

APPENDIX A

**CIPL EXTENSION PROJECT
MARINE MAMMAL MONITORING AND MITIGATION PLAN**

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MARINE MAMMAL MONITORING AND MITIGATION PLAN

Harvest will implement a robust Marine Mammal Monitoring and Mitigation Plan (4MP) for these activities. This Plan includes land- and platform-based observations by experienced Protected Species Observers (PSOs).

The objectives of the 4MP include:

- Establish real-time mitigation procedures as required by the IHA.
- Collect information needed to estimate the number of exposures of marine mammals to sound levels that may result in harassment, which must be reported to NMFS.
- Collect data on occurrence and activities of marine mammals in the area and timing of the Project activities.
- Provide an opportunity to collect information on behavioral responses of marine mammals to vessels.
- Provide a communication channel to coastal communities.

1. Land- and Platform-Based Monitoring

After discussions with the project operations team, it was determined that placing PSOs on the Project vessels is not possible due to safety concerns and space. There is no space on the tugs and the barge does not have sufficient accommodations or height sufficient for PSOs to effectively monitor the Level B monitoring zones. Therefore, we identified the best locations for PSOs to effectively monitor the Level B harassment zone will be on land at Ladd Landing and on the Tyonek platform (Figure 1).

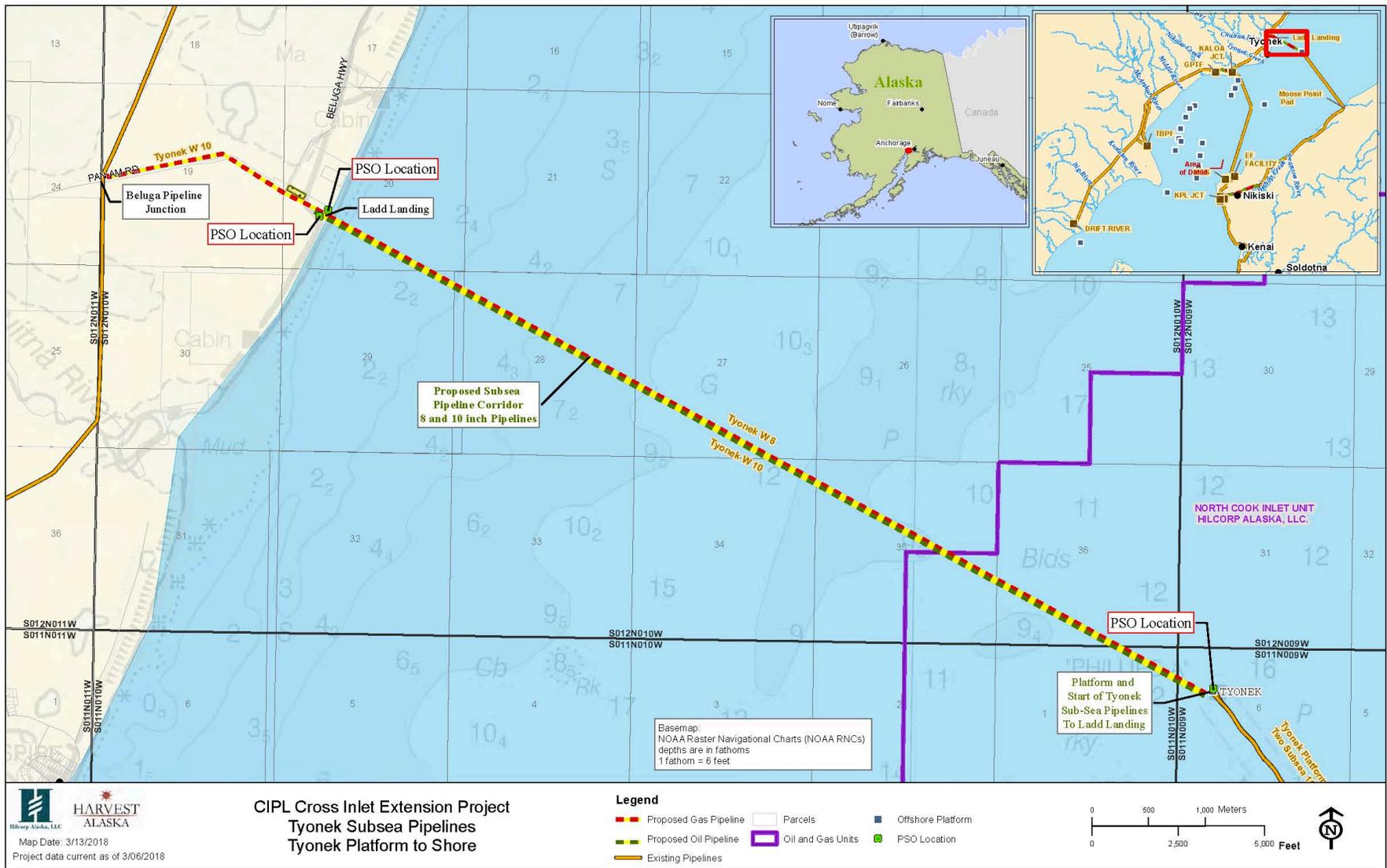


Figure 1. PSO Stations at Ladd Landing and Tyonek Platform.

NMFS-approved PSOs will monitor for marine mammals during vessel use related to pipeline installation during all daytime hours. Marine mammal monitoring and mitigation methods were designed to meet the requirements and objectives specified in the IHA. Two PSOs will be stationed at either the land-based station at Ladd Landing or on the Tyonek platform depending on the location of construction activity within the pipeline corridor.

The main purposes of PSOs are to conduct visual watches for marine mammals to serve as the basis for implementation of mitigation measures, document numbers of marine mammals present, record any reactions of marine mammals to project-related activities, and identify whether there was any possible effect on accessibility of marine mammals to subsistence hunters in Cook Inlet. These observations will provide the real-time data needed to implement some of the key measures.

