral observations on marine mammals that occur in the project area. Results of monitoring efforts will be provided to NMFS in a draft summary report within 90 days of the conclusion of monitoring. This information could be made available to regional, state, and federal resource agencies, universities, and other interested private parties upon written request to NMFS.

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Appendix A
Marine Mammal Monitoring and Mitigation Plan

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Marine Mammal Monitoring and Mitigation Plan

Kodiak Ferry Terminal and Dock Improvements Project

State Project #68938

June 2015

Prepared for:
Alaska Department of Transportation and Public Facilities
6860 Glacier Highway
Juneau, Alaska 99801

Prepared by:
HDR

With Input from:
R&M Consultants, Inc.

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Acronyms and Abbreviations

4MP	Marine Mammal Monitoring and Mitigation Plan
BA	Biological Assessment
dB	Decibel
DOT& PF	Alaska Department of Transportation and Public Facilities
ESA	Endangered Species Act
FR	*Federal Register*
IHA	Incidental Harassment Authorization
MMPA	Marine Mammal Protection Act
µPa	MicroPascal
NMFS	National Marine Fisheries Service
rms	Root Mean square
wDPS	Western Distinct Population Segment

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1.0 INTRODUCTION

The Alaska Department of Transportation and Public Facilities (DOT&PF) proposes the following Marine Mammal Monitoring and Mitigation Plan (4MP) for use during pile installation and extraction for the proposed Kodiak Ferry Terminal and Dock Improvements Project at Pier 1 in Kodiak, Alaska. The 4MP was prepared as an appendix to the request for an Incidental Harassment Authorization (IHA) under the Marine Mammal Protection Act (MMPA), and in support of the Biological Assessment (BA) for formal Section 7 consultation with the National Marine Fisheries Service (NMFS) under the Endangered Species Act (ESA).

The Pier 1 project will reconstruct an existing ferry terminal, including the removal and installation of piles in the marine environment. The project has the potential to generate elevated levels of underwater and in-air noise that could exceed Level A (injury) and Level B (disturbance) harassment thresholds established by NMFS for marine mammals under the MMPA (70 Federal Register [FR] 1871-1875).

Level A harassment means any act of pursuit, torment, or annoyance that has the potential to injure a marine mammal or marine mammal stock in the wild. Level B harassment means any act of pursuit, torment, or annoyance that has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering, but that does not have the potential to injure a marine mammal or marine mammal stock in the wild.

NMFS has defined levels of harassment for marine mammals under water as:

- **Level A Harassment – injury by continuous or impulse noise**: NMFS has established a "do not exceed" exposure criterion of 180 decibels (dB) re 1 microPascal (µPa) root mean square (rms) for cetaceans and 190 dB re 1 µPa rms for pinnipeds.
- **Level B Harassment – harassment by impulse noise** (e.g., impact pile driving and down-hole drilling) is set at 160 dB re 1 µPa rms.
- **Level B Harassment – harassment by continuous noise** (e.g., vibratory pile driving) is set at 120 dB re 1 µPa rms (70 FR 1871-75).

Steller sea lions (*Eumetopias jubatus*) from the western Distinct Population Segment (wDPS), harbor seals (*Phoca vitulina*), harbor porpoises (*Phocoena phocoena*), and killer whales (*Orcinus orca*) may occur in the Pier 1 project area, and a small number of Level B takes was requested for these marine mammals. A small number of Level A takes was also requested for Steller sea lions. Humpback whales (*Megaptera novaeangliae*), fin whales (*Balaenoptera physalus*), gray whales (*Eschrichtius robustus*), and Dall's porpoises (*Phocoenoides dalli*) generally inhabit more offshore habitats than the Near Island channel and are not expected to occur in the vicinity of the Pier 1 project area; no Level A or Level B take was requested for these species, and pile removal or installation will be halted to avoid take of these species.

The overall goal of this 4MP is to ensure compliance with the ESA and MMPA when the 4MP is implemented by the Wildlife Observers at the project site. This 4MP has been developed to minimize and mitigate harassment to marine mammals during Pier 1 construction activities, and to monitor and record the extent of harassment when it does occur. This 4MP also describes the methods that will be used to monitor and record the extent of Level A and Level B harassment. Please refer to the IHA application and BA prepared for the Pier 1 project for a more detailed discussion of the project and its potential effects on marine mammals, including additional details on mitigation methods that will be implemented during construction.

