

Application for the Incidental Harassment Authorization for the Taking of Pacific Walrus and Polar Bear in Conjunction with the Quintillion Subsea Operations Cable Project, 2016

REVISED FINAL

January 2016

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1. DESCRIPTION OF SPECIFIC ACTIVITY

Quintillion Subsea Operations, LLC (Quintillion), is proposing to install a subsea fiber optic cable network (the Project) along the northern and western coasts of Alaska to provide high speed internet connectivity to six rural Alaska communities. The subsea fiber optic cable network will link with an existing North Slope terrestrial-based fiber optic line. The Quintillion Subsea Project will consist of 1,904 kilometers (km) (1,183 miles [mi]) of submerged fiber optic cable that includes a main trunk line and six branch lines to onshore facilities in Nome, Kotzebue, Point Hope, Wainwright, Barrow, and Oliktok Point (Figure 1-1). Alcatel-Lucent Submarine Networks (ASN) will conduct the work to lay the cable for the Nome to Oliktok Point system, which is the subject of this application.

The cable-lay ships, cable-lay barges, and support tugs proposed for the Project use thrusters for dynamic positioning and anchor handling during laying operations. The noises generated by these sources have a possibility of acoustically harassing marine mammals, a form of “take” as defined under the Marine Mammal Protection Act (MMPA), and thus are subject to governance under MMPA. Incidental and unintentional harassment takes are permitted with the issuance of an Incidental Harassment Authorization (IHA) from the National Marine Fisheries Service (NMFS). MMPA identifies 14 specific items that must be addressed when applying for an IHA, which allow the NMFS to fully evaluate whether the proposed actions remain incidental and unintentional. The 14 items are addressed below relative to Quintillion Subsea Operation, LLC’s proposed 2016 cable laying project.

1.1. Overview of Activity

The planned fiber optic cable-lay project will occur in the offshore waters of the Bering, Chukchi, and Beaufort Seas between Nome and Oliktok Point (Figure 1-1). The main trunk line is 1,317 km (818 mi) in length, and will run from the tail of the Nome branching line to the tail of the Oliktok Point branching line (Table 1-1). The lengths of these branching lines range between 27 km (17 mi) and 233 km (145 mi). Branching lines connect to the main trunk line at the branching unit (BU), which is a piece of hardware that allows the interconnection of the branching cable from the main trunk line to the shore end facility. The cable signal is amplified through the use of a repeater that is attached to the cable approximately every 60 km (37 mi). Collectively, the cable, BUs, and repeaters make up the “submerged plant”. Depending on bottom substrate, water depth, and distance from shore, the cable will either lay on the ocean floor or will be buried using a plough or a remote operating vehicle (ROV) equipped for burial water jetting. Specific project details follow.

1.2. Project Details

1.2.1. Cable Network

The location of all cable routes will be finalized after the cable route survey (CRS) and burial assessment survey (BAS) is completed (in fall of 2015) and reported. However, any changes in the planned routes (Figure 1-1) resulting from the CRS are expected to be minor, and would not appreciably affect the marine mammal assessment. The length of each cable segment (trunk line and branches) is found in Table 1-1.