For this program, it is not feasible to implement a power down or shut down procedure because once the activity has started, stopping or even slowing the process could have major safety consequences. Accordingly, once the activity is started, Harvest will not be able to stop operations if a marine mammal enters the Level B zone. The PSOs will observe for marine mammals out to the horizon; detectability will depend on environmental conditions, height of the viewing location (i.e., at Ladd Landing or on the Tyonek platform), distance of the marine mammal, and species. PSOs will monitor as long as daylight conditions allow which varies throughout the season. The PSOs will be in contact with the vessel operators via radios and cell phones.

2. Mitigation Measures

2.1 Shut Down Procedures

Mitigation measures typically used in industry programs include powering or shutting down activities if a marine mammal is in or approaching an established zone (based on distances to Level A criteria). As described in Section 6.1.2 of the IHA application, Level A takes are not anticipated for this Project. There is no potential for the Project activities to cause marine mammal PTS due to impulsive noise peak levels anticipated. In-water construction activities are planned to be completed within a 5-month period and are not expected to result in PTS or Level A serious injury or mortality of any marine mammal. To be precautionary, Harvest proposes the following mitigation and monitoring scenarios prior to and during activities to reduce potential exposures of sound on marine mammals.

- When the vessel is positioned on site, the PSO will ‘clear’ the area by observing the safety zone (2,200 m) for 30 minutes; if no marine mammals are observed within those 30 minutes, activities will commence.
- If a marine mammal(s) is observed within the safety zone during the clearing, the PSO will continue to watch until the animal(s) is gone and has not returned for 15 minutes if the sighting was a pinniped, or 30 minutes if it was a cetacean.
- Once the PSO has cleared the area, operations may commence.
- Should a marine mammal be observed during pipe pulling, the PSO will monitor and carefully record any reactions observed until the pipe is secure. No new operational activities would be started until the animal leaves the area. PSOs will also collect behavioral information on marine mammals beyond the safety zone. All vessel engines would be placed in idle when not working.

However, to maintain control of the vessel in the currents and tides of Cook Inlet, the engine cannot ever be completely shut down.

- Because the PSOs are not stationed on the vessels, the PSO will be in communication with the Project vessels via VHF radio at all times.

2.2. Speed or Course Alteration

If a marine mammal is detected outside the safety zone for activities and, based on its position and the relative motion, is likely to enter those zones, the vessel's speed and/or direct course may, when practical and safe, be changed. The marine mammal activities and movements relative to the vessels will be closely monitored to ensure that the marine mammal does not approach within either zone.