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2.0 HARASSMENT THRESHOLDS

Distances to the harassment thresholds, as defined by sound isopleths, vary by marine mammal type and by pile-removal and installation tool (Table 2-1). The Level B harassment isopleth will be 3 meters during down-hole drilling, 225 meters during impact pile installation when pile caps are used, and 1,136 meters during vibratory pile installation or removal (Table 2-1; Figure 2-1). The Level B harassment isopleth for vibratory pile driving will be rounded up to 1,150 meters for monitoring purposes for the Pier 1 project. The Level B harassment zone for down-hole drilling is too small, at 3 meters, to be illustrated to scale and is not shown in Figure 2-1. The monitored Level B harassment zone for vibratory pile installation and removal will include the entire area that is ensonified within Near Island Channel, and then will extend along the channel to the northeast and southwest based on vectors from the sound source. Marine waters will not be monitored if they are located behind landmasses such as islands or headlands that have blocked transmission of sound, as it will be assumed that these areas will not be ensonified.

Level A harassment of Steller sea lions would occur only within 4 meters if pile caps are used during impact hammering, or within 9 meters if pile caps are not used (Table 2-1; Figure 2-2).

Table 2-1. Distances in meters from Pier 1 construction activity to NMFS' Level A and Level B harassment thresholds (isopleths) for different pile installation and extraction methods and pile types, assuming a 125-dB background noise level

Method, pile type	Level A		Level B
	Pinnipeds	Cetaceans	Pinnipeds and Cetaceans
Vibratory Hammer			
Timber pile extraction	<1	<1	506
Steel H-piles	<1	<1	167
24-inch steel piles	<1	1	1,136
18-inch steel piles	<1	1	1,136
16-inch timber piles	<1	1	1,136
Down-hole Drill			
24-inch steel piles	<1	<1	3
Impact Hammer			
With caps			
24-inch steel piles	4	15	225
Without caps			
24-inch steel piles	9	34	508

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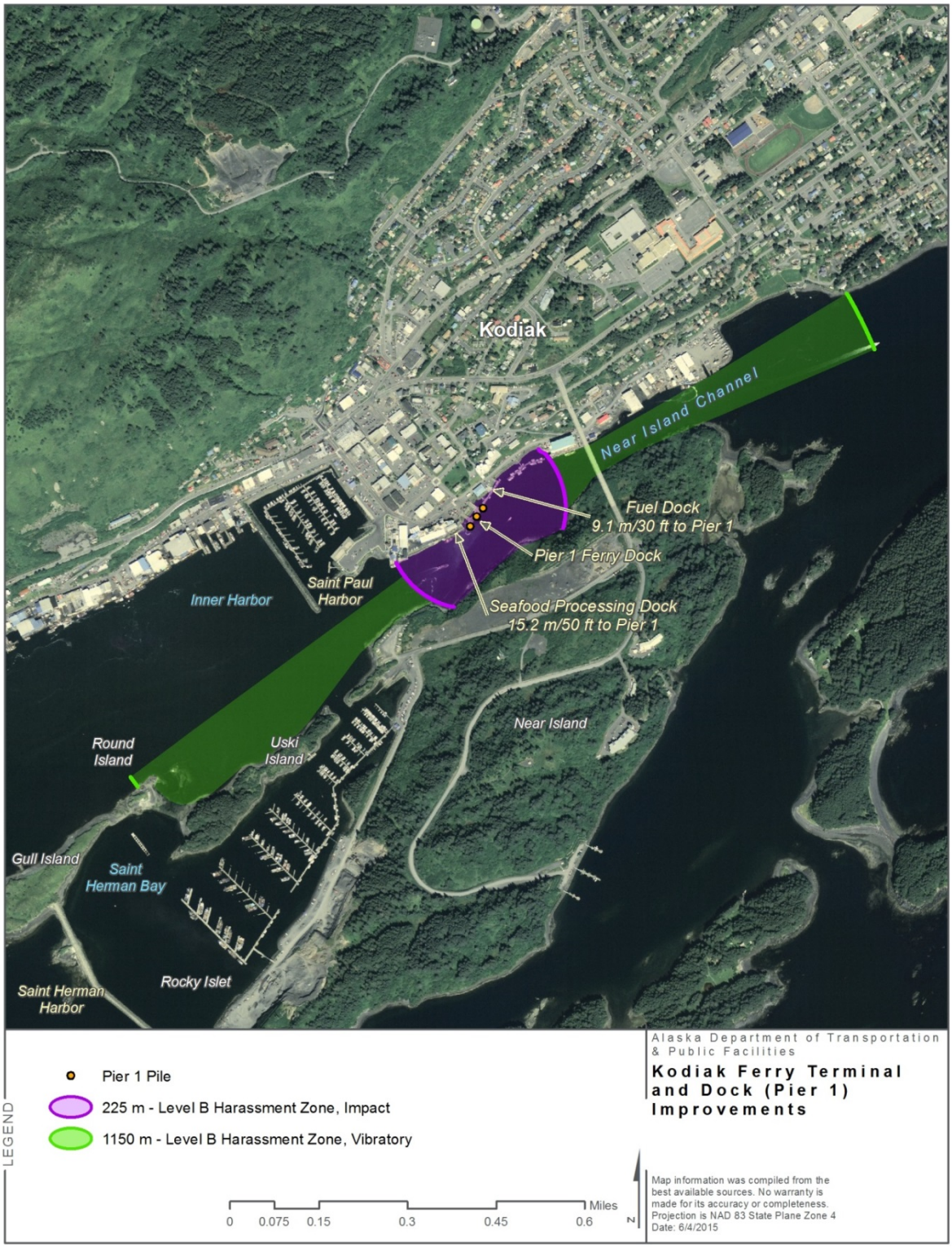

