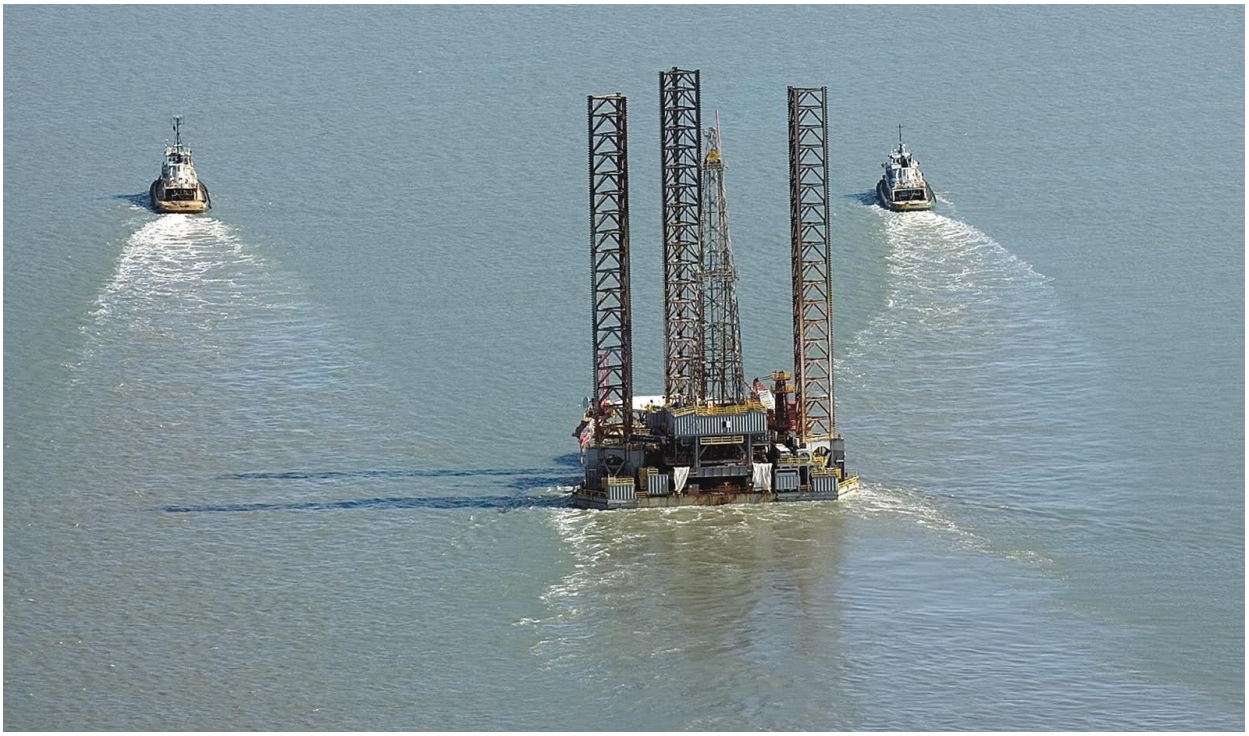
Request for Two Incidental Harassment Authorizations for 2024 to 2025 and 2025 to 2026
Furie Operating Alaska
Natural Gas Production Drilling



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ACRONYMS AND ABBREVIATIONS

°	degree
%	percent
61N	61 North Environmental
BOEM	Bureau of Ocean Energy Management
CFR	Code of Federal Regulations
CIPL	Cross Inlet Pipeline
dB	decibel
DIP	demographically independent population
DPS	distinct population segment
ESA	Endangered Species Act
FR	Federal Register
HF	high frequency
Hilcorp	Hilcorp Alaska, LLC
hp	horsepower
Hz	hertz
IHA	incidental harassment authorization
JASCO	JASCO Applied Sciences
JRP	Julius R. Platform
kHz	kilohertz
KLU	Kitchen Lights Unit
km	kilometer
km^2	square kilometer
kNm	kilonewton-meters
L_{pk}	peak received sound pressure level
LF	low frequency
MF	mid-frequency
MML	Marine Mammal Laboratory
MMPA	Marine Mammal Protection Act
NCI	North Cook Inlet
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
OPR	Office of Protected Resources
OSK	Offshore Systems Kenai
OSV	offshore supply vessel
OW	otariids in water
POA	Port of Alaska
PSO	protected species observer
PTS	permanent threshold shift
PW	phocids in water
re 1 µPa	referenced to a pressure of 1 microPascal

ACRONYMS AND ABBREVIATIONS (Continued)

rms	root mean square
SEL	sound exposure level
SEL_{cum}	cumulative sound exposure level
SLR	SLR Consulting Limited
SPL	sound pressure level
SSL	sound source level
SSV	sound source verification
TL_c	transmission loss coefficient
UME	unusual mortality event
VHF	very-high frequency
Weston	Weston Solutions, Inc.

1 DESCRIPTION OF ACTIVITIES

From April 1, 2024, through March 31, 2025, (Year 1), and from April 1, 2025 through March 31, 2026 (Year 2), Furie Operating Alaska, LLC (Furie) is planning to conduct two separate production drilling projects at the Julius R. Platform (JRP), located in Cook Inlet, Alaska (Figure 1). The JRP was constructed in 2015 and produces natural gas that is processed and sold to local utilities and industrial customers in Southcentral Alaska. The purpose of the drilling programs is to access and develop proven natural gas reserves located within the Kitchen Lights Unit, a lease area located within Cook Inlet, and bring the gas to market.

Under the authority of Section 101(a)(5)(D) of the Marine Mammal Protection Act (MMPA) (Title 16 of the United States Code [USC] § 1371(a)(5)(D)) and Title 50 of the Code of Federal Regulations [CFR] Part 216, subpart I, Furie requests two, one-year Incidental Harassment Authorizations (IHAs) from the National Oceanic and Atmospheric Administration (NOAA), National Marine Fisheries Service (NMFS)—one for Year 1 and one for Year 2—authorizing the non-lethal, incidental, unintentional take by behavioral disturbance of small numbers of the following marine mammal species that may occur in the vicinity of sound-generating activities:

- fin whales (*Balaenoptera physalus*)
- humpback whales (*Megaptera novaeangliae*)
- minke whales (*Balaenoptera acutorostrata*)
- gray whales (*Eschrichtius robustus*)
- beluga whales (*Delphinapterus leucas*)
- killer whales (*Orcinus orca*)
- harbor porpoise (*Phocoena phocoena*)
- Dall's porpoise (*Phocoenoides dalli*)
- Pacific white-sided dolphin (*Lagenorhynchus obliquidens*)
- harbor seals (*Phoca vitulina*)
- Steller sea lions (*Eumetopias jubatus*)
- California sea lions (*Zalophus californianus*).

For efficiency, the requests for each of these IHAs are combined in this submission, addressing the required elements listed in 50 CFR § 216.104 for each request.

1.1 Year 1 Activity, Equipment, and Acoustic Sources

Furie intends to conduct production drilling at the JRP with the Enterprise 151 jack-up drilling rig (or a similar rig) in both Year 1 and Year 2. Up to two conductor pipes may be driven into the seabed using an impact hammer, an acoustic source with the potential to result in the take of marine mammals described below. The two conductor pipes may be installed in Year 1, in Year 2, or one in each year. Once production drilling commences, additional lower-level sound sources include diesel generators, mud and cement pumps, and ventilation fans. Offshore supply vessels (OSVs) and helicopters will transport supplies and personnel to the Enterprise 151.

The Enterprise 151 is a 150 H class independent-leg, cantilevered jack-up drill rig capable of drilling to depths of 7,620 meters (25,000 feet) that can operate in waters up to 46 meters (150 feet) in depth. It has three legs that are adjusted to raise and lower the hull over the water's surface. Each leg of the jack-up rig has a spud can on the bottom designed to shallowly penetrate the seabed and disperse the rig's weight on the sea floor (refer to Figure 2 and Figure 3).

A jack-up rig is not self-propelled and requires vessels (tugs or heavy-lift ships) to transport it to an offshore drilling location. The Enterprise 151 has a buoyant triangular hull, allowing it to be towed like a barge. The rig will be towed to the JRP by up to three ocean-going tugboats. Upon arrival at the JRP, a fourth tugboat may join the other three for up to one hour to complete the precise positioning of the rig next to the JRP. Details of the proposed tugs towing jack-up rig activity are discussed further in Section 1.1.1.

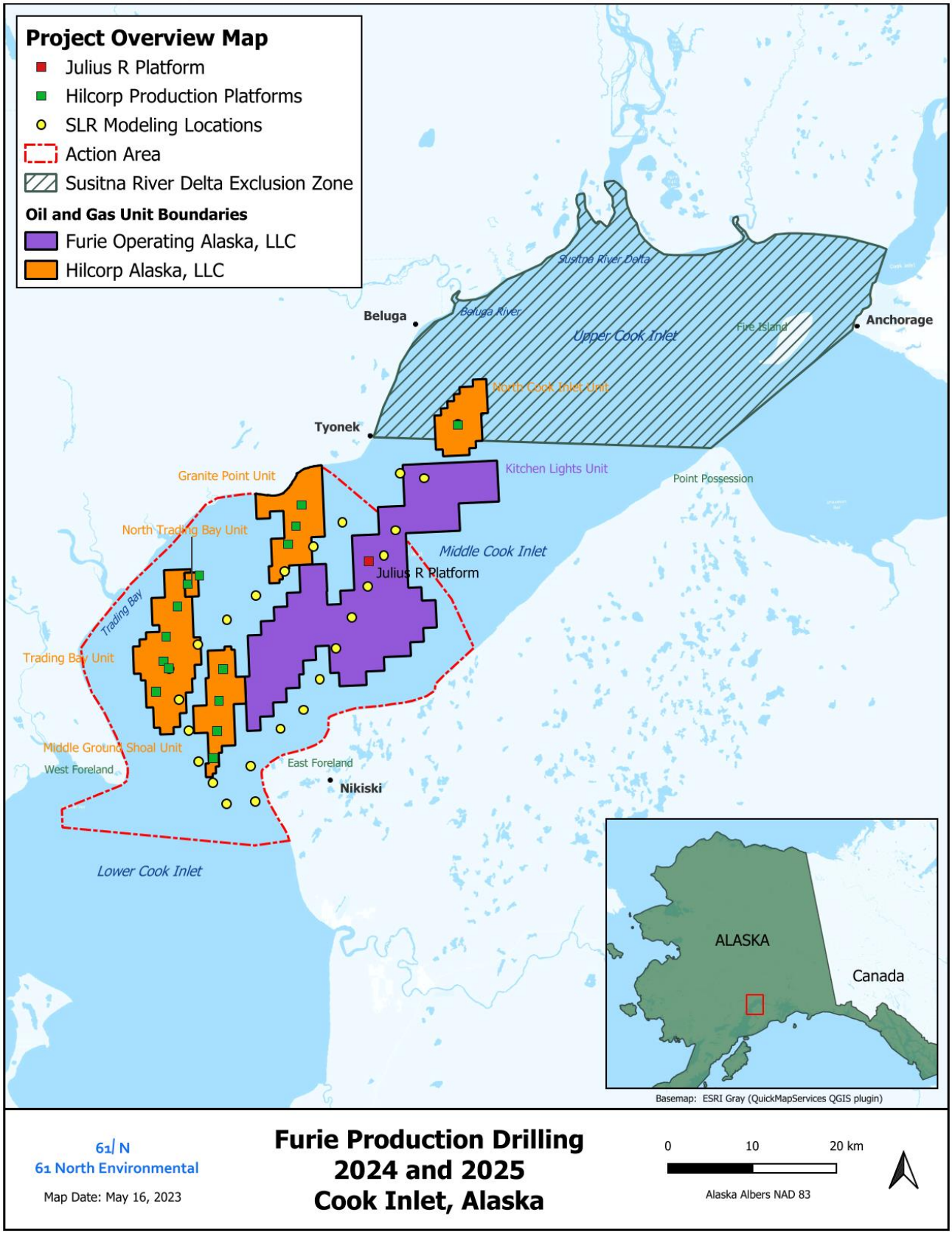

Figure 1. Project Location and Regional Landmarks

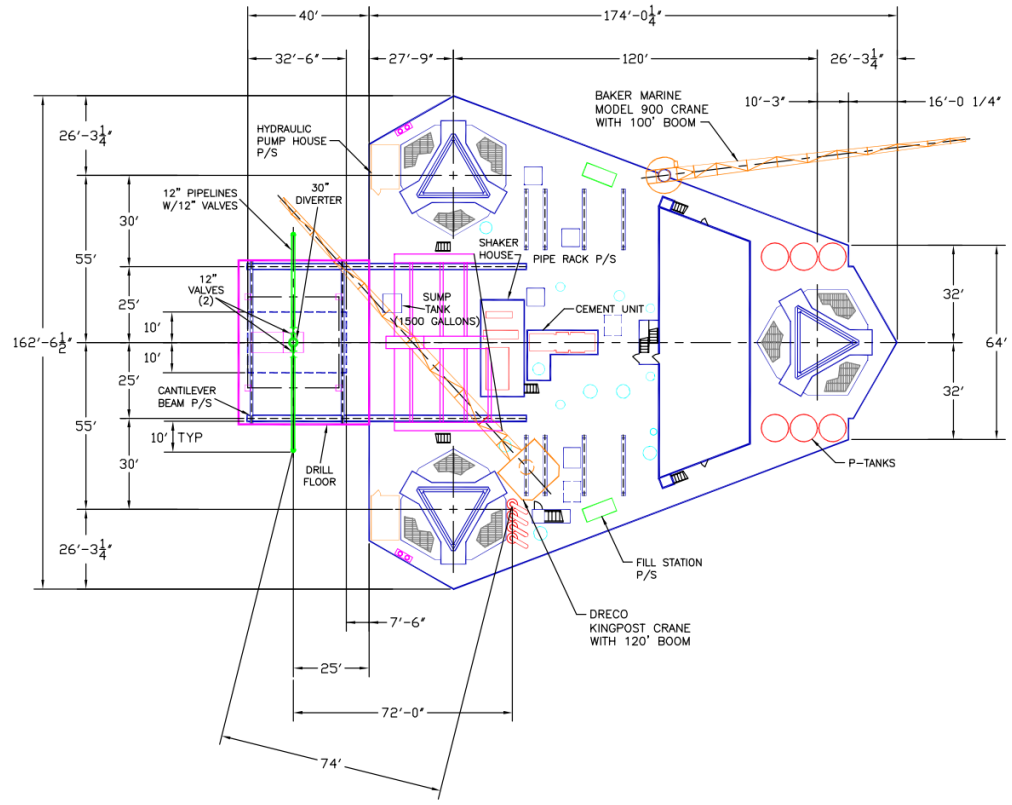

Figure 2. Plan View Schematic of Enterprise 151 (formerly Spartan 151)

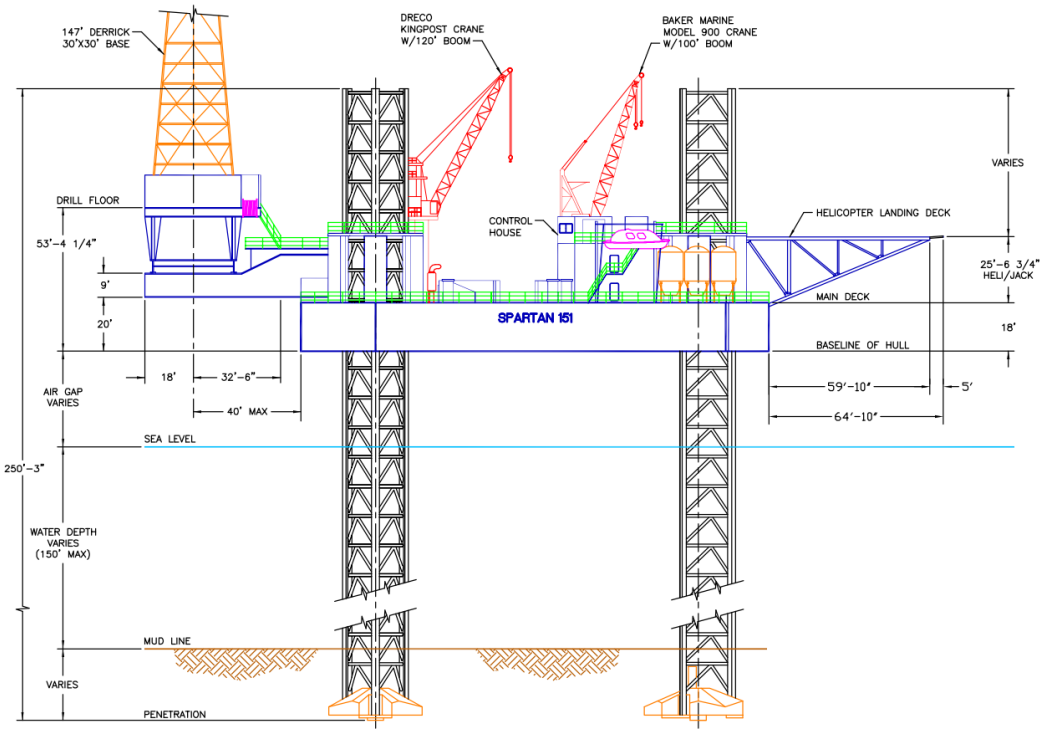

Figure 3. Elevation View Schematic of Enterprise 151 (formerly Spartan 151)

Furie does not expect Level A take (injury or mortality) of marine mammals to result from towing a jack-up rig with tugboats. Furie requests a small number of Level B takes for species listed in Section 6.6 that may result from towing the jack-up rig. During the installation of the conductor pipes during production drilling, Level A take of harbor seals may occur (refer to Section 6), and Level B harassment of all marine mammal species from behavioral disturbances may occur. Although sound levels from towing and positioning the Enterprise 151 and from conductor pipe installation exceed thresholds that may cause a permanent threshold shift (PTS) in marine mammal hearing sensitivity to marine mammal species other than harbor seals (considered an injury under the MMPA), the areas ensonified above the threshold will be small, and the probability of actual injury will be low. Furie requests authorization to take, through behavioral disturbance (Level B), a small number of each species that may be present and a small number of Level A takes of harbor seals that may occur incidentally to the project, as discussed in Section 6.6. The potential for both Level A and B harassment will be minimized by implementing the mitigation and monitoring measures described in Sections 11 and 13.

1.1.1 Tugs Towing the Jack-Up Rig

The Enterprise 151 (or a similar jack-up rig) will be towed to the JRP by three tugboats, which a fourth tugboat may join upon arrival at the JRP to aid in positioning. The tugboats are typically rated between 4,000 horsepower (hp) and 8,000 hp. Specifications of the proposed tugs are provided in Table 1. Additional specifications and details will be provided upon request.

Table 1. Tugboat Specifications

Vessel	*Activity*	*Length*	*Width*	*Gross Tonnage*
M/V Bering Wind	Towing and positioning the jack-up rig	22 meters (72 feet)	10 meters (33 feet)	144
M/V Anna T	Towing and positioning the jack-up rig	32 meters (105 feet)	11 meters (36 feet)	160
M/V Bob Franco	Towing and positioning the jack-up rig	37 meters (121 feet)	11 meters (36 feet)	196
M/V TBD	Positioning the jack-up rig	Unknown	Unknown	Unknown

Hilcorp Alaska, LLC (Hilcorp) recently applied for and received IHAs to conduct oil- and gas-related activities, which included towing the Enterprise 151 in Cook Inlet, near Furie's platform. During these applications, Hilcorp conducted a literature review to determine the expected sound levels of tugboats while under tow at various hp ratings and power outputs. The literature review did not identify any previous SSV studies that measured three tugs towing a jack-up rig. The review suggested that the power rating of the tug (in total hp) did not correlate with sound level, but found that relative power output (i.e., as a percentage of total) was a better predictor of sound energy. The literature review determined that a sound level of 180 decibels (dB) referenced to a pressure of 1 microPascal (re 1

µPa) at 1 meter was a reasonable estimate of underwater sound from the tugs at an average power output of 50 percent (Weston Solutions, Inc [Weston] and SLR Consulting Limited [SLR] 2022). In 2021, JASCO Applied Sciences (JASCO) conducted an in-situ sound-source verification (SSV) study of three tugs towing the Spartan 151 jack-up rig (the former name of the Enterprise 151), which measured 167.3 dB re 1 µPa at 20 percent output, and 205.9 dB re 1 µPa at 85 percent output (Lawrence et al. 2022 as cited in Weston and SLR 2022). The analysis assumed a linear relationship between power output and sound level and calculated 185 dB re 1 µPa at 1 meter as the best available data for the sound source level (SSL) of three tugs towing a jack-up rig at 50 percent power.

Hilcorp engaged underwater acousticians at SLR to develop a detailed propagation loss model using dBSea software that considered environmental variables such as the bathymetry in the areas of operation. The fluid parabolic equation modeling algorithm, with 5 Padé terms, was used for low frequencies, and a ray tracing model was used for high frequencies. The model calculated the 120 dB isopleth propagating from three tugs towing a jack-up rig at 25 locations between Hilcorp platforms and well sites and the Rig Tenders Dock in Nikiski, Alaska. The average 120 dB isopleth across all locations and seasons was determined to be 3,850 meters (Weston and SLR 2022).

To safely tow the Enterprise 151 to the JRP, three tugs are needed, and a fourth tug may be needed to position the rig at the JRP. The root mean square (rms) sound pressure level (SPL) of 185 dB of three tugs at 50 percent power implies each tug individually has a source level of 180.2 dB rms SPL because the addition of 3 equal-intensity sound signals adds 4.8 dB to the sound level of a single source (Engineering Toolbox 2023). Each doubling of sound intensity adds 3 dB to the baseline (Engineering Toolbox 2023), and four tugs represents two doublings of a single source. Therefore, adding 6 dB to the 180.2 dB baseline results in an expected SSL of 186.2 dB rms SPL for the use of four tugs (refer to Section 6 for further discussion).

Several factors will determine the duration that the tugboats are towing the Enterprise 151, including the origin and destination of the towing route (e.g., Rig Tenders Dock, the JRP, one of Hilcorp's platforms) and the tidal conditions. The power output will be variable and influenced by the prevailing wind direction and velocity, the current velocity, and the tidal stage. To the extent feasible, transport will be timed with the tide to minimize towing duration and power output.

A high slack tide is required to access the shallow water near the dock, whether beginning a tow or returning the Enterprise 151 to the Rig Tenders Dock. In all other locations, a slack tide at either high or low tide is required to attach the tugs to the rig and float it off position or to position the rig and detach from it. Current velocity at high and low slack typically slows to 1 to 2 knots, and speeds above 3 or 4 knots are unsafe to attempt to attach to and float the rig or to position the rig and detach from it.

The JRP is located north of the Rig Tenders Dock, and therefore, if the transport of the Enterprise 151 begins at the Rig Tenders Dock, the initial transit north may coincide with a high ebb as the current flows south. The Offshore Systems Kenai (OSK) Dock is located northeast of the Rig Tenders Dock around the point of the East Foreland of upper Cook Inlet. The area near the OSK Dock provides protection from the fast currents of the mid-inlet, and the Enterprise 151 will first be towed to this area (approximately one and half hours in duration) and held in position for up to three hours to minimize power output and the time spent transiting against the outgoing current. During the tow against the outgoing tide around the East Foreland, the output power of the tugs may reach 70 percent. During positioning attempts, power output can reach up to 90 percent for up to a few minutes (Weston and SLR 2022).

During the return south to the Rig Tenders Dock, the beginning of the tow is likely to coincide with a high ebb, and initial travel will be in the direction of the outgoing current. However, the conditions may again require the rig to

be held in the slower currents near the OSK Dock to wait for ebbing currents to slow, and for the tide to return to high flood or high slack. The Enterprise 151 will be returned to its storage location next to the Rig Tenders Dock during a high slack, which may require towing against the northward flowing, high flood currents for a brief period.

Other origin and destination scenarios are also possible, depending on whether Hilcorp contracts to use the Enterprise 151 before or after Furie in the same season. For example, Furie may assume operatorship of the Enterprise 151 mid-season at one of Hilcorp's platforms or drilling locations (rather than at the Rig Tenders Dock), and tow the rig to the JRP. Similarly, if Furie is first to contract the Enterprise 151 in the season, the origin would be the Rig Tenders Dock. However, Hilcorp may assume operatorship and begin towing the rig from the JRP to one of their platforms or drilling locations. As a result, Furie may tow the rig once or twice within the season, beginning at several potential locations. However, if Furie operates the Enterprise 151 last, or is the only operator, the second tow of the season would return the Enterprise 151 to the Rig Tenders Dock. Table 2 displays the potential scenarios in a matrix format.

Table 2. Potential Rig Tow Origins and Destinations

Scenario	*Tow #1*	*Tow #2*
Furie is Sole Operator	Furie tows from the Rig Tenders Dock to the JRP	Furie tows from the JRP to the Rig Tenders Dock
Furie Early Season, Hilcorp Late Season	Furie tows from the Rig Tenders Dock to the JRP	Hilcorp tows from the JRP to a Hilcorp-operated platform or drill site
Hilcorp Early Season, Furie Late Season	Furie tows from a Hilcorp-operated platform or drill site to the JRP	Furie tows from the JRP to the Rig Tenders Dock

One potential variation to the third scenario in Table 2 may result if Hilcorp operates the Enterprise 151 early season and conducts work at the Tyonek platform or elsewhere within the North Cook Inlet Unit. Because that area is close to the Susitna River delta, which often contains a high density of endangered Cook Inlet beluga whales, Hilcorp's IHA requires additional mitigation measures (e.g., aerial surveys). The IHAs describe a "Susitna Delta Exclusion Zone" and an aerial survey area within which the additional measures are applicable.

As of the date of this application, Hilcorp indicated to Furie that it is not planning to conduct work at the Tyonek platform or within the North Cook Inlet Unit in 2024 or 2025. However, should an operational need arise to conduct work at these locations, and the work is authorized, Hilcorp indicated they would maintain operatorship of the Enterprise 151 to carry the responsibility for the additional mitigation measures within the Susitna Delta Exclusion Zone until the Enterprise 151 and tugboats have left the exclusion zone. Therefore, if Furie is the operator, the Tyonek platform and other potential sites within the North Cook Inlet Unit are not considered potential origin locations for a rig tow.

Tugs will be under power for approximately 14 hours during rig tows that begin or end at the Rig Tenders Dock. As described above, a tow starting at the Rig Tenders Dock would begin at high slack, pause near the OSK Dock to wait for currents to slow, then arrive at the JRP and the next high slack (approximately 12 hours after departure). Once the tugs arrive at the JRP, there is a 1- to 2-hour window when the slack current velocity is slow (1 to 2 knots), allowing the tugs to position the jack-up rig and pin the legs to the bottom. Upon return, the tugs would be secured to the Enterprise 151 at the JRP on a high slack, float off location, and transit south with the outgoing tide south towards Nikiski. The tow will likely pause near OSK to wait for the tide cycle to return to a high flood before moving near the Rig Tenders Dock to bring it close to shore on high slack. Therefore, the tugs will be under load, typically at half-power or less, for up to 14 hours during mobilization to the JRP from Rig Tenders or demobilization in reverse order.

If the rig tow begins at a Hilcorp platform or drill site (excluding the northern locations), then the Enterprise 151 may be lowered, secured to the tugs, and floated off location during low slack to take advantage of the flood tide to tow the rig north or east to the JRP. In this scenario, the total tow duration is expected to be approximately 8 hours, allowing for the 6 hours between the low slack and high slack and an additional 1 to 2 hours to position the rig.

The tugs may abort the first positioning attempt until favorable conditions return if it takes longer than anticipated and the current velocity exceeds 3 to 4 knots. If so, the tugs will move the jack-up rig nearby, where the legs can be temporarily lowered to the seafloor to secure it. The tugs will remain close by, jogging in the current until the positioning attempt can be resumed. The tugs usually complete the positioning on the first attempt, but they may be under power for approximately five additional hours if a second attempt is needed.

The tugs will generally attempt to transport the jack-up rig by traveling with the tide, except when circumstances threaten human safety, property, or infrastructure. The jack-up rig may need to be towed against the tide to a safe harbor if a slack tide window is missed or extreme weather events occur.

The probability of other injurious or lethal interactions with the tugs (e.g., vessel strikes) or the rig and equipment is exceedingly small. Therefore, Furie is not requesting Level A take incidental to the towing and positioning activities. Reports of vessel strikes of marine mammals have identified that most occur at vessel speeds between 13 and 24 knots (Jensen and Silber 2003). The tugs will tow the rig at 4 knots or less. In addition to the slow speed of the tow, tug operators will be in constant radio communication with each other. To further reduce the probability of interaction, Furie will station protected species observers (PSOs) on each tug to continuously monitor the route ahead and around each tug as part of a mitigation program. Due to safety concerns, the tug operators will not be able to stop or idle, and their ability to take evasive action will be limited. However, tugs will reduce power to limit the sound levels when marine mammals are sighted if it can be done safely.

1.1.2 Production Drilling

Production drilling at the JRP will be conducted using the Enterprise 151 jack-up rig. During production drilling, potential underwater sound sources include conductor pipe installation, drilling, supply vessels, diesel generators, mud pumps, ventilation fans, and helicopter operations.

1.1.2.1 CONDUCTOR PIPE INSTALLATION

Active wells occupy four of the six well slots within the caisson (monopod leg) of the JRP. In Year 1, Furie intends to drill up to two natural gas wells and is considering two types of wells. The first requires drilling a new wellbore from

the surface to the gas-bearing formations, also known as a “grassroots” well. A grassroots well requires all new components from the surface to the bottom depth, including a conductor pipe, surface and subsurface casing, cement, production liner, tubulars, chokes, sleeves, and a wellhead. The second type of well is a “sidetrack” well, a new branch drilled from within an existing well. A sidetrack well requires fewer new components because many existing components, such as the conductor pipe, surface casing, and wellhead, are re-used.

The conductor pipe is the uppermost portion of a gas well and supports the initial sedimentary part of the well, preventing the surface layers from collapsing and obstructing the wellbore. The pipe also facilitates the return of cuttings from the drill head and supports the wellhead components. The conductor pipe is typically installed with an impact pile driver when starting a grassroots well. The 20-inch diameter conductor pipes are installed 130 to 180 feet below the mud line. As the pipe is driven into the sediment, the sections are connected either by welding or drivable quick connections. Once installed, the conductor pipes remain a permanent component of the natural gas wells. For efficiency, Furie expects to install a conductor in each of the two empty well slots in Year 1 but expects to complete only one grassroots well and one sidetrack well in Year 1. However, Furie may elect to install only one conductor in Year 1 and install the second conductor in Year 2. It is also possible that Furie may conduct only sidetrack drilling in Year 1, and the install one or both conductors in Year 2. This application conservatively assumes that two conductors could be installed in either year, but no more than two will be installed over the course of both seasons because only two well slots remain to accept new conductors.

Furie proposes to install the conductor pipes using a Delmag D62 impact hammer. The Delmag D62 hammer has an impact weight of 6,200 kilograms (13,640 pounds) and reaches an impact energy maximum of 224 kilonewton-meters (kNm; 165,215 foot-pounds) at a drop height of 3.6 meters (12 feet). Acousticians have performed several SSV studies on Delmag D62 impact hammers (and similar hammers); however, an SSV measuring the impact installation of a 20-inch diameter conductor encased within a well slot, which is also encased within a caisson or monopod leg was not identified. Therefore, a proxy SSV is needed to estimate the underwater SSLs expected from the conductor installation.

From 2020 through 2022, the Petroleum and Cement Terminal and the South Floating Dock were constructed at the Port of Alaska (POA) in upper Cook Inlet in Anchorage, Alaska. Lacking project-specific empirical SSLs for the impact installation of 24-inch and 36-inch piles, the POA substituted proxy SSLs developed by the U.S. Navy (2015). The U.S. Navy study reviewed six SSVs of impact installation of 24-inch piles, rejecting those with unrepresentative data (e.g., too few strikes recorded), and selected two studies in which the substrate (glacial till with erratics) was similar. The data from the two SSVs were combined, and average SSLs, weighted by the number of strikes, were developed for the rms SPL, sound exposure level (SEL), and peak SPLs. The weighted averages at 10 meters were 193 dB rms SPL, 184 dB SEL, and 210 dB peak SPL (U.S. Navy 2015). Because the POA intended to use a sound attenuation device such as a bubble curtain, the SSLs were reduced by 7 dB in the POA analysis.

The monopod leg of the JRP will encase the well slot, which will encase the conductor pipes; therefore, some attenuation is expected. Stokes et al. (2010) modeled various forms of attenuation devices, including a dewatered cofferdam (i.e., a caisson). They predicted it would reduce noise levels by 20 dB (considered the upper bound of noise mitigation). Significant attenuation was noted in pile installation projects that used dewatered coffer dams and isolation casings with bubble curtains evaluated by Caltrans (2015). However, water-filled isolation casings (such as the well slot and caisson at the JRP) are expected to provide limited sound attenuation (Caltrans 2015). Due to the well slot's reflective surfaces and the monopod leg's caisson inside the JRP, some attenuation of the impact noise is expected before reaching the open water. However, lacking project-specific empirical data for a 20-

inch conductor installed within a well slot located within a monopod leg, the unaltered SSLs from U.S. Navy (2015) are used for Level A and Level B isopleth calculations.

The conductor pipes may be installed with the Enterprise 151 while cantilevered over the JRP, or they may be installed with the crane onboard the JRP without the use of the jack-up rig. No difference in the intensity or frequency of the underwater sounds is expected.

1.1.2.2 DRILLING OPERATIONS

After the conductor pipe installation is complete and the Enterprise 151 is positioned at the JRP, Furie intends to conduct production drilling activities. Furie expects to drill up to two wells each year, which could be any combination of new grassroots wells or sidetrack wells, to maintain or increase natural gas production levels to meet critical local energy needs. Other potential sources of sound from the Enterprise 151 include the operation of the diesel generators, mud pumps, ventilation fans, OSVs, and helicopter operations.

After the Enterprise 151 is positioned next to the JRP, the rig will jack up so that the hull is initially approximately 5 to 10 feet out of the water. To set the spud cans on the bottoms of the legs securely into the seafloor and ensure stability, the Enterprise 151 has specialized "preload" tanks within the hull that are filled with seawater and designed to add weight to the hull. The preload is conducted while the hull is only slightly out of the water to maintain a lower center of gravity until full settling and stability are achieved. After preloading, the seawater is discharged,[1] and the hull is raised so that the drilling derrick can be cantilevered over the top deck of the JRP and positioned over a well slot.

In 2016, while the Randolph Yost jack-up rig was drilling at the JRP, Denes and Austin (2016) characterized drilling and mud pumping sound as 158 dB rms at 1 m and 148.8 dB rms at 1 m, respectively. In 2011, while the Enterprise 151 was conducting exploration drilling in Furie's Kitchen Lights Unit lease area, Marine Acoustics Inc. (2011) performed an SSV near the JRP in water depths ranging from 24.4 to 27.4 m (80 to 90 feet). The SSV measured sound from the diesel generator engines at 137 dB re 1 µPa rms at 1 meter within the frequency bandwidth of 141 to 178 hertz (Hz). The SSV also identified the PZ-10 mud pump and ventilation fans as minor sources of underwater sound. Based on the 137 dB re 1 µPa rms measured at 1 meter, the 120 dB Level B isopleth was estimated at 50 meters from the jack-up leg or drill riser. Due to the small radii of the 120 dB isopleths of drilling, mud pumping, and generator noise, no Level A or Level B takes are expected or requested for these activities.

OSVs support all operating offshore platforms in Cook Inlet throughout the open water season and will be used during Furie's planned drilling operations. Supplies and equipment such as drill string, bits, tools, casing, power packs, drilling mud, and other consumables to support Furie's production drilling efforts will be staged onshore at the OSK Dock in Nikiski. The equipment and supplies will be loaded onto the OSVs at the OSK Dock, which will then transport them to the Enterprise 151. The cargo will be lifted from the deck of the supply vessels onto the Enterprise 151 by one of the four cranes onboard the rig. During production drilling, an average of two daily vessel trips are expected between the OSK Dock and the rig. No Level A or Level B take is expected from the operation of OSVs and is not discussed further in this application.