3. Monitoring Methodology

A land-based PSO station at Ladd Landing on the west side of Cook Inlet (Figure 1) will be used when Project vessels are nearshore working towards the platform to install the pipeline. Once pipeline installation activities have reached the mid-way point between shore and the Tyonek platform, PSOs will move to a station on the Tyonek platform offshore (Figure 1). There will be two PSOs at the observation station (i.e., either at Ladd Landing or on Tyonek platform). One PSO will be on watch at one time and will observe for no more than 4 hours at a time and no more than 12 hours in a 24-hour period. Each of these locations is expected to provide good visibility of the monitoring zone however, the optimal location will be chosen just prior to Project start. The PSO will be in constant communication with the Project vessel operators via VHF radio.

PSOs will be outfitted with hand-held 7x50 Fujinon reticle binoculars and “big-eye” 20-25x100 binoculars. The approximate height of the bluffs at Ladd Landing is 24-30 meters (m, 80-100 feet [ft]) and the height of the Tyonek platform is 30 meters (m) (100 feet [ft]) at Mean Lower Low Water (MLLW). At these heights, the estimated maximum viewing distance is 5.1-6.3 kilometers (km) (3-3.9 miles [mi]). The total distance between Ladd Landing and the Tyonek platform is approximately 8.9 km (5.5 mi), thus PSOs will be able to effectively view the Level B zone from either the shoreline or the platform. As described in the July 2012 Protected Species Monitoring Program Report for the Apache seismic program in Cook Inlet, land-based PSOs stationed at Tyonek could effectively view beluga whales at these distances using big-eyes (see Appendix A, SAE 2012). Based on available data, the height of the bluff at Ladd Landing and the fact that there is good visibility to the northeast and to the southwest along the shoreline, it is estimated that the Level B zone and the entirety of the pipeline route can be viewed using big-eye binoculars. Further, the PSOs will closely monitor up and down Cook Inlet for beluga whales who tend to travel within 1-2 km (0.62-1.24 mi) from shore. The height of Tyonek platform and the unobstructed view of the Inlet also provides a safe, effective location for PSOs to monitor the Level B zone during Project activities using big-eye binoculars.

The PSOs will scan systematically with the naked eye and 7x50 reticle binoculars, while sightings will be confirmed with the big-eye binoculars. When a mammal sighting is made, the following information about the sighting will be carefully and accurately recorded:

- Species, group size, age/size/sex categories (if determinable), behavior when first sighted and after initial sighting, heading (if consistent), bearing and distance from the PSO, apparent reaction

to activities (e.g., none, avoidance, approach, paralleling, etc.), closest point of approach, and behavioral pace.

- Time, location, speed, activity of the vessel, sea state, ice cover, visibility, and sun glare.
- The positions of other vessel(s) in the vicinity sighting.
- The vessel's position, speed, water depth, sea state, ice cover, visibility, and sun glare will also be recorded at the start and end of each observation watch, every 30 minutes during a watch, and whenever there is a change in any of those variables.

Distances to nearby marine mammals will be estimated with binoculars (Fujinon 7x50 binoculars) containing a reticle to measure the vertical angle of the line of sight to the animal relative to the horizon. Personnel on the bridge will also assist the PSOs in watching for marine mammals and will be in contact with the PSOs via VHF radio. PSOs are instructed to identify animals as unknown when appropriate rather than strive to identify an animal when there is significant uncertainty. Harvest also will ask that the PSOs provide any sightings cues they used and any distinguishable features of the animal even if they are not able to identify the animal and record it as unidentified. Emphasis is also placed on recording what was not seen, such as dorsal features. In addition to routine PSO duties, observers will be encouraged to record comments about their observations into the 'comment' field in the database. Copies of these records will be available to the observers for reference if they wish to prepare a statement about their observations. If prepared, this statement would be included in the 90-day reports documenting the monitoring work. Throughout the program, the PSOs will prepare daily, weekly, and monthly reports as required summarizing the recent results of the monitoring program. The reports will summarize the species and numbers of marine mammals sighted. These reports will be provided to agencies as required and/or requested.

An electronic database will be used to record and collate data obtained from visual observations. The PSOs will enter the data into the data entry program installed on field laptops. The program automates the data entry process, reduces data entry errors, and maximizes PSO time spent looking at the water. PSOs also have voice recorders available to them that will help maximize time spent focused on observing for marine mammals in the water. Quality control of the data will be facilitated by: (1) the start-of-season training session; (2) subsequent supervision by the lead PSO; and (3) ongoing data checks during the field season. The data will be sent from the PSO stations to Anchorage regularly, and backed up regularly onto storage devices on site.