Figure 2-1. Distances to the underwater 125 dB rms (vibratory noise, rounded to 1,150 meters) and 160 dB rms (impact noise) Level B isopleths

Note that the distance to the underwater 160 dB rms down-hole drilling Level B isopleth is 3 meters and is not depicted in this figure due to scale and clarity. Harassment zones are based on vectors radiating from the sound source where landforms and solid dock structures do not block sound and are illustrated accordingly.

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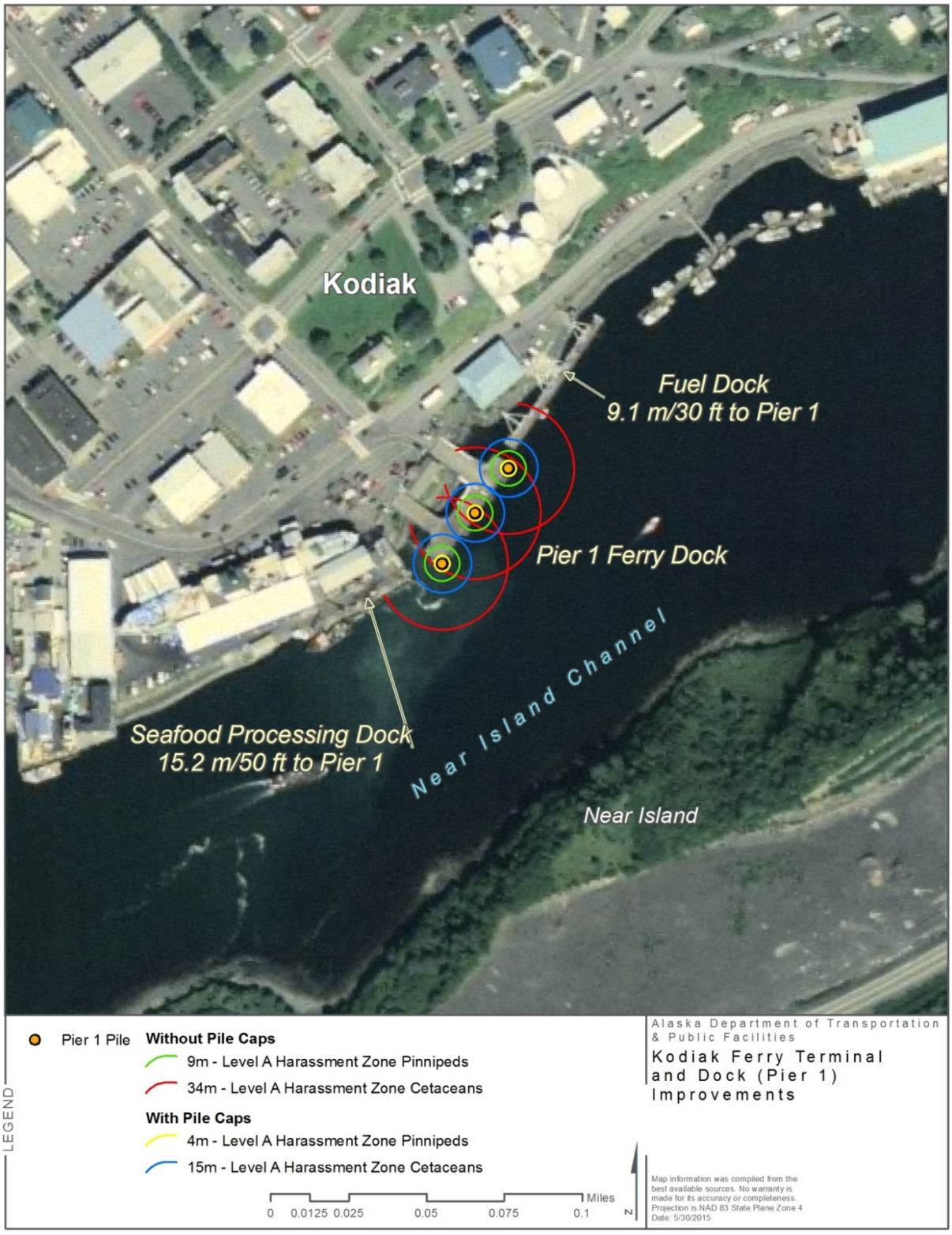

Figure 2-2. Distances to the underwater sound isopleths for Level A harassment for impact pile installation for cetaceans and pinnipeds

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3.0 MARINE MAMMAL MONITORING

To minimize impacts of project activities on marine mammals, Wildlife Observers will be present at the Pier 1 site during down-hole drilling, impact pile installation, and vibratory pile removal and installation. Wildlife Observers will search for, monitor, document, and track marine mammals around and within the Level A and Level B harassment zones (Figure 2-1 and Figure 2-2). It should be noted that the titles Protected Species Observer, Marine Mammal Observer, and Wildlife Observer are intended to be synonymous for consultation, documentation, and construction purposes.