[1] The water from the preload tanks is discharged as "uncontaminated ballast water" under an Alaska Pollutant Discharge Elimination Program (APDES) wastewater discharge permit authorized under the Clean Water Act.

Helicopters will transport personnel and supplies from shore to the rig and platform during production drilling activities. Both the Enterprise 151 and the JRP have helicopter landing pads, and both will be in use. Helicopters may operate from Furie's central processing facility in Nikiski, the Merrill Number 3 Airport on Island Lake Road in Nikiski (known locally as the "Rediski Airfield"), or from the helipad at OSK. An average of two helicopter flights per day are expected during production drilling. Flight routes will typically be the shortest distance between the takeoff and landing points.

The received sound levels in water from airborne helicopters typically are below the Level B harassment threshold. One study measured the underwater sound level of a Bell 212 helicopter flying at 500 feet at 109 dB re 1 µPa (Richardson et al. 1995). In addition, Richardson et al. (1995) reported that sounds from aircraft typically reflect off the surface of the water except within a 13-degree cone below the source. Because of this, aircraft passing overhead are only detectable underwater for short periods. While in flight, no Level A or B harassment of marine mammals is anticipated because helicopters will maintain an altitude of 1,500 feet (457 meters). Short durations of elevated sound will occur in a small radius below the helicopter deck near the rig during takeoffs and landings. However, the probability of Level A or Level B takes is negligible. Therefore, the impacts of helicopters on marine mammals are not discussed further in this application.

1.2 Year 2 Activity, Equipment, and Acoustic Sources

Furie intends to conduct additional production drilling in Year 2 at the JRP with the Enterprise 151 jack-up drilling rig (or a similar rig). Furie expects to install both conductor pipes at the JRP in Year 1, but one or both may be installed in Year 2 instead. Therefore, the estimated take from installing the conductor pipes in 2024, is also conservatively assumed in 2025 (Year 2). For this application, the activities in Year 2 are expected to be the same as Year 1 activities, and the calculated takes for each year are the same. The same tugboat arrangement will tow the Enterprise 151 to and from the JRP and position it. Furie plans to drill up to two wells in Year 2 that could be either new grassroots wells, sidetracks, or a combination of each.

2 DATES, DURATION, AND GEOGRAPHIC REGION

2.1 Year 1 Dates and Durations of Activities

Furie intends to tow the Enterprise 151 and conduct the Year 1 production drilling activities between April 1, 2024, and November 15, 2024. Upper Cook Inlet often does not become fully ice-free to allow for safe towing of a jack-up rig until mid-April. Ice conditions can also begin to return to the inlet between late October and mid-November, depending on temperatures and weather patterns. Rig tows will only be conducted during ice-free conditions and in consultation with the U.S. Coast Guard. The rig tows are expected to range between 8 and 14 hours, depending on the origin and destination (see Section 1.1.1). If the positioning attempts are unsuccessful, an additional 5 hours of tugboat operation may be needed per additional positioning attempt. In the event of unexpected adverse weather, or other unforeseen events, the rig may be towed to a safe location temporarily. Depending on conditions and the destination, a tow to a safe harbor may take an additional 8 to 14 hours. Once the Enterprise 151 is on location at the JRP, drilling operations are expected to occur for a minimum of 45 days and a maximum of 180 days.

Hilcorp also plans to use the Enterprise 151 for production drilling at one or more of its platforms or other potential work during the open-water season in 2024. The timing and details of Hilcorp's intended plans are unknown now. It is, therefore, possible that Hilcorp will first tow the Enterprise 151 to one of their assets, and Furie will assume operational responsibility for the rig mid-season when their project is complete. It is also possible that Furie will tow the rig to the JRP first, and then Hilcorp will assume operatorship mid-season and tow it to one of their asset locations. It is also possible that Furie will be the only operator of the Enterprise 151 in 2024 and will be responsible for towing it from the Rig Tenders Dock to the JRP and returning it to the dock upon completion. The implications of these scenarios are discussed further in the sections below.

Installation of each conductor pipe is expected to take approximately 4 to 6 hours of intermittent impact hammering over 1 or 2 days. The combined total for installation of both conductor pipes is expected to be 8 to 12 hours of impact hammering over 2 to 4 days.

2.2 Year 2 Dates and Durations of Activities

The rig tow in Year 2 is expected between April 1, 2025, and November 15, 2025. The durations of rig tows, contingencies for multiple positioning attempts, and safety issues described for Year 1 activities apply to Year 2 activities. Similarly, the duration of production drilling at the JRP is expected to range from 45 to 180 days.

2.3 Geographic Region of Year 1 and Year 2 Activities

In Hilcorp's 2022 IHA application, the area of activity was segmented into three regions: "lower Cook Inlet," referring to waters south of the East and West Forelands; "middle Cook Inlet," referring to waters north of the East and West Forelands and south of Threemile River on the west and Point Possession on the east; and "upper Cook Inlet" referring to waters north and east of Beluga River on the west and Point Possession on the east. The JRP is located in middle Cook Inlet, approximately 8 miles due south of Tyonek, Alaska, and approximately 10 miles offshore from the shoreline to the southeast of the JRP (Figure 1).

The southernmost area of operation during Furie's Year 1 and Year 2 drilling projects is the Rig Tenders Dock, located in Nikiski, Alaska, where the Enterprise 151 overwinters. The Rig Tenders Dock is in lower Cook Inlet, approximately

2.3 miles south of the East Foreland. Depending on the path of the tugs towing the jack-up rig, the ensonified zone where sounds from the tugs exceed 120 dB will reach approximately 4 kilometers (km) further south.

The northernmost location at which Furie may assume operatorship of the Enterprise 151 is Hilcorp's Bruce platform, located 6.4 miles (10.3 km) northwest of the JRP (Figure 1). Although the Tyonek platform is further north, Hilcorp has stated that they do not intend to conduct work there in 2024 or 2025. Furthermore, if they do conduct work there, Hilcorp has indicated that they would maintain operatorship of the Enterprise 151 until it is towed out of the "Susitna Delta Exclusion Zone" that is described in their IHA, because of the increased mitigation requirements, such as aerial surveys. Therefore, Furie does not intend to operate or tow the Enterprise 151 north of the Bruce platform.

Furie expects to tow the Enterprise 151 once or twice each season. The origin of the first rig tow before Furie's use at the JRP and the destination of the tow after use at the JRP is yet to be determined. As described above, Hilcorp also intends to use the Enterprise 151 for similar work in the same region of Cook Inlet. Furie will coordinate the use of the Enterprise 151 with Hilcorp. Furie may assume operatorship of the Enterprise 151 from Hilcorp mid-season, pass operatorship to Hilcorp mid-season, or be the sole operator of the rig if Hilcorp does not use it.

If Furie is the first to operate the Enterprise 151 in a season, the origination of the first tow is likely to begin at the Rig Tenders Dock and would end at the JRP. If Furie is the sole operator of the Enterprise 151 within a season, the rig would be returned to Rig Tenders at the end of the production drilling operation. However, if Hilcorp is the first to use the Enterprise 151, the origination of Furie's tow could be any of Hilcorp's assets – i.e., platforms or well locations within the lease areas operated by Hilcorp. If Hilcorp uses the Enterprise 151 after Furie, operatorship and responsibility for the rig tow will pass to Hilcorp when it is towed from JRP to one of its Cook Inlet assets.

To date, Hilcorp has consulted extensively with NMFS regarding towing the Enterprise 151 from the Rig Tenders Dock to its asset locations, between locations, and returning it to the Rig Tenders Dock. The consultations have included highly technical and location-specific sound source modeling of three tugs under power and location-specific densities of Cook Inlet beluga whales. The JRP is centrally located relative to Hilcorp's lease areas, platforms, and potential well locations:

- The JRP is approximately 8 miles southwest of the North Cook Inlet Unit containing the Tyonek Platform and Well 17589.
- The JRP is east of the Granite Point Unit, which contains the Bruce, Anna, and Granite Point platforms.
- The JRP is northeast of the North Trading Bay, Trading Bay, and Middle Ground Shoal units, which contain the Spark, Spurr, Monopod, King Salmon, Grayling, Steelhead, Dolly Varden, Baker, Platform A, Platform C, and Dillon platforms.
- The JRP is between 5.9 miles (9.6 km) and 18.4 miles (29.5 km) from Hilcorp's platforms with an average of 13.4 miles (21.6 km).
- The towing route from the Rig Tenders Dock to the JRP is approximately 22 miles (35 km).

The JRP is in a relatively low marine mammal density area in the mid-inlet. However, if Furie assumes responsibility for operating the Enterprise 151 at one of Hilcorp's asset locations, the marine mammal density at that location becomes applicable to Furie's activities.

Many factors influence Hilcorp's decisions of which assets to develop and which projects to execute. Therefore, Hilcorp modeled several scenarios and estimated the number of Level A and Level B exposures that accounted for

various project iterations. Because Furie's proposed activities may include towing the Enterprise 151 from Hilcorp locations, the thorough analysis completed by Hilcorp is directly applicable to this project. It is used extensively to estimate the impacts of the project conservatively.

The project location and regional landmarks are presented in Figure 1.

3 SPECIES AND NUMBERS OF MARINE MAMMALS

The marine mammal species and stocks known to occur in the areas of activity, their population estimates, MMPA designation, and Endangered Species Act (ESA) listing status are presented in Table 3. Each species is described in detail in Section 4.

Table 3. Marine Mammal Species, Population Estimates, Stock, and Conservation Status

Species or DPS	*Abundance (Population/Stock)*	*MMPA Designation*	*ESA Listing*
Cook Inlet beluga whale *(Delphinapterus leucas)*	331[1] (Cook Inlet)	Depleted & Strategic	Endangered
Western DPS Steller sea lion *(Eumetopias jubatus)*	52,932[2] (Western DPS)	Depleted & Strategic	Endangered
Humpback whale *(Megaptera novaeangliae)*	11,278[2] (Hawaii DPS)	None	None
	2,241[2] (Mexico-North Pacific DPS)	Depleted & Strategic	Threatened
	1,084[2] (Western North Pacific DPS)		Endangered
Harbor seal *(Phoca vitulina)*	28,411[2] (Cook Inlet/Shelikof)	None	None
Harbor porpoise *(Phocoena phocoena)*	31,046[2] (Gulf of Alaska)	Strategic	None
Pacific white-sided dolphin *(Lagenorhynchus obliquidens)*	26,880[2]	None	None
Killer whale *(Orcinus orca)*	1,920[2] (Eastern North Pacific Alaska Resident)	None	None
	587[2] (Gulf of Alaska, Aleutian Islands, & Bering Sea Transient)		
Gray whale *(Eschrichtius robustus)*	26,960[3] (Eastern North Pacific)	None	None
Fin Whale *(Balaenoptera physalus)*	2,554[4] (Alaska [Northeast Pacific])	Depleted & Strategic	Endangered
Minke whale *(Balaenoptera acutorostrata)*	1,233[5] (Alaska)	None	None
Dall's porpoise *(Phocoenoides dalli)*	83,400[4] (Alaska)	None	None
California sea lion *(Zalophus californianus)*	257,606[3] (United States)	None	None

Notes:

[1] N_{best} = 331. The 95 percent probability range is 290–386 whales (Goetz et al. 2023).
[2] Young et al. 2022.
[3] Carretta et al. 2022.
[4] Muto et al. 2021
[5] Zerbini et al. 2006
DPS = Distinct Population Segment
ESA = Endangered Species Act
MMPA = Marine Mammal Protection Act.

4 AFFECTED SPECIES STATUS AND DISTRIBUTION

Twelve marine mammal species are known to occur in Cook Inlet. Gray whales, minke whales, fin whales, Pacific white-sided dolphins, and California sea lions are rarely seen north of the forelands. However, they are included because of documented sightings in or near the area of activities. Fin whales typically remain outside the entrance to Cook Inlet when migrating and are rarely observed in Cook Inlet, and minke whales have been seen regularly near Anchor Point (Shelden et al. 2013, 2015, 2017). The greatest densities of gray whales in lower Cook Inlet occur when they migrate south from November through January and back north in March through May (Ferguson et al. 2015). Individual gray whales were sighted north of the action area, near the POA in Anchorage, in 2020 and 2021 (61 North Environmental [61N] 2021, 2022a).

Beluga whales, harbor seals, and harbor porpoises are regularly sighted in the area of activity (Rugh et al. 2010; Hobbs et al. 2005; Shelden et al. 2013; Lomac-MacNair et al. 2014). Killer whales and Steller sea lions may occur less frequently in middle Cook Inlet (Shelden et al. 2003). Humpback whales and Dall's porpoises are observed more frequently in lower Cook Inlet; however, they are occasionally observed north of the forelands in middle Cook Inlet.

Recent sighting results from Hilcorp's Cook Inlet activities and other projects in Cook Inlet are described in the following sections.

4.1 Fin Whale

Fin whales in Alaska are from the Northeast Pacific stock. Two other stocks of fin whales are currently recognized in U.S. Pacific waters: California/Washington/Oregon and Hawaii (Muto et al. 2021).

4.1.1 Status and Threats

The fin whale is listed as endangered under the ESA. It is also designated as depleted, and the Northeast Pacific stock is classified as a strategic stock under the MMPA. There are key uncertainties in assessing the abundance of the Northeast Pacific stock of fin whales. Zerbini et al. (2006) estimated the rates of increase of fin whales in coastal waters south of the Alaska Peninsula (Kodiak and Shumagin Islands) at 4.8 percent between 1987 and 2003. This estimate is the first available for North Pacific fin whales and is consistent with other estimates of population growth rates of large whales, but contains uncertainties regarding the initial population estimate, population structure, and the small fraction of the range surveyed. NMFS currently recognizes a single stock of fin whales in the Northeast Pacific, but acoustic data suggests that multiple stocks overlap in the Bering Sea. Little is known about the pelagic distribution of fin whales due to the need for dedicated marine mammal survey efforts in the Bering Sea and Gulf of Alaska (Muto et al. 2021).

Fin whales are vulnerable to natural and anthropogenic impacts. The lowering of prey abundance or quality or changes in distribution may affect foraging energetics. Fin whales may expand their range because melting sea ice increases the available habitat. Ice loss may also increase shipping and commercial activities, which may increase the incidence of ship strikes. Warming waters may increase algal blooms that produce biotoxins associated with large whale deaths (Muto et al. 2021).

4.1.2 Regional and Seasonal Distribution

Seasonally, fin whales inhabit the Gulf of Alaska, the Bering Sea, and the northern Chukchi Sea (Muto et al. 2021). Surveys of the coastal areas of the Aleutians and the Alaska Peninsula found fin whales primarily between the Kenai Peninsula and the Shumagin Islands and that they were numerous near the Semidi Islands and Kodiak Island (Zerbini et al. 2006). During an opportunistic study of the Gulf of Alaska, a concentration of fin whales was found west of Kodiak Island in Shelikof Strait and the southern Cook Inlet region. Fewer numbers were also identified east of Kodiak to Prince William Sound on the continental shelf (Alaska Fisheries Science Center [AFSC] 2003). In the northeastern Chukchi Sea, visible sightings and acoustic detections have increased, indicating that the stock may be reoccupying territory utilized before widespread commercial whaling (Muto et al. 2021).

During the summer months, fin whales are documented regularly in the Gulf of Alaska; however, calls are seldom detected (Stafford et al. 2007). The study found that fin whale calls were highest from September to November and February to March in recordings from the southeast Bering Sea (Stafford et al. 2010). From 2007 through 2010, in the northeastern Chukchi Sea, calls were detected from July through October (Delarue et al. 2013).

Sightings of fin whales in Cook Inlet are rare; most occur near the entrance. From 2000 to 2022, 10 sightings of 26 estimated individual fin whales in lower Cook Inlet were observed during NMFS aerial surveys (Shelden et al. 2013, 2015, 2017, 2022; Shelden and Wade 2019). None were observed in the area of Furie's proposed drilling project. In the fall of 2019, during Hilcorp's seismic survey in lower Cook Inlet, eight sightings of 23 fin whales were documented, suggesting greater numbers may use the area in the fall than previously estimated (Fairweather Science 2020). The expected range of fin whales in the project area is shown in Figure 4.

4.1.3 Life History

Fin whales are long-lived, with lifespans of up to 90 years. They become sexually mature between 6 and 12 years of age. Calves are born in tropical and subtropical areas during midwinter after 11 to 12 months of gestation. They weigh 4,000 to 6,000 pounds and are about 18 feet long (NOAA Fisheries 2023e).

Fin whales prefer habitats with water greater than 2,000 meters in depth (Panigada et al. 2006) but may feed in waters as shallow as 10 meters if prey is available. Most foraging activity occurs in upwellings or thermal front waters that are highly productive (Sergeant 1977, ONR 2001, Panigada et al. 2008). Fin whales typically eat euphausiids, large copepods, herring, pollock, and capelin (Nemoto 1970, Kawamura 1982). They occur in high-latitude waters in spring and summer, returning to lower-latitude waters in the fall and winter.

Fin whales are often solitary or observed in small groups, with rare sightings of 50 to 300 traveling together during migrations (NMFS 2010a). Fin whales in Cook Inlet have only been observed as individuals or small groups.

Fin whales produce low-frequency sounds that may travel long distances, indicating an ability to communicate over far reaches (Payne and Webb 1971, Edds-Walton 1997). Tyack (1999) speculates that this may allow them to locate large geographic features to aid in navigation. Fin whales are baleen whales categorized in the low-frequency cetacean hearing group with a generalized range of 7 Hz to 35 kilohertz (kHz) (NOAA Fisheries 2018).

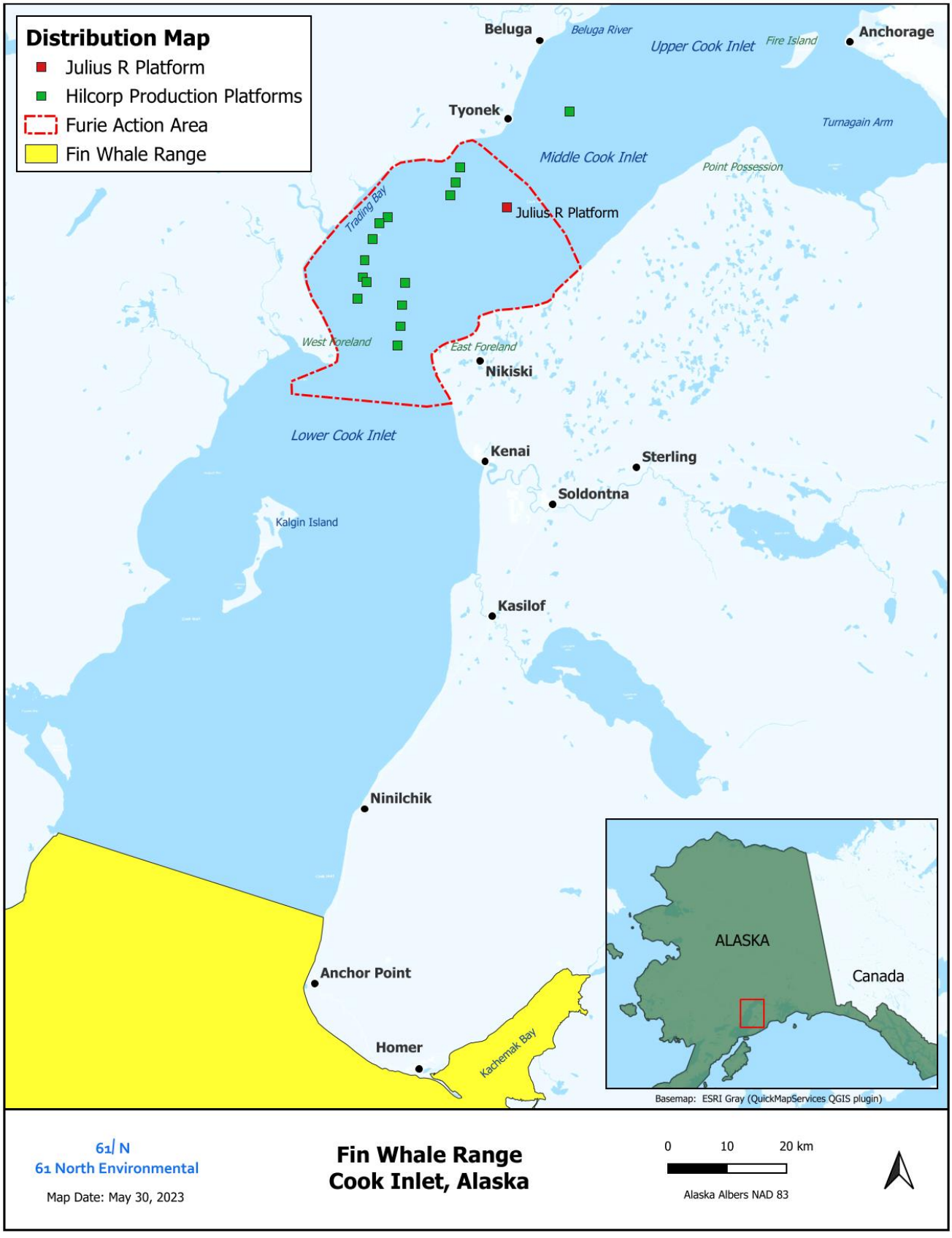

Figure 4. Fin Whale Distribution in the Project Area

4.2 Humpback Whale

Humpback whales occur worldwide and migrate seasonally from high-latitude subarctic and temperate summering areas to low-latitude subtropical and tropical wintering regions. Humpback whale stocks in the North Pacific are grouped and managed by their wintering locations and summer feeding areas. They are also grouped by DPS under the ESA. Within a DPS or stock, groupings are further subdivided into demographically independent populations (DIPs) and units (Young et al. 2022). The DIPs and units link the wintering and summer feeding areas and are presented in Table 4 and illustrated in Figure 5.

Table 4. North Pacific Humpback Whale DPS, ESA Status, DIPs/Units, and Stocks

DPS	*ESA Status*	*DIPs-/-units*	*Stocks*
Central America	Endangered	Central America - CA-OR-WA DIP	Central America / Southern Mexico - CA-OR-WA stock
Mexico	Threatened	Mainland Mexico - CA-OR-WA DIP	Mainland Mexico – CA-OR-WA stock
		Mexico - North Pacific unit	Mexico - North Pacific stock
Hawaii	Not Listed	Hawaii - North Pacific unit	Hawaii stock
		Hawaii - Southeast Alaska / Northern British Columbia DIP	
Western North Pacific	Endangered	Philippines / Okinawa - North Pacific unit	Western North Pacific stock
		Marianas / Ogasawara - North Pacific unit	

Note:
Adapted from Young et al. 2022.

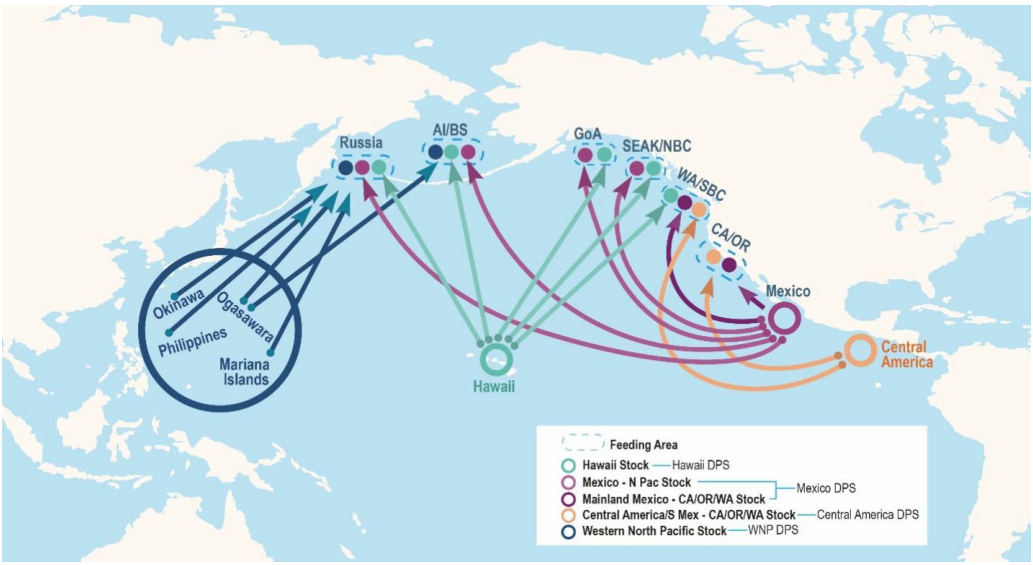

Figure 5. North Pacific Humpback Whale Wintering and Summer Feeding Areas
Source: (excerpted from Young et al. 2022)

Humpback whales in the Gulf of Alaska and Cook Inlet are composed primarily of two DPSs, including the Hawaii DPS (approximately 89 percent), with a smaller number from the Mexico DPS (roughly 11 percent) and a small number (less than 1 percent) reported from the Western North Pacific DPS.

4.2.1 Status and Threats

The Western North Pacific stock and DPS of humpback whales are listed as endangered under the ESA and considered a strategic and depleted stock under the MMPA. The Hawaii DPS and stock of humpback whales are not listed under the ESA. Although they were formerly considered as depleted and a strategic stock under the MMPA because they were part of the larger Central North Pacific stock that contained ESA-listed subgroups. NMFS recently defined the Hawaii DPS as a separate stock and therefore is no longer considered depleted or strategic under the MMPA. The Mexico-North Pacific stock of humpback whales is one of two stocks that make up the "Mexico DPS" of humpback whales, which are listed as threatened under the ESA and are therefore considered "depleted" and "strategic" under the MMPA (Young et al. 2022).

Zerbini et al. (2006) estimated that the humpback whale population in the northern Gulf of Alaska (including all three DPSs) increased by 6.6 percent annually. This estimate is consistent with other recent estimates of annual population rate increases of North Pacific humpback whales, such as coastal areas of Mexico (8.7 percent) and the Revillagigedo Archipelago (8.8 percent). However, a large whale "unusual mortality event" (UME) was documented in the Western Gulf of Alaska in 2015-2016 (which coincided with extreme ocean temperatures). The event may have caused population declines in Prince William Sound, Glacier Bay, and Icy Strait. It is unknown whether the population is currently increasing (Young et al. 2022).

Several threats and habitat concerns exist for humpback whales. Human-caused injury and mortality can occur from vessel strikes, fishing gear entanglement, and marine debris. Anthropogenic sound from shipping traffic and low-frequency sonar are believed to cause "masking," which inhibits communication and hunting of prey. Warming ocean temperatures are believed to affect prey species abundance and distribution and harmful algal blooms, which have been attributed to humpback whale mortality (Young et al. 2022).

4.2.2 Regional and Seasonal Distribution

Humpback whales typically migrate to subtropical and tropical waters to breed and overwinter. During the spring, they migrate north to British Columbia, southeast Alaska, the Gulf of Alaska, and the southern Chukchi Sea to feed on euphausiids and small schooling fishes (Muto et al. 2021).

During summer, humpback whales are regularly present in lower Cook Inlet and nearby regions, including Shelikof Strait, Kodiak Island bays, the Barren Islands, Albatross Banks, the Kenai Peninsula, the Alaska peninsula, Elizabeth Island, and south of the Aleutian Islands. Humpbacks also may be present in some of these areas in the fall (Muto et al. 2017).

Humpback whales have been observed during marine mammal surveys conducted in Cook Inlet, with the majority sighted in lower Cook Inlet south of Kalgin Island. Eighty-three groups containing an estimated 187 humpbacks were sighted during the Cook Inlet beluga whale aerial surveys conducted by NMFS from 1994 to 2012 (Shelden et al. 2013). Surveys conducted north of the forelands have documented small numbers in middle Cook Inlet. During the 2014 Apache seismic surveys in Cook Inlet, five groups (six individuals) were reported, with three groups north of the forelands on the east side of the inlet (Lomac-MacNair et al. 2014). In 2015, during the construction of Furie's

platform and pipeline, four groups of humpback whales were documented. Another group of six to 10 unidentified whales, thought to be either humpback or gray whales, was sighted approximately 15 km northeast of the JRP. Large cetaceans were visible near the project (i.e., whales or blows were visible), for 2 hours out of the 1,275 hours of observation conducted (Jacobs 2015). During SAExploration's 2015 seismic program, three humpback whales were observed in Cook Inlet, including two near the Forelands and one in lower Cook Inlet (Kendall et al. 2015 as cited in Weston and SLR 2022). The expected range of humpback whales in the project area is shown in Figure 6.

4.2.3 Life History

Humpback whales can live to be 80 to 90 years and reach sexual maturity between 4 and 10 years of age. Females give birth to a single calf, 13 to 16 feet long, every one to three years after an 11-month gestation period. Calves spend up to a year with their protective mothers, maintaining close contact. Calves will likely return to the same feeding and breeding areas as their mothers (NOAA Fisheries 2023i).

Humpback whales migrate to warmer tropical or subtropical waters during winter to mate and give birth and to the cooler temperate or sub-Arctic waters in summer to feed. Humpbacks prefer shallow coastal water during feeding and mating but traverse deeper water when migrating (Winn and Reichley 1985).

Feeding humpbacks vocalize sounds in the range of 20 Hz to 2 kHz at 175 to 192 dB (Thompson et al. 1986). Feeding-based vocalizations within groups may attract other nearby whales (D'Vincent et al. 1985; Sharpe and Dill 1997). Humpback whales vocalize less in summer habitats than while feeding in winter habitats. Humpbacks are baleen whales and are categorized in the low-frequency cetacean hearing group with a generalized range of 7 Hz to 35 kHz (NOAA Fisheries 2018).

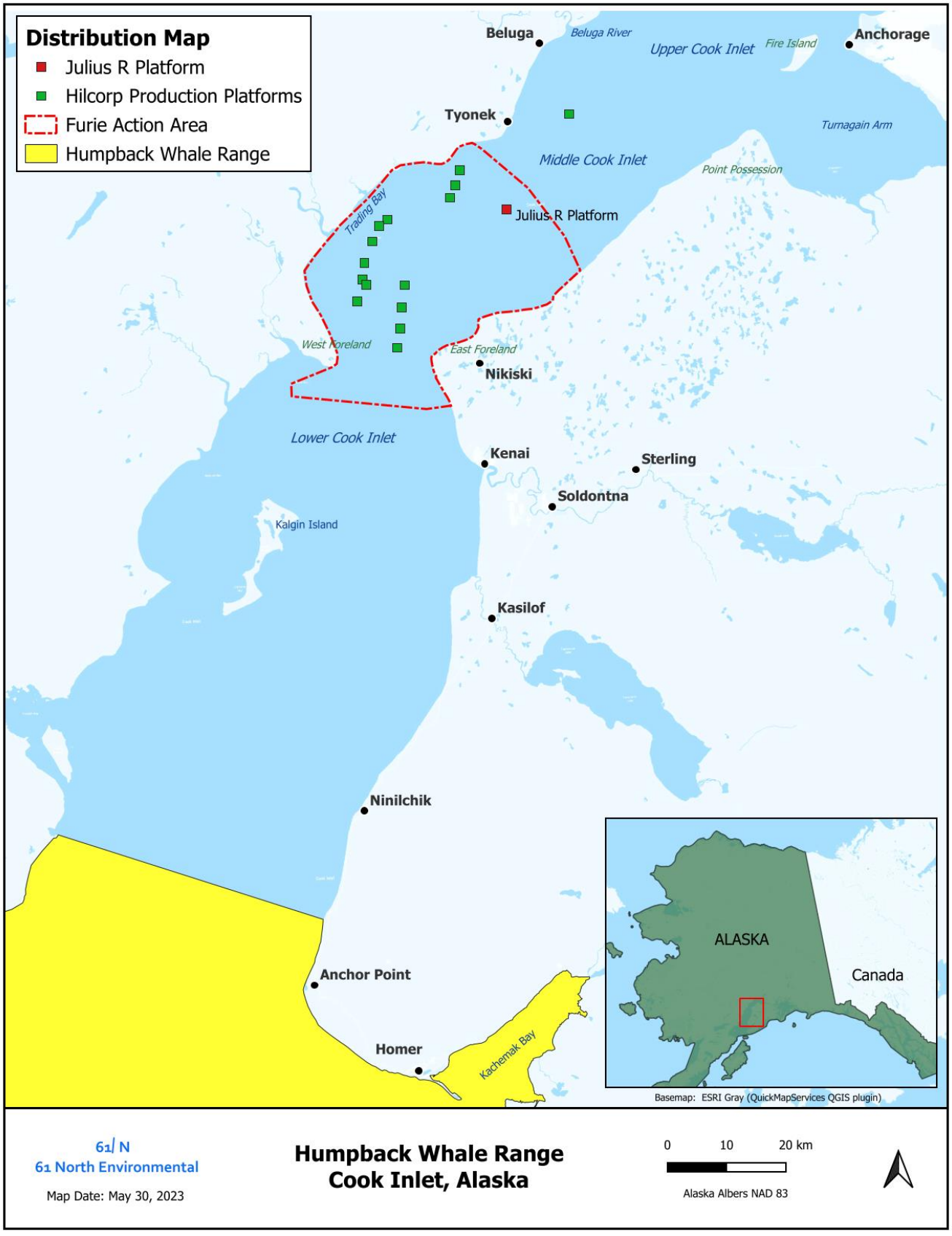

Figure 6. Humpback Whale Distribution in the Project Area

4.3 Minke Whale

Minke whales are the smallest in the family Balaenopteridae (also known as Rorqual) and are one of the most abundant worldwide in this group. Their population is believed to be stable throughout most of their range (NOAA Fisheries 2023k). Two stocks of minke whales are recognized in U.S. waters, including the Alaska stock and the California/Washington/Oregon stock. Minke whales occur from the Bering and Chukchi seas south to near the Equator in the North Pacific Ocean (Muto et al. 2021). In the Gulf of Alaska, minke whales are present mostly during summer in localized feeding areas near Kodiak's north coast and the Alaska Peninsula's south coast (Zerbini et al. 2006).

4.3.1 Status and Threats

Minke whales are not listed under the ESA or categorized as depleted or strategic stock under the MMPA. The population size or trends of minke whales in the North Pacific are poorly understood. Similar to all large whales in Alaska, the habitat concerns for minke whales include elevated levels of sound from anthropogenic sources (e.g., shipping, military sonars), possible changes in prey distribution with climate change, entanglement in fishing gear, ship strikes due to increased vessel traffic (e.g., from increased shipping in higher latitudes), and oil and gas activities (Muto et al. 2021).

4.3.2 Regional and Seasonal Distribution

Only portions of the minke whale's range in the North Pacific have been surveyed, and there are no reliable estimates of the total population. Minke whales are believed to be migratory in the northern part of their range, including the Bering and Chukchi seas and the Gulf of Alaska, and have been known to establish home ranges in Washington to central California. Minke whales in Alaska are considered a separate stock from minke whales in California, Oregon, and Washington because the "resident" minke whales from California to Washington appear behaviorally distinct from whales farther north (Muto et al. 2021). Recently, minke whales have been observed year-round near Cape Starichkof and Anchor Point in Alaska (Muto et al. 2017).

During the NMFS annual and semiannual surveys of Cook Inlet, minke whales were observed near Anchor Point in 1998, 1999, 2006, and 2021 (Shelden et al. 2013, 2015, 2017, 2022; Shelden and Wade 2019) and near Ninilchik and the middle of lower Cook Inlet in 2021 (Shelden et al. 2022). Minkes were sighted southeast of Kalgin Island and near Homer during Apache's 2014 survey (Lomac-MacNair et al. 2014), and one was observed near Tuxedni Bay in 2015 (Kendall et al. 2015, as cited in Weston and SLR 2022). During Hilcorp's seismic survey in lower Cook Inlet in the fall of 2019, eight minke whales were observed (Fairweather Science 2020). In 2018, no minke whales were observed during observations conducted for the Cross Inlet Pipeline (CIPL) project near Tyonek (Sitkiewicz et al. 2018). The expected range of minke whales in the project area is shown in Figure 7.