3.1. Protected Species Observers

Monitoring for marine mammals will be conducted by trained PSOs from the land- or platform-based observation stations for the duration of in-water work that may result in harassment to comply with mitigations contained in the IHA. The observers will monitor the occurrence and behavior of marine mammals near the project vessels during all daylight periods during the program, and during most periods when activities are not being conducted. PSO duties will include watching for and identifying marine mammals; recording their numbers, distances, and reactions to the activities; and documenting exposures to sound levels that may constitute harassment as defined by NMFS.

3.1.1. Number of Observers

A sufficient number of PSOs will be utilized to meet the following criteria:

- 100 percent monitoring coverage during all periods of operations in daylight;
- Maximum of four consecutive hours on watch per PSO; and
- Maximum of approximately 12 hours on watch per day per PSO.

3.1.2. Crew Rotation

Harvest anticipates that there will be provisions for crew rotation at least every three to six weeks to avoid observer fatigue. During crew rotations, detailed notes will be provided to the incoming crew leader. Other communications such as email, fax, and/or phone communication between the current and oncoming crew leaders during each rotation will also occur when necessary. In the event of an unexpected crew change Harvest will facilitate such communications to ensure monitoring consistency among shifts.

3.1.3. Observer Qualifications and Training

Crew leaders serving as PSOs will have experience from one or more projects with operators in Alaska and Cook Inlet. Biologist-observers will have previous PSO experience, and crew leaders will be highly experienced with previous marine mammal monitoring projects. All PSOs will be trained and familiar with the marine mammals of the area. A PSO handbook, adapted for the specifics of the planned program will be prepared and distributed beforehand to all PSOs. All observers will also complete a training session on marine mammal monitoring, to be conducted shortly before the anticipated start of the season. The training sessions will be conducted by marine mammalogists with extensive crew leader experience from previous monitoring programs in Alaska.

Primary objectives of the training include:

- Review of the 4MP for this project, including any amendments adopted, or specified by the IHA.
- Review of marine mammal sighting, identification, (photographs and videos) and distance estimation methods, including any amendments specified by the IHA.
- Review operation of specialized equipment (e.g., reticle binoculars, big eye binoculars, night vision devices, Global Positioning System [GPS]).
- Review of data recording and data entry systems, including procedures for recording data on mammal sightings, project and monitoring activities, environmental conditions, and entry error control. These procedures will be implemented through use of a customized computer database and laptop computers.

3.1.4. PSO Handbook

A PSO Handbook will be prepared for the Harvest monitoring program. The Handbook will contain maps, illustrations, and photographs as well as copies of important documents and descriptive text and are intended to provide guidance and reference information to trained individuals who will participate as PSOs. The following topics will be covered in the PSO Handbook:

- Summary overview descriptions of the project, marine mammals and underwater sound energy, the 4MP, the IHA, and other regulations/permits/agencies.

- Monitoring and mitigation objectives and procedures, including disturbance zones.
- Responsibilities of staff and crew regarding the 4MP.
- Instructions for staff and crew regarding the 4MP.
- Data recording procedures: codes and coding instructions, common coding mistakes, electronic database; navigational, vessel data recording, field data sheet.
- Use of specialized field equipment (e.g., reticle binoculars, big eye binoculars, laser rangefinders).
- Reticle binocular distance scale.
- Table of wind speed, Beaufort wind force, and sea state codes.
- Data storage and backup procedures.
- List of species that might be encountered (identification, natural history, etc.).
- Safety precautions while at Ladd Landing or on the platform.
- Crew and/or personnel discord; conflict resolution among PSOs and crew.
- Drug and alcohol policy and testing.
- Scheduling of hitches and watches.
- Communications.
- List of field gear provided.
- Suggested list of personal items to pack.
- Suggested literature, or literature cited.
- Field reporting requirements and procedures.
- Copies of the authorizations/permits.

4. Unmanned Aerial Surveys

Harvest plans to augment this PSO program with the use of an unmanned aerial system (UAS), pending final Federal Aviation Administration (FAA) approval. These UAS operations will be managed by Harvest and may be executed by a third-party contractor to be identified. The UAS platforms currently being evaluated include: fixed-wing platforms, such as the ScanEagle, Puma, or Flexrotor; and a remotely-operated tethered balloon, such as the Aerostat. Depending on FAA approval, these will be operated by land-based pilots. All platforms will provide increased viewing distances for detection of marine mammals for monitoring and mitigation purposes.