3.1 Monitoring Overview

One Wildlife Observer will begin observations of the appropriate harassment zones 30 minutes prior to the start of pile installation or extraction, and will continue to observe for 20 minutes after completion of pile installation or extraction. During monitoring, the Wildlife Observer will scan the water every few minutes with high-quality binoculars, and will use the naked eye to scan during the remainder of the time. A high-powered spotting scope will also be available for scanning greater distances, so that any marine mammals swimming toward the harassment zones can be observed.

A second Wildlife Observer will be available to observe during alternate shifts of 4–6 hours each day to prevent fatigue. When not monitoring at the Pier 1 project site, the second Wildlife Observer will conduct periodic visual surveys of the Dog Bay float. Monitoring numbers of Steller sea lions hauled out on the Dog Bay float will provide an index of numbers using the harbor area, which may reflect the number of individual sea lions in the Pier 1 project vicinity. Counts of Steller sea lions hauled out on the Dog Bay float will be conducted at least twice per week during the in-water construction period at Pier 1. Four counts will be made per day to account for variability in numbers due to time of day, tide, and other factors.

Wildlife Observers will have no other construction-related tasks or responsibilities while monitoring for marine mammals. Each Wildlife Observer will be trained in marine mammal identification and behaviors, and provided with reference materials to ensure standardized and accurate observations and data collection.

Before construction commences, the Wildlife Observers will meet with the Contractor and DOT&PF to determine the most appropriate observation platform for monitoring during pile removal and installation. Considerations will include:

- Height of the observation platform, to maximize field of view and distance
- Ability to see the harassment zones
- Safety of the Wildlife Observers, construction crews, and other people present during construction
- Minimization of interference with construction activities

A clear authorization and communication system will be in place to ensure that Wildlife Observers and the construction crew understand their respective roles and responsibilities. If pile installation or extraction must be powered down or shut down to avoid take, the Wildlife Observer will contact a designated member of the construction crew. A “shutdown” is defined as a duration of 30 minutes or more when in-water noise from pile removal or installation does

not occur. All communications with the construction crew will be documented in the environmental conditions and construction activities log (Section 3.3.2). Although it is the role of the Wildlife Observers to watch for marine mammals, DOT&PF construction personnel will be trained and instructed to notify the Wildlife Observers immediately if they observe a marine mammal.

Specific aspects and protocols of marine mammal observations will also include:

- Monitoring distances will be measured with range finders.
- Distances to animals will be based on the best estimate of the Wildlife Observer, relative to known distances to objects in the vicinity of the Wildlife Observer.
- Bearings to animals will be determined by using a compass.
- Pre-Activity Monitoring:
    - The Level A and Level B harassment zones will be monitored for 30 minutes prior to in-water pile removal or installation.
    - If a marine mammal is present within the Level A harassment zone, ramping up will be delayed until the animal(s) leaves the Level A harassment zone. Activity will begin only after the Wildlife Observer has determined, through sighting, that the animal(s) has moved outside the Level A harassment zone.
    - If a Steller sea lion, harbor seal, harbor porpoise, or killer whale is present in the Level B harassment zone, ramping up will begin and a Level B take will be documented. Ramping up will occur when these species are in the Level B harassment zone whether they entered the Level B zone from the Level A zone, or from outside the project area.
    - If any marine mammal other than Steller sea lions, harbor seals, harbor porpoises, or killer whales is present in the Level B harassment zone, ramping up will be delayed until the animal(s) leaves the zone. Ramping up will begin only after the Wildlife Observer has determined, through sighting, that the animal(s) has moved outside the harassment zone.
- During-Activity Monitoring:
    - Vibratory Pile Installation or removal (Level B at 1,150 meters)
        - Vibratory pile installation or removal will continue if a Steller sea lion, harbor seal, harbor porpoise, or killer whale enters the Level B harassment zone and a Level B take will be documented. If Level B take reaches the authorized limit, then vibratory pile installation will be stopped as these species approach to avoid additional take of these species.
        - Vibratory pile installation or removal will be stopped if a humpback whale, Dall's porpoise, gray whale, fin whale, or any other marine mammal for which take is not authorized approaches the Level B harassment zone.
    - Impact Pile Installation (Level B at 225 meters)
        - Impact pile installation will continue if a Steller sea lion, harbor seal, harbor porpoise, or killer whale enters the Level B harassment zone and a Level B

take will be documented. If Level B take reaches the authorized limit, then impact pile installation will be stopped as these species approach to avoid additional take of these species.