4.3.3 Life History

Minke whales are believed to mate and give birth in the winter, but the timing and location of reproduction are poorly understood. Minke whales become sexually mature at around 3 to 8 years, and females give birth after a gestation period of 10 to 11 months. Minke whales eat crustaceans, plankton, and small schooling fish (e.g., anchovies, dogfish, capelin, coalfish, cod, eels, herring, mackerel, salmon, sand lance, saury, and wolfish) (NOAA Fisheries 2023k).

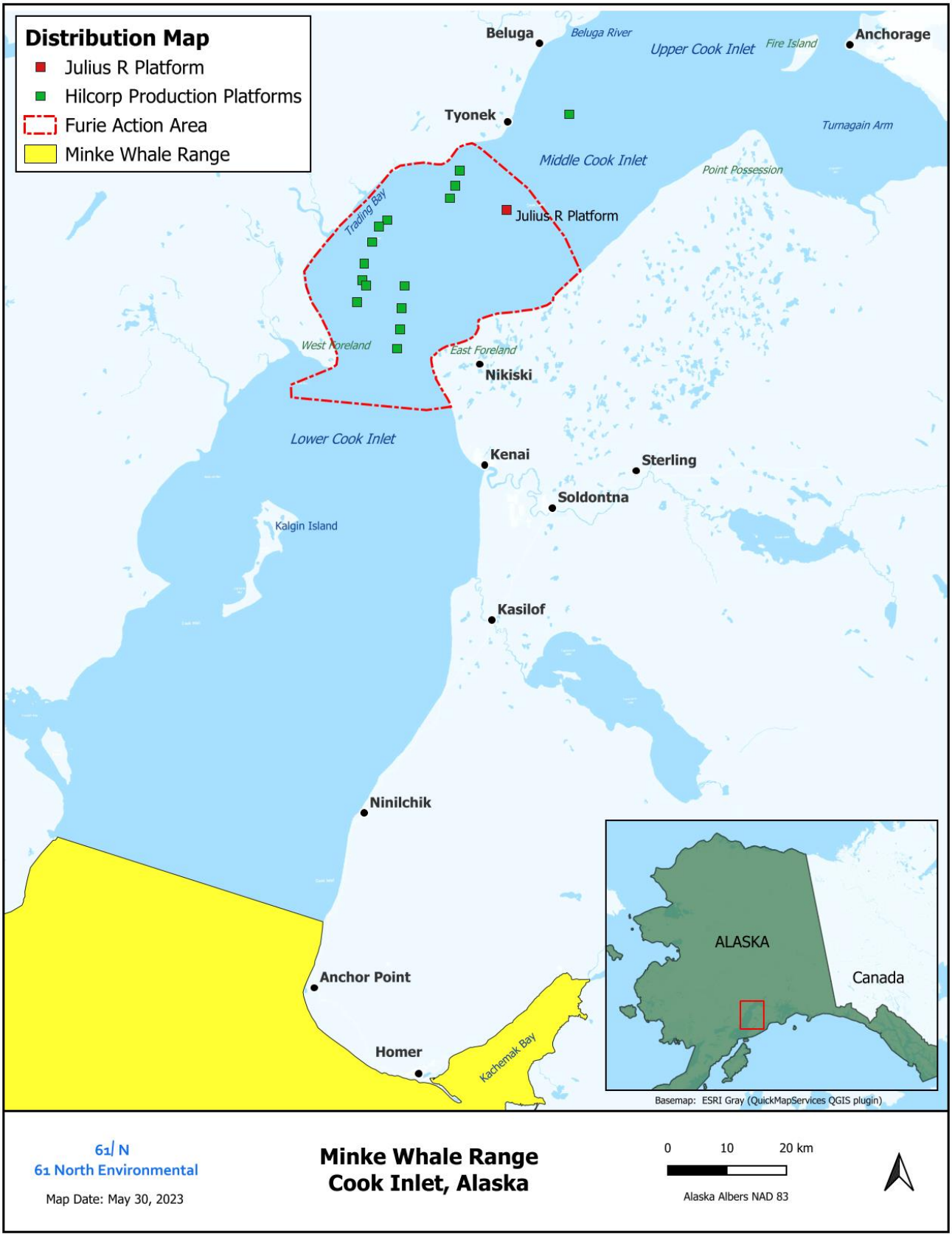

Figure 7. Minke Whale Distribution in the Project Area

4.4 Killer Whale

Killer whales are present in all oceans globally, ranging more widely than any other cetacean. They occur in higher densities in the colder latitudes of the northern and southern hemispheres and are present year-round in Alaska. Killer whales in the North Pacific Ocean are categorized as "resident," "transient," or "offshore" based on morphology, ecology, genetics, and behavior. The Eastern North Pacific Alaska Resident stock and the Gulf of Alaska, Aleutian Islands, and Bering Sea Transient stock inhabit the Cook Inlet region of Alaska. Another transient group, the AT1 Transient stock, occurs within Prince William Sound and westward to the Kenai Fjords (Muto et al. 2021).

4.4.1 Status and Threats

Neither the Eastern North Pacific Alaska Resident nor the Gulf of Alaska, Aleutian Islands, and Bering Sea Transient stocks of killer whales are designated as depleted under the MMPA or listed as threatened or endangered under the Endangered Species Act. The killer whale population found in the Prince William Sound and Kenai Fjords area from the Alaska Resident stock was estimated to increase by 3.2 percent annually between 1990 and 2005. However, population abundance and trends for the entire stock are unavailable. Reliable population trends for the Gulf of Alaska, Aleutian Islands, and Bering Sea Transient killer whale stock are unavailable. However, the populations of other transient stocks in the North Pacific increased by 4.1 percent annually in one study from 2012 through 2018 and 2.7 percent annually in another study from 2006 through 2011 (Muto et al. 2021).

Threats exist to killer whales from entanglement in fishing gear, lack of food from overfishing and habitat loss, bioaccumulation of contaminants (because they are a top predator), oil and gas activity, and vessel noise.

4.4.2 Regional and Seasonal Distribution

Killer whales from the Alaska Resident stock and the Gulf of Alaska, Aleutian Islands, and Bering Sea Transient stock are found in lower Cook Inlet but rarely in middle and upper Cook Inlet. Recent studies have documented the movements of Alaska Resident killer whales from the Bering Sea into the Gulf of Alaska as far north as southern Kodiak Island (Muto et al. 2017).

Killer whales have been sighted near Homer and Port Graham in lower Cook Inlet (Shelden et al. 2003, 2022; Rugh et al. 2005). Resident killer whales from pods often sighted near Kenai Fjords and Prince William Sound have been occasionally photographed in lower Cook Inlet (Shelden et al. 2003). The availability of salmon influences when resident killer whales are more likely to be sighted in Cook Inlet. Killer whales were observed in the Kachemak and English Bay three times during aerial surveys conducted between 1993 and 2004 (Rugh et al. 2005). Transient killer whales were increasingly reported to feed on belugas in the middle and upper Cook Inlet in the 1990s. A decline in sea lions and harbor seals was suggested as a potential cause of beluga predation (Shelden et al. 2003).

During the 2015 SAExploration seismic program near the North Foreland, two killer whales were observed (Kendall et al. 2015, as cited in Weston and SLR 2022). Killer whales were observed in lower Cook Inlet in 1994, 1997, 2001, 2005, 2010, 2012, and 2022 during the NMFS aerial surveys (Shelden et al. 2013, 2022). Eleven killer whale strandings have been reported in Turnagain Arm: six in May 1991 and five in August 1993. During the Hilcorp lower Cook Inlet seismic survey in the fall of 2019, 21 killer whales were documented (Fairweather Science 2020). Throughout four months of observation in 2018 during the CIPL project in middle Cook Inlet, no killer whales were observed (Sitkiewicz et al. 2018). In September 2021, two killer whales were documented in Knik Arm in upper Cook Inlet, near the POA (61N 2022a). The expected range of killer whales in the project area is shown in Figure 8.

4.4.3 Life History

Killer whales typically live 30 to 50 years, but some have been known to live up to 90 years. Female killer whales become sexually mature between 10 and 13 years old. Pregnancies last between 15 and 18 months, and they give birth to a single calf that remains close with their mother for the first two years. Calving may occur in any month. Killer whales live in pods of maternally related individuals and are highly social. Pods generally range from a few to more than 20 whales in size. Hunting for the food sources particular to each ecotype is learned from other pod members (NOAA Fisheries 2023j).

Resident killer whales are fish-eating specialists that feed primarily on salmon and other schooling fish. They have large and stable pods that can range from 5 to 50 individuals. They are often seen in coastal waters near salmon runs and have distinctive dialects that are unique to each pod. Transient killer whales are mammal-eating specialists that feed on seals, sea lions, porpoises, dolphins, and sometimes whales. They have small, fluid pods that can range from 2 to 10 individuals. They are more widely distributed and have less predictable movements than resident killer whales. They have less complex vocalizations than resident killer whales and use echolocation more often to hunt their prey. Offshore killer whales are poorly understood and rarely encountered. They are thought to feed on fish and sharks and have large pods that can range from 20 to 100 individuals. They have intermediate vocalizations between resident and transient killer whales and are mostly seen in offshore waters (Matkin et al., 2007).

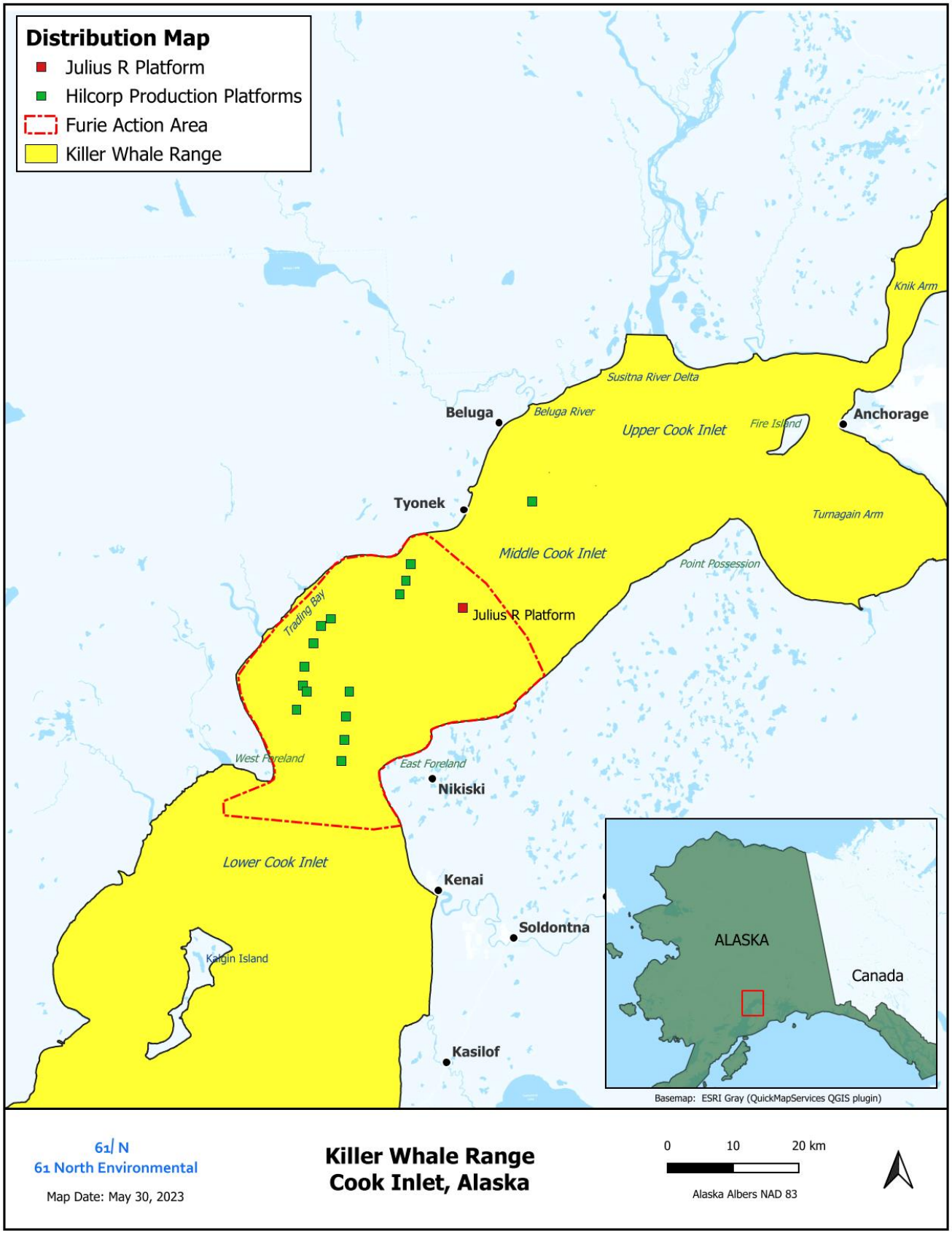

Figure 8. Killer Whale Distribution in the Project Area

4.5 Gray Whale

Two stocks of gray whales are present in the North Pacific Ocean, including the western North Pacific stock and the eastern North Pacific stock. The western stock spends summer and fall primarily in the Okhotsk Sea off northeast Sakhalin Island, Russia, and off southeastern Kamchatka in the Bering Sea. Some whales observed in the summer feeding grounds of the western stock have also been observed in the wintering areas of the eastern stock near Mexico, indicating some movement between stocks (Carretta et al. 2022). However, in Alaska, most gray whales are from the eastern stock, some of which migrate greater than 10,000 miles between summer feeding areas in the Chukchi and Bering seas and wintering areas near Mexico (NOAA Fisheries 2023f).

4.5.1 Status and Threats

The eastern North Pacific stock of gray whales was listed as endangered but was removed from listing in 1994. The stock is not considered depleted or designated as a strategic stock under the MMPA (Carretta et al. 2022). In 2019, a UME was declared when several gray whales were found stranded in the U.S., Mexico, and Canada along the Pacific coast in poor body condition. The UME is ongoing, with high numbers of strandings documented into May 2023 (NOAA Fisheries 2023a). As of 2017, the population of eastern stock gray whales had increased by 22 percent since 2010 (Carretta et al. 2022). As of 2022, the population had decreased by 38 percent from a peak in 2015–2016; however, large variations in the eastern North Pacific gray whale population are common (NOAA Fisheries 2022b).

Numerous factors are believed to contribute to the recent decline in numbers; however, ecological changes in the Arctic causing changes in food sources are cited as leading contenders (NOAA Fisheries 2022b). Ship strikes, entanglement in fishing gear and marine debris, and predation by killer whales are also threats to the population. Industrial activity, shipping noise, and exposure to pollutants affect the gray whale habitat nearshore. Sea ice conditions in the Arctic are expanding the summer range but may be shifting the availability of prey from benthic to pelagic species (Carretta et al. 2022).

4.5.2 Regional and Seasonal Distribution

Gray whales begin migrating north from winter habitats between February and April (Jones and Swartz 1984). As they pass the Kenai Peninsula, most cross over to the southeast coast of the Kodiak Archipelago and pass by Cook Inlet (Consiglieri et al. 1982; Rice and Wolman 1971). However, a few are seen near Kachemak Bay and north of Anchor Point by local fishermen (Bureau of Ocean Energy Management [BOEM] 2015). Those that migrate into lower Cook Inlet typically arrive between March and June and then return to the inlet as they migrate south in November and December (Consiglieri et al. 1982; Rice and Wolman 1971).

Some gray whales remain in certain coastal areas in the Pacific Northwest, including lower Cook Inlet, instead of migrating to the Arctic in summer (Moore et al. 2007). Several surveys and monitoring programs have sighted gray whales in lower Cook Inlet. In 1994, 2000, 2001, 2005, and 2009, gray whales were observed in the lower inlet near Port Graham, Elizabeth Island, and Kamishak Bay, with one sighting near the Beluga River during the NMFS aerial surveys (Shelden et al. 2013). During Buccaneer's drilling program at the Cosmopolitan lease in 2013, gray whales were seen north of Anchor Point at Cape Starichkof (Owl Ridge 2014). Nine gray whales were documented in June and July 2012 during Apache's seismic program (Lomac-MacNair et al. 2013) and another in 2014 (Lomac-MacNair et al. 2014). During SAExploration's seismic survey in 2015, no gray whales were observed (Kendall et al. 2015, as

cited in Weston and SLR 2022). No gray whales were observed during the 2019 Hilcorp seismic survey in lower Cook Inlet (Fairweather Science 2020) or during the 2018 CIPL project (Sitkiewicz et al. 2018).

Gray whales are occasionally seen in mid- and upper Cook Inlet, Alaska, but they are not common. In 2020, a young male gray whale was stranded in the Twentymile River near Girdwood for over a week before swimming back into Turnagain Arm. However, the whale did not survive and was found dead in west Cook Inlet later that month (NOAA Fisheries 2020). One gray whale was sighted in Knik Arm near the POA in upper Cook Inlet in May of 2020 during observations conducted during construction of the Petroleum and Cement Terminal project (61N 2021). The sighting occurred less than a week before the reports of the gray whale stranding in the Twentymile River and was likely the same animal. In 2021, one small gray whale was sighted in Knik Arm near Ship Creek, south of the POA (61N 2022a).

Although some sightings have been documented in the middle and upper Inlet, the gray whale range typically only extends into the lower Cook Inlet region, as shown in Figure 6; as such, they do not occur frequently in middle Cook Inlet and Trading Bay but are included herein in the event they travel northward into the Action Area. The expected range of gray whales in the project area is shown in Figure 9.

4.5.3 Life History

On average, gray whales reach sexual maturity at about 8 to 9 years old. Females birth a single calf, 14 to 16 feet long and weighing approximately 2,000 pounds, after 12 to 13 months of gestation. Gray whales are known to live to be 75 to 80 years old. Most gray whales calve and breed from late December to early February in protected waters along the western coast of Baja, California, Mexico (NOAA Fisheries 2023f), with weaning occurring around September on the feeding grounds (Rice et al. 1984).

Gray whales usually travel solo or in small, transient groups, except when they gather in large numbers in areas where they feed or mate. They feed mainly on benthic and epibenthic invertebrates, such as amphipods, that they suck from the sea floor. They roll on their sides and swim slowly, filtering their food through many coarse baleen plates on each side of their upper jaw. They often create long mud trails and “feeding pits” on the seafloor as they feed. Killer whales are their predators (NOAA Fisheries 2023f). Gray whales are categorized in the low-frequency cetacean hearing group with a generalized range of 7 Hz to 35 kHz (NOAA Fisheries 2018).

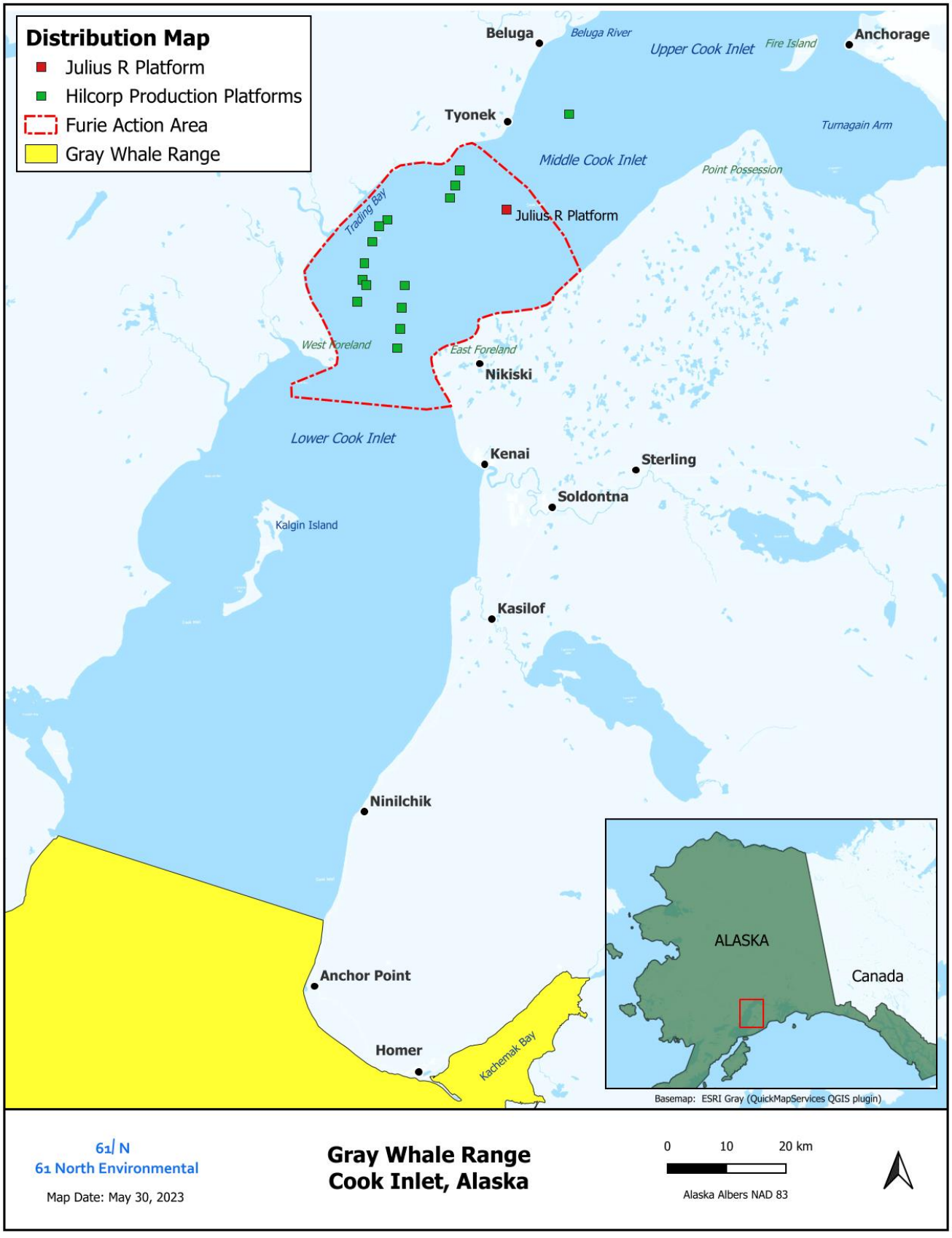

Figure 9. Gray Whale Distribution in the Project Area

4.6 Cook Inlet Beluga Whale

Cook Inlet beluga whales are a small and isolated endangered DPS, separated from other beluga stocks by the Alaska Peninsula. Genetic tests show that this group differs from other Alaska groups, indicating that the Peninsula prevents them from interbreeding (O'Corry-Crowe et al. 1997). The population of beluga whales in the Cook Inlet decreased from an estimated 1,300 individuals in the 1970s (Calkins 1989) to a currently estimated population of 331 animals (Goetz et al. 2023). The population decline observed in the mid-1990s was linked to unrestricted subsistence hunting by Alaska Natives (Mahoney and Shelden 2000). Since 2006, no Cook Inlet belugas have been harvested (Muto et al. 2021).

4.6.1 Status and Threats

Cook Inlet beluga whales are listed as endangered under the ESA and as a depleted and strategic stock under the MMPA (Muto et al. 2021). The change in population from an estimated 1,300 animals in the 1970s to approximately 300 animals in the early 2000s is well documented. From 2008 to 2018, there was an average decline of 2.3 percent per year, with a 93 percent probability that the annual decline exceeded 1 percent (Shelden and Wade 2019). The cause for the decreasing trend is unknown. However, the decline overlaps with the northeast Pacific marine heatwave that occurred from 2014 to 2016 in the Gulf of Alaska, significantly impacting the marine ecosystem (Suryan et al. 2020, as cited in Goetz et al. 2023).

The most recent abundance estimate calculated an average annual increase between 0.2 and 0.9 percent between 2012 and 2022 (Goetz et al. 2023). There are key uncertainties in assessing the Cook Inlet stock of beluga whales. Despite a population well below historical levels, the factors preventing the recovery of the DPS are currently unknown. Mortality and injury from human-caused threats such as commercial fishing, illegal harvest, and ship strikes are believed to be rare. Based on stranding data, non-human and other unknown causes caused an average of 10 documented mortalities per year.

The Cook Inlet Beluga Recovery Plan (NOAA Fisheries 2016) identifies the following potential threats:

- **High concern:** catastrophic events (e.g., natural disasters, spills, mass strandings), cumulative effects of multiple stressors, and noise.
- **Medium concern:** disease agents (e.g., pathogens, parasites, and harmful algal blooms), habitat loss or degradation, reduction in prey, and unauthorized take.
- **Low concern:** pollution, predation, and subsistence harvest.

The recovery plan did not treat climate change as a distinct threat but as a consideration in the threats of high and medium concern.

4.6.2 Regional and Seasonal Distribution

According to the information available, Cook Inlet belugas are believed to remain in the inlet year-round. The ecological range of Cook Inlet belugas has contracted significantly since the 1970s. From late spring to fall, nearly the entire population is now found in the upper inlet north of the forelands, with a range reduced to approximately 39 percent of the size documented in the late 1970s (Goetz et al. 2023). The recent annual and semiannual aerial surveys (since 2008) found that approximately 83 percent of the population inhabits the area between the Beluga River and Little Susitna River during the survey period, typically conducted in early June. Some aerial survey counts

were performed in August, September, and October, finding minor differences in the numbers of belugas in the upper inlet compared to June, reinforcing the importance of the upper inlet habitat area (Muto et al. 2021).

The ecological range identified during the aerial surveys has also been confirmed with tagging studies. Between 1999 and 2002, 18 Cook Inlet belugas were captured and fitted with satellite transmitters. The transmitters collected data for as little as a few days and up to 293 days with at least some data obtained each calendar month. None of the tagged belugas left the inlet. All but three remained north of the forelands for the duration of transmission, and those that traveled south did so only briefly (Shelden et al. 2018). In the winter, belugas are more widely dispersed based on aerial surveys, opportunistic sighting reports, and tagging results, with animals found between Kalgin Island and Point Possession. In November, beluga whales remained in Knik Arm, Turnagain Arm, and Chickaloon Bay, similar to locations observed in September. Later in winter (January into March), belugas were sighted near Kalgin Island and in deeper waters offshore. However, even when ice cover exceeds 90 percent in February and March, belugas travel into Knik Arm and Turnagain Arm (Hobbs et al. 2005).

Using the June aerial survey data from 1994 to 2008, Goetz et al. (2012) constructed a model of summer habitat preference for the entire Cook Inlet. The model identified a positive geographic association with rivers with prey species (primarily eulachon and salmon), shallow tidal flats, and sandy substrate and a negative association with sources of anthropogenic disturbance. A heat map of the summer habitat was generated, with 1 km^2 cells ranging from 0 to 1.12 belugas per km^2 Using the June aerial survey data from 1994 to 2008, Goetz et al. (2012) constructed a model of summer habitat preference for the entire Cook Inlet. The model identified a positive geographic association with rivers with prey species (primarily eulachon and salmon), shallow tidal flats, and sandy substrate and a negative association with sources of anthropogenic disturbance. A heat map of the summer habitat was generated, with 1 km^2 cells ranging from 0 to 1.12 belugas per km^2 (Figure 10). The areas of highest concentration were the Susitna River delta (from the Beluga River to the Little Susitna River), upper Knik Arm, and Chickaloon Bay. Each area has generally large salmon runs, shallow tidal flats, and little anthropogenic disturbance (Figure 10). The location of the JRP and the towing routes between the Rig Tenders Dock and the JRP are areas of predicted low density in the summer months.

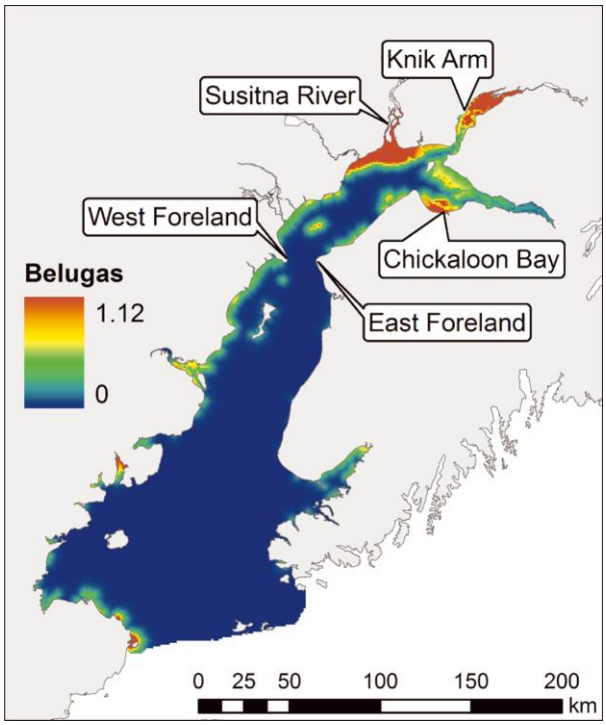

Figure 10. Expected number of belugas per km²
Source: (excerpted from Goetz et al. 2012)

In 2011, 33 beluga whales were sighted near Redoubt Bay in lower Cook Inlet during Apache's seismic test program (Lomac-MacNair et al. 2013). In 2012, 151 groups (1,463 individuals) were documented in mid-inlet during Apache's 2012 seismic program (Lomac-MacNair et al. 2014). In 2015, eight groups (33 individuals) were observed, and two were recorded acoustically during SAExploration's seismic program (Kendall et al. 2015, as cited in Weston and SLR 2022). From May 9 through September 15, 2018, 143 groups (814 individuals) were near Ladd Landing and Tyonek Platform during Harvest Alaska's CIPL (Sitkiewicz et al. 2018). From September 10 to October 18, 2019, aerial surveys were flown in lower Cook Inlet during Hilcorp's seismic survey, and no belugas were sighted. The project vessels observed two beluga whale carcasses (Fairweather Science 2020).

The range of beluga whales in the project area and critical habitat areas are shown in Figure 11.

4.6.3 Life History

Belugas have been known to live 80 years or more, but the oldest documented Cook Inlet beluga was 49 years of age (NOAA Fisheries 2023b). The age of sexual maturity in belugas varies, ranging from 4 to 12 years for females and 6 to 12 years (or later) for males (O'Corry-Crowe 2009; Heide-Joregensen and Teilmann 1994; Suydam 2009). The age of sexual maturity of Cook Inlet belugas is not known conclusively. However, photo-identification records of one female showed close associations with a calf at ages 10 and 13 (the whale was 14 when deceased). Cook Inlet belugas are believed to mate between March and May and calve between July and October (Shelden et al. 2020, McGuire et al. 2020). Studies of other belugas have found they typically mate between February and June (Burns and Seaman 1986; Suydam 2009). Females in the Chukchi Sea were found to gestate for 14.9 months on average, giving birth every two to three years, with a pregnancy rate of 0.41. The calves in this study were typically born between mid-June and mid-July and remained with the mother for up to 2 years of age (Suydam 2009).

In the summer months, belugas feed on eulachon and all five species of Pacific salmon. Food sources at other times of the year are less well known. Stomach contents from stranded belugas have contained flatfish, shrimp, polychaetes, and amphipods. Starry flounders have been found in the stomachs of deceased Cook Inlet belugas in 6 percent of necropsies, with some reports of asphyxiation caused by these sometimes-large flounders (NOAA Fisheries 2022a).

Beluga hearing capabilities have been extensively studied and reported on (Johnson et al. 1989; Klishin et al. 2000; Finneran et al. 2002, 2005; Erbe 2008; White et al. 1978; Awbrey et al. 1988; Ridgway et al. 2001; Castellote et al. 2019). Castellote et al. (2014) measured hearing ranges between 4 and 150 kHz in beluga whales in Bristol Bay, Alaska. The animals perceived sounds at 128 kHz well, with some hearing up to 150 kHz. Beluga whales are included in the NMFS-identified mid-frequency functional hearing group (NOAA Fisheries 2018).

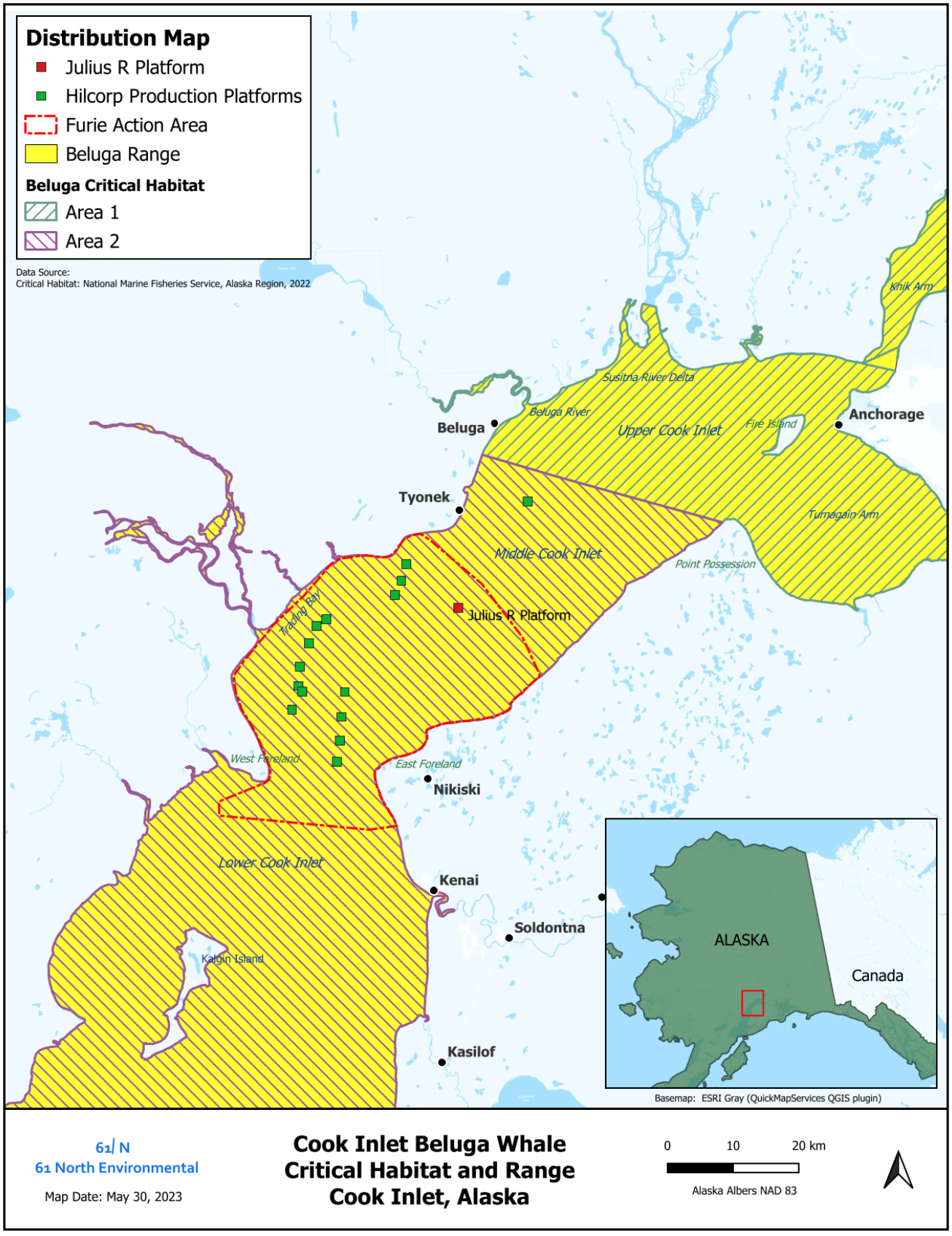

Figure 11. Beluga Distribution in the Project Area

4.7 Harbor Porpoise

Harbor porpoises are small (5 to 5.5 feet) and shy cetaceans that are typically seen alone or in small groups (2 to 10 animals). They are often found in shallow waters such as bays, estuaries, and other coastal areas (NOAA Fisheries 2023g). There are three stocks of harbor porpoises in Alaska, including the Bering Sea stock, the Gulf of Alaska stock, and the Southeast Alaska stock (Muto et al. 2021). The Gulf of Alaska stock is the stock most likely to be found in Cook Inlet.