The purpose of the UAS monitoring program is for PSOs to monitor the safety zone. PSOs working with the UAS pilot would be different from those dedicated to land- or platform-based monitoring. There are three important operational time periods for monitoring:

- 1) ‘clearing’ the safety zone prior to start of operations;
- 2) continuous monitoring during operations to confirm the area remains ‘clear’; and
- 3) continuous monitoring during operations to characterize behavioral responses of marine mammals.

The UAS program is designed to detect marine mammals during each of these periods. The UAS program does not supplement the existing PSO program but rather, has been designed to be a stand-alone monitoring and mitigation program which may be used in lieu of an on-water mitigation vessel in the future.

4.1 Monitoring Procedures

The UAS will be collecting continuous high-resolution video during all flight operations. The pilots (land- or vessel-based) will be monitoring the video feed in real-time for the presence of marine mammals. A UAS station near the PSO station for the lead PSO with real-time video feed from the UAS will be set up (i.e., computer, monitor, connectivity), if possible. If a suspected marine mammal is identified by the UAS/balloon operators, the UAS will be flown in a circle over the sighting to maintain a constant view of the marine mammal at greater than 1,000 ft above ground level (AGL). The pilots will notify the lead PSO who will verify the sighting and distance relative to the vessels. If the PSO determines it is not a marine mammal, the PSO will communicate with the pilots to continue surveying. If the PSO determines it is a marine mammal of concern, the PSO will instruct the pilot to maintain visual contact or to continue surveying.

The UAS pilots will contact the lead PSO via radio or phone. The video feed of the sighting will be streamed to the lead PSO via the UAS viewing station, if possible. The video feed provides an instant replay through the laptop interface so the PSO can verify the sighting if the real-time feed no longer shows the animal.

Prior to starting the activity, PSOs must ‘clear’ the safety zone by observing for 30 minutes; if no marine mammals are observed within those 30 minutes, the activities may commence. The UAS will support this activity by launching approximately 1 hour prior to the planned start of the clearing (which is 30 minutes prior to the planned start). The UAS will fly over the planned survey line and 2,200 m past the end of the line to determine if any marine mammals are in this general vicinity. It is imperative that the UAS pilots coordinate with the lead PSO for planned start times and area to be surveyed.

The UAS will support this activity by flying a circular pattern throughout the safety zone as much as possible to detect beluga whales and other marine mammals.

4.2. UAS Operational Considerations

- The UAS must maintain an elevation to be specified in coordination with NMFS that will not result in disturbance of marine mammals.
- Launch and recovery must be coordinated with the Harvest Project Manager and lead PSO.
- Pilots must coordinate with other airspace operators to avoid collisions. Coordination includes but is not limited to FAA and local airports.
- Harvest will provide a flight plan detailing operational procedures, permit stipulations, loss-link, recovery in the event of a failure or unplanned water landing, and other safety procedures.

4.3. UAS Descriptions

Below are the aircraft descriptions for two candidate UAS for this monitoring program.

4.3.1. ScanEagle

The ScanEagle is a capable platform, with a zero-length catapult launch and snag line recovery system and a payload of ~3 kilogram (kg), loaded weight <50 pounds (lb), 1 kiloWatt (kW) power, 60-80 knots cruise/dash range, and endurance of up to 24 hours, depending upon configuration and flight conditions.



FIGURE 1. PHOTO OF SCANEAGLE

TABLE 1. SPECIFICATIONS OF SCANEAGLE

Specification	Description
Type of UAS	Fixed wing
Dimensions	5.3 feet (ft) x 10.2 ft wide
Average altitude	3,000-5,000 ft AGL, payload dependent; NMFS recommends 1000 ft AGL to avoid disturbance
Battery size	N/A
Internal combustion engines	Liquid C10 Racing fuel (i.e., two-stroke mixed gas)
Range from launch	~18 hours with no check in required
# Pilots	2 per flight
Launch method	Catapult launch and cable from crane recovery SuperWedge is 10ft high, 4ft wide, and 21ft long when deployed Land specifics: 100x100ft launch and recovery area recommended
Recovery method	It weighs 1,558lbs and has a minimum safety radius of 30 ft in operation. Recovery system - SkyHook is a modified Genie TZ-34/20 trailer and is 44 ft 11in tall, 11 ft 5in wide, and 37 ft long when deployed. It weighs 3,540 lbs and has a mandatory 75 ft safety radius in operation. Land specifics: 100x100 ft launch and recovery area recommended
Sensors	Video EO, mid-wave infrared (MWIR) with live stream
Ground control station specifications	Three 18" monitors, 2x transportable 3x3x4 shock-proofed computer rack, 110v DC power, add 6ft wide directional antenna
PSO Data Viewing station	Laptop, monitors, video encoder (in addition to ground control station)