- Impact pile installation will be stopped if a humpback whale, Dall's porpoise, gray whale, fin whale, or any other marine mammal for which take is not authorized approaches the Level B harassment zone.

- Impact Pile Installation (with pile caps, Level A at 4 meters for pinnipeds and 15 meters for cetaceans)
  - Impact pile installation will be stopped if any species of marine mammal approaches the Level A harassment zone. If a Steller sea lion enters the Level A harassment zone before impact pile installation can be stopped, then a Level A take will be documented.
- Down-hole Drilling (Level B at 3 meters)
  - Down-hole drilling will continue if a Steller sea lion, harbor seal, harbor porpoise, or killer whale enters the Level B harassment zone and a Level B take will be documented. If Level B take reaches the authorized limit, then down-hole drilling will be stopped as these species approach to avoid additional take of these species.
  - Down-hole drilling will be stopped if a humpback whale, Dall's porpoise, gray whale, fin whale, or any other marine mammal for which take is not authorized approaches the Level B harassment zone.

- Post-Activity Monitoring:
  - Monitoring of the Level A and Level B harassment zones will continue for 20 minutes following the completion of the activity.

3.2 Wildlife Observer Qualifications

At a minimum, all Wildlife Observers must be capable of spotting and identifying marine mammals and documenting applicable data during all types of weather, including rain, sleet, snow, and wind. All Wildlife Observers must also be comfortable with handling the authority to stop work when necessary.

Qualifications will include:

- Visual acuity in both eyes (correction is permissible) sufficient to allow detection and identification of marine mammals at the water's surface. Use of binoculars may be necessary to correctly identify the target to species.
- Demonstrated ability to conduct field observations and collect data according to assigned protocols (this may include academic training).
- Ability to work in cold, wet weather, including sleet, wind, snow, and rain.
- Experience or training in field identification of marine mammals.

- Sufficient training, orientation, or experience with construction operations to provide for personal safety during observations.
- Ability to communicate orally, by radio or in person, with project personnel about marine mammals observed in the area.
- Ability to collect the required marine mammal observation data as detailed in Section 3.3.

3.3 Data Collection

3.3.1 Environmental Conditions and Construction Activity

The Wildlife Observer will also document environmental conditions, types of construction activities, types of nearby commercial activities, and any communications with the construction crew in the environmental conditions and construction activities log. Environmental conditions will be documented at the beginning and end of every monitoring period and every half hour, or as conditions change. Any nearby commercial activities that could influence marine mammal behavior will be documented at the time of a marine mammal sighting. These could include presence and number of vessels offloading at the seafood processing facility dock, the number and type of vessels sailing by, and the number and type of vessels refueling at the neighboring dock. Data collected will also include the Wildlife Observers' names; location of the observation station; time of observation; wave height; wind speed; amount and position of glare; weather conditions; and visibility (Table 3-1).

The Wildlife Observer will document the time of startup or ramping up (Section 4.2) as well as shutdown. The reason for stopping work, time of shutdown, and type of pile driving or other in-water work taking place will also be documented. Additionally, all communications between an Wildlife Observer and the construction crew will be documented.

Data collected regarding environmental conditions, marine mammal sightings, and mitigation measures will be entered into a spreadsheet. Each data entry will be checked for quality assurance and quality control. Upon request, the data will be submitted to NMFS along with the final monitoring report.

3.3.2 Sightings

Each marine mammal sighting will be documented on a sighting form, which consists of a data page/table on the front and a map on the back (Attachment 1). Alternatively, data will be collected using a laptop, tablet or similar electronic device that is protected from wet weather. Regardless of the collection platform, data will consist of start and end times of each sighting; number of individuals; sex and age class, if possible; behavior and movement; distances from project activities to the sighting; type of in-water activity at the time of sighting; and whether and when project activities were stopped in response to the sighting (Table 3-1). Monitoring distances will be measured with range finders and marked with buoys as needed. To the extent practicable, the Wildlife Observers will record behavioral observations that may make it possible to determine if the same or different individuals are being "taken" as a result of project activities over the course of a single day. While monitoring and tracking a sighting, Wildlife Observers will also continue to sweep the water with binoculars and the naked eye to identify other marine mammals potentially entering the area. These data will be submitted to NMFS as part of the final monitoring report.