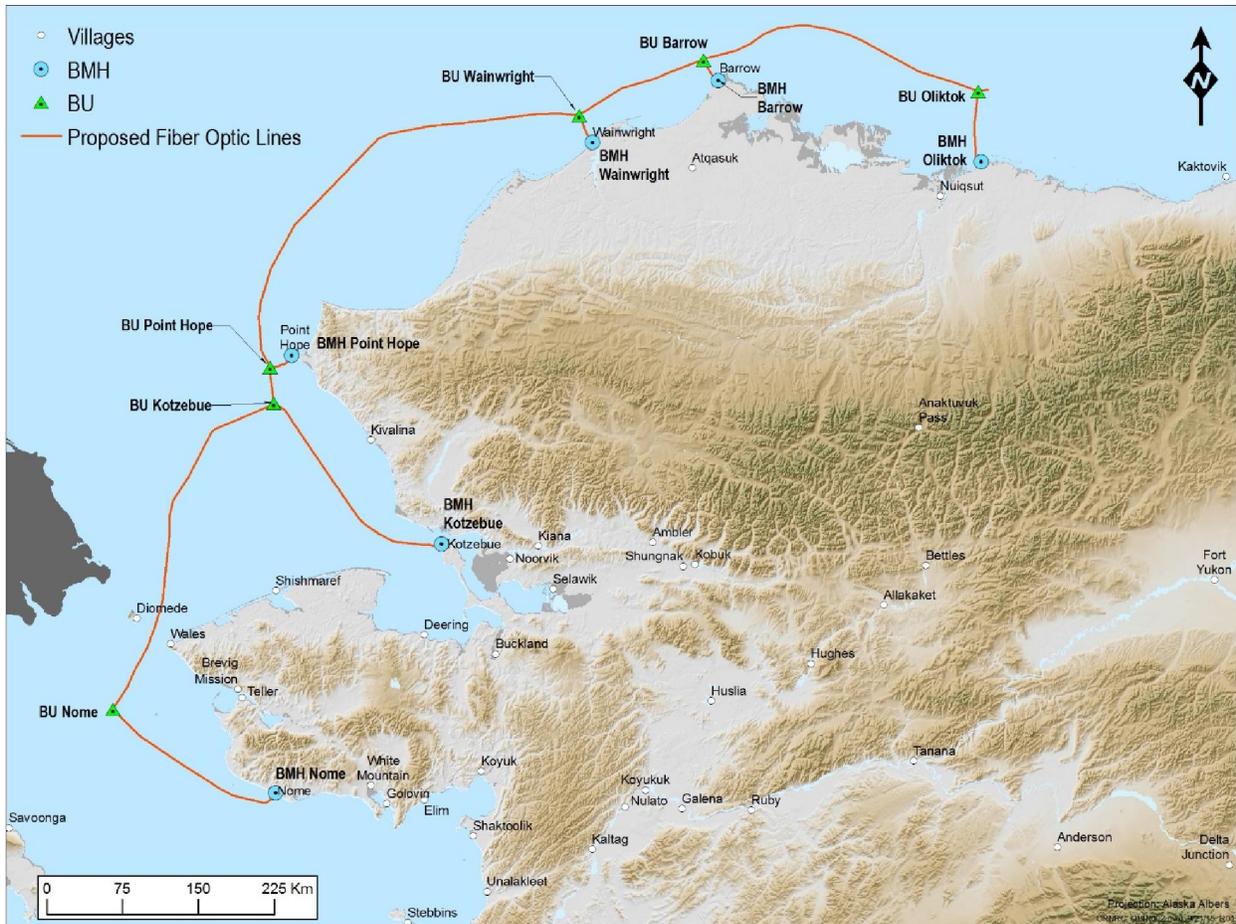


Figure 1-1. Quintillion Subsea Operations, LLC’s proposed fiber optics cable network.

Table 1-1. Network route lengths for each segment.

	Segment (km)							Total
	Main	Branching Lines						
		Oliktok	Barrow	Wainwright	Point Hope	Kotzebue	Nome	
Route Length	1,317	74	27	31	27	233	195	1,904

1.2.2. Vessels

The offshore (waters >12 m deep) cable-lay operations will be conducted from the *Ile de Brehat* (Figure 1-2) and one or more of its sister ships (*Ile de Sein*, *Ile de Batz*). All three ships are 140 m (460 ft) in length 23 m (77 ft) in breadth, with berths for a crew of 70. The ships are propelled by two 4,000 kW fixed-pitch propellers. Dynamic positioning 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 ships are found in Appendix A. The ASN vessels and crew operate within the strictest compliance of all International, National, Local, and U.S. Coast Guard (USCG) territorial regulations. Support vessels include a tug and barge that will remain in the vicinity of the main lay ships.

In order to maintain a flexible enough schedule to respond to the 2016 sea ice conditions, to respond to Bering Sea fisheries (cable-burying) and Beaufort Sea subsistence concerns, Quintillion plans to use two

sister cable-laying ships, and possibly the third, operating at separate locations to ensure the project is completed during the 2016 open-water season.

During cable laying activities occurring in nearshore waters too shallow (<12 m deep) for the *Ile de Brehat* or other ships, an unpowered cable-lay barge will be used to lay the final shore ends of the cable. The cable-lay barge will slowly move along the cable route by winching along an anchor-spread. Two small (<3,000 hp) utility tug boats will be used to constantly maneuver the anchors into position. The utility tugs to be used have not been identified yet. The proposed barge is small and provides few accommodations for additional crew or supernumeraries.



Figure 1-2. The proposed cable-laying ship C/S *Ile de Brehat*.

The branch line segment between and Oliktok Point and BU Oliktok (Figure 1-1) crosses a hard seafloor that poses a more unique challenge to burying the cable in the ice scour zone. For this segment the *CB Networker* (Figure 1-3), a 60-m (197-ft) powered cable-lay barge, will be used because it includes a vertical injector powerful enough to cut a cable trench through the hard sediments found off Oliktok Point. The *CB Networker* is also large enough to operate offshore and will lay the full 75 km cable length between Oliktok Point and BU Oliktok. This additional vessel will also facilitate completing the Beaufort Sea cable-routes before the start of the 2016 whaling season.



Figure 1-3. The proposed cable-lay barge *CB Networker*.

