Quintillion 2017 Subsea Cable System

Phase 1 Installation Program

Marine Mammal Monitoring and Mitigation

90-Day Report

January 2018

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MARINE MAMMAL MONITORING AND MITIGATION 90-DAY REPORT: QUINTILLION 2017 SUBSEA CABLE SYSTEM PHASE 1 INSTALLATION PROGRAM

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To meet passive acoustical monitoring (PAM) obligations required by the Incidental Harassment Authorizations (IHAs), Quintillion Subsea Operations, LLC (Quintillion) provided funding to the Arctic Long-Term Integrated Mooring Array (ALTIMA) project, a passive acoustical program conducted by the University of Washington Joint Institute for the Study of the Atmosphere and Ocean (JISAO) and the NMFS Marine Mammal Laboratory (MML). In exchange, the ALTIMA project provided acoustical data and analysis of underwater sounds produced by the cable-lay activities as they passed by the moored acoustical recorders, as well as data on marine mammal vocalizations. Manuel Castellote of JISAO led the project with assistance from Catherine Berchok and Jessica Crance with MML and Stephanie Grassia of JISAO.

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ACRONYMS AND ABBREVIATIONS

4MP.....Marine Mammal Monitoring and Mitigation Plan
AHT .....anchor-handling tug
ALTIMA.....Arctic Long-Term Integrated Mooring Array
ASL.....above sea level
ASN .....Alcatel-Lucent Submarine Networks
BU.....branching unit
CPA.....closest point of approach
dB.....decibel(s)
DP .....dynamic positioning
ft.....foot/feet
h .....hour(s)
HDD.....Horizontal Directionally Drilled
IHA .....Incidental Harassment Authorization
I&R .....Illingworth & Rodkin
JISAO.....Joint Institute for the Study of the Atmosphere and Ocean (University of Washington)
km .....kilometer(s)
KP.....Kilometer Point
kt .....knot(s)
kW.....kilowatt
LOG .....Letter of Guidance
m .....meter(s)
mi .....mile(s)
min……minute(s)
MML.....NMFS Marine Mammal Laboratory
MMPA .....Marine Mammal Protection Act
NMFS.....National Marine Fisheries Service
Owl Ridge.....Owl Ridge Natural Resource Consultants, Inc.
PAM.....passive acoustic monitoring
PLIB.....Post-Lay Inspection and Burial
PSO .....Protected Species Observer
PTS……..permanent threshold shift
Quintillion.....Quintillion Subsea Operations, LLC
re 1µ Pa .....relative to 1 micro Pascal
rms .....root mean square
ROV .....remotely operated vehicle
SPL……..sound pressure level
SSV .....sound source verification
USFWS .....U.S. Fish and Wildlife Service

1. INTRODUCTION AND BACKGROUND

Quintillion Subsea Operations, LLC (Quintillion), completed in October 2017 the installation phase of a subsea fiber-optic cable network along the northern and western coasts of Alaska to provide high speed internet connectivity to five rural Alaska communities and an industrial site (Oliktok Point). The subsea fiber-optic cable network links with an existing North Slope terrestrial-based fiber-optic line. The Quintillion project consists of over 1,900 kilometers (km) (1,180 miles [mi]) of fiber-optic cable including a main trunk line and six branch lines to onshore facilities in Nome, Kotzebue, Point Hope, Wainwright, Barrow, and Oliktok Point (Figure 1-1). About 96% of the subsea cable was installed by Alcatel-Lucent Submarine Networks (ASN) in 2016, and the remaining 76 km (47 mi) of route was installed during the 2017 open water season (Figure 1-2).

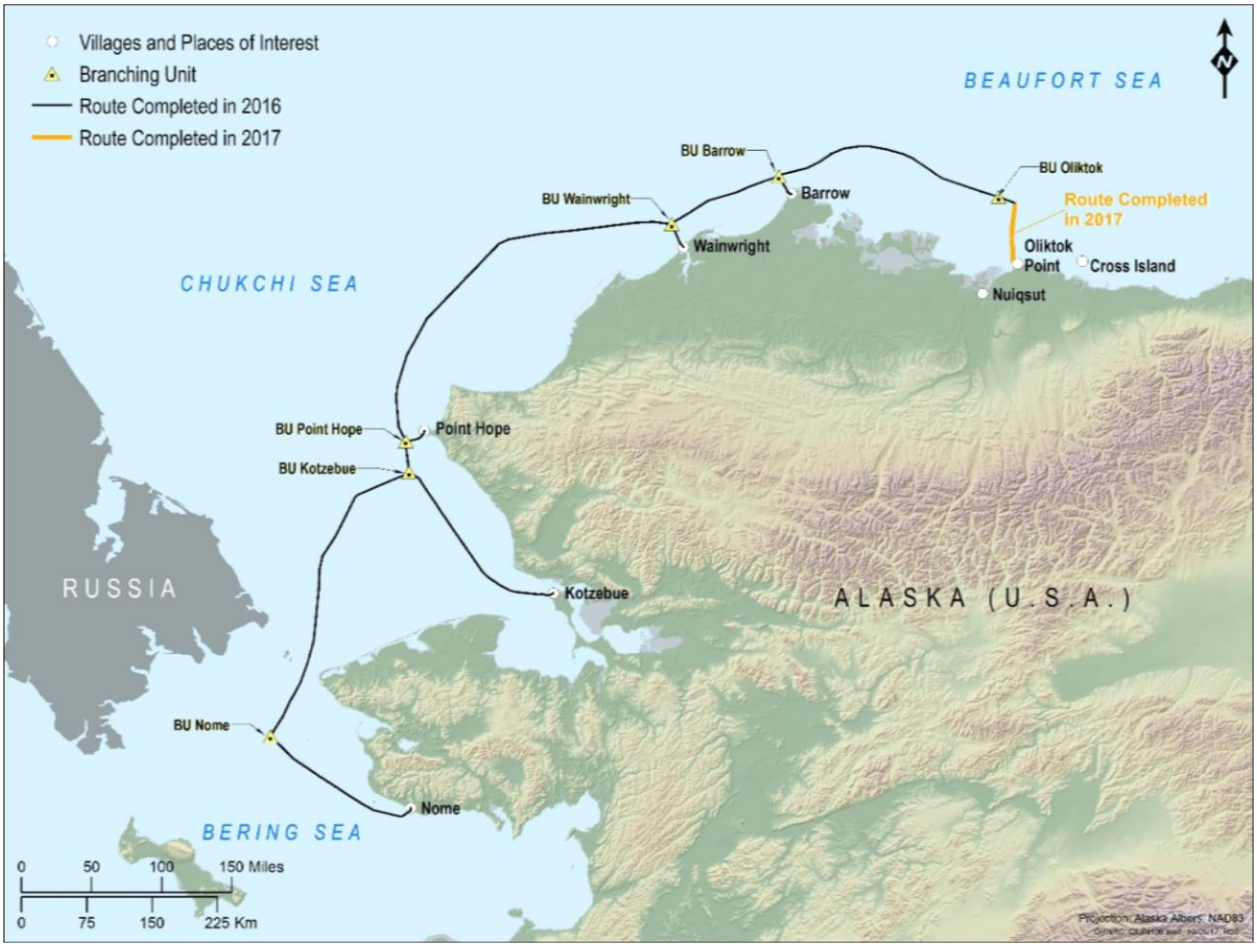

Figure 1-1. Quintillion Subsea Fiber Optic Cable Network

The cable-lay ship and support vessels employed for this project used drive propellers and thrusters for propulsion, dynamic positioning (DP), and anchor-handling during cable-lay operations. The noise generated by these sources has a potential for acoustically harassing marine mammals, a form of "take" as

defined under the Marine Mammal Protection Act (MMPA), and thus are subject to governance under the MMPA. Incidental and unintentional harassment takes are permitted with the issuance of Incidental

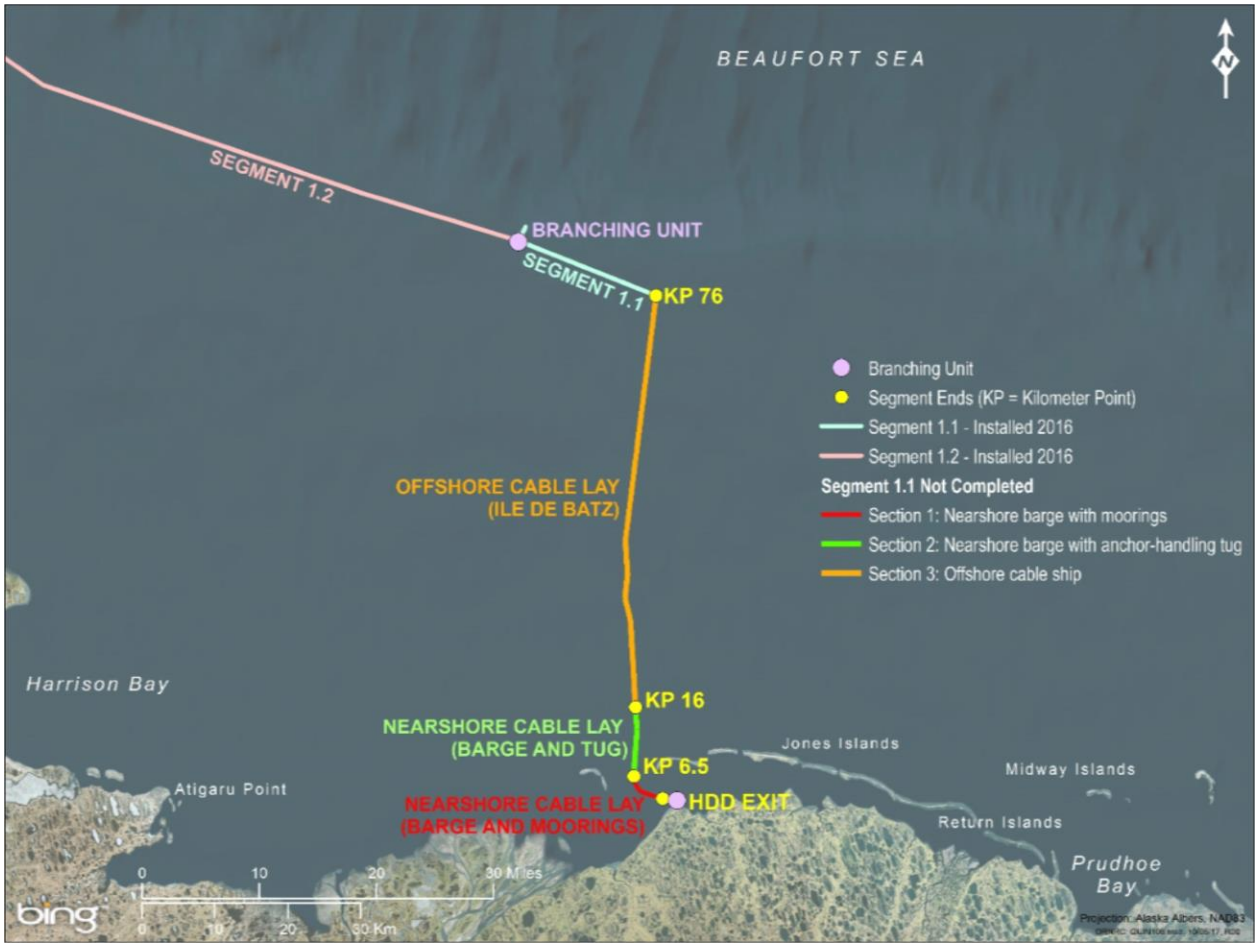

Figure 1-2. Location of 2017 Cable-Lay Operations

Harassment Authorizations (IHAs) from the National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS). Quintillion received IHAs from both agencies, both of which stipulate that Quintillion monitor for marine mammals during the cable-lay activities and report the results of the monitoring program within 90 days of activity completion. Owl Ridge Natural Resource Consultants, Inc. (Owl Ridge) prepared this 90-day report which addresses the 2017 installation and includes results of the associated sound source verification (SSV) study conducted by Illingworth & Rodkin (I&R). A passive acoustical monitoring program (PAM) was also conducted in conjunction with the University of Washington's and NMFS Marine Mammal Laboratory (MML) Arctic Long-Term Integrated Mooring Array (ALTIMA), and will be reported by MML in a separate document later in 2018.

1.1. Authorizations

On June 23, 2017, Quintillion received an IHA from NMFS authorizing acoustical harassment of 12 marine mammal species under the jurisdiction of NMFS with a valid period of July 1 to November 15, 2017. The

USFWS issued Quintillion an IHA on July 19, 2017, authorizing incidental take of small numbers of Pacific walrus and polar bears, also with an effective date ending November 15, 2017.

Copies of both IHAs are provided in Appendix A.

1.2. Monitoring and Mitigation Objectives

The purpose of this 90-day report is to:

- describe Quintillion's 2017 cable-lay and maintenance activities in the Bering, Chukchi, and Beaufort Seas
- describe the methodology and results of the marine mammal monitoring program
- estimate the number of marine mammals potentially exposed to underwater noise levels exceeding thresholds for harassment take
- present the results from the 2017 SSV study (the PAM study results will follow in 2018).

As stipulated in the IHAs, a vessel-based marine mammal monitoring program was implemented. The specific objectives of the monitoring program were to:

- ensure disturbance to marine mammals is minimized and all permit stipulations are followed
- document effects of the cable-lay activities on marine mammals
- collect data on the occurrence and distribution of marine mammals in the Project Area.

These objectives were met by implementing an agency-approved Marine Mammal Monitoring and Mitigation Plan (4MP) using a team of experienced Protected Species Observers (PSOs), including both a biologist and a Native Inupiat observer. The PSOs conducted visual marine mammal observations from the cable-ship, *Ile de Batz*, and implemented mitigation (e.g., speed reduction, course alteration) when necessary. No marine mammal monitoring occurred during nearshore barge-based cable activities off Oliktok Point during the 2017 because of a lack of berthing and safe viewing platforms.

The vessel-based observations provided:

- the basis for real-time mitigation, if necessary, as required by the IHA
- information needed to estimate the number of "Level B takes" of marine mammals by harassment, which must be reported to NMFS and USFWS
- data on the occurrence, distribution, and activities of marine mammals in the areas where the cable-lay operations are conducted
- information to compare the distances, distributions, behavior, and movements of marine mammals relative to the source vessels at times with and without cable-lay activity.

In addition to conducting visual observations, the Native Inupiat PSO also provided a communication channel to coastal subsistence communities, including Inupiat/Yupik hunters, as needed.

1.3. 90-Day Report Organization

This report was developed to meet the requirements specified in the NMFS and USFWS IHAs and includes the following sections:

1. Background and Introduction (this section)
2. Subsea Cable Installation Operations
3. Sound Source Verification and Passive Acoustic Monitoring
4. Marine Mammal Monitoring Implementation
5. Marine Mammal Monitoring Results
6. Literature Cited

In addition to the report sections, this document has ten appendices (see Table of Contents) to provide background material and additional information to supplement the report.

2. SUBSEA CABLE INSTALLATION OPERATIONS

2.1. Project Details

The 2017 cable-lay program involved two separate operations: 1) an offshore operation conducted by the cable-lay ship *Ile de Batz* supported by the supply tug *Discovery* and 2) a nearshore operation at Oliktok Point involving the barge *Miller Bay* and the support vessels *Dana Cruz*, *Gretchen H*, *Maggie M*, and *Arctic Solution* (collectively the barge fleet). Vessel details are provided in Section 2.1.1.

1) The 2017 offshore operations began with the arrival of *Ile de Batz* offshore Nome on July 2, where it began Post-Lay Inspection and Burial (PLIB) operations at the Nome branching unit (BU) (Figure 1-1, Section 2.1.2). It was joined by the support vessel *Discovery* on July 5. PLIB operations were completed on July 22 after which both vessels returned to Nome for crew-change and bunkering. The *Ile de Batz* remained in port at Nome awaiting sea ice conditions offshore off Oliktok Point to improve before departing August 3, and arriving at the Oliktok route on August 6. The *Discovery* followed a day later. The *Ile de Batz* began pre-trenching operations on August 11 after waiting five more days for sea ice to clear entirely off the cable route. Pre-trenching operations (see Section 2.1.3), followed by cable laying, was completed on October 22 and the ship departed the Oliktok area arriving in Nome on October 26, effectively leaving the Project Area and terminating the 2017 program.

2) The nearshore barge fleet arrived at Nome on July 19. After a two-day resupply at Nome, the barge fleet proceeded to Oliktok Point to begin nearshore cable-lay operations, eventually arriving on July 25. The barge fleet completed their nearshore cable-lay operations on August 18. All vessels in the nearshore fleet were back in Nome, or south of Nome (outside the Project Area), by August 24.

2.1.1. *Vessels*

The PLIB, pre-trenching, and offshore cable laying were conducted by the *Ile de Batz* (Figure 2-1) with support from the supply vessel *Discovery* (Figure 2-2). The *Ile de Batz* is a sister ship to the *Ile de Brehat* and *Ile de Sein*, the two cable ships used during the 2016 program. The vessel is 140 meters (m) (460 feet [ft]) and supports a crew of 70. The ship is propelled by two 4,000-kilowatt (kW) fixed-pitch propellers. DP is maintained by two 1,500-kW bow thrusters, two 1,500-kW aft thrusters, and one 1,500 kW-fore thruster. The full specifications of the ship are provided in Appendix B. The platform supply vessel *Discovery* is 61 m (200 ft) in length, and its project role was to provide supply support to the *Ile de Batz* and scout for approaching sea ice as needed.

The shallow-water, nearshore operations at Oliktok Point were conducted from the barge *Miller Bay*, equipped with a vibro plow that it pulled along using winches and anchors. The *Miller Bay* was supported by three shallow-draft tugs: *Dana Cruz* (Figure 2-3), *Gretchen H* (Figure 2-4), and *Maggie M* (Figure 2-5). The *Miller Bay* is a 76-m (250-ft) barge normally used for ocean freighting. The 28-m (92-ft) *Dana Cruz* was used primary to handle anchors during winching operations, except in the shallowest waters, where the smaller, 25.5-m (84-ft) *Gretchen H* or 21-m (69-ft) *Maggie M* were used. The combined need to maneuver

the barge and handle heavy anchors while operating in shallow waters necessitated the need for a varied fleet of small tugs. The *Gretchen H* also towed the *Miller Bay* to and from the Oliktok Point site. The 19-m (62-ft) *Arctic Solution* (Figure 2-6) was used as a crew transfer vessel and a platform for the divers.

Figure 2-1. Cable Ship *Ile de Batz*

Figure 2-2. Anchor-Handling Tug *Discovery*

Figure 2-3. Anchor-Handling Tug *Dana Cruz*

Figure 2-4. Anchor-Handling Tug *Gretchen H*

Figure 2-5. Utility Tug *Maggie M*

Figure 2-6. Crew/Dive Boat *Arctic Solution*

2.1.2. *Post-Lay Inspection and Burial*

PLIB operations were conducted during the first three weeks in July by the *Ile de Batz* and involved inspection (looking for exposed cable) of the cable route completed in 2016, and laying concrete mattresses at the Nome, Kotzebue, Point Hope, and Wainwright BUs (Figure 1-1). A BU is a piece of hardware that allows the interconnection of the branching cable from the main trunk line to the shore-end facility. Because it is a critical splice in the cables, it is crucial that it be protected from ice scour or fishing equipment, hence the placement of three or four concrete mattresses over the splice. The mattresses were 6 m x 3 m (19.6 ft x 9.8 ft) in size and were lowered to the seafloor using a mattress frame (Figure 2-7). Prior to mattress-lay, the BU locations were detected using a remotely operated vehicle (ROV) (ROVJET 400; Figure 2-8, Appendix B) equipped with a tone-detection device capable of locating buried fiber optic cable to a distance of 20 m (66 ft). The ROV occasionally used its water jets to mark the BU location to assist in mattress placement.

Figure 2-7. Concrete Mattress Deployment

Figure 2-8. ROVJET 400

2.1.3. *Cable-Lay Operations*

The 2017 cable-lay operation focused on completing the final 76 km (47 mi) of the 1,900-km (1,180-mi) route not completed in 2016 (the Oliktok branch; Figure 1-2). The 2017 program included two separate operations: 1) a barge-based, nearshore operation that laid cable using a vibro plow (Figure 2-9) from where the cable exited the Horizontal Directionally Drilled (HDD) pipe immediately offshore of Oliktok Point to Kilometer Point (KP) 16; and 2) a ship-based sea plow (Figure 2-10, Appendix B) operation from KP 16 to KP 76.

The nearshore operation involved using small tugs to maneuver the barge into place and place moored anchors. Using the anchors, the barge then winched itself along the route pulling the vibro plow and laying cable as it went. As the name implies, the vibro plow vibrates as it trenches, which facilitates the cutting efficiency through the dense seafloor sediments found offshore of Oliktok Point.

Figure 2-9. Example Vibro Plow

Figure 2-10. Sea Plow Being Hauled Aboard the *Ile de Batz*

The approximately 60 km (37 mi) of the offshore cable-lay operations (Figure 1-2) were conducted by the *Ile de Batz*, which involved first making multiple pre-trenching passes over the cable route to loosen up the locally dense sediments prior to actual cable laying. Two different sea plows, one set to cut to 2 m (6.6 ft) depth and the other to 4 m (13.1 ft), were pulled across the route during the pre-trenching operation. The 4-m plow was then used to lay the cable along the prepared route.

2.1.4. *Ice Management*

The project was planned to avoid the presence of sea ice and to allow continuous safe operations. Both the nearshore and offshore fleets were able to effectively avoid the presence of sea ice during transit to the Oliktok branch line. When the *Ile de Batz* arrived at the offshore portion of the Oliktok branch on August 6, drifting ice (<5% ice coverage) along the route forced a 5-day delay at the beginning of pre-trenching operations. However, once the ice cleared the area, the ship was able to conduct and complete operations under open water conditions. Maneuvering sea ice floes to protect operations was not necessary or conducted in 2017.

2.2. Acoustical Sources

The primary acoustical sources during the 2017 operations were the cavitation noise generated by the cable ship when pulling the sea plow during pre-trenching and cable-laying, and the support tugs of the nearshore operations during anchor-handling operations. Limited noise was also generated during PLIB operations by the ship thrusters in DP mode over BU sites (during ROV and mattress-lay operations), or using thrusters to maintain position while idle. Prior to operations, these various noise sources were estimated to generate sound levels exceeding 120 decibels (dB) relative to 1 micro Pascal (re 1 μPa) root mean square (rms) to distances ranging from 2.3 km (1.4 mi) to 8.45 km (5.25 mi) based on previous research (Table 2-1). The

cable-ship-generated noise is estimated based on actual measurements (Pommerenck and Reyff 2016) made by the *Ile de Brehat*, sister ship of the *Ile de Batz*, during cable-lay operations off of Nome in 2016. The measured 5.35-km (3.3-mi) radius to the 120-dB isopleth was used in estimating the number of marine mammal exposures due to pre-trenching and ship-based cable-lay operations. The 2.3-km (1.4-mi) radius from Chukchi Sea industrial operations reported by Hartin *et al*. (2011) was used to estimate exposure while the ship was in DP mode.

Because the conservative proxy values (Blackwell and Greene 2003) originally used during the IHA process for estimating anchor-handling noise levels may not accurately represent the noise levels associated with small tugs operating in very shallow waters (especially because the estimated radius to the 120-dB was computed applying the conservative *15 log r* practical spreading model to Blackwell and Greene's source value as requested by NMFS), and given that nearshore operations would not be monitored by PSOs, NMFS and the Scientific Peer Review Panel requested that a SSV be conducted of the operating nearshore vessels for future reference. The results of the study (Reyff 2017) are included in Section 3 and Appendix C, and show that the maximum measured zone of influence was less than the estimated value (Table 2-1).

Table 2-1. Estimated and Measured Distances to the Level B Harassment Threshold (120 dB) for each of Quintillion's Proposed 2017 Cable-Lay Activities.

Operation	Distance to 120-dB Isopleth (km)	Source
Sea Plow (pre-trenching and cable lay)	5.35	Pommerenck and Reyff (2016)
Anchor Handling (nearshore)	8.45	Blackwell and Greene (2003)
Anchor Handling (nearshore maximum)	5.0	Reyff (2017)
DP Mode	2.30	Hartin *et al*. (2011)

3. SOUND SOURCE VERIFICATION AND PASSIVE ACOUSTIC MONITORING

During the IHA application process, Quintillion agreed to conduct a SSV of the nearshore barge operations at Oliktok Point to more accurately evaluate the area ensonified by these operations, especially the underwater sound levels generated by the small tugs in the shallow nearshore waters. The full report of the SSV conducted by Reyff (2017) is provided in Appendix C, and summarized in Section 3.1 below.

In 2016 Quintillion funded a PAM project designed to acoustically measure the underwater soundscape and marine mammal vocal activity before, during, and after cable-lay operations passed by six moored underwater recorders. Data were collected in 2016 from three of the recorders and reported in Castellote *et al*. (2017), which was attached as Appendix D of the 2016 90-day report for this project (Blees *et al*. 2017). Recorded data on the 2016 operations from the remaining three recorders was not retrieved until September 2017 and not returned to the MML until October 2017. Because of time-constraints in analyzing and reporting the detailed data, a final report was not available at the 90-day due date of this report and, therefore, will be submitted to NMFS and USFWS separately at a later date in 2018. The methodology of this program and an overview of the 2016 results are provided in Section 3.2.

3.1. Sound Source Verification

Quintillion contracted I&R to conduct an SSV of the nearshore cable barge operations at Oliktok Point, especially during anchor-handling activities. As mentioned earlier, information on noise levels generated by small tugs while pulling anchors is lacking, and NMFS requested that such data be collected during operations in the nearshore waters off Oliktok Point. Specific methodology used to collect SSV data is described by I&R in the SVV report (Reyff 2017; Appendix C). In general, the SSV procedure used hydrophones suspended from the *Arctic Solution* to collect spot measurements as the boat drifted away from the barge operations, and four autonomous hydrophones anchored at fixed distances (ranging from 100 m [328 ft] to nearly 2,000 m (1.2 mi) from the barge and supporting tugs.

At the time of measurement, the nearshore operation was conducting multiple activities, often simultaneously, including winching (barge) and pulling anchors (tugs). Activity was interspersed with periods of idleness. For safety reasons due to weather, individual activities could not be simply turned on and off to isolate sound signatures, thus multiple sound sources often contributed to the soundscape during a given activity period. Still, the loudest sound sources, usually from the tugs during anchor handling operations, were discernable.

Reyff (2017) found that, as expected, underwater sound levels (continuous only) were highest when the tugs – *Dana Cruz* and *Maggie M* – were handling anchor lines. Noise levels varied during these operations depending on whether tugs were pulling anchors using high power (and generating consider cavitation), or retrieving (ratcheting) or releasing anchor chains. During one of the periods when both tugs were operating simultaneously the computed distance to the 120-dB isopleth averaged 3,900 m (2.4 mi), with a maximum distance of 5,000 m (3.1 mi). At another time the average radius was 2,800 m (1.7 mi) (3,300 m [2.1 mi] maximum) for both tugs operating together. When operating alone, the threshold radius for the larger *Dana*

Cruz was 1,900 m (1.2 mi), and 1,300 m (0.8 mi) for *Maggie M*. Sound levels produced by the barge alone while laying cable did not exceed 120 dB beyond 300 m (0.2 mi). Much of the barge-related noise actually emanated from the acoustical beacons attached to the vibro plow providing continuous data back to the ship on plow location and depth. The transponders operated at frequencies of 20 to 30 kiloHertz.

The distances to the 160-dB isopleth (harassment threshold for walrus) could only be roughly estimated at between 30 m (90 ft) and 120 m (394 ft), depending on the fall-off rate used.

3.2. Passive Acoustical Monitoring

Conducting an effective PAM program for a linear operation, where the sound sources are constantly moving away from moored receivers, is difficult and very expensive. Receiver moorings would have to be constantly repositioned ahead of the cable-lay operations, necessitating the use of extraneous (noise-producing) vessels of a size sufficient to allow them to remain at sea, and near the cable fleet, during Arctic storm conditions. However, prior to the 2016 cable-lay operations, the MML and the University of Washington JISAO, had already placed multiple PAM moorings near the proposed cable routes as part of their ALTIMA project (Figure 3-1). Quintillion contracted the MML and JISAO to retrieve acoustical data from six of these moorings and analyze them for marine mammal vocalizations and underwater sound associated with the cable-lay operations.

Six long-term moorings were selected for analysis based on their proximity to the cable routes (distances ranged from 4.7 to 15.5 km [2.9 to 9.6 mi] from the routes) and potential vessel transit pathways. Because of the timing of the initial data retrieval (September 2016), only three of the mooring receivers at that time contained cable-lay operations acoustical data. These include moorings NM1 (Norton Sound) approximately 150 km (93 mi) offshore of Nome, KZ1 (Kotzebue Sound) approximately 260 km (162 mi) offshore of Kotzebue, and WT1 (Wainwright) approximately 48 km (30 mi) offshore of Wainwright (Figure 3-1), the results of which were reported in Castellote *et al*. (2017), attached as an appendix to the 2016 90-day report for this project. At the time of data retrieval, the cable-lay operations had not yet passed by the remaining three moorings. Data from these three moorings (offshore Cape Lisburne [CL1], Icy Cape [IC1], and Point Barrow [BF2]) were retrieved in September 2017, and eventually relayed to the MML in mid-October 2017. Because of the late timing of retrieval, the data from these moorings will analyzed in fall and winter of 2017, and the results are to be provided by MML to NMFS and USFWS in a supplemental report in 2018.

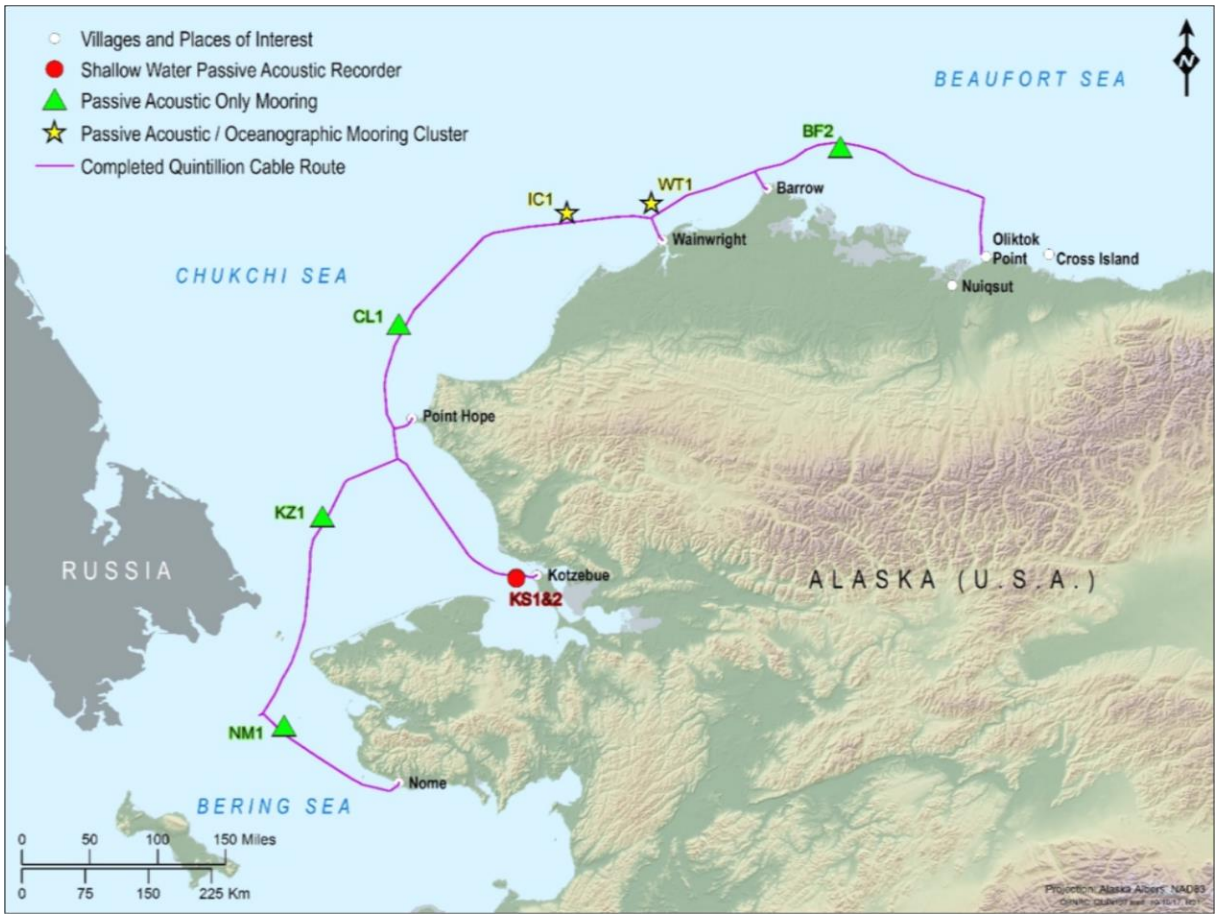

Figure 3-1. Locations of PAM Moorings Analyzed for Marine Mammal Vocalizations and Cable-Lay Underwater Sound Levels

Two moorings (KS 1 and 2) were also placed offshore of Kotzebue in 2016 with the intention of recording nearshore cable-lay noise, but nearshore sea ice formation forced the retrieval of the recorders before the cable-lay fleet arrived. Soundscape data were collected and are reported in Castellote *et al*. (2017).

4. MARINE MAMMAL MONITORING IMPLEMENTATION

This section summarizes the efforts to implement the 4MP and stipulations summarized in the NMFS and USFWS IHAs (Appendix A).

4.1. Harassment Zones

Prior to the 2016 operations, the primary underwater noise concern was Level B harassment noise emanating from thrusters used by the cable ships during continuous DP, and the cavitation noise from small anchor-handling tugs during anchor maneuvering activities associated with the cable-lay barge operations. A subsequent SSV by I&R (Pommerenck and Reyff 2016) found that noise emitted from the cavitation of the drive propellers of the cable ships when pulling the plow through the hard seafloor dominated the sound signature during cable laying. The measured radius to the 120-dB harassment isopleth was 5.35 km (3.32 mi), the distance that was monitored by PSOs during pre-trenching and cable-lay activities (Table 4-1).

The *Ile de Batz* operated in DP mode during PLIB operations, including ROV operations and mattress laying, and while idle but maintaining position.

Table 4-1. Harassment Zones Monitored by the PSOs during the 2017 Operations

Vessel Type	Activity	Distance to 120-dB isopleth
Cable Ship	Plow Pre-Trenching and Cable Laying	5.35 km (3.32 mi)
Cable Ship	Dynamic Positioning	2.30 km (1.43 mi)

The continuous noise from the cable-lay operations did not significantly exceed permanent threshold shift (PTS) criteria (<4 m [13 ft] radius in all cases), thus established safety shutdown zones were not needed to prevent Level A harassment.

4.2. Methods

4.2.1. *Monitoring Methods*

Two qualified PSOs were stationed onboard the *Ile de Batz* to actively monitor for marine mammals and implement mitigation when necessary. Mitigation measures are described in the IHAs (Appendix A). PSOs were not required onboard vessels lacking berthing space (consistent with U.S. Coast Guard regulations); therefore, they were not stationed on any of the support vessels during this program.

PSOs actively monitored during PLIB, pre-trenching, and cable-lay operations that occurred during daylight hours and during most other daylight activities (e.g., transit). PSOs did not monitor during periods of inclement weather or darkness when visibility was ineffective or if it was unsafe. Both PSOs remained on board for the entire program (June 28 to October 26). The Lead PSO was responsible for in-field oversight of the PSO team, data management and quality control, serving as the primary point of contact on each vessel, and daily submittal of data and reports.

At least one PSO was on watch at all times during daylight operations, including transit and vessel-standby (e.g., bad weather) periods. Watches were conducted from the bridge, which provided an elevated and 360° observation vantage. Eye height above sea level (ASL) was measured by the PSOs once onboard and periodically checked throughout the program to ensure continued accuracy. The approximate eye height ASL from the bridge of the *Ile de Batz* was 26.8 m (88 ft).

During daylight, at least one PSO systematically scanned the area around the vessel alternating between the naked eye and use of Fujinon® (7x50) reticle binoculars. When the vessels were moving slowly (approximately 0.5 knots [kt]) during cable-lay operations, or were stationary, PSOs regularly scanned behind the vessel for marine mammals. Distance to marine mammals were estimated using reticle binoculars, clinometers, or the best estimate determined by naked eye. Range finders were also provided to aid in distance estimation.

Environmental data were collected approximately every 30 minutes (min) that PSOs were on watch or whenever conditions or vessel activities substantially changed. This data included, but was not limited to: date, time, vessel position and speed, sea state (Appendix E), visibility, precipitation, and ice cover. Marine mammal data were recorded for all sightings at the time of observation, and included, but were not limited to: date, time, vessel location at time of sighting, species, group size, number of juveniles in group, distance from vessel, behavior and reactionary behavior (Appendix F), and mitigation type and implementation time (if necessary). All environmental and marine mammal data were collected on computers into an electronic database, which was exported and emailed daily to Anchorage headquarters for additional quality control and reporting. Marine mammal sighting data are summarized in Appendix G, and maps of vessel tracks and sighting locations are provided in Appendix H.

4.2.2. *Analysis Methods*

Analysis of data collected by PSOs involved: 1) categorization by PSO effort, species groups, noise activities, and environmental conditions; 2) initial and reactionary behavior of marine mammals; and 3) estimating the number of marine mammals by species that were potentially affected by the project noise.

4.2.2.1. Data Categorization

- PSO effort is defined as the number of hours at least one observer was on watch collecting environmental and marine mammal sighting data during daylight. PSO effort was summarized by watch status, area, vessel noise activity, and sea state.
- Marine mammal sighting data were summarized by species groups, noise activity, and environmental conditions. Species groups include cetaceans, pinnipeds (excluding Pacific walrus), Pacific walrus, and polar bear. Pacific walrus and polar bears were analyzed separately from cetaceans and pinnipeds due to their separate management by USFWS.
- All marine mammal sighting summaries excluded resightings to avoid unnecessary count inflation. A “Best Count” for each observation was assigned for summaries.
- General behavior and reactionary behaviors were summarized by species, noise activity, and distance (Closest Point of Approach or CPA) to noise activity. Behavior and reaction definitions are provided in Appendix F.

- All activities north of 64°N (just south of Nome) were considered within the Project Area (while the area south of that latitude was considered the transit area between Dutch Harbor and Nome).
- Unlimited visibility was recorded as ≥10 km (6.2 mi).
- Noise activity is separated into three categories (listed below) based on the radial distance (km) to the 120-dB sound level threshold (See Section 3 for details on sound levels). Normal vessel noise during transit is not regulated per the NMFS and USFWS; therefore, is not considered in the sound threshold analyses.
    - Dynamic Positioning (2.35 km [1.46 mi] radial distance to 120-dB threshold):
        - *Ile de Batz* laying concrete mattresses and operating the ROV while in DP mode.
        - All other vessel use of thrusters for DP, including at idle, but maintaining position. Thruster use varied, but was considered at maximum capacity for analyses to remain conservative.
    - Pre-trenching and Cable-laying, Plow In (5.35 km [3.32 mi] radius): *Ile de Batz* pulling the sea plow either to pre-trench or lay cable.
- The Level B harassment threshold for Pacific walrus is 160 dB re 1 µPa (rms).
- No noise criteria were designated for polar bear.
- Distance to noise activity was based on the animal's CPA.
- The numbers of marine mammals that were recorded within an active ensonification zone at least one time per 24-hour (h) period (exposed to harassing level sounds) were considered "potentially exposed".
- Carcass reports (Appendix I) were filled out for all sightings of dead marine mammals.

4.2.2.2. Estimating Numbers Potentially Affected

It was assumed that any animal that was observed within a noise-threshold radii for Level A (injurious) or Level B (harassment) take as "potentially exposed". The Level A radius was small (<4 m [13 ft]) for all species hearing groups and is not examined further, because the zone effectively would be under the vessel and not observable. Table 4-2 outlines the 120-dB and 160-dB harassment thresholds (ensonification radii) used to determine potential exposures, measured during the SSV (Section 3). The 120-dB zone for continuous sound was monitored for all marine mammal species and the 160-dB zone applied only to walrus.

Table 4-2. Ensonification Zones for *Ile de Batz* Activities

Vessel Activity	Ensonification Zone Radii (m) (Level B Take)	
	120 dB	160 dB
Pre-trenching and Cable Laying	5,350	29
Dynamic Positioning	2,300	15

5. MARINE MAMMAL MONITORING RESULTS

5.1. Protected Species Observer Effort

The *Ile de Batz,* with PSOs onboard, departed Dutch Harbor for the Nome BU on June 28, and the PSOs disembarked at Nome on October 26. Total days the PSOs operated from the ship was 121 days, and the distance the vessel traveled while the PSOs were onboard was 8,360 km (5,195 mi). PSOs monitored for marine mammals both during transit to and from the Project Area (Figure 1-1), and within the Project Area (north of 64°N).