Scan Eagle Weather Limitations

1. Day Visual Flight Rules (VFR) in visual meteorological conditions (VMC)
2. Flight through visible moisture: ScanEagle can operate in light rain up to 30 minutes, operations may be restricted by Certificate of Authorization (COA).
3. Flight operations in icing conditions at assigned operational altitudes: ScanEagle- not allowed
4. Flight Pitch Altitude: ScanEagle - +/- 5 degrees
5. Flight Bank Angle: ScanEagle - +/- 20 degrees
6. Ambient Outside Air Temperature (OAT)
 - a. Maximum OAT: ScanEagle - 130F
 - b. Minimum OAT at Altitude: ScanEagle – No minimum
7. Wind
 - a. Ship launch wind over deck conditions:
 - i. Wind over deck conditions shall be determined by shipboard wind measurement and indication system.
 - ii. Max gusts for launch and recovery: 5 Kts (5.75 mph, 9.26 kph)
 - b. Launches (including gusts):
 - i. 20 Kts from $\pm 30^\circ$ relative to the launcher centerline.
 - ii. 35 Kts from $\pm 20^\circ$ relative to the launcher centerline.
 - iii. Launches with tailwinds: Not allowed
 - c. Recoveries (including gusts)
 - i. Port recoveries:
 1. 40 Kts from 320° to 350° relative to the ship centerline.
 2. 40 Kts from 320° to 330° relative to the ship centerline.
 - ii. Starboard recoveries:
 1. 40 Kts from 10° to 40° relative to the ship centerline.
 - iii. Recoveries with tailwinds: Not allowed
 - d. Wind limitations during flight:
 - i. Max winds (sustained plus gusts): 40 kts
 - ii. Max gust component (gusts are considered any wind variations above the measured sustained value: No violent gust or shear conditions
 - e. Flight Operations
 - i. For this operation only one ScanEagle can be airborne at any given time
 - f. Open water operation: Limited to COA
 - g. Over land operation: Limited to COA
 - h. Operation with inoperative instruments and equipment: (dependent on safety of flight) possible, not recommended.

4.3.2. Puma

Puma AE (AeroEnvironment) is a fully waterproof, small UAS designed for land and maritime operations. Capable of landing in water or on land, the Puma AE empowers the operator with an operational flexibility previously not available in the small UAS class. The enhanced precision navigation system with secondary GPS provides greater positional accuracy and reliability of the Puma AE. AeroEnvironment's common ground control system allows the operator to control the aircraft manually or program it for GPS-based autonomous navigation.



FIGURE 2. PHOTO OF PUMA

TABLE 2. SPECIFICAIONS OF PUMA

Specification	Description
Type of UAS	Fixed wing
Dimensions	4.6 ft x 9.2 ft wide
Average altitude	200-400 ft AGL, payload dependent; 500ft AGL normal operating altitude
Battery size	Lithium Ion approximately 6" x 3" x 3" in size
Range from launch	2-4 hours; always within contact and monitoring in real-time; check-in would include battery change
Internal combustion engines	No
# Pilots	2 per flight
Launch method	Hand launch
Recovery method	Deep-stall auto-land (from water or on-deck)
Sensors	Video EO, mid-wave infrared (MWIR) with live stream
Ground control station specifications	Consists of a laptop, hand controller, Ground Data Terminal box with small antenna mast. 5x5ft area footprint
PSO Data Viewing station	Additional monitors and hand controllers may be used for video viewing.