1.2.3. Pre-Lay Grapnel Run

Before cable is laid, a pre-lay grapnel run (PLGR) will be carried out along the proposed cable route where burial is required. The objective of the PLGR operation is to identify and clear any seabed debris (*e.g.*, wires, hawsers, fishing gear) which may have been deposited along the route. Any debris recovered during the PLGR operations would be discharged ashore on completion of the operations and disposed of in accordance with local regulations. If any debris cannot be recovered, then a local re-route will be planned to avoid the debris. The PLGR operation will be conducted to industry standards employing towed grapnels (the type of grapnel being determined by the nature of the seabed). The PLGR operation will be conducted by a local tug boat ahead of the cable-lay activities. The PLGR operation is similar to a fishing trawler operation, and there are no acoustical harassment concerns of consequence.

1.2.4. Cable Laying

The objective of the offshore surface cable-lay operation is to install the cable as close as possible to the planned route with the correct amount of cable slack to enable the cable to conform to the contours of the seabed without loops or suspensions. A slack plan will be developed that uses direct bathymetric data and a catenary modeling system to control the ship and the cable pay out speeds to ensure the cable is accurately placed in its planned physical position.

Cable-burying will occur in all waters south of Bering Strait to avoid conflicts with fisheries (snagging the cable). In water depths greater than about 12 m (about 40 ft) the cable will be buried using an SMD Heavy Duty HD3 Plough (Figure 1-4). The plough has a submerged weight of 25 tonnes (27.6 tons). The plough is pulled by the tow wire and the cable fed through a cable depressor that pushes it into the trench. Burial depth is controlled by adjusting the front skids. The normal tow speed is approximately 600 meters per hour (m/hr) (approximately 0.37 miles per hour [mph]).

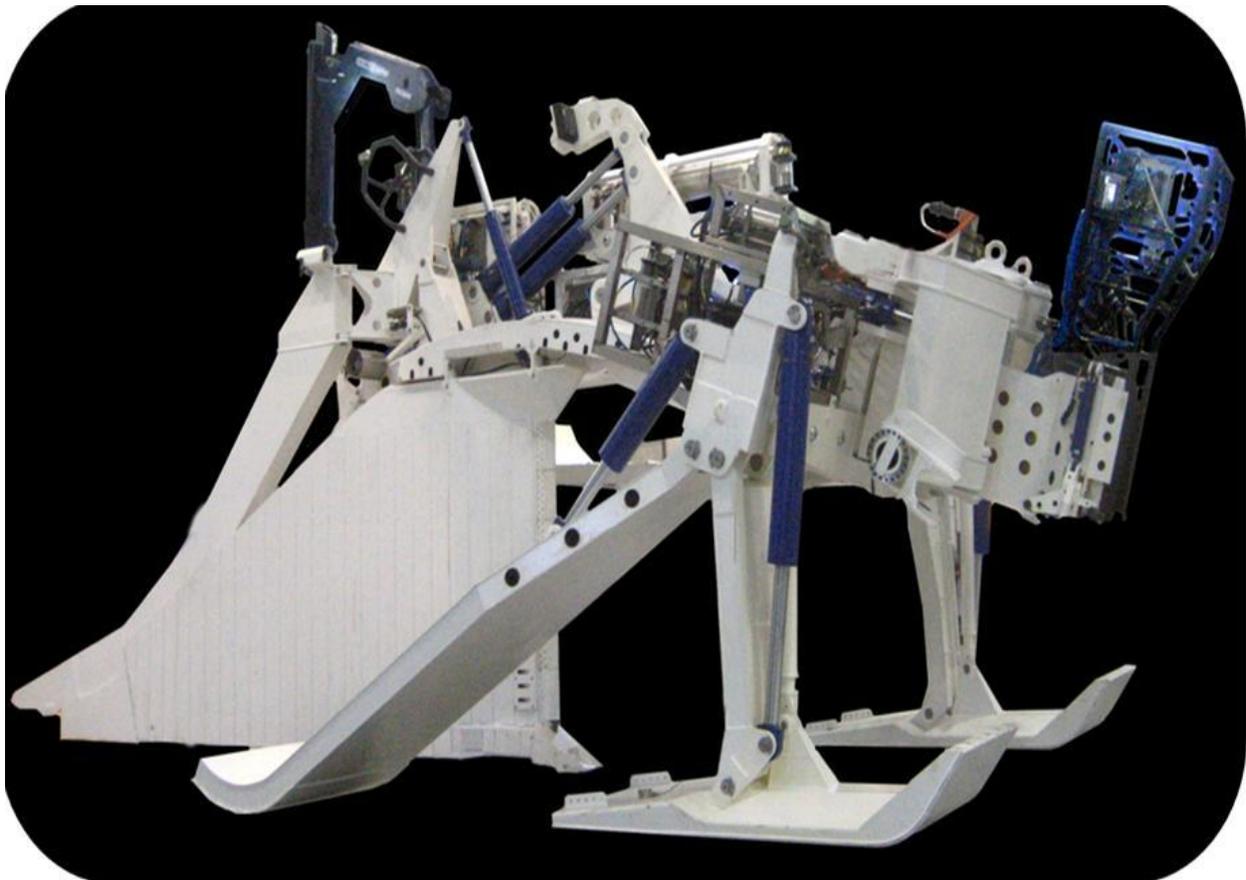


Figure 1-4. SMD HD3 plough.