5.1.1. *PSO Effort by Area*

During the 121 days the PSOs operated aboard the *Ile de Batz*, a total of 2,006 h of effort was dedicated to actively monitoring for marine mammals, including the cable ship transit from Dutch Harbor to the Project Area. Within the 118 days operating just within the Project Area, 1,955 h of (on-watch) monitoring effort were expended, or 69% of the total hours the *Ile de Batz* was present in the Project Area. The remaining off-watch hours indicate periods when no PSOs were actively observing for marine mammals, but performed spot-watches. Spot-watches occurred either when the PSOs were notified of a marine mammal during darkness (when PSOs were not required to be on-watch) or during extended periods of standby (when no project activities were occurring or during bad weather where observation conditions were not safe). Duration of darkness increased as the season progressed, thus increasing the off-watch periods.

5.1.2. *On-Watch PSO Effort in the Project Area by Vessel Noise Activity*

Marine mammal monitoring, within the Project Area, occurred during five primary activities: idle in DP mode (2.3-km radius), ROV work (including mattress laying) in DP mode (2.3-km radius), pre-trenching (5.35-km radius), cable-laying (5.35-km radius), and transit (not applicable; no required monitoring radius). The monitoring effort expected for each activity is provided in Table 5-1.

Table 5-1. On-Watch PSO Effort by Vessel Activity within the Project Area

	Activity					
	Pre-trenching	**Cable Laying**	**Idle - DP**	**ROV - DP**	**Transit**	***Total***
On-Watch PSO Effort (h)	284	31	1,051	254	335	*1,955*

5.1.3. *On-Watch PSO Effort in the Project Area by Speed Class*

PLIB, pre-trenching, and cable-laying requires that vessels remain on station or travel at slow speeds, resulting in 1,555 h (80%) of PSO effort when vessel speed was <1 kt and 1,660 h (85%) when <5 kt. Faster speeds occurred during transit, but only 118 h (6%) at speeds >10 kt (maximum achieved vessel speed was 13 kt).

5.1.4. *On-Watch PSO Effort in the Project Area by Ice Coverage*

Sea ice coverage was measured as a percentage relative to available viewing area. However, ice occurred within the viewing area for only 73 h of effort, and then at concentrations of 5% or less. Sea ice was not a

factor in affecting sighting rates, and no marine mammals were recorded when sea ice was present, thus this factor is not considered further.

5.1.5. *On-Watch PSO Effort in the Project Area by Sea State*

The most common sea states observed during on-watch PSO effort in the Project Area were Beaufort sea states 2 through 4 (55% or 1,081 h). Of total on-watch PSO effort (1,955 h), 79% or 1,550 h occurred during sea states 5 or less (Figure 5-1).

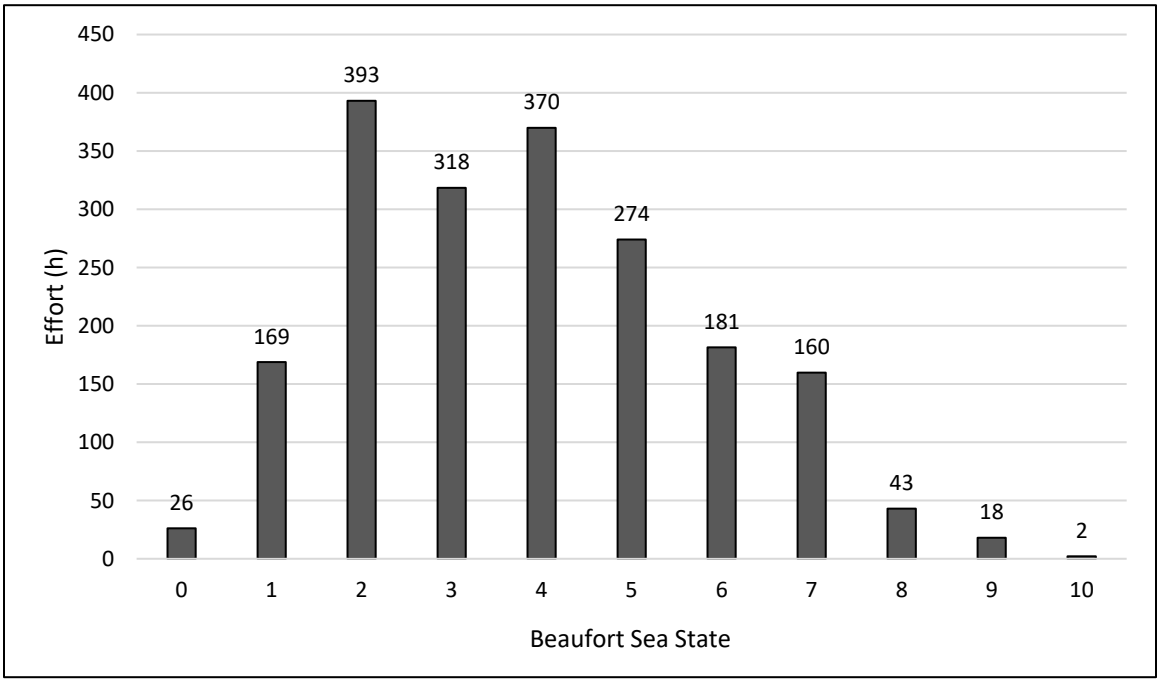

Figure 5-1. PSO Effort in the Project Area by Sea State

5.1.6. *On-Watch PSO Effort in the Project Area by Day or Night Conditions*

Nearly all PSO effort (1,895 h, 97%) occurred during daylight or twilight conditions and considered usable for advanced analyses. The 60 h of night observation involved the attempt to use a night-vision scope to monitor marine mammals, but this effort was eventually abandoned as ineffective.

5.1.7. *On-Watch PSO Effort in the Project Area by Precipitation*

No precipitation was recorded during 998 h (51%) of the total PSO effort in the Project Area (Figure 5-2). Fog (intermittent) was the most common form of precipitation (778 h, 40% of all usable effort) followed by snow (110 h, 6%). Other precipitation types (mist, rain) were rare.

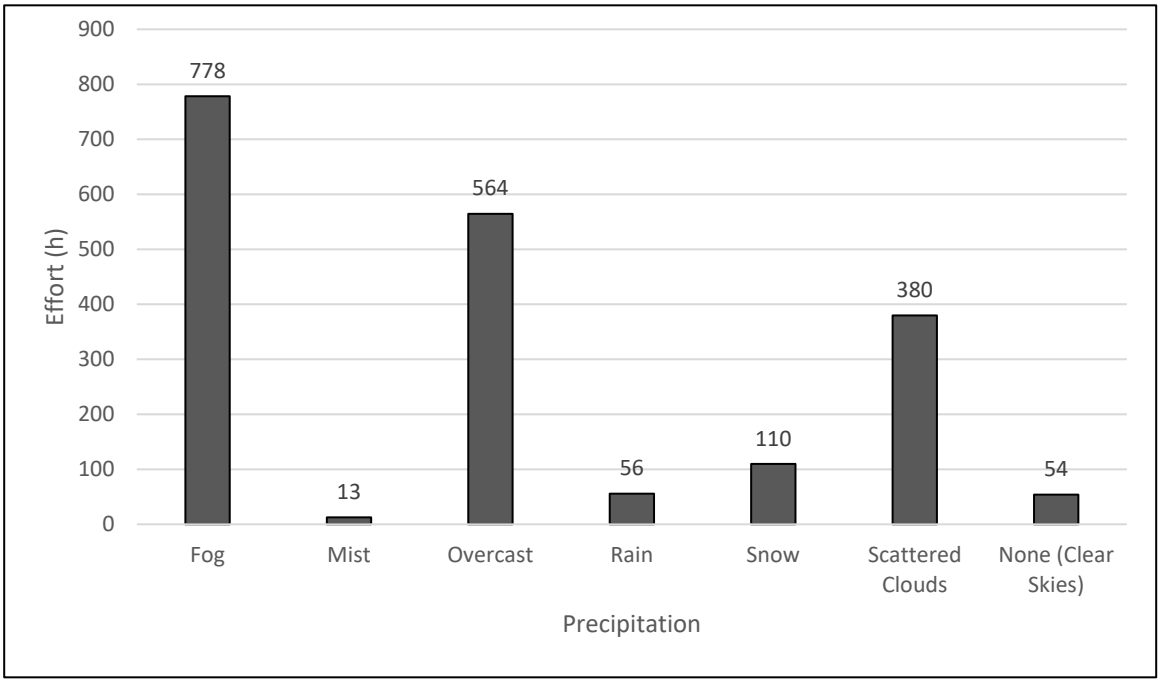

Figure 5-2. PSO Effort in the Project Area by Precipitation

5.1.8. *On-Watch PSO Effort in the Project Area by Visibility*

Visibility was virtually unlimited (≥9 km) for approximately 41% (806 h) of on-watch PSO effort in the Project Area, while visibility of ≤1 km occurred during approximately 26% (511 h) of the effort (Figure 5-3). Fog was the primary reason for limited visibility.

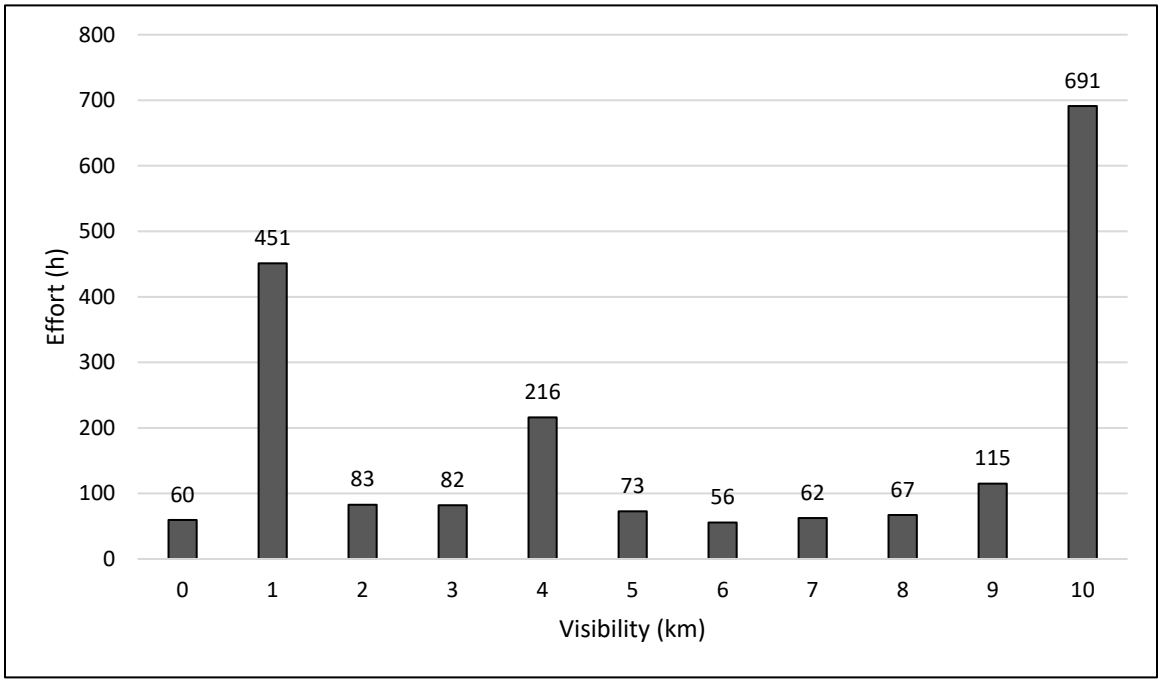

Figure 5-3. PSO Effort in the Project Area by Visibility

5.2. Marine Mammals Recorded

In total, 203 observations of 287 individual marine mammals were recorded from the *Ile de Batz* during all activities, including transit from Dutch Harbor and during off-watch PSO effort (details in Appendix G). These summaries exclude carcasses which are addressed in Section 5.2.5, and reported in Appendix I.

Approximately 6.9% of total marine mammal sightings (13 groups) occurred from the *Ile de Batz* during transit to/from the Project Area while the remaining 92.1% of sightings (187 groups) occurred within the Project Area (north of 64°N; Table 5-2 and Appendix H). Example photographs of the identified cetaceans observed are provided in Appendix J.

Table 5-2. Total Marine Mammal Sightings within the Project Area

Species	Groups	Individuals
Bowhead Whale	17	25
Fin Whale	2	4
Humpback Whale	5	14
Minke Whale	3	3
Gray Whale	35	50
Unidentified Mysticete	13	15
Unidentified Whale	5	5
Bearded Seal	14	14
Ringed Seal	57	77
Spotted Seal	2	4
Steller Sea Lion	2	2
Pacific Walrus	7	9
Unidentified Pinniped	1	1
Unidentified Seal	24	25
Total	*187*	*248*

5.2.1. *Cetaceans*

A total of 80 groups of 116 individual cetaceans (whales and porpoises) were observed within the Project Area (Table 5-2 and Appendix H). Gray whales were the most commonly observed cetacean with 35 groups of 50 individuals recorded. Group size ranged from 1 to 4, and the mean group size was 1.43. Most gray whales were observed during PLIB operations or transit through the northern Bering or Chukchi Seas.

Bowhead whales (17 groups, 25 individuals) were observed during operations occurring offshore of Oliktok Point during their fall migration out of the Beaufort Sea. Bowhead whale group size ranged from 1 to 5 with a mean of 1.47.

Humpback whales (5 groups, 14 individuals) were recorded in the Project Area, including 2 groups north of Bering Strait (with one pair recorded approximately 50 km north of Cape Lisburne). Five groups of 12 humpback whales were recorded south of the Project Area during the transit from Dutch Harbor. Group size for all sightings ranged from 1 to 7, and averaged 2.6. All other cetaceans (fin whales, minke whales, and harbor porpoise) were observed in total numbers of less than 5. Two groups of 15 Dall's porpoise and 3 groups of 5 harbor porpoise were recorded south of the Project Area during transit. One group of 8 Dall's porpoise was observed just inside the Project Area. No beluga or killer whales were observed in 2017.

Approximately 22.5% of cetacean groups (17.2% of individuals) observed within the Project Area were unidentified due largely to sighting distance (the majority of unidentified cetaceans were recorded at distances exceeding 3.6 km [2.2 mi]), sighting brevity, or limited visibility due to environmental conditions such as precipitation or high sea state. None of the unidentified cetaceans displayed reactions to the vessel activity.

5.2.1.1. Sea State

Identified cetaceans were recorded during Beaufort sea states ranging from 0 to 6, with the greatest number of sightings (37 groups or 59.7%) observed during sea states 2 and 3 (Table 5-3), when only about a third (36.4%) of the on-watch PSO effort occurred, clarifying the effect higher sea states have on marine mammal detection. Only 1.3% of on-watch PSO effort occurred during sea state 0, which explains why so few sightings occurred during this condition. Calm conditions were very rare during 2017. Over 60% of unidentified cetacean sightings occurred during sea states 3 or greater, further indicating that poor viewing conditions due to higher sea state was a factor in limiting species identification. Nearly 78% of the identified large whale (bowhead, fin, humpback, gray) sightings occurred during sea states $\leq$3, conditions under which only 46.3% of the monitoring effort occurred, indicating that the effectiveness of large whale detection at sea states higher than 3 was low, especially for gray whales where 94% of the sightings occurred at sea states $\leq$3.

Table 5-3. Cetacean Groups (Individuals) Observed within the Project Area by Sea State

Species	Beaufort Sea State							*Total*
	0	**1**	**2**	**3**	**4**	**5**	**6**	
Bowhead Whale	-	1 (1)	3 (5)	5 (10)	4 (4)	3 (4)	1 (1)	*17 (25)*
Fin Whale	-	1 (2)	-	-	1 (2)	-	-	*2 (4)*
Humpback Whale	-	1 (3)	1 (2)	1 (1)	1 (7)	1 (1)	-	*5 (14)*
Minke Whale	1 (1)	1 (1)	1 (1)	-	-	-	-	*3 (3)*
Gray Whale	2 (3)	5 (6)	8 (16)	18 (23)	-	2 (2)	-	*35 (50)*
Unidentified Mysticete	-	-	6 (6)	4 (4)	2 (4)	-	1 (1)	*13 (15)*
Unidentified Whale	-	-	1 (1)	-	-	2 (2)	2 (2)	*5 (5)*
Total	*3 (4)*	*9 (13)*	*20 (31)*	*28 (38)*	*8 (17)*	*8 (9)*	*4 (4)*	*80 (116)*

5.2.1.2. Visibility

The effect visibility has on the ability to detect whales is indicated by the fact that 81% of all whale sightings occurred when visibility was $\geq$9 km (Table 5-4), a condition that occurred only 41% of the time. Because the viewing area increases by a factor of 3.14 (*pi*) as viewing distance increases, the ability to detect low-density (but high visibility) species such as whales increases proportionally.

Unsurprisingly, very few whales were observed when the visibility was <3 km.

Table 5-4. Cetacean Groups (Individuals) Observed within the Project Area by Visibility

Species	Visibility (km)											*Total*
	0	1	2	3	4	5	6	7	8	9	>10	
Bowhead Whale	-	-	-	-	1 (3)	-	-	-	-	3 (3)	13 (19)	*17 (25)*
Fin Whale	-	-	-	-	-	-	-	-	-	-	2 (4)	*2 (4)*
Humpback Whale	-	-	-	-	-	2 (2)	-	-	-	-	3 (12)	*5 (14)*
Minke Whale	-	1 (1)	-	-	1 (1)	-	-	-	-	-	1 (1)	*3 (1)*
Gray Whale	-	1 (4)	1 (1)	5 (5)	1 (2)	-	-	1 (2)	-	5 (5)	21 (31)	*35 (50)*
Unidentified Mysticete	-	-	-	-	-	-	-	1 (1)	-	4 (6)	8 (8)	*13 (15)*
Unidentified Whale	-	-	-	-	-	-	-	-	-	-	5 (5)	*5 (5)*
Total	*-*	*2 (5)*	*1 (1)*	*5 (5)*	*3 (6)*	*2 (2)*	*-*	*2 (3)*	*-*	*12 (14)*	*53 (80)*	*80 (116)*

5.2.1.3. Vessel Noise Activities

As compared to all other activities, more cetaceans (50% of all groups) were observed during DP and transit (40%) activities (Table 5-5). This may be expected given that most on-watch PSO effort (83.9%) occurred during these two activity types. Few cetaceans were observed during pre-trenching activities, and none during the brief time (31 h) actual cable laying occurred.

Table 5-5. Cetacean Groups (Individuals) Observed within the Project Area by Vessel Noise Activity

Species	Transit	DP (ROV or Mattress Laying)	Pre-trenching	Cable Laying	*Total*
Bowhead Whale	8 (15)	6 (6)	3 (4)	-	*17 (25)*
Fin Whale	1(2)	1 (2)	-	-	*2 (4)*
Humpback Whale	2 (5)	3 (9)	-	-	*5 (14)*
Minke Whale	2 (2)	1 (1)	-	-	*3 (3)*
Gray Whale	15 (26)	20 (24)	-	-	*35 (50)*
Unidentified Mysticete	3 (3)	9 (11)	1 (1)	-	*13 (15)*
Unidentified Whale	1 (1)	-	4 (4)	-	*5 (5)*
Total	*32 (54)*	*40 (53)*	*8 (9)*	*-*	*80 (116)*

5.2.1.4. Closest Points of Approach

Cetaceans were observed between 150 m (492 ft) and 7,613 m (4.7 mi) from the *Ile de Batz* (Table 5-6). Over 91% of the gray whale groups were observed at closest approach within 3 km (1.9 mi) of the ship, while in contrast over 73% of the bowhead sightings were greater than 3 km (1.9 mi) away. We attribute no scientific explanation for this difference, other than bowhead blows are probably detectable at farther distances than the bushy blows of gray whales. The closest approach of 70% of the unidentified whales exceeded 3 km (1.9 mi), which may be anticipated because distance played a factor in the observers' inability to identify the whales to species.

Table 5-6. Cetacean Groups (Individuals) Observed within the Project Area by Closest Point of Approach to Vessel

Species	Distance (m)									*Total*
	<100	100-500	501-1000	1001-2000	2001-3000	3001-4000	4001-5000	5001-5500	>5500	
Bowhead Whale	-	2 (6)	-	2 (4)	2 (3)	5 (6)	2 (2)	4 (4)	-	*15 (25)*
Fin Whale	-	-	1 (2)	1 (2)	-	-	-	-	-	*2 (4)*
Gray Whale	-	4 (9)	5 (6)	11 (13)	12 (16)	2 (4)	-	1 (2)	-	*35 (50)*
Humpback Whale	-	-	3 (11)	-	-	2 (3)	-	-	-	*5 (14)*
Minke Whale	-	1 (1)	2 (2)	-	-	-	-	-	-	*3 (3)*
Unidentified Mysticete	-	-	1 (1)	-	2 (2)	3 (3)	1 (1)	5 (7)	1 (1)	*15 (15)*
Unidentified Whale	-	1 (1)	-	-	-	-	-	3 (3)	1 (1)	*5 (5)*
Total	*-*	*8 (17)*	*12 (22)*	*14 (19)*	*16 (21)*	*12 (16)*	*3 (3)*	*13 (16)*	*2 (2)*	*80 (116)*

5.2.1.5. Cetacean Behavior

Over half (58.8%) of the cetacean behaviors (see definitions in Appendix F) observed were a form of traveling (surface active-travel: 10.0%; travel/swim: 48.8%) indicating directional movement, rather than surface behaviors such as surface activity or milling behavior (12.5% combined) (Table 5-7). When the actual behaviors of the animals could not be discerned, the PSOs recorded the animal activity that cued the observation such as a blow sighting, breaching, diving, thrashing, or fluking. Combined, they accounted for 27.5% of the recorded behaviors. Feeding, by a group of three gray whales evident by mud plumes, was recorded only once.

Table 5-7. Cetacean Groups (Individuals) Observed within the Project Area by Behavior

Behavior	Species*							*Total*
	BHW	FW	GW	HBW	MW	UM	UW	
Blow	-	-	1 (1)	-	-	9 (9)	3 (3)	*13 (13)*
Breach	1 (1)	-	-	1 (1)	-	1 (1)	-	*3 (3)*
Diving	-	-	-	-	-	1 (1)	-	*1 (1)*
Feeding	-	-	1 (3)	-	-	-	-	*1 (3)*
Fluke	1 (1)	-	2 (2)	-	-	1 (1)	-	*4 (4)*
Milling	-	-	1 (2)	-	-	-	-	*1 (2)*
Surface Active	3 (4)	1 (2)	2 (8)	3 (12)	-	-	-	*9 (26)*
Thrashing	-	-	-	-	-	-	1 (1)	*1 (1)*
Surface Active-Travel	4 (10)	1 (2)	3 (4)	-	-	-	-	*8 (16)*
Swimming/Traveling	8 (9)	-	25 (30)	1 (1)	3 (3)	1 (3)	1 (1)	*38 (46)*
Total	*17 (25)*	*2 (4)*	*35 (50)*	*5 (14)*	*3 (3)*	*13 (15)*	*5 (5)*	*80 (116)*

**Species Codes: BHW – bowhead whale, FW – fin whale, GW – gray whale, HBW – humpback whale, MW – minke whale, UM – unidentified Mysticete, UW – unidentified whale.*

5.2.1.6. Cetacean Reactionary Behavior and Mitigation Actions

Reactionary behaviors (definitions in Appendix F) were only observed during 2.5% of all cetacean observations within the Project Area, and included avoidance (moving away from the vessel) by a group of 3 gray whales and a single unidentified whale. None of the remaining 78 groups or 112 individuals exhibited a reactionary behavior to the presence of the cable ship.

5.2.2. *Cetacean Sighting Rates*

The ability to effectively observe and record marine mammals can be hampered by high sea states, poor visibility due to fog or other precipitation, and darkness. Further, the sighting rate from a stationary vessel is expected to be different compared to one in transit, given the differences in viewing time. When calculating sighting rates, these poor viewing conditions and differences in (viewing time) should be accounted for when looking at differences in sighting rates by project activity type. Based on the distribution of sightings by viewing conditions discussed in the previous sections, identified cetaceans were effectively observed during daylight/twilight hours when sea states were ≤3, and visibility conditions were ≥9 km. Further, 51% of the identified cetacean groups were observed during transit activities, which accounted for only 17% of the effort. (Although the sighting time was less during transit, more effort occurred in areas where cetaceans were more common, especially gray whales in the Chukchi Sea, than stationary time spent at the Nome BU or north of Oliktok Point.) Once all these factors are applied to the cetacean sighting data, simply too few species sightings and PSO effort remained, within each activity category, to calculate scientifically meaningful sighting rates. (More valid cetacean sighting rates can be found in the 2016 90-dary report [Blees *et al*. 2017] where four times more cetacean sighting data were available to analyze.)

5.2.3. *Pinnipeds (Excluding Pacific Walrus)*

A total of 100 groups of 123 individual pinnipeds (excluding walrus) were observed within the Project Area from the *Ile de Batz* (Table 5-2, Appendix H). Ringed seals were the most common pinniped observed: 57 groups of 77 individuals. All but three of these seals were recorded during operations offshore of Oliktok Point (Beaufort Sea). Four of the ringed seals were identified as juveniles.

Fourteen bearded seals were recorded, all singles, which is typical for this species. Five of these seals were recorded in the Chukchi Sea with the remaining observed in the Beaufort Sea offshore of Oliktok Point.

In contrast to 2016, when spotted seals made up 57% of all pinniped sightings from all vessels, only 2 sightings (4 individuals) of this seal were made in 2017 from the *Ide de Batz*. This was due to the ship operating almost entirely in offshore waters where this species is less common. One animal was observed approximately 90 km (56 mi) northwest of Nome, and the second (a group of 3) about 70 km (43 mi) north of Oliktok Point.

Single Steller sea lions were recorded twice over two days (July 1 and 2) of PLIB operations at the Nome BU. It is possible that these two sightings were of the same individual sea lion and it is likely other local individual pinnipeds were recorded multiple times when the vessel was conducting PLIB operations (essentially stationary and at the same location for multiple days).

Twenty-four groups of 25 seals could not be identified to species. In addition, one unidentified pinniped might have been a walrus. Two groups (4 individuals) of northern fur seals were observed south of the

Project Area during the transit from Dutch Harbor, and represent the only pinnipeds observed outside the Project Area. As in 2016, no ribbon seals were observed.

5.2.3.1. Sea State

Pinnipeds were observed during sea states up to 7, with 76% of groups observed during sea states ≤3 (Table 5-8), a condition which represented over 46.3% of all on-watch PSO effort. Pinnipeds observed in sea states ≥5 were all ringed seals sighted within 150 m (492 ft) of the vessel while it was operating at a fixed location. In general, pinnipeds were effectively observed only during sea states ≤3.

Table 5-8. Pinniped Groups (Individuals) Observed from the *Ile de Batz* within the Project Area by Sea State

Species	Beaufort Sea State								*Total*
	0	1	2	3	4	5	6	7	
Bearded Seal	1 (1)	2 (2)	8 (8)	2 (2)	1 (1)	-	-	-	*14 (14)*
Ringed Seal	-	6 (6)	23 (42)	11 (12)	4 (4)	6 (6)	2 (2)	5 (5)	*57 (77)*
Spotted Seal	1 (1)	1 (3)	-	-	-	-	-	-	*2(4)*
Steller Sea Lion	-	-	1 (1)	1 (1)	-	-	-	-	*2 (2)*
Unidentified Seal	1 (1)	10 (11)	4 (4)	5 (5)	-	1 (1)	1 (1)	2 (2)	*24 (25)*
Unidentified Pinniped	-	-	1 (1)	-	-	-	-	-	*1 (1)*
Total	*3 (3)*	*19 (22)*	*37 (56)*	*19 (20)*	*5 (5)*	*7 (7)*	*3 (3)*	*7 (7)*	*100 (123)*

5.2.3.1. Visibility

Because of their small size compared to cetaceans, pinnipeds are less affected by visibility, as long as visibility distance exceeds the maximum distance pinnipeds are effectively detected (see Section 5.2.3.3). Twenty percent of the pinniped groups were observed when visibility was only 1 km (Table 5-9), a condition that occurred a similar 23% of the time PSOs were active. In general, the percentage of pinniped sightings by visibility class roughly mirrored the percentage effort by each class.

Table 5-9. Pinniped Groups (Individuals) Observed within the Project Area by Visibility

Species	Visibility (km)											*Total*
	0	1	2	3	4	5	6	7	8	9	>10	
Bearded Seal	-	2 (2)	2 (2)	2 (2)	-	-	-	-	-	1 (1)	7 (7)	*14 (14)*
Ringed Seal	-	15 (19)	6 (12)	8 (18)	1 (1)	-	1 (1)	2 (2)	1 (1)	2 (2)	21 (21)	*57 (77)*
Spotted Seal	1 (3)	-	-	-	-	-	-	-	-	-	1 (1)	*2 (4)*
Steller Sea Lion	1 (1)	-	-	-	-	-	-	-	-	-	1 (1)	*2 (2)*
Unidentified Seal	-	3 (3)	2 (2)	7 (8)	1 (1)	3 (3)	-	1 (1)	-	1 (1)	6 (6)	*24 (25)*
Unidentified Pinniped	-	-	-	1 (1)	-	-	-	-	-	-	-	*1 (1)*
Total	*2 (4)*	*20 (24)*	*10 (16)*	*18 (29)*	*2 (2)*	*3 (3)*	*1 (1)*	*3 (3)*	*1 (1)*	*4 (4)*	*36 (36)*	*100 (123)*

5.2.3.2. Vessel Noise Activities

More pinnipeds (76% of groups; 78% of individuals) were observed while the ship was in DP mode (Table 5-10) as it held position (idle, ROV operation, or mattress laying). This activity group accounted for 66.8% of the monitoring effort, much of it near Oliktok Point where ringed seals were common.

Table 5-10. Pinniped Groups (Individuals) Observed from within the Project Area by Vessel Noise Activity

Species	Transit	DP (Idle, ROV, or Mattress Laying)	Pre-trenching	Cable Laying	*Total*
Bearded Seal	4 (4)	9 (9)	1 (1)	-	*14 (14)*
Ringed Seal	2 (2)	49 (69)	5 (5)	1 (1)	*57 (77)*
Spotted Seal	2 (4)	-	-	-	*2 (4)*
Steller Sea Lion	-	2 (2)	-	-	*2 (2)*
Unidentified Seal	7 (8)	16 (16)	1 (1)	-	*24 (25)*
Unidentified Pinniped	1 (1)	-	-	-	*1 (1)*
Total	*16 (19)*	*76 (96)*	*7 (7)*	*1 (1)*	*100 (123)*

5.2.3.3. Closest Points of Approach

The CPA for pinnipeds ranged from 3 m (9.8 ft) to 1,250 m (0.8 mi), with 82% within 500 m (0.3 mi) (Table 5-11), a percentage that was relatively consistent with the three larger pinniped groups (bearded seal, ringed seal, unidentified seal). Only one seal, unidentified, was observed beyond 1 km (0.6 mi).

Table 5-11. Pinniped Groups (Individuals) Observed within the Project Area by Closest Point of Approach to Vessel

Species	Distance (m)				*Total*
	<100	100-500	501-1000	1001-2000	
Bearded Seal	6 (6)	5 (5)	3 (3)	-	*14 (14)*
Ringed Seal	34 (46)	15 (18)	8 (13)	-	*57 (77)*
Spotted Seal	-	1 (3)	1 (1)	-	*2 (4)*
Steller Sea Lion	2 (2)	-	-	-	*2 (2)*
Unidentified Seal	5 (5)	13 (14)	5 (5)	1 (1)	*24 (25)*
Unidentified Pinniped	-	1 (1)	-	-	*1 (1)*
Total	*47 (59)*	*35 (41)*	*17 (22)*	*1 (1)*	*100 (123)*

5.2.3.4. Pinniped Behavior

The majority (76%) of pinniped groups exhibited common behaviors of looking, milling, diving, swimming/traveling, and general surface activity (Table 5-12). Twenty-one percent (21 single seals) quickly dove before its previous behavior could be determined. A group of six ringed seals was observed among a flock of gulls suggesting they were feeding on concentrated prey.

Table 5-12. Pinniped Groups (Individuals) Observed within the Project Area by Behavior

Behavior	Species*						*Total*
	BS	RS	SS	SSL	US	UP	
Diving	-	8 (8)	-	-	13 (13)	-	*21 (21)*
Feeding	-	1 (6)	-	-	-	-	*1 (6)*
Looking	3 (3)	2 (2)	1 (3)	-	1 (1)	-	*7 (9)*
Milling	3 (3)	8 (9)	-	-	1 (1)	-	*12 (13)*
Surface Active	4 (4)	21 (31)	-	1 (1)	4 (5)	-	*30 (41)*
Spy-hop	-	-	-	1 (1)	-	-	*1 (1)*
Sink	-	-	-	-	1 (1)	-	*1 (1)*
Surface Active-Travel	2 (2)	3 (3)	-	-	-	-	*5 (5)*
Travel/Swim	2 (2)	14 (18)	1 (1)	-	4 (4)	1 (1)	*22 (26)*
Total	*14 (14)*	*57 (77)*	*2 (4)*	*2 (2)*	*24 (25)*	*1 (1)*	*100 (123)*

** Species Codes: BS - bearded seal, RS - ringed seal, SS - spotted seal, SSL - Steller sea lion, US - unidentified seal, UP – unidentified pinniped*

5.2.3.5. Pinniped Reactionary Behavior and Mitigation

Thirty-nine percent of the pinniped groups did not react to vessel activities in the Project Area, and another 53% reacted by simply noting the presence of the ship by looking at it (Table 5-13). More reactive behaviors (combined 8%) included altering swimming direction (avoidance and change direction) to avoid the vessel, approaching the vessel, and splashing when diving. No reactions were indications of the animals exhibiting a threat or flee response, but were rather more curiosity or avoidance behaviors commonly seen near vessels in the Arctic (Blees *et al*. 2010, Hartin *et al*. 2011, Reider *et al*. 2013, Cate *et al*. 2014, Ireland and Bisson 2016). No mitigation was necessary to avoid pinniped interactions.

Table 5-13. Pinniped Groups (Individuals) Observed from within the Project Area by Reactionary Behavior

Species	None	Looking	Splash	Approach	Avoidance	Change Direction	*Total*
Bearded Seal	2 (2)	9 (9)	1 (1)	1 (1)	-	1 (1)	*14 (14)*
Ringed Seal	26 (34)	30 (42)	-	-	-	1 (1)	*57 (77)*
Spotted Seal	1 (1)	-	-	-	1 (3)	-	*2 (4)*
Steller Sea Lion	-	2 (2)	-	-	-	-	*2 (2)*
Unidentified Seal	10 (10)	12 (13)	-	-	2 (2)	-	*24 (25)*
Unidentified Pinniped	-	-	-	-	1 (1)	-	*1 (1)*
Total	*39 (47)*	*53 (66)*	*1 (1)*	*1 (1)*	*4 (6)*	*2 (2)*	*100 (123)*

5.2.4. *Pinniped Sighting Rates*

The only species of pinniped recorded in sizeable numbers was the ringed seal (57 groups). Over 70% of the ringed seal sightings occurred during sea states ≤3, but visibility played little factor as virtually all these sightings occurred within 1 km (0.6 mi) of the vessel, regardless of visibility. Further, nearly 86% of the ringed seals groups were recorded during one project activity: while the *Ile de Batz* was stationary, but operating in DP mode, within the Beaufort Sea (and probably represented repeated sighting of a few local individuals). Once data were screened for the most effective viewing conditions, too few ringed seals were observed during project activities other than stationary DP mode (largely because other activities occurred

infrequently in areas supporting larger ringed seal numbers) for valid sighting rate comparisons; thus, sighting rates were not calculated for these seals. Better pinniped sighting rate information is in the Quintillion 2016 90-day report (Blees *et al.* 2017) that included five times more seal observations than were recorded in 2017.

5.2.5. *Pacific Walrus*

Only 7 groups of 9 total Pacific walruses were observed within the Project Area (Table 5-2, Appendix H). One individual was observed at the Nome BU, 1 single and a group of 3 in the Chukchi Sea off Wainwright, and 4 singles observed during activities offshore of Oliktok Point. None of the animals were associated with sea ice at the time of sighting (all were in the water). One of the single animals was a juvenile (see photo in Appendix J).

5.2.5.1. Sea State

Walruses were observed under varied sea states (Table 5-14), with over 71% of the sightings during sea states ≤3.

Table 5-14. Pacific Walrus Groups (Individuals) Observed from the *Ile de Batz* within the Project Area by Sea State

Species	Beaufort Sea State									*Total*
	0	1	2	3	4	5	6	7	8	
Pacific Walrus	-	1 (1)	2 (4)	2 (2)	1 (1)	-	-	-	1 (1)	*7 (9)*

5.2.5.2. Visibility

Over 57% of the groups and two-thirds of the individual walrus were observed when visibility exceeded 10 km (6.2 mi). The remaining three groups were observed when visibility was 1, 4, and 8 km (0.6, 2.5 and 5.0 mi).

5.2.5.3. Vessel Noise Activities

One animal was observed during mattress-lay operations (DP mode) at the Nome BU, 2 groups were observed while transiting between Point Hope and Wainwright BUs, 3 groups while the vessel was idle (on standby), but using DP to maintain position off Oliktok Point, and 1 while cable-laying off Oliktok.

5.2.5.4. Closest Points of Approach

The closest approach ranged between 3 and 726 m, with the two closest approaches, 3 and 5 m, of single animals swimming to the vessel while it was stationary (mattress laying at the Nome BU and idle offshore of Oliktok Point).

5.2.5.5. Behavior and Reaction

Observed walrus were either resting at the surface or traveling at the time of observation. Two walrus approached the vessel. None overtly reacted to the presence of the vessel; looking at the vessel was the only reaction noted.

5.2.5.6. Pacific Walrus Sighting Rates

Too few walruses were recorded to calculate scientifically meaningful sighting rates.

5.2.6. *Polar Bears*

No polar bears were observed from the *Ile de Batz*. A single bear was observed by the crew of the *Discovery* on August 8 while it was monitoring sea ice conditions 25 km north of Oliktok Point. The bear was 500 m (at closest approach) from the vessel feeding on a seal carcass (on a 300-m floe). The *Discovery* moved away from the bear at sighting. The bear exhibited no reaction to the vessel and was still feeding when last seen.

5.2.7. *Carcasses*

Four marine mammal carcasses were recorded, one Pacific walrus, one unidentified whale, and two that could not be identified beyond that they were a marine mammal (Appendix I). The unidentified whale (June 29) appeared to be a small humpback whale, but it was too decomposed for confirmation. It was observed south of Saint Matthew Island (outside the Project Area) during transit from Dutch Harbor.

Two of the carcasses were in such of decomposition (and observed at such a distance) to confirm whether the animal was whale or walrus. One (July 3) was observed passing in the current while the *Ile de Batz* was conducting PLIB operations at the Nome BU, and the other (July 14) was recorded offshore Wainwright.

The Pacific walrus (July 17) carcass was encountered west of Ledyard Bay and was in moderate decomposition. No visible wounds were noted, but there were also no visible tusks.

5.3. Animals Potentially Affected

Cable installation generated various levels of noise based on the type of activity being conducted, thus various noise thresholds (zones) were measured to determine the number of potentially affected marine mammals (Table 4-2). Marine mammals, except walrus, that entered an active 120-dB Level B harassment zone were considered potentially exposed. Walrus were considered acoustically exposed when they entered an active 160-dB Level B zone.

5.3.1. *Cetaceans*

Table 5-15 highlights the number of cetaceans observed within the 120-dB harassment zone. Three unidentified mysticetes were observed within these zones; however, most were likely gray whales based on their locations and associated sightings. Authorized take was not exceeded for any of the cetacean species.

Table 5-15. Cetaceans (Individuals) Potentially Exposed to Sound Levels Exceeding 120 dB

Species	Authorized Level B Take	Vessel Activity (Dist. To 120 dB Threshold)		*Total*
		Pre-trenching or Cable Laying (5.35 km)	Dynamic Positioning (2.3 km)	
Bowhead Whale	314	4	0	***4***
Fin Whale	15	0	2	***2***
Gray Whale	34	0	18	***18***
Humpback Whale	60	0	8	***8***
Minke Whale	15	0	1	***1***
Unidentified Mysticete	-	0	3	***3***
Unidentified Whale	-	0	0	***0***

5.3.2. *Pinnipeds*

Table 5-16 shows the number of pinnipeds observed within the 120-dB harassment zone. It is likely that most of the unidentified seals observed during dynamic positioning were ringed seals because they were observed from the *Ile de Batz* while it was on standby offshore of Oliktok Point where ringed seals are common. Ringed seals comprised 72.8% of all pinniped takes (excluding walrus), which is unsurprising given they comprised 62.6% of all pinniped individuals recorded. Further, 92% of the ringed seal takes occurred when the vessel was holding position using DP for extended periods within prime ringed seal habitat offshore of Oliktok Point. Many of the takes probably represent multiple exposures of the same few seals. Also, because the *Ile de Batz* remained largely offshore this year, there were no takes of nearshore inhabiting spotted seals. In no case was authorized take exceeded.