4.7.1 Status and Threats

The Gulf of Alaska harbor porpoise is not listed under the ESA or designated as depleted under the MMPA. Estimates of mortality and severe injury from commercial fisheries and the population level of the Gulf of Alaska stock are dated; therefore, this stock is designated as a strategic stock under the MMPA (Muto et al. 2021). The most recent estimate of the population of the Gulf of Alaska stock of harbor porpoises is based on a survey conducted in 1998. The estimate from this survey was 10,489 porpoises, but was reevaluated by Hobbs and Waite (2010) using a correction factor to account for availability bias, resulting in an estimated 31,046 animals. The population trend for Gulf of Alaska harbor porpoises is unknown (Muto et al. 2021).

Threats to harbor porpoises include industrial activities, in-water construction, and dredging that may cause underwater noise and affect habitat quality (Linnenschmidt et al. 2013). Other harmful conditions include entanglement in fishing gear (Muto et al. 2021) and neurotoxins resulting from algal blooms (Lefebvre et al. 2016).

4.7.2 Regional and Seasonal Distribution

Harbor porpoises prefer shallow coastal waters less than 100 meters in depth (Hobbs and Waite 2010). They are common in nearshore areas of the Gulf of Alaska, Shelikof Strait, and lower Cook Inlet (Dahlheim et al. 2000). Harbor porpoises are often observed in lower Cook Inlet in Kachemak Bay and from Cape Douglas to the West Foreland (Rugh et al. 2005).

Harbor porpoises have been observed during most aerial surveys conducted in Cook Inlet since 1993. They are frequently documented in Chinitna and Tuxedni Bays on the west side of lower Cook Inlet (Rugh et al. 2005), with smaller numbers observed in upper Cook Inlet between April and October. There were 137 groups comprised of 190 individuals documented between May and August during Apache's 2012 seismic program (Lomac-MacNair et al. 2013) and 77 groups totaling 130 animals during the May 2014 survey. Kendall et al. (2015, as cited in Weston and SLR 2022) documented 52 groups comprised of 65 individuals north of the Forelands during SAExploration's 2015 seismic survey. Two groups totaling three harbor porpoises were observed in the fall of 2019 during Hilcorp's lower Cook Inlet seismic survey (Fairweather Science 2020). Four monitoring events were conducted at the POA in Anchorage between April 2020 and August 2022, during which 42 groups of harbor porpoises comprised of 50 individual porpoises were documented over 285 days of observation (61N 2021, 2022a, 2022b, and 2022c). The expected range of harbor porpoises within the project area is shown in Figure 12.

4.7.3 Life History

Harbor porpoises live to about 24 years of age. Sexual maturity is reached at 3 to 4 years of age, and females may give birth annually for several years. Their gestation period is approximately 10 to 11 months, followed by lactation of 8 to 12 months (NOAA Fisheries 2023g). Mating is believed to occur from June to October, with calving primarily

in May and June (Consiglieri et al. 1982). Harbor porpoises mainly eat schooling fish, like herring and mackerel, but are also known to eat squid and octopus (NOAA Fisheries 2023g). A study near Yakutat detected harbor porpoises with some seasonality at two river mouths, but their presence did not correlate to periods of high forage species abundance. The study also suggested that pink salmon, pollock, saffron cod, Pacific sand lance, Pacific sandfish, and eulachon are part of the porpoise diet, indicating opportunistic feeding on available species (Castellote et al. 2015). Dahlheim et al. (2009) found that harbor porpoises in southeast Alaska did not demonstrate seasonality in their occurrence, which may indicate they feed opportunistically on a wide range of forage species.

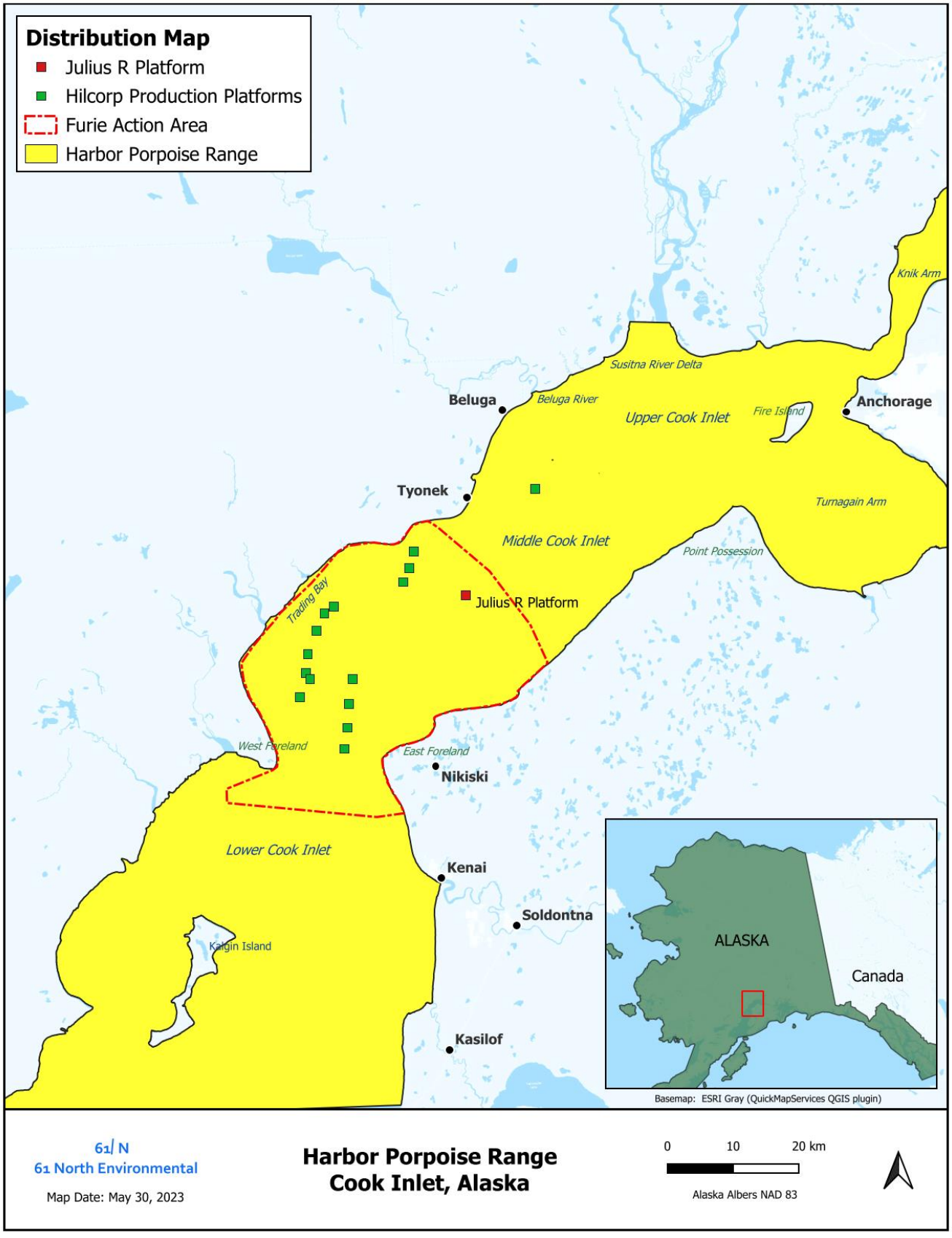

Figure 12. Harbor Porpoise Distribution in the Project Area

4.8 Dall's Porpoise

The Alaska stock of Dall's porpoises is widely distributed throughout the Gulf of Alaska and the Bering Sea, except for the shallow waters of upper Cook Inlet and the eastern flats of the Bering Sea.

4.8.1 Status and Threats

Dall's porpoises are not listed under the ESA and are not considered depleted or a strategic stock under the MMPA. Natural and anthropogenic factors such as habitat modifications and climate change affect this species. Those that inhabit nearshore areas are threatened by industrialization, including exposure to contaminants from runoff (Linnenschmidt et al. 2013) and wastewater treatment plants (NOAA Fisheries 2023d). Entanglement in nearshore and offshore fishing gear is a threat (NOAA Fisheries 2023d).

4.8.2 Regional and Seasonal Distribution

Dall's porpoises are present in most of the eastern North Pacific year-round. There is evidence of seasonal movements onshore and offshore along the west coast of the continental U.S. and abandonment of areas with ice, such as Prince William Sound, in winter (Muto et al. 2021). The Dall's porpoise range in Alaska includes lower Cook Inlet, but very few sightings have been reported in upper Cook Inlet. Observations have been documented near Kachemak Bay and Anchor Point (Owl Ridge 2014; BOEM 2015). In August 2015, one Dall's porpoise was reported in the mid-inlet north of Nikiski during SAExploration's seismic program (Kendall et al. 2015 as cited in Weston and SLR 2022). During aerial surveys in Cook Inlet, they were observed in Iniskin Bay, Barren Island, Elizabeth Island, and Kamishak Bay (Shelden et al. 2013). Ten groups totaling 30 Dall's porpoises were observed in the fall of 2019 during Hilcorp's lower Cook Inlet seismic survey (Fairweather Science 2020). The expected range of Dall's porpoises in the project area is shown in Figure 13.

4.8.3 Life History

Dall's porpoises generally live 15 to 20 years and become sexually mature between 3.5 and 8 years of age. Females give birth between June and September after a gestation period of 10 to 12 months. They move in groups of two to 12 individuals but are occasionally seen in larger groups. They are fast swimmers, often attracted to fast-moving vessels, and are known to bow ride beside large and small boats. When surfacing, they create a "rooster tail" of water unique to the species. They feed on schooling fish and crustacean species such as anchovies, herring, hake, lanternfish, smelt, squid, octopus, crabs, and shrimp (NOAA Fisheries 2023d).

Dall's porpoises are within the high-frequency cetacean hearing group, with a generalized hearing range of 275 Hz to 160 kHz (NOAA Fisheries 2018).

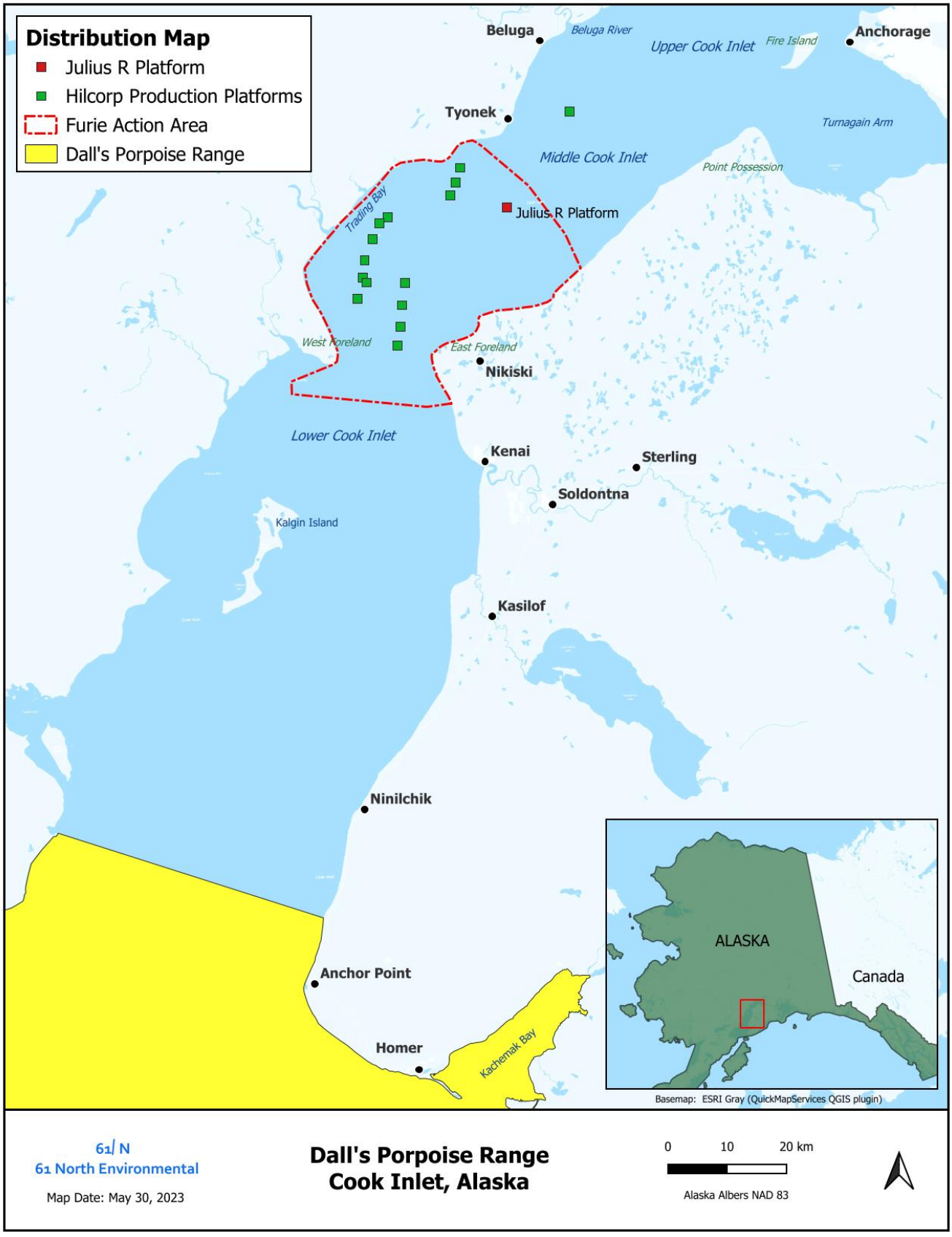

Figure 13. Dall's Porpoise Distribution in the Project Area

4.9 Pacific White-Sided Dolphin

Pacific white-sided dolphins are social and often travel in large groups, ranging from 10 to more than 100 animals or more. They are playful and aerobatic. They live in the North Pacific off the coasts of California, Oregon, Washington, and Alaska (NOAA Fisheries 2023l). Two management stocks are recognized and include the California/Oregon/Washington stock and the North Pacific stock (Muto et al. 2021). They are uncommon in most of Cook Inlet, but their presence was documented in lower Cook Inlet in Iniskin Bay and offshore of Port Graham in 2019 (Castellote et al. 2020).

4.9.1 Status and Threats

Pacific white-sided dolphins are not listed under the ESA and are not considered depleted or a strategic stock under the MMPA. Population estimates are dated and unreliable, but the minimum estimate for the North Pacific stock is 26,880. Population trends are unknown (Muto et al. 2021). Threats to the Pacific white-sided dolphins include modifications to nearshore habitat from industrialization, underwater noise, stormwater runoff, and entanglement in fishing gear (although few or no recent incidents have been reported).

4.9.2 Regional and Seasonal Distribution

The species is common in the Gulf of Alaska's pelagic waters and Alaska's nearshore areas, British Columbia, and Washington (Muto et al. 2021). They are not typically found in Cook Inlet, but in 2019, Castellote et al. (2020) documented short durations of Pacific white-sided dolphin presence using passive acoustic recorders near Iniskin Bay (6 minutes) and at an offshore mooring located approximately midway between Port Graham and Iniskin Bay (51 minutes). Visual monitoring conducted during the same period by marine mammal observers on seismic vessels near the offshore recorder did not detect any Pacific white-sided dolphins (Fairweather Science 2020). The expected range of Pacific white-sided dolphins in the project area is shown in Figure 14.

4.9.3 Life History

Pacific white-sided dolphins live 40 years or more and reach sexual maturity between 8 and 11 years of age. Females give birth approximately every three years, nursing their calves for up to 18 months. They typically feed on a variety of prey, such as squid and small schooling fish (capelin, sardines, and herring). They are attracted to vessels and are known to bow ride (NOAA Fisheries 2023l). Pacific white-sided dolphins are within the high-frequency cetacean hearing group, with a generalized hearing range of 275 Hz to 160 kHz (NOAA Fisheries 2018).

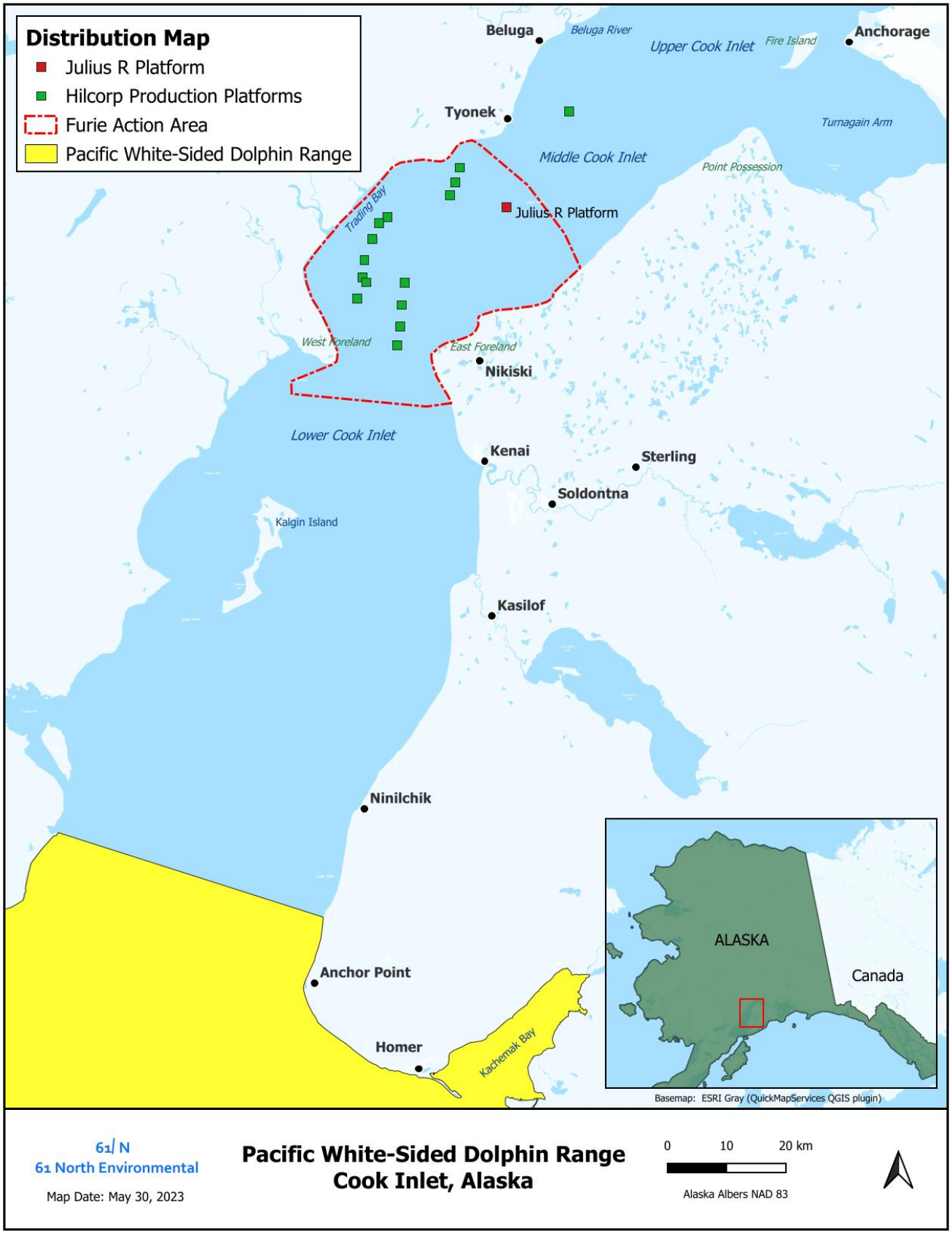

Figure 14. Pacific White-Sided Dolphin Distribution in the Project Area

4.10 Harbor Seal

Harbor seals are found in coastal areas of nearly all temperate zones in the northern hemisphere, including the east and west coasts of the U.S. and Canada, Europe, and Asia (NOAA Fisheries 2023h). In Alaska, their range includes the Pribilof Islands, Bristol Bay, Aleutian Islands, Alaska Peninsula, Kodiak, Cook Inlet, and Southeast Alaska (Muto et al. 2021). Twelve harbor seal stocks are managed in Alaska, with the Cook Inlet/Shelikof Strait stock present in the project area.

4.10.1 Status and Threats

Harbor seals are not listed under the ESA or considered depleted or strategic stock under the MMPA. The abundance of the Cook Inlet/Shelikof Strait stock was last surveyed in 2018, and it was determined that the 8-year trend estimate was a decrease of 111 seals per year (Muto et al. 2021). Harbor seals are an important subsistence species for Alaska Native tribes in the Cook Inlet region. An estimated 177 to 288 harbor seals were harvested annually from 2004 to 2008, and 104 were harvested in 2014. Estimates of the annual harvest for other years are not available. Threats to harbor seals include entanglement in nearshore fishing gear, illegal shooting, and disturbance by cruise vessels in glacial fjords (Muto et al. 2021).

4.10.2 Regional and Seasonal Distribution

In the spring and summer, harbor seals display an affinity for coastal haulout areas for feeding, breeding, pupping, and molting, while ranging further offshore and outside of Cook Inlet during the winter. High-density areas include Kachemak Bay, Iniskin Bay, Iliamna Bay, Kamishak Bay, Cape Douglas, and Shelikof Strait. Up to a few hundred seals seasonally occur in middle and upper Cook Inlet (Rugh et al. 2005), with the highest concentrations found near the Susitna River during eulachon and salmon runs (Nemeth et al. 2007; Boveng et al. 2012), but most remain south of the forelands (Boveng et al. 2012).

More than 200 haulout sites are documented in lower Cook Inlet (Montgomery et al. 2007) and 18 in middle and upper Cook Inlet (London et al. 2015). Of the 18 in middle and upper Cook Inlet, nine are considered “key haulout” locations where aggregations of 50 or more harbor seals have been documented. Seven key haulouts are in the Susitna River delta, and two are near the Chickaloon River. The two haulout locations closest to the JRP are located at Middle Ground Shoal, which becomes inundated with water at most high tides (London et al. 2015).

Harbor seals have been sighted in Cook Inlet during every year of the aerial surveys conducted by NMFS and during all recent mitigation and monitoring programs in lower, middle, and upper Cook Inlet (61N 2021, 2022a, 2022b, and 2022c; Fairweather Science 2020; Kendall et al. 2015 as cited in Weston and SLR 2022; Lomac-MacNair et al. 2013, 2014; Sitkiewicz et al. 2018). The expected range of harbor seals in the project area is shown in Figure 15.

4.10.3 Life History

Harbor seals live between 25 and 30 years, grow to 180 to 285 pounds, and reach 5 to 6 feet long. They become sexually mature at the age of 3 to 7 years old. Females typically give birth during the spring or summer, depending on the location; pups are born earlier in the southern portions of the West Coast than in the north. Harbor seal pups are mobile immediately and can swim upon birth, dive for up to 2 minutes when they are days old, and travel over 100 miles within one month. Harbor seals may raise pups in nurseries for protection from predators, but they do not always do so (NOAA Fisheries 2023h).

Harbor seals are not migratory; rather, they travel within a limited range depending on food availability, breeding opportunities, tides, and weather. Harbor seals eat eulachon and salmon, which attract them to the streams of upper Cook Inlet (NMFS 2003). They also eat capelin, cod, pollock, flatfish, shrimp, octopus, squid, shellfish, and crustaceans (Muto et al. 2021; NOAA Fisheries 2023h).

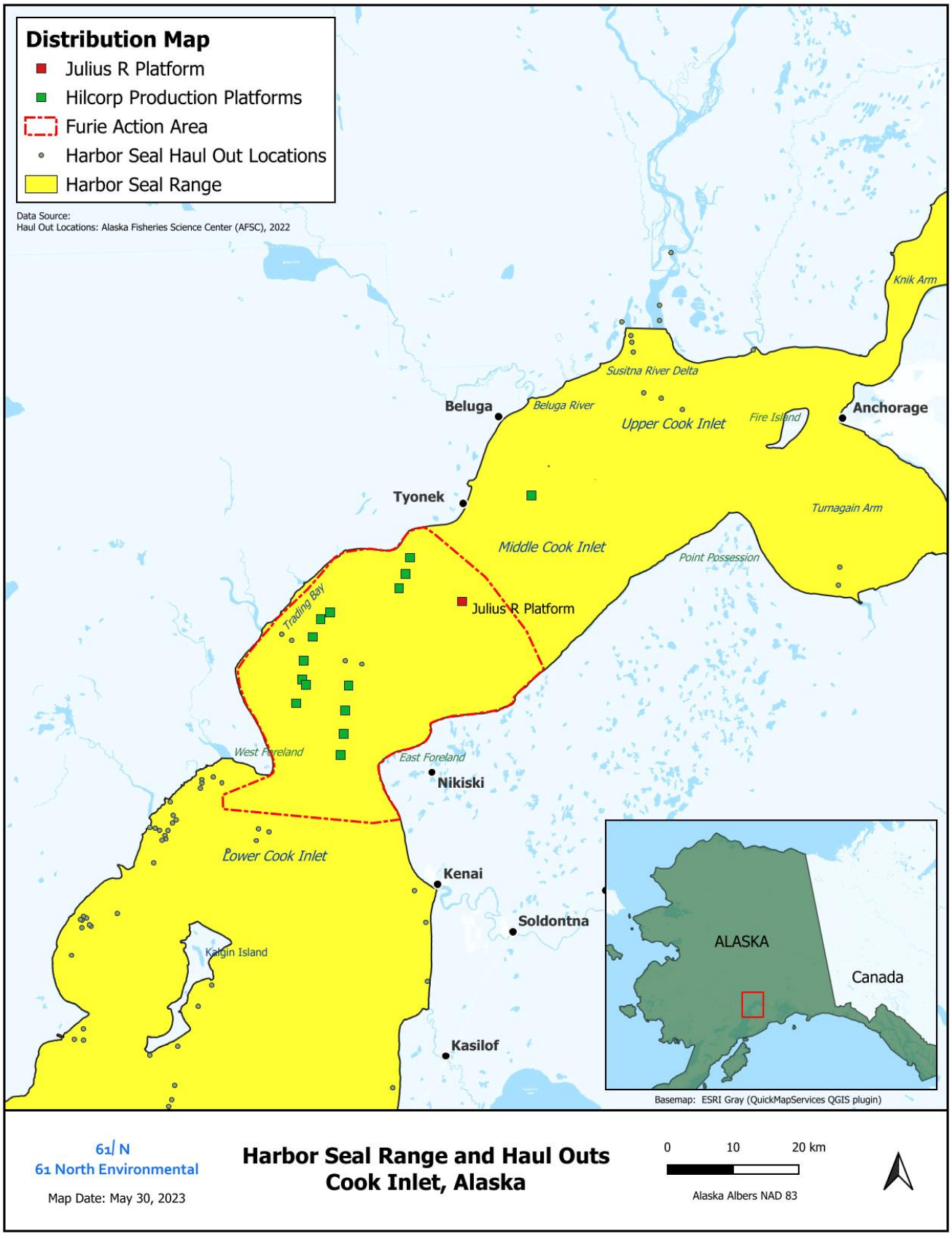

Figure 15. Harbor Seal Distribution and Haul Out Locations in the Project Area

4.11 Steller Sea Lion

Steller sea lions are the largest “eared seals” in the Otariidae family of sea lions and fur seals. In Alaska, they are recognized as the Eastern DPS and Western DPS, equivalent to the Eastern and Western stocks. Steller sea lions in Cook Inlet belong to the Western stock, including all animals west of Cape Suckling (144° west longitude).

4.11.1 Status and Threats

Steller sea lions from the Western DPS are listed as endangered under the ESA, and the Western stock is classified as depleted and strategic under the MMPA. From the 1970s to 2000, the Western stock of Steller sea lions decreased from 220,000 to 265,000 to less than 50,000. The population has increased since 2003, but variation has been considerable in the six subregions of this stock. The Central Gulf subregion has shown an estimated 3.8 to 3.4 percent annual increase from 2002 to 2018 (Muto et al. 2021).

Ten federally managed commercial fisheries in Alaska were reported to have caused mortality and severe injury to Western Steller sea lions between 2014 and 2018 (Muto et al. 2021). Other human-caused mortality and severe injury result from subsistence harvest, incidental take, illegal shooting, stampedes at rookeries, and marine debris. Other factors that may have contributed to the decline in population include the removal of forage fish by commercial fishing, environmental change, warming waters causing harmful algal blooms and declines in groundfish populations, disease, contaminants (e.g., mercury and organochlorines), and predation from killer whales (Muto et al. 2021).

4.11.2 Regional and Seasonal Distribution

Most Steller sea lions in Cook Inlet are found south of Anchor Point on the east side of lower Cook Inlet, with concentrations near haulout sites at Shaw Island and Elizabeth Island and by Chinitna Bay and Iniskin Bay on the west side (Rugh et al. 2005). Critical habitat is designated for Steller sea lions within 20 nautical miles of all major haulouts and rookeries, including near the eastern entrance of Cook Inlet (Figure 16). Steller sea lions are rarely seen in upper Cook Inlet (Nemeth et al. 2007). About 3,600 sea lions use haulout sites in the lower Cook Inlet area (Sweeney et al. 2017), with additional individuals venturing into the area to forage. However, rookeries and haulouts have not been identified near the action area in the mid-inlet (Figure 17). There is no designated critical habitat for Steller sea lions in the mid- or upper inlet.

Seasonally, Steller sea lions remain near rookeries or haulouts during the breeding season in May through July, then range more widely during other times of the year (Jemison et al. 2013; Allen and Angliss 2014). Several surveys and monitoring programs have documented Steller sea lions throughout Cook Inlet, including in upper Cook Inlet in 2012 (Lomac-MacNair et al. 2013), near Cape Starichkof in 2013 (Owl Ridge 2014), in middle and lower Cook Inlet in 2015 (Kendall et al. 2015, as cited in Weston and SLR 2022), in middle Cook Inlet in 2018 (Sitkiewicz et al. 2018), in lower Cook Inlet in 2019 (Fairweather Science 2020), and near the POA in Anchorage in 2020, 2021, and 2022 (61N 2021, 2022a, 2022b, and 2022c). The expected range of Steller sea lions in the project area is shown in Figure 17.

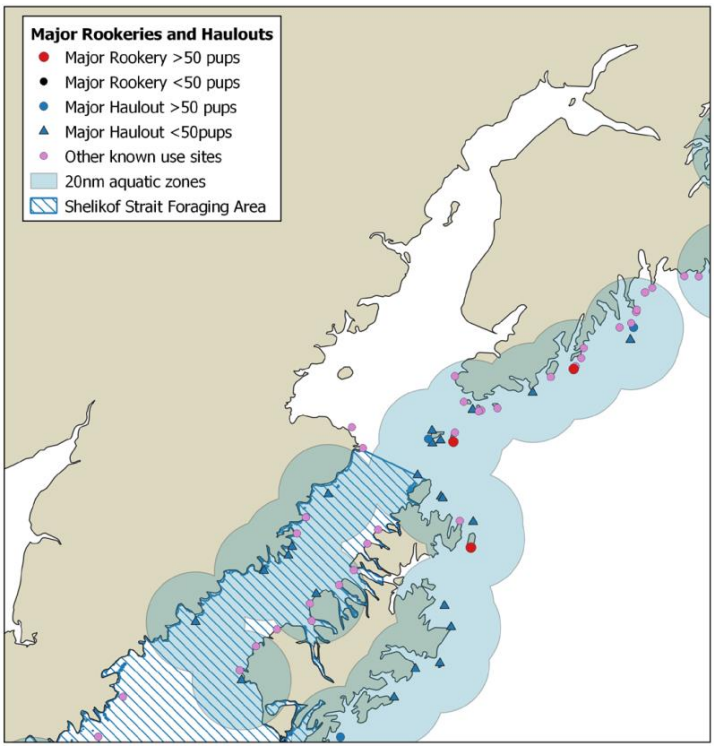

Figure 16. Steller sea lion rookery and haulout sites, and designated critical habitat near lower Cook Inlet (50 CFR § 226.202).

4.11.3 Life History

Steller sea lions are sexually dimorphic, with males growing up to 2,500 pounds and 11 feet long and females reaching 800 pounds and 9.5 feet long. Males can breed between 3 and 8 years of age but often can only defend a breeding territory after reaching 9 or 10 years of age. Females become sexually mature at 4 to 6 years of age, typically birthing one pup each year in mid-May to mid-July. Pups usually wean in less than a year, but some continue to nurse for up to three years (NOAA Fisheries 2023m).

Steller sea lions have a varied diet that includes Atka mackerel, pollock, salmon, Pacific cod, Pacific sand lance, arrowtooth flounder, Irish lords, rock sole, capelin, eulachon, Pacific sandfish, Pacific herring, rockfish, smooth lumpsucker, Pacific hake, and cephalopods such as squid and octopus (NOAA Fisheries 2023m).

Kastelein et al. (2005) categorized Steller sea lion vocalizations, including belches, barks, and clicks. Steller sea lions are in the otariid pinniped hearing group, with a generalized hearing range of 60 Hz to 39 kHz (NOAA Fisheries 2018). Audiograms determined they are most sensitive to frequencies between 1 and 16 kHz, but they can also hear low-frequency sounds (25 Hz) (Kastelein et al. 2005).

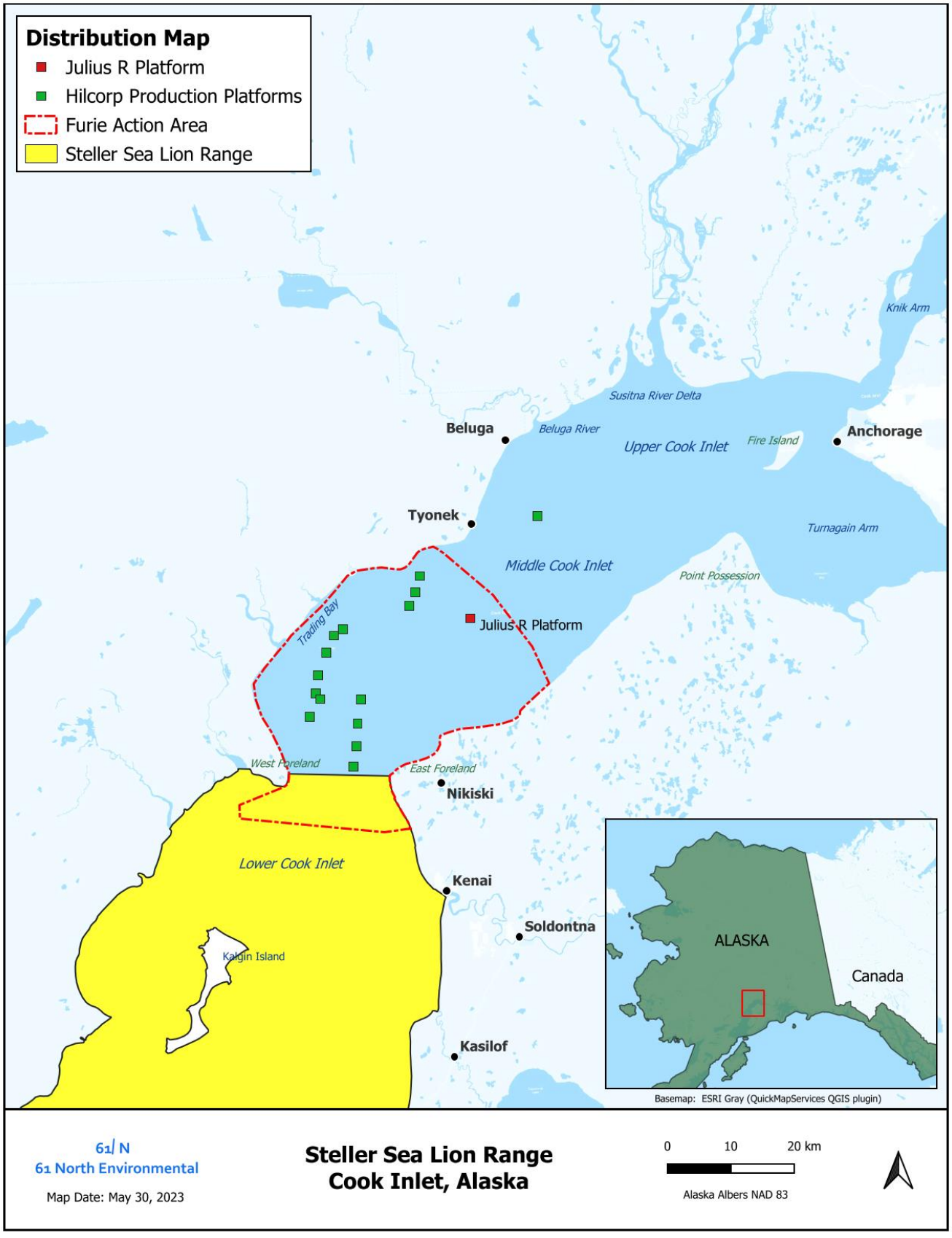

Figure 17. Steller Sea Lion Distribution in the Project Area

4.12 California Sea Lion

California sea lions are uncommon in Alaska; only 52 sightings were reported between 1973 and 2003. Most occurrences were during the spring, and increased sighting rates correlated with increased population further south (Maniscalco et al. 2004).