Puma Weather Limitations

1. Day Visual Flight Rules (VFR) in visual meteorological conditions (VMC)
2. Flight through visible moisture: Yes; 1 inch/hour
3. Flight operations in icing conditions at assigned operational altitudes: No
4. Flight Pitch Altitude: Unknown
5. Flight Bank Angle: Unknown
6. Ambient OAT
 - a. Maximum OAT: 120°F (49°C)
 - b. Minimum OAT at Altitude: -20°F (-29°C)
7. Wind
 - a. Ship launch wind over deck conditions:
 - i. Wind over deck conditions shall be determined by shipboard wind measurement and indication system.
 - ii. Max gusts for launch and recovery: Unknown
 - b. Launches (including gusts):
 - i. Unknown; Is hand launched
 - ii. Launches with tailwinds: Cannot launch with a tailwind.
 - c. Recoveries (including gusts):
 - i. Port recoveries:
 1. Unknown; will conduct a deep stall to belly land on the water
 - ii. Starboard recoveries:
 1. Unknown; will conduct a deep stall to belly land on the water
 - iii. Recoveries with tailwinds: Not recommended
 - d. Wind limitations during flight:
 - i. Max winds (sustained plus gusts): Unknown
 - ii. Max gust component (gusts are considered any wind variations above the measured sustained value): Unknown
 - e. Flight Operations
 - i. For this operation only one Puma can be airborne at any given time
 - f. Open water operation: Limited to COA
 - g. Over land operation: Limited to COA
 - h. Operation with inoperative instruments and equipment: Dependent upon the inoperative equipment, but not recommended to not possible.

5. Acoustic Monitoring

The NMFS Marine Mammal Laboratory, in coordination with Harvest, will be conducting acoustic monitoring during the CIPL project. There are two goals to the acoustic monitoring plan: 1) obtain acoustic data related to pipeline installation activities; and 2) determine habitat use of the CIPL project area by marine mammals. Data gathered would be used to inform an assessment of the project after-the-fact, inform future ESA and MMPA consultations involving similar work, and supplement visual monitoring during the UAS study.

NMFS, in coordination with Harvest, will deploy the acoustic monitoring package approximately 1 mile north of the pipeline corridor and no more than 2 miles from shore. The approximate dimensions of the mooring package are 12 in. high by 18 in. long by 14 in. deep and 77 lbs in air weight. The anchor is

composed of a 4-ft. long railroad track piece of 160 lbs. A mooring line of approximately 5 ft. will connect the anchor and package when assembled (see Figure 3). The mooring can be deployed by 2 people from any small boat or vessel, deployed by gravity (i.e., there is no need to lower it down).



FIGURE 2. PHOTO OF ACOUSTIC MONITORING PACKAGE

5.1 Monitoring Outputs

Analysis of the data could be done in multiple ways. Data collected during acoustic monitoring will be included in the reports provided to NMFS after the project is complete.

A few key outputs of the report include:

- ‘Baseline’ (either prior to or after project, or a combination of both) and ‘during operation’ noise received levels in broadband SPL (dB_{Rms} re 1microPa), spectral content, and SEL at peak and slack current times (if impulsive signals are detected then also peak levels) and a comparative analysis of results.
- Average broadband SPL, spectral content, and SEL for the 24-hour periods and if applicable for specific longer periods related to activities.

- Approximated source levels for the different sources, using several transmission losses (cylindrical, spherical, practical, etc.). Information will be needed from the activity log and tug GPA track.
- Beluga whale and other marine mammal detection frequency (if a CPOD is used). A CPOD is C-Pod is an ultrasonic field recorder used to record echolocation of the whales.

6. Reporting

The results of monitoring, including estimates of exposure to key sound levels, will be presented in weekly, monthly, and 90-day reports. Reporting will address the requirements established by NMFS in the IHA. The technical report(s) will include:

- Summaries of monitoring effort: total hours, total distances, and distribution of marine mammals throughout the study period compared to sea state, and other factors affecting visibility and detectability of marine mammals;
- Analyses of the effects of various factors influencing detectability of marine mammals: sea state, number of observers, and fog/glare;
- Species composition, occurrence, and distribution of marine mammal sightings including date, water depth, numbers, age/size/gender categories (when discernable), group sizes, and ice cover;
- Analyses of the effects of pipeline installation;
- Sighting rates of marine mammals during periods with and without installation activities (and other variables that could affect detectability);
- Initial sighting distances versus vessel location;
- Closest point of approach versus vessel location;
- Observed behaviors and types of movements versus vessel location;
- Numbers of sightings/individuals seen versus vessel location;
- Distribution around the vessels versus vessel location; and
- Estimates of ‘take by harassment’.