Table 5-16. Pinnipeds (Individuals) Potentially Exposed to Sound Levels Exceeding 120 dB

Species	Authorized Level B Take	Vessel Activity (Dist. To 120-dB Threshold)		*Total*
		Pre-trenching or Cable Laying (5.35 km)	Dynamic Positioning (2.30 km)	
Bearded Seal	62	1	9	***10***
Ringed Seal	855	6	69	***75***
Spotted Seal	296	0	0	***0***
Steller Sea Lion	8	0	2	***2***
Unidentified Seal	-	1	15	***16***
Unidentified Pinniped	-	0	0	***0***

5.3.3. *Walrus*

One walrus approached the *Ile de Batz* within 3 m when the vessel was actively laying mattresses while in DP mode. This was the only walrus within the acoustical zone of influence of an activity addressed in the IHA that could be construed as a take exposure, and it should be noted that animal voluntarily approached the ship.

Based on the single Level B take, project activities did not have significant impacts on walrus, and Quintillion did not come close to exceeding the 250 walrus takes authorized.

5.3.4. *Polar Bear*

Because the cable-lay operation was specifically timed to avoid the presence of sea ice, no polar bears were observed by the PSOs onboard the *Ile de Batz*. One bear was observed by crew onboard the *Discovery* during an ice monitoring event, but the ship moved away from the feeding bear before it could be disturbed. Thus, the 2017 program had no effect on polar bears.

5.4. Summary and Conclusions

In 2016, Quintillion initiated a fiber-optic cable installation project in Arctic Alaska that, when complete, would connect five villages (Nome, Kotzebue, Point Hope, Wainwright, and Barrow) and Oliktok Point with high speed internet service. Ninety-six percent of the 1,904-km (1,183-mi) marine route was installed in 2016, with the remaining 76 km (47 mi) completed in summer and fall of 2017. As stipulated in the 2017 IHAs from both NMFS and USFWS, PSOs were onboard the cable-lay vessel (*Ile de Batz*) from which they monitored for marine mammals.

Within the Project Area, defined as all the cable and transit routes between Nome and Oliktok Point (or north of 64°N), PSOs recorded 187 groups of marine mammals composed of 248 individuals representing 10 species (bowhead whale, fin whale, humpback whale, minke whale, gray whale, bearded seal, ringed seal, spotted seal, Steller sea lion, and Pacific walrus). In addition, PSOs recorded 16 groups of 39 individual marine mammals during cable ship transit from Dutch Harbor to Nome. Four species (humpback whale, Dall's porpoise, harbor porpoise, and northern fur seal) were recorded during these transits across the Bering Sea. Four species typically defined as "subarctic" were recorded in the Project Area including fin whales (4 animals), humpback whales (14 animals), minke whales (3 animals), and Steller sea lions (2 animals). Two of the fin whales and 5 humpback whales were observed in the Chukchi Sea, some as far north as Cape Lisburne.

Harassment takes were defined as cetaceans and pinnipeds that were exposed to underwater sound levels from the Quintillion activities that exceeded 120 dB re 1 μPa (rms), except for walrus where the harassment threshold is defined as 160 dB re 1 μPa (rms) by USFWS. Thirty-three identified cetaceans (Table 5-15) and 88 identified pinnipeds (including one walrus) (Table 5-16) were potentially exposed to noise levels exceeding threshold. In no case did the number of potentially exposed animals come close to exceeding the authorized Level B take.

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APPENDIX A – PROJECT AUTHORIZATIONS

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

JUN 2 3 2017

Elizabeth Pierce
~~Erin Sedor~~
Quintillion Subsea Operations, LLC
201 E. 56th Avenue, #300
Anchorage, Alaska 99518

Dear Ms. Pierce ~~Sedor~~:

Enclosed is an Incidental Harassment Authorization issued to the Quintillion Subsea Operations, LLC, under the authority of Section 101(a)(5)(D) of the Marine Mammal Protection Act (16 U.S.C. 1361 *et seq.*), to take small numbers of marine mammals by Level B harassment incidental to conducting subsea cable-laying operations in the U.S. Bering, Chukchi, and Beaufort seas.

You are required to comply with the conditions contained in this Authorization. In addition, you must cooperate with any Federal, State or local agency monitoring the impacts of your activities. The Authorization requires monitoring the presence of marine mammals, mitigating adverse impacts to the lowest level practicable, and reporting any behavioral modifications resulting from your activity as observed by qualified individuals.

If you have any questions concerning the Authorization or its requirements please contact Shane Guan, Office of Protected Resources, NMFS, at (301) 427-8401.

Sincerely,

Donna S Wieting

Donna S. Wieting
Director
Office of Protected Resources

Enclosure

Incidental Harassment Authorization

Quintillion Subsea Operations, LLC (Quintillion), 201 E. 56th Avenue, #300, Anchorage, Alaska 99518, is hereby authorized under section 101(a)(5)(D) of the Marine Mammal Protection Act (MMPA; 16 U.S.C. 1371(a)(5)(D)) and CFR 216.107 to take, by Level B harassment only, small numbers of marine mammals to conducting subsea cable-laying operations in the U.S. Bering, Chukchi, and Beaufort seas, when adhering to the following terms and conditions.

1. This Authorization is valid from July 1, 2017, through November 15, 2017.

2. This Authorization is valid only for activities associated with subsea cable-laying and subsea cables operation and maintenance (O&M) related activities in the Bering, Chukchi, and Beaufort seas. The specific areas where Quintillion's operations will be conducted are within the Bering, Chukchi, and Beaufort seas, Alaska, as shown in Figure 1-1 of Quintillion's IHA application.

3. (a) The species authorized taking by Level B harassment and in the numbers shown in Table 1 are: beluga whales (*Delphinapterus leucas*); bowhead whales (*Balaena mysticetus*); gray whales (*Eschrichtius robustus*), humpback whale (*Megaptera novaeangliae*), fin whale (*Balaenoptera physalus*), minke whale (*B. acutorostrata*), killer whale (*Orcinus orca*), harbor porpoise (*Phocoena phocoena*), ringed seal (*Phoca hispida*), bearded seals (*Erignathus barbatus*), spotted seals (*Phoca largha*), ribbon seal (*Histriophoca fasciata*), and Steller sea lion (*Eumetopias jubatus*).

   (b) The authorization for taking by harassment is limited to the following acoustic sources and from the following activities:
   - Subsea cable-laying and subsea cable O&M activities; and
   - Vessel activities related to the above activities.

4. Prohibitions.

   (a) The taking, by incidental harassment only, is limited to the species listed under condition 3(a) above and by the numbers listed in Table 1 of this Authorization. The taking by death, injury of these species or the taking by harassment, injury or death of any other species of marine mammal is prohibited unless separately authorized or exempted under the MMPA and may result in the modification, suspension, or revocation of this Authorization.

(b) The taking of any marine mammal is prohibited whenever the required protected species observers (PSOs), required by condition 7(a), are not present in conformance with condition 7(a) of this Authorization.

5. Mitigation.

(a) Vessel Movement Mitigation:

(i) When the cable-laying fleet is traveling in Alaskan waters to and from the project area (before and after completion of cable-laying), the fleet vessels will:

(A) Not approach within 1.6 km (1 m) distance from concentrations or groups of whales (aggregation of six or more whales) by all vessels under the direction of Quintillion

(B) Take reasonable precautions to avoid potential interaction with the bowhead whales observed within 1.6 km (1 mi) of a vessel.

(C) Reduce speed to less than 5 knots when weather conditions require, such as when visibility drops, to avoid the likelihood of collision with whales. The normal vessel travel speeds when laying cable is well less than 5 knots; however vessels laying cable cannot change course and cable-laying operations will not cease until the end of cable is reached.

(b) Mitigation Measures for Subsistence Activities:

(i) Quintillion shall participate in the Automatic Identification System (AIS) vessel-tracking system to allow the vessel to be tracked and located in real time via the Marine Exchange of Alaska (MEA).

(ii) Quintillion will sponsor memberships in the MEA such that local subsistence groups can monitor Quintillion vessel movements.

(iii) Quintillion will distribute a daily activity report by email to all interested parties. Daily reports will include vessel activity, location, subsistence information, and any potential hazards.

(iv) Quintillion project vessels will monitor local marine VHF channels as requested for local traffic and will use log books to assist in the standardization of record keeping.

(v) Quintillion shall monitor the positions of all of its vessels and will schedule timing and location of cable-laying segments to avoid any areas where subsistence activity is normally planned.

(vi) Barge and ship transiting to and from the project area:

(A) Vessels transiting in the Beaufort Sea east of Bullen Point to the Canadian border shall remain at least 5 miles offshore during transit along the coast, provided ice and sea conditions allow. During transit in the Chukchi Sea, vessels shall remain as far offshore as weather and ice conditions allow, and at all times at least 5 miles offshore.

(B) From August 31 to October 31, transiting vessels in the Chukchi Sea or Beaufort Sea shall remain at least 20 miles offshore of the coast of Alaska from Icy Cape in the Chukchi Sea to Pitt Point on the east side of Smith Bay in the Beaufort Sea, unless ice conditions or an emergency that threatens the safety of the vessel or crew prevents compliance with this requirement. This condition shall not apply to vessels actively engaged in transit to or from a coastal community to conduct crew changes or logistical support operations.

(C) Vessels shall be operated at speeds necessary to ensure no physical contact with whales occurs, and to make any other potential conflicts with bowheads or whalers unlikely. Vessel speeds shall be less than 10 knots when within 1.6 kilometers (1 mile) of feeding whales or whale aggregations (6 or more whales in a group).

(D) If any vessel inadvertently approaches within 1.6 kilometers (1 mile) of observed bowhead whales, except when providing emergency assistance to whalers or in other emergency situations, the vessel operator will take reasonable precautions to avoid potential interaction with the bowhead whales by taking one or more of the following actions, as appropriate:

- Reducing vessel speed to less than 5 knots within 900 feet of the whale(s);
- Steering around the whale(s) if possible;
- Operating the vessel(s) in such a way as to avoid separating members of a group of whales from other members of the group;
- Operating the vessel(s) to avoid causing a whale to make multiple changes in direction; and

- Checking the waters immediately adjacent to the vessel(s) to ensure that no whales will be injured when the propellers are engaged.

(vii) Quintillion shall complete operations in time to ensure that vessels associated with the project complete transit through the Bering Strait to a point south of 59 degrees North latitude no later than November 15, 2017. Any vessel that encounters weather or ice that will prevent compliance with this date shall coordinate its transit through the Bering Strait to a point south of 59 degrees North latitude with local subsistence communities. Quintillion vessels shall, weather and ice permitting, transit east of St. Lawrence Island and no closer than 10 miles from the shore of St. Lawrence Island.

6. Monitoring.

(a) Vessel-based Visual Monitoring:

(i) Vessel-based visual monitoring for marine mammals shall be conducted by NMFS-approved protected species observers (PSOs) throughout the period of cable-laying and O&M activities.

(ii) PSOs shall be stationed aboard the cable-laying vessel throughout the duration of the subsea cable-laying and O&M operations.

(iii) A sufficient number of PSOs shall be onboard the survey vessel to meet the following criteria:

(A) 100 percent monitoring coverage during all periods of cable-laying operations in daylight;

(B) Maximum of 4 consecutive hours on watch per PSO, with a minimum 1-hour break between shifts; and

(C) Maximum of 12 hours of watch time in any 24-hour period per PSO.

(iv) The vessel-based marine mammal monitoring shall provide the basis for real-time mitigation measures as described in 5(b) above.

(b) PSOs Qualification and Training

(i) Lead PSOs and most PSOs will be individuals with experience as observers during marine mammal monitoring projects in Alaska or other offshore areas in recent years.

(ii) New or inexperienced PSOs will be paired with an experienced PSO or experienced field biologist so that the quality of marine mammal observations and data recording is kept consistent.

(iii) Resumes for candidate PSOs will be provided to NMFS for review and acceptance of their qualifications.

(iv) Inupiat observers shall be experienced in the region and familiar with the marine mammals of the area.

(v) All observers will complete an observer training course designed to familiarize individuals with monitoring and data collection procedures.

(c) Establishing Disturbance Zones

(i) Establish zones of influence (ZOIs) surrounding the cable-laying vessel where the received level would be 120 dB (rms) re 1 μPa. The size of the measured distance to the 120 dB (rms) re 1 μPa is 5.35 km.

(d) Marine Mammal Observation Protocol

(i) PSOs shall watch for marine mammals from the best available vantage point on the survey vessels, typically the bridge.

(ii) PSOs shall scan systematically with the unaided eye and 7 x 50 reticle binoculars, and night-vision and infra-red equipment when needed.

(iii) Personnel on the bridge shall assist the marine mammal observer(s) in watching for marine mammals; however, bridge crew observations will not be used in lieu of PSO observation efforts.

(e) Monitoring Data Recording

(i) PSOs shall record the following information during monitoring:

(A) The species, group size, age/size/sex categories (if determinable), the general behavioral activity, heading (if consistent), bearing and distance from vessel, sighting cue, behavioral pace, and apparent reaction of all marine mammals seen near the vessel (e.g., none, avoidance, approach, paralleling, etc.);

(B) The time, location, heading, speed, and activity of the vessel, along with sea state, visibility, cloud cover and sun glare at (I) any time a marine mammal is sighted, (II) at the start and end of each watch, and (III) during a watch (whenever there is a change in one or more variable);

(C) The identification of all vessels that are visible within 5 km of the vessel from which observation is conducted whenever a marine mammal is sighted and the time observed;

(D) Any identifiable marine mammal behavioral response (sighting data should be collected in a manner that will not detract from the PSO's ability to detect marine mammals);

(E) Any adjustments made to operating procedures; and

(F) Visibility during observation periods so that total estimates of take can be corrected accordingly.

(ii) Distances to nearby marine mammals will be estimated with binoculars (7 x 50 binoculars) containing a reticle to measure the vertical angle of the line of sight to the animal relative to the horizon. Observers may use a laser rangefinder to test and improve their abilities for visually estimating distances to objects in the water.

(iii) Quintillion shall use the best available technology to improve detection capability during periods of fog and other types of inclement weather. Such technology might include night-vision goggles or binoculars as well as other instruments that incorporate infrared technology.

(iv) PSOs shall understand the importance of classifying marine mammals as "unknown" or "unidentified" if they cannot identify the animals to species with confidence. In those cases, they shall note any information that might aid in the identification of the marine mammal sighted.

(f) Monitoring Measures that Support Impact Analyses

(i) Quintillion shall evaluate whether the angle of the vessel relative to the recording location has any effect on the received levels for its 2016 sound source verification (SSV) tests, and work with the National Marine Mammal Laboratory (NMML) to compare the SSV received levels with the levels obtained by the mooring-based PAM data to determine whether the results from the SSV testing need to be corrected based on the bearing of the recording equipment to the ship. The results shall be included in the 2017 monitoring report.

(ii) Quintillion will contribute $20,000 to the University of Alaska, Fairbanks for their bowhead whale feeding study in the eastern Chukchi Sea or western Beaufort Sea during the open water season.

(iii) Quintillion shall undertake efforts to further evaluate potential impacts of the 2016 activities on bowhead whales and, subsequently, whaling efforts, if being requested.

(iv) Quintillion shall make the marine mammal and underwater acoustic data it collected in 2016 and the data it will collect in 2017 publicly available.

(g) Passive Acoustics Monitoring

(i) Quintillion shall conduct sound source verification on the vibro plow if it is to be used for cable-laying in the Beaufort Sea.

7. Reporting:

(a) Marine Mammal Monitoring Report

(i) Quintillion shall provide NMFS with a draft monitoring report within 90 days of the conclusion of the subsea cable-laying and O&M activities or within 90 days of the expiration of the IHA, whichever comes first.

(ii) The draft report shall be subject to review and comment by NMFS. Any recommendations made by NMFS must be addressed in the report prior to acceptance by NMFS.

(iii) The draft report will be considered the final report for this activity under this Authorization if NMFS has not provided comments and recommendations within 90 days of receipt of the draft report.

(b) Notification of Injured or Dead Marine Mammals

(i) In the unanticipated event that the specified activity clearly causes the take of a marine mammal in a manner prohibited by the IHA, such as a serious injury, or mortality (e.g., ship-strike, gear interaction, and/or entanglement), Quintillion will immediately cease the specified activities and immediately report the incident to the Permits and Conservation Division, Office of Protected Resources, NMFS, and the Alaska Regional Stranding Coordinators. The report would include the following information:

- Time, date, and location (latitude/longitude) of the incident;
- Name and type of vessel involved;
- Vessel's speed during and leading up to the incident;
- Description of the incident;
- Status of all sound source use in the 24 hours preceding the incident;
- Water depth;

- Environmental conditions (e.g., wind speed and direction, Beaufort sea state, cloud cover, and visibility);
- Description of all marine mammal observations in the 24 hours preceding the incident;
- Species identification or description of the animal(s) involved;
- Fate of the animal(s); and
- Photographs or video footage of the animal(s) (if equipment is available).

Activities would not resume until NMFS is able to review the circumstances of the prohibited take. NMFS would work with Quintillion to determine the necessary measures to minimize the likelihood of further prohibited take and ensure MMPA compliance. Quintillion would not be able to resume its activities until notified by NMFS via letter, email, or telephone.

(ii) In the event that Quintillion discovers a dead marine mammal, and the lead PSO determines that the cause of the death is unknown and the death is relatively recent (i.e., in less than a moderate state of decomposition as described in the next paragraph), Quintillion would immediately report the incident to the Permits and Conservation Division, Office of Protected Resources, NMFS, and the NMFS Alaska Stranding Hotline. The report would include the same information identified in the paragraph above. Activities would be able to continue while NMFS reviews the circumstances of the incident. NMFS would work with Quintillion to determine whether modifications in the activities would be appropriate.

(iii) In the event that Quintillion discovers a dead marine mammal, and the lead PSO determines that the death is not associated with or related to the activities authorized in the IHA (e.g., previously wounded animal, carcass with moderate to advanced decomposition, or scavenger damage), Quintillion would report the incident to the Permits and Conservation Division, Office of Protected Resources, NMFS, and the NMFS Alaska Stranding Hotline, within 24 hours of the discovery. Quintillion would provide photographs or video footage (if available) or other documentation of the stranded animal sighting to NMFS and the Marine Mammal Stranding Network. Quintillion can continue its operations under such a case.

8. This Authorization may be modified, suspended or withdrawn if the holder fails to abide by the conditions prescribed herein or if NMFS determines the authorized taking is having more than a negligible impact on the species or stock of affected marine mammals.

9. A copy of this Authorization must be in the possession of each contractor who performs the subsea cable-laying and O&M activities in the U.S. Arctic Ocean.

Donna S. Wieting

JUN 2 3 2017

Donna S. Wieting, Director
Office of Protected Resources
National Marine Fisheries Service

Date

Table 1. Species/stocks and numbers of marine mammals allowed under this IHA.

Species	Level B take authorized
Bowhead whale	314
Gray whale	34
Beluga whale (Beaufort Sea)	188
Beluga whale (E. Chukchi Sea)	188
Beluga whale (E. Bering Sea)	188
Harbor porpoise	15
Ringed seal	855
Spotted seal	296
Bearded seal	62
Humpback whale	60
Fin whale	15
Minke whale	15
Killer whale	5
Ribbon seal	5
Steller sea lion	8

United States Department of the Interior

U.S. FISH AND WILDLIFE SERVICE
1011 East Tudor Road
Anchorage, Alaska 99503-6199

IN REPLY REFER TO:

AFES/MMM

JUL 1 8 2017

Ms. Elizabeth Pierce
Quintillion Subsea Operations, LLC
201 East 56th Avenue, Suite 300
Anchorage, Alaska 99518

Dear Ms. Pierce:

On November 28, 2016, the U.S. Fish and Wildlife Service's (Service) Region 7, Marine Mammal Management Office received a request from Quintillion Subsea Operation, LLC (Quintillion) to provide an Incidental Harassment Authorization (IHA) for take by harassment of Pacific walruses (*Odobenus rosmarus divergens*) and polar bears (*Ursus maritimus*) that may occur incidental to continuation of a cable-laying project begun in 2016. Upcoming work is planned to occur in the marine waters and coastal lands of Alaska, specifically the marine waters of the northern Bering, Chukchi, and southwestern Beaufort seas and coastal land adjacent to Nome, Kotzebue, Point Hope, Wainwright, Utqiagvik (formerly Barrow), and Oliktok Point in summer and fall 2017. Quintillion updated its application for this work on January 19, 2017, and submitted additional project information on February 10, 2017. This letter is to transmit the enclosed IHA and its relevant operational conditions and monitoring and reporting requirements to Quintillion.

This IHA is issued in accordance with provisions of the Marine Mammal Protection Act of 1972, as amended. The Service published a 30-day notice in the *Federal Register* informing the public of the proposed IHA on June 1, 2017 (82 FR 25304). This authorization to take Pacific walruses and polar bears by harassment is valid from the date of issuance through November 15, 2017. Should you have any questions regarding this IHA and the required terms and conditions, please contact Ms. Kimberly Klein at (907) 786-3621, or by email at kimberly_klein@fws.gov.

Sincerely,

Karen P Clark

ACTING Regional Director, Alaska Region

Enclosure

Email cc: Mr. Gregory Green, Owl Ridge Natural Resource Consultants, Inc.
Mr. Glenn Ruckhaus, Owl Ridge Natural Resource Consultants, Inc.
Mr. Kyle Parker, Holland and Hart, LLP
Ms. Kristina Woolston, Quintillion Subsea Operations, LLC
Mr. John Sargent, U. S. Army Corps of Engineers

United States Department of the Interior

U.S. FISH AND WILDLIFE SERVICE
1011 East Tudor Road
Anchorage, Alaska 99503-6199

IN REPLY REFER TO:

AFES/MMM

INCIDENTAL TAKE AUTHORIZATION
(IHA-17-01)

ISSUED: July 18, 2017
EXPIRES: November 15, 2017

Quintillion Subsea Operation, LCC (Quintillion) is authorized to take, by non-lethal Level B harassment, small numbers of Pacific walruses (*Odobenus rosmarus divergens*) and polar bears (*Ursus maritimus*) during the installation and testing of a fiber optic cable network in the State of Alaska and associated Federal waters during the 2017 open water season. This Incidental Harassment Authorization (IHA) is issued by the Regional Director–Alaska Region, U.S. Fish and Wildlife Service (Service) in accordance with section 101(a)(5)(D) of the Marine Mammal Protection Act (MMPA), as amended (16 U.S.C. 1371).

Activities are described in full in the following documents, incorporated here by reference:

- *Final Environmental Assessment for an Incidental Harassment Authorization for Pacific Walruses (*Odobenus rosmarus divergens*) and Polar Bears (*Ursus maritimus*) during the 2017 Quintillion Fiber Optic Cable Project*. Prepared by the Service, Marine Mammals Management Office (MMM), in Anchorage, Alaska (July 2017). Available at: https://www.fws.gov/alaska/fisheries/ mmm/iha.htm.
- *Marine Mammals; Incidental Take during Specified Activities; Proposed Incidental Harassment Authorization for Pacific Walruses and Polar Bears in Alaska and Associated Federal Waters*. Published in the *Federal Register* (82 FR 25304, June 1, 2017). Available at: https://www.gpo.gov/fdsys/pkg/FR-2017-06-01/pdf/2017-11381.pdf.

Prohibitions

1) The taking, by incidental Level B harassment only, is limited to 250 Pacific walruses and 20 polar bears. The number of takes may not exceed these limits. The taking by Level A harassment, serious injury, or death is prohibited.
2) The taking of Pacific walruses and polar bears[1] whenever the required conditions, mitigation, monitoring, and reporting measures have not been fully implemented as required by this IHA, is prohibited.

[1] Throughout this document "Pacific walruses" means one or more Pacific walrus; "polar bears" means one or more polar bear. "Pacific walruses and polar bears" (or vice versa) means one or more of either animal.

Conditions

3) All vessel captains, operations managers, and protected species observers (PSOs or "observers") must receive a copy of this IHA and maintain access to it for reference at all times during cable laying activities and associated project work. These personnel must understand, be fully aware of, and be capable of implementing the conditions of this IHA at all times during project work.
4) This IHA is valid only for activities associated with Quintillion's proposed project as described in the Service documents cited on page 1. Changes to the proposed project without prior authorization may invalidate this IHA.
5) The only species authorized for taking by Level B harassment are Pacific walruses and polar bears. The taking of any other species under the Service's jurisdiction or the taking of Pacific walruses and polar bears in a manner not expressly authorized by this IHA must be reported to the Service MMM immediately, but not later than 48 hours after the incident.
6) The following documents are approved and all provisions are incorporated into this IHA by reference unless otherwise noted herein or in Service documents cited on page 1.
    - *2017 Plan of Cooperation: Quintillion Subsea Operations Cable-Lay Project; Bering, Chukchi, and Beaufort Seas, Alaska* (November 2016; also referred to as the "POC").
    - *Marine Mammal Monitoring and Mitigation Plan: Quintillion Subsea Cable –Lay Project, 2017* (January 2017; also referred to as the "4MP").
7) All operators[2] are required to cooperate with the Service to monitor the impacts of the activity on Pacific walruses and polar bears and subsistence users.
8) At the discretion of the Service, all operators will allow Service personnel, or the Service's designated representative, to board project vessels or visit project work sites for the purpose of monitoring impacts to Pacific walruses and polar bears and subsistence uses of those species at any time throughout project activities.
9) All operators are required to follow all applicable mitigation, monitoring, and reporting measures specified herein. Failure to do so may result in the modification, suspension, or revocation of this IHA.

Mitigation Measures

10) Avoidance
    a) Quintillion has stated that project work will be conducted in waters no less than 30 kilometers (km) (19 miles [mi]) offshore whenever possible to avoid nearshore Pacific walrus concentrations, terrestrial haulouts, and coastal areas used by polar bears. Where cable end branches come ashore, landings will be conducted at right angles to the coastline, and work will be conducted immediately adjacent to the respective village (except at Oliktok Point where no village exists) to minimize nearshore activities and avoid areas where haulouts may occur. Project vessels and activities shall maintain at all times at least 1.6 km (1 mi) distance from known Pacific walrus terrestrial haulouts.

[2] "Operators" are all personnel operating under Quintillion's authority, including all contractors and subcontractors.

b) Quintillion has stated that project work will not occur within 50 km (31.1 mi) of Point Lay, where Pacific walrus haulouts are likely, or within 20 km (12.4 mi) of the Hanna Shoal Walrus Use Area (HSWUA as described in 78 FR 35364, June 12, 2013). Takes of Pacific walruses at any terrestrial haulout or within the HSWUA are not authorized by this IHA.
c) Underwater sound levels will be minimized to the greatest extent practicable, for example by powering engines at the lowest possible level to complete work, and by choosing the smallest appropriate vessel where multiple options exist.
d) Quintillion's operations must avoid the sea ice habitat of Pacific walruses and polar bears to the greatest extent practicable. Quintillion previously proposed to conduct ice management to gain access to Oliktok Point. Quintillion has since stated that it does not intend to conduct this work and will not operate in the vicinity of sea ice greater than 1/10 concentration. Takes of Pacific walruses or polar bears due to ice management activities are therefore not authorized by this IHA.

11) Adaptive Measures
a) Operators shall work with PSOs to apply adaptive measures as specified herein, and shall recognize the authority of PSOs, up to and including stopping work, except where doing so poses a significant safety risk to vessels and personnel.
b) Except as identified under 12(c):
    (i) Project activities shall be conducted no closer than 805 meters (m) [0.5 mi] to Pacific walruses or polar bears;
    (ii) All operators shall take reasonable precautions to avoid interactions with Pacific walruses and polar bears by changing speed or course or reducing sound production when these animals are observed within 805 m (0.5 mi). Changes in speed or course will be achieved gradually to avoid abrupt maneuvers whenever possible; and
    (iii) Vessels will reduce speed to 9.3 km per hour (kph) (5.8 mi per hour [mph] or 5 knots [kn]) or less when Pacific walruses or polar bears are present, or when visibility drops due to inclement weather, rough seas, fog, or at night.
c) During cable laying when the cable ship will not be able to alter course or speed to avoid marine mammals:
    (i) Vessels shall maintain constant slow speeds less than 9.3 km per hour (5.8 mph or 5 kn); and
    (ii) Operators will not begin work on a course that is likely to approach Pacific walruses or polar bears within 805 m (0.5 mi).
d) Vessels may not be operated in such a way as to separate members of a group of Pacific walruses or polar bears from other members of the group.
e) Activities shall not be conducted near haulouts; if Pacific walruses are observed on land, vessels will maintain a 1.6-km (1-mi) separation distance.
f) In the event of unauthorized take (e.g. injury or death of Pacific walruses or polar bears due to project activities, including separation of mother from young, stampeding haulouts, injured animals, and animals otherwise in distress) Quintillion shall cease its activities (or reduce activities to the minimum level necessary to maintain safety) until such time that the Service has reviewed the circumstances of the unauthorized take, determined whether additional mitigation measures are

necessary to avoid further unauthorized taking, and notified Quintillion that it may resume project activities. This adaptive measure shall only apply when there is a reasonable suspicion that the unauthorized take is associated with project activities.

g) Injured, dead, or otherwise distressed Pacific walruses or polar bears that the lead PSO determines are not associated with project activities (e.g., animals known to be from outside the project area, previously wounded animals, or carcasses with moderate to advanced decomposition or scavenger damage) must be reported to the Service within 48 hours of the discovery. Sufficient information, including photographs, video, or other documentation shall be provided to enable the Service to confirm the conclusion of the lead PSO.

12) Measures to Reduce Impacts to Subsistence Users. Quintillion shall:
   a) Plan routes in offshore waters away from nearshore subsistence harvest areas.
   b) Schedule operations to avoid conflict with subsistence harvest.
   c) Where cable faults are found, schedule operations and maintenance work, also called "O&M," to avoid local subsistence activities.
   d) Implement the POC (cited in Condition 6, page 2).
   e) Participate in the Automatic Identification System, commonly referred to as "AIS," for vessel tracking to allow the cable-laying fleet to be located in real time.
   f) Monitor local marine radio channels for communication with local vessel traffic.
   g) Distribute a daily report by email to all interested parties identified in the POC. Include in the report all vessel activities and locations, any potential hazards, and any subsistence and local activities to be avoided by Quintillion (as noted in the POC or identified by local subsistence users).
   h) Conduct community meetings in affected villages at the end of the cable installation process to discuss and summarize project completion. Quintillion will notify the Service when meetings occur and will provide a summary of information presented and input received.

Monitoring

13) Acoustic Monitoring
   a) Observers will monitor ensonification zones where the estimated received sound levels are 120 decibels (dB)[3] or greater for the presence of approaching polar bears and Pacific walruses, and 160 dB or greater for polar bears and Pacific walruses that may be exposed to higher levels of sound[4]. Specific distances to be monitored will

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3. All dB levels given herein are dB_{rms} re: 1 µPa. RMS refers to the root-mean-squared dB level, the square root of the average of the squared sound pressure level over a 1 second duration. All sound source levels herein are as measured at 1 m (3 ft) from the source.

4. The Service considers take by Level B harassment to occur whenever Pacific walruses are exposed to sound levels of 160 dB or greater or polar bears or walruses exhibit biologically significant changes in behavior indicating harassment (e.g., disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering). Quintillion has committed to monitoring the 120-dB and 160-dB isopleth and reporting the behaviors of all Pacific walruses and polar bears therein. We expect Quintillion to report all observations within the 160-dB zone and any Pacific walruses or polar bears exhibiting a behavioral response indicating harassment by project activities, regardless of location. The Service will review observation reports and make final determinations regarding take.

depend on the activity being conducted, but will not be less than 805 m (0.5 mi). Greater distances will be monitored during louder activities, including use of the sea plow and use of dynamic positioning thrusters.

b) Observers will record the distance from the vessel to polar bears and Pacific walruses upon initial observation, the duration of the encounter, and the distance at last observation in order to monitor cumulative sound exposures. Observers will note any instances of animals lingering close to or traveling with vessels for prolonged periods of time.

c) Sound source verification will be conducted during anchor handling by tugs and during cable laying with the vibro plow. Results will be used to calibrate the 120-dB and 160-dB ensonification zones for these activities.

14) Vessel-Based PSOs

a) The duties of PSOs will include: watching for and identifying Pacific walruses and polar bears; recording observation details; documenting presence in any applicable ensonification zone; identifying and documenting potential harassment; and working with vessel operators to implement all appropriate adaptive mitigation measures.

b) Observers will conduct vessel-based monitoring for Pacific walruses and polar bears while vessels are in transit and during all periods of project work except as described in part 15(c).

c) Quintillion has determined that monitoring by PSOs is not feasible from the construction barge, the pontoon barge, or the small river tug due to the limited space aboard these vessels. Pacific walruses are unlikely to occur where these vessels are operating, but polar bears may be present. The vessel crews shall remain vigilant for polar bears and will implement all relevant measures specified in the 4MP if a polar bear is seen.

d) A sufficient number of trained PSOs will be required to conduct monitoring during all project activities, with a maximum of 4 consecutive hours on watch and 12 hours of watch time per day per PSO.

e) Monitoring by PSOs will be conducted during all hours of cable laying activity.

f) Each vessel will have an experienced field crew leader to supervise the PSO team, which will contain individuals with prior experience as marine mammal monitoring observers, including experience specific to Pacific walruses and polar bears.

g) New or inexperienced PSOs will be paired with an experienced PSO so that the quality of marine mammal observations and data recording is kept consistent.

h) Resumes for candidate PSOs will be made available for the Service to review.

i) All observers will have completed a training course designed to familiarize individuals with monitoring and data collection procedures.

j) Fujinon 7 × 50 or equivalent binoculars, laser range finders (Leica LRF 1200 or equivalent), and night vision equipment will be provided to PSOs.

k) All location, weather, and marine mammal observation data will be recorded onto a standard field form or database.

l) Global positioning system and weather data will be collected at the beginning and end of a monitoring period and at every half-hour in between.

m) Position data will also be recorded at the change of an observer or upon sighting a Pacific walrus or polar bear. Sufficient position data will be collected to enable the Service to map an accurate charting of vessel travel.
n) Observation records of Pacific walruses and polar bears will include group size and composition (adults/juveniles), behavior, distance from vessel, presence in applicable ensonification zones, initial behavior, and any apparent reactions to the project activities. Sufficient data will be collected to enable the Service to evaluate the reactions of Pacific walruses and polar bears to project activities and any potential effects of project activities upon those animals.

Reporting Requirements

15) Quintillion must keep the Service informed of the impacts of authorized activities on Pacific walruses and polar bears by:
    a) Notifying the Service at least 48 hours prior to commencement of activities;
    b) Reporting any injury or death of a Pacific walruses and polar bears due to project activities immediately, but not later than 48 hours after the incident. See also parts 12(f) and 12(g).
    c) Notifying the Service upon project completion or end of the work season.

16) Weekly reports will be submitted to the Service each Thursday during project activities. The reports will summarize project activities, monitoring efforts conducted by PSOs, results of sound source verification, the number of Pacific walruses and polar bears detected, the number exposed to sound levels greater than 160 dB, and descriptions of all behavioral reactions of Pacific walruses and polar bears to project activities.

17) A final report will be submitted to the Service within 90 days after the expiration of this IHA. The report will describe all project activities, monitoring efforts, and results. The report will include:
    a) Monitoring summary (hours of monitoring, activities monitored, number of PSOs, and, if requested by the Service, the daily monitoring logs).
    b) A summary of project activities completed and additional work, if any, yet to be done.
    c) Analyses of the factors influencing visibility and detectability of marine mammals (e.g., sea state, number of observers, and fog/glare).
    d) Discussion of location, weather, ice cover, sea state, and other factors affecting the presence and distribution of Pacific walruses and polar bears.
    e) Numbers, locations (or distance and direction from the vessel), initial behaviors upon detection, and reactions to the vessel operations of all sighted Pacific walruses and polar bears.
    f) Dates, times, vessel locations, heading, speed, weather, and sea conditions (including sea state and wind force), as well as description of the specific cable-laying activity occurring during observations of Pacific walruses and polar bears.
    g) Estimated distance between project vessels and polar bears and Pacific walruses at closest approach and at the end of encounter.
    h) Duration of encounters.

i) An estimate of the number of Pacific walruses and polar bears that have been exposed to noise (based on visual observation) at received levels greater than or equal to 120 dB and 160 dB with a description of the responses (changes in behavior).
j) Descriptions of uncertainty accompanying any numerical analyses, with uncertainty expressed by confidence limits, a minimum-maximum, posterior probability distribution, or another applicable method, with the exact approach to be selected based on the sampling method and data available.
k) A description of the mitigation measures implemented during project activities and their observed effectiveness for minimizing impacts to Pacific walruses and polar bears.
l) An analysis of the effects of Quintillion's operations on Pacific walruses, polar bears, and their availability for subsistence uses.
m) Occurrence, distribution, and composition of all Pacific walrus and polar bear sightings, including date, water depth, numbers, age/size/gender (if determinable), group sizes, visibility, location of the vessel, and location of the animal (or distance and direction to the animal from the vessel) in the form of electronic database or spreadsheet files.
n) A discussion of any specific Pacific walrus and polar bear behaviors of interest.
o) An assessment of the effectiveness of the POC for preventing impacts to subsistence users of polar bears and Pacific walruses, including summaries of post-season meetings held with the cable-landing communities.

18) Notification of Injured or Dead Marine Mammals
a) In the unexpected event that Quintillion's activity or any associated work causes the take of Pacific walruses or polar bears in a manner not authorized, including but not limited to stampeding of haulouts, abandonment of young, animals in acute distress, or injury or mortality (e.g., ship-strike), Quintillion shall report the incident to the Service immediately, but not later than 48 hours later. The report will include the following:
(i) Time, date, and location (latitude/longitude) of the incident;
(ii) Name and type of vessel involved;
(iii) Vessel's speed during and leading up to the incident;
(iv) Description of the incident;
(v) Description of all sound sources used in the 24 hours preceding the incident;
(vi) Water depth;
(vii) Environmental conditions (e.g., wind speed and direction, cloud cover, and visibility);
(viii) Description of all Pacific walrus and polar bear observations in the 24 hours preceding the incident;
(ix) Description of the animal(s) involved;
(x) Fate of the animal(s); and
(xi) Photographs or video footage of the animal(s) (if equipment is available).
(xii) Confirmation that project activities have stopped.

19) All reports shall be submitted to the Service MMM by email: fw7_mmm_reports@fws.gov.

Activities related to the monitoring described in this IHA do not require a separate scientific research permit issued under section 104 of the MMPA.

In accordance with section 7 of the Endangered Species Act of 1973 (ESA), intra-agency consultation with the Service's Fairbanks Field Office (FFO) for potential impacts of issuance of this IHA on threatened and endangered species and candidates for ESA listing was completed on July 7, 2017. The FFO concluded that issuance of the IHA is not likely to jeopardize the continued existence of the Pacific walrus and concurred with our determination this action is not likely to adversely affect polar bears and their critical habitat.

Should you have any questions regarding this IHA and the required terms and conditions, please contact Mr. Christopher Putnam at (907) 786-3844, or Ms. Kimberly Klein at (907) 786-3621, or by email at christopher_putnam@fws.gov or kimberly_klein@fws.gov

Karen P Clark

ACTING Regional Director, Region 7
U.S. Fish and Wildlife Service

7/18/17
Date

United States Department of the Interior

U.S. FISH AND WILDLIFE SERVICE
Fairbanks Fish and Wildlife Field Office
101 12th Avenue, Room 110
Fairbanks, Alaska 99701
August 13, 2015

Mr. John Sargent
Project Manager
U.S. Army Corps of Engineers
Alaska District Regulatory Division, North Branch
P.O. Box 6898
JBER, AK 99506-1518

Re: Endangered Species Act section 7 consultation for the proposed issuance of permit POA-2015-3976 for horizontal directional drilling of conduit and fiber optic cable associated with the Quintillion project in northern Alaska

Mr. Sargent:

This letter is in response to your request for concurrence with a "not likely to adversely affect" determination for endangered and threatened species, pursuant to Section 7 of the Endangered Species Act of 1973, as amended (Act).

THE PROPOSED ACTION

We understand that the U.S. Army Corps of Engineers (USACE) is evaluating a project proposed by Quintillion. The Quintillion Fiber Optic Project would result in the installation of a fiber optic communication network along the coast of Alaska thaw would link six communities (Nome, Kotzebue, Point Hope, Wainwright, Barrow, and Oliktok Point (See attached figures)) and provide them with high-speed internet. Permitting for this project would occur in two phases.

The USACE plans to permit the first phase under General Permit POA-2015-3976. In the first phase Quintillion would install fiber optic cables within a 5.5 inch diameter metal conduit at the six communities to provide a transition between the terrestrial and marine environments. The conduit would be horizontally directionally drilled (HDD) from a 48 square-foot terrestrial entry pit using a drill head and a 140 HDD rig to a marine location up to 5,000 feet from the terrestrial entry pit. A man hole would provide future access to the terrestrial end of the cable. The conduit would dip up to 90 feet underground, and the drill head would surface on the sea floor, and a vessel would deploy a diver to retrieve the drill head and cap the conduit flush with the sea floor.