4.12.1 Status and Threats

California sea lions are not listed as endangered or threatened under the ESA and are not depleted or designated as a strategic stock under the MMPA. The annual population growth is estimated to be 7 percent, and the population estimate as of 2014 was 257,606. Threats to the California sea lion include entanglement in marine debris, vessel strikes, oil exposure, entrainment in power plants, illegal shootings, harmful algal blooms, reduced prey species from increases in water temperature, and underwater noise (Carretta et al. 2022).

4.12.2 Regional and Seasonal Distribution

California sea lions live in the shallow coastal waters of the eastern North Pacific Ocean. They range from southeast Alaska to the Pacific coast of central Mexico (NOAA Fisheries 2023c). They breed on islands in southern California, western Baja California, and the Gulf of California. During non-breeding periods, California sea lions are known to migrate seasonally to coastal areas of Canada (Carretta et al. 2022). The few observed in Alaska typically do not travel further north than Southeast Alaska. They are often associated with Steller sea lion haulouts and rookeries (Maniscalco et al. 2004). Sightings in Cook Inlet are rare, with two documented during the Apache 2012 seismic survey (Lomac-MacNair et al. 2013) and anecdotal sightings in Kachemak Bay. None were sighted during the 2019 Hilcorp lower Cook Inlet seismic survey (Fairweather Science 2020) or the CIPL project in 2018 (Sitkiewicz et al. 2018). The expected range of California sea lions in the project area is shown in Figure 18.

4.12.3 Life History

California sea lions live 20 to 30 years, reaching sexual maturity at 4 to 5 years of age. Older males establish and defend breeding territories and mate with up to 14 females. They breed from late June to early August, and pups are born in May and June. They are nursed for up to a year. California sea lions primarily feed on squid, anchovies, mackerel, rockfish, and sardines found in upwelling areas offshore. California sea lions are in the otariid pinniped hearing group, with a generalized hearing range of 60 Hz to 39 kHz (NOAA Fisheries 2018).

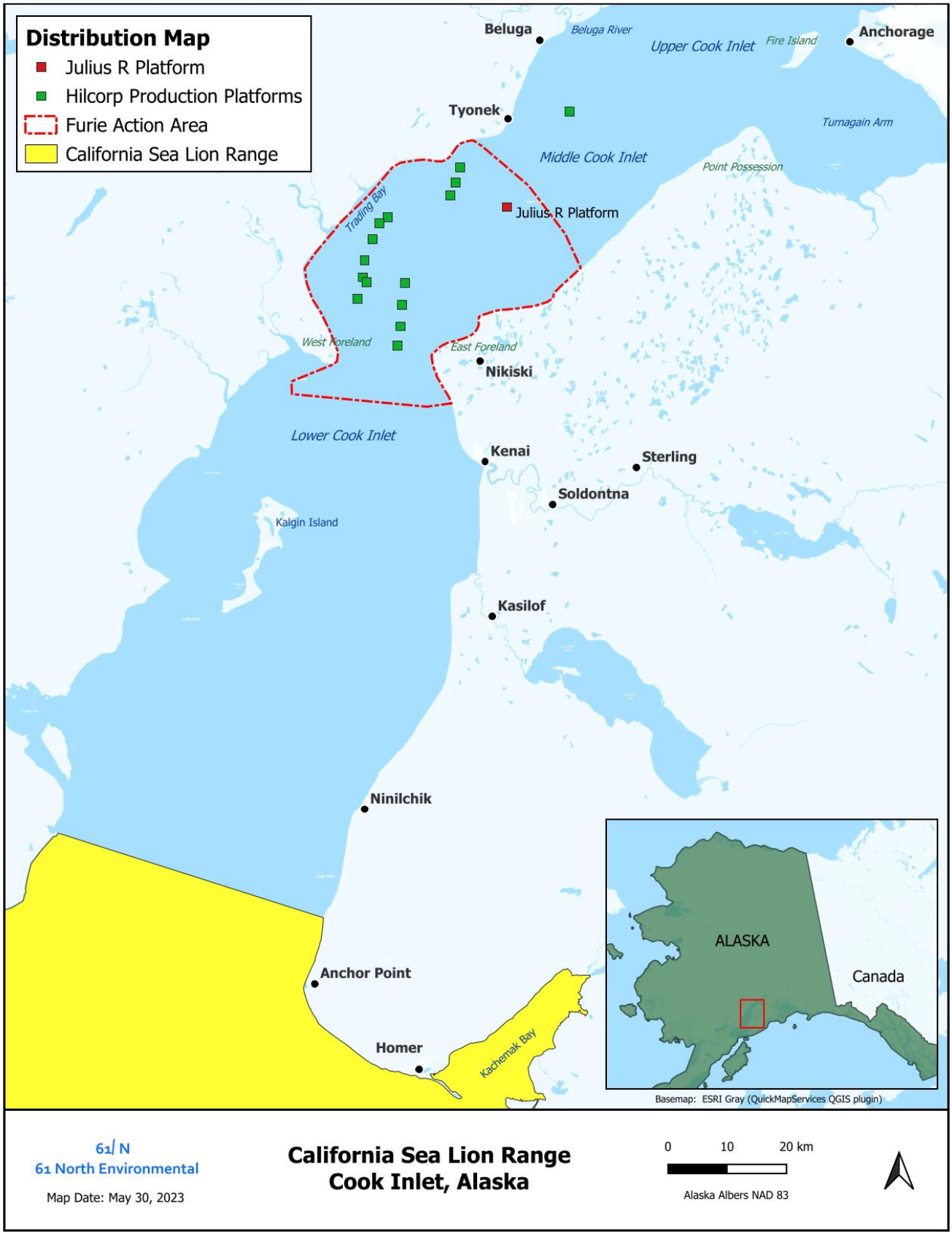

Figure 18. California Sea Lion Distribution in the Project Area

5 TYPE OF INCIDENTAL TAKE AUTHORIZATION REQUESTED

Under the MMPA, "Take" means to harass, hunt, capture, kill, or attempt to harass, hunt, capture, or kill any marine mammal. "Harassment" is statutorily defined as any act of pursuit, torment, or annoyance which: A) has the potential to injure a marine mammal or marine mammal stock in the wild (Level A Harassment), or B) has the potential to disturb a marine mammal or marine mammal stock in the wild by disrupting behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering but which does not have the potential to injure a marine mammal or marine mammal stock in the wild (Level B Harassment). Furie requests authorization for both Level A and Level B take, incidental to the activities described within. However, the request for Level A take is limited to harbor seals and is not requested for other species.

5.1 Year 1 Anticipated Take

During the open water season in 2024, Furie plans to tow the Enterprise 151 with three tugboats and position it at the JRP with up to four tugboats. Furie also plans to install up to two 20-inch conductor pipes 130 to 180 feet into the seabed with an impact hammer in two well slots located within the caisson of the platform. Production drilling activities will be conducted for 45 to 180 days.

5.1.1 Conductor Pipe Installation

Furie may install two conductor pipes in the two empty well slots in Year 1, but one or both may instead be installed in Year 2. The 20-inch-diameter conductor pipes are installed up to 180 feet below the mud line. As the pipe is driven into the sediment, the sections are connected either by welding or drivable quick connections. The conductor pipe supports the initial sedimentary part of the well, preventing the surface layers from collapsing and obstructing the wellbore. The pipe also facilitates the return of cuttings from the drill head and supports the wellhead components.

Some attenuation of the sounds from the impact installation of the conductor pipes is expected, but the degree of attenuation is unknown. Each conductor pipe driving event is expected to occur over a 1- to 2-day period (2 to 4 days total). However, actual sound generation would occur intermittently for approximately 4 to 6 hours per conductor pipe (8 to 12 hours total) during this period. The SSLs from the conductor pipe installation are discussed in Section 1.1.2.1, and the Level A and Level B take estimates from the installation are discussed in Section 6.

The conductor pipes may be installed with the Enterprise 151 while cantilevered over the JRP, or they may be installed before the rig arrives by using the crane onboard the JRP. It is currently unknown whether the conductor pipe will be installed before the arrival of the rig or while the rig is at the JRP. No difference in the intensity or frequency of the underwater sounds is expected.

5.2 Year 2 Anticipated Take

During the open water season of 2025, Furie plans to tow the Enterprise 151 with three tugboats and position it at the JRP with up to four tugboats. As with the Year 1 activity, the rig tow's potential origination is unknown and could either be the Rig Tenders Dock or one of Hilcorp's platforms. Production drilling activities will be conducted for 45 to 180 days in Year 2. If none or only one conductor pipe is installed in Year 1, then up to two conductor pipes may

be installed in Year 2. If they are both installed in Year 1, none will be installed in Year 2. Because conductor pipes may be installed in Year 2, both Level A and Level B takes are requested for Year 2.

6 TAKE ESTIMATES FOR MARINE MAMMALS

The probability of physical trauma or mortality resulting from vessel strikes or other interactions with equipment is exceedingly low and unlikely to occur during project activities. During the impact installation of the conductor pipes, a small number of harbor seals may approach within the applicable Level A isopleth for the onset of PTS. Therefore, authorization for Level A takes is requested for harbor seals only. Level A takes of other species are not expected and are not requested in this application. Physical injury to the hearing abilities of marine mammals through the onset of PTS is unlikely to occur. However, it is possible if some species remain near high-intensity sounds for long durations. The acoustic thresholds that may cause PTS are discussed in Section 6.1.

Documenting signs of behavioral disturbances (Level B harassment), such as abandonment of a feeding site or avoidance of an area with excessive underwater sound, is subjective and can be difficult or impossible to verify with certainty when observed. Reactions to project activities may be difficult to discern from normal, unaffected behavior or may not be visible at all if they occur underwater. To quantitatively assess the number of takes projects may cause, NMFS developed acoustic threshold criteria for continuous and intermittent sound to determine when Level B harassment occurs. The criteria are discussed further in Section 6.1.

The SSLs of each activity are discussed in Section 1 and include parameters such as rms SPL, SEL, and peak SPL. The transmission loss coefficient (TL_c) indicates the rate of decrease in acoustic intensity over distance. It is a principal factor when combined with the SSL in calculating the distance at which the received level of the sounds falls below the acoustic threshold criteria. The zones around the sound source defined by the radii of the distances to the Level A and Level B harassment areas are known as isopleths. Sections 6.2 and 6.3 discuss the Level A and Level B isopleths.

Density estimates are defined in terms of the number of animals per square kilometer (km^2) for each species. Level A and Level B takes are estimated by multiplying the area of the Level A and Level B zones (in km^2) by the density and by the number of events (e.g., tows, days, installations) for each activity. The sound criteria, the calculated areas of each ensonified zone, density estimates, and the calculated take estimates are further discussed in the following sections.

6.1 Acoustic Threshold Criteria

6.1.1 Level A Acoustic Thresholds

In 2016, NMFS developed guidance, revised in 2018, to assist project proponents in assessing the Level A sound threshold criteria at which PTS onset may occur in marine mammals (NOAA Fisheries 2018). Five functional hearing groups for marine mammals are identified in the guidance document to account for the variability in perceived levels of sound intensity at different frequencies. These five groups and the Level A acoustic thresholds for each are presented in Table 5.

Table 5. Functional Hearing Groups of Marine Mammals in the Project Area

Hearing Group	*Species*	*Generalized Hearing Range*	*Level A Threshold for Impulsive Sound*	*Level A Threshold for Non-Impulsive Sound*
Low-frequency (LF) cetaceans	Humpback whales Fin whales Minke whales Gray Whales	7 Hz to 35 kHz	219 dB L_{pk} 183 dB SEL	199 dB SEL
Mid-frequency (MF) cetaceans	Beluga whales Killer whales	150 Hz to 160 kHz	230 dB L_{pk} 185 dB SEL	198 dB SEL
High-frequency (HF) cetaceans	Dall's porpoise Harbor porpoise Pacific white-sided dolphin	275 Hz to 160 kHz	202 dB L_{pk} 155 dB SEL	173 dB SEL
Phocids in water (PW)	Harbor seals	50 Hz to 86 kHz	218 dB L_{pk} 185 dB SEL	201 dB SEL
Otariids in water (OW)	Steller sea lions California sea lions	60 Hz to 39 kHz	232 dB L_{pk} 203 dB SEL	219 dB SEL

Notes:
L_{pk} = peak received sound pressure level
SEL = sound exposure level
rms = root-mean-square

6.1.2 Level B Acoustic Thresholds

The current thresholds used by NMFS to estimate Level B harassment are 160 dB re 1 µPa rms for impulsive sound (such as the impact installation of the conductor) and 120 dB re 1 µPa rms for non-impulsive sound (such as a tug pulling a jack-up rig) for all marine mammals.

6.2 Level A Zone Isopleths

Level A acoustic thresholds may be exceeded during four separate project activities:

1. Towing the Enterprise 151 with three tugboats
2. Positioning the Enterprise 151 with three tugboats for up to five hours

3. Positioning the Enterprise 151 with four tugboats for up to one hour
4. Impact installation of conductor pipes at the JRP

The area (in km^2) of the Level A zones for each activity is calculated in Sections 6.2.1 and 6.2.3 to estimate the number of Level A takes.

6.2.1 Level A Zones for Towing the Enterprise 151

An array of three tugboats towing the rig is considered a mobile source and may expose passing marine mammals to elevated sounds for short durations. As described in Section 1.1.1, an SSV measured the combined sound level of three tugs towing the Enterprise 151 and determined the SPL to be 185 dB re 1 µPa at 1 meter at 50 percent power. In Hilcorp's 2022 application, SLR conducted detailed modeling of Level A zones for all five functional hearing groups of marine mammals for the rig towing activity. The model conservatively assumed an 18-second exposure—6 seconds from each of the three moving tugs. Of the five groups, only the analysis of the HF hearing group resulted in a potential Level A exposure. The Level A zone was calculated to be 8 meters (Weston and SLR 2022).

Because the tugs towing the rig are a "mobile" source, the 8-meter Level A zone will also ensonify a swath along the transit route that is equal to the diameter of the zone, or 16 meters across. A 35-km route is assumed for towing the rig to and from the JRP (refer to Section 6.3.1 for more details). The total area of the Level A zone ensonified along the route is calculated by Equation 1.

Equation 1.

$$A = 2rd + \pi r^2$$

Where:

r = radius of the isopleth (km)

d = distance of the rig tow route (km)

Therefore, the total area of the Level A zone for HF cetaceans resulting from the rig tow is 0.56 km^2.

6.2.2 Level A Zones for Positioning the Enterprise 151

Positioning of the rig may take up to 5 hours in the same location and is considered a stationary source. If a marine mammal remains near a stationary source, the potential for the onset of PTS increases as the exposure duration increases. Because of the potential for longer-duration exposures, the radii of Level A isopleths from the stationary activity of positioning the rig at the JRP are larger than the radii of the Level A zones from transiting tugs.

In Hilcorp's 2022 application, SLR modeled the three-tug scenario using a stationary source level of 185 dB re 1 µPa at 1 meter for the stationary rig positioning phase. The model included two locations—Trading Bay and middle Cook Inlet—and various salinity and temperature profiles for May, July, and October. The modeling resulted in average Level A zones of 95 meters (LF), 78 meters (MF), 679 meters (HF), and 69 meters (PW) for the stationary scenario. The Level A acoustic thresholds, radii of these isopleths (in meters), and the areas of the ensonified zones (in km^2) are presented in Table 6.

Table 6. Level A Isopleths and Level A Zone Areas for a 5-hour Exposure to a Continuous 185 dB rms SPL

Hearing Group	*LF*	*MF*	*HF*	*PW*
Level A Acoustic Threshold (SEL_{cum})	199	198	173	201
*PTS (Level A) Isopleth to threshold (meters)**	95	78	679	69
Level A Zone Area (km^2)	0.03	0.02	1.45	0.01

Notes:

SEL_{cum} = cumulative sound exposure level

**Source: (Weston and SLR 2022)*

In addition to the three tugs needed to tow the Enterprise 151, a fourth tug may be needed for approximately one hour to position the rig safely. The three-tug rms SPL of 185 dB (at 50 percent power) implies each tug individually has a source level of 180.2 dB rms SPL because the addition of three equal-intensity sound signals adds 4.8 dB to the sound level of a single source (Engineering Toolbox 2023). Each doubling of sound intensity adds 3 dB to the baseline (Engineering Toolbox 2023), and four tugs represent two doublings of a single source. Therefore, 6 dB were added to the 180.2 dB baseline for an expected sound level of 186.2 dB rms SPL for using four tugs.

The NMFS Level A Guidance User Companion Spreadsheet was used to calculate the Level A isopleths with the following inputs: 186.2 dB rms SPL for the source level, a one-hour duration, and the SLR-modeled transmission loss coefficient of 18.129[2]. The isopleths are presented in Table 7, and the full NMFS User Companion spreadsheet is included in Appendix A.

Table 7. Level A Isopleths for 186.2 dB Stationary Continuous Sound Source for 1 hour

Hearing Group:	*LF*	*MF*	*HF*	*PW*	*OW*
SEL_{cum} Threshold	199	198	173	201	219
PTS (Level A) Isopleth to threshold (meters)	18	1.7	16.1	10.7	1.2
Level A Zone Area (km^2)	0.001	0.00001	0.001	0.0003	0.000005

[2] The SLR modeling in Weston and SLR (2022) determined the average 120 dB isopleth was 3,850 meters for a continuous noise source of 185 dB rms SPL across 25 locations in the project area. The coefficient is calculated as (185 dB - 120 dB)/Log10(3850/1) = 18.129 dB per decade.

6.2.3 Level A Zone for Conductor Pipe Installation

Impact installation of the 20-inch conductor pipes within the well slots, located within the caisson of the JRP, may create underwater SPLs/SELs that potentially cause the onset of PTS in marine mammals in all five functional hearing groups. As described in Section 1.1.2.1, the data source for the appropriate proxy selected for the SSLs of conductor installation is U.S. Navy (2015). The study combined data from two SSVs for impact installation of 24-inch piles and developed SSL averages weighted by the number of strikes for rms SPL, SEL, and peak SPLs. The weighted averages at 10 meters were 193 dB rms SPL, 184 dB SEL, and 210 dB peak SPL. The unaltered SSLs from U.S. Navy (2015) are used for Level A and Level B isopleth calculations because project-specific empirical data is lacking for the sound attenuation expected from the "double wall" encasement of the well slot located within a monopod leg.

Transmission Loss Coefficient

During the construction of the JRP in 2015, JASCO conducted an SSV during the impact installation of 42-inch piles with a Menck 800S hydraulic impact hammer (Austin et al. 2015). The piles were installed to pin the JRP to the seafloor. Because of the much larger size of the piles compared to the 20-inch conductor and because the hammer has almost four times the energy of the Delmag D62, it is not a suitable proxy for SSLs in this application. However, the TL_c from the impact hammering was measured at 20.3 dB and is the only empirical measurement of TL_c at the JRP.

Other SSVs in Cook Inlet have measured similar coefficients from the unattenuated impact installation of steel piles (or conductors). For instance, Blackwell (2005) measured a TL_c of 20.8 dB at Port MacKenzie (near the POA) while installing 36-inch piles with a Delmag D62 impact hammer. Illingworth and Rodkin (2014, as cited in 79 Federal Register (FR) 54397) measured sound levels during the installation of a 30-inch conductor with a Delmag D62 impact hammer in open water at the Cosmopolitan #1 well site. Regression analysis of the reported rms SPLs at various distances results in a TL_c of 20.5 dB. The Cosmopolitan #1 well is located 75 miles south of the JRP and has similar salinity, temperature, water depth, and bathymetry. Širović and Kendall (2009) reported a TL_c of 16.4 dB during impact installation at the POA Marine Terminal Redevelopment Project.

In contrast, the SSV conducted at the POA in 2020 during attenuated impact installation of 48-inch piles with a Delmag D180 hammer reported a TL_c ranging from 12 dB to 18.8 dB (weighted for marine mammal functional hearing groups) and an unweighted TL_c ranging from 8.8 dB to 20.8 dB (Reyff et al. 2021).

It is understood that many variables, such as the composition of the substrate, bathymetry, salinity, temperature, sound frequency profile, hammer type, and energy can affect localized TL_c values and that a TL_c value measured in one area is not necessarily applicable to another. When projects do not have site- and activity-specific SSV data, NMFS recommends using the "practical spreading loss" TL_c of 15 dB. With the site-specific TL_c of 20.3 dB measured at the JRP during impact pile driving and other studies of similar projects located north and south of the JRP with measured TL_c values greater than 20 dB, using the practical spreading loss TL_c of 15 dB may overestimate takes from conductor pipe installation. However, the conservative TL_c of 15 dB accounts for the uncertainty and potential variability of the TL_c that may occur in this specific scenario.

The following parameters are used to estimate the size of the Level A zones for the installation of the 20-inch conductor:

- SEL of 184 dB (at 10 meters)
- Peak SPL of 210 dB (at 10 meters)

- 6,100 strikes per conductor
- TL_c of 15 dB per decade
- 70 percent installation on the first day, followed by 30 percent installation on the second day
- Installation of two conductors in Year 1; no conductors will be installed in Year 2

As discussed above, the proxy SSLs are from the unattenuated impact installation of 24-inch piles described in U.S. Navy (2015). The number of strikes is derived from a 2016 drive log recorded at the JRP during the installation of one of the conductors with an IHC S-90 hydraulic hammer. The S-90 is rated at less than half the energy of the Delmag D62; therefore, the number of strikes is likely to be less than estimated. The conductors are typically installed in 40-foot sections that are welded together. Because of the time it takes to weld new sections, approximately 70 percent of the installation is expected to be completed on day 1, and the remaining 30 percent would be completed on day 2. The outputs of the NMFS User Spreadsheet, tab E.1 "IMPACT Pile Driving" are presented in Table 8, and the full spreadsheets are included in Appendix A.

Table 8. Level A Calculated PTS Zones for Conductor Pipe Installation

Hearing Group:	*LF*	*MF*	*HF*	*PW*	*OW*
SEL_{cum} Threshold	183	185	155	185	203
PTS (Level A) Isopleth to threshold (meters) *70-percent Installation*	1,933.6	68.8	2,303.2	1,034.7	75.3
Level A Zone Area 70-percent Installation (km^2)	11.75	0.01	16.67	3.36	0.02
PTS Isopleth to threshold (meters) *30-percent Installation*	1,099.1	39.1	1,309.2	588.2	42.8
Level A Zone Area 30-percent Installation (km^2)	3.80	0.00	5.38	1.09	0.01
PK Threshold	219	230	202	218	232
PTS PK Isopleth to threshold (meters)	2.5	NA	34.1	2.9	NA

Notes:
Source: NMFS User Spreadsheet, Tab E.1 "IMPACT Pile Driving" (refer to Appendix A for input values)
N/A = Level A Isopleth is negligible

6.3 Level B Zone Isopleths

The Level B acoustic threshold of 120 dB for continuous noise will be exceeded by the tugs towing and positioning the Enterprise 151. The Level B acoustic threshold of 160 dB for impulsive noise will be exceeded during the impact installation of the conductor pipes.

6.3.1 Level B Zone for Towing the Enterprise 151

In October of 2021, JASCO conducted an SSV while Hilcorp towed the Enterprise 151 (formerly the Spartan 151), which determined that the tugs at 50 percent power emitted sound at 185 dB (Lawrence et al. 2022, as cited in Weston and SLR 2022). Using this data, Hilcorp employed hydro-acoustic specialists at SLR to model the sound propagation at 25 locations and three distinct seasonal periods to account for variability in the bathymetry, water salinity, and temperature profiles. The 25 locations were selected based on their proximity to the routes where the tugs would tow the Enterprise 151 from the Rig Tenders Dock in Nikiski, Alaska, to the various oil and gas platforms operated by Hilcorp and between them. The result of the modeling was an average 120 dB isopleth of 3,850 meters (Weston and SLR 2022).

The 3,850-meter Level B zone was used in Hilcorp's application to calculate the estimated number of exposures for each species and is replicated here as the best available data for this identical activity.

The route from the Rig Tenders Dock to the JRP is estimated to be 30 to 35 km. A 35-km route is conservatively assumed to allow diversion to the eddy area near the OSK Dock to await a tide change. Using Equation 1, the total area of the Level B zone for the rig tow is 316.1 km^2.

Furie may also begin towing the rig from one of Hilcorp's platform locations. The towing distance between Hilcorp's platforms and the JRP ranges from 10 km to 35 km, with an average of approximately 22 km. However, seven of Hilcorp's platforms are located in Trading Bay, where beluga density is estimated to be higher than offshore areas (refer to Section 6.4.2). If Furie begins towing the Enterprise 151 at the Dolly Varden platform, one potential towing route to the JRP that passes northwest of Middle Ground Shoal is also approximately 35 km in length. Therefore, a 35-km towing route, which equates to a Level B ensonified area of 316.1 km^2, is assumed to estimate potential exposures for either scenario conservatively. At the end of the season, Furie is likely to tow the Enterprise 151 back to the Rig Tenders Dock; therefore, two towing events are assumed in both Year 1 and Year 2.

6.3.2 Level B Zone for Positioning the Enterprise 151

As described in Section 1.1.1, a fourth tug may be needed for up to one hour to position the Enterprise 151 at the JRP safely. Although only three tugs are needed for most of the 5-hour positioning attempt, the duration of noise is not a parameter when calculating Level B exposure estimates, as it is when Level A exposures are calculated. The largest 120 dB isopleth that occurs during each "event" is the isopleth that is applicable when estimating Level B exposures. Therefore, a radius for the 120 dB isopleth associated with the 4-tug scenario is needed to determine the estimated Level B exposures that may occur during rig positioning.

The average TL_c for the modeling conducted by SLR is 18.129 dB,[3] which is calculated by using the 120 dB isopleth of 3,850 meters for the 3-tug scenario at 185 dB rms SPL (refer to Section 6.2.2). Using 186.2 dB rms SPL as the source level, the Level B zone for the 4-tug scenario is 4,483 meters, which equates to an ensonified area of 63.1 km^2 for the positioning attempts.

6.3.3 Level B Zone for Conductor Pipe Installation

The U.S. Navy (2015) study (described in Sections 1.1.2.1 and 6.2.3) combined data from two SSVs for impact installation of 24-inch piles and developed SSL averages weighted by the number of strikes for rms SPL, SEL, and peak SPLs. The weighted averages at 10 meters were 193 dB rms SPL, 184 dB SEL, and 210 dB peak SPL. The unaltered SSLs from U.S. Navy (2015) are used for Level A and Level B isopleth calculations because project-specific empirical data is lacking for the sound attenuation expected from the "double wall" encasement of the well slot located within a monopod leg.

The TL_c of 15 dB, also discussed in Section 6.2.3, is used along with the rms SPL of 193 dB at 10 meters to calculate the estimated 160 dB isopleth for conductor pipe installation, which results in a Level B radius of 1,585 meters and an area of 7.89 km^2. Each conductor pipe is expected to take 2 days to install, resulting in 4 installation events to estimate the total number of Level B exposures.

The Level B zones, total ensonified areas, number of events for towing and positioning the Enterprise 151, and installation of the conductor pipes are presented in Table 9 for Year 1 and Year 2.

Table 9. Level B Zones, Areas, and Number of Events by Activity for Year 1 and Year 2

Activity	*Level B Acoustic Threshold*	*Level B Isopleth (radius in meters)*	*Level B Area (km^2)*	*No. of Events Year 1*	*No. of Events Year 2*
Towing the Enterprise 151	120 dB	3,850	316.1	2	2
Positioning the Enterprise 151	120 dB	4,483	63.1	2	2
Impact Installation of Conductor Pipe	160 dB	1,585	7.89	4	0

6.4 Estimates of Marine Mammal Density

6.4.1 Non-Beluga Species Density Estimates

In Hilcorp's 2022 IHA application, the densities of each species of marine mammal (except for California sea lions and Pacific white-sided dolphins) were calculated from the data reported in the annual and semiannual aerial

[3] The SLR modeling in Weston and SLR (2022) determined the average 120 dB isopleth was 3,850 meters for a continuous noise source of 185 dB rms SPL across 25 locations in the project area. The coefficient is calculated as (185 dB - 120 dB)/Log10(3850/1) = 18.129 dB per decade.

surveys of Cook Inlet conducted by the Marine Mammal Laboratory (MML), a division of NOAA's Alaska Fisheries Science Center. While the MML surveys primarily aim to estimate the beluga whale population in Cook Inlet, all sightings of marine mammal species are documented. To calculate the densities of each species, Hilcorp divided the counts of each species by the total area observed in km^2 during the surveys from 2000 through 2018 (Weston and SLR 2022).

The semiannual aerial survey of Cook Inlet scheduled for 2020 was postponed until 2021 due to the Covid-19 pandemic. The 2022 semiannual survey was conducted as planned, and the combined results of the 2021 and 2022 surveys were published by Shelden et al. (2022). The preliminary report did not include an updated abundance estimate for Cook Inlet beluga whales but indicated it would be forthcoming in a subsequent publication. The total numbers of other marine mammal species were also reported; however, the surveyed area (or percentage of Cook Inlet) was not reported. Therefore, updated densities could not be derived. Consequently, the densities used in Hilcorp's application (Weston and SLR 2022) remain applicable and are used in this application to maintain consistency.

Very few sightings of Pacific white-sided dolphins and California sea lions have been reported in Cook Inlet, and none have been recorded during formal surveys, resulting in a near-zero density estimate. Instead, the take estimates for these species are based on infrequent observations of small groups or individuals.

6.4.2 Beluga Density Estimates

In addition to the average densities calculated from aerial survey data in Hilcorp's application, a more localized density for belugas is available from the detailed analysis of aerial data conducted by Goetz et al. (2012). The model incorporates several covariates of habitat quality (e.g., water depth, substrate, proximity to salmon streams, proximity to anthropogenic activity, among others) and relates the probability of a beluga sighting (presence/absence) and the group size to the covariates. After determining the covariates most correlated with beluga presence, the model was applied across the entire inlet, providing an output of predicted summer beluga density (in belugas/km^2) for each 1 km by 1 km square of Cook Inlet waters.

The activities in Trading Bay, described in Hilcorp's 2022 IHA application, are in an area of higher predicted density than those in the North Cook Inlet (NCI) Lease Unit located offshore in middle Cook Inlet. Hilcorp used the Goetz et al. (2012) model to derive separate densities for each area, with the highest predicted density from the range within each impact area selected, resulting in 0.015053 belugas/km^2 for Trading Bay and 0.001664 belugas/km^2 for the NCI area.

Because Furie may assume operatorship of the Enterprise 151 at one of Hilcorp's platforms within Trading Bay and tow the rig through that region of Cook Inlet, the Trading Bay density estimate for belugas in Hilcorp's application is assumed to be the best available data for the initial tow of the rig to the JRP within this application.

In 2018, Furie developed an IHA application for an exploration drilling program within the Kitchen Lights Unit (KLU) lease area. The drilling program was not conducted, and no IHA was issued. However, the Goetz et al. (2012) model was used to determine an average beluga density of 0.00125 belugas/km^2 within 5 km of the JRP. This density predicts that 0.098 belugas are within 5 km (an area of 78 km^2) at any given time. The density can also be viewed as the probability of beluga attendance, in that 0.00125 belugas/km^2 can be converted to 0.00125 beluga-hours per

hour of observation of the 1 km^2 area. [4] Multiplying by the 78 km^2 area, the density predicts a beluga attendance of 0.098 beluga-hours per hour of observation within 5 km of the JRP. In 2015, during the construction of the JRP, professional PSOs monitored the area near construction for 278 hours over 23 days. If the density accurately predicted attendance, it would equate to 27.2 beluga-hours during the observation period (278 hours observation x 0.098 beluga-hours/hour observation = 27.2 beluga-hours). However, no belugas were sighted during the monitoring (Jacobs 2015). While it is possible that belugas were present and were not sighted, the lack of sightings indicates that 0.00125 belugas/km^2 is a conservatively high estimate of beluga density in this area.

PSOs also monitored waters in the vicinity of the construction of the 15-mile marine gathering gas line from the JRP to the onshore processing facility in Nikiski in 2015 (Jacobs 2015). The marine gathering line transitions onshore near the OSK Dock in Nikiski and traverses much of the same region through which the Enterprise 151 will be towed to or from the Rig Tenders Dock in Nikiski. The average beluga density of the area within 5 km of the marine gathering line route was extracted from the Goetz et al. (2012) model and resulted in 0.00554 belugas/km^2. This density estimate predicts an average of 0.44 belugas within 5 km of the monitoring location at any given time, or 382 beluga-hours during the 868 hours of observation over the 48 days. No belugas were sighted, indicating that 0.00554 belugas/km^2 is a conservatively high estimate of beluga density in that area during that time of year.

Because the JRP is located centrally in middle Cook Inlet in an area of low beluga density and towing the Enterprise 151 from the JRP to the Rig Tenders Dock at the end of the season will occur in a low-density area, the NCI beluga density used in Hilcorp's application (0.001664 belugas/km^2) is assumed to be a conservative estimate for these activities. Therefore, the use of the Trading Bay and NCI beluga densities developed in the Hilcorp application are sufficiently conservative and maintain consistency between the two applications by applying the same density to similar activities in similar locations.

Table 10 presents the density estimates of marine mammal species that may be encountered in the project area.

[4] Beluga attendance is "beluga-hours per hour of observation." For example, if 1 beluga is present within a defined area for 1 hour it is equal to 1 beluga-hour; if 2 belugas are present for 15 minutes it is equal to 0.5 beluga-hours (2 belugas X 0.25 hour = 0.5 beluga-hours); if 12 are present for 6 minutes it is equal to 1.2 beluga-hours (12 belugas X 0.1 hour = 1.2 beluga-hours); and so on. If an area is observed for 10 hours and a group of 12 belugas is present for 6 minutes, then the beluga presence would be 12 belugas X 0.1 hour / 10 hours, which is equal to 0.12 beluga-hours per hour of observation. Therefore, if a beluga density predicts 0.098 belugas within 5 km at any given time, one should expect 0.098 beluga-hours per hour of observation. If an observation period is 1 hour in length, and one beluga is observed within the area for 5.88 minutes (9.8 percent of an hour), this would equal 0.098 beluga-hours per hour of observation (1 beluga X 0.098 hours / 1 hour = 0.098 beluga-hours per hour of observation). Similarly, if the observation period is 10 hours in length, and a group of 5 belugas is sighted within the area for 11.76 minutes it would equal 0.098 beluga-hours per hour of observation (5 belugas X 0.196 hour / 10 hours = 0.098 beluga-hour per hour of observation). In this way, beluga density (belugas/km^2) is related to beluga attendance (beluga-hours per hour of observation) and can be compared to actual observation periods of a specified area (in km^2), to determine how accurately an estimated density predicts marine mammal presence.