Table 3-1. Data attributes and definitions

Data Attribute	Attribute Definition and Units Collected
Environmental Conditions	
Weather conditions	Dominant weather conditions, collected every 30 minutes: sunny (S), partly cloudy (PC), light rain (LR), steady rain (R), fog (F), overcast (OC), light snow (LS), snow (SN)
Wind speed	In knots
Wind direction	From the north (N), northeast (NE), east (E), southeast (SE), south (S), southwest (SW), west (W), northwest (NW)
Wave height	Calm, ripples (up to 4 inches), small wavelets (up to 8 inches), large wavelets (up to 2 feet), small waves (up to 3 feet), moderate waves (up to 6 feet), large waves (up to 9 feet)
Cloud cover	Amount of cloud cover (0–100%)
Visibility	Maximum distance at which a marine mammal could be sighted
Glare	Amount of water obstructed by glare (0–100%) and direction of glare (from south, north, etc.)
Tide	Predicted hourly data information gathered from National Oceanic and Atmospheric Administration will be available on-site
Construction and Communication Activities	
Time of event	Time that construction activities and all communications between Wildlife Observers and construction crews take place
Type of construction activity	Type of construction activity occurring, including ramp up, startup, shutdown, and type of pile driving
Communication	Information communicated between Wildlife Observers and construction crew
Marine Mammal Sighting Data	
Time of initial and last sighting	Time the animals are initially and last sighted
Number of individuals	Minimum and maximum number of animals counted; record the count the Wildlife Observer believes to be the most accurate
Sex and age, if possible	Generally, numbers of females with pups or calves
Initial and final heading	Direction animals are headed when initially and last sighted
In-water construction activities at time of sighting	Type of construction activities occurring at time of sighting
Distance from marine mammal to construction activities	Distance from marine mammal to construction activities when initially sighted, closest approach to activities, and final sighting
Commercial activities at time of sighting	Description of nearby commercial activities occurring at time of sighting, such as presence and number of vessels offloading at seafood processing facility dock, number and type of vessels sailing by, number and type of vessels refueling at dock
Behavior	Behaviors observed, indicating the primary and secondary behaviors
Change in behavior	Changes in behavior; indicate and describe
Group cohesion	Orientation of animals within the group and the distance between animals

4.0 MITIGATION MEASURES

The DOTP&F proposes to employ mitigation measures to minimize the number of marine mammals potentially affected. Mitigation measures discussed here will include those that pertain to Level A and Level B harassment zones, and those that involve observation of marine mammals and actions designed specifically to minimize the number of marine mammal takes in the immediate project area.

4.1 Harassment Zones

Modeling results for Level A and Level B harassment zones discussed in Section 2.0 were used to develop mitigation measures for pile removal and installation. These include:

- During pile installation and removal, the shutdown zone shall include all areas where the underwater noise levels are anticipated to equal or exceed the Level A (injury) harassment criteria for Steller sea lions and harbor seals (190 dB rms isopleth) and for harbor porpoises and killer whales (180 dB rms isopleth). During all pile installation and removal activities, regardless of predicted noise levels, a conservative 4-meter (13-foot) shutdown zone will be in effect for Steller sea lions and harbor seals, and a conservative 15-meter (50-foot) shutdown zone will be in effect for harbor porpoises and killer whales.
- During impact pile installation, the Level B harassment zone shall extend to 225 meters for Steller sea lions, harbor seals, harbor porpoises, and killer whales. This 225-meter distance will serve as a shutdown zone for all other marine mammals (humpback whales, Dall's porpoises, gray whales, fin whales, or any other) to avoid Level B take. Level B take of humpback whales, Dall's porpoises, gray whales, and fin whales is not requested and will be avoided by shutting down before individuals of these species enter the Level B harassment zone.
- During vibratory pile installation and removal, the Level B harassment zone shall extend to 1,150 meters for Steller sea lions, harbor seals, harbor porpoises, and killer whales. This 1,150-meter distance will serve as a shutdown zone for all other marine mammals (humpback whales, Dall's porpoises, gray whales, fin whales, or any other) to avoid Level B take. Level B take of humpback whales, Dall's porpoises, gray whales, and fin whales is not requested and will be avoided by shutting down before individuals of these species enter the Level B harassment zone.
- The Level A and Level B harassment zones will be monitored throughout the time required to install or extract a pile. If a harbor seal, harbor porpoise, or killer whale is observed entering the Level B harassment zone, a Level B exposure will be recorded and behaviors documented. That pile segment will be completed without cessation, unless the animal approaches the Level A shutdown zone. Pile installation or extraction will be halted immediately before the animal enters the Level A zone. Level A take of harbor seals, harbor porpoises, and killer whales is not requested and will be avoided by shutting down before individuals of these species enter the Level A harassment zone.
- If a Steller sea lion, harbor seal, harbor porpoise, or killer whale is present in the Level B harassment zone, ramping up will begin and a Level B take will be documented. Ramping up will occur when these species are in the Level B harassment zone whether they entered the Level B zone from the Level A zone, or from outside the project area.