The USACE plans to evaluate and permit the remaining portion of the Quintillion Fiber Optic Project under an Individual Permit. Activities permitted during the second phase would include connecting the terrestrial end of the cable with the communities and the marine end of the cable to a main cable on the sea floor that would link the communities. The Individual Permit application would be submitted as soon as sufficient engineering and logistics plans can provide a description of installation techniques, terrestrial infrastructure locations, and schedule. Thus, we will consult on the Individual Permit at a later date.

THE ACTION AREA

The proposed action area includes areas where direct and indirect effects to listed species could occur during HDD drilling operations on shore, and retrieval of the drill head and capping of the conduit at sea.

EFFECTS OF THE ACTION ON LISTED SPECIES

The Action Area is within the range of three species listed as threatened under the ESA: the Alaska-breeding Steller's eider (*Polysticta stelleri*), spectacled eider (*Somateria fisheri*), and polar bear (*Ursus maritimus*). Because the first phase of the Quintillion project may affect these species, we analyze possible effects below.

Project effects on Spectacled and Alaska-breeding Steller's Eiders

The Service listed the spectacled eider (*Somateria fisheri*) as threatened on May 10, 1993 (58 FR 27474) and the Alaska-breeding population of the Steller's eider (*Polysticta stelleri*) as threatened on June 11, 1997 (62 FR 31748). Both species can nest in terrestrial habitats and may migrate through marine portions of the Action Area. HDD in the terrestrial portion of the Action Area would begin after the breeding and nesting season, so field crews are very unlikely to encounter and disturb nesting individuals. Additionally, HDD activities would minimally impact tundra habitat because the HDD footprint would be small and field crews would use drill mats that would minimize vegetation impacts.

However, vessels used to retrieve the drill head and cap the conduit may encounter and temporarily disturb migrating (non-breeding) spectacled eiders. We expect disturbance of non-breeding or migrating eiders would be minor because non-nesting individuals can respond to vessel disturbance by moving away to a perceived safe distance. Because disturbance to non-breeding or migrating listed eiders would be so minor that injury or death is not expected, project effects to these birds would be insignificant.

Additionally, vessels may pose a collision risk to migrating listed eiders. This risk, however, is difficult to assess. While the risk is not zero, because Quintillion would use a minimal number of vessels (a barge and a few support vessels) and listed eider density is generally low, we anticipate vessels would pose a discountable collision risk to listed eiders.

Project Effects on Polar Bears

Due to threats to its sea ice habitat, on May 15, 2008 the Service published a Final Rule in the Federal Register listing the world-wide population of the polar bear (*Ursus maritimus*) as threatened (73 FR 28212) under the Act. Non-denning (transient) polar bears could be present in

the Action Area and human-polar bear interactions could occur, although we expect them to occur infrequently due to the low density of polar bears in the Action Area. We also expect that interactions would have only a minor and temporary effect on transient polar bears because they would likely to respond by departing the area. Furthermore, Quintillion would provide field crews with an interaction plan for personnel to follow in the event that polar bears are encountered. Because (1) the density of polar bears in the action area is low and encounters with polar bears are expected to be infrequent; (2) behavioral effects to transient polar bears are not expected to result in injury or death of a polar bear; and (3) mitigation measures included in Quintillion's interaction plan would minimize potential impacts in the event that transient polar bears are encountered, we expect effects of the proposed action on polar bears would be insignificant.

CONCLUSION

Because the first project phase would have, at most, a discountable and insignificant effect on listed eiders, we concur with the USACE's determination that the project is not likely to adversely affect spectacled and Alaska-breeding Steller's eiders. Likewise, because this project phase would have an insignificant effect on polar bears, we concur that the project is not likely to adversely affect this species. Preparation of a Biological Assessment or further consultation under section 7 of the Act is not necessary at this time. Thank you for the opportunity to comment on this project, and we look forward to working with the USACE on the second permitting phase of this project. If you need further assistance, please contact Shannon Torrence at (907) 455-1871.

Sincerely,

Ted Swem

Ted Swem
Branch Chief
Endangered Species

NOME, ALASKA

HDD ENTRY POINT
8' X 6' ENTRY PIT
8' X 20' CUTTINGS PIT
AREA OF IMPACT = 208 sq. ft.
(NOT TO SCALE)

PUBH

PEM1/SS1B

ID #64
150' X 150'
LEASE
SITNASUAK

ID #145
50' ESMT
AK D0T & PF

NOME COUNCIL ROAD

PUBH

HIGH TIDE Line
Meander from,
MS 1299
(APPROX.)

M2USP

M1UBL

ID #146
50' ESMT
RASMUSSEN

N o r t o n S o u n d

ADL 611831

HDD ENTRY POINT

PEM1/SS1B

NOME COUNCIL ROAD

E2EM1/SS1P

E1UBL

ADL 611831

ADL 611832

ADL 598757

ADL 603866

4921'

M1UBL

N o r t o n S o u n d

ADL 603867

ADL 603864

HDD EXIT POINT

WETLAND TYPE

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Pond

- PROPOSED SUBMARINE FIBER OPTIC CABLE ROUTE
- STATE OFFSHORE LEASE TRACT
- ACTIVE MINING CLAIM
- U.S. SURVEY 3791
- ATS NO. 1268
- NATIVE ALLOTMENTS

- PROPOSED HDD ENTRY POINT AND PIT
- AS-CALCULATED EXIT POINT

SOURCES
IMAGERY: Quantum Spatial - 8.19.2009
ALASKA MAPPED - BDL WMS LAYER
NATIVE ALLOTMENTS - BLM
STATE OFFSHORE PERMIT OR LEASE - DNR
STATE MINING CLAIM - DNR
FIBER ROUTE & BMH - NHTI/UMIAQ
NATIONAL WETLANDS INVENTORY - USFWS
(edited to show ground conditions)

FOR INFORMATIONAL PURPOSES ONLY
No survey has been conducted for this exhibit
Lots of Nome Council Road were digitized from Plat 2003 - 24 MC1299 and USS 3791. Does not represent a survey.

NOT FOR CONSTRUCTION

Figure:
NOME, AK
PROPOSED HDD ROUTE

Scale:
0 150 300 450 600
Feet

Date:
8/4/2015

UMIAQ

UMQ: \\Uicasgis01\gis\Umiaq\Project\7009013_ARCTIC_FOC\MXD\OME_USACE_r02.mxd

KOTZEBUE, ALASKA

HDD EXIT POINT

ID #144
COMBINED ESMT
CITY OF KOTZEBUE

840'

HIGH TIDE LINE

KOTZEBUE SOUND

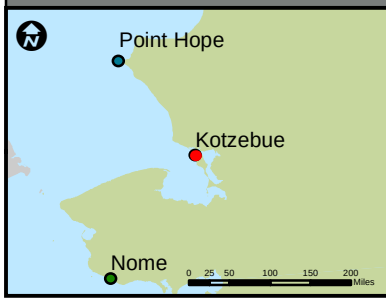
SHORE AVENUE

SECOND AVENUE

SEAWALL

TUNDRA WAY

HDD ENTRY POINT
8' X 6' ENTRY PIT
8' X 20' CUTTINGS PIT
AREA OF IMPACT = 208 sq. ft.
(NOT TO SCALE)



AS-STAKED ENRY POINT AND PIT

AS-CALCULATED EXIT POINT

PROPOSED SUBMARINE FIBER OPTIC CABLE ROUTE

*Lot lines are for display purposes and do not represent a survey.

Source:
Imagery - Quantum Spatial
Date: 6.12.2013

NOT FOR CONSTRUCTION

DISCLAIMER

For informational purposes only. Umiaq makes no expressed or implied warranties of merchantability or fitness with regards to character and function of this printed map. All attempts have been made to identify discrepancies among data sources and are provided as is. The user is cautioned against using this map for detailed analysis or interpretations.

Figure: **KOTZEBUE, AK**
AS-STAKED HDD ENTRY

Scale:
0 50 100
Feet

Date:
8/4/2015

UMIAQ

UMQ: \\Uicasgis01\GIS\Umiaq\Project\7009013_ARCTIC_FOC\MXD\OTZ_USACE_r03.mxd

BARROW, ALASKA

HDD EXIT POINT

4400'

M1UBL

HDD ENTRY POINT

PEM1/SS1B

PEM1/SS1E

PEM1E

0 0.1 0.2 0.3 0.4 Miles

WETLAND TYPE

- Estuarine and Marine Deepwater
- Freshwater Emergent Wetland

ID #24
250' ESMT
CITY OF BARROW

HIGH TIDE Line
Meander from,
US Survey - 4615

CITY OF BARROW

PLAT 87-6
B.R.D.

ID #148
50' ESMT
CITY OF BARROW

CTY

Tract: A

ID #55
150' X 150' LEASE
CITY OF BARROW

NUNAVAAQ STREET

Tract: B
CTY

HDD ENTRY POINT
8' X 6' ENTRY PIT
8' X 20' CUTTINGS PIT
AREA OF IMPACT = 208 sq. ft.
(NOT TO SCALE)

Tract: A

OWNERSHIP

- CORPORATION (COR)
- CITY (CTY)
- NORTH SLOPE BOROUGH (NSB)
- SHAREHOLDER (SHR)
- STATE OF ALASKA (SOA)

COR SHR

Barrow
Wainwright
Atqasuk
Point Lay
0 25 50 75 100 Miles

- AS-STAKED ENTRY POINT AND PIT
- AS-CALCULATED EXIT POINT
- PROPOSED SUBMARINE FIBER OPTIC CABLE ROUTE

USFWS:
NATIONAL WETLANDS INVENTORY

DISCLAIMER

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NOT FOR CONSTRUCTION

Figure: BARROW, AK
AS-STAKED HDD ENTRY

Scale: 0 100 200 300 400 Feet

Date: 8/4/2015

UMIAQ

UMQ: \\Uicasgis01\gis\Umiaq\Project\7009013_ARCTIC_FOC\MXD\BRW_USACE_r03.mxd

POINT HOPE, ALASKA

ID #59
150' X 150'
LEASE
TIKIGAQ

HDD ENTRY POINT
8' X 6' ENTRY PIT
8' X 20' CUTTINGS PIT
AREA OF IMPACT = 208 sq. ft.
(NOT TO SCALE)

(100' ROW)

ID #147
50' ESMT
TIKIGAQ

ID #50
50' ESMT
NSB

ID #147
50' ESMT
TIKIGAQ

RICTED)
-0186

NA (RESTRICTED)
50-2006-0071

NA (RESTRICTED)
50-2005-0185

NA (RESTRICTED)
50-2005-0185

HIGH TIDE LINE
(Approximate)

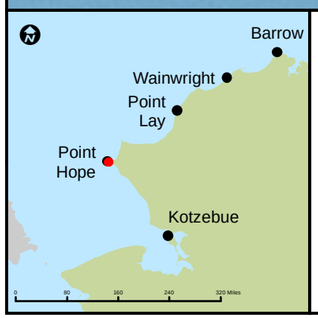
M2USP

M1UBL

HDD EXIT POINT

WETLAND TYPE

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland



AS-STAKED ENTRY POINT AND PIT

AS-CALCULATED EXIT POINT

PROPOSED SUBMARINE FIBER OPTIC CABLE ROUTE

NATIVE ALLOTMENTS

NSB PARCELS

NOT FOR CONSTRUCTION
FOR INFORMATIONAL PURPOSES ONLY
SOURCES
IMAGERY: Quantum Spatial - 8.20.2013
ALASKA MAPPED - BDL WMS LAYER
PARCELS/ROW: NSB GIS
NATIVE ALLOTMENTS: BLM

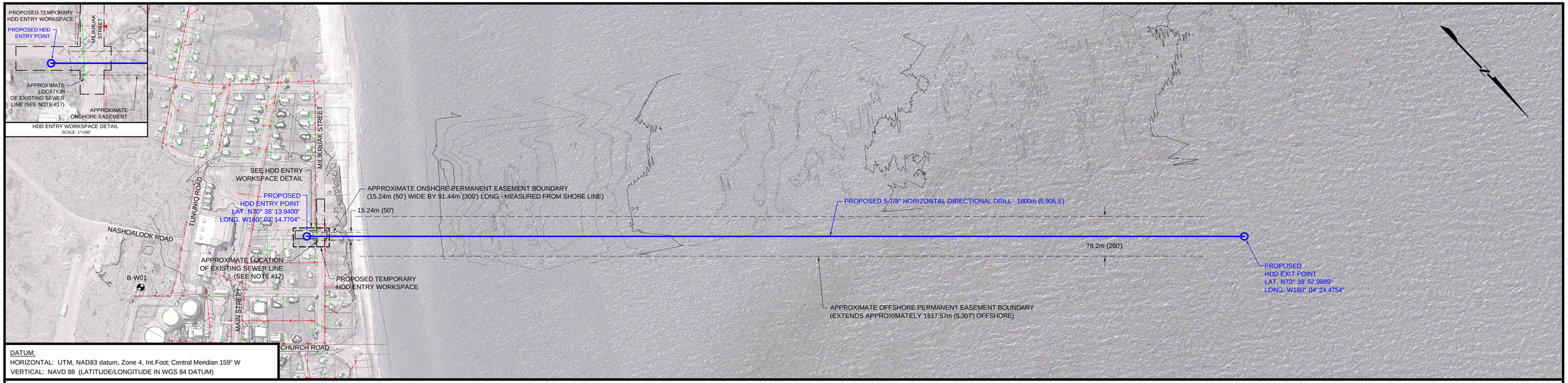
Figure:
POINT HOPE, AK
AS-STAKED HDD ENTRY

Scale:
0 300 600 900
Feet

Date:
8/4/2015

UMIAQ

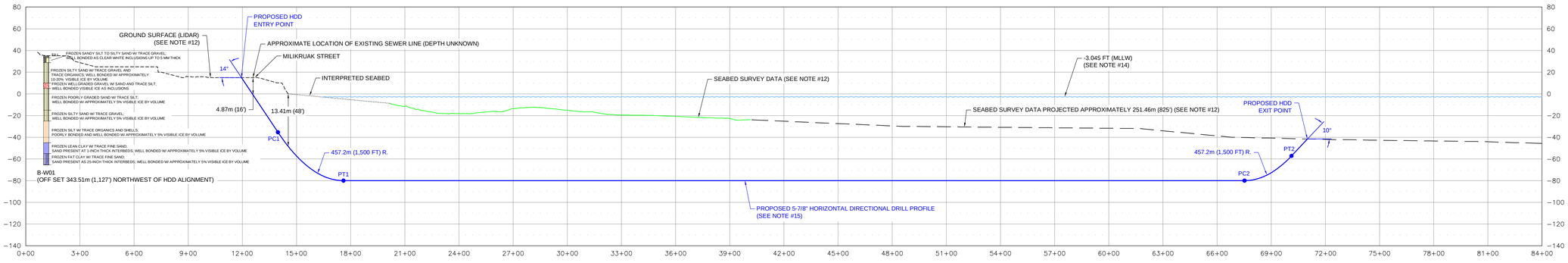
UMQ: \\Uicasgis01\gis\Umiaq\Project\7009013_ARCTIC_FOC\MXD\PHO_USACE_r00.mxd



NOTE: THIS IS A FULL SIZE DRAWING THAT IS INTENDED TO BE PRINTED ON A 24" X 36" SHEET OF PAPER.

PLAN

300' 0 300'
SCALE IN FEET



PROFILE

300' 0 300'
HORIZONTAL SCALE IN FEET
50' 0 50'
VERTICAL SCALE IN FEET

DIRECTIONAL DRILL DATA WAINWRIGHT LANDFALL HDD		
DESCRIPTION	STATION * (FT)	ELEVATION (FT)
ENTRY @ 14°	11+95.00	15.00
P C 1 (14.00° @ 1,500 FT R.)	13+97.32	-35.44
P T 1	17+60.20	-80.00
P C 2 (10.00° @ 1,500 FT R.)	67+51.39	-80.00
P T 2	70+11.87	-57.21
EXIT @ 10°	71+00.50	-41.58
HORIZONTAL DISTANCE = 1800m (5905.5 FT)		
DIRECTIONAL DRILL PIPE LENGTH = 1803.81m (5918.02 FT)		

* THE STATIONING IS BASED ON AN ARBITRARY REFERENCE POINT

RECOMMENDED TOLERANCES	
ITEM	TOLERANCE
PILOT HOLE ENTRY ANGLE	INCREASE ANGLE UP TO 1° (STEEPER), BUT NO DECREASE IN ANGLE ALLOWED.
PILOT HOLE ENTRY LOCATION	AS PER COORDINATES PROVIDED BY COMPANY WITH NO CHANGES WITHOUT COMPANY APPROVAL.
PILOT HOLE EXIT ANGLE	INCREASE ANGLE UP TO 1° (STEEPER) OR DECREASE UP TO 2° (FLATTER).
PILOT HOLE EXIT LOCATION	UP TO 10 FEET BEYOND OR 20 FEET SHORT OF THE EXIT LOCATION. BETWEEN 5 FEET LEFT AND 5 FEET RIGHT OF CENTERLINE.
PILOT HOLE DEPTH	BETWEEN 5 FEET ABOVE AND 10 FEET BELOW THE DESIGN DRILL PROFILE ALLOWED.
PILOT HOLE ALIGNMENT	SHALL REMAIN WITHIN 20 FEET LEFT OR RIGHT OF THE HDD ALIGNMENT.

LEGEND

- TYPE OF SOIL
- Boring Location
- Major Contour - 10' Interval
- Minor Contour - 2' Interval
- Power Lines
- Sanitary Sewer Lines
- Property Lines

DRAFT

NOTES:

1. CONTRACTOR SHALL ADHERE TO THE SPECIFICATIONS AND REQUIREMENTS PER NEW HORIZONS TELECOMMUNICATIONS, INC. SPECIFICATIONS, CONTRACT DOCUMENTS AND SPECIAL PERMIT CONDITIONS, EXCEPT AS NOTED ON THIS DRAWING.
2. CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL UNDERGROUND UTILITIES PRIOR TO BEGINNING CONSTRUCTION. IF ANY UTILITY IS LOCATED WITHIN 4.57m (15') OF THE DESIGNED HDD PROFILE AND ALIGNMENT, CONTRACTOR SHALL OBTAIN APPROVAL FROM NEW HORIZONS TELECOMMUNICATIONS, INC. PRIOR TO INITIATING HDD OPERATIONS.
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5. WORK SPACE: MAXIMUM WORK SPACE LIMITS ARE DEPICTED. RESTRICT CLEARING TO THE WORK SPACE INDICATED AT THE ENTRY POINT AND WHERE PROVIDED BY RT CASEY, LLC.
6. WATER SOURCE: DRILL WATER SHALL BE OBTAINED FROM AN APPROVED SOURCE.
7. SPILL-PREVENTION: REFUELING OF ALL EQUIPMENT SHALL BE COMPLETED IN ACCORDANCE WITH THE SPCC PLAN.
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11. GEOTECHNICAL DATA: BORE HOLES ARE OFFSET FROM THE PIPELINE CENTERLINE AS SHOWN ON THE PLAN VIEW. THE GEOTECHNICAL INFORMATION PROVIDED ON THIS DRAWING IS A GENERAL SUMMARY. REFER TO THE APPLICABLE GEOTECHNICAL REPORT IN THE CONTRACT DOCUMENTS FOR MORE DETAILED INFORMATION.
12. OFFSHORE BATHYMETRIC DATA PROVIDED BY GOLDER ASSOCIATES. NOAA SURFACE BASED ON OFFSHORE SOUNDING POINT DATA DOWNLOADED FROM HTTP://ENCDIRECT.NOAA.GOV. GROUND SURFACE DEM (1/3 ARC SECOND) DATA TAKEN FROM ESRI ONLINE DATA. LIDAR DATA DOWNLOADED FROM HTTP://EARTHEXPLORER.USGS.GOV/.
13. AERIAL PHOTOS TAKEN FROM GOOGLE EARTH PRO © 2015, LICENSED TO GEOENGINEERS, INC., DATED JULY 25, 2009.
14. MLLW OBTAINED FROM PRUDHOE BAY, AK TIDE STATION 9497645.
15. DRILL PIPE TO CONSIST OF 5-7/8" OD, 4-1/4" FLUSH ID DOUBLE WHITE BAND "S".
16. A PRECONSTRUCTION SURVEY IS RECOMMENDED TO VERIFY THE SEABED ELEVATION AT THE PROPOSED EXIT POINT. IF THE SEABED ELEVATION DIFFERS SIGNIFICANTLY FROM WHAT IS SHOWN ON THIS DRAWING, GEOENGINEERS, INC. SHOULD BE CONTACTED TO EVALUATE THE PROPOSED HDD PROFILE AND EXIT LOCATION RELATIVE TO THE ACTUAL SEABED ELEVATION.
17. LOCATION OF UNDERGROUND SEWER LINE REPORTED BY RT CASEY LLC. DEPTH OF THE SEWER LINE IS UNKNOWN, BUT ASSUMED TO BE LESS THAN 8 FEET. LOCATION AND DEPTH OF SEWER LINE SHALL BE PHYSICALLY VERIFIED BY POT HOLE EXCAVATION PRIOR TO BEGINNING WORK TO VERIFY THAT THE PROPOSED HDD PLAN AND PROFILE DOES NOT CONFLICT WITH THE EXISTING SEWER LINE.
18. PROPERTY BOUNDARIES, AND POWER AND SEWER UTILITIES SHOWN ON THIS DRAWING WERE PROVIDED BY UMIAQ. REFERENCE DRAWING 2008-063 AIN ESMT BASE.DWG.

REFERENCES	
DRAWING NUMBER	REFERENCE DRAWING TITLE
2008-063 AIN ESMT BASE	

REVISIONS					
NO.	DESCRIPTION	BY	DATE	CHK'D	APP'D
A	ISSUED AS DRAFT	BTL	06/23/15	BCR	TNH
B	ISSUED AS DRAFT	BTL	06/26/15	BCR	TNH

BCR Design	06/04/15 Date
BTL Drawn	06/11/15 Date
BCR Checked	06/17/15 Date
TNH Approved	06/17/15 Date

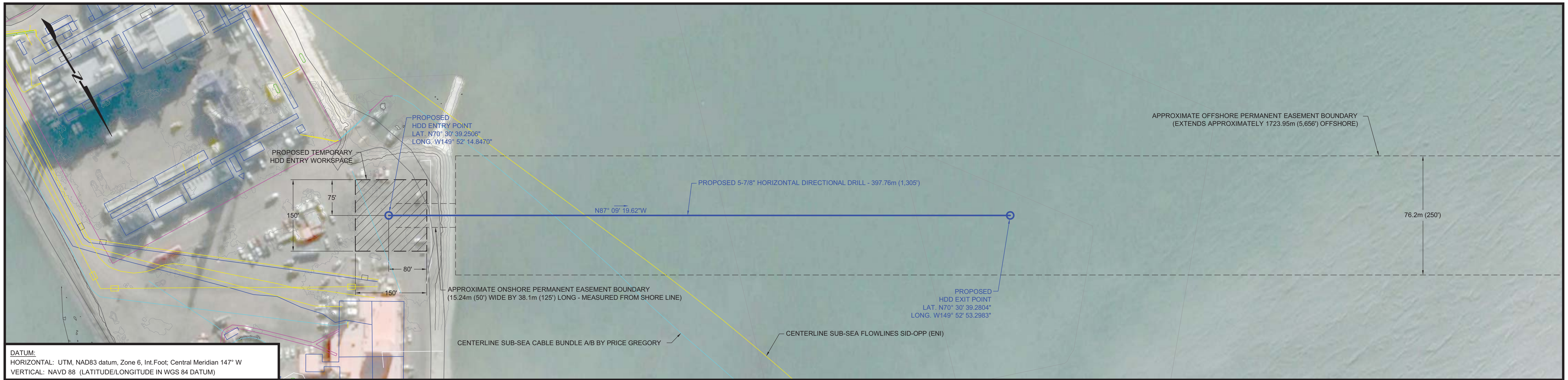
GEOENGINEERS
1200 NW NAITO PKWY
SUITE 180
PORTLAND, OREGON 97209
Telephone (503) 624-9274
Fax (503) 620-5940
RTC
R.T. CASEY, L.L.C.

QUINTILLION ARCTIC FIBER PROJECT

WAINWRIGHT LANDFALL HDD
WAINWRIGHT, ALASKA

Project No. 21964-001-00
Drawing No. —
Sheet 3

P:\21219\840\01000\CAD\cosings\Wainwright\Drawings\Wainwright Landfall HDD.dwg(T-A6 HDD Drawing modified on Jun 26, 2015 - 2:23pm

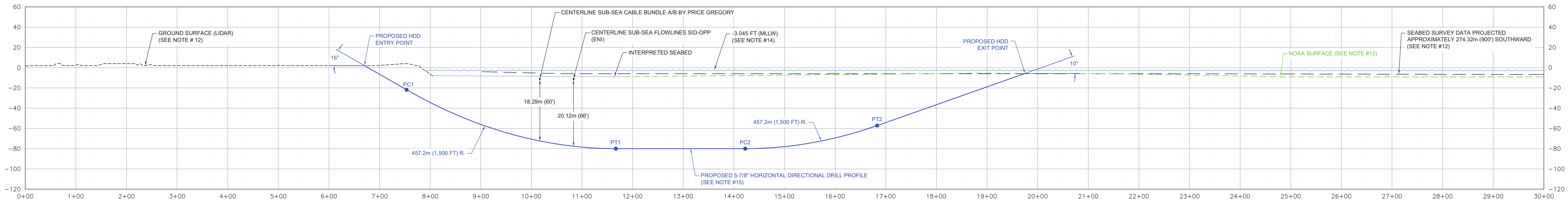


DATUM:
HORIZONTAL: UTM, NAD83 datum, Zone 6, Int.Foot; Central Meridian 147° W
VERTICAL: NAVD 88 (LATITUDE/LONGITUDE IN WGS 84 DATUM)

NOTE: THIS IS A FULL SIZE DRAWING THAT IS INTENDED TO BE PRINTED ON A 24" X 36" SHEET OF PAPER.

PLAN

100' 0 100'
SCALE IN FEET



PROFILE

100' 0 100'
HORIZONTAL SCALE IN FEET
50' 0 50'
VERTICAL SCALE IN FEET

DIRECTIONAL DRILL DATA OLIKTOK LANDFALL HDD		
DESCRIPTION	STATION * (FT)	ELEVATION (FT)
ENTRY @ 16°	6+70.00	2.00
P C 1 (16.00° @ 1,500 FT R.)	7+53.32	-21.89
P T 1	11+66.78	-80.00
P C 2 (10.00° @ 1,500 FT R.)	14+22.43	-80.00
P T 2	16+82.90	-57.21
EXIT @ 10°	19+75.00	-5.71
HORIZONTAL DISTANCE = 397.76m (1,305.00 FT)		
DIRECTIONAL DRILL PIPE LENGTH = 402.21m (1,319.61 FT)		

* THE STATIONING IS BASED ON AN ARBITRARY REFERENCE POINT

NOTES:

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15. DRILL PIPE TO CONSIST OF 5-7/8" OD, 4-1/4" FLUSH ID DOUBLE WHITE BAND "S".
16. A PRECONSTRUCTION SURVEY IS RECOMMENDED TO VERIFY THE SEABED ELEVATION AT THE PROPOSED EXIT POINT. IF THE SEABED ELEVATION DIFFERS SIGNIFICANTLY FROM WHAT IS SHOWN ON THIS DRAWING, GEOENGINEERS, INC. SHOULD BE CONTACTED TO EVALUATE THE PROPOSED HDD PROFILE AND EXIT LOCATION RELATIVE TO THE ACTUAL SEABED ELEVATION.
17. THE LOCATION OF SUB-SEA CABLE BUNDLE AND SUB-SEA FLOW LINES SHOWN ON THIS DRAWING IS BASED ON AN AUTOCAD FILE PROVIDED BY RT CASEY, AND DRAWINGS IDENTIFIED AS ENI DOC# DRW-PL-PSN00-011-01, REV 0 (DATED 10/20/08), ENI DOC# DRW-PL-PSN00-012-01, REV 0 (DATED 10/20/08) AND FLOWLINE ROUTE GENERAL ALIGNMENT, REV C (DATED 03/13/08). GEOENGINEERS, INC., CANNOT GUARANTEE THE ACCURACY OF THESE FILES. AS SUCH, THE LOCATIONS AND DEPTHS OF THESE UTILITIES SHOWN ON THIS DRAWING ARE APPROXIMATE.

REFERENCES

DRAWING NUMBER	REFERENCE DRAWING TITLE
ACAD-LK619D26_S1	OLIKTOK DOCK UNDERGROUND UTILITIES ASBUILT

REVISIONS

NO.	DESCRIPTION	BY	DATE	CHK'D	APP'D
0	ISSUED FOR CONSTRUCTION	BTL	07/09/15	BCR	TNH

BCR Design	06/04/15 Date
BTL Drawn	06/11/15 Date
BCR Checked	07/09/15 Date
TNH Approved	07/09/15 Date

GEOENGINEERS
1200 NW NAITO PKWY
SUITE 180
PORTLAND, OREGON 97209
Telephone (503) 624-9274
Fax (503) 620-5940
R.T. CASEY, L.L.C.

QUINTILLION ARCTIC FIBER PROJECT

OLIKTOK LANDFALL HDD
OLIKTOK, ALASKA

Project No. 21964-001-00
Drawing No. —
Sheet 5

APPENDIX B – VESSEL AND EQUIPMENT SPECIFICATIONS

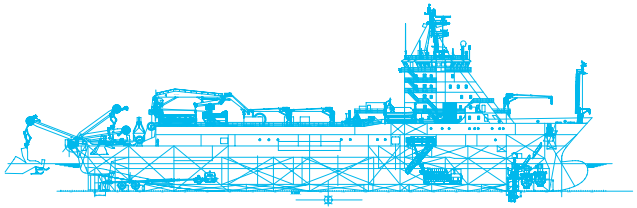
Ile de Brehat, Ile de Sein, Ile de Batz

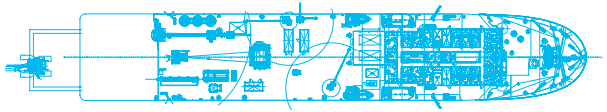
Ile de Brehat / Ile de Sein / Ile de Batz

Technical Specifications

DESCRIPTION / POSITIONING	Three state-of-the-art vessels, highly powerful for long-haul cable installation and burying in the harshest conditions. Duplex DP and Integrated Control System
OWNER	ALDA MARINE
OPERATOR	ALDA MARINE S.A.S.
SHIP MANAGER	LOUIS DREYFUS ARMATEURS S.A.S.
FLAG	French
CONSTRUCTION YEAR	2002
LENGTH OVERALL	140.36 m
BREADTH	23.40 m
DRAFT	8.00 m (summer draft)
DEADWEIGHT	9820 mt
ACCOMMODATION	Single cabins: 60; double cabins: 5
CABLE TANK CAPACITY	Main cable tank: 2 x 2500 tonnes (max cap each tank: 3500 tonnes), 2 x 1500 m^3 Spare cable tank: 2 x 250 tonnes, 2 x 150 m^3
REPEATER STORAGE	2 x 100
CABLE MACHINERY	1 Linear Cable Engine – DOWTY 21 Wheel pairs, Drum Engine – DOWTY 6T DOHB / 28T Drum, 2 Transporter – DOWTY 2 Wheel Pairs, 1 Stern Hauler – DOWTY 2 Wheel Pairs
TYPE OF PLOUGH	1 SMD HD3 Plough – burial in all soils (including fractured rocks). Max burial: 3.00 m
CABLE LAYING SOFTWARE	MakaiLay
DYNAMIC POSITIONING	DP2 BV PDY MATAR ALSTOM
TRANSIT SPEED	15 knots
BOLLARD PULL	100 tonnes
POWER GENERATION	4 x 4320 kW MAK + 1 x 1360 kW MAK
THRUSTERS	2 x Lips 1500 kW Bow Thrusters, 1 x Lips 720 rpm - 1500 kW AZ Fore Thruster 2 x Lips 1500 kW Aft Thrusters
PROPULSION	2 electrically driven fixed pitch propellers. Output 4000 kW each. Propeller diameter: 3700 mm. Max propeller speed: 146 rpm

Installation vessels





Alcatel·Lucent

SMD HD3 Plough

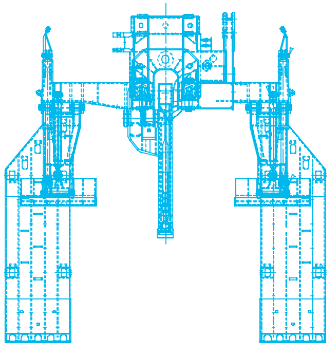
SMD Heavy Duty HD3 Plough

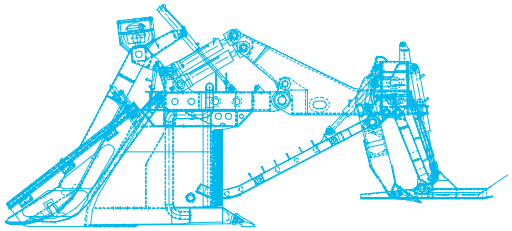
Ploughs

Technical Specifications

GENERAL SPECIFICATION AND OPERATION

DIMENSIONS	10.82 m long (skids down, plough hinged, depressor down) 4.80 m high (plough hinged) 5.96 m wide (over rear stabilisers)
SUBMERGED WEIGHT	25 tonnes (excluding ripper and jetting package)
OPERATION	Pulled by tow wire from surface vessel
CONTROL	Full remote control from shipboard control cabin or from remote control console whilst being towed
STEER ANGLE	+/- 16º
BURIAL DEPTH	2.30 m trench depth at zero share pitch (soil dependent) 3.00 m achievable in soft soils with plough pitched aft Optional interchangeable share 1.5 m available A forward mounted Rock Tooth can cut the trench in rock usually with a layer of soil above it
OPERATING DEPTH	1500 m maximum
REPEATER BURIAL	Repeater burial depth 50-90% of plough burial depth, dependent on soil conditions
SOIL TYPE	Any, within limits of pull force (130 tonnes)
SOFT MUD CAPACITY	5 kPa minimum
PLOUGHING SPEED	Recommended maximum 2 knots depending on seabed conditions
HYDRAULIC SYSTEM	RESERVOIR: Flexible pressure compensated, 100 litres working capacity SYSTEM HYDRAULIC OIL: Houghton Vaughan Hydrodrive HPE 22
CYLINDERS	Heavy duty marine type with welded swivel eyes
SURVEILLANCE EQUIPMENT	The surveillance equipment comprises CCTV cameras, associated lamps, pan and tilt units CAMERAS: 3 x SIT LAMPS: 5 x 150 W 24 V incandescent SONAR: Mesotech 1000 digital sonar head (range up to 100 m) HYDROPHONE: A hydrophone is provided with an integral pre-amplifier ACOUSTIC POSITIONING: Provision is made for responder/ transponder unit





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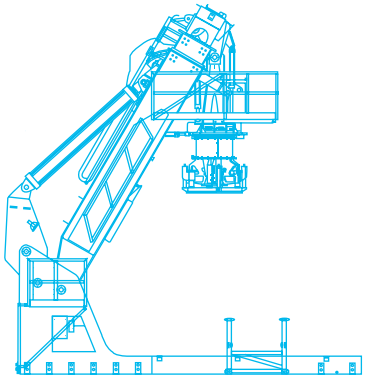
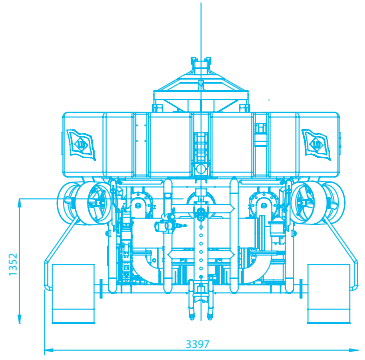
ROVJet 400 & Dynacon LARS

ROVJet 400 & Dynacon LARS

Technical Specifications

LARS	Dynacon Model 1015 Telescoping horizontal luffing, lifting umbilical SWL 13.5 tonnes, max operating sea state: 6
ROV	
CONFIGURATION	Vehicle free-swimming or on tracks
TOTAL POWER	300 kW (400 hp)
MAXIMUM DEPTH RATING	2500 m
DIMENSIONS (APPROX.)	Length: 5.00 m; Width (on tracks): 3.40 m; Height: 2.00 m
WEIGHT IN AIR (APPROX.)	10 tonnes with tracks, 9 tonnes without tracks
HP JETTING SYSTEM	1 x 93 kW 2 pole 3.3 kV electro-jetting units for HP Jetting 1 x 125 HP Flowserve Type QN102-2A HP jetting pump Nominal Jet Pressure: 7 bar (300 m3/h)
LP JETTING SYSTEM	1 x 93 kW 2 pole 3.3 kV electro-jetting units for LP Jetting 1 x 125 HP Flowserve Type QN122-1A LP jetting pump Nominal Jet Pressure: 3 bar (550 m3/h)
JETTING TOOLS	1 x Main Jetting Tool HP & LP Flow for Depth Burial Depth control: 0-2000 mm (0-3000 mm on Lodbrog) with main swords 1 m and 2 m swords option (3 m sword option on Lodbrog) Transducers: Tool Depth (transducer fitted on cylinder) Depressor height, Water pressure, Cable Detection 1 x Forward Jetting Tool HP Flow for Surface Trenching Depth control: 0-400 mm
SURVEILLANCE EQUIPMENT	2 x Typhoon 22:1 Colour Zoom, 2 x CCD monochrome, 1 x Tornado Low Light Camera
PAN & TILTS	2 x PT10-FB-120V-OIL-AL with feedback
OA SONAR	Tritech Super Seeking DFS
ECHO SOUNDER	Tritech PA500:6-S. Range: 50 m
CABLE TRACKER	TSS 440/350 Dual track on deployment frame
CABLE TOOLS PACKAGE	1 x Schilling Orion 7P, 1 x LD Travocean 3R (special for cutting application), Webtool HCV100, LD Travocean Cable Clamp





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APPENDIX C – SOUND SOURCE VERIFICATION REPORT

QUINTILLION SUBSEA OPERATIONS FIBER OPTIC CABLE-LAYING PROJECT

SOUND SOURCE VERIFICATION

Oliktok Point, Alaska

November, 2017

♦ ♦ ♦

Prepared for:

Owl Ridge Natural
Resource Consultants, Inc.
Anchorage, Alaska

Prepared by:

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Job No. : 17-141

INTRODUCTION

Quintillion Subsea Operations (QSO) conducted a fiber optic cable-laying project in the marine waters of Alaska near Oliktok Point during the 2017 open-water season. The operations included subsea cable-laying activity from the *Miller Bay* barge with two supporting tug boats and a crew boat. The operation occurred in nearshore waters, about 7.7 kilometers northwest of Oliktok Point, Alaska. As a stipulation under two (National Marine Fisheries Service and U.S. Fish and Wildlife Service) Incidental Harassment Authorizations (IHAs), QSO was requested to collect underwater sound data from dominant operational activities with the potential to acoustically harass marine mammals. The sound source verification (SSV) specifically measured underwater sound from trenching and winching operations by the cable-laying barge *Miller Bay*. Note that an SSV was performed for similar operations conducted near Nome in 2016 that targeted sounds near shore from the *CB Networker* barge and offshore operations for thruster and propeller noise generated by the cable-laying ship *Ile de Brehat*[1]. For this 2017 SSV, conducted on August 11, 2017, measurements were made of the cavitation of main propellers and thrusters from tugs working anchoring lines, and ratcheting of anchor cables during cable-laying that involved pulling a plough. An attempt was made to identify noise emanating from transponders or transducers, but the primary noise source, the cavitation of the main propellers from the tugs during anchor-handling, overshadowed all other sound sources including the use of thrusters. The SSV measurements taken during these cable-laying operations are summarized in this report.

TERMINOLOGY

Various technical terms used in this report are defined in the Glossary of Terms in Appendix A. Sound pressure is the instantaneous absolute positive or negative pressure and is presented in this report as a decibel referenced as 1 micro Pascal (dB re 1 µPa). While several noise metrics are used to describe sounds in the environment, the root-mean-square (RMS) sound pressure level descriptor is used to describe measured sounds from the cable-laying activity. The RMS sound pressure level is also presented in dB re 1 µPa and is averaged over a defined time period in a stated frequency range or band. The appropriate time period to average for the RMS computation varies by the type of sound (e.g., pulsed or continuous). This project involved continuous sounds that are averaged over the measurement periods, as they do not vary much with time. Sounds were measured over the frequency range of 20 to 20,000 Hz. The average sound level during the measurement period is also computed to be the equivalent average sound pressure level (Leq). Sound Exposure Level (SEL) is proportionally equivalent to the time integral of the pressure squared and is also described in this report in terms of dB re 1 μPa^2 sec over the duration of a sound event.