Table 10. Marine Mammal Density Estimates in the Project Area

Species	*Density (individuals/km^2)*
Humpback whale	0.001770
Minke whale	0.000009
Gray whale	0.000075
Fin whale	0.000311
Killer whale	0.000601
Beluga (Trading Bay)	0.015053
Beluga (NCI)	0.001664
Dall's porpoise	0.000154
Harbor porpoise	0.004386
Pacific white-sided dolphin	0.000000
Harbor seal	0.241401
Steller sea lion	0.007609
California sea lion	0.000000

6.5 Exposure Calculations

To calculate the estimated number of Level A and Level B exposures, the density of each marine mammal species (in animals/km^2) is multiplied by the area of the respective zone (in km^2) and then multiplied by the number of days each event occurs. The calculations of the estimated Level A and Level B take are presented in Table 11 and Table 12 for Year 1 and Year 2.

Table 11. Estimated Level A Exposures for Year 1 and Year 2

Species	*Density*	*3-Tug Rig Tow PTS Area (km^2)*	*No. of Tows per Season*	*Estimated Level A Exposures*	*3-Tug Stationary Positioning (5 hrs) PTS Area (km^2)*	*4-Tug Stationary Positioning (1 hr) PTS Area (km^2)*	*No. of Attempts*	*Estimated Level A Exposures*	*Conductor 70-Percent Install PTS Area (km^2)*	*Conductor 30-Percent Install PTS Area (km^2)*	*No. of Conductors*	*Estimated Level A Exposures*	***Total Estimated Level A Exposures***
Humpback whale	0.001770	N/A (Zones are negligible in size)			0.028	0.001	2	0.0001	11.746	3.795	2	0.06	**0.06**
Minke whale	0.000009							0.000001				0.0003	**0.0003**
Gray whale	0.000075							0.000004				0.002	**0.002**
Fin whale	0.000311							0.00002				0.01	**0.01**
Killer whale	0.000601				0.019	N/A		0.00002	0.015	0.005		0.00002	**0.00005**
Goetz beluga - NCI	0.001664							0.00006				0.00007	**0.0001**
Dall's porpoise	0.000154	0.560	2	0.0002	1.448	0.001		0.0004	16.665	5.385		0.007	**0.007**
Harbor porpoise	0.004386			0.005				0.01				0.2	**0.2**
Pacific white-sided dolphin	0.000000			0.000				0.000				0.000	**0.000**
Harbor seal	0.241401	N/A (Zones are negligible in size)			0.015	0.0003		0.007	3.363	1.087		2.1	**2.2**
Steller sea lion	0.007609				N/A (Zones are negligible in size)				0.018	0.006		0.0004	**0.0004**
California Sea Lion	0.000000											0.000	**0.000**

Note:
Total exposures may not equal sum of exposures due to rounding

Table 12. Estimated Level B Exposures for Year 1 and Year 2

Species	*Density*	*3-Tug Rig Tow Season Start Ensonified Area (km^2)*	*Estimated Level B Exposures*	*4-Tug Positioning Attempt Ensonified Area (km^2)*	*No. of Attempts*	*Estimated Level B Exposures*	*3-Tug Rig Tow Season End Ensonified Area (km^2)*	*Estimated Level B Exposures*	*Conductor Installation Ensonified Area (km^2)*	*No. Days Conductor Installation*	*Estimated Level B Exposures*	***Total Estimated Level B Exposures***
Humpback whale	0.001770	316.1	0.6	63.1	2	0.2	316.1	0.6	7.89	4	0.06	**1.4**
Minke whale	0.000009		0.003			0.001		0.003			0.0003	**0.007**
Gray whale	0.000075		0.02			0.009		0.02			0.002	**0.06**
Fin whale	0.000311		0.1			0.04		0.1			0.01	**0.2**
Killer whale	0.000601		0.2			0.08		0.2			0.02	**0.5**
Goetz beluga - NCI	0.001664		N/A			0.2		0.5			0.05	**0.8**
Goetz beluga - TB	0.015053		4.8			N/A		N/A			N/A	**4.8**
Dall's porpoise	0.000154		0.05			0.01		0.05			0.005	**0.1**
Harbor porpoise	0.004386		1.4			0.3		1.4			0.1	**3.2**
Pacific white-sided dolphin	0.000000		0.000			0.000		0.000			0.000	**0.000**
Harbor seal	0.241401		76.3			15.2		76.3			7.6	**175.5**
Steller sea lion	0.007609		2.4			0.5		2.4			0.2	**5.5**
California Sea Lion	0.000000		0.000			0.000		0.000			0.000	**0.000**

Note:
Total exposures may not equal sum of exposures due to rounding

6.6 Requested Takes for Year 1 and Year 2

Level A

The estimated number of Level A exposures from towing and positioning the Enterprise 151 is negligible for all species. Therefore, Furie is not requesting Level A Takes for these activities.

The highest estimated number of Level A exposures for impact installation of both conductors is 2.1 harbor seals. However, when each impact installation event is viewed individually, the highest probability occurs on days when 70 percent of the conductor is installed. The Level A zone for phocids during the 70-percent installation period is 3.363 km^2, which, when multiplied by the harbor seal density (0.241401 seals/km^2), results in an 81 percent probability of one Level A exposure of a harbor seal for each event. For the onset of PTS to occur, the harbor seal would need to remain within 1,034.7 meters for the full duration of impact installation, which will occur intermittently over a period of up to 12 hours because of breaks in pile driving to weld new sections. The intermittent nature of the activity will further reduce the likelihood of PTS onset.

Furthermore, the average density of 0.241401 seals/km^2 assumes a homogeneous distribution of harbor seals throughout Cook Inlet. While the actual distribution of harbor seals is unknown, the middle of Cook Inlet (where the JRP is located) is likely to have a below-average density. Like belugas, harbor seals congregate near the mouths of anadromous streams, within streams, and along nearshore areas. Although Level A harassment of harbor seals is unlikely, Furie requests three Level A takes of harbor seals in Year 1 and in Year 2 to allow for the installation of conductor pipes in either year.

Level B

Marine mammals are often found in pairs or groups; therefore, in addition to the probabilistic estimates of Level B takes in Section 6.5, group size is considered in the requested number of takes for each species.

Several recent surveys and monitoring programs have documented groups of humpback whales ranging up to 14 whales in size. During the annual survey, Shelden et al. (2022) recorded a group of three humpback whales west of Kachemak Bay in June of 2022. Past annual aerial surveys have documented groups up to 12 in number (Shelden et al. 2013, 2015, 2016, 2019). During Hilcorp's lower Cook Inlet seismic survey, group size ranged from 1 to 14 (Fairweather Science 2020). During monitoring of the Harvest Alaska CIPL project (the closest to Furie's Action Area), two sightings of three humpbacks were reported. During construction of the JRP in 2015, a group of 6 to 10 unidentified whales, thought to be either gray whales or humpbacks, was observed approximately 15 km northeast of the platform (Jacobs 2015). The estimated number of Level B exposures is 1.4, with most of the exposure probability resulting from the towing the rig with tugboats (about a 60 percent chance of encountering one humpback during each tow). Furie requests three Level B takes of humpbacks each year to allow for encounters with groups of up to three whales.

Groups of up to three minke whales have been recorded in recent years, including one group of three southeast of Kalgin Island (Lomac-MacNair et al. 2014). Other recent surveys in Cook Inlet typically have documented minkes traveling alone (Shelden et al. 2013, 2015, 2017; Kendall et al. 2015, as cited in Weston and SLR 2022; Fairweather Science 2020). Though the probability of a Level B exposure of minke whales is low due to the low density in Cook Inlet, Furie requests three Level B takes of minke whales each year to allow for encounters with groups up to three whales.

Gray whale density is low in Cook Inlet and is typically lower north of the Forelands. However, during the construction of the JRP in 2015, one gray whale was documented approximately 5 km from the platform, and a group of 6 to 10 unidentified whales, thought to be either gray whales or humpbacks, was observed approximately 15 km northeast of the platform (Jacobs 2015). Nine gray whales were observed in June and July during Apache's 2012 seismic program, and one was observed during the 2014 program (Lomac-MacNair et al. 2013, 2014). None were observed during the 2018 CIPL project in middle Cook Inlet (Sitkiewicz et al. 2018). In 2020 and 2021, one gray whale was reported in each season at the POA (61N 2021, 2022a). The documented occasional presence of gray whales near and north of the project area suggests that gray whale density may be seasonally higher than the relatively low density suggested by the aerial surveys. Therefore, Furie requests three Level B takes of gray whales each year to allow for encounters with groups of up to three whales.

Fin whales are rare in middle and upper Cook Inlet; however, groups up to 15 in number were reported during the 2019 seismic survey in lower Cook Inlet conducted by Hilcorp (Fairweather Science 2020). During the NMFS aerial surveys, ten groups totaling 26 individuals were recorded from 2000 to 2018 (Shelden et al. 2013, 2015, 2016, 2019), although none were reported during the 2021 and 2022 surveys (Shelden et al. 2022). Although fin whales are not common in middle and upper Cook Inlet, Furie requests two Level B takes each year to allow for the potential of a chance encounter with a group of two whales.

During the 2022 aerial survey, NMFS reported a group of killer whales in lower Cook Inlet estimated at between 20 and 30 whales, dispersed among smaller subgroups during an off-effort portion of the flight, and three groups comprised of four individual whales during on-effort portions of the survey. In 2019, during the seismic surveys conducted by Hilcorp in lower Cook Inlet, 21 killer whales were reported in groups ranging in size from two to five individuals (Fairweather Science 2020). During the construction of the Petroleum and Cement Terminal at the POA in Anchorage in 2021, one group of two killer whales was reported (61N 2022a). With a documented presence north of the project and potential group sizes exceeding 20 whales regionally, Furie requests eight Level B takes of killer whales each year.

Beluga group sizes are highly variable, with large congregations of up to 200 whales documented near the Susitna River Delta (McGuire et al. 2021). Shelden and Wade (2019) estimated group sizes ranging from 2 to 147 belugas, with a median group size of 11 whales during the 2018 aerial survey. Over three seasons of monitoring at the POA, 61N reported groups of up to 53 belugas, with a median group size of 3 and a mean group size of 4.4 (61N 2021, 2022a, 2022b, and 2022c). The large congregations documented at the Susitna River are not expected in Trading Bay or offshore areas near the JRP or the towing route for the Enterprise 151. Groups encountered in offshore areas are likely to travel between feeding grounds, and attendance durations in the area are expected to be low. The calculated estimate of Level B exposures based on Furie's activity is 5 to 6 belugas. In their 2022 IHA application, Hilcorp proposed, and NMFS accepted, using the median group size from the aerial surveys (11 belugas) as the basis for a typical group encounter, allotting one encounter in the first year (11 beluga takes) and two encounters in the second year (22 beluga takes). Because Furie is proposing only up to two rig tows each year, and few, if any, beluga takes are expected during impact installation of the conductor pipes, Furie requests 11 Level B takes of beluga whales each year or double the estimated exposures.

Dall's porpoise groups typically range from 2 to 12 individuals (NOAA Fisheries 2023d). Two groups of three porpoises were reported during the Apache seismic survey in 2012 (Lomac-MacNair et al. 2014). In 2019, during the seismic surveys conducted by Hilcorp in lower Cook Inlet, groups were between two and seven in number

(Fairweather Science 2020). Dall's porpoises are typically only sighted in lower Cook Inlet, and few are expected north of Kalgin Island. Therefore, Furie requests three Level B takes of Dall's porpoise each year.

Due to the small size and limited surface expression of harbor porpoises, they may often be missed in surveys and monitoring programs, and therefore their density may be underestimated. They typically travel in groups of two or three (NOAA Fisheries 2023g). A review of harbor porpoise sightings during the annual Cook Inlet aerial surveys found group sizes typically ranged from 1 to 5 in number, with up to 92 individuals sighted in a survey season (Shelden et al. 2014). The PSO program at the POA reported 18 harbor porpoises in 2020 and 27 in 2021 (61N 2021, 2022a). In 2018, during the Harvest Alaska CIPL project (located north of the JRP), 29 sightings of 44 individuals were reported (Sitkiewicz et al. 2018). In the notice of IHA issuance for the CIPL project, a recent increase in sightings of harbor porpoise was noted (83 FR 19224, May 2, 2018), causing Hilcorp to request more than four times the number of Level B takes than estimated exposures (44 versus approximately 10, respectively) (Weston and SLR 2022). The estimated number of Level B exposures for harbor porpoises is approximately three; therefore, Furie requests 12 Level B takes of harbor porpoises each year to account for the uncertainty in actual harbor porpoise density and an apparent increase in recent sightings in middle and upper Cook Inlet.

In 2014, during Apache's seismic survey program, three Pacific white-sided dolphins were reported (Lomac-MacNair et al. 2014). They are considered rare in most of Cook Inlet, including in the lower entrance, but their presence was documented in Iniskin Bay and mid-inlet through passive acoustic recorders in 2019 (Castellote et al. 2020). Because there is no density estimate for Pacific white-sided dolphins, the estimated number of exposures is zero. However, Furie requests three Level B takes each year to allow for an encounter with a group of a size comparable to that reported in 2014.

Harbor seals are typically observed alone in open water but may congregate in larger numbers in river mouths to feed and haul out in exceptionally large groups in some locations (Alaska Department of Fish and Game [ADF&G] 2023c). Harbor seals are commonly sighted in the middle and upper inlet, including during each monitoring season at the POA in 2020 through 2022 (61N 2021, 2022a, 2022b, and 2022c). The estimated number of harbor seal exposures each year is 176 (see Table 12); therefore, 176 Level B takes of harbor seals are requested.

Steller sea lions are sighted with some frequency in Cook Inlet, with a higher occurrence in the lower inlet. In three seasons of monitoring at the POA in Anchorage from 2020 through 2022, sightings ranged from six to eight individuals each year. Fiscus and Baines (1966) suggested that Steller sea lions typically forage alone or in small groups, while other studies suggest they form larger groups to feed on schooling fish (Gende et al. 2001). Other monitoring programs in the middle and lower inlet have documented Steller sea lions, including Apache's 2012 program (four individuals), Buccaneer's drilling project off Cape Starichkof (seven individuals), SAExploration's seismic survey in 2015 (four individuals), and during the 2018 CIPL project (a group of two) (Lomac-MacNair et al. 2013; Owl Ridge 2014; Kendall et al. 2015, as cited in Weston and SLR 2022; Sitkiewicz et al. 2018). Because Steller sea lions are typically sighted individually in middle and upper Cook Inlet, Furie requests six Level B takes each year based on the estimated number of exposures.

Very few confirmed sightings of California sea lions have been documented in Cook Inlet. During Apache's 2012 seismic survey, two were reported (Lomac-MacNair et al. 2013), and anecdotal sightings have been reported in Kachemak Bay. To allow for a potential encounter with a group of two, Furie requests two Level B takes of California sea lions each year.

The requested Level A and Level B takes for all species for each year are presented in Table 13.

Table 13. Requested Level A and Level B Takes for Year 1 and Year 2

Species	*Number of Level A Takes Requested*	*Number of Level B Takes Requested*
Humpback whale	0	3
Minke whale	0	3
Gray whale	0	3
Fin whale	0	2
Killer whale	0	8
Beluga whale	0	11
Dall's porpoise	0	3
Harbor porpoise	0	12
Pacific white-sided dolphin	0	3
Harbor seal	3	176
Steller sea lion	0	6
California sea lion	0	2

7 ANTICIPATED IMPACT OF THE ACTIVITY

The activities proposed are not expected to cause injury or mortality to marine mammals. The rig towing activity is not likely to cause any physiological effects because of the short duration of potential exposures, the low sound energy levels, and the general habituation to vessel traffic by marine mammals in Cook Inlet. The maximum duration of tug traffic is expected to be approximately 20 to 25 hours over two days at the beginning and end of the drilling season, with shorter durations likely to occur. Because of the short duration of impacts, marine mammals are expected to resume normal behaviors and reoccupy any abandoned areas quickly after the tugs are released from the project.

In general, behavioral disturbances such as changes in travel patterns, avoidance of ensonified areas, abandonment of preferred locations, or masking of hearing and echolocation abilities are more likely to occur than physiological harm. Belugas in Cook Inlet may be the marine mammal species most sensitive to the effects of industrial noise. Gervaise et al. (2012) measured ship noise levels in the St. Lawrence Estuary in Canada, ranging from 102.1–114.1 dB rms, which, in the authors' estimation, reduced the range of beluga communication and echolocation by up to 85 percent of its expected value compared to natural noise conditions.

The impact installation of the conductor pipes has the potential to cause a temporary or permanent threshold shift in the hearing of some species because of the higher intensity and duration of the noise. Despite the potential for these physiological effects to occur, the probability of their occurrence is low due to the low density of marine mammals in the mid-inlet location of the JRP and the conservative assumptions used to develop the Level A zones. Implementing mitigation measures such as a marine mammal monitoring program and soft start techniques (that allow marine mammals to avoid or leave an area before sound intensity reaches peak levels) will further reduce the probability of serious harm. The short duration of 4 to 6 hours of impact installation expected per conductor pipe, over 2 to 4 days in Year 1, may cause temporary avoidance of the mid-inlet location. During the operational period of the action (April–October), the action area is not considered high-quality habitat for most marine mammal species, including Cook Inlet beluga whales, so a slight avoidance of the area is not likely to cause an adverse effect.

Because the probabilities of Level A takes are low for all species except for harbor seals, Furie is requesting authorization for Level A takes for harbor seals only. The number of Level A takes for harbor seals requested (3) represents approximately 0.01 percent of the total stock. The total annual Level B takes requested are a small portion (0.24 percent or less) of most of the marine mammal stocks that may be present. The number of Level B takes requested for harbor seals (176) represent less than 1 percent of the stock. The number of Level B takes requested for Cook Inlet beluga (11) represent just over 3 percent of the stock. The total requested takes for each species represent a small percentage of the respective stocks, which meets the "small numbers" requirement of the MMPA. Table 14 lists the number of Level B take requests for each species and the percentage of the populations impacted.

Table 14. Take Requests as a Percent of Marine Mammal Populations for Year 1 and Year 2

Species	*Population*	*Level B Take Requested*	*Percent of Stock Impacted*
Humpback whale	14,603[1]	3	0.00%
Minke whale	1,233	3	0.24%
Gray whale	26,960	3	0.01%
Fin whale	2,554	2	0.08%
Killer whale	2,507[2]	8	0.03%
Beluga whale	331	11	3.32%
Dall's porpoise	83,400	3	0.00%
Harbor porpoise	31,406	12	0.04%
Pacific white-sided dolphin	26,880	3	0.01%
Harbor seal	28,411	176	0.62%
Steller sea lion	52,932	6	0.01%
California sea lion	257,606	2	0.00%

Notes:

[1] Combined total of Hawaii, Mexico-North Pacific, and Western North Pacific DPSs

[2] Combined total of Eastern North Pacific Alaska Resident and Gulf of Alaska, Aleutian Islands, & Bering Sea Transient stocks

8 POTENTIAL IMPACTS ON SUBSISTENCE USES

The Village of Salamatof and the Native Village of Tyonek are two federally recognized Alaska Native tribes that are known to or are likely to conduct subsistence harvests of marine mammals near the project area. However, other Dena'ina Athabascans, part of the Kenaitze, Knik, Eklutna, Ninilchik, Seldovia, and Chickaloon tribes, have occupied settlements in Cook Inlet for the last 1,500 years and have been the primary traditional users of this area into the present.

8.1 Salamatof Tribe

The Salamatof Tribe is the federally recognized Alaska Native tribe located in the Village of Salamatof, between Kenai and Nikiski, Alaska. Salamatof is about two miles south of the Rig Tenders Dock in Nikiski, centered on Salamatof Creek and Salamatof Lake. The Salamatof Native Association, Inc. is the village corporation for the tribe, managing the assets of 169 shareholders. Salamatof is part of Cook Inlet Region, Inc. (CIRI), the regional corporation for the Dena'ina, Athabascan, Southeast Indian, Inupiat, Yup'ik, Alutiiq/Sugpiaq, and Aleut/Unangax people that have lived in this area of Southcentral Alaska for thousands of years.

Subsistence harvest data for the Salamatof Tribe was not available but is assumed to be similar to other nearby tribes, such as the Kenai Tribe, which reported limited harvests of harbor seals and Steller sea lions in the 1990s and 2000s (ADF&G 2023b).

8.2 Native Village of Tyonek

The Native Village of Tyonek is a federally recognized Alaska Native tribe located on the western shore of Cook Inlet, near the North Foreland. The village is strategically located between the productive habitats of the Susitna River Delta, the Beluga River, and the MacArthur River flats of Trading Bay. The JRP is located approximately 8 miles south of Tyonek, in the offshore waters of Cook Inlet. The Tyonek Native Corporation manages the assets of its 900 shareholders. Tyonek is also part of the regional Alaska Native corporation, CIRI.

Subsistence harvesters from Tyonek utilize areas from Tuxedni Bay to the Susitna River (BOEM 2016) to harvest marine mammals, consisting primarily of harbor seals in recent years. Harbor seals are harvested between June and September from areas along the western shoreline of Cook Inlet, north and south of Tyonek (Jones et al. 2015). Furie is unaware of any systematic, annual reporting of subsistence harvests; however, subsistence reports from as recently as 2013 have reported harvests of harbor seals by the Tyonek Tribe, with harvests reported intermittently since the 1980s. During the 2013 survey in Tyonek, six households reported attempting to harvest marine mammals, with six harbor seals reported as harvested, supporting use by 14 separate households (Jones et al. 2015).

The harvest of beluga whales was unregulated before 1999, when, through a cooperative agreement between NMFS and affected Alaska Native tribes, subsistence harvest was significantly restricted. Five belugas were harvested between 2001 and 2005. In 2008, a supplemental environmental impact statement conducted by NMFS restricted beluga whale harvest based on abundance and population growth metrics (NOAA Fisheries 2008). To date, these metrics have not been reached, effectively ending the hunting of beluga whales since 2005. No subsistence harvest of beluga whales is expected during Furie's project activities.

8.3 Project Impacts on Subsistence Use and Resources

Furie is planning to conduct stakeholder outreach before the planned operations in 2024 and 2025, including discussions with representatives of the Salamatof and Tyonek Tribes. The project activities proposed are expected to occur between April and November, which overlaps with the typical summer and fall seasons when subsistence activities would occur. Furie is committed to consulting with subsistence users with traditional knowledge of the harvest locations and timing to help avoid or mitigate any impacts that may occur. These consultations are expected to inform Furie's planned operations and establish communication avenues for notification of work activities or for subsistence users to notify Furie of planned activities.

Towing the Enterprise 151 from the Rig Tenders Dock to the JRP is unlikely to overlap spatially with subsistence activities, as they typically occur near salmon streams such as the Susitna, Beluga, and McArthur rivers and other remote areas with higher concentrations of seals or sea lions (Jones et al. 2015). The Rig Tenders Dock is in an area of shoreline with industrial development and activity that is less conducive to hunting activity. Few, if any, impacts on subsistence activities are expected after the rig is moved away from the shoreline. If Furie tows the rig from Hilcorp's Spurr, Spark, or Bruce platforms that are located less than 2 miles from shoreline areas (at low tide), it is possible that the activity could cause marine mammals to avoid or abandon nearshore areas suitable for hunting.

The operation of the tugs in the Trading Bay area is the activity most likely to overlap temporally or spatially with subsistence hunts, yet the probability of interference is low. Furie is more likely to begin a tow from another Hilcorp location, or at the Rig Tenders Dock, than from one of the Trading Bay platforms. If Furie does assume operatorship of the Enterprise 151 after its use at one of Hilcorp's platforms, the attachment of the tugs to the rig and movement of the rig away from the area are expected to be brief, lasting only a few hours on one occasion in a season.

The conductor pipe will be installed at the JRP, which is a minimum of 7.5 miles (12 km) from the nearest shoreline. Sounds transmitted from the impact installation may be audible to marine mammals in some nearshore areas. However, they will be significantly below the thresholds at which behavioral disturbances are likely to occur.

Neither towing the Enterprise 151 nor installing the conductor pipes is expected to injure or remove any subsistence species (e.g., harbor seals) or make them unavailable for harvest. Similarly, none of Furie's proposed activities are expected to impact the availability of forage or prey species significantly.

Furie will prepare a Stakeholder Engagement Plan to identify affected communities, subsistence groups, and other interested parties, plan community meetings, and provide the project activities' timing, duration, and details. Furie will also gather and document any questions, issues raised, or solutions to problems identified.

Because of the limited duration of the offshore location of most of the proposed activities, the impacts on subsistence users and subsistence resources are expected to be negligible in both Year 1 and Year 2.

9 POTENTIAL IMPACTS ON HABITAT

The proposed project activities' primary impact on marine mammal habitats is the temporary increase in noise levels above ambient background levels. The increased sound may cause temporary avoidance or abandonment of project areas and reduce echolocation and communication. The operation of the tugs while towing the rig will not create a physical barrier. However, the zone of ensonification may create the perception of a barrier in nearshore areas. While the Enterprise 151 is pinned to the seafloor next to the JRP, the spud cans will disturb a small area on the seafloor. Besides small depressions in the sediment, sand, and cobble near the JRP, no physical alterations or damage to the habitat is expected, and impacts to prey species through removal, injury, or displacement will be minor or negligible. Similarly, no measurable impacts on lower trophic level species (e.g., zooplankton and benthic invertebrates) are expected.

9.1 Potential for Habitat Avoidance or Abandonment

The background sound levels in Cook Inlet vary widely due to natural and anthropogenic noise sources. Castellote et al. (2019) analyzed data from 8,756 hours of recordings from Eagle River, Six Mile Creek, Cairn Point, Fire Island, Trading Bay, Kenai River, and Tuxedni Bay. Commercial shipping traffic was the primary source of anthropogenic noise, particularly in areas near shipping routes and oil and gas activities, such as Kenai River, Trading Bay, Fire Island, and Cairn Point. Other sources included dredging, unclassified machinery, and outboard motors. Tidal currents in Cook Inlet are strong and are known to produce occasional periods of sound exceeding 120 dB. Measurement of the actual ambient sound levels during periods free of anthropogenic noise is confounded by flow noise around the recorders. However, the analysis by Castellote et al. (2019) found it is below 120 dB 94 to 100 percent of the time in areas less affected by current.

Over 81 days from February to April 2012, Castellote et al. (2019) documented 244 commercial ship events on recorders in Trading Bay, averaging more than three events per day. The shipping noise was likely from OSVs that support oil and gas activities and commercial ships heading to or from the POA in Anchorage, both of which regularly pass through the action area of Furie's proposed project. The received levels at the recorders often exceeded 120 dB, suggesting that the ships' source levels regularly exceed 120 dB, which suggests these frequent events regularly impact communication and echolocation (as described in Section 7). Whether marine mammals are habituated to these regularly occurring sources of anthropogenic noise in Cook Inlet or if avoidance or abandonment of habitat areas results from human activity in this region is not well studied. However, the role of anthropogenic noise in the overall reduction in habitat quality is well documented.

Avoidance behaviors have been documented in baleen whales from cruise ships and tankers up to 4 km (Baker et al. 1982, 1983). When baleen whales feed, studies have shown little reaction to vessels beyond 800 meters (Watkins et al. 1981; Krieger and Wing 1986). Other studies have documented whales remaining in an area after disturbance from the presence of vessels (Baker et al. 1988, 1992). Therefore, short-duration and localized displacement of baleen whales along the rig tow route may occur.

Toothed whale responses to vessel activity vary depending on the species and activity. Some may tolerate or even approach moving vessels (e.g., bow riding behaviors by porpoises). In contrast, others may avoid or abandon areas if confined by ice or shallow water or previously harassed by vessels (Richardson et al. 1995). Beluga whales often show extreme sensitivity in the form of reduced surfacing, increased speed, or formation of groups to some vessel types and activities, such as when in the presence of a small, 16-foot inflatable boat, as documented by Blane and

Jaakson (1994). Belugas may also tolerate vessel sounds, such as when passing near the Northern Lights cargo ship at the POA while its engines were operating and producing sounds above 120 dB (Blackwell and Greene 2003). Other documented responses include changes in behavioral states (Richardson et al. 1995), changes in vocalizations (Lesage et al. 1999; Scheifele et al. 2005; Gervaise et al. 2012), and avoidance (Blane and Jaakson 1994; Erbe and Farmer 2000).

Richardson et al. (1995) surmised that when in water, seals and sea lions are often tolerant or even attracted to vessels, and avoidance reactions are generally limited to when these species are hauled out on land.

The proposed activity most likely to cause avoidance or abandonment behavior is if Furie begins towing the Enterprise 151 from one of Hilcorp's platforms in Trading Bay. Several streams and rivers in Trading Bay, such as the McArthur River, support runs of all five species of Pacific salmon and eulachon (ADF&G 2023a), which are important prey species for marine mammals that frequent the area. Beluga density in Trading Bay is higher than offshore, where the JRP and the other Hilcorp platforms are located. It is also higher than along the primary towing route to and from the Rig Tenders Dock (Goetz et al., 2012). If Furie begins a tow in Trading Bay, up to 7 km of nearshore habitat may be briefly ensonified above the 120 dB behavioral threshold for one or two hours by the 3,850-meter 120 dB isopleth for tugs towing the rig. No physical barrier to movement will be created, but a perceived barrier may result from the temporary noise.

It is important to note that if Furie assumes operatorship of the Enterprise 151 at one of Hilcorp's platforms to tow the rig to the JRP, this activity will offset a rig tow that Hilcorp would have otherwise conducted to return the rig to the Rig Tenders Dock. Therefore, the estimated takes from this activity are likely to be duplicated in an IHA obtained by Hilcorp. Also, given that Castellote et al. (2019) recorded an average of three commercial shipping events per day (90 or more per month) in Trading Bay, the single additional event would increase the total number of events by less than 0.2 percent throughout the season (April to November).

Towing the rig between the JRP and the Rig Tenders Dock may also cause a brief deflection of a travel pattern, (i.e., avoidance) in areas along the route. After the Enterprise 151 is moved away from the Rig Tenders Dock, the open water areas on either side of the rig tow will allow ample room for movement around and beyond the towing route. The density of species with a general affinity for nearshore areas (e.g., belugas, harbor seals, harbor porpoises, Stellar sea lions, and California sea lions) is expected to be lower than in Trading Bay. Other species, such as baleen whales, Dall's porpoises, Pacific white-sided dolphins, and killer whales, may be higher in offshore areas.

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

The potential impacts on habitat from towing the Enterprise 151 and from the impact installation of the conductor pipes are discussed in Section 9. The project's effects on marine mammal habitats are expected to be temporary and minor. The JRP is in an area of Cook Inlet with swift tidal currents known to scour the seafloor and reverse twice daily. The placement of the legs of Enterprise 151 will impact a small amount of low-quality marine habitat for a short period, and the long-term impacts are discountable. The greatest impact on marine mammals associated with the proposed drilling program will be a temporary reduction in habitat quality because of elevated noise levels. The displacement of marine mammals by noise will not be permanent, and there will be no long-term effects on their habitat. Although the drilling program may occur over multiple months (Section 2), the duration of noise from towing the rig and from the impact installation of the conductors is short-term and temporary, with extended periods between events for recovery should displacement or behavior modification occur. The drilling program is not expected to result in habitat-related effects that could cause significant or long-term consequences for individual marine mammals or their populations.

11 MITIGATION MEASURES TO PROTECT MARINE MAMMALS AND THEIR HABITAT

Furie is committed to minimizing the impacts of its drilling program by implementing mitigation measures and a monitoring program. The measures and monitoring program proposed in this application correspond closely to those required by NMFS in the two IHAs issued to Hilcorp in 2022 for similar activities, except that Furie will not operate or tow the Enterprise 151 within the Susitna Delta Exclusion Zone identified in the IHAs (87 FR 62364, October 14, 2022). Hilcorp has indicated to Furie that it will continue to operate the Enterprise 151 until it has been towed out of the Susitna Delta Exclusion Zone and will maintain responsibility for all applicable mitigation measures within the area. Furie will implement the Marine Mammal Mitigation and Monitoring Plan provided in Appendix B and summarized in the following sections.

11.1 General Mitigation Measures

1. Furie will implement all the reasonable and prudent measures and terms and conditions described in a Biological Opinion and Incidental Take Statement anticipated to be issued by NMFS under Section 7 of the Endangered Species Act.
2. Incidental take of marine mammals will be limited to only those species authorized by an IHA.
3. Taking of marine mammals by severe injury or death is prohibited.
4. If a species for which authorization has not been granted, or a species for which authorization has been granted but the authorized takes have been reached, is observed approaching or within the clearance zone or harassment zone, in-water work will be delayed or shut down (other than tug towing jack-up rig activity if already initiated). Activities will not resume until the animal has been confirmed to have left the area or the observation period, as indicated in Sections 11.3 and 11.4 below, has elapsed.
5. Furie personnel, contractors, and vessel operators will avoid direct physical interaction with marine mammals during project activities.
6. Furie will inform NMFS of impending in-water activities that require a PSO a minimum of one week prior to the onset of those activities.
7. Trash will be disposed of in accordance with state law (AS 46.06.080). In addition, the project proponent will ensure that all closed loops (e.g., packing straps, rings, bands) will be cut prior to disposal. In addition, the project proponent will secure all ropes, nets, and other marine mammal entanglement hazards so they cannot enter public waterways.

11.2 Protected Species Observer Requirements

Furie will employ PSOs to conduct monitoring during the rig towing and positioning activities and conductor pipe installation. PSOs will be independent (i.e., not vessel or production drilling personnel) and have no other assigned tasks during monitoring periods. PSOs will be trained biologists with the following minimum qualifications:

1. Visual acuity in both eyes (correction is permissible) sufficient for discernment of moving targets at the water's surface with the ability to estimate target size and distance; use of binoculars may be necessary to identify the target correctly;

2. Advanced education in biological science or a related field (undergraduate degree or higher required)—PSOs may substitute Alaska native traditional knowledge for experience;
3. PSOs must be approved by NMFS prior to beginning any activity subject to the IHA. PSO resumes should be submitted for review by NMFS no later than 10 business days prior to the start of rig towing or installation of the conductor pipes.
4. Experience and ability to conduct field observations and collect data according to assigned protocols (this may include academic experience);
5. Experience or training in the field identification of marine mammals, including the identification of behaviors;
6. Sufficient training, orientation, or experience with the tugging and positioning operation to provide for personal safety during observations;
7. Writing skills sufficient to prepare a report of observations, including but not limited to the number and species of marine mammals observed; dates and times when in-water activities were conducted, marine mammal behavior; and
8. Ability to communicate orally, by radio, or in person with project personnel to provide real-time information on marine mammals observed in the area as necessary.

11.3 Mitigation and Monitoring Measures for Rig Towing and Positioning

Furie and its contractors will implement the following mitigation and monitoring measures:

1. Furie will conduct briefings between vessel captains and crew and the marine mammal monitoring team before the start of all in-water work and when new personnel join the work to explain responsibilities, communication procedures, marine mammal monitoring protocol, and operational procedures.
2. Furie will station PSOs at the highest possible vantage point on either the jack-up rig or on one of the tugs.
3. Furie will establish a clearance zone that extends 1,500 meters from the tug or jack-up rig on which the PSOs are positioned.
4. Before commencing operational activities in daylight hours, two NMFS-approved PSOs must observe the clearance zone for 30 minutes; if no marine mammals are observed within those 30 minutes, activities may commence.
5. Before commencing operational activities in nighttime hours, two NMFS-approved PSOs must observe the extent visible for 30 minutes while using night vision devices (e.g., Armasight by FLIR Command Pro®, or similar); if no marine mammals are observed within those 30 minutes, activities may commence.
6. PSOs must scan the waters for at least 30 minutes after tugging and positioning activities have been completed each day, and after each stoppage of 30 minutes or greater.
7. If a marine mammal is observed within the clearance zone during the pre-activity clearing, operations may not commence until the PSO observes one of the following:
    a. The animal is outside of and on a path away from the clearance zone, or

b. For pinnipeds and small cetaceans - 15 minutes without observing the marine mammal have elapsed; for baleen whales - or 30 minutes have elapsed without observing the marine mammal.