- If a Steller sea lion is observed entering the Level B harassment zone, a Level B exposure will be recorded and behaviors documented. That pile segment will be completed without cessation. If the individual approaches the Level A harassment zone, pile installation will be halted, to try to avoid Level A exposure. However, as discussed in the DOT&PF's IHA application, it is possible that Level A exposure of sea lions will occur, despite best efforts to avoid Level A exposure. If a Steller sea lion is observed entering the Level A harassment zone, shutdown will occur immediately, and a Level A exposure will be recorded and behaviors documented. Sea lion behaviors will be recorded at all times during monitoring.

4.2 Starting Up and Ramping Up

At the beginning of the work day or when pile installation or extraction activities have been stopped for longer than 30 minutes, ramping up procedures will be implemented. Ramping up generally involves starting the equipment for brief durations to provide marine mammals in the vicinity of a construction site with an audible warning of impending noise, giving them the opportunity to leave the area before noise reaches the threshold of disturbance.

Each day before in-water pile removal or installation begins, the Wildlife Observer will search the Level A and Level B harassment zones for 30 minutes to locate any marine mammals. If a marine mammal is present within the Level A harassment zone, ramping up will not begin. If a humpback whale, Dall's porpoise, gray whale, or fin whale, or other species for which Level B take is not authorized is present within the Level B harassment zone, ramping up will not begin. If a Steller sea lion, harbor seal, harbor porpoise, or killer whale is present within the Level B zone, ramping up will be authorized to begin and a Level B take will be recorded for each individual marine mammal.

For impact pile driving, ramping up will be accomplished by an initial set of three strikes, followed by a 30-second waiting period, and then followed by two subsequent three-strike sets. For vibratory pile installation or extraction, sound will be initiated for 15 seconds followed by a 1-minute waiting period; this will be repeated two subsequent times.

If pile-driving installation or extraction is stopped for more than 30 minutes, work may be started again after the above ramping-up procedures are followed.

Ongoing in-water pile removal or installation will be continued during periods when conditions such as low light, darkness, high sea state, fog, ice, rain, glare, or other conditions prevent effective marine mammal monitoring of the entire Level B harassment zone, provided both the in-water noise-generating activity and marine mammal monitoring continues (acknowledging that monitoring will occur at a reduced level of effectiveness). A Wildlife Observer will continue to monitor the visible portion of the Level B harassment zone throughout the duration of activities producing in-water noise. Pile removal or installation will not be initiated or ramped up from a "shutdown condition" when the complete Level B harassment zone is not visible for a continuous 30-minute pre-operational monitoring period (whether due to darkness, low light, high sea state, fog, ice, heavy rain, glare, or other conditions). A shutdown condition is defined as a duration of 30 minutes or more when in-water noise from pile removal or installation does not occur.

4.3 Avoiding Level A take

During all pile installation and removal activities, regardless of predicted noise levels, a conservative 4-meter (13-foot) shutdown zone will be in effect for Steller sea lions and harbor

seals, and a conservative 15-meter (50-foot) shutdown zone will be in effect for harbor porpoises and killer whales. This mitigation measure will effectively avoid Level A take for all marine mammals, with the potential exception of Steller sea lions, which are abundant in the project area and are attracted to the neighboring seafood processing facility (see DOT&PF's IHA application). Any Level A take of Steller sea lions will be documented.

4.4 Other Mitigation Measures

Site visits to the Pier 1 area and discussions with local stakeholders have resulted in potential mitigation measures that require further consideration and assessment.

Currently, vessels making deliveries to the seafood processing plant tie up at the dock on their starboard sides, with their sterns to the northeast toward the Pier 1 dock. If delivering vessels were able to tie up on their port sides, with their sterns toward the southwest, away from Pier 1, the distance between the area of attraction for sea lions (the stern, where fish may be available) and Pier 1 would be reduced by the length of the vessel (up to 30.5 meters [100 feet] or more). Initial discussions with the seafood processing plant indicated that reversing the typical docking orientation of delivering vessels may be an option during the short periods of time when impact pile driving is planned. Further discussions and coordination are anticipated.

At certain busy times during the year, multiple vessels may wait in line for their turn to make fish deliveries to the processing plant. Often, the vessels "raft up" out from the processing plant dock by tying up to one another, port to starboard, into the channel. This additional activity and presence of multiple sources of food at once can increase the number of sea lions attracted to the processing plant and the Pier 1 area. If alternative dock space were available in another place, such as at Pier 2 or Oscar's Dock, both City of Kodiak-owned facilities, vessel captains may choose to tie up in a less-congested area, reducing the attraction of sea lions to the processing plant and Pier 1. Further discussions of this potential mitigation measure are also anticipated.