Under the Marine Mammal Protection Act, NMFS has defined levels of harassment for marine mammals. Level A harassment is defined as "Any act of pursuit, torment, or annoyance which has the potential to injure a marine mammal or marine mammal stock in the wild." Level B harassment is defined as "Any act of pursuit, torment, or annoyance which has the potential to disturb a marine

1 See Illingworth & Rodkin, Inc. 2016. Quintillion Subsea Operational Fiber Optic Cable-Laying Project Sound Source Verification – Nome Alaska. Prepared by Keith Pommerenck and James Reyff. October 21.

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."

During the permitting process, NMFS practice regarding exposure of marine mammals to high level sounds was that cetaceans and pinnipeds exposed to impulsive sounds of 180 and 190 dB RMS or greater, respectively, are considered to have been taken by Level A (i.e., injurious) harassment. Behavioral harassment (Level B) is considered to have occurred when marine mammals are exposed to sounds of 120 dB RMS or greater for continuous noise (except for Pacific walrus where the threshold is 160 dB RMS). The application of the 120 dB RMS threshold can sometimes be problematic because this threshold level can be either at or below the ambient noise level of certain locations. NMFS has not defined any auditory bandwidth for marine mammals that relate to behavior; so, this report does not consider any adjustments to RMS levels to account for frequency range. Acoustic thresholds addressed in this report are described in *Table 1*.

Table 1 - Underwater acoustic criteria for marine mammals used for this project,

Species	Underwater Noise Thresholds Used for IHA (dB re 1µPa)	
	Anthropogenic Disturbance Threshold	**Injury Threshold**
Cetaceans	120 dB RMS	180 dB RMS
Pinnipeds	120 dB RMS	190 dB RMS
Pacific Walrus	160 dB RMS	190 dB RMS

METHODS AND EQUIPMENT

The primary measurements were based on recordings obtained from four different autonomous units that were equipped with hydrophones, signal processing equipment and digital audio recorders. Direct measurements near the *Miller Bay* barge were made primarily from the *Outright*, an approximately 9-meter (m) aluminum vessel (*Figure 1*), drifting at different positions near the project vessels. The submerged autonomous units were deployed at four different positions by the *Outright*. Direct measurements and recordings were conducted while drifting to minimize noise contamination caused by strumming from the hydrophone lines and flow noise. In addition, one measurement and recording was made from the stern of the *Miller Bay (*approximately 20 m from the plow). The autonomous units were attached to a bottom anchor using a line that adjusted the hydrophone to the mid-depth. A floating mooring ball was also attached to the anchor to provide easy retrieval. The water depth was typically 7 m at the location of hydrophone deployments.

Figure 1 – Deploying hydrophones from the Outright to make SSV measurements.

Live spot measurements were made live using a RESON Model TC-4013 hydrophone. The hydrophone signal was fed through an in-line PCB Model 422E13 charge converter and into a PCB Model 480M122 Power Supply. The output was split into a Larson Davis Model 831 Precision Sound Level Meter (LDL 831) and a Roland R-05 solid-state digital data recorder. The LDL 831 system provided live displays of the RMS values. The observer recorded the RMS sound pressure level, exact time, and distance to the vessel from the noise source.

Figure 2 – Autonomous hydrophone system.

Measurements were also conducted using four autonomous hydrophone systems, each system consisted of a TC4013 hydrophone with PCB in-line charge amplifier (Model 422E13), PCB Multi Gain Signal Conditioner (Model 480M122), and a Roland Model R-05 Solid State Recorder (*Figure 2*). The Roland recorders were set to a sampling rate of 48,000 samples per second. Each autonomous unit was set with an anchored weight at a fixed location with a large float on the surface for ease in retrieval.

Live measurements and sound recordings were analyzed using the LDL 831. During post-processing, the data collected using the LDL 831 was subsequently exported to Microsoft Excel format for further data analysis and examination. Some measurements were affected by background wave and current noise from the relatively rough sea conditions, which at times exceeded 150 dB RMS. Acoustic data affected by background noise were discarded.

All measurements were made to the northwest of the *Miller Bay* barge track, as waters to the southeast were shallower and affected by a shoal. A pair of autonomous units were deployed at about 350 to 450 m northwest of the *Miller Bay* track and another pair was deployed approximately 1-kilometer northwest. Figure 3 shows the location of the *Miller Bay* track and autonomous unit deployments. One pair of measurements was made in front of the *Miller Bay* track while the other was made perpendicular or normal and then behind the barge track.

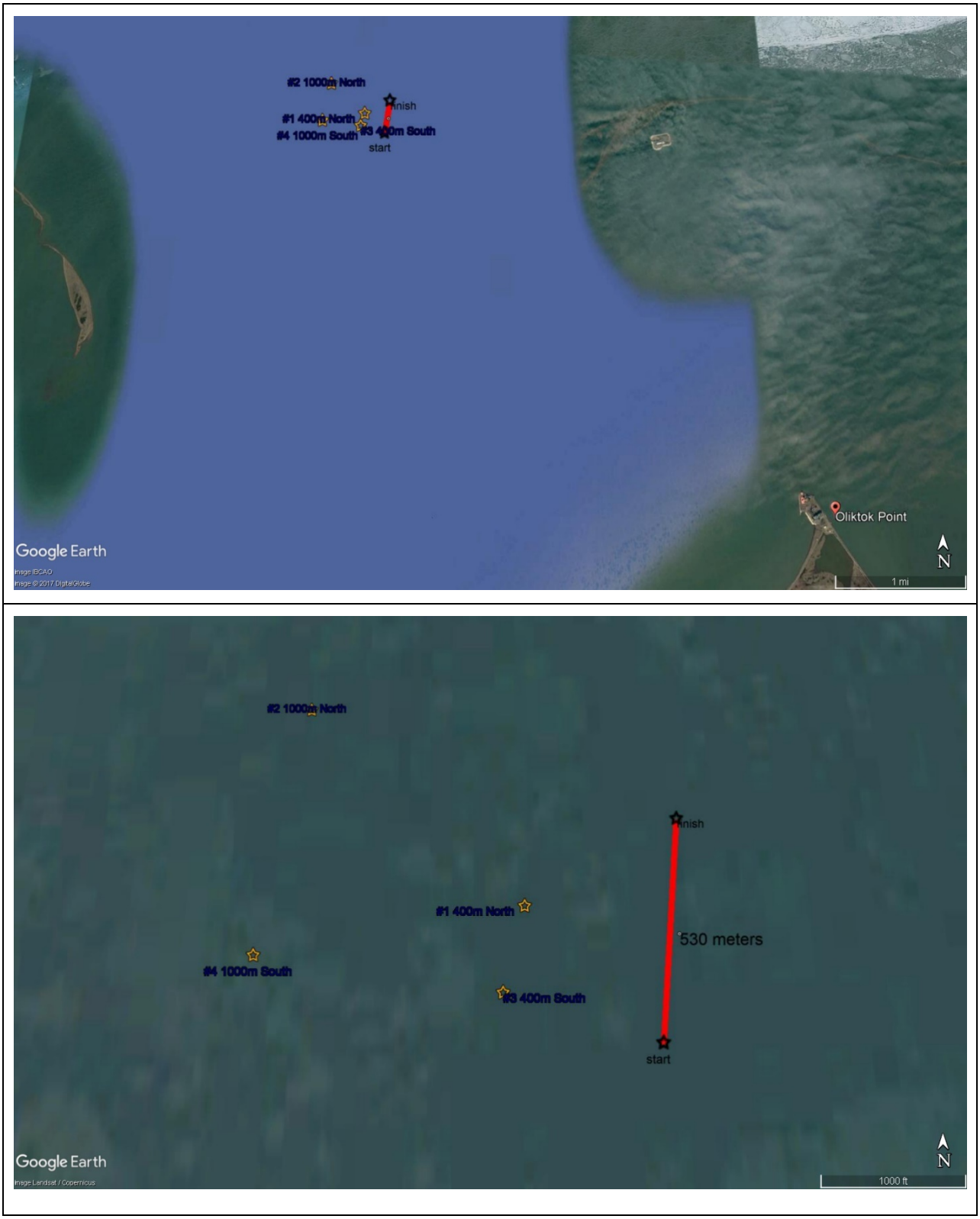


Figure 3 – Acoustic monitoring positions and track of Miller Bay barge (estimated to be 530 m during the measurement period).

MEASUREMENT RESULTS

Overall Sound Levels

The ploughing operations had several sound sources. The loudest sounds were generated by two tugs: the *Maggie M* and the *Dana Cruz*. There was a crew boat operating in the area that also created short-term noise events. The two tugs were used to manage the anchor lines that are used to move (via winching) the barge at a nearly continuous rate. A plough is pulled behind the *Miller Bay* barge; however, no discernable sound was detected from plough other than the acoustical beacons attached to it that made a tonal sound at 20,000 Hz[2]. This sound was at the upper limit of the frequency range of the acoustic measurements systems used for this SSV. The noise from the cavitation produced by the main propellers of the tugs made continuous sounds that were louder than all the other vessel-generated sounds. Since there were two tugs operating and there were the ratcheting sounds of the anchor lines, the acoustic environment around this operation was complex and varied considerably over time. *Figure 4* shows the 1-second RMS sound pressure levels measured over a four-hour period at each of the four autonomous measurement positions.

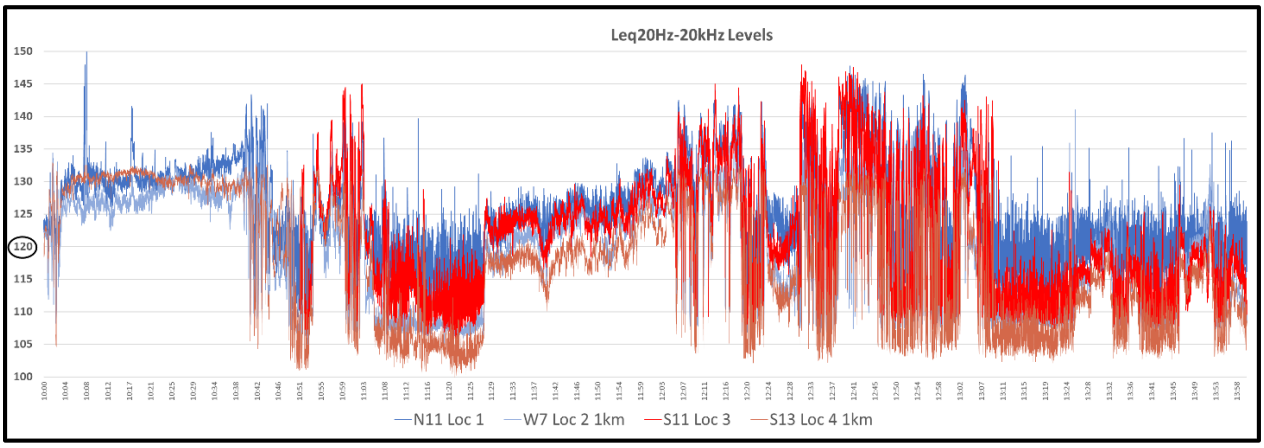


Figure 4 – Time history of sound levels measured over a 4-hour period on August 11, 2017. Note that measurements for Loc3 did not begin until almost 1-hour after the deployments of Loc1, Loc2, and Loc4 due to interference from the Dana Cruz tug handling of anchor lines.

The autonomous units were deployed at four positions, referred to as Locations 1 through 4. The first units were deployed at 09:30 ADT; however, tug operations delayed the deployment of Location 3 until 10:50 ADT. The time history shows the large variation in sound levels as various operations occurred over the course of the measurement period. During the measurements period, cable laying operations covered approximately 530 m. Spot measurements were conducted near the stern of the *Miller Bay* to isolate sounds from the plough.

Conditions during the SSV measurement were characterized by southwest winds of about 10 to 20 kilometers per hour and 1- to 1.5-m seas. Sea conditions (i.e., tidal current and swells) produced low frequency noise, primarily over the 20 to 31.5 Hz 1/3rd octave bands. To avoid the effect of

[2] There are two acoustical beacons attached to the plow operating at a 20-30 kHz range. Since these transponders are highly directional, they do not show up in much of the far-field sound measurements.

this noise, the sound contribution below the 25-Hz center 1/3rd octave band frequency were eliminated in the data analysis (filtered). Overall received sound levels typically ranged from 105 to 145 dB. The overall sound levels measured over this period and represented as energy-equivalent, or Leq, sound levels are summarized in *Table 2*. The four-hour period is reflective of the varying acoustic environment during ploughing operations. Note that the loudest sounds (or spikes in sound levels) measured near the beginning of the period were propeller cavitation sounds from the *Outright* crew boat that was deploying the hydrophones. This occurred when the *Outright* was in close proximity to the hydrophones. Since these were very short events, they appear to have not affected overall sound levels. There were other boat/barge operations not associated with this project occurring during the first part of the acoustic survey. It is not clear if they had any effect on the measurements. Based on the operating log, ploughing operations occurred throughout the measurement period except between 10:34 and 10:40 when anchors were shifted.

Table 2 – Overall Measured Levels.

Location	Overall Measured Leq	Overall Median 1-sec Level	Overall Average 1-sec Level
Loc1 ~400m West	132 dB Leq(4-hr)	125 dB	125 dB
Loc2 ~1,000m Northwest	126 dB Leq(4-hr)	119 dB	120 dB
Loc3 * ~450m Southwest	131 dB Leq(3-hr)*	121 dB*	120 dB*
Loc4 ~950m West	125 dB Leq(4-hr)	118 dB	118 dB

*Loc3 started 1-hour later due to local boat and anchor line activity.

Activity Levels

Sound levels were averaged over several different time segments in an effort to compute the sounds from various sources associated with the project. *Figure 5* shows the sound levels over time and the samples identified for further analysis.

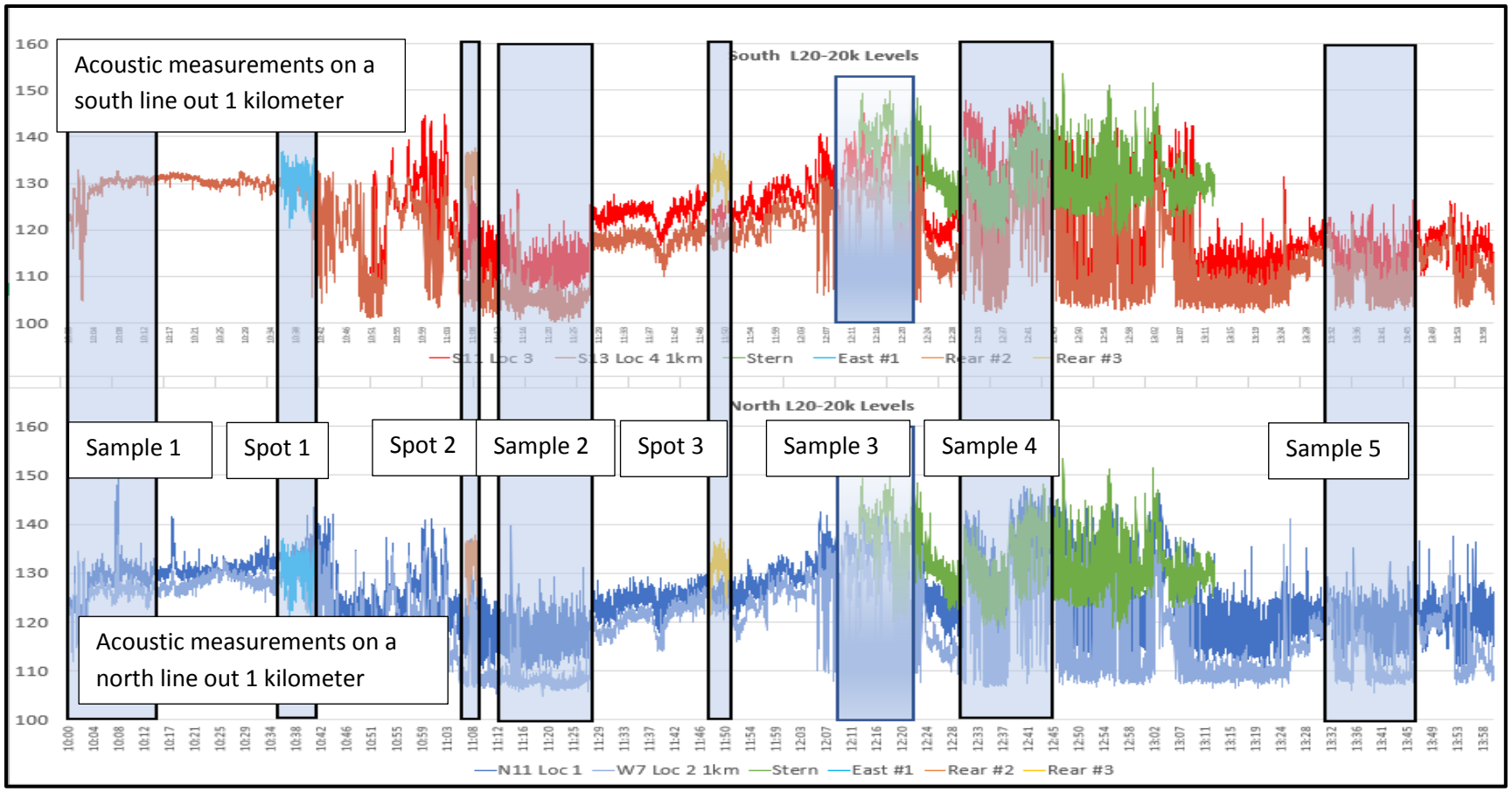


Figure 5 – Time history of sound levels measured both north and south at 300 to 400 m and about 1,000 m with spot samples. Shaded portions indicate the time periods data were analyzed to identify source level

Sample 1 – Time = 10:00-10:15

The first sample examined was from when the *Dana Cruz* tug was adjusting anchor lines near Loc3. Because of the tug activity, the Loc3 hydrophone could not be deployed until 10:54, when these anchoring operations were almost complete. The *Dana Cruz* tug and anchoring operations appeared to dominate the underwater sound environment (i.e., cavitation of main propellers and thrusters from working anchoring lines). It could not be discerned from the data what sound the *Maggie M* was contributing; however, the *Dana Cruz* was observed to be active during this period and the acoustic data reflect this since the hydrophones closest to the *Dana Cruz* measured the highest sound levels. The energy-average sound level, or Leq, during this period, along with the average distance from the hydrophones to each sound source, was used to compute the sound level fall off. The *Dana Cruz* was operating at about 600 to 1,200 m from the hydrophones where sound levels ranged from 131 to 126 dB. The computed distance to the 120-dB level was about 3,200 m from the *Dana Cruz*. Most of the sounds were in the 50 to 1,000 Hz 1/3rd octave band frequency range. *Figure 6* presents the acoustic data for this sampling period.

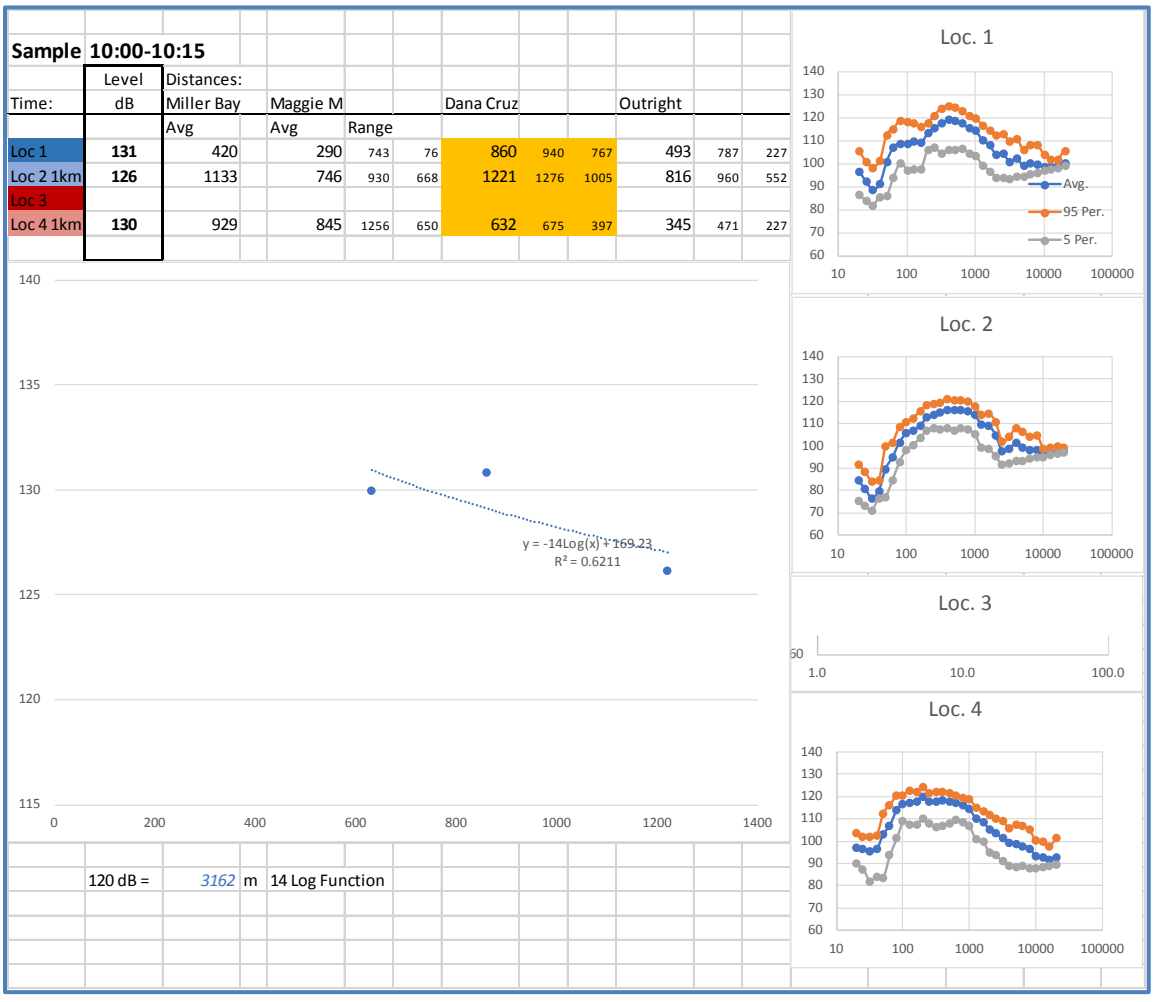


Figure 6 – Sound levels measured during Sample 1.

Spot 1 – Time = 10:36-10:42

A spot measurement was made about 200 to 400 m off the stern of the *Miller Bay*, while the *Dana Cruz* was handling anchor lines. It was not clear if the *Maggie M* tug was contributing to the measured sound levels. Using the distances from the *Dana Cruz*, sound levels fell off at a 13-Log rate, where the distance to the 120-dB level was about 5,000 m. It's not clear how much the *Maggie M* may have contributed. The correlation between sound levels from the *Maggie M* were better and suggest a fall-off rate of 24-Log with a higher source level. Using the *Maggie M* fall-off rate and source level, the distance to 120 dB was computed at 2,800 m. The average distance computed using both fall-off rates and source levels was 3,900 m. Similar to Sample 1, most of the sounds were in the 1/3rd octave band range between 50 and 1,200 Hz. *Figure 7* presents the acoustic data for the Spot 1 measurement.

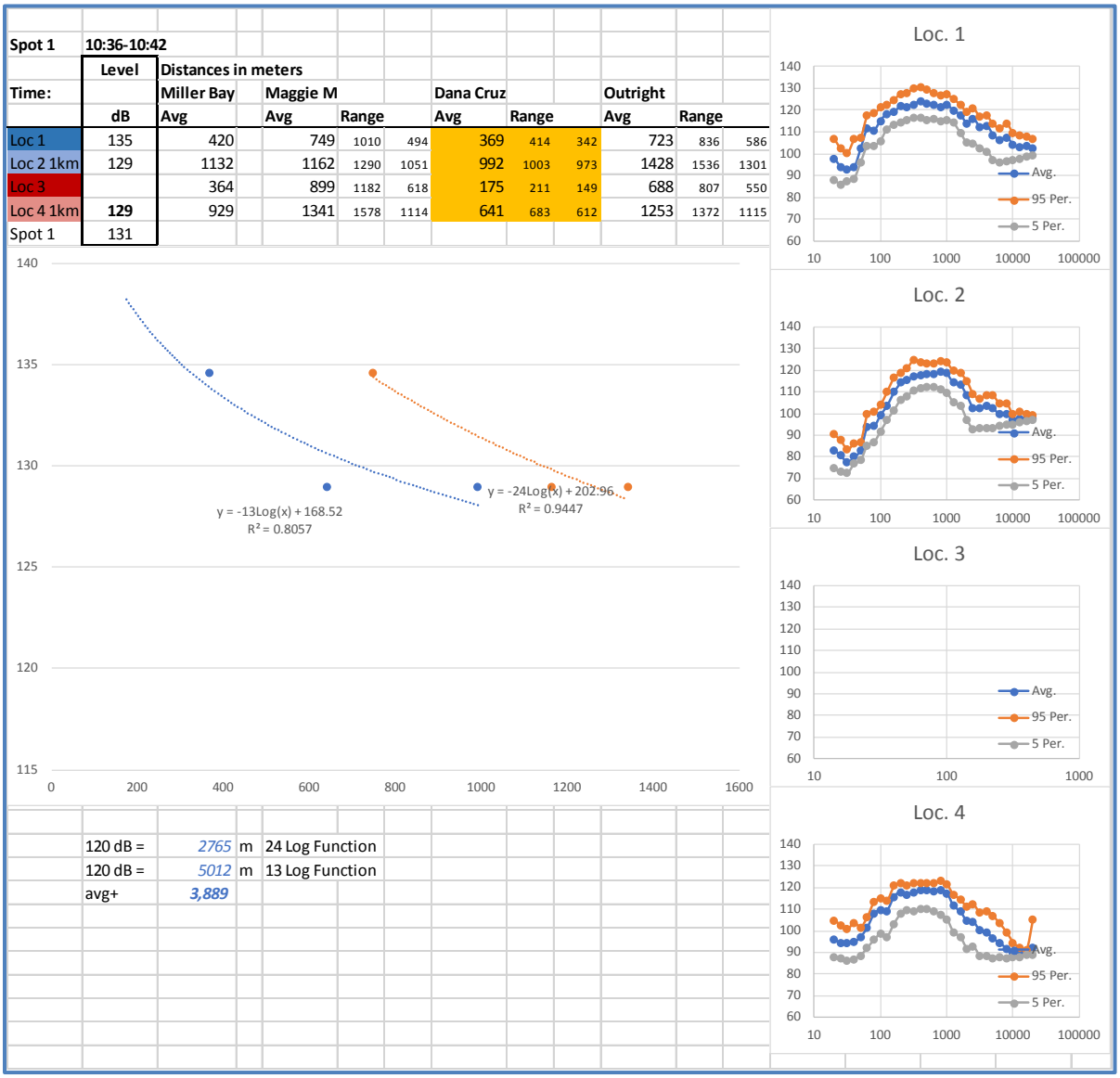


Figure 7 – Sound levels measured during Spot 1.

Spot 2 – Time = 11:07-11:09

A short spot measurement was made about 100 m southwest off the stern of the *Miller Bay*, while the *Dana Cruz* was ratcheting anchor lines. Much of the sounds in the 1/3rd octave band frequency range of 300 to 2,000 Hz. The computed distance to the 120-dB level was about 800 m. *Figure 8* presents the acoustic data for the Spot 2 measurement.

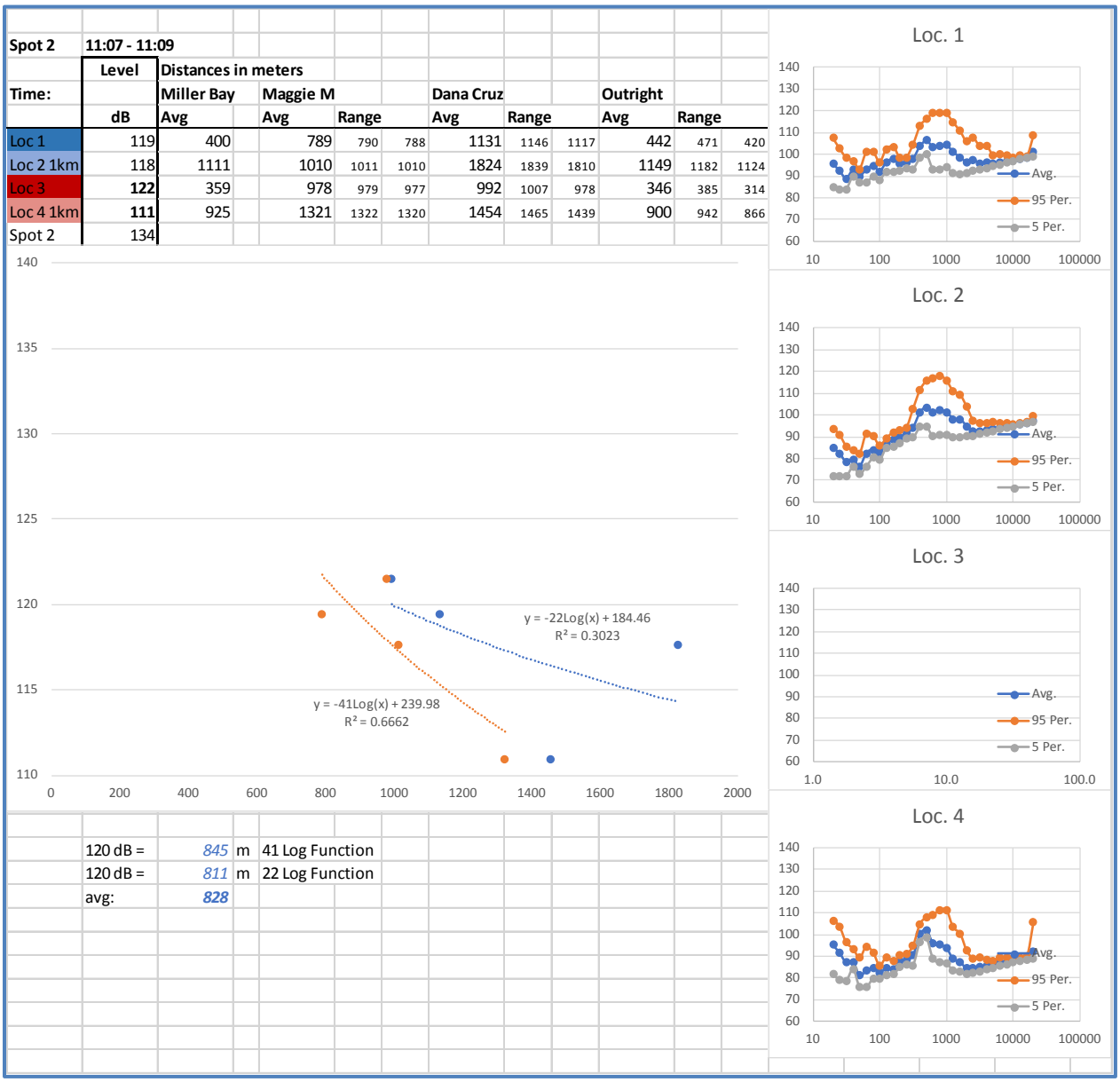
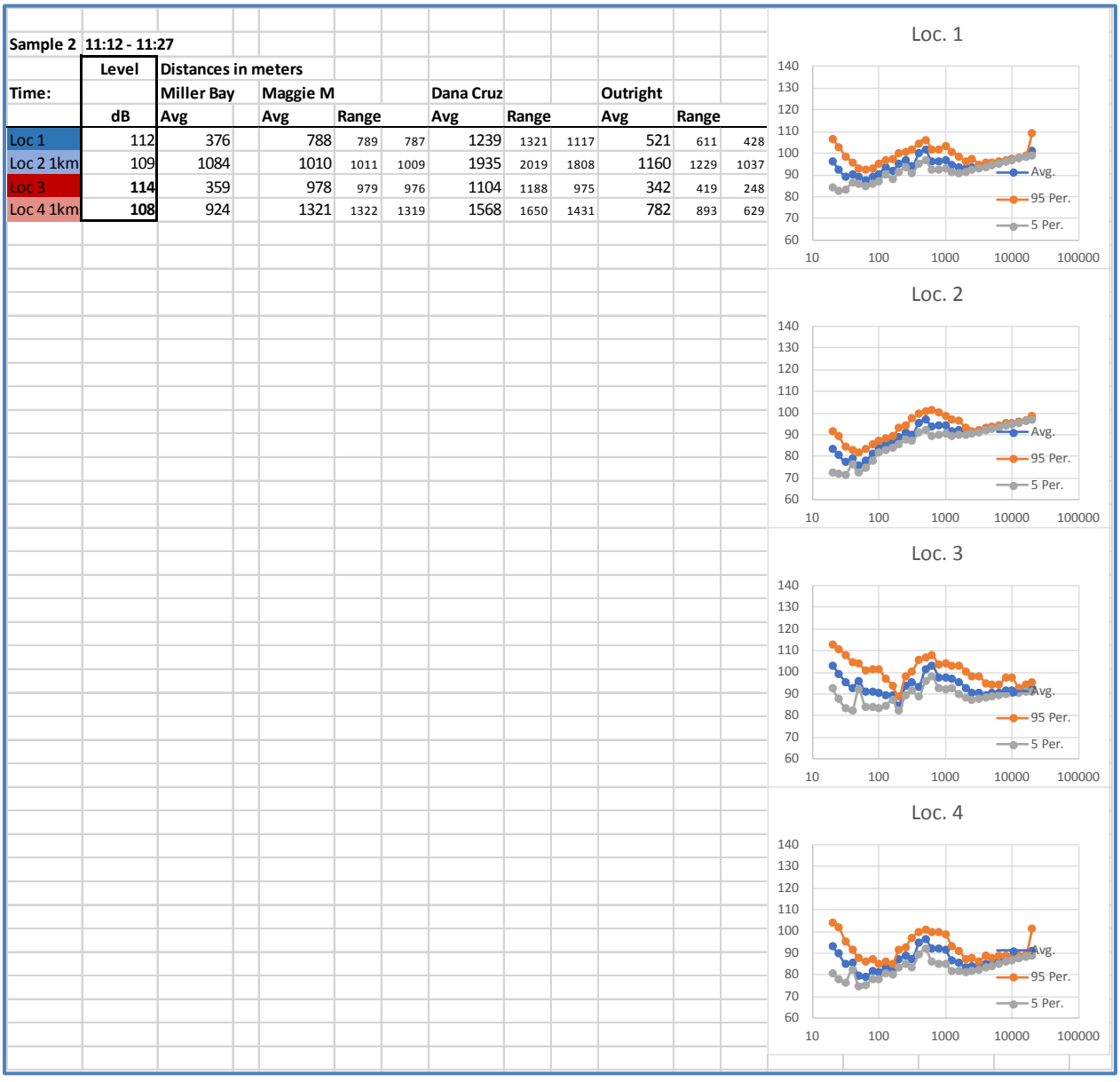


Figure 8 – Sound levels measured during Spot 2.

Sample 2 – Time = 11:12-11:27

A sample was analyzed for the period where little anchoring activity occurred during ploughing operations. Sound levels at all positions were below 115 dB. *Figure 9* presents the acoustic data for the Sample 2 measurement. The extent of the 120-dB sound levels was less than 300 m from the *Miller Bay* operation.



Sample 2	11:12 - 11:27										
	Level	Distances in meters									
Time:		Miller Bay	Maggie M			Dana Cruz			Outright		
	dB	Avg	Avg	Range		Avg	Range		Avg	Range	
Loc 1	112	376	788	789	787	1239	1321	1117	521	611	428
Loc 2 1km	109	1084	1010	1011	1009	1935	2019	1808	1160	1229	1037
Loc 3	**114**	359	978	979	976	1104	1188	975	342	419	248
Loc 4 1km	**108**	924	1321	1322	1319	1568	1650	1431	782	893	629

Figure 9 – Sound levels measured during Sample 2.

Spot 3 – Time = 11:12-11:27

The Spot 3 measurement was conducted when *Maggie M* tug operations were occurring. The acoustic data indicate that the *Dana Cruz* was not a substantial source of noise during this measurement. *Figure 10* presents the acoustic data for the Spot 3 measurement. Measurements indicate that sound levels exceeding 120 dB extended out about 1,300 m from the source (thought to be the *Maggie M*). While sounds from the *Maggie M* propeller cavitation and thrusters dominated the far-field sound environment, the acoustical beacons attached to the plough are evident at 20,000 Hz in some of the 1/3-rd octave band frequency spectra.

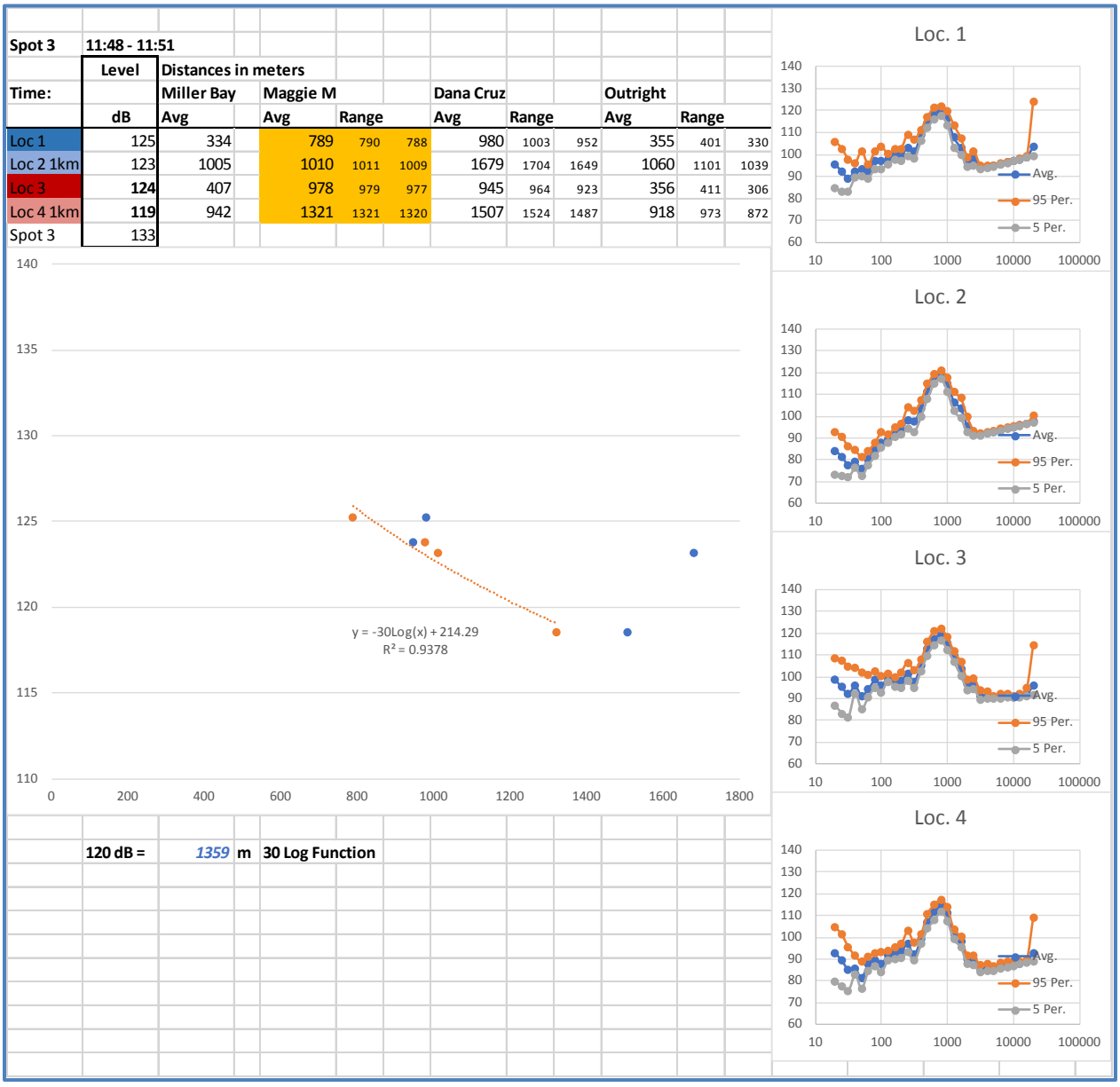
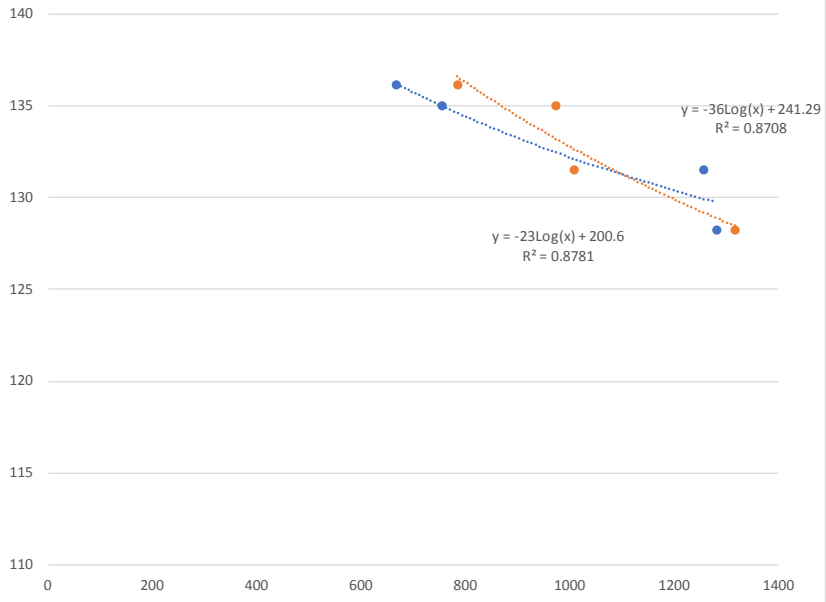


Figure 10 – Sound levels measured during Spot 3.