8. Should a marine mammal be observed during tugs towing the jack-up rig, the PSO must monitor and carefully record any reactions observed until the towing or positioning is concluded. No new operational activities may be started until the animal leaves the clearance zone. Shifting from towing to positioning without shutting down is not considered a new operational activity.
9. Furie will conduct tug towing rig operations with a favorable tide unless human safety or equipment integrity is at risk.
10. Furie will only conduct tug towing rig activities at night if necessary to accommodate a favorable tide.
11. Furie and its vessel contractors will abide by NMFS marine mammal viewing guidelines while operating additional equipment or vessels related to this project, including not actively approaching marine mammals within 100 yards and slowing vessels to the minimum speed necessary.
12. Furie will conduct marine mammal monitoring during all in-water work associated with the tug towing jack-up rig activities in accordance with the Marine Mammal Monitoring and Mitigation Plan included in Appendix B.
13. Two PSOs will be stationed on the tug or jack-up rig for monitoring purposes for the entirety of jack-up rig towing and positioning operations.
14. The PSOs will scan the monitoring area systematically with the naked eye, 7x50 reticle binoculars, or 20-25x100 big-eye binoculars.
15. The PSOs will always be in communication with all vessel captains via very high frequency (VHF) radio and/or cell phones and alert vessel captains to all marine mammal sightings relative to the vessel location.

11.4 Mitigation and Monitoring Measures for Conductor Pipe Installation

1. Furie will conduct briefings between conductor pipe installation supervisors and crew and the marine mammal monitoring team before the start of installation and when new personnel join the work to explain responsibilities, communication procedures, marine mammal monitoring protocol, and operational procedures.
2. The PSOs will maintain lines of communication with the conductor pipe installation supervisors and crew via VHF radio and/or cell phones, alert them to all marine mammal sightings, and provide instructions to delay or shutdown the impact installation of the conductor pipe as appropriate.
3. Impact installation of conductor pipes will occur during daylight hours only.
4. Furie will use soft-start techniques when installing the conductor with an impact hammer. During the soft start, the hammer operator will provide an initial set of three strikes at reduced energy, followed by a 30-second waiting period, and then two subsequent reduced-energy strike sets. A soft start will be implemented at the start of each day's operation of the impact hammer and at any time following the cessation of impact hammering for a period of 30 minutes or longer.

5. In the event of a delay or shutdown of activity due to the presence of marine mammals within a shutdown zone, marine mammal behavior will be monitored and documented until they leave of their own volition, at which point the impact installation of the conductor pipe may begin or resume.
6. Furie will conduct marine mammal monitoring during conductor pipe installation activities in accordance with the Marine Mammal Monitoring and Mitigation Plan included in Appendix B.
7. Furie will establish a monitoring location on the JRP at the highest possible vantage point to monitor to the maximum extent possible in all directions.
8. Monitoring will take place from 30 minutes before the initiation of impact installation of the conductor pipe (i.e., pre-start clearance monitoring) through 30 minutes after the completion of the impact installation of the conductor pipe, and after each stoppage of 30 minutes or greater.
9. Pre-start clearance monitoring will be conducted during periods of visibility sufficient for the PSO to determine that shutdown zones (as specified in an IHA) are clear of marine mammals. Impact installation of the conductor pipe may commence following 30 minutes of observation, which has indicated the shutdown zones are clear of marine mammals.
10. If PSO monitoring ceases for more than 30 minutes within a day but impact installation of the conductor pipe is scheduled to resume, the PSO will follow the pre-start clearance monitoring protocol as described above and complete another 30-minute observation period before impact installation of the conductor pipe may commence.
11. If a marine mammal for which take is authorized is entering or is observed within the shutdown zone established in the IHA, impact installation of the conductor pipe will be halted or delayed. Impact installation of the conductor pipe will not commence or resume until the animal has voluntarily left and been visually confirmed to be 100 meters beyond the shutdown zone and on a trajectory away from the zone, or 30 minutes have passed without subsequent detections.
12. If Cook Inlet beluga whales are observed within or approaching the Level B zone for conductor pipe installation, impact installation of the conductor pipe will be delayed or halted until the beluga(s) have voluntarily left and been visually confirmed to be 100 meters beyond the Level B zone and on a trajectory away from the zone, or 30 minutes have passed without subsequent detections.
13. If, during impact installation of the conductor pipe, the PSO can no longer effectively monitor the entirety of the Level B zone due to environmental conditions (e.g., fog, rain, wind), impact installation may only continue until the active segment of conductor pipe is driven; no additional sections of conductor pipe or new conductor pipe will be driven until conditions improve such that the Level B zone can be effectively monitored.
14. If visibility is reduced such that the entire Level B zone cannot be effectively monitored for 15 minutes or more, a new 30-minute period of pre-start clearance monitoring will be conducted before impact installation of the conductor pipe may be resumed.

11.5 Reporting

Furie will prepare and submit marine mammal monitoring reports to NMFS monthly and a draft report summarizing all monitoring within 90 calendar days of monitoring completion. Furie will respond to any comments on the draft

report by NMFS and incorporate changes into a final report, which it will submit within 30 days of receipt of the comments. The reports will contain the elements described in the Marine Mammal Mitigation and Monitoring Plan and will include:

1. Dates and times (beginning and ending) of all marine mammal monitoring;
2. Activities occurring during each daily observation period, including:
    a. The type of activity (towing, positioning, or conductor installation);
    b. The total duration of each type of activity (towing, positioning, and conductor installation);
    c. The number of attempts required for positioning;
    d. Indications of when nighttime operations were required and if towing against the tide was required.
3. PSO locations during marine mammal monitoring;
4. Environmental conditions during monitoring periods (at the beginning and end of the PSO shift and whenever conditions change significantly), including Beaufort sea state and any other relevant weather conditions, including cloud cover, fog, sun glare, overall visibility to the horizon, and estimated observable distance;
5. Upon observation of a marine mammal, the following information:
    a. The name of PSO who sighted the animal(s) and PSO location and activity at the time of sighting;
    b. The time of sighting;
    c. Identification of the animal(s) (e.g., genus/species, lowest possible taxonomic level, or unidentified), PSO confidence in identification, and the composition of the group if there is a mix of species;
    d. The distance and location of each observed marine mammal relative to the tugs or conductor installation for each sighting;
    e. The estimated number of animals (min/max/best estimate);
    f. The estimated number of animals by cohort (adults, juveniles, neonates, group composition, etc.);
    g. The animal's closest point of approach and estimated time spent within the harassment zone;
    h. A description of any marine mammal behavioral observations (e.g., observed behaviors such as feeding or traveling), including an assessment of behavioral responses thought to have resulted from the activity (e.g., no response or changes in behavioral state such as ceasing feeding, changing direction, flushing, or breaching);
    i. The number of marine mammals detected within the harassment zone by species; and
    j. Detailed information about the implementation of any mitigation (e.g., delays), a description of specific actions that ensued, and resulting changes in the behavior of the animal(s), if any.
6. Furie will submit all PSO datasheets and raw sighting data with the draft report.
7. Furie will report all injured or dead marine mammals. If personnel involved in Furie's activities discover an injured or dead marine mammal, Furie will report the incident to the Office of Protected Resources (OPR),

NMFS (PR.ITP.MonitoringReports@noaa.gov), and to the Alaska regional stranding network [(877) 925-7773] as soon as feasible. If the death or injury was clearly caused by the specified activity, Furie will immediately cease the activities until NMFS OPR is able to review the circumstances of the incident and determine what, if any, additional measures are appropriate. Furie will not resume their activities until notified by NMFS if the injury or death is a result of the activity.

8. Reports of injured or dead marine mammals will include the following information:
    a. Time, date, and location (latitude and longitude) of the first discovery (and updated location information if known and applicable);
    b. Species identification (if known) or description of the animal(s) involved;
    c. Condition of the animal(s) (including carcass condition if the animal is dead);
    d. Observed behaviors of the animal(s), if alive;
    e. If available, photographs or video footage of the animal(s); and
    f. General circumstances under which the animal was discovered.

11.6 Mitigation Measures for Helicopter Flights

To minimize the possibility of adverse effects from aircraft sound on marine mammals, Furie will ensure that helicopters must transit at an altitude of 1,500 feet (457 meters) or higher, to the extent practicable, while maintaining Federal Aviation Administration flight rules (e.g., avoidance of cloud ceiling, etc.), excluding takeoffs and landing. If flights must occur at altitudes less than 1,500 feet due to environmental conditions, aircraft must make course adjustments, as needed, to maintain at least a 1,500-foot separation from all observed marine mammals. Helicopters must not hover or circle above marine mammals.

12 MITIGATION MEASURES TO PROTECT SUBSISTENCE USES

If Furie tows the Enterprise 151 within or near Trading Bay, a traditional subsistence hunting area, the activity could affect the availability of marine mammals for subsistence uses. There is less of a chance of impacts on subsistence hunting during the impact installation of the conductor pipe because it will take place 8 miles or more from the nearest shorelines. If Furie tows the Enterprise 151 to or from the Rig Tenders Dock, the likelihood of an impact on subsistence users is also low.

Furie is drafting a Stakeholder Engagement Plan, which will be implemented before and during the proposed project activities. To minimize the impact on subsistence use, Furie will communicate with representative tribal members and subsistence users to discuss the measures that will be taken. Furie will contact in writing the Kenaitze, Tyonek, Knik, Eklutna, Ninilchik, Seldovia, Salamatof, and Chickaloon tribes to inform them of the project location and timing, identify potential impacts on marine mammals and mitigation efforts, and invite them to share their concerns regarding marine mammal subsistence.

Furie will host an informational meeting (or meetings) to discuss the project and invite all interested stakeholders, including local tribal interests, to attend. If a tribe raises concerns that the project could impact the subsistence hunting of marine mammals, Furie will offer to enter into a Plan of Cooperation with the concerned tribe(s). All interactions and communications with subsistence users will be documented and retained per the Stakeholder Engagement Plan.

Due to the nature of the project, the short duration of towing and positioning of the jack-up rig, and the small area impacted by noise from the installation of the conductor pipe, Furie anticipates that the effect on subsistence use will be low and will be mitigated by the measures intended to reduce the impacts on marine mammals.

13 MONITORING AND REPORTING

As described in Section 11, Furie intends to employ PSOs while towing and positioning the Enterprise 151 and while installing conductor pipes with an impact hammer. The purpose of the monitoring will be to identify and locate any marine mammals within the vicinity of the project, record details of the marine mammal groups, record project activities, record reactions of marine mammals to the project activities, and implement and document the mitigation measures required. The monitoring program team will document environmental conditions, such as precipitation, visibility, wind, sea state, light conditions, glare, and other parameters as required.

The PSOs will be stationed at the highest possible vantage point (e.g., the helicopter landing deck) on the JRP to allow for monitoring of conductor pipe installation progress and monitoring in all directions around the JRP. Similarly, during the rig tow and positioning activities, PSOs will be stationed at the highest possible vantage point on the Enterprise 151 or on a tug. A sufficient number of PSOs will be deployed on the tug, Enterprise 151, or JRP to provide coverage while allowing for mandatory breaks or limitations on the duration of continuous observation. The monitoring program is described in further detail in the Marine Mammal Monitoring and Mitigation Plan provided in Appendix B.

Furie will provide NMFS with all pre- and post-activity notifications, in-season reports (e.g., stranding, injury, or mortality of marine mammals; unauthorized takes), monthly and final reports of activities, and marine mammal sightings, promptly following the requirements in the IHA and Biological Opinion for the project.

14 SUGGESTED MEANS OF COORDINATION

To minimize the potential impacts of the production drilling program, Furie will cooperate with NMFS and other federal agencies, including the U.S. Fish and Wildlife Service, the U.S. Coast Guard, the U.S. Environmental Protection Agency, the U.S. Army Corps of Engineers, the Alaska Oil and Gas Conservation Commission, and the State of Alaska Department of Environmental Conservation. Potential impacts on the subsistence use of marine mammals will be minimized, as discussed in Sections 8 and 12.

Due to the potential hand-off of the Enterprise 151 between companies, Furie will work closely with Hilcorp to coordinate responsibilities for the mitigation measures to ensure there is no lapse in implementation. To the extent feasible, Furie will ensure the monitoring data and reporting are consistent with Hilcorp's monitoring efforts to maximize the usefulness of information for the public, researchers, and future permitting efforts.

Furie will provide an assessment of the mitigation measures and their effectiveness in the final report. Furie will submit the field data and behavioral observations of marine mammals that occur in the project area to NMFS, which could be made available to regional, state, and federal resource agencies, universities, and other interested private parties upon written request to NMFS. If other research programs are taking place in Cook Inlet at the same time, Furie invites opportunities to discuss cooperation and information sharing.

15 REFERENCES

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APPENDIX A

NMFS User Spreadsheets for Level A Isopleths

A: STATIONARY SOURCE: Non-Impulsive, Continuous

VERSION 2.2: 2020

KEY

	Action Proponent Provided Information
	NMFS Provided Information (Technical Guidance)
	Resultant Isopleth

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	Furie Operating Alaska 2024 and 2025 Natural Gas Production Drilling
PROJECT/SOURCE INFORMATION	Lawrence et al. 2022 measured 3 tugs at 50% output at 185 dB. Subtracted 4.8 dB to estimate single tug, then added 6 dB to estimate 4 tugs during positioning.
Please include any assumptions	
PROJECT CONTACT	Drew Lenz 61 North Environmental

STEP 2: WEIGHTING FACTOR ADJUSTMENT

		Specify if relying on source-specific WFA, alternative weighting/dB adjustment, or if using default value.
Weighting Factor Adjustment (kHz)¥	2	Default value

¥ Broadband: 95% frequency contour percentile (kHz) OR Narrowband: frequency (kHz); For appropriate default WFA: See INTRODUCTION tab

† If a user relies on alternative weighting/dB adjustment rather than relying upon the WFA (source-specific or default), they may override the Adjustment (dB) (row 47), and enter the new value directly. However, they must provide additional support and documentation supporting this modification.

STEP 3: SOURCE-SPECIFIC INFORMATION

Source Level (L_{rms})	186.2
Duration of Sound Production (hours) within 24-h period	1
Duration of Sound Production (seconds)	3600
10 Log (duration of sound production)	35.56
Propagation loss coefficient	18.129

NOTE: The User Spreadsheet tool provides a means to estimates distances associated with the Technical Guidance's PTS onset thresholds. Mitigation and monitoring requirements associated with a Marine Mammal Protection Act (MMPA) authorization or an Endangered Species Act (ESA) consultation or permit are independent management decisions made in the context of the proposed activity and comprehensive effects analysis, and are beyond the scope of the Technical Guidance and the User Spreadsheet tool.

RESULTANT ISOPLETHS

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL_{cum} Threshold	199	198	173	201	219
PTS Isopleth to threshold (meters)	**18.0**	**1.7**	**16.1**	**10.7**	**1.2**

WEIGHTING FUNCTION CALCULATIONS

Weighting Function Parameters	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
a	1	1.6	1.8	1	2
b	2	2	2	2	2
f_1	0.2	8.8	12	1.9	0.94
f_2	19	110	140	30	25
C	0.13	1.2	1.36	0.75	0.64
Adjustment (-dB)†	**-0.01**	**-19.74**	**-26.87**	**-2.08**	**-1.15**

NOTE: If user decided to override these Adjustment values, they need to make sure to download another copy to ensure the built-in calculations function properly.

$$W(f) = C + 10\log_{10}\left\{\frac{(f/f_1)^{2a}}{[1+(f/f_1)^2]^a\,[1+(f/f_2)^2]^b}\right\}$$

E.1: IMPACT PILE DRIVING (STATIONARY SOURCE: Impulsive, Intermittent)

VERSION 2.2: 2020

KEY

	Action Proponent Provided Information
	NMFS Provided Information (Technical Guidance)
	Resultant Isopleth

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	Furie Operating Alaska 2024 and 2025 Natural Gas Production Drilling
PROJECT/SOURCE INFORMATION	SEL: 181 dB U.S. Navy 2015 Strikes: 2016 Conductor Install at JRP TL: Description in IHA App

Please include any assumptions

PROJECT CONTACT	Drew Lenz 61 North Environmental

STEP 2: WEIGHTING FACTOR ADJUSTMENT

		Specify if relying on source-specific WFA, alternative weighting/dB adjustment, or if using default value
Weighting Factor Adjustment (kHz)¥	2	default value

¥ Broadband: 95% frequency contour percentile (kHz); For appropriate default WFA: See INTRODUCTION tab

† If a user relies on alternative weighting/dB adjustment rather than relying upon the WFA (source-specific or default), they may override the Adjustment (dB) (row 73), and enter the new value directly. However, they must provide additional support and documentation supporting this modification.

STEP 3: SOURCE-SPECIFIC INFORMATION

NOTE: METHOD E.1-1 is PREFERRED method when SEL-based source levels are available (because pulse duration is not required). Only use method E.1-2 if SEL-based source levels are not available.

E.1-1: METHOD TO CALCULATE PK AND SEL_{cum} (SINGLE STRIKE EQUIVALENT) PREFERRED METHOD (pulse duration not needed)

Unweighted $SEL_{cum\ (at\ measured\ distance)}$ = SEL_{ss} + 10 Log (# strikes)	**213.6**

SEL_{cum}

Single Strike SEL_{ss} ($L_{E,p,single\ strike}$) specified at "x" meters (Cell B32)	181
Number of strikes per pile	6100
Number of piles per day	0.3
Transmission loss coefficient	15
Distance of single strike SEL_{ss} ($L_{E,p,single\ strike}$) measurement (meters)	10

PK

$L_{p,0\text{-}pk}$ specified at "x" meters (Cell G29)	210
Distance of $L_{p,0\text{-}pk}$ measurement (meters)†	10
$L_{p,0\text{-}pk}$ Source level	225.0

RESULTANT ISOPLETHS*

*Impulsive sounds have dual metric thresholds (SELcum & PK). Metric producing largest isopleth should be used.

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL_{cum} Threshold	183	185	155	185	203
PTS Isopleth to threshold (meters)	**1,099.1**	**39.1**	**1,309.2**	**588.2**	**42.8**
PK Threshold	219	230	202	218	232
PTS PK Isopleth to threshold (meters)	**2.5**	**NA**	**34.1**	**2.9**	**NA**

"NA": PK source level is ≤ to the threshold for that marine mammal hearing group.

E.1: IMPACT PILE DRIVING (STATIONARY SOURCE: Impulsive, Intermittent)

VERSION 2.2: 2020

KEY

	Action Proponent Provided Information
	NMFS Provided Information (Technical Guidance)
	Resultant Isopleth

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	Furie Operating Alaska 2024 and 2025 Natural Gas Production Drilling
PROJECT/SOURCE INFORMATION	SEL: 181 dB U.S. Navy 2015 Strikes: 2016 Conductor Install at JRP TL: Description in IHA App

Please include any assumptions

PROJECT CONTACT	Drew Lenz 61 North Environmental

STEP 2: WEIGHTING FACTOR ADJUSTMENT

		Specify if relying on source-specific WFA, alternative weighting/dB adjustment, or if using default value
Weighting Factor Adjustment (kHz)¥	2	default value

¥ Broadband: 95% frequency contour percentile (kHz); For appropriate default WFA: See INTRODUCTION tab

† If a user relies on alternative weighting/dB adjustment rather than relying upon the WFA (source-specific or default), they may override the Adjustment (dB) (row 73), and enter the new value directly. However, they must provide additional support and documentation supporting this modification.

STEP 3: SOURCE-SPECIFIC INFORMATION

NOTE: METHOD E.1-1 is PREFERRED method when SEL-based source levels are available (because pulse duration is not required). Only use method E.1-2 if SEL-based

E.1-1: METHOD TO CALCULATE PK AND SEL_{cum} (SINGLE STRIKE EQUIVALENT) PREFERRED METHOD (pulse duration not needed)

Unweighted $SEL_{cum\ (at\ measured\ distance)}$ = SEL_{ss} + 10 Log (# strikes)	**217.3**

SEL_{cum}

Single Strike SEL_{ss} ($L_{E,p,\ single\ strike}$) specified at "x" meters (Cell B32)	181
Number of strikes per pile	6100
Number of piles per day	0.7
Transmission loss coefficient	15
Distance of single strike SEL_{ss} ($L_{E,p,\ single\ strike}$) measurement (meters)	10

PK

$L_{p,0\text{-}pk}$ specified at "x" meters (Cell G29)	210
Distance of $L_{p,0\text{-}pk}$ measurement (meters)†	10
$L_{p,0\text{-}pk}$ Source level	225.0

RESULTANT ISOPLETHS*

*Impulsive sounds have dual metric thresholds (SELcum & PK). Metric producing largest isopleth should be used.

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL_{cum} Threshold	183	185	155	185	203
PTS Isopleth to threshold (meters)	**1,933.6**	**68.8**	**2,303.2**	**1,034.7**	**75.3**
PK Threshold	219	230	202	218	232
PTS PK Isopleth to threshold (meters)	**2.5**	**NA**	**34.1**	**2.9**	**NA**

"NA": PK source level is ≤ to the threshold for that marine mammal hearing group.

APPENDIX B

Marine Mammal Mitigation and Monitoring Plan

Marine Mammal Mitigation and Monitoring Plan
Furie Operating Alaska
Natural Gas Production Drilling 2024 to 2025 and 2025 to 2026

Final

October 2023

Prepared for

Furie Operating Alaska
Anchorage, Alaska

Prepared by

61 North Environmental
Anchorage, Alaska

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ACRONYMS AND ABBREVIATIONS

4MP	marine mammal mitigation and monitoring plan
dB	decibel
ESA	Endangered Species Act
HF	high-frequency
Hilcorp	Hilcorp Alaska, LLC
hp	horsepower
IHA	incidental harassment authorization
JRP	Julius R. Platform
km	kilometer
km2	square kilometer
kNm	kilonewton-meters
Lpk	peak received sound pressure level
LF	low-frequency
MF	mid-frequency
MMPA	Marine Mammal Protection Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
OPR	Office of Protected Resources
OSK	Offshore Systems Kenai
OSV	offshore supply vessel
OW	otariids in water
PSO	protected species observer
PTS	permanent threshold shift
PW	phocids in water
re 1 µPa	referenced to a pressure of 1 microPascal
rms	root mean square
SEL	sound exposure level
SPL	sound pressure level
VHF	very-high frequency

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1 INTRODUCTION

Furie Operating Alaska, LLC (Furie) has applied for two incidental harassment authorizations (IHAs) from the National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS) under Section 101(a)(5) of the Marine Mammal Protection Act (MMPA). Harassment of marine mammals is categorized as Level A and Level B harassment. Level A harassment is defined under the MMPA 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."

The IHAs authorize the non-lethal, unintentional taking of small numbers of marine mammals, incidental to towing a mobile jack-up drilling rig and production drilling activities at the Julius R. Natural Gas Platform (JRP) in Cook Inlet, Alaska (Figure 1). The application requested IHAs for two years of activities. The first year (Year 1) is from April 1, 2024, to March 31, 2025, and the second year (Year 2) is from April 1, 2025, to March 31, 2025.

The IHAs are expected to authorize the non-lethal, incidental, and unintentional take by behavioral disturbance of small numbers of the following marine mammal species that may occur in the vicinity of sound-generating activities:

- fin whales (*Balaenoptera physalus*)
- humpback whales (*Megaptera novaeangliae*)
- minke whales (*Balaenoptera acutorostrata*)
- gray whales (*Eschrichtius robustus*)
- beluga whales (*Delphinapterus leucas*)
- killer whales (*Orcinus orca*)
- harbor porpoise (*Phocoena phocoena*)
- Dall's porpoise (*Phocoenoides dalli*)
- Pacific white-sided dolphin (*Lagenorhynchus obliquidens*)
- harbor seals (*Phoca vitulina*)
- Steller sea lions (*Eumetopias jubatus*)
- California sea lions (*Zalophus californianus*)

This marine mammal mitigation and monitoring plan (4MP) describes the means and methods that will be used to implement the mitigation, monitoring, and reporting measures described in the IHAs.

2 DESCRIPTION OF ACTIVITIES

The JRP was constructed in 2015 and produces natural gas that is processed and sold to local utilities and industrial customers in Southcentral Alaska. Furie is planning to conduct two seasons of production drilling projects at the JRP. The purpose of the 2024 and 2025 drilling programs is to access and develop proven natural gas reserves located within the Kitchen Lights Unit, a lease area located within Cook Inlet, and to bring the gas to market.

2.1 Activity, Equipment, and Acoustic Sources

Furie intends to conduct production drilling in Year 1 at the JRP with the Enterprise 151 jack-up drilling rig (or a similar rig). Up to two conductor pipes may be driven into the seabed using an impact hammer. The installation of the conductors is an acoustic source with the potential to result in the take of marine mammals, as described below. Once production drilling commences, additional lower-level sound sources include diesel generators, mud and cement pumps, and ventilation fans. Offshore supply vessels (OSVs) and helicopters will transport supplies and personnel to the Enterprise 151. The low intensity of the drilling, generators, mud and cement pumps, and other equipment onboard the Enterprise 151 is not expected to cause take of marine mammals and is not expected to require monitoring. The OSV operators will be required to follow marine mammal avoidance measures but will not require continuous monitoring by protected species observers (PSOs).

The Enterprise 151 is a 150 H-class independent-leg, cantilevered jack-up drill rig capable of drilling to depths of 7,620 meters (25,000 feet) that can operate in waters up to 46 meters (150 feet) in depth. It has three legs that are adjusted to raise and lower the hull over the water's surface. Each leg of the jack-up rig has a spud can on the bottom designed to shallowly penetrate the seabed and disperse the rig's weight on the sea floor (refer to Figure 2).

A jack-up rig is not self-propelled and requires tugs to transport it to an offshore drilling location. The Enterprise 151 has a buoyant triangular hull, allowing it to be towed like a barge. Up to three ocean-going tugboats will tow the rig. Upon arrival at the JRP, a fourth tugboat may join the other three for up to one hour to complete the precise positioning of the rig next to the JRP. Details of the proposed towing activity are discussed further in Section 2.1.1.

Furie does not expect Level A take (injury or mortality) of marine mammals to result from towing a jack-up rig with tugboats. Furie requests a small number of Level B takes for species listed in Section 0 that may result from towing the jack-up rig. During the installation of the conductor pipe (the upper portion of a natural gas well) with an impact pile driving hammer, Level A take of harbor seals may occur, and Level B harassment of all marine mammal species from behavioral disturbances may occur. Although sound levels from towing and positioning the Enterprise 151 and from conductor pipe installation exceed Level A harassment thresholds, the areas ensonified above the threshold will be small, and the probability of injury will be low. The potential for Level A and Level B harassment will be minimized by implementing the mitigation and monitoring measures described in this document.

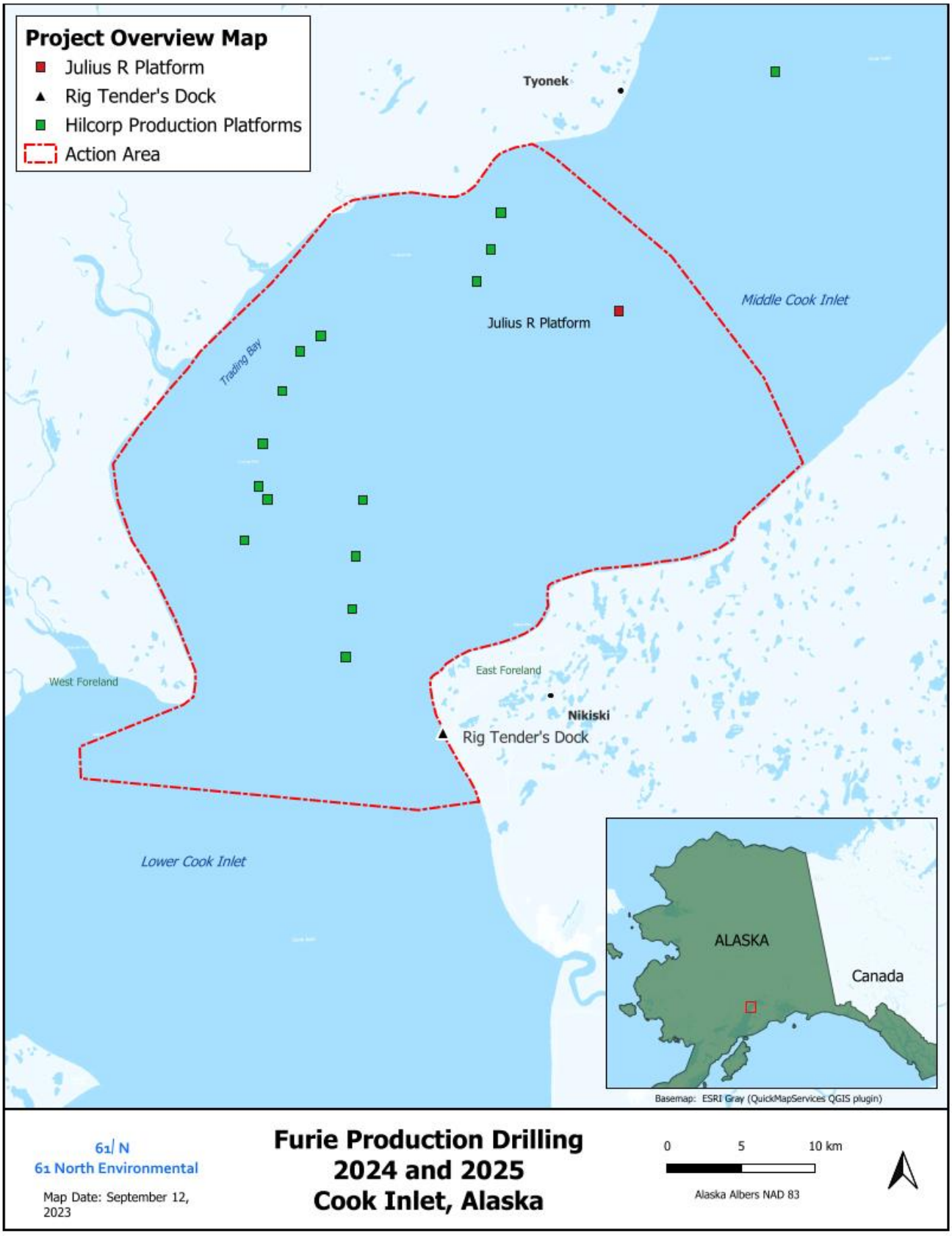

Figure 1. Project Location and Regional Landmarks

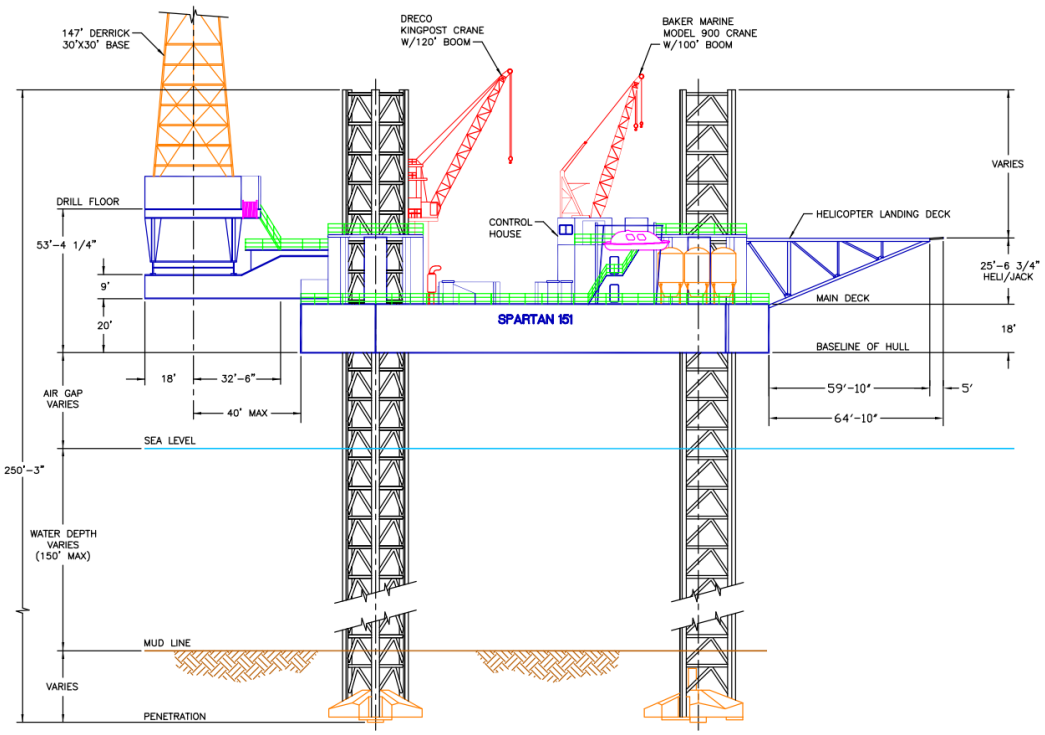

Figure 2. Enterprise 151 Schematic (Elevation View)

2.1.1 Tugs Towing the Jack-Up Rig

Three tugboats will tow the Enterprise 151 (or a similar jack-up rig) to the JRP; a fourth tugboat may join once at the JRP to help with positioning. The tugboats are typically rated between 4,000 horsepower (hp) and 8,000 hp.

In 2021, a hydroacoustic study measured the sound level of three tugs towing the Enterprise 151 at various power outputs. The report calculated the sound level of 50 percent towing power at 185 decibels (dB) at 1 meter, referenced to a pressure of 1 microPascal (re 1 µPa) (Lawrence et al. 2022, as cited in Weston and SLR 2022). Modeling of this sound source resulted in an estimated 120 dB isopleth at 3,850 meters (Weston and SLR 2022). A fourth tug may be needed to position the Enterprise 151 safely at the JRP. The estimated sound level of four tugs operating at 50 percent power simultaneously is 186.2 dB.

Several factors will determine the duration that the tugboats are towing the Enterprise 151, including the origin and destination of the towing route (e.g., Rig Tenders Dock, the JRP, one of Hilcorp Alaska, LLC [Hilcorp]'s platforms) and the tidal conditions. The power output will be variable and influenced by the prevailing wind direction and velocity, the current velocity, and the tidal stage. To the extent feasible, transport will be timed with the tide to minimize towing duration and power output.

A high slack tide is required to access the shallow water near the dock, whether beginning a tow or returning the Enterprise 151 to the Rig Tenders Dock. In all other locations, a slack tide at either high or low tide is required to attach the tugs to the rig and float it off position or to position the rig and detach from it. Current velocity at high and low slack typically slows to 1 to 2 knots, and speeds above 3 or 4 knots are unsafe to attempt to attach to and float the rig or to position the rig and detach from it.

The JRP is located north of the Rig Tenders Dock, and therefore, if the transport of the Enterprise 151 begins at the Rig Tenders Dock, the initial transit north may coincide with a high ebb as the current flows south. The Offshore Systems Kenai (OSK) Dock is located northeast of the Rig Tenders Dock around the point of the East Foreland of upper Cook Inlet. The area near the OSK Dock provides protection from the fast currents of the mid-inlet, and the Enterprise 151 may first be towed to this area (approximately one and a half hours in duration) and held in position for up to three hours to minimize power output and the time spent transiting against the outgoing current. During the tow against the outgoing tide around the East Foreland, the output power of the tugs may reach 70 percent. During positioning attempts, power output can reach up to 90 percent for up to a few minutes (Weston and SLR 2022).

During the return south to the Rig Tenders Dock, the beginning of the tow is likely to coincide with a high ebb, and initial travel will be in the direction of the outgoing current. However, the conditions may again require the rig to be held in the slower currents near the OSK Dock to wait for the tide to return to high flood or high slack before berthing it at the Rig Tenders Dock. The final portion of the transit may require towing against the northward-flowing, high flood currents for a brief period.