5.0 REPORTING

A draft report will be submitted to NMFS within 90 calendar days of the completion of marine mammal monitoring. A final report will be prepared and submitted to NMFS within 30 days following receipt of comments on the draft report from NMFS. To the extent practicable, the Wildlife Observers will record behavioral observations that may make it possible to determine if the same or different individuals are being "taken" as a result of project activities over the course of a single day.

In general, reporting will include:

a. Numbers of days of observations

b. Lengths of observation periods

c. Locations of observation stations and dates used

d. Numbers, species, dates, group sizes, and locations of marine mammals observed

e. Descriptions of work activities, categorized by type of work taking place while marine mammals were being observed

f. Distances to marine mammal sightings, including closest approach to construction activities

g. Descriptions of any observable marine mammal behavior in the Level A and Level B harassment zones

h. Actions performed to minimize impacts to marine mammals

i. Times of shutdown events including when work was stopped and resumed due to the presence of marine mammals or other reasons

j. Refined take estimates based on the numbers of Steller sea lions, harbor seals, harbor porpoises, and killer whales observed during the course of pile installation and removal activities

k. Descriptions of the type and duration of any noise-generating work occurring and ramp-up procedures used while marine mammals were being observed

l. Details of all shutdown events, and whether they were due to presence of marine mammals, inability to clear the hazard area due to low visibility, or other reasons

m. Summary of counts at the Dog Bay float and surrounding areas that are being monitored by the alternate Wildlife Observer

n. Summary of vessel activities at the adjacent seafood processing plant

o. Tables, text, and maps to clarify observations

Full documentation of monitoring methods, an electronic copy of the data spreadsheet, and a summary of results will also be included in the report.

If a marine mammal stranding is observed, NMFS or the U.S. Fish and Wildlife Service will be contacted immediately through the Alaska Marine Mammal Stranding Hotline (1-877-925-7773).

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Attachment 1: Data Forms

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Marine Mammal Sighting Form

Project: **Location:** **Sighting #:**

(1st sighting of the day is Sighting#: 1)

Date: **Observer(s):**

Time *(military)*		**Species** *(circle)*	**Distance** *(animal to activity)*		**Number of Animals**		**Number of Animals in Each Class**			
Initial Sighting Time		Steller Sea Lion	Initial Distance		Min Count		Adults		Calves/ Pups	
Final Sighting Time		Harbor Seal	Closest Distance		Max Count		Juveniles		Unkn. Age	
Time Entered H-Zone B		Harbor Porpoise	Final Distance		Best Count					
Time Exited H-Zone B		Killer Whale					Male		Female	
Time Entered H-Zone A		Sea Otter								
Time Exited H-Zone A		other: _____					Unknown Sex			

Behavior of Marine Mammal check all observed behaviors; place a 1 next to primary, 2 next to secondary activity):
Indicate any changes in behavior in the Additional Information section

__ Travel __ Fight __ Mill Other:_____
__ Disoriented __ Play __ Dive
__ Slap __ Spyhop __ Unknown
__ Feeding Observed __ Swimming Toward Site __ Swimming Away from Site

Group Cohesion (Orientation of animals within the group and the approx. distance between animals) :

Project Activities and Harassment Zone

Entered Harassment Zone A? **Y or N** **Entered Harassment Zone B?** **Y or N**

In-Water Work was occuring at initial sighting? **Y or N** **List In-water Activites**:_____

SHUT DOWN or **DELAYED** from _____ to _____ (time)

NO SHUT DOWN, *EXPLANATION REQUIRED* :

Describe Commerical Activities (# and type of vessels offloading at sea food processing dock, traveling by, refueling at dock):

Additional Information (include more detailed information on behavior):

Draw locations on hardcopy map

Daily Environmental Conditions, Construction, and Communication Activity Log

Page _____ of _____

Project:_____ Location:_____ Observer(s):_____ Date: _____

Environmental Conditions (Recorded every 30 minutes or as conditions change)									Construction and Communication Activities *(include all start up and shut-down activities and all communication to construction crew)*		
Time	Weather Conditions	Wind Speed	Wind Direction	Beaufort Sea State	Glare (%)	Visibility (m)	Cloud Cover (%)	Comments	Time	Type of Construction Activity *(Ramp up, Startup, shutdown, type of pile driving)*	Communication/Comments

Weather Conditions: (S) Sunny, (PC) Partly Cloudy, (L) Light Rain, (R) Steady Rain, (F) Fog, (OC)Overcast, (LS) Light Snow, (SN) Snow
Beaufort Scale: (0) Calm (1) ripples- up to 4 in (2) small wavelets- up to 8 in (3) large wavelets- up to 2 ft, (4) small waves- up to 3 ft (5) moderate waves- up to 6 ft (6) large waves- up to 9 ft


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