Sample 3 – Time = 12:06-12:20

The Sample 3 measurement occurred over one of the louder periods of the monitoring. It appears both tugs were active at the time. Based on an average fall off rate from both tug operations, the distance to the 120-dB level was computed at 2,800 m. *Figure 11* presents the acoustic data for this period.

Sample 3	12:06 - 12:20										
	Level	Distances in meters									
Time:		Miller Bay	Maggie M			Dana Cruz			Outright		
	dB	Avg	Avg	Range		Avg	Range		Avg	Range	
Loc 1	136	338	784	787	782	668	684	648	360	361	358
Loc 2 1km	131	966	1009	1010	1007	1257	1348	1155	951	956	949
Loc 3	**135**	450	974	976	971	754	801	700	492	493	486
Loc 4 1km	**128**	957	1317	1319	1315	1280	1304	1257	980	981	978



	120 dB =	***3325***	**m**	**23 Log Function**
	120 dB =	*2297*	m	36 Log Function
	avg	***2811***		

Figure 11 – Sound levels measured during Sample 3.

Sample 4 – Time = 12:30-12:45

Sample 4 includes sounds that appears to have been made by the *Dana Cruz*, which was operating relatively close to the hydrophones. Based on the measured sound levels and the distance from the *Dana Cruz*, the distance to the 120-dB levels was computed at 1,900 m. *Figure 12* presents the acoustic data for this period.

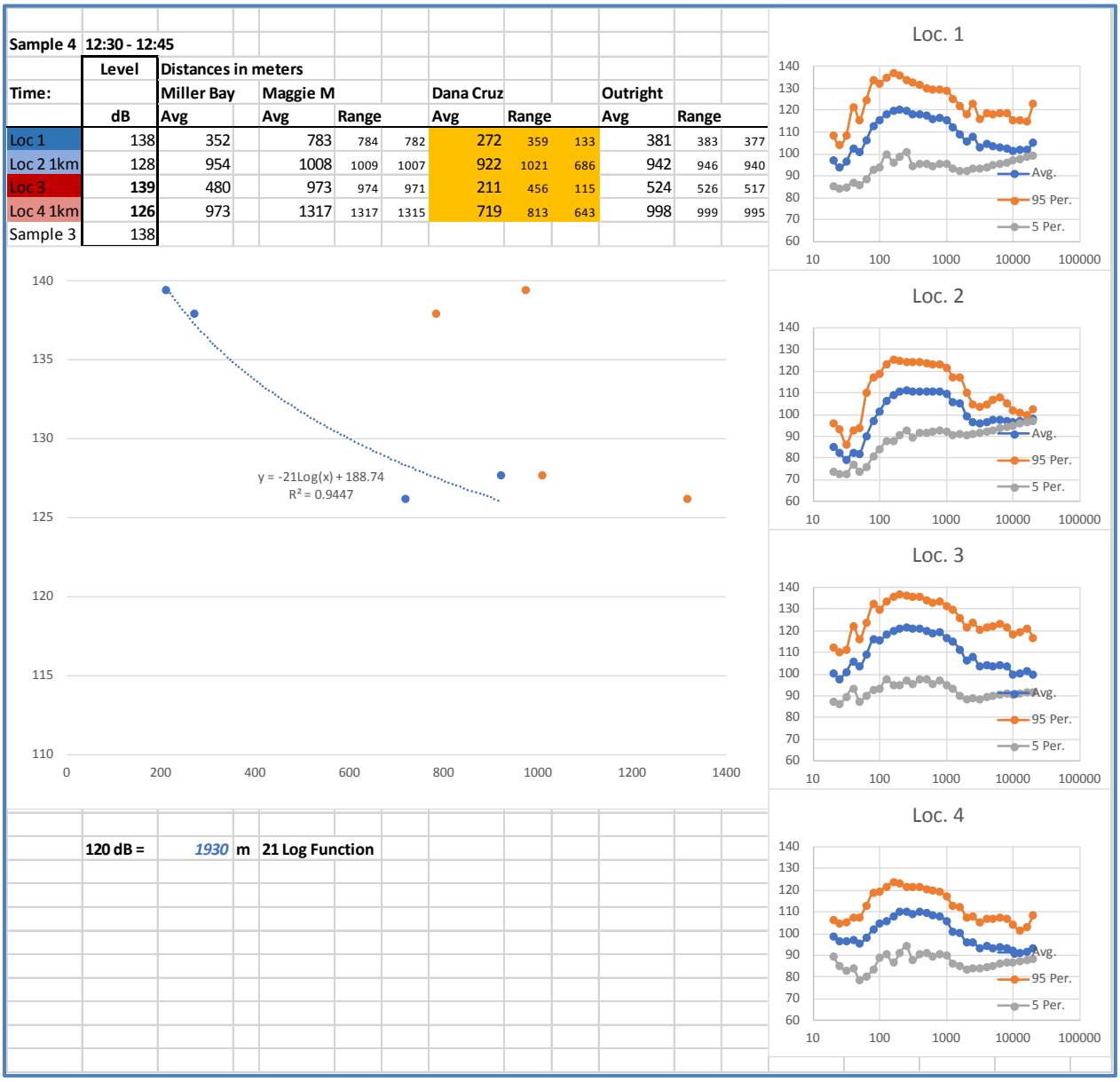


Figure 12 – Sound levels measured during Sample 4.

Sample 5 – Time = 13:30-13:45

Sample 5 includes sounds from the quietest period. During this period, tugs were not very active. Sound levels at all measurement positions were below 120 dB, ranging from 113 to 117 dB. The closest measurement position was about 400 m from the *Miller Bay* and 250 to 1,000 m from the tugs. *Figure 13* presents the acoustic data for this period. Note the tonal sound at 20,000 Hz that is likely associated with the acoustical beacons attached to the plough.

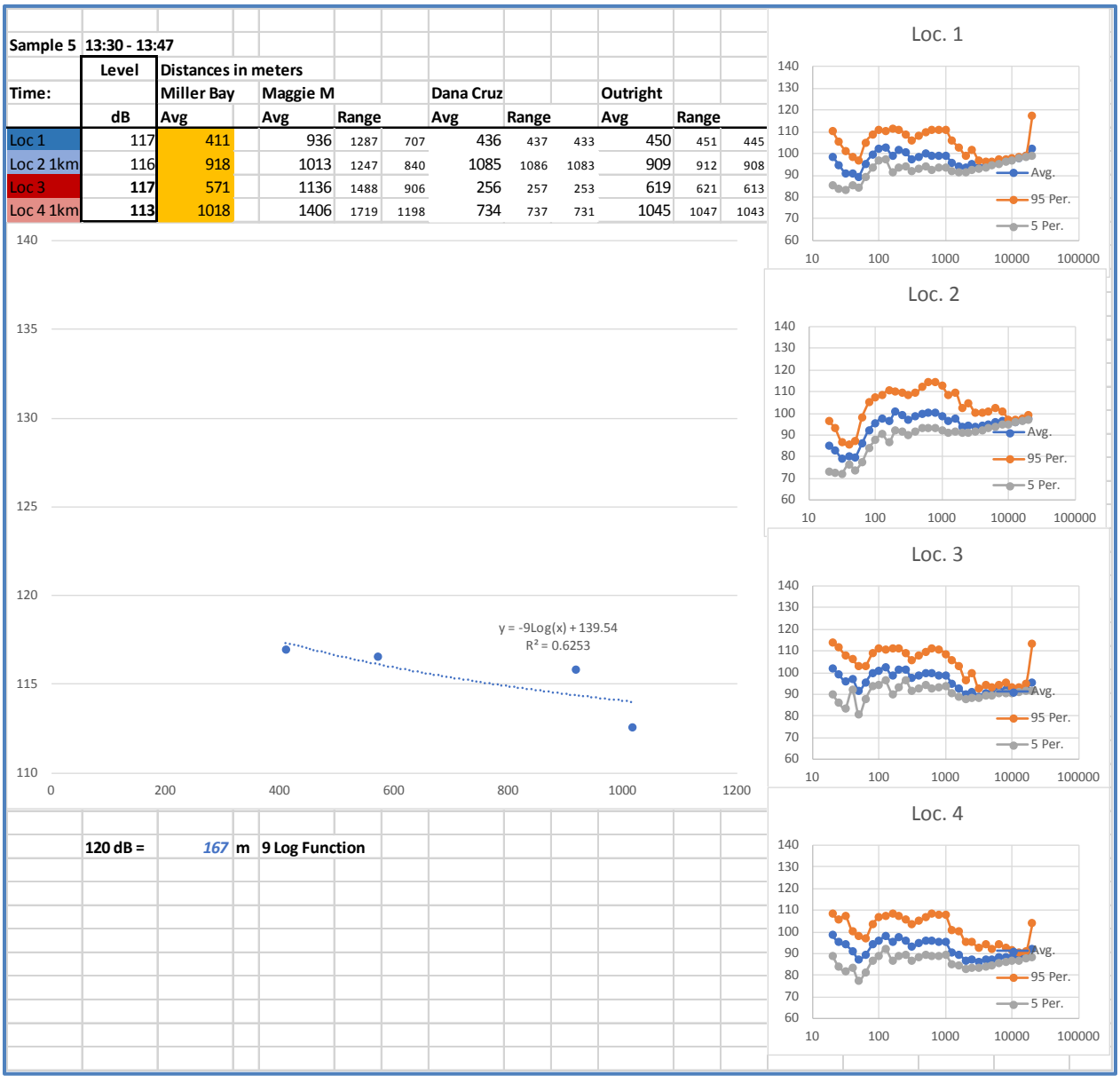


Figure 13 – Sound levels measured during Sample 5.

Distance to Threshold Levels

Measurements were made at various distances from *Miller Bay* cable-laying barge while pulling the plough. The continuous measurements made at the four different positions were plotted with the corresponding distances computed from the GPS coordinates, as shown in *Figure 14*. Measurements indicate that the distance to the 190- and 180-dB RMS levels were less than 10 m and probably did not occur near the sources. The distance to the 120-dB level is computed at a range of less than 200 m to 3.9 kilometers, depending on the average time and activity occurring. When tug operations were not occurring, the distance to the 120-dB threshold was less than 300 m. The overall transmission loss rate computed based on the 4-hour measurements are shown in *Figure 14*. The computed distances to the 120-dB threshold are reported in *Table 3*. Note these distances are based on the dominant source of sound and not just the barge operation.

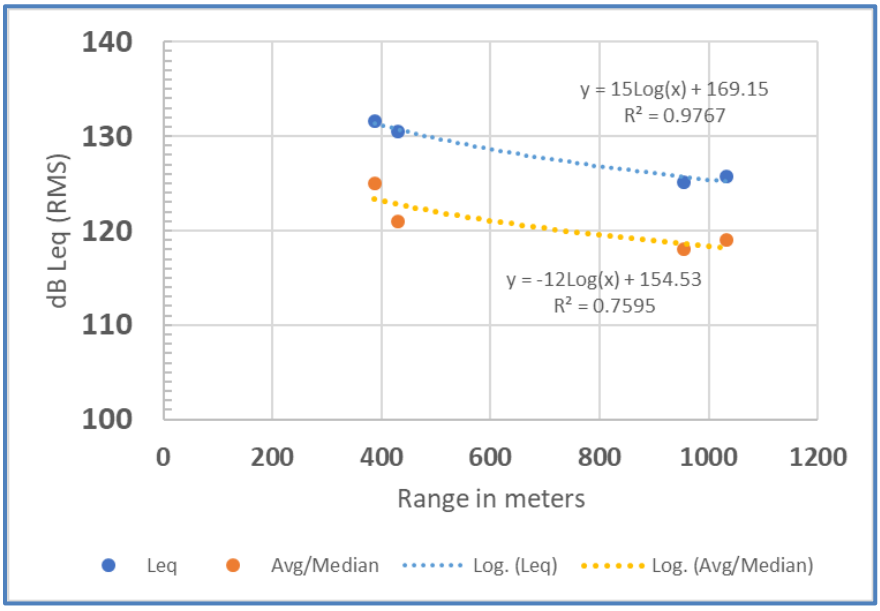


Figure 14 – Overall sound fall-off rate.

Table 3 - Distance to the 120-dB acoustic thresholds with Miller Bay operations.

Thresholds (continuous sounds, RMS)	**Approximate distance, based on relationship between measured level and range***
Based on overall Leq level	1,700 meters
Based on overall average/median 1-sec Leq	700 meters
Based on loudest operating period (Leq)	3,900 meters from source**
Based on quietest operating period (Leq)	<200 meters

* Based on broadband levels (20 – 20,000 Hz) in dB, re 1 µPa.
** Source is tug or tugs handling anchor lines, which could be up to 1 kilometer away from the barge.

Note that the highest sound levels are generated by tug propeller cavitation and thrusters. The *Miller Bay* operations that include towing of the plough were found to produce much less noise. In fact, the Sample 5 measurement indicates relatively quiet sounds are dominated by a 20,000 Hz tone from the acoustical beacons attached to the plough. The computed distance from the *Miller Bay* to the 120-dB level when tugs were not operating was less than 300 m. When tugs were operating, the range increased to about 3,600 m. Note that tugs operated several hundred meters from the *Miller Bay*, so the center of noise generating activities was not the *Miller Bay*. As shown in *Figures 4 and 5*, there was considerable variability in measured sounds levels over time. Since NMFS does not have a protocol for reporting RMS sound pressure levels from continuous sounds that vary in amplitude over time, Table 3 presents the sounds as energy and event averages.

This study focused on measurements to define the areas where levels exceeded 120 dB. The areas exceeding 160 dB were much closer to the sound sources than the measurements, so this discussion provided a rough estimate of the extent of the 160 dB levels. Based on the acoustic data collected in this survey, the only areas where sound pressure levels would exceed 160 dB were near the tug operations. When the tugs were not operating, it appears there were no areas where sound levels exceeded 160 dB. The distance to the 160-dB threshold was computed for the loudest sampling period described above, when tugs were operating (i.e., Sample 4 measurements). A distance of 120 m was computed using the average fall off rate from the *Dana Cruz* and from the *Maggie M*. Note that the distance was computed at 60 m for Spot 1 that had the longest distance to the120 dB threshold and less than 30 m for the other measurements periods. There were no measurements made near active tugs, so this estimate is a computed number that is well outside the measurement range. A tug would have to generate sound pressure levels greater than 175 dB at 10 m to generate such a large area above 160 dB.

High Frequency Sounds (Sounder or Transducer)

Sample measurements were made from and near the stern of the *Miller Bay* in close proximity to the cable ploughing. The sound during these measurements were mostly dominated by the distant tug operations. However, a tonal sound from the acoustical beacons attached to the plough at about 20,000 Hz was detected. This sound could not be fully characterized because it occurs at the upper frequency range of the recording and measurement equipment. This tonal sound appeared in the frequency spectra of most measurements, particularly when tug activity was quiet. These spectra include plots of the average, maximum (level exceeded 5 percent of the time) and minimum (level exceeded 95 percent of the time) plots. Since this sound is likely from a beacon that is intermittent, it primarily shows up in the maximum levels reported (i.e., 95^{th} percentile level). While detectable at times at the distant continuous measurement positions, this tone did not show up in the overall levels (i.e., not represented in the level exceeded 5 percent of the time). The overall $1/3^{rd}$ octave band frequency plots for the continuous measurements are provided in *Figures 16-19*. These high-frequency sounds were computed to fall off at a 30 dB per tenfold increase in distance ($30*\text{Log}_{10}$ rate). These sounds dropped below 120 dB at about 400 to 500 m from the source.

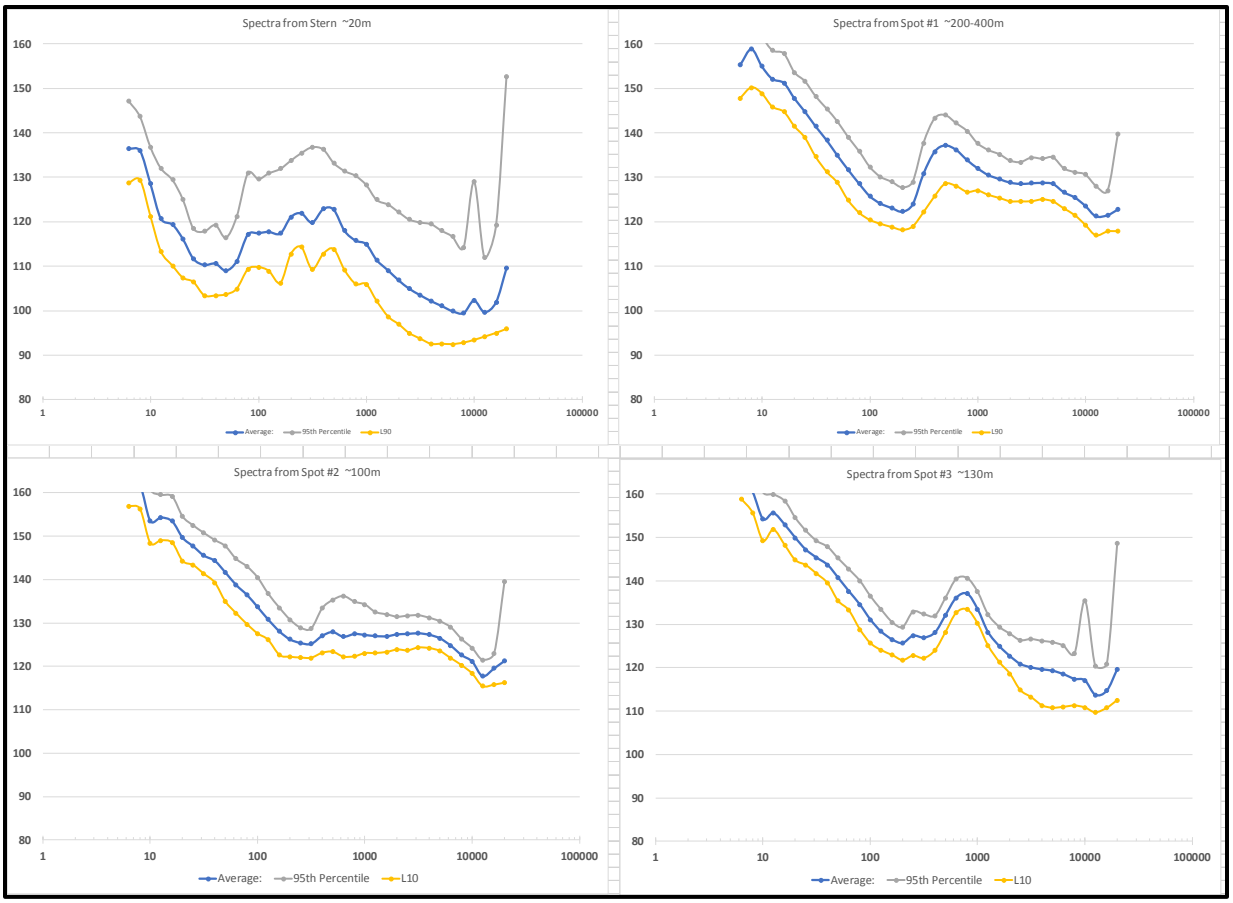


Figure 15 – 1/3rd Octave band frequency spectra for spot measurements made near the stern of the Miller Bay.

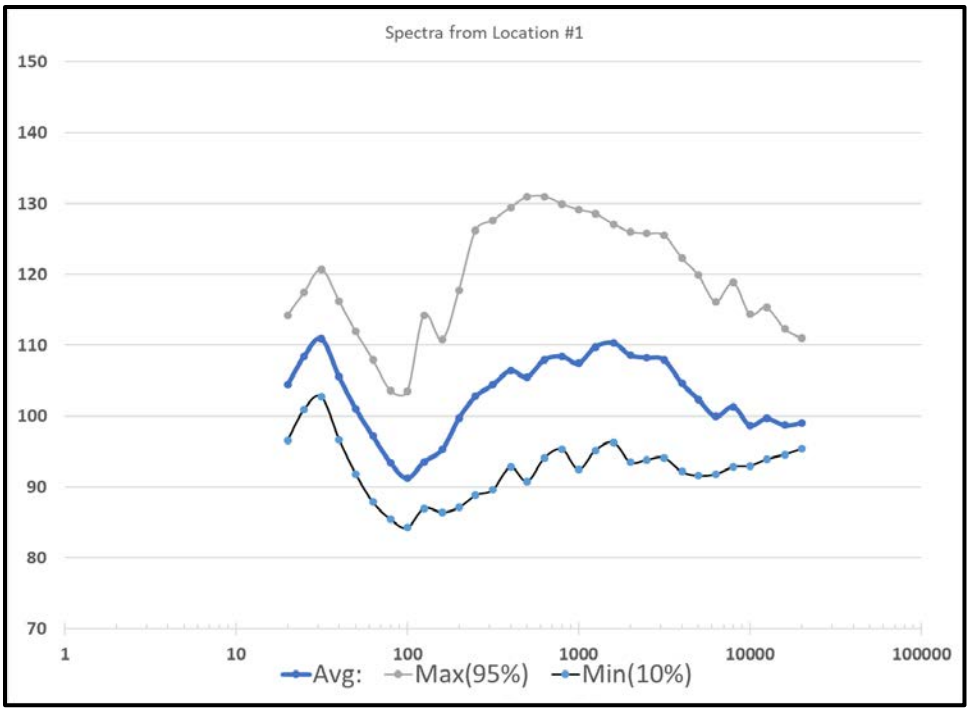


Figure 16 - 1/3rd-octave band spectra for Location 1

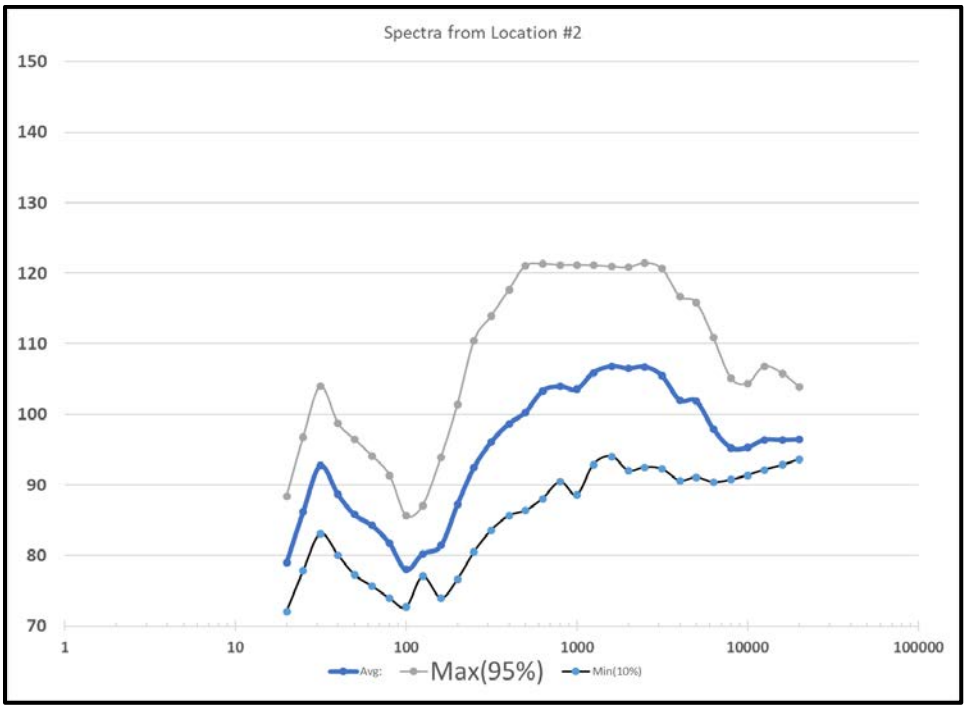


Figure 17 - 1/3rd-octave band spectra for Location 2

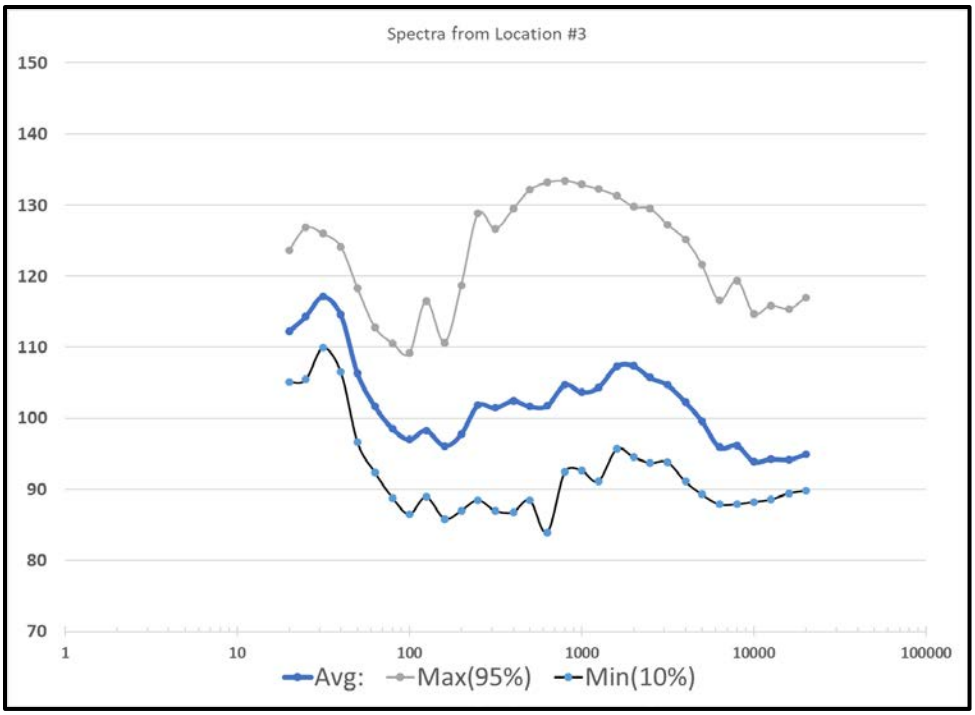


Figure 18 - 1/3rd-octave band spectra for Location 3

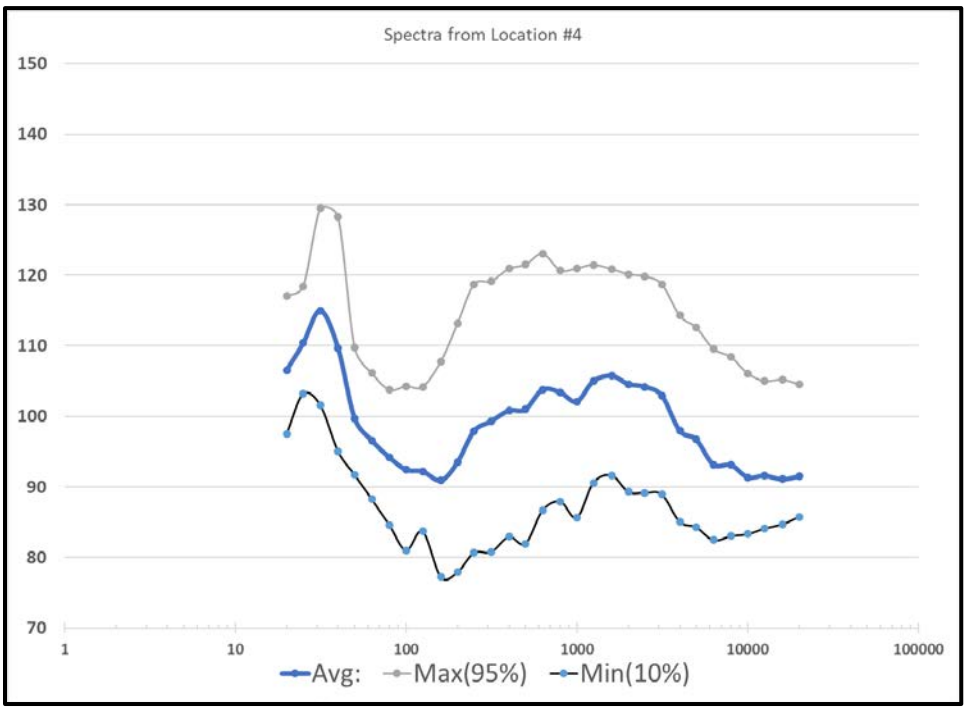


Figure 19 - 1/3rd-octave band spectra for Location 4

Appendix A – Glossary of Technical Terms

Ambient sound – Normal background sound in the environment that has no distinguishable sources.

Ambient sound level – The background sound pressure level at a given location, normally specified as a reference level to study a new intrusive sound source.

Amplitude – The maximum deviation between the sound pressure and the ambient pressure.

Background level – Similar to ambient sound level with the exception that is a composite of all sound measured during the construction period minus the pile removal.

Decibel (dB) – A customary scale most commonly used for reporting levels of sound. A difference of 10 dB corresponds to a factor of 10 in sound power. A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure. The reference pressure for water is 1 microPascal, and for air it is 20 microPascals (the threshold of healthy human auditory sensitivity).

Fast, Slow, and Impulse – Most sound level meters have two conventional time weightings, F = Fast and S = Slow with time constants of 125 milliseconds (ms) and 1,000 ms, respectively. Some also have I = Impulse time weighting, which is a quasi-peak detection characteristic with rapid rise time (35 ms) and a much slower 1.5-second decay.

- F = 125 ms up and down
- S = 1 second up and down
- I = 35 ms while the signal level is increasing or 1,500 ms while the signal level is decreasing.

Frequency – The number of complete pressure fluctuations per second above and below atmospheric pressure, measured in cycles per second (Hertz [Hz]). Normal human hearing is between 20 and 20,000 Hz. Infrasonic sounds are below 20 Hz and ultrasonic sounds are above 20,000 Hz.

Frequency spectrum – The distribution of frequencies that comprise a sound.

Hertz (Hz) – The units of frequency where 1 Hz equals 1 cycle per second.

Kilohertz (kHz) – 1,000 Hz

L_{eq} – *Equivalent Average Sound Pressure Level (or Energy-Averaged Sound Level).* The decibel level of a constant noise source that would have the same total acoustical energy over the same time interval as the actual time-varying noise condition being measured or estimated. Leq values must be associated with an explicit or implicit averaging time in order to have practical meaning. The use of A-weighted, C-weighted, or Z-weighted (flat) decibel units sometimes is indicated by LA_{eq}, LC_{eq}, or LZ_{eq}, respectively

LZ_{eq} – Z-weighted, Leq, sound pressure level.

LZ_{max} – Maximum Sound Pressure level during a measurement period or a noise event.

LZ_{peak} – Z-weighted peak sound pressure level.

microPascal (μPa) – The Pascal (symbol Pa) is the SI unit of pressure. It is equivalent to one Newton per square meter. There are 1,000,000 microPascals in one Pascal.

Peak sound pressure level (L_{PEAK}) – The largest absolute value of the instantaneous sound pressure. This pressure is expressed in decibels (referenced to a pressure of 1 μPa for water and 20 μPa for air) or in units of pressure, such as μPa or Pounds per Square Inch.

Root mean square (RMS) sound pressure level – Decibel measure of the square root of mean square (RMS) pressure. For impulses, the average of the squared pressures over the time that comprise that portion of the waveform containing 90 percent of the sound energy of the impulse.

SLM – Sound level meter.

Sound – Small disturbances in a fluid from ambient conditions through which energy is transferred away from a source by progressive fluctuations of pressure (or sound waves).

Sound exposure – The integral over all time of the square of the sound pressure of a transient waveform.

Sound exposure level (SEL) – The time integral of frequency-weighted squared instantaneous sound pressures. Proportionally equivalent to the time integral of the pressure squared. Sound energy associated with an acoustical event is characterized by the SEL. SEL is the constant sound level in one second, which has the same amount of acoustic energy as the original time-varying sound (i.e., the total energy of an event). SEL is calculated by summing the cumulative pressure squared over the time of the event ($1\mu Pa^2$-sec**)**.

Sound pressure level (SPL) – An expression of the sound pressure using the decibel (dB) scale and the standard reference pressures of 1 μPa for water and 20 μPa for air when addressing human concerns. Sound pressure is the sound force per unit area, usually expressed in microPascals (or microNewtons per square meter), where 1 Pascal is the pressure resulting from a force of 1 Newton exerted over an area of 1 square meter. The SPL is expressed in dB as one or 20 times the logarithm to the base 10 of the ratio between the pressure exerted by the sound to a reference sound pressure. SPL is the quantity directly measured by a sound level meter.

Z-weighted – Z-weighting is a flat frequency response of 10 Hz to 20 kHz ±1.5 dB. This response replaces the older "Linear" or "Unweighted" responses as these did not define the frequency range over which a sound level meter would be linear.

A-Weighted - The sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise.

APPENDIX D – PASSIVE ACOUSTICAL MONITORING

This report to be provided separately by the NMFS Marine Mammal Laboratory authors in 2018.

APPENDIX E – BEAUFORT SEA STATE SCALE

Beaufort Wind Force (Sea State)

Beaufort Force	Wind speed (kts)	Descriptive Terms	Effect at Sea
0	Less than 1	Calm	Sea like a mirror. Smoke rises vertically.
1	1-3	Light air	Ripples with the appearance of scales are formed but without foam crests. Smoke drifts from stack.
2	4-6	Light breeze	Small wavelets, still short but more pronounced; crests have glassy appearance and do not break. Wind felt on face.
3	7-10	Gentle breeze	Large wavelets. Crests begin to break. Foam of glassy appearance. Perhaps scattered whitecaps. Wind extends light flag.
4	11-16	Moderate breeze	Small waves, becoming longer; fairly frequent whitecaps. Wind raises dust, loose paper.
5	12-21	Fresh breeze	Moderate waves, taking a more pronounced long form; many whitecaps are formed (chance of some spray). Flag waves and snaps briskly.
6	22-27	Strong breeze	Large waves begin to form; the white foam crests are more extensive everywhere (probably some spray). Whistling in rigging.
7	28-33	Moderate gale	Sea heaps up and white foam from breaking waves begins to be blown in streaks along the direction of the wind. (Spray begins to be seen.) Inconvenient to walk in the wind.
8	34-40	Fresh gale	Moderately high waves of greater length; edges of crests break into spray. The foam is blown in well-marked streaks along the direction of the wind. Difficult to walk into the wind.
9	41-47	Strong gale	High waves. Dense streaks of foam along the direction of the wind. Sea begins to roll. Spray may affect visibility.
10	48-55	Whole gale	Very high waves with long overhanging crests. The resulting foam in great patches is blown in dense white streaks along the direction of the wind. On the whole, the surface of the sea takes a while appearance. The rolling of the sea becomes heavy and shock like. Visibility is affected.
11	56-63	Storm	Exceptionally high waves. (small and medium-sized ships might be for a long time lost to view behind waves.) The sea is completely covered with long white patches of foam lying along the direction of the wind. Everywhere the edges of the wave crests are blown in the froth. Visibility affected.
12	Above 64	Hurricane	The air is filled with foam and spray. Sea completely white with driving spray; visibility very seriously affected.

APPENDIX F – BEHAVIOR AND REACTION CODES

Behavior	Description
Blow	Animal exhales forming a misty column.
Bow Ride	Animal approaches the vessel and jumps repeatedly in the pressure wave in front of the vessel.
Breach	Animal propels itself out of the water showing 1/2 or more of body above the surface.
Dive	Animal shows arch to tail stock before submerging for a period of time.
Feed	Prey or prey indicators (birds) visible during observations.
Fluke	Bringing tail flukes into the air at the beginning of a dive.
Lobtail	Slapping the tail surface down on the water.
Logging	Animal is stationary and horizontal at the surface and appears to be resting.
Looking	Animal is looking at something in particular.
Milling	Surfacing in constantly varying directions while remaining in the same area.
Other	Behavior other than what is listed; notes provided.
Porpoising	high speed surface behavior where long jumps are alternated with swimming close to the surface.
Rafting	Several individual animals lying together at the surface.
Resting	Animal is resting either at the surface of the water or on ice/land.
Sink	Animal at the surface sinks into the water without any other movement; often pinnipeds.
Spyhop	Animal rises vertically to a point where the eyes are above the water.
Surface Active	Animal is displaying more than one surface behavior, but not actively traveling in any direction. Often a group behavior.
Surface Active Travel	Animal is displaying more than one surface behavior and actively traveling in any direction. Often a group behavior.
Swim	Animal is swimming at or near the surface (not diving).
Thrash	Violent movement at surface that produces splash.
Traveling	Animals moving in a particular direction; group behavior.
Unknown	Behavior is unknown due to sighting distance or brevity.
Walking	Animal walking on ice or land; polar bears only.
Reaction	**Definition**
Change Direction	Animal changes direction of travel and proceeds in a new direction.
Increase Speed	Animal increases swim speed
Looking	Animal looks at vessel.
None	No notable reaction deviating from initial behavior.
Splash	Animal splashes, usual a result of a dive.
Spy hop	Animal rises vertically to a point where the eyes are above the water to look at vessel

APPENDIX G – SIGHTING DATA

Table G-1. Summary of all sightings of marine mammals recorded within the project area (north of 64°N) during Quintillion's 2017 fiber optic cable program.

Sight #	Vessel	Date	Time	Latitude	Longitude	Vessel Activity	Vessel Heading (deg)	Speed (kt)	Precip / Cloud Cover	Vis	Sea State	Species	Group Size	# Juvs	Behavior	Reaction	CPA (m)
16	Ile de Batz	07/01/2017	11:21:01	64.6224	168.4484	Transit	319	5.3	Fog	1	3	Gray Whale	4	0	Surface Act.	None	500
17	Ile de Batz	07/01/2017	19:07:28	64.9307	168.9782	ROV	0	0	Overcast	9	3	Gray Whale	1	0	Traveling	None	2682
18	Ile de Batz	07/01/2017	19:45:43	64.9305	168.9779	DP	0	0	Overcast	9	3	Gray Whale	1	0	Traveling	None	1541
19	Ile de Batz	07/01/2017	21:07:10	64.9306	168.9780	DP	0	0	Fog	1	2	Steller Sea Lion	1	0	Spyhop	Looking	10
22	Ile de Batz	07/02/2017	6:43:40	64.9301	168.9787	DP	0	0	Overcast	10	3	Steller Sea Lion	1	0	Surface Act.	Looking	10
23	Ile de Batz	07/02/2017	11:33:42	64.9281	168.9767	ROV	350	0.1	Overcast	10	2	Unid. Mysticete	1	0	Blow	None	2149
24	Ile de Batz	07/02/2017	15:26:10	64.9248	168.9718	ROV	316	0	Overcast	10	3	Unid. Mysticete	1	0	Blow	None	2149
25	Ile de Batz	07/02/2017	20:14:44	64.9550	168.9716	DP	350	0	Overcast	10	3	Gray Whale	1	0	Traveling	None	2682
26	Ile de Batz	07/02/2017	20:27:16	64.9250	168.9715	DP	350	0	Overcast	10	3	Unid. Mysticete	1	0	Blow	None	3579
27	Ile de Batz	07/02/2017	20:45:13	64.9250	168.9717	DP	350	0.1	Overcast	10	3	Gray Whale	2	0	Traveling	None	5462
28	Ile de Batz	07/02/2017	21:10:10	64.9250	168.9711	DP	350	0.1	Overcast	10	3	Gray Whale	1	0	Traveling	None	2149
29	Ile de Batz	07/02/2017	21:42:49	64.9249	168.9709	DP	20	0	Overcast	10	3	Gray Whale	1	0	Traveling	None	2149
30	Ile de Batz	07/02/2017	22:40:30	64.9248	168.9711	DP	20	0	Overcast	10	3	Gray Whale	1	0	Traveling	None	2149
31	Ile de Batz	07/02/2017	23:42:10	64.9250	168.9709	DP	20	0	Overcast	10	3	Gray Whale	1	0	Traveling	None	1203
32	Ile de Batz	07/03/2017	1:18:28	64.9248	168.9717	DP	335	0.1	Overcast	9	3	Gray Whale	1	0	Traveling	None	1203
33	Ile de Batz	07/03/2017	3:40:52	64.9249	168.9718	DP	330	0	Overcast	4	3	Gray Whale	1	0	Traveling	None	1351
34	Ile de Batz	07/03/2017	10:59:52	64.9300	168.9789	DP	330	0.1	Part Cloudy	10	2	Unid. Mysticete	1	0	Fluking	None	5462
35	Ile de Batz	07/03/2017	11:36:37	64.9300	168.9789	DP	330	0.1	Part Cloudy	10	2	Unid. Mysticete	1	0	Blow	None	7613
37	Ile de Batz	07/03/2017	17:10:57	64.9297	168.9779	ROV	330	0.1	Part Cloudy	10	3	Gray Whale	1	0	Traveling	None	1203
38	Ile de Batz	07/03/2017	20:06:08	64.9291	168.9770	ROV	0	0.1	Overcast	10	3	Gray Whale	1	0	Traveling	None	2682
39	Ile de Batz	07/03/2017	22:08:10	64.9251	168.9710	ROV	0	0.1	Overcast	9	2	Unid. Mysticete	1	0	Blow	None	5462
40	Ile de Batz	07/03/2017	22:29:33	64.9258	168.9698	ROV	0	0.1	Overcast	9	2	Gray Whale	1	0	Traveling	None	1541
41	Ile de Batz	07/04/2017	1:03:25	64.9291	168.9771	ROV	0	0.1	Overcast	9	3	Gray Whale	1	0	Traveling	None	2682
42	Ile de Batz	07/04/2017	5:07:11	64.9249	168.9722	ROV	305	0.1	Overcast	9	4	Unid. Mysticete	3	0	Traveling	None	5462
43	Ile de Batz	07/04/2017	7:28:22	64.9302	168.9761	DP	288	0.3	Overcast	10	4	Humpback Whale	7	1	Surface Act.	None	905

Table G-1. Summary of all sightings of marine mammals recorded within the project area (north of 64°N) during Quintillion's 2017 fiber optic cable program.