Tugs will be under power for approximately 14 hours during rig tows that begin or end at the Rig Tenders Dock. A tow starting at the Rig Tenders Dock would begin at high slack, pause near the OSK Dock, and then arrive at the JRP and the subsequent high slack (approximately 12 hours after departure). Once the tugs arrive at the JRP, there is a 1- to 2-hour window when the slack current velocity is slow, allowing the tugs to position the jack-up rig and pin the legs to the bottom.

Other origin and destination scenarios are also possible, depending on whether Hilcorp contracts to use the Enterprise 151 before Furie in the same season. For example, Furie may assume operatorship of the Enterprise 151 mid-season at one of Hilcorp's platforms or drilling locations (rather than at the Rig Tenders Dock) and tow the rig to the JRP. However, if Furie operates the Enterprise 151 last or is the only operator, the second tow of the season would return the Enterprise 151 to the Rig Tenders Dock.

Upon return, the tugs would be secured to the Enterprise 151 at the JRP on a high slack, float off location, and transit south with the outgoing tide south towards Nikiski. The tow will likely pause near OSK to wait for the tide cycle to return to a high flood before moving near the Rig Tenders Dock to bring it close to shore on high slack. Therefore, the tugs will be under load, typically at half-power or less, for up to 14 hours during mobilization to the JRP from Rig Tenders or demobilization in reverse order.

If the rig tow begins at a Hilcorp platform or drill site (excluding the northern locations), then the Enterprise 151 may be lowered, secured to the tugs, and floated off location during low slack to take advantage of the flood tide to tow the rig north or east to the JRP. In this scenario, the total towing duration is expected to be approximately 8 hours, allowing for the 6 hours between the low slack and high slack and an additional 1 to 2 hours to position the rig.

If the first positioning attempt takes longer than anticipated, the tugs may abort it until favorable conditions return. If so, the tugs will move the jack-up rig nearby, where the legs may be temporarily lowered to the seafloor to secure it. The tugs will remain close by, jogging in the current, until the positioning attempt can be resumed. The tugs usually complete the positioning on the first attempt, but they may be under power for approximately five additional hours if a second attempt is needed.

The tugs will generally attempt to transport the jack-up rig by traveling with the tide, except when circumstances threaten human safety, property, or infrastructure. The jack-up rig may need to be towed against the tide to a safe harbor if a slack tide window is missed or extreme weather events occur.

The tugs will tow the rig at 4 knots or less. In addition to the slow speed of the tow, tug operators will be in constant radio communication with each other. To further reduce the probability of interaction, Furie will station PSOs on a tug or the jack-up rig to continuously monitor the route ahead and around each tug. Due to safety concerns, the tug operators will be unable to stop or idle to avoid marine mammals, and their ability to take evasive action will be limited. However, tugs may reduce power to limit the sound levels when marine mammals are sighted if it can be done safely.

2.1.2 Conductor Pipe Installation

The conductor pipe is the uppermost portion of a gas well and supports the initial sedimentary part of the well, preventing the surface layers from collapsing and obstructing the wellbore. The pipe also facilitates the return of cuttings from the drill head and supports the wellhead components. The conductor pipe is typically installed with an impact pile driver. The 20-inch diameter conductor pipes are installed 130 to 180 feet below the mud line. As the pipe is driven into the sediment, the sections are connected either by welding or drivable quick connections. For efficiency, Furie expects to install a conductor in each of the two empty well slots in Year 1. However, Furie may elect to install only one conductor in Year 1 and install the second conductor in Year 2. It is also possible that Furie may conduct only sidetrack drilling in Year 1, and the install one or both conductors in Year 2.

Furie proposes to install the conductor pipes using a Delmag D62 impact hammer. The Delmag D62 hammer has an impact weight of 6,200 kilograms (13,640 pounds) and reaches an impact energy maximum of 224 kilonewton-meters (kNm; 165,215 foot-pounds) at a drop height of 3.6 meters (12 feet). The expected sound pressure level (SPL) at 10 meters of the impact hammer on the 20-inch conductor is 193 dB, the expected sound exposure level (SEL) is 184 dB, and the expected peak SPL is 210 dB (U.S. Navy 2015).

The monopod leg of the JRP will encase the well slot, which will encase the conductor pipes; therefore, some sound attenuation is expected. However, lacking project-specific empirical data for a 20-inch conductor installed within a well slot located within a monopod leg, the unaltered sound source levels from U.S. Navy (2015) are used for Level A and Level B isopleth calculations.

The conductor pipes may be installed with the Enterprise 151 while cantilevered over the JRP or with the crane onboard the JRP before the rig arrives. No difference in the intensity or frequency of the underwater sounds is expected.

2.1.3 Production Drilling

The Enterprise 151 jack-up rig will conduct production drilling at the JRP. Potential underwater sound sources during production drilling include conductor pipe installation, drilling, diesel generators, mud pumps, ventilation fans, OSV operations, and helicopter operations. The installation of the conductor pipe is the only sound source from production drilling activities with Level A and Level B harassment zones large enough to require a dedicated PSO for marine mammal monitoring. The OSV crews will follow general marine mammal avoidance and mitigation measures while operating in support of the project. Helicopter pilots will also follow mitigation measures, including maintaining a minimum flight altitude of 1,500 feet whenever possible to avoid harassment of marine mammals.

3 ACOUSTIC THRESHOLD CRITERIA AND ISOPLETHS

3.1 Level A Acoustic Thresholds and Isopleths

In 2016, NMFS developed guidance, revised in 2018, to assist project proponents in assessing the Level A sound threshold criteria at which permanent threshold shift (PTS) onset may occur in marine mammals (NOAA Fisheries 2018). Five functional hearing groups for marine mammals are identified in the guidance document to account for the variability in perceived levels of sound intensity at different frequencies. These five groups and the Level A acoustic thresholds for each are presented in Table 1.

Table 1. Functional Hearing Groups of Marine Mammals in the Project Area

Hearing Group	*Species*	*Generalized Hearing Range*	*Level A Threshold for Impulsive Sound*	*Level A Threshold for Non-Impulsive Sound*
Low-frequency (LF) cetaceans	Humpback whales Fin whales Minke whales Gray Whales	7 Hz to 35 kHz	219 dB L_{pk} 183 dB SEL	199 dB SEL
Mid-frequency (MF) cetaceans	Beluga whales Killer whales	150 Hz to 160 kHz	230 dB L_{pk} 185 dB SEL	198 dB SEL
High-frequency (HF) cetaceans	Dall's porpoise Harbor porpoise Pacific white-sided dolphin	275 Hz to 160 kHz	202 dB L_{pk} 155 dB SEL	173 dB SEL
Phocids in water (PW)	Harbor seals	50 Hz to 86 kHz	218 dB L_{pk} 185 dB SEL	201 dB SEL
Otariids in water (OW)	Steller sea lions California sea lions	60 Hz to 39 kHz	232 dB L_{pk} 203 dB SEL	219 dB SEL

Notes:

L_{pk} = peak received sound pressure level

SEL = sound exposure level

rms = root mean square

Level A acoustic thresholds may be exceeded during the following activities:

1. Towing the Enterprise 151 with three tugboats
2. Positioning the Enterprise 151 with three tugboats for up to five hours
3. Positioning the Enterprise 151 with four tugboats for up to one hour
4. Impact installation of conductor pipes at the JRP

Because of the short duration of exposure to a passing sound source during towing, the calculated Level A zones for towing are negligible (from less than 1 meter to 8 meters), resulting in an exceptionally low probability of Level A take. The Level A zones are larger for three tugs positioning the rig for five hours, ranging from a negligible size (OW hearing group) to 679 meters (HF hearing group). The Level A zones for four tugs positioning the rig for up to one hour are smaller still, ranging from negligible in size (MF and OW hearing groups) to 18 meters (LF hearing group). Although the small zone sizes result in a low probability of take, it is important to maintain awareness of the Level A zone sizes during the positioning of the jack-up rig in the event marine mammals are sighted within the zones. It is estimated that it will take two days to install the conductor pipes, with approximately 70 percent of the installation on day one and 30 percent on day two. The Level A zones range from 43 meters (OW hearing group) to 2,303 meters (HF hearing group).

The Level A zones for all project activities are listed in Table 2, and the Level A zones that are greater than 1,000 meters for 70 percent conductor pipe installation are presented in Figure 3.

Table 2. Level A Isopleths (meters) for Project Activities

Hearing Group:	*LF*	*MF*	*HF*	*PW*	*OW*
SEL Threshold	199	198	173	201	219
Towing the Rig with Three Tugs	-	-	8	-	-
Positioning the Rig with Three Tugs for 5 Hours	95	78	679	69	-
Positioning the Rig with Four Tugs for 1 Hour	18	-	16	11	-
Conductor Pipe Installation (70 percent)	1,934	69	2,303	1,035	75
Conductor Pipe Installation (30 percent)	1,099	39	1,309	588	43

3.2 Level B Acoustic Thresholds and Isopleths

The current thresholds used by NMFS to estimate Level B harassment are 160 dB re 1 µPa rms for impulsive sound (such as the impact installation of the conductor) and 120 dB re 1 µPa rms for non-impulsive sound (such as a tug pulling a jack-up rig) for all marine mammals.

The Level B acoustic threshold of 120 dB for continuous noise will be exceeded by the tugs towing and positioning the Enterprise 151. The Level B acoustic threshold of 160 dB for impulsive noise will be exceeded during the impact installation of the conductor pipes. The Level B zone for towing the jack-up rig is 3,850 meters, for positioning the jack-up rig is 4,483 meters, and for impact installation of the conductor pipes is 1,585 meters.

The Level B zones for the project activities are listed in Table 3. The Level B zone for conductor pipe installation is shown in Figure 3, and the Level B zones for rig towing and positioning are illustrated on Figure 4.

Table 3. Level B Isopleths (meters) for Project Activities

Activity	*Level B Acoustic Threshold*	*Level B Isopleth (radius in meters)*
Towing the Enterprise 151	120 dB	3,850
Positioning the Enterprise 151	120 dB	4,483
Impact Installation of Conductor Pipe	160 dB	1,585

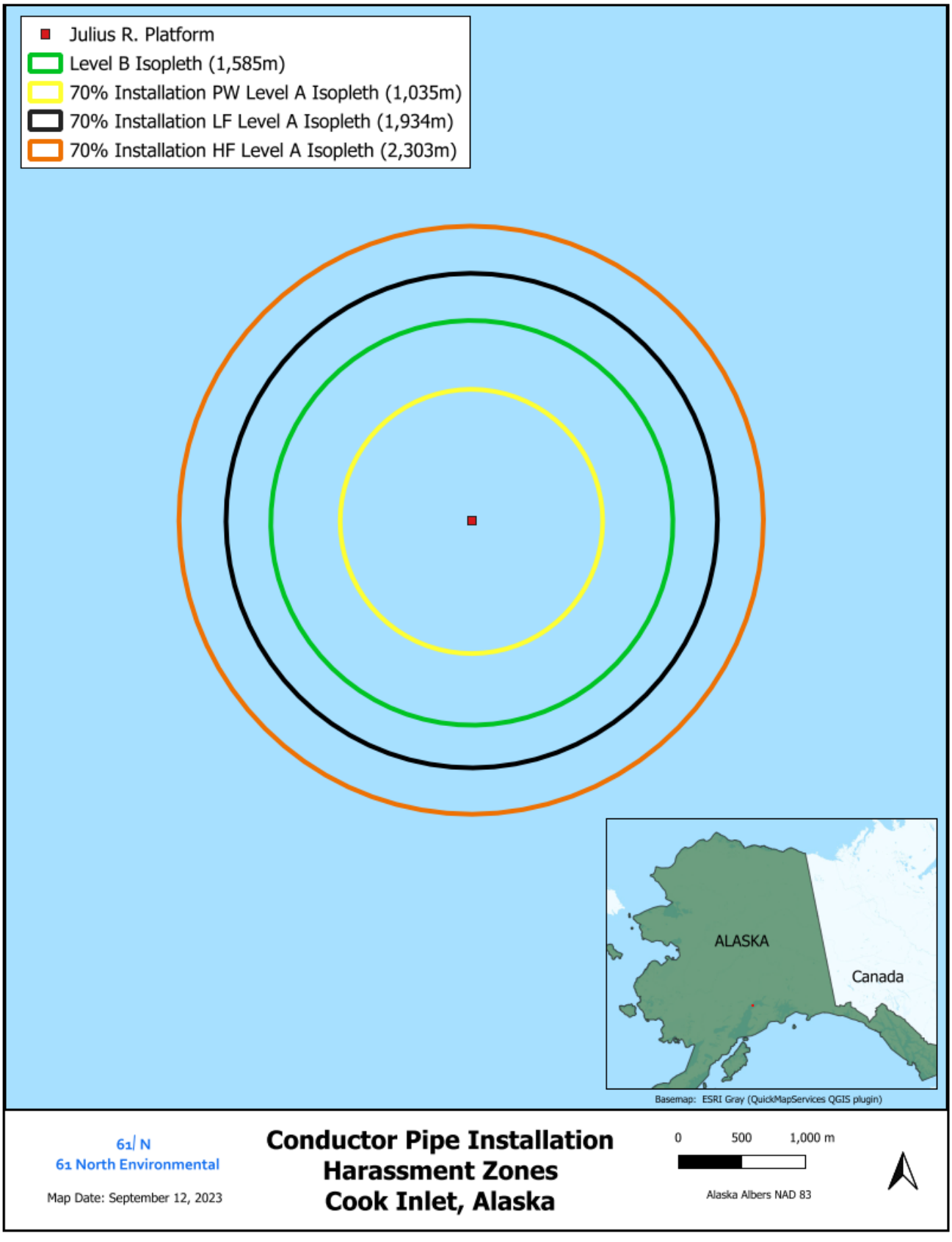

Figure 3. Harassment Zones for Conductor Pipe Installation

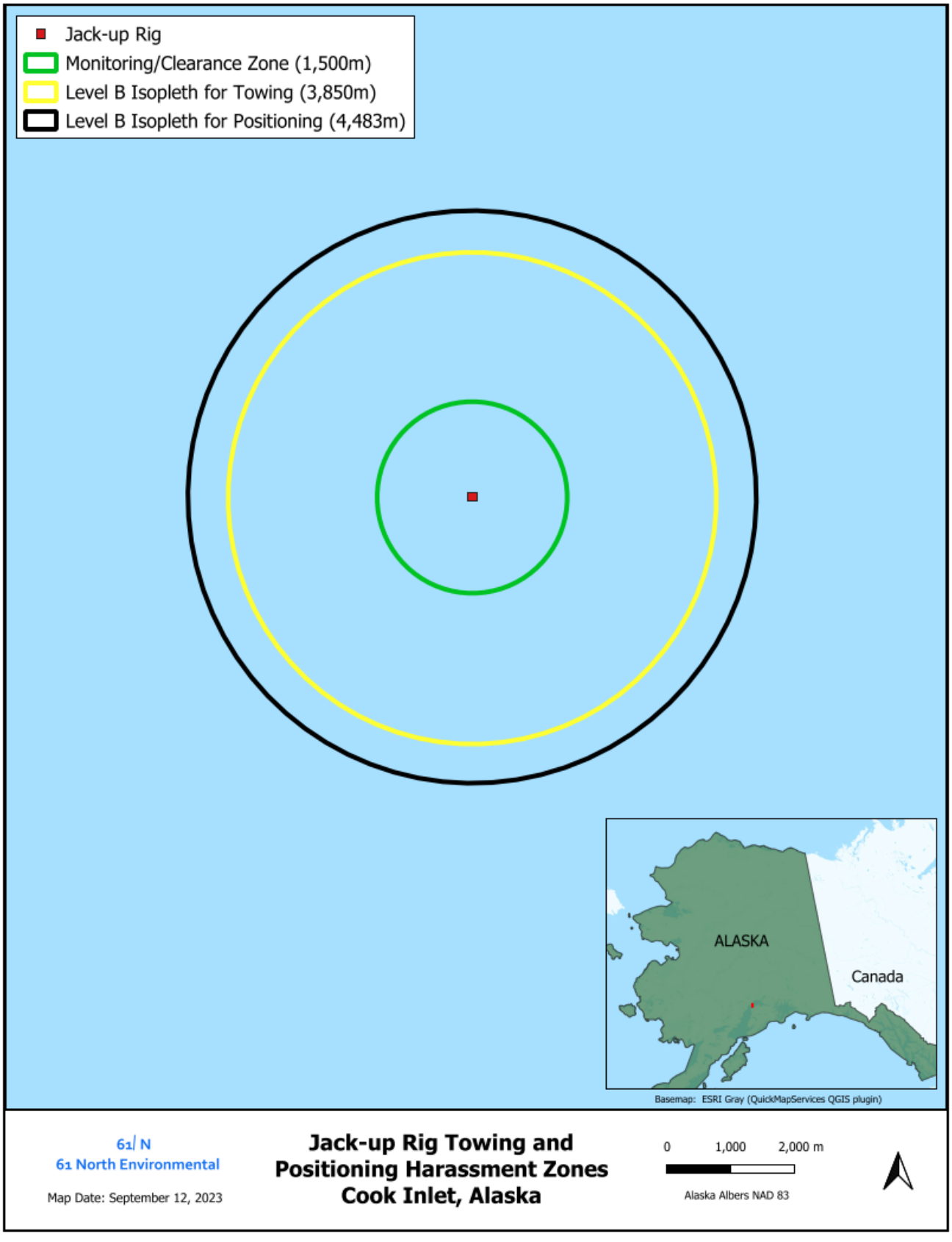

Figure 4. Harassment and Monitoring Zone for Jack-up Rig Towing and Positioning

4 MONITORING/CLEARANCE ZONE

Although the Level B zones for towing and positioning the rig are 3,850 and 4,483 meters, respectively, smaller cetaceans (i.e., porpoises), sea lions, and seals are difficult to spot at distances beyond 1,500 meters. Additionally, the tugs will not be able to shut down during rig towing or positioning. Therefore, a 1,500-meter radius will be used to demarcate a monitoring zone area beyond which potential takes of porpoises, sea lions, and seals will be extrapolated. The potential take will be extrapolated using the density estimates for these species. For example, the 3,850-meter Level B zone will ensonify an area of 316 square kilometers (km^2) over a 35-kilometer (km) towing route. The 1,500-meter monitoring zone covers a swath of 112 km^2 over the same route. Subtracting the monitoring zone from the Level B zone results in a 204 km^2 area to extrapolate the potential take. In practice, the PSOs will document all marine mammals sighted within or outside of any monitoring zone or harassment zone. If porpoises, seals, or sea lions are sighted outside the monitoring zone but within the Level B zone during active towing, they will be reported as takes. The extrapolated estimates will only be provided to NMFS in the final report and will not be recorded or estimated by the PSOs daily.

Additionally, because the entire Level B zone may not be adequately monitored for porpoises, sea lions, and harbor seals, the 1,500-meter zone will serve as a "clearance zone" prior to beginning a rig tow. The 1,500-meter zone will be scanned for 30 minutes to confirm the area is free of marine mammals before the start of a rig tow. The Level B zone (3,850 meters) will be scanned for all other marine mammals. If any marine mammals are sighted within the Level B or clearance zone, the tow will be delayed to the extent feasible while maintaining the necessary departure time to transit during favorable tides and currents. If a rig move is planned at night for a favorable tide, the PSOs must scan the 1,500-meter zone with night-vision optics (e.g., Armasight by FLIR Command Pro®, or similar).

During conductor pipe installation, the Level A and Level B zone sizes can be sufficiently monitored as is; therefore, the 1,500-meter monitoring and clearance zone is not applicable to the activity. The 1,500-meter monitoring and clearance zone is presented in Figure 4.

5 ROLES AND RESPONSIBILITIES

Furie is responsible for complying with the project permits and authorizations. Furie will ensure that the tugboat captains, rig move coordinator, and conductor pipe installation supervisor (collectively, the "points of contact" [POCs]) receive a briefing with instructions on their roles in implementing the mitigation measures required by the IHA. The POCs responsibilities include accommodating the PSOs with a safe location to conduct monitoring, discussing operations, and implementing mitigation instructions. The POC briefing will include directions that all personnel working on the project are responsible for communicating sightings of marine mammals during in-water sound-generating activities. The PSOs are responsible for assisting Furie and their contractors to comply with the project-specific MMPA and Endangered Species Act (ESA) requirements, conducting monitoring at the appropriate times, communicating sightings and mitigation instructions to POCs promptly, and documenting monitoring effort, project activities, marine mammal sightings, environmental conditions, and mitigation measures employed.

6 COMMUNICATION

A clear authorization and communication system will be in place to ensure that PSOs and POCs understand their roles and responsibilities before operations begin. Each PSO will be trained and provided with reference materials (i.e., observation and communication protocols) to ensure standardized communication systems and accurate

observations and data collection. All field personnel (PSOs, jack-up rig crew, and vessel crew) will communicate marine mammal sightings to ensure that PSOs and POCs know when marine mammals are in the area. Typically, PSOs will use very high-frequency (VHF) handheld radios to monitor and communicate on the VHF channel used by vessel and rig POCs.

The POCs must inform the PSOs of the planned start of operations so that the 30 minutes of pre-activity monitoring can be completed beforehand. When a marine mammal is sighted approaching or within a Level B or Level A harassment zone during towing or positioning activities, the Lead PSO will contact the tug captain of the tug nearest to the sighting to advise of the sighting and recommend a reduced throttle if it is safe to do so. The vessel captains (or the rig move coordinator) will have sole discretion over whether a reduction in throttle or velocity can be performed safely. Similarly, the PSOs will contact the POC for conductor pipe installation to advise them on shutdown protocols if marine mammals are sighted within any applicable shutdown zones required by the IHA (e.g., a Level A zone for a species that does not have Level A takes authorized). The conductor pipe installation POC will assess the installation, including safety considerations, to determine if a shutdown will occur immediately.

7 PROTECTED SPECIES OBSERVER REQUIREMENTS

Furie will employ PSOs to conduct monitoring during the rig towing and positioning activities and conductor pipe installation. The PSOs will be independent (i.e., not vessel or production drilling personnel) and have no other assigned tasks during monitoring periods. PSOs will be trained biologists with the following minimum qualifications:

1. Visual acuity in both eyes (correction is permissible) sufficient for discernment of moving targets at the water's surface with the ability to estimate target size and distance; use of binoculars may be necessary to identify the target correctly;
2. Advanced education in biological science or a related field (undergraduate degree or higher required)—PSOs may substitute Alaska native traditional knowledge for experience;
3. Experience and ability to conduct field observations and collect data according to assigned protocols (this may include academic experience);
4. Experience or training in the field identification of marine mammals, including the identification of behaviors;
5. Sufficient training, orientation, or experience with the tugging and positioning operation to provide for personal safety during observations;
6. Writing skills sufficient to prepare a report of observations, including but not limited to the number and species of marine mammals observed; dates and times when in-water activities were conducted, marine mammal behavior; and
7. Ability to communicate orally, by radio, or in person with project personnel to provide real-time information on marine mammals observed in the area as necessary.

8 EQUIPMENT

The PSOs will be equipped with the following items:

- Portable radios for the PSOs to communicate with the POCs and other PSOs (if there are multiple stations)

- Cellular phones and phone numbers for all PSOs, the rig move coordinator, tugboat captains, and the conductor pipe POC
- Daily tide tables
- Binoculars (7X or better) with built-in rangefinder or reticles
- Spotting scopes for stationary monitoring (i.e., from the helicopter deck of the JRP)
- Sighting and data entry forms printed on waterproof paper
- Personal protective equipment appropriate for the safety hazards of the vessel, platform, or jack-up rig
- Laminated copy of definitions for data collected
- A copy of this 4MP, the IHA, and biological opinion/ITS for the project

9 MITIGATION MEASURES TO PROTECT MARINE MAMMALS AND THEIR HABITAT

Furie is committed to minimizing the impacts of its drilling program by implementing mitigation measures and the monitoring program, using NMFS-qualified PSOs during rig towing and positioning, and conductor pipe installation. Furie proposed the following measures during the consultation with NMFS, but the mitigation measures in the IHA and Incidental Take Statement (ITS) issued for the project will be followed if there are any discrepancies.

9.1 General Mitigation Measures

1. Furie will implement all the reasonable and prudent measures and terms and conditions described in a Biological Opinion and Incidental Take Statement anticipated to be issued by NMFS under Section 7 of the Endangered Species Act.
2. Incidental take of marine mammals will be limited to only those species authorized by an IHA.
3. Taking of marine mammals by severe injury or death is prohibited.
4. If a species for which authorization has not been granted, or a species for which authorization has been granted but the authorized takes have been reached, is observed approaching or within the clearance zone or harassment zone, in-water work will be delayed or shut down (other than tug towing jack-up rig activity if already initiated). Activities will not resume until the animal has been confirmed to have left the area or the observation period, as indicated in Sections 1 and 1 below, has elapsed.
5. Furie personnel, contractors, and vessel operators will avoid direct physical interaction with marine mammals during project activities.
6. Furie will inform NMFS of impending in-water activities that require a PSO a minimum of one week prior to the onset of those activities.
7. Trash will be disposed of in accordance with state law (AS 46.06.080). In addition, the project proponent will ensure that all closed loops (e.g., packing straps, rings, bands) will be cut prior to disposal. In addition, the project proponent will secure all ropes, nets, and other marine mammal entanglement hazards so they cannot enter public waterways.

9.2 Mitigation and Monitoring Measures for Rig Towing and Positioning

Furie and its contractors will implement the following mitigation and monitoring measures:

1. Furie will conduct briefings between vessel captains and crew and the marine mammal monitoring team before the start of all in-water work and when new personnel join the work to explain responsibilities, communication procedures, marine mammal monitoring protocol, and operational procedures.
2. Furie will station PSOs at the highest possible vantage point on either the jack-up rig or on one of the tugs.
3. Furie will establish a clearance zone that extends 1,500 meters from the tug or jack-up rig on which the PSOs are positioned.
4. Before commencing operational activities in daylight hours, two NMFS-approved PSOs must observe the clearance zone for 30 minutes; if no marine mammals are observed within those 30 minutes, activities may commence.
5. Before commencing operational activities in nighttime hours, two NMFS-approved PSOs must observe the extent visible for 30 minutes while using night vision devices (e.g., Armasight by FLIR Command Pro®, or similar); if no marine mammals are observed within those 30 minutes, activities may commence.
6. PSOs must scan the waters for at least 30 minutes after tugging and positioning activities have been completed each day, and after each stoppage of 30 minutes or greater.
7. If a marine mammal is observed within the clearance zone during the pre-activity clearing, operations may not commence until the PSO observes one of the following:
    a. The animal is outside of and on a path away from the clearance zone, or
    b. For pinnipeds and small cetaceans - 15 minutes without observing the marine mammal have elapsed; for baleen whales - or 30 minutes have elapsed without observing the marine mammal.
8. Should a marine mammal be observed during tugs towing the jack-up rig, the PSO must monitor and carefully record any reactions observed until the towing or positioning is concluded. No new operational activities may be started until the animal leaves the clearance zone. Shifting from towing to positioning without shutting down is not considered a new operational activity.
9. Furie will conduct tug towing rig operations with a favorable tide unless human safety or equipment integrity is at risk.
10. Furie will only conduct tug towing rig activities at night if necessary to accommodate a favorable tide.
11. Furie and its vessel contractors will abide by NMFS marine mammal viewing guidelines while operating additional equipment or vessels related to this project, including not actively approaching marine mammals within 100 yards and slowing vessels to the minimum speed necessary.
12. Furie will conduct marine mammal monitoring during all in-water work associated with the tug towing jack-up rig activities in accordance with the Marine Mammal Monitoring and Mitigation Plan included in Appendix B.
13. Two PSOs will be stationed on the tug or jack-up rig for monitoring purposes for the entirety of jack-up rig towing and positioning operations.

14. The PSOs will scan the monitoring area systematically with the naked eye, 7x50 reticle binoculars, or 20-25x100 big-eye binoculars.
15. The PSOs will always be in communication with all vessel captains via very high frequency (VHF) radio and/or cell phones and alert vessel captains to all marine mammal sightings relative to the vessel location.

9.3 Mitigation and Monitoring Measures for Conductor Pipe Installation

1. Furie will conduct briefings between conductor pipe installation supervisors and crew and the marine mammal monitoring team before the start of installation and when new personnel join the work to explain responsibilities, communication procedures, marine mammal monitoring protocol, and operational procedures.
2. The PSOs will maintain lines of communication with the conductor pipe installation supervisors and crew via VHF radio and/or cell phones, alert them to all marine mammal sightings, and provide instructions to delay or shutdown the impact installation of the conductor pipe as appropriate.
3. Impact installation of conductor pipes will occur during daylight hours only.
4. Furie will use soft-start techniques when installing the conductor with an impact hammer. During the soft start, the hammer operator will provide an initial set of three strikes at reduced energy, followed by a 30-second waiting period, and then two subsequent reduced-energy strike sets. A soft start will be implemented at the start of each day's operation of the impact hammer and at any time following the cessation of impact hammering for a period of 30 minutes or longer.
5. In the event of a delay or shutdown of activity due to the presence of marine mammals within a shutdown zone, marine mammal behavior will be monitored and documented until they leave of their own volition, at which point the impact installation of the conductor pipe may begin or resume.
6. Furie will conduct marine mammal monitoring during conductor pipe installation activities in accordance with the Marine Mammal Monitoring and Mitigation Plan included in Appendix B.
7. Furie will establish a monitoring location on the JRP at the highest possible vantage point to monitor to the maximum extent possible in all directions.
8. Monitoring will take place from 30 minutes before the initiation of impact installation of the conductor pipe (i.e., pre-start clearance monitoring) through 30 minutes after the completion of the impact installation of the conductor pipe, and after each stoppage of 30 minutes or greater.
9. Pre-start clearance monitoring will be conducted during periods of visibility sufficient for the PSO to determine that shutdown zones (as specified in an IHA) are clear of marine mammals. Impact installation of the conductor pipe may commence following 30 minutes of observation, which has indicated the shutdown zones are clear of marine mammals.
10. If PSO monitoring ceases for more than 30 minutes within a day but impact installation of the conductor pipe is scheduled to resume, the PSO will follow the pre-start clearance monitoring protocol as described above and complete another 30-minute observation period before impact installation of the conductor pipe may commence.

11. If a marine mammal for which take is authorized is entering or is observed within the shutdown zone established in the IHA, impact installation of the conductor pipe will be halted or delayed. Impact installation of the conductor pipe will not commence or resume until the animal has voluntarily left and been visually confirmed to be 100 meters beyond the shutdown zone and on a trajectory away from the zone, or 30 minutes have passed without subsequent detections.
12. If Cook Inlet beluga whales are observed within or approaching the Level B zone for conductor pipe installation, impact installation of the conductor pipe will be delayed or halted until the beluga(s) have voluntarily left and been visually confirmed to be 100 meters beyond the Level B zone and on a trajectory away from the zone, or 30 minutes have passed without subsequent detections.
13. If, during impact installation of the conductor pipe, the PSO can no longer effectively monitor the entirety of the Level B zone due to environmental conditions (e.g., fog, rain, wind), impact installation may only continue until the active segment of conductor pipe is driven; no additional sections of conductor pipe or new conductor pipe will be driven until conditions improve such that the Level B zone can be effectively monitored.
14. If visibility is reduced such that the entire Level B zone cannot be effectively monitored for 15 minutes or more, a new 30-minute period of pre-start clearance monitoring will be conducted before impact installation of the conductor pipe may be resumed.

9.4 Reporting

Furie will prepare and submit monthly marine mammal monitoring reports to NMFS and a draft report summarizing all monitoring within 90 calendar days of monitoring completion. Furie will respond to any comments on the draft report by NMFS and incorporate changes into a final report, which it will submit within 30 days of receipt of the comments. The reports will include:

1. Dates and times (beginning and ending) of all marine mammal monitoring;
2. Activities occurring during each daily observation period, including:
    a. The type of activity (towing, positioning, or conductor installation);
    b. The total duration of each type of activity (towing, positioning, and conductor installation);
    c. The number of attempts required for positioning;
    d. Indications of when nighttime operations were required and if towing against the tide was required.
3. PSO locations during marine mammal monitoring;
4. Environmental conditions during monitoring periods (at the beginning and end of the PSO shift and whenever conditions change significantly), including Beaufort sea state and any other relevant weather conditions, including cloud cover, fog, sun glare, overall visibility to the horizon, and estimated observable distance;
5. Upon observation of a marine mammal, the following information:
    a. The name of the PSO who sighted the animal(s) and PSO location and activity at the time of sighting;
    b. The time of sighting;

c. Identification of the animal(s) (e.g., genus/species, lowest possible taxonomic level, or unidentified), PSO confidence in identification, and the composition of the group if there is a mix of species;

d. The distance and location of each observed marine mammal relative to the tugs or conductor installation for each sighting;

e. The estimated number of animals (min/max/best estimate);

f. The estimated number of animals by cohort (adults, juveniles, neonates, group composition, etc.);

g. The animal's closest point of approach and estimated time spent within the harassment zone;

h. A description of any marine mammal behavioral observations (e.g., observed behaviors such as feeding or traveling), including an assessment of behavioral responses thought to have resulted from the activity (e.g., no response or changes in behavioral state such as ceasing feeding, changing direction, flushing, or breaching);

i. The number of marine mammals detected within the harassment zone by species; and

j. Detailed information about the implementation of any mitigation (e.g., delays), a description of specific actions that ensued, and resulting changes in the behavior of the animal(s), if any.

6. Furie will submit all PSO datasheets and raw sighting data with the draft report.

7. Furie will report all injured or dead marine mammals. If personnel involved in Furie's activities discover an injured or dead marine mammal, Furie will report the incident to the Office of Protected Resources (OPR), NMFS (PR.ITP.MonitoringReports@noaa.gov), and to the Alaska regional stranding network [(877) 925-7773] as soon as feasible. If the death or injury was clearly caused by the specified activity, Furie will immediately cease the activities until NMFS OPR is able to review the circumstances of the incident and determine what, if any, additional measures are appropriate. Furie will not resume their activities until notified by NMFS if the injury or death is a result of the activity.

8. Reports of injured or dead marine mammals will include the following information:

    a. Time, date, and location (latitude and longitude) of the first discovery (and updated location information if known and applicable);

    b. Species identification (if known) or description of the animal(s) involved;

    c. Condition of the animal(s) (including carcass condition if the animal is dead);

    d. Observed behaviors of the animal(s), if alive;

    e. If available, photographs or video footage of the animal(s); and

    f. General circumstances under which the animal was discovered.

9.5 Mitigation Measures for Helicopter Flights

To minimize the possibility of adverse effects from aircraft sound on marine mammals, Furie will ensure that helicopters must transit at an altitude of 1,500 feet (457 meters) or higher, to the extent practicable, while maintaining Federal Aviation Administration flight rules (e.g., avoidance of cloud ceiling, etc.), excluding takeoffs

and landing. If flights must occur at altitudes less than 1,500 feet due to environmental conditions, aircraft must make course adjustments, as needed, to maintain at least a 1,500-foot separation from all observed marine mammals. Helicopters must not hover or circle above marine mammals.

10 REFERENCES

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U.S. Navy. 2015. *Proxy source sound levels and potential bubble curtain attenuation for acoustic modeling of nearshore marine pile driving at Navy installations in Puget Sound*. Prepared by Michael Slater, Naval Surface Warfare Center, Carderock Division, and Sharon Rainsberry, Naval Facilities Engineering Command Northwest. Revised January 2015.

Weston and SLR (Weston Solutions, Inc. and SLR Consulting, Ltd.). 2022. *Request for Two Incidental Harassment Authorizations for 2022 to 2023 and 2023 to 2024 Cook Inlet Oil and Gas Activities*. Prepared for Hilcorp Alaska, LLC. Prepared by Weston Solutions, Inc. with contributions from SLR Consulting, Ltd.