Sight #	Vessel	Date	Time	Latitude	Longitude	Vessel Activity	Vessel Heading (deg)	Speed (kt)	Precip / Cloud Cover	Vis	Sea State	Species	Group Size	# Juvs	Behavior	Reaction	CPA (m)
44	Ile de Batz	07/04/2017	14:51:00	64.9281	168.9746	Mattress	174	0.1	Overcast	10	4	Pac. Walrus	1	0	Resting	Approach	3
45	Ile de Batz	07/04/2017	15:03:03	64.9281	168.9746	ROV	174	0.1	Overcast	10	4	Fin Whale	2	0	Traveling	None	1250
46	Ile de Batz	07/05/2017	2:13:19	64.9223	168.9935	ROV	209	0.1	Fog	5	5	Humpback Whale	1	0	Breaching	None	3579
47	Ile de Batz	07/06/2017	22:11:40	64.9294	168.9923	ROV	205	0.4	Fog	3	5	Gray Whale	1	0	Traveling	None	1541
48	Ile de Batz	07/07/2017	23:58:10	64.9321	168.9748	ROV	180	0.2	Fog	5	3	Humpback Whale	1	0	Traveling	None	600
49	Ile de Batz	07/08/2017	5:26:59	64.9300	168.9769	DP	0	2	Part Cloudy	7	2	Gray Whale	2	0	Traveling	None	2682
50	Ile de Batz	07/08/2017	6:34:45	64.9303	168.9771	DP	359	0.1	Part Cloudy	10	2	Gray Whale	1	0	Traveling	None	2149
51	Ile de Batz	07/08/2017	9:09:33	64.9303	168.9766	Mattress	359	0	Overcast	10	2	Ringed Seal	1	0	Milling	None	5
52	Ile de Batz	07/08/2017	15:22:05	64.9302	168.9768	Mattress	359	0.1	Fog	4	2	Minke Whale	1	0	Traveling	None	750
53	Ile de Batz	07/08/2017	17:55:00	65.0951	168.8777	Transit	16	6.9	Fog	1	1	Minke Whale	1	0	Traveling	None	500
54	Ile de Batz	07/08/2017	18:09:55	65.1256	168.8543	Transit	11	9.8	Fog	2	1	Gray Whale	1	0	Fluking	None	500
55	Ile de Batz	07/08/2017	18:44:52	65.2230	168.7937	Transit	16	12.4	Fog	3	1	Gray Whale	1	0	Fluking	None	325
56	Ile de Batz	07/08/2017	19:11:35	65.3119	168.7377	Transit	16	12.4	Fog	3	1	Gray Whale	2	0	Traveling	None	2000
57	Ile de Batz	07/08/2017	19:12:34	65.2170	168.7368	Transit	16	12.4	Fog	3	1	Gray Whale	1	0	Traveling	None	2682
58	Ile de Batz	07/10/2017	15:00:24	68.3367	166.7204	ROV	40	0	Part Cloudy	3.5	5	Gray Whale	1	0	Blow	None	775
59	Ile de Batz	07/12/2017	21:14:40	68.2043	167.1603	ROV	150	0.3	Fog	1	2	Bearded Seal	1	0	Looking	Looking	100
60	Ile de Batz	07/14/2017	9:40:53	69.3261	166.5697	Transit	45	12.6	Clear	10	2	Humpback Whale	2	0	Surface Act.	None	3579
61	Ile de Batz	07/14/2017	10:30:08	69.4710	166.1366	Transit	46	12.4	Clear	10	2	Unid. Mysticete	1	0	Breaching	None	650
62	Ile de Batz	07/14/2017	17:37:37	70.4484	163.1435	Transit	45	12.5	Clear	10	2	Unid. Whale	1	0	Thrashing	Avoid	150
63	Ile de Batz	07/14/2017	19:52:30	70.7857	162.0860	Transit	45	12.4	Clear	10	2	Bearded Seal	1	0	Traveling	Looking	450
64	Ile de Batz	07/14/2017	20:32:15	70.8273	162.7980	Transit	85	12.5	Clear	10	2	Bearded Seal	1	0	Looking	Change Dir.	250
65	Ile de Batz	07/14/2017	21:49:58	70.8583	160.9050	Transit	84	12.4	Clear	10	2	Unid. Mysticete	1	0	Blow	None	4313
66	Ile de Batz	07/14/2017	22:17:40	70.8611	160.6660	Transit	84	12.4	Part Cloudy	10	2	Gray Whale	1	0	Traveling	None	1795
67	Ile de Batz	07/14/2017	22:29:07	70.8673	160.5082	Transit	84	9.9	Part Cloudy	10	2	Gray Whale	3	1	Feeding	Avoid	250
68	Ile de Batz	07/14/2017	23:18:22	70.8667	160.4542	Transit	290	2.5	Part Cloudy	10	2	Gray Whale	4	0	Surface Act.	None	2149

Table G-1. Summary of all sightings of marine mammals recorded within the project area (north of 64°N) during Quintillion's 2017 fiber optic cable program.

Sight #	Vessel	Date	Time	Latitude	Longitude	Vessel Activity	Vessel Heading (deg)	Speed (kt)	Precip / Cloud Cover	Vis	Sea State	Species	Group Size	# Juvs	Behavior	Reaction	CPA (m)
70	Ile de Batz	07/15/2017	2:28:15	70.8658	160.4543	ROV	199	0.1	Clear	10	2	Bearded Seal	1	0	Traveling	None	400
71	Ile de Batz	07/15/2017	3:21:10	70.8662	160.4554	ROV	249	0.1	Part Cloudy	10	2	Gray Whale	3	0	Traveling	None	3579
72	Ile de Batz	07/15/2017	4:16:08	70.8660	160.4539	ROV	201	0.1	Overcast	10	2	Gray Whale	1	0	Traveling	None	836
75	Ile de Batz	07/19/2017	1:24:44	66.8644	163.1369	DP	1	0	Part Cloudy	10	1	Ringed Seal	1	0	Traveling	None	574
76	Ile de Batz	07/21/2017	20:44:19	66.8647	163.7288	Transit	271	9	Part Cloudy	10	2	Bearded Seal	1	0	Looking	Splash	641
77	Ile de Batz	08/03/2017	17:24:51	64.9085	167.0141	Transit	304	9.1	Overcast	10	0	Spotted Seal	1	0	Swimming	None	520
78	Ile de Batz	08/03/2017	18:02:02	64.9523	168.1816	Transit	304	9.1	Overcast	10	0	Minke Whale	1	0	Traveling	None	641
79	Ile de Batz	08/03/2017	18:03:43	64.9838	168.1910	Transit	304	9.1	Overcast	10	0	Gray Whale	1	0	Traveling	None	641
80	Ile de Batz	08/03/2017	18:24:54	65.0134	168.2610	Transit	349	9.3	Overcast	10	1	Gray Whale	1	0	Traveling	None	986
81	Ile de Batz	08/04/2017	4:08:11	66.6811	168.0885	Transit	10	11.5	Clear	3	2	Unid. Pinniped	1	0	Swimming	Avoid	350
82	Ile de Batz	08/04/2017	6:05:05	67.0475	167.9165	Transit	8	11.3	Clear	10	1	Unid. Seal	1	0	Looking	Avoid	50
83	Ile de Batz	08/04/2017	7:37:11	67.2986	167.7898	Transit	10	11.4	Clear	10	1	Humpback Whale	3	1	Surface Act.	None	520
84	Ile de Batz	08/04/2017	7:37:11	67.2986	167.7898	Transit	10	11.4	Clear	10	1	Fin Whale	2	1	Surface Act.	None	800
85	Ile de Batz	08/04/2017	9:28:07	67.5964	167.6590	Transit	9	12	Clear	10	0	Unid. Seal	1	0	Diving	Avoid	25
86	Ile de Batz	08/04/2017	10:22:49	67.7763	167.5706	Transit	13	12.1	Clear	10	0	Gray Whale	2	0	Milling	None	1250
87	Ile de Batz	08/05/2017	13:22:55	70.8515	160.6442	Transit	56	9.3	Part Cloudy	10	3	Gray Whale	1	0	Swimming	None	2682
88	Ile de Batz	08/05/2017	14:04:59	70.8889	160.4306	Transit	60	9.3	Overcast	10	3	Gray Whale	2	0	Traveling	None	836
89	Ile de Batz	08/05/2017	14:43:46	70.9366	160.1745	Transit	60	9.6	Overcast	10	3	Gray Whale	1	0	Traveling	None	3579
90	Ile de Batz	08/05/2017	14:59:16	70.9588	160.0496	Transit	61	9.6	Overcast	10	3	Pac. Walrus	1	1	Surface Act.	Looking	30
91	Ile de Batz	08/05/2017	16:20:30	71.0795	159.3985	Transit	59	9.7	Overcast	10	2	Pac. Walrus	3	0	Traveling	None	726
92	Ile de Batz	08/05/2017	20:11:34	71.3916	157.7413	Transit	60	9.8	Overcast	10	2	Ringed Seal	1	0	Traveling	Looking	520
93	Ile de Batz	08/05/2017	23:06:49	71.6157	156.4985	Transit	56	8.9	Overcast	10	3	Gray Whale	1	0	Traveling	None	1203
94	Ile de Batz	08/06/2017	8:48:41	71.3080	152.0178	Transit	102	9.1	Fog	5	1	Unid. Seal	1	0	Swimming	Looking	350
95	Ile de Batz	08/06/2017	9:08:07	71.2976	151.8681	Transit	102	9.1	Fog	5	1	Unid. Seal	1	0	Surface Act.	Looking	425
96	Ile de Batz	08/06/2017	9:50:04	71.2760	151.5493	Transit	105	9	Fog	3	1	Unid. Seal	2	0	Surface Act.	Looking	325

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Sight #	Vessel	Date	Time	Latitude	Longitude	Vessel Activity	Vessel Heading (deg)	Speed (kt)	Precip / Cloud Cover	Vis	Sea State	Species	Group Size	# Juvs	Behavior	Reaction	CPA (m)
97	Ile de Batz	08/06/2017	12:10:21	71.1982	150.4803	Transit	103	7.2	Fog	2	1	Unid. Seal	1	0	Diving	None	975
98	Ile de Batz	08/06/2017	13:00:08	71.1814	150.2620	Transit	100	5.7	Fog	7	1	Ringed Seal	1	0	Swimming	Looking	800
99	Ile de Batz	08/06/2017	13:33:45	71.1709	150.1066	Transit	102	5.5	Fog	1	1	Spotted Seal	3	0	Looking	Avoid	125
100	Ile de Batz	08/08/2017	8:32:27	71.0592	149.8856	DP	10	0.6	Part Cloudy	10	2	Unid. Seal	1	0	Milling	Looking	1250
101	Ile de Batz	08/08/2017	13:19:57	71.0951	149.8615	DP	13	0.6	Part Cloudy	10	3	Ringed Seal	1	1	Looking	Looking	150
102	Ile de Batz	08/09/2017	12:12:19	70.9207	149.9578	DP	345	0.9	Fog	1	3	Unid. Seal	1	0	Diving	Looking	650
103	Ile de Batz	08/09/2017	12:49:31	70.9266	149.9547	DP	345	0.8	Fog	3	3	Unid. Seal	1	0	Diving	Looking	100
104	Ile de Batz	08/09/2017	13:01:32	70.9272	149.9542	DP	345	0.8	Fog	3	3	Unid. Seal	1	0	Diving	Looking	850
105	Ile de Batz	08/11/2017	10:57:13	71.0597	149.8851	Trenching	11	0.6	Overcast	10	4	Ringed Seal	1	0	Diving	None	50
106	Ile de Batz	08/11/2017	16:45:11	71.1014	149.8572	Trenching	11	0.5	Overcast	10	5	Ringed Seal	1	0	Swimming	None	520
108	Ile de Batz	08/11/2017	21:11:35	71.1353	149.8385	Trenching	9	0.6	Overcast	10	5	Unid. Whale	1	0	Blow	None	5462
107	Ile de Batz	08/11/2017	18:17:20	71.1135	149.8499	Trenching	14	0.7	Overcast	10	6	Unid. Seal	1	0	Swimming	None	641
109	Ile de Batz	08/13/2017	12:48:25	70.8576	149.9913	DP	65	0.3	Overcast	10	7	Ringed Seal	1	0	Diving	Looking	10
110	Ile de Batz	08/13/2017	13:16:28	70.8576	149.9910	DP	66	0.3	Overcast	10	7	Ringed Seal	1	0	Diving	Looking	175
111	Ile de Batz	08/15/2017	14:24:38	70.6532	150.0006	Trenching	359	0.5	Part Cloudy	10	4	Ringed Seal	1	0	Swimming	None	641
112	Ile de Batz	08/15/2017	22:09:34	70.6769	150.0006	DP	356	0	Overcast	10	3	Ringed Seal	1	0	Diving	Looking	80
113	Ile de Batz	08/16/2017	7:16:43	70.7100	149.9987	DP	191	0.1	Overcast	10	2	Ringed Seal	1	0	Surface Act.	Looking	150
114	Ile de Batz	08/17/2017	16:50:28	70.6884	150.0000	Trenching	1	0.2	Fog	9	2	Bearded Seal	1	0	Swimming	Looking	726
115	Ile de Batz	08/17/2017	18:15:54	70.6958	150.0005	Trenching	1	0.2	Fog	9	2	Ringed Seal	1	0	Surface Act.	None	641
116	Ile de Batz	08/18/2017	18:49:23	70.9079	149.9646	DP	266	1	Fog	1	3	Ringed Seal	1	0	Surface Act.	Looking	100
117	Ile de Batz	08/18/2017	21:29:15	70.9084	149.9634	DP	10	0.1	Overcast	9	3	Unid. Mysticete	1	0	Diving	None	3579
118	Ile de Batz	08/19/2017	12:33:05	70.9766	149.9307	DP	60	0.2	Overcast	10	3	Unid. Seal	1	0	Surface Act.	Looking	400
119	Ile de Batz	08/19/2017	16:44:13	70.9767	149.9308	DP	56	0.1	Overcast	10	3	Ringed Seal	1	0	Surface Act.	None	641
120	Ile de Batz	08/19/2017	17:55:43	70.8638	149.9408	Transit	148	5.2	Overcast	10	3	Bowhead Whale	1	0	Surface Act.	None	5462
121	Ile de Batz	08/19/2017	18:46:16	70.7996	149.9994	Transit	166	3.3	Overcast	10	3	Bowhead Whale	2	0	Surface Act.	None	2149

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Sight #	Vessel	Date	Time	Latitude	Longitude	Vessel Activity	Vessel Heading (deg)	Speed (kt)	Precip / Cloud Cover	Vis	Sea State	Species	Group Size	# Juvs	Behavior	Reaction	CPA (m)
122	Ile de Batz	08/19/2017	21:28:57	70.7994	149.9999	DP	181	0.2	Overcast	10	4	Bowhead Whale	1	0	Breaching	None	5462
123	Ile de Batz	08/20/2017	12:45:46	71.0201	149.9070	DP	10	0.1	Fog	4	3	Unid. Seal	1	0	Diving	None	100
124	Ile de Batz	08/21/2017	16:47:22	70.7950	150.0012	DP	10	0	Fog	1	2	Ringed Seal	1	0	Surface Act.	Looking	80
125	Ile de Batz	08/21/2017	16:56:12	70.7980	150.0013	DP	10	0	Fog	2	2	Ringed Seal	6	0	Feeding	Looking	50
126	Ile de Batz	08/21/2017	17:10:30	70.7150	150.0012	DP	10	0	Fog	2	2	Ringed Seal	1	0	Swimming	Looking	35
127	Ile de Batz	08/21/2017	17:53:45	70.7950	150.0015	DP	9	0.1	Fog	1	2	Ringed Seal	3	0	Swimming	Looking	35
128	Ile de Batz	08/21/2017	20:17:29	70.7950	150.0017	DP	10	0.2	Fog	1	2	Ringed Seal	2	0	Milling	None	120
129	Ile de Batz	08/21/2017	21:00:30	70.7949	150.0009	DP	18	0.1	Fog	3.5	2	Ringed Seal	6	1	Surface Act.	Looking	80
130	Ile de Batz	08/21/2017	21:35:30	70.7949	150.0009	DP	18	0.1	Fog	3.5	2	Ringed Seal	6		Surface Act.	None	650
131	Ile de Batz	08/22/2017	12:33:15	70.9580	149.9359	DP	10	0.1	Fog	2	2	Bearded Seal	1	0	Surface Act.	Looking	25
132	Ile de Batz	08/22/2017	14:50:05	70.9660	149.9332	Trenching	2	0.3	Part Cloudy	10	3	Ringed Seal	1	1	Surface Act.	None	20
134	Ile de Batz	08/22/2017	18:56:48	70.9564	149.9633	Trenching	189	0.2	Part Cloudy	10	4	Bowhead Whale	1	0	Traveling	None	4313
135	Ile de Batz	08/22/2017	20:40:04	71.0456	149.8928	Transit	14	10.2	Part Cloudy	10	5	Bowhead Whale	1	0	Surface Act.	None	3579
136	Ile de Batz	08/25/2017	14:20:10	70.9790	149.9300	Trenching	5	0.9	Overcast	10	4	Unid. Mysticete	1	0	Blow	None	5462
137	Ile de Batz	08/26/2017	18:56:25	70.8640	149.9871	ROV	50	0.2	Overcast	9	6	Unid. Mysticete	1	0	Blow	None	5462
138	Ile de Batz	08/27/2017	15:31:20	71.1034	149.8516	DP	80	0.1	Rain	3	6	Ringed Seal	1	0	Surface Act.	None	35
139	Ile de Batz	08/30/2017	16:34:19	71.1034	149.8520	DP	68	0.1	Overcast	10	6	Ringed Seal	1	0	Traveling	None	120
140	Ile de Batz	09/01/2017	15:38:45	70.8042	150.0000	DP	0	0.2	Fog	8	2	Ringed Seal	1	0	Surface Act.	None	12
141	Ile de Batz	09/02/2017	16:21:41	70.8849	149.9758	DP	10	0.1	Fog	3.5	3	Ringed Seal	1	0	Surface Act.	Looking	50
142	Ile de Batz	09/02/2017	17:14:32	70.8849	149.9760	DP	9	0	Fog	1	3	Ringed Seal	2	0	Traveling	None	100
143	Ile de Batz	09/02/2017	17:50:52	70.8849	149.9758	DP	9	0.1	Part Cloudy	10	2	Ringed Seal	1	0	Milling	Looking	60
144	Ile de Batz	09/02/2017	18:20:49	70.8849	149.9760	DP	10	0.1	Part Cloudy	10	2	Ringed Seal	1	0	Traveling	Looking	75
145	Ile de Batz	09/02/2017	19:39:42	70.8849	149.9760	DP	10	0.1	Overcast	9	2	Ringed Seal	1	0	Surface Act.	Looking	90
146	Ile de Batz	09/02/2017	19:55:09	70.8849	149.9759	DP	10	0	Fog	2	2	Ringed Seal	2	0	Traveling	None	378
147	Ile de Batz	09/02/2017	20:02:38	70.8849	149.9758	DP	10	0	Fog	2	2	Ringed Seal	1	0	Swimming	Looking	65

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148	Ile de Batz	09/02/2017	21:42:52	70.8850	149.9758	DP	10	0.1	Overcast	10	2	Ringed Seal	1	0	Surface Act.	None	180
149	Ile de Batz	09/03/2017	6:05:33	70.8849	149.9760	DP	9	0	Fog	2	1	Unid. Seal	1	0	Swimming	None	95
150	Ile de Batz	09/03/2017	6:20:03	70.8849	149.9761	DP	10	0.2	Fog	3	1	Unid. Seal	1	0	Diving	Looking	500
151	Ile de Batz	09/03/2017	7:01:28	70.8842	149.9758	DP	10	0.1	Fog	3.5	2	Unid. Seal	1	0	Diving	None	125
152	Ile de Batz	09/03/2017	13:03:55	70.8848	149.9766	DP	10	0	Part Cloudy	10	2	Ringed Seal	1	0	Surface Act.	Looking	40
153	Ile de Batz	09/03/2017	15:44:12	70.8849	149.9762	DP	99	0.1	Part Cloudy	10	2	Ringed Seal	1	0	Milling	Looking	437
154	Ile de Batz	09/03/2017	15:51:35	70.8849	149.9762	DP	9	0	Part Cloudy	10	1	Ringed Seal	1	1	Surface Act.	Looking	25
155	Ile de Batz	09/03/2017	17:16:25	70.8849	149.9762	DP	10	0	Clear	10	1	Bowhead Whale	1	0	Traveling	None	2682
156	Ile de Batz	09/03/2017	18:28:15	70.8847	149.9764	DP	9	0	Part Cloudy	10	1	Bearded Seal	1	0	Traveling	None	836
157	Ile de Batz	09/04/2017	13:25:04	70.8848	149.9747	DP	25	0.1	Fog	1	5	Ringed Seal	1	0	Milling	Looking	75
158	Ile de Batz	09/04/2017	14:52:54	70.8848	149.9753	DP	20	0.1	Fog	1	5	Ringed Seal	1	0	Surface Act.	Looking	60
159	Ile de Batz	09/04/2017	16:29:30	70.8848	149.9756	DP	21	0	Fog	1	5	Ringed Seal	1	0	Looking	None	50
161	Ile de Batz	09/04/2017	17:43:15	70.8849	149.9753	DP	20	0.1	Fog	1	5	Ringed Seal	1	0	Surface Act.	None	45
163	Ile de Batz	09/05/2017	6:22:45	70.8849	149.9752	DP	21	0.2	Fog	3.5	1	Unid. Seal	1	0	Diving	None	100
164	Ile de Batz	09/05/2017	7:43:59	70.8850	149.9755	DP	21	0.1	Fog	3.5	1	Ringed Seal	1	0	Diving	None	100
165	Ile de Batz	09/05/2017	11:03:54	70.8840	149.9713	DP	59	0.1	Fog	1	2	Unid. Seal	1	0	Diving	None	75
166	Ile de Batz	09/05/2017	11:12:55	70.8839	149.9711	DP	59	0.1	Fog	1	2	Ringed Seal	1	0	Surface Act.	None	350
167	Ile de Batz	09/05/2017	11:35:17	70.8841	149.9712	DP	60	0.1	Fog	1	2	Ringed Seal	1	0	Milling	Looking	40
171	Ile de Batz	09/05/2017	17:43:12	70.8841	149.9715	DP	60	0	Fog	3.5	2	Ringed Seal	1	0	Milling	Change Dir.	30
173	Ile de Batz	09/06/2017	9:10:02	70.8840	149.9719	DP	59	0.1	Fog	1	5	Ringed Seal	1	0	Diving	None	75
174	Ile de Batz	09/06/2017	14:37:27	70.8841	149.9712	DP	60	0.1	Fog	4	7	Ringed Seal	1	0	Swimming	None	40
175	Ile de Batz	09/07/2017	13:49:21	70.8838	149.9710	DP	75	0.5	Fog	1	7	Ringed Seal	1	0	Surface Act.	Looking	100
176	Ile de Batz	09/07/2017	15:43:16	70.8839	149.9708	DP	73	0.3	Fog	1	7	Ringed Seal	1	0	Traveling	Looking	70
177	Ile de Batz	09/07/2017	17:58:32	70.8837	149.9709	DP	73	0.7	Fog	7	7	Unid. Seal	1	0	Diving	Looking	200
178	Ile de Batz	09/07/2017	20:18:16	70.8840	149.9712	DP	72	0.1	Rain	5	7	Unid. Seal	1	0	Sink	Looking	836

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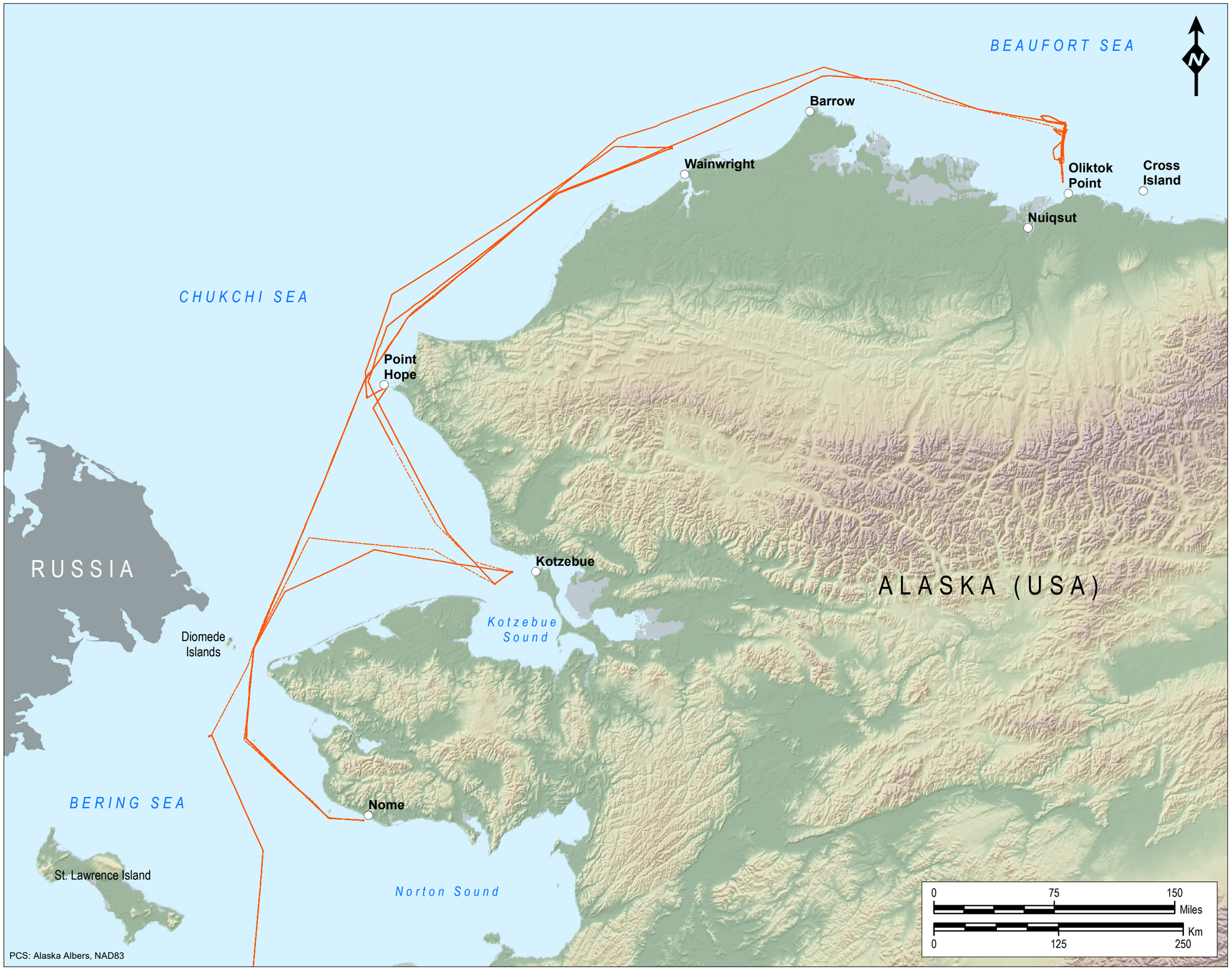
179	Ile de Batz	09/08/2017	15:09:28	70.8842	149.9720	DP	58	0.2	Fog	9	6	Bowhead Whale	1	0	Fluking	None	3579
180	Ile de Batz	09/09/2017	10:23:08	70.8839	149.9716	DP	58	0	Overcast	10	1	Unid. Seal	1	0	Diving	None	75
181	Ile de Batz	09/10/2017	8:22:26	70.8848	149.9764	DP	10	0.1	Overcast	9	2	Unid. Seal	1	0	Diving	None	100
182	Ile de Batz	09/10/2017	15:12:25	70.8843	149.9765	DP	10	0.1	Overcast	10	3	Bowhead Whale	1	0	Traveling	None	3579
183	Ile de Batz	09/10/2017	20:12:16	70.8844	149.9765	DP	10	0.1	Part Cloudy	10	4	Bowhead Whale	1	0	Traveling	None	5462
185	Ile de Batz	09/11/2017	10:40:55	70.8844	149.9763	DP	10	0.1	Fog	2	4	Ringed Seal	1	0	Diving	Looking	100
186	Ile de Batz	09/11/2017	20:30:55	70.8837	149.9768	DP	10	0	Fog	6	3	Ringed Seal	1	0	Surface Act.	Looking	20
187	Ile de Batz	09/13/2017	14:18:24	71.0838	149.8678	DP	130	0.1	Part Cloudy	10	3	Ringed Seal	1	0	Surface Act.	None	75
188	Ile de Batz	09/15/2017	12:28:30	71.0839	149.8675	DP	132	0.3	Part Cloudy	10	2	Bearded Seal	1	0	Milling	Looking	350
191	Ile de Batz	09/16/2017	12:29:31	71.0842	149.8681	DP	40	0.1	Fog	1	0	Bearded Seal	1	0	Milling	Looking	3
194	Ile de Batz	09/18/2017	13:37:52	71.0842	149.8680	DP	79	0.1	Fog	1	1	Unid. Seal	1	0	Swimming	None	150
195	Ile de Batz	09/18/2017	14:50:32	71.0840	149.8681	DP	80	0.2	Fog	3.5	1	Ringed Seal	1	0	Traveling	None	90
196	Ile de Batz	09/18/2017	18:31:28	71.0833	149.8704	DP	295	0.2	Fog	1	2	Pac. Walrus	1	0	Traveling	Looking	180
198	Ile de Batz	09/19/2017	10:33:03	71.0834	149.8705	DP	320	0.1	Snow	2	4	Ringed Seal	1	0	Milling	Looking	30
199	Ile de Batz	09/19/2017	12:23:29	71.0835	149.8698	DP	329	0.1	Snow	2	4	Bearded Seal	1	0	Milling	Looking	30
200	Ile de Batz	09/20/2017	18:38:12	71.0091	149.9134	DP	10	0.1	Overcast	10	3	Bearded Seal	1	0	Surface Act.	Looking	85
201	Ile de Batz	09/23/2017	15:03:56	70.7632	150.0124	Trenching	181	0.6	Part Cloudy	10	5	Unid. Whale	1	0	Traveling	None	7613
202	Ile de Batz	09/23/2017	15:31:47	70.7591	150.0091	Trenching	172	0.4	Part Cloudy	10	5	Bowhead Whale	2	1	Traveling	None	3579
203	Ile de Batz	09/23/2017	18:12:35	70.7353	149.9991	Trenching	177	0.1	Overcast	9	4	Bowhead Whale	1	0	Traveling	None	4313
204	Ile de Batz	09/24/2017	15:11:03	70.7552	150.0123	Transit	4	8.7	Part Cloudy	10	2	Bowhead Whale	1	0	Traveling	None	1795
205	Ile de Batz	09/24/2017	15:17:24	70.7649	150.0110	Transit	4	8.7	Part Cloudy	10	2	Bowhead Whale	1	0	Traveling	None	150
206	Ile de Batz	09/25/2017	16:02:14	70.9288	149.9522	Trenching	10	0.9	Part Cloudy	10	6	Unid. Whale	1	0	Blow	None	5462
207	Ile de Batz	09/25/2017	16:38:01	70.9363	149.9480	Trenching	10	0.7	Part Cloudy	10	6	Unid. Whale	1	0	Blow	None	5462
208	Ile de Batz	09/26/2017	15:23:19	70.9645	149.9349	DP	281	0.2	Overcast	9	5	Bowhead Whale	1	0	Traveling	None	3579
209	Ile de Batz	09/30/2017	14:06:08	71.1576	149.8701	DP	269	1.2	Part Cloudy	10	8	Pac. Walrus	1	0	Surface Act.	Looking	5

Table G-1. Summary of all sightings of marine mammals recorded within the project area (north of 64°N) during Quintillion's 2017 fiber optic cable program.

Sight #	Vessel	Date	Time	Latitude	Longitude	Vessel Activity	Vessel Heading (deg)	Speed (kt)	Precip / Cloud Cover	Vis	Sea State	Species	Group Size	# Juvs	Behavior	Reaction	CPA (m)
210	Ile de Batz	10/07/2017	13:12:10	70.9113	149.9338	Transit	242	1.2	Snow	3.5	5	Unid. Seal	1	0	Surface Act.	Looking	100
211	Ile de Batz	10/09/2017	14:57:52	70.7677	150.0126	Cable Lay	0	1.2	Fog	7	1	Ringed Seal	1	0	Traveling	None	100
212	Ile de Batz	10/09/2017	15:48:30	70.7843	150.0070	Cable Lay	7	0.7	Fog	8	1	Pac. Walrus	1	0	Milling	None	30
213	Ile de Batz	10/10/2017	12:54:41	70.9624	149.9336	DP	9	0.1	Fog	1	3	Ringed Seal	1	0	Diving	None	50
214	Ile de Batz	10/10/2017	16:39:47	70.9624	149.9339	DP	10	0.1	Fog	3.5	3	Pac. Walrus	1	0	Surface Act.	None	30
215	Ile de Batz	10/10/2017	18:09:35	70.9584	149.9359	DP	10	0	Mist	3	3	Bearded Seal	1	1	Surface Act.	Approach	30
216	Ile de Batz	10/10/2017	18:13:12	70.9584	149.9359	DP	10	0	Mist	3	3	Ringed Seal	1	0	Traveling	Looking	80
218	Ile de Batz	10/21/2017	15:56:05	71.1544	149.8601	Transit	80	0.1	Snow	3.5	1	Bearded Seal	1	0	Surface Act.	Looking	75
219	Ile de Batz	10/22/2017	10:11:28	70.9000	149.9681	Transit	184	11.8	Part Cloudy	7	3	Unid. Mysticete	1	0	Blow	None	3579
220	Ile de Batz	10/23/2017	17:53:16	71.1122	160.5995	Transit	241	12.7	Part Cloudy	10	3	Bowhead Whale	1	0	Traveling	None	5462
221	Ile de Batz	10/23/2017	17:59:04	71.1030	160.6553	Transit	241	12.7	Part Cloudy	10	3	Bowhead Whale	5	0	Traveling	None	450
222	Ile de Batz	10/23/2017	18:40:00	71.0329	161.0657	Transit	245	12.5	Part Cloudy	4	2	Bowhead Whale	3	0	Traveling	None	1200

APPENDIX H – VESSEL TRACKING AND MARINE MAMMAL SIGHTING MAPS



Village or Place of Interest

Ile de Batz Tracklines

QUINTILLION

90 DAY REPORT

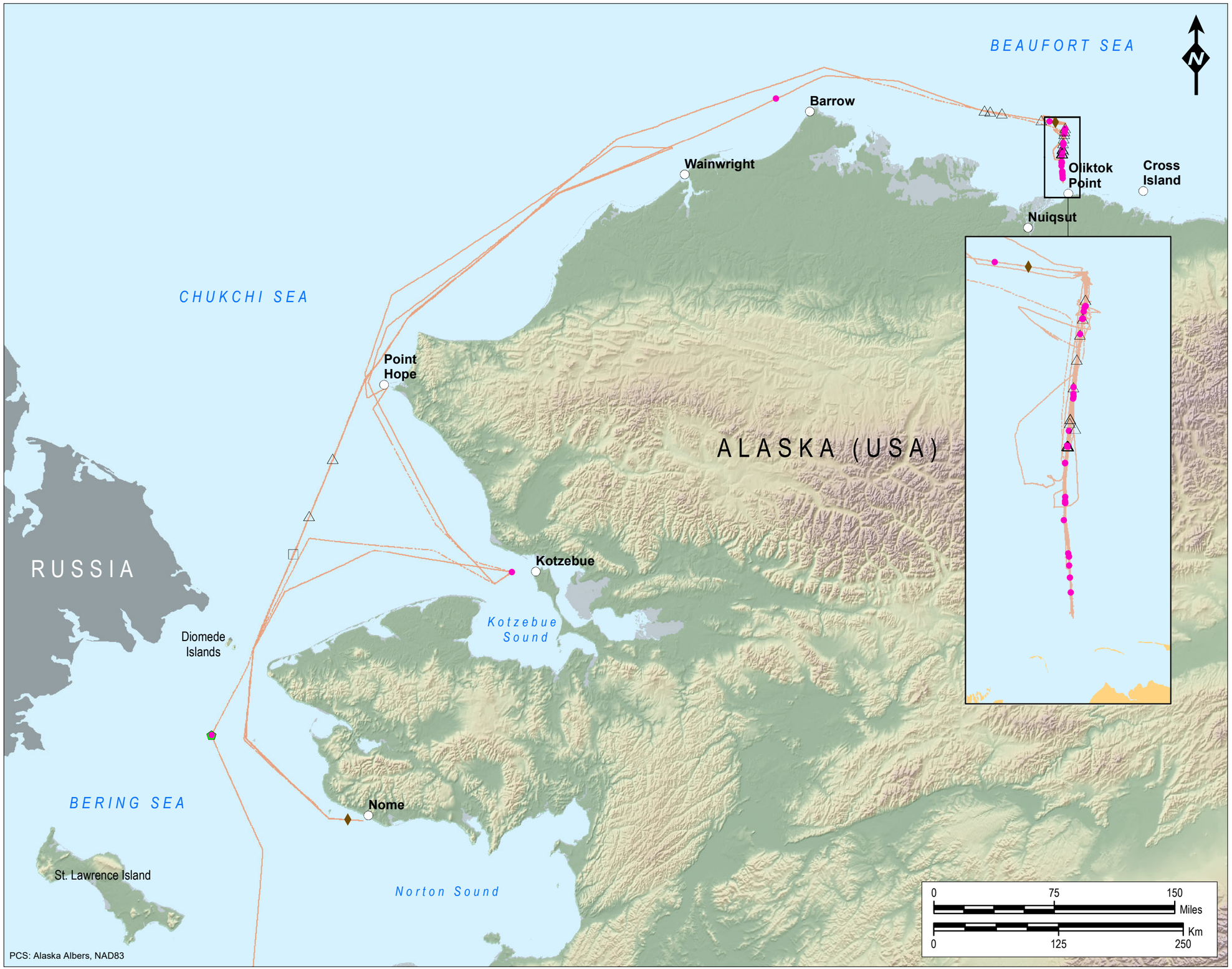
VESSEL TRACK LOCATIONS

QUINTILLION

APPENDIX

H-1

ORNRC: QUIN109.mxd, 12/11/17, R00



Village or Place of Interest

Ile de Batz Tracklines

Species

- Ringed Seal
- Spotted Seal
- Steller Sea Lion
- Unidentified Pinniped
- Unidentified Seal

QUINTILLION

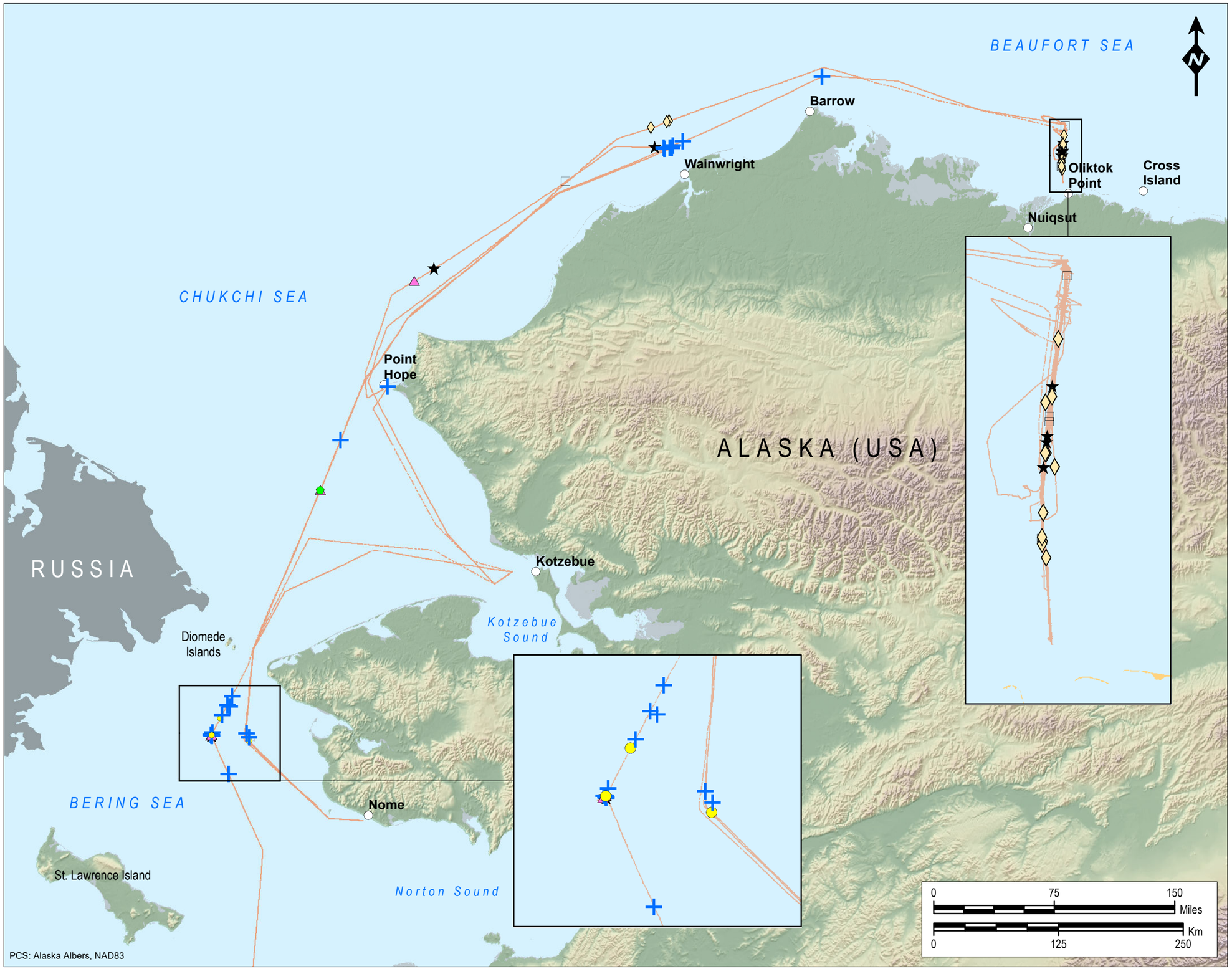
90 DAY REPORT

PINNIPED SIGHTINGS

QUINTILLION

APPENDIX H-3

ORNRC: QUIN110.mxd, 12/11/17, R00



Village or Place of Interest

Ile de Batz Tracklines

Species

- Bowhead Whale
- Fin Whale
- Gray Whale
- Humpback Whale
- Minke Whale
- Unidentified Mysticete
- Unidentified Whale

QUINTILLION

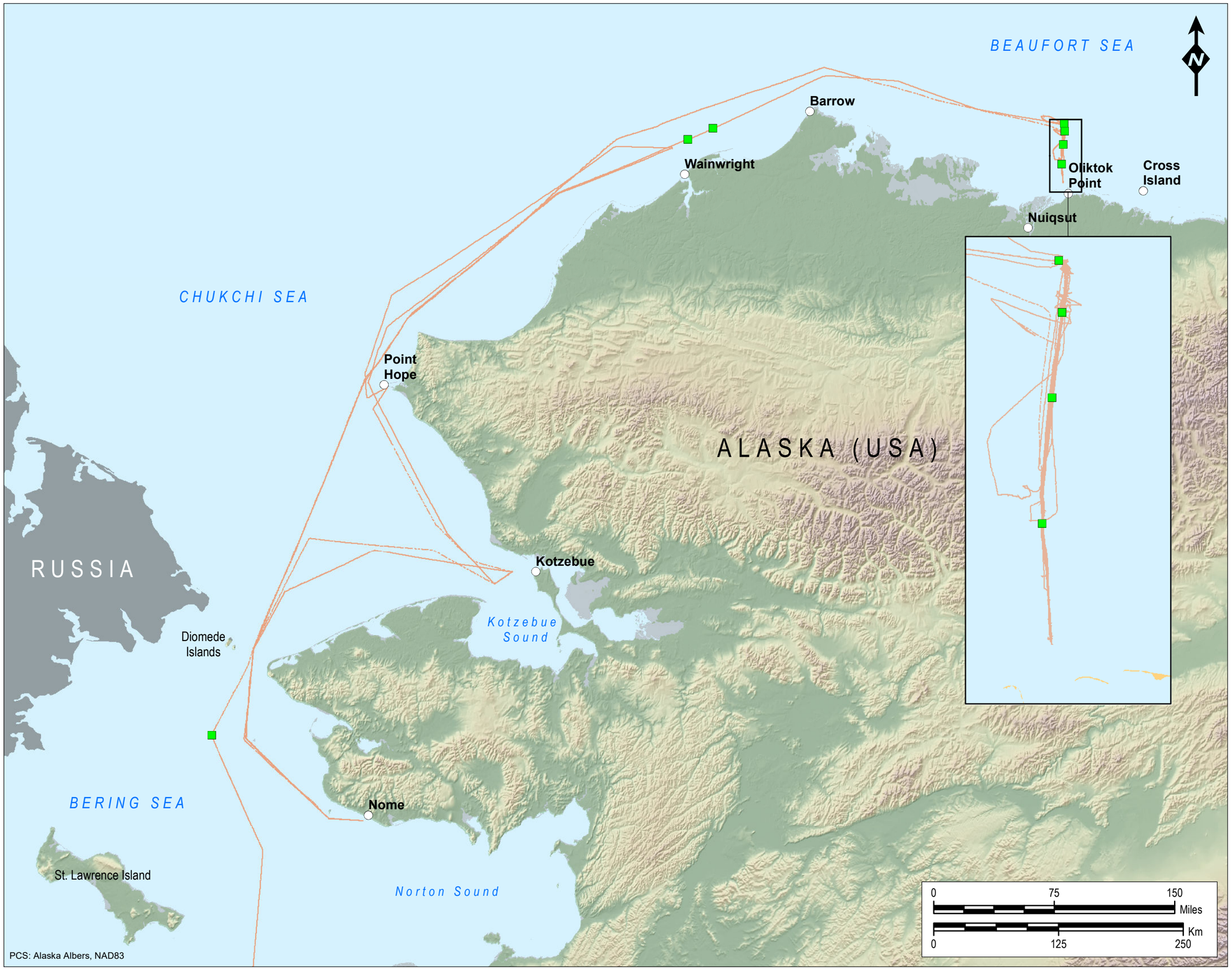
90 DAY REPORT

CETACEAN SIGHTINGS

QUINTILLION

APPENDIX H-2

ORNRC: QUIN111.mxd, 12/11/17, R00



Village or Place of Interest

Ile de Batz Tracklines

Species

Pacific Walrus

QUINTILLION

90 DAY REPORT

PACIFIC WALRUS SIGHTINGS

QUINTILLION

APPENDIX

H-4

ORNRC: QUIN112.mxd, 12/11/17, R00

APPENDIX I – CARCASS REPORTS

MARINE MAMMAL STRANDING REPORT - LEVEL A DATA

FIELD #: _____ **NMFS REGIONAL #:** _____ (NMFS USE) **NATIONAL DATABASE#:** _____ (NMFS USE)

COMMON NAME: Unidentified Whale **GENUS:** _____ **SPECIES:** _____

EXAMINER Name: Jonah Leavitt Affiliation: PSO - Owl Ridge NRC; Vessel: Ile de Batz

Address: 6407 Brayton Drive, Suite 204 Anchorage, AK 99507 Phone: 907-334-3448

Stranding Agreement or Authority: _____

LOCATION OF INITIAL OBSERVATION

State: Alaska County: _____

City: _____

Body of Water: Bering Sea

Locality Details: Transiting to Nome from Dutch Harbor

Lat (DD): 58 . 6314 N

Long (DD): 168 . 6029 W

■ Actual ☐ Estimated

How Determined: (check ONE)

■ GPS ☐ Map ☐ Internet/Software

OCURRENCE DETAILS ☐ Restrand GE# _____ (NMFS Use)

Group Event: ☐ YES ■ NO

If Yes, Type: ☐ Cow/Calf Pair ☐ Mass Stranding # Animals: _____ ☐ Actual ☐ Estimated

Findings of Human Interaction: ☐ YES ☐ NO ■ Could Not Be Determined (CBD)

If Yes, Choose one or more: ☐ 1. Boat Collision ☐ 2. Shot ☐ 3. Fishery Interaction

☐ 4. Other Human Interaction:_____

How Determined (Check one or more): ☐ External Exam ☐ Internal Exam ☐ Necropsy

☐ Other: _____

Gear Collected? ☐ YES ■ NO Gear Disposition: _____

Other Findings Upon Level A: ☐ YES ☐ NO ☐ Could Not Be Determined (CBD)

If Yes, Choose one or more: ☐ 1. Illness ☐ 2. Injury ☐ 3. Pregnant ☐ 4.Other:_____

How Determined (Check one or more): ☐ External Exam ☐ Internal Exam ☐ Necropsy

☐ Other: _____

INITIAL OBSERVATION

Date: Year: 2017 Month: June Day: 29

First Observed: ☐ Beach or Land ■ Floating ☐ Swimming

CONDITION AT INITIAL OBSERVATION (Check ONE)

☐ 1. Alive ■ 4. Advanced Decomposition

☐ 2. Fresh dead ☐ 5. Mummified/Skeletal

☐ 3. Moderate decomposition ☐ 6. Condition Unknown

LEVEL A EXAMINATION ■ Not Able to Examine

Date: Year: 2017 Month: June Day: 29

CONDITION AT EXAMINATION (Check ONE)

☐ 1. Alive ■ 4. Advanced Decomposition

☐ 2. Fresh dead ☐ 5. Mummified/Skeletal

☐ 3. Moderate decomposition ☐ 6. Unknown

INITIAL LIVE ANIMAL DISPOSITION (Check one or more)

☐ 1. Left at Site ☐ 6. Euthanized at Site

☐ 2. Immediate Release at Site ☐ 7. Transferred to Rehabilitation:

☐ 3. Relocated Date: Year:_____ Month:_____Day:___ Facility:_____

☐ 4. Disentangled ☐ 8. Died during Transport

☐ 5. Died at Site ☐ 9. Euthanized during Transport

☐ 10. Other:_____

CONDITION/DETERMINATION (Check one or more)

☐ 1. Sick 7. Location Hazardous

☐ 2. Injured ☐ a. To animal

☐ 3. Out of Habitat ☐ b. To public

☐ 4. Deemed Releasable ☐ 8. Unknown/CBD

☐ 5. Abandoned/Orphaned ☐ 9.Other_____

☐ 6. Inaccessible _____

MORPHOLOGICAL DATA

SEX (Check ONE)

☐ 1. Male

☐ 2. Female

■ 3. Unknown

AGE CLASS (Check ONE)

☐ 1. Adult ☐ 4. Pup/Calf

☐ 2. Subadult ■ 5. Unknown

☐ 3. Yearling

■ Whole Carcass ☐ Partial Carcass

Straight length:_____ ☐ cm ☐ in ☐ actual ☐ estimated

Weight:_____ ☐ kg ☐ lb ☐ actual ☐ estimated

PHOTOS/VIDEOS TAKEN: ■ YES ☐ NO

Photo/Video Disposition: _____

TAG DATA Tags Were:

Present at Time of Stranding (Pre-existing): ☐ YES ☐ NO

Applied during Stranding Response: ☐ YES ☐ NO

ID#	Color	Type	Placement* (Circle ONE)	Applied	Present
			D DF L LF LR RF RR	☐	☐
			D DF L LF LR RF RR	☐	☐
			D DF L LF LR RF RR	☐	☐

* D= Dorsal; DF= Dorsal Fin; L= Lateral Body
LF= Left Front; LR= Left Rear; RF= Right Front; RR= Right Rear

CARCASS STATUS (Check one or more)

■ 1. Left at Site ☐ 4. Towed: Lat_____Long_____ ☐ 7. Landfill

☐ 2. Buried ☐ 5. Sunk: Lat_____Long_____ ☐ 8. Unknown

☐ 3. Rendered ☐ 6. Frozen for Later Examination ☐ 9. Other_____

SPECIMEN DISPOSITION (Check one or more)

☐ 1. Scientific collection ☐ 2. Educational collection

☐ 3. Other:_____

Comments: _____

NECROPSIED ■ NO ☐ YES ☐ Limited ☐ Complete

☐ Carcass Fresh ☐ Carcass Frozen/Thawed

NECROPSIED BY: _____

Date: Year: _____ **Month:**_____ **Day:**_____

ADDITIONAL REMARKS

ADDITIONAL IDENTIFIER: _____ (If animal is restranded, please indicate any previous field numbers here)

Carcass was possible humpback whale due to length of pectoral fin identified by the arrow in the photograph.

Other marine mammal sightings within last 24-hours include: Humpback whales, Dall's porpoise, and northern fur seal.

DISCLAIMER

THESE DATA SHOULD NOT BE USED OUT OF CONTEXT OR WITHOUT VERIFICATION. THIS SHOULD BE STRICTLY ENFORCED WHEN REPORTING SIGNS OF HUMAN INTERACTION DATA.

DATA ACCESS FOR LEVEL A DATA

UPON WRITTEN REQUEST, CERTAIN FIELDS OF THE LEVEL A DATA SHEET WILL BE RELEASED TO THE REQUESTOR PROVIDED THAT THE REQUESTOR CREDIT THE STRANDING NETWORK AND THE NATIONAL MARINE FISHERIES SERVICE. THE NATIONAL MARINE FISHERIES SERVICE WILL NOTIFY THE CONTRIBUTING STRANDING NETWORK MEMBERS THAT THESE DATA HAVE BEEN REQUESTED AND THE INTENT OF USE. ALL OTHER DATA WILL BE RELEASED TO THE REQUESTOR PROVIDED THAT THE REQUESTOR OBTAIN PERMISSION FROM THE CONTRIBUTING STRANDING NETWORK AND THE NATIONAL MARINE FISHERIES SERVICE.

PAPERWORK REDUCTION ACT INFORMATION

PUBLIC REPORTING BURDEN FOR THE COLLECTION OF INFORMATION IS ESTIMATED TO AVERAGE 30 MINUTES PER RESPONSE, INCLUDING THE TIME FOR REVIEWING INSTRUCTIONS, SEARCHING EXISTING DATA SOURCES, GATHERING AND MAINTAINING THE DATA NEEDED, AND COMPLETING AND REVIEWING THE COLLECTION OF INFORMATION. SEND COMMENTS REGARDING THIS BURDEN ESTIMATE OR ANY OTHER ASPECT OF THE COLLECTION INFORMATION, INCLUDING SUGGESTIONS FOR REDUCING THE BURDEN TO: CHIEF, MARINE MAMMAL AND SEA TURTLE CONSERVATION DIVISION, OFFICE OF PROTECTED RESOURCES, NOAA FISHERIES, 1315 EAST-WEST HIGHWAY, SILVER SPRING, MARYLAND 20910. NOT WITHSTANDING ANY OTHER PROVISION OF THE LAW, NO PERSON IS REQUIRED TO RESPOND, NOR SHALL ANY PERSON BE SUBJECTED TO A PENALTY FOR FAILURE TO COMPLY WITH, A COLLECTION OF INFORMATION SUBJECT TO THE REQUIREMENTS OF THE PAPERWORK REDUCTION ACT, UNLESS THE COLLECTION OF INFORMATION DISPLAYS A CURRENTLY VALID OFFICE OF MANAGEMENT AND BUDGET (OMB) CONTROL NUMBER.

CARCASS / INJURY FORM

Date:	06/29/17	**Time:**	21:42	**Lat:**		**Lon:**	168.6092
Vessel:	Ile de Batz	**Speed (kt):**	12.4	**Depth (m):**	x		

Environmental Conditions

Bft State:	2	**Precip:**	X	**Vis:**	10	**Ice:**	X

Project/Vessel Activities (include vessel speed)

24-hours before Observation:

In transit to Nome Alaska from Dutch Harbor

During Observation:

Transiting to Nome

After Observation:

Continue transit to Nome

Description of Observation

A dead whale carcass was sighted floating on the surface. Birds were feeding on and around the carcass and was in an advanced state of decomposition. Flukes were observed and photos were taken.

Description of Animal(s)

The carcass was obviously decomposed and sea birds were feeding on and around it.

Fate of Animal(s)

The carcass was left floating.

Other Marine Mammals observed in 24-hours? If yes, provide summary as attachment.	Yes
Photos provided?	Yes

MARINE MAMMAL STRANDING REPORT - LEVEL A DATA

FIELD #: _____ **NMFS REGIONAL #**: _____ (NMFS USE) **NATIONAL DATABASE#**: _____ (NMFS USE)

COMMON NAME: Unknown **GENUS**: _____ **SPECIES**: _____

EXAMINER Name: Layne Olson Affiliation: Owl Ridge Natural Resource Consultants

Address: _____ Phone: _____

Stranding Agreement or Authority: _____

LOCATION OF INITIAL OBSERVATION

State: AK County: _____

City: _____

Body of Water: Bering Sea

Locality Details: 22.7 Nautical Miles West of King Island

Lat (DD): 64 . 9298 N

Long (DD): 168 . 9787 W

■ Actual ☐ Estimated

How Determined: (check ONE)

■ GPS ☐ Map ☐ Internet/Software

OCURRENCE DETAILS ☐ Restrand GE# _____ (NMFS Use)

Group Event: ☐ YES ■ NO

If Yes, Type: ☐ Cow/Calf Pair ☐ Mass Stranding # Animals: _____ ☐ Actual ☐ Estimated

Findings of Human Interaction: ☐ YES ☐ NO ■ Could Not Be Determined (CBD)

If Yes, Choose one or more: ☐ 1. Boat Collision ☐ 2. Shot ☐ 3. Fishery Interaction

☐ 4. Other Human Interaction:_____

How Determined (Check one or more): ☐ External Exam ☐ Internal Exam ☐ Necropsy

☐ Other: _____

Gear Collected? ☐ YES ☐ NO Gear Disposition: _____

Other Findings Upon Level A: ☐ YES ☐ NO ☐ Could Not Be Determined (CBD)

If Yes, Choose one or more: ☐ 1. Illness ☐ 2. Injury ☐ 3. Pregnant ☐ 4.Other:_____

How Determined (Check one or more): ☐ External Exam ☐ Internal Exam ☐ Necropsy

☐ Other: _____

INITIAL OBSERVATION

Date: Year: 03 Month: July Day: 2017

First Observed: ☐ Beach or Land ■ Floating ☐ Swimming

CONDITION AT INITIAL OBSERVATION (Check ONE)

☐ 1. Alive ■ 4. Advanced Decomposition

☐ 2. Fresh dead ☐ 5. Mummified/Skeletal

☐ 3. Moderate decomposition ☐ 6. Condition Unknown

LEVEL A EXAMINATION ☐ Not Able to Examine

Date: Year: _____ Month: _____ Day: _____

CONDITION AT EXAMINATION (Check ONE)

☐ 1. Alive ☐ 4. Advanced Decomposition

☐ 2. Fresh dead ☐ 5. Mummified/Skeletal

☐ 3. Moderate decomposition ☐ 6. Unknown

INITIAL LIVE ANIMAL DISPOSITION (Check one or more)

☐ 1. Left at Site ☐ 6. Euthanized at Site

☐ 2. Immediate Release at Site ☐ 7. Transferred to Rehabilitation:

☐ 3. Relocated Date: Year:_____ Month:_____Day:___ Facility:_____

☐ 4. Disentangled ☐ 8. Died during Transport

☐ 5. Died at Site ☐ 9. Euthanized during Transport

☐ 10. Other:_____

CONDITION/DETERMINATION (Check one or more)

☐ 1. Sick 7. Location Hazardous

☐ 2. Injured ☐ a. To animal

☐ 3. Out of Habitat ☐ b. To public

☐ 4. Deemed Releasable ☐ 8. Unknown/CBD

☐ 5. Abandoned/Orphaned ☐ 9.Other_____

☐ 6. Inaccessible _____

MORPHOLOGICAL DATA

SEX (Check ONE)

☐ 1. Male

☐ 2. Female

■ 3. Unknown

AGE CLASS (Check ONE)

☐ 1. Adult ☐ 4. Pup/Calf

☐ 2. Subadult ■ 5. Unknown

☐ 3. Yearling

☐ Whole Carcass ☐ Partial Carcass

Straight length: Undetermined ☐ cm ☐ in ☐ actual ☐ estimated

Weight: Undetmined ☐ kg ☐ lb ☐ actual ☐ estimated

PHOTOS/VIDEOS TAKEN: ■ YES ☐ NO

Photo/Video Disposition: _____

TAG DATA Tags Were:

Present at Time of Stranding (Pre-existing): ☐ YES ☐ NO

Applied during Stranding Response: ☐ YES ☐ NO

ID#	Color	Type	Placement* (Circle ONE)	Applied	Present
			D DF L LF LR RF RR	☐	☐
			D DF L LF LR RF RR	☐	☐
			D DF L LF LR RF RR	☐	☐

* D= Dorsal; DF= Dorsal Fin; L= Lateral Body
LF= Left Front; LR= Left Rear; RF= Right Front; RR= Right Rear

CARCASS STATUS (Check one or more)

■ 1. Left at Site ☐ 4. Towed: Lat_____Long_____ ☐ 7. Landfill

☐ 2. Buried ☐ 5. Sunk: Lat_____Long_____ ☐ 8. Unknown

☐ 3. Rendered ☐ 6. Frozen for Later Examination ☐ 9. Other_____

SPECIMEN DISPOSITION (Check one or more)

☐ 1. Scientific collection ☐ 2. Educational collection

☐ 3. Other:_____

Comments: _____

NECROPSIED ☐ NO ☐ YES ☐ Limited ☐ Complete

☐ Carcass Fresh ☐ Carcass Frozen/Thawed

NECROPSIED BY: _____

Date: Year: _____ **Month:**_____ **Day:**_____

ADDITIONAL REMARKS

ADDITIONAL IDENTIFIER: _____ (If animal is restranded, please indicate any previous field numbers here)

DISCLAIMER

THESE DATA SHOULD NOT BE USED OUT OF CONTEXT OR WITHOUT VERIFICATION. THIS SHOULD BE STRICTLY ENFORCED WHEN REPORTING SIGNS OF HUMAN INTERACTION DATA.

DATA ACCESS FOR LEVEL A DATA

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CARCASS / INJURY FORM

Date:	07/03/2017	**Time:**	12:32	**Lat:**		**Lon:**	168.9787
Vessel:	Ile de Batz	**Speed (kt):**	0	**Depth (m):**	50		

Environmental Conditions

Bft State:	2	**Precip:**	None	**Vis:**	Good	**Ice:**	None

Project/Vessel Activities (include vessel speed)

24-hours before Observation:

Vessel performing ROV work, and standing by on DP.

During Observation:

Standing by on DP, stationary.

After Observation:

Standing by on DP, stationary.

Description of Observation

Light-colored mass observed floating with current with numerous seabirds appearing to feed on and around it. Visible portion appeared to be 1.5 - 2 square meters in area. Unable to identify any characteristics to determine animal species.

Description of Animal(s)

See above.

Fate of Animal(s)

Floated away in N direction with current.

Other Marine Mammals observed in 24-hours? If yes, provivde summary as attachment. Yes

Photos provided? Yes

MARINE MAMMAL STRANDING REPORT - LEVEL A DATA

FIELD #: _____ **NMFS REGIONAL #:** _____ (NMFS USE) **NATIONAL DATABASE#:** _____ (NMFS USE)

COMMON NAME: Unknown **GENUS:** _____ **SPECIES:** _____

EXAMINER Name: Jonah Leavitt Affiliation: Owl Ridge NRC

Address: _____ Phone: _____

Stranding Agreement or Authority: _____

LOCATION OF INITIAL OBSERVATION

State: AK County: North Slope

City: _____

Body of Water: Chukchi Sea

Locality Details: _____

Lat (DD): 70. . 8273 N

Long (DD): 161 . 7980 W

☐ Actual ■ Estimated

How Determined: (check ONE)

■ GPS ☐ Map ☐ Internet/Software

OCURRENCE DETAILS ☐ Restrand GE# _____ (NMFS Use)

Group Event: ☐ YES ■ NO

If Yes, Type: ☐ Cow/Calf Pair ☐ Mass Stranding # Animals: _____ ☐ Actual ☐ Estimated

Findings of Human Interaction: ☐ YES ☐ NO ■ Could Not Be Determined (CBD)

If Yes, Choose one or more: ☐ 1. Boat Collision ☐ 2. Shot ☐ 3. Fishery Interaction

☐ 4. Other Human Interaction:_____

How Determined (Check one or more): ☐ External Exam ☐ Internal Exam ☐ Necropsy

☐ Other: _____

Gear Collected? ☐ YES ■ NO Gear Disposition: _____

Other Findings Upon Level A: ☐ YES ■ NO ☐ Could Not Be Determined (CBD)

If Yes, Choose one or more: ☐ 1. Illness ☐ 2. Injury ☐ 3. Pregnant ☐ 4.Other:_____

How Determined (Check one or more): ☐ External Exam ☐ Internal Exam ☐ Necropsy

☐ Other: _____

INITIAL OBSERVATION

Date: Year: 17 Month: 07 Day: 14

First Observed: ☐ Beach or Land ■ Floating ☐ Swimming

CONDITION AT INITIAL OBSERVATION (Check ONE)

☐ 1. Alive ☐ 4. Advanced Decomposition

☐ 2. Fresh dead ☐ 5. Mummified/Skeletal

☐ 3. Moderate decomposition ■ 6. Condition Unknown

LEVEL A EXAMINATION ■ Not Able to Examine

Date: Year: _____ Month: _____ Day: _____

CONDITION AT EXAMINATION (Check ONE)

☐ 1. Alive ☐ 4. Advanced Decomposition

☐ 2. Fresh dead ☐ 5. Mummified/Skeletal

☐ 3. Moderate decomposition ☐ 6. Unknown

INITIAL LIVE ANIMAL DISPOSITION (Check one or more)

☐ 1. Left at Site ☐ 6. Euthanized at Site

☐ 2. Immediate Release at Site ☐ 7. Transferred to Rehabilitation:

☐ 3. Relocated Date: Year:_____ Month:_____Day:___ Facility:_____

☐ 4. Disentangled ☐ 8. Died during Transport

☐ 5. Died at Site ☐ 9. Euthanized during Transport

☐ 10. Other:_____

CONDITION/DETERMINATION (Check one or more)

☐ 1. Sick 7. Location Hazardous

☐ 2. Injured ☐ a. To animal

☐ 3. Out of Habitat ☐ b. To public

☐ 4. Deemed Releasable ☐ 8. Unknown/CBD

☐ 5. Abandoned/Orphaned ☐ 9.Other_____

☐ 6. Inaccessible _____

MORPHOLOGICAL DATA

SEX (Check ONE)

☐ 1. Male

☐ 2. Female

☐ 3. Unknown

AGE CLASS (Check ONE)

☐ 1. Adult ☐ 4. Pup/Calf

☐ 2. Subadult ■ 5. Unknown

☐ 3. Yearling

☐ Whole Carcass ☐ Partial Carcass

Straight length:_____ ☐ cm ☐ in ☐ actual ☐ estimated

Weight:_____ ☐ kg ☐ lb ☐ actual ☐ estimated

PHOTOS/VIDEOS TAKEN: ■ YES ☐ NO

Photo/Video Disposition: _____

TAG DATA Tags Were:

Present at Time of Stranding (Pre-existing): ☐ YES ☐ NO

Applied during Stranding Response: ☐ YES ■ NO

ID#	Color	Type	Placement* (Circle ONE)	Applied	Present
			D DF L LF LR RF RR	☐	☐
			D DF L LF LR RF RR	☐	☐
			D DF L LF LR RF RR	☐	☐

* D= Dorsal; DF= Dorsal Fin; L= Lateral Body
LF= Left Front; LR= Left Rear; RF= Right Front; RR= Right Rear

CARCASS STATUS (Check one or more)

■ 1. Left at Site ☐ 4. Towed: Lat_____Long_____ ☐ 7. Landfill

☐ 2. Buried ☐ 5. Sunk: Lat_____Long_____ ☐ 8. Unknown

☐ 3. Rendered ☐ 6. Frozen for Later Examination ☐ 9. Other_____

SPECIMEN DISPOSITION (Check one or more)

☐ 1. Scientific collection ☐ 2. Educational collection

☐ 3. Other:_____

Comments: _____

NECROPSIED ■ NO ☐ YES ☐ Limited ☐ Complete

☐ Carcass Fresh ☐ Carcass Frozen/Thawed

NECROPSIED BY: _____

Date: Year: _____ **Month:**_____ **Day:**_____

ADDITIONAL REMARKS

ADDITIONAL IDENTIFIER: _____ (If animal is restranded, please indicate any previous field numbers here)

DISCLAIMER

THESE DATA SHOULD NOT BE USED OUT OF CONTEXT OR WITHOUT VERIFICATION. THIS SHOULD BE STRICTLY ENFORCED WHEN REPORTING SIGNS OF HUMAN INTERACTION DATA.

DATA ACCESS FOR LEVEL A DATA

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PAPERWORK REDUCTION ACT INFORMATION

PUBLIC REPORTING BURDEN FOR THE COLLECTION OF INFORMATION IS ESTIMATED TO AVERAGE 30 MINUTES PER RESPONSE, INCLUDING THE TIME FOR REVIEWING INSTRUCTIONS, SEARCHING EXISTING DATA SOURCES, GATHERING AND MAINTAINING THE DATA NEEDED, AND COMPLETING AND REVIEWING THE COLLECTION OF INFORMATION. SEND COMMENTS REGARDING THIS BURDEN ESTIMATE OR ANY OTHER ASPECT OF THE COLLECTION INFORMATION, INCLUDING SUGGESTIONS FOR REDUCING THE BURDEN TO: CHIEF, MARINE MAMMAL AND SEA TURTLE CONSERVATION DIVISION, OFFICE OF PROTECTED RESOURCES, NOAA FISHERIES, 1315 EAST-WEST HIGHWAY, SILVER SPRING, MARYLAND 20910. NOT WITHSTANDING ANY OTHER PROVISION OF THE LAW, NO PERSON IS REQUIRED TO RESPOND, NOR SHALL ANY PERSON BE SUBJECTED TO A PENALTY FOR FAILURE TO COMPLY WITH, A COLLECTION OF INFORMATION SUBJECT TO THE REQUIREMENTS OF THE PAPERWORK REDUCTION ACT, UNLESS THE COLLECTION OF INFORMATION DISPLAYS A CURRENTLY VALID OFFICE OF MANAGEMENT AND BUDGET (OMB) CONTROL NUMBER.

CARCASS / INJURY FORM

Date:	07/14/17	**Time:**	2029	**Lat:**	70.8273	**Lon:**	161.7980
Vessel:	Ile de Batz	**Speed (kt):**	12.5	**Depth (m):**	50		

Environmental Conditions

Bft State:	2	**Precip:**	x	**Vis:**	10	**Ice:**	x

Project/Vessel Activities (include vessel speed)

24-hours before Observation:

In transit to Wainwright Ak.

During Observation:

In transit to Wainwright AK.

After Observation:

In transit to Wainwright Ak.

Description of Observation

A floating dead carcass was sighted at 20:29 local time. It was 3579 meters distant, and port side at the 0900 clock-face position. Birds were feeding on and near the carcass. No identifying marks were observed due to distance of the carcass. It was white probably due to decomposition. Photos were taken.

Description of Animal(s)

The animal was apparently dead as birds were feeding on it. It was white and no other description was available due to distance.

Fate of Animal(s)

The carcass was left floating at site.

Other Marine Mammals observed in 24-hours? If yes, provivde summary as attachment.	yes
Photos provided?	yes

MARINE MAMMAL STRANDING REPORT - LEVEL A DATA

FIELD #: _____ **NMFS REGIONAL #:** _____ (NMFS USE) **NATIONAL DATABASE#:** _____ (NMFS USE)

COMMON NAME: Pacific Walrus **GENUS:** Odobenus **SPECIES:** rosmarus

EXAMINER Name: Layne Olson Affiliation: Owl Ridge NRC

Address: _____ Phone: _____

Stranding Agreement or Authority: _____

LOCATION OF INITIAL OBSERVATION

State: AK County: _____

City: _____

Body of Water: Chukchi Sea

Locality Details: West of Ledyard Bay

Lat (DD): 69 . 6119 N

Long (DD): 165 . 1700 W

■ Actual ☐ Estimated

How Determined: (check ONE)

■ GPS ☐ Map ☐ Internet/Software

OCURRENCE DETAILS ☐ Restrand GE# _____ (NMFS Use)

Group Event: ☐ YES ■ NO

If Yes, Type: ☐ Cow/Calf Pair ☐ Mass Stranding # Animals: _____ ☐ Actual ☐ Estimated

Findings of Human Interaction: ☐ YES ☐ NO ☐ Could Not Be Determined (CBD)

If Yes, Choose one or more: ☐ 1. Boat Collision ☐ 2. Shot ☐ 3. Fishery Interaction

☐ 4. Other Human Interaction: _____

How Determined (Check one or more): ☐ External Exam ☐ Internal Exam ☐ Necropsy

☐ Other: _____

Gear Collected? ☐ YES ☐ NO Gear Disposition: _____

Other Findings Upon Level A: ☐ YES ☐ NO ☐ Could Not Be Determined (CBD)

If Yes, Choose one or more: ☐ 1. Illness ☐ 2. Injury ☐ 3. Pregnant ☐ 4.Other: _____

How Determined (Check one or more): ☐ External Exam ☐ Internal Exam ☐ Necropsy

☐ Other: _____

INITIAL OBSERVATION

Date: Year: 2017 Month: July Day: 16

First Observed: ☐ Beach or Land ■ Floating ☐ Swimming

CONDITION AT INITIAL OBSERVATION (Check ONE)

☐ 1. Alive ☐ 4. Advanced Decomposition

☐ 2. Fresh dead ☐ 5. Mummified/Skeletal

■ 3. Moderate decomposition ☐ 6. Condition Unknown

LEVEL A EXAMINATION ☐ Not Able to Examine

Date: Year: _____ Month: _____ Day: _____

CONDITION AT EXAMINATION (Check ONE)

☐ 1. Alive ☐ 4. Advanced Decomposition

☐ 2. Fresh dead ☐ 5. Mummified/Skeletal

☐ 3. Moderate decomposition ☐ 6. Unknown

INITIAL LIVE ANIMAL DISPOSITION (Check one or more)

☐ 1. Left at Site ☐ 6. Euthanized at Site

☐ 2. Immediate Release at Site ☐ 7. Transferred to Rehabilitation:

☐ 3. Relocated Date: Year:_____ Month:_____Day:___ Facility:_____

☐ 4. Disentangled ☐ 8. Died during Transport

☐ 5. Died at Site ☐ 9. Euthanized during Transport

☐ 10. Other:_____

CONDITION/DETERMINATION (Check one or more)

☐ 1. Sick 7. Location Hazardous

☐ 2. Injured ☐ a. To animal

☐ 3. Out of Habitat ☐ b. To public

☐ 4. Deemed Releasable ☐ 8. Unknown/CBD

☐ 5. Abandoned/Orphaned ☐ 9.Other_____

☐ 6. Inaccessible _____

MORPHOLOGICAL DATA

SEX (Check ONE)

☐ 1. Male

☐ 2. Female

■ 3. Unknown

AGE CLASS (Check ONE)

☐ 1. Adult ☐ 4. Pup/Calf

☐ 2. Subadult ■ 5. Unknown

☐ 3. Yearling

■ Whole Carcass ☐ Partial Carcass

Straight length: 200 ■ cm ☐ in ☐ actual ■ estimated

Weight:_____ ☐ kg ☐ lb ☐ actual ☐ estimated

PHOTOS/VIDEOS TAKEN: ■ YES ☐ NO

Photo/Video Disposition: _____

TAG DATA Tags Were:

Present at Time of Stranding (Pre-existing): ☐ YES ☐ NO

Applied during Stranding Response: ☐ YES ☐ NO

ID#	Color	Type	Placement* (Circle ONE)	Applied	Present
			D DF L LF LR RF RR	☐	☐
			D DF L LF LR RF RR	☐	☐
			D DF L LF LR RF RR	☐	☐

* D= Dorsal; DF= Dorsal Fin; L= Lateral Body
LF= Left Front; LR= Left Rear; RF= Right Front; RR= Right Rear

CARCASS STATUS (Check one or more)

■ 1. Left at Site ☐ 4. Towed: Lat_____Long_____ ☐ 7. Landfill

☐ 2. Buried ☐ 5. Sunk: Lat 69.6119 Long_____ ☐ 8. Unknown

☐ 3. Rendered ☐ 6. Frozen for Later Examination ☐ 9. Other_____

SPECIMEN DISPOSITION (Check one or more)

☐ 1. Scientific collection ☐ 2. Educational collection

☐ 3. Other:_____

Comments: _____

NECROPSIED ☐ NO ☐ YES ☐ Limited ☐ Complete

☐ Carcass Fresh ☐ Carcass Frozen/Thawed

NECROPSIED BY: _____

Date: Year: _____ **Month:** _____ **Day:** _____

ADDITIONAL REMARKS

ADDITIONAL IDENTIFIER: _____ (If animal is restranded, please indicate any previous field numbers here)

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CARCASS / INJURY FORM

Date:	07/16/2017	**Time:**	07:13	**Lat:**	69.6119	**Lon:**	165.1700
Vessel:	Ile de Batz	**Speed (kt):**	10	**Depth (m):**	50		

Environmental Conditions

Bft State:	2	**Precip:**	Fog	**Vis:**	5 km	**Ice:**	N/A

Project/Vessel Activities (include vessel speed)

24-hours before Observation:

Departed Wainwright to transit to Kotzebue.

During Observation:

In transit to Kotzebue.

After Observation:

Continued transit to Kotzebue.

Description of Observation

Carcass observed floating belly-down, forward of vessel, at the 0100 clock-face position at ~800m, with one seabird atop it. Vessel passed carcass, with walrus ~150m off starboard side.

Description of Animal(s)

Carcass was discolored to an orange-pink-white hue. Body was intact, showing minor bloating, and no visible predation or wounds. Photos showed diagnostic robust body, large chest/shoulder area, thick, wrinkly, rough skin, bulging side-set eyes, and bristly whiskers on muzzle, denoting pacific walrus. No tusks were visible.

Fate of Animal(s)

Animal was left undisturbed, floating at sea surface.

Other Marine Mammals observed in 24-hours? If yes, provivde summary as attachment. No

Photos provided? Yes

APPENDIX J – PHOTOGRAPHS

Figure J-1. Bowhead Whale

Figure J-2. Fin Whale

Figure J-3. Minke Whale

Figure J-4. Humpback Whale

Figure J-5. Gray Whale

Figure J-6. Gray Whale

Figure J-7. Pacific Walrus

Figure J-8. Spotted Seal

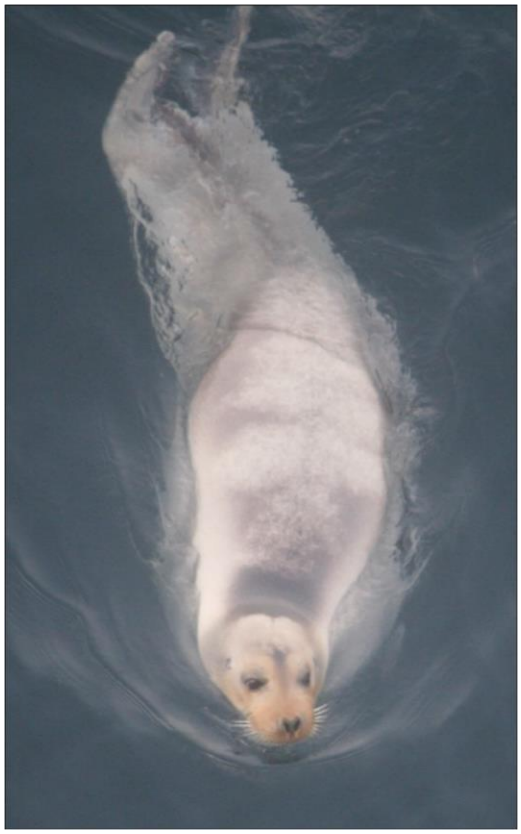

Figure J-9. Bearded Seal

Figure J-10. Ringed Seal