In water depths less than 12 m (40 ft) cable burial will be by jet burial using a towed sled, tracked ROV, or by diver jet burial. Methods will be subject to seabed conditions in the area. The planned ROV (ROVJET 400 series, Figure 1-5) is 5.8 m (19.0 ft) long and 3.4 m (11.2 ft) wide and weighs 9.1 tonnes (10 tons), and has both a main and forward jet tool capable of trenching to 2 m (6.6 ft) depth.

Nearer to shore, where seasonal ice scouring occurs, the cable will be floated on the surface and then pulled through an existing HDD bore pipe to the BMH where it will be anchor-clamped and spliced to the terrestrial cable. The floated cable portion is then lowered to the seabed by divers and buried (using a post-lay burial method as described above) from the HDD bore pipe seaward.



Figure 1-5. ROVJET.

1.2.5. Post-Lay Inspection and Burial

While it is expected that the cable trench will fill back in by natural current processes, it is important to ensure that cable splices and BUs are fully buried and that there are no unnecessary plough skips at locations where burial is critical. To ensure proper burial, a post-lay inspection and burial (PLIB) will be conducted using the ROVJET 400 series mentioned above. It is expected that PLIB will be necessary for no more than about 10 km (6.2 mi) of the cumulative planned burial routes.

1.3. Acoustical Sources

There are a number of acoustical sources associated with cable-lay operations including thrusters, ploughs, jets, ROVs, echo sounders, and positioning beacons. The predominant noise source during cable-lay operations is the cavitation noise produced by thrusters during dynamic positioning of the vessel (Tetra Tech 2013). Cavitation is the random collapsing of bubbles produced by the blades. The *C/S Ile de Brehat* maintains dynamic positioning during cable-lay operations by using two 1,500 kW bow thrusters, two 1,500 kW aft thrusters, and one 1,500 kW fore thruster. Sound source measurements have not been conducted specific to the *C/S Ile de Brehat* but other acoustical studies have shown thruster noise measurements ranging between 171 and 180 dB re 1 μ Pa [rms] at 1 m (decibels relative to 1 microPascal root mean square

at 1 m) (Nedwell *et al.* 2003, MacGillivray 2006, Samsung 2009, Hartin *et al.* 2011, Deepwater Wind 2013, Tetra Tech 2013).

Thruster noise represents a continuous sound source, and exceeds NMFS Level B harassment criteria when exceeding 120 dB re 1 μ Pa (rms). Various acoustical investigations in the Atlantic Ocean have modeled distances to the 120 dB isopleth with results ranging between 1.4 km and 4.5 km (0.8 mi and 2.7 mi) (Samsung 2009, Deepwater Wind 2013, Tetra Tech 2013) for water depths similar to those where Quintillion will be operating in the Chukchi and Beaufort Seas. However, all these ranges were based on conservative modeling that included maximum parameters and worst-case assumptions.

Hartin *et al.* (2011) physically measured dynamic positioning noise from the 104-m (341-ft) *Fugro Synergy* operating in the Chukchi Sea while it was using thrusters (2,500 kW) more powerful than those used on the *C/S Ile de Brehat* (1,500 kW). Measured dominant frequencies were 110 Hertz (Hz) to 140 Hz, and the measured (90th percentile) radius to the 120-dB isopleth was 2.3 km (1.4 mi). Because this radius is a measured value from the same water body where Quintillion's cable-lay operation will occur, as opposed to a conservatively modeled value from the Atlantic Ocean, it is the value used in calculating marine mammal exposure estimates. Sound source levels from the *Fugro Synergy* during dynamic positioning did not exceed 180 dB, thus there are no Level A harassment or injury concerns. However, a sound source verification of the *C/S Ile de Brehat* is planned to be conducted soon after it begins operations near Nome (see Appendix B Marine Mammal Monitoring and Mitigation Plan).

The proposed nearshore cable-lay barge would not be self-powered, but rather moves by winching along anchor lines and, thus, would not produce significant underwater noise. The most significant noise during these nearshore operations would come from the small utility tugs during anchor maneuvering activity. Source levels for large (45-83 m in length) anchor-handling tugs during anchor pulling operations have been measured at been 181 and 207 dB re 1 μ Pa (rms) (Laurinolli *et al.* 2005, Austin *et al.* 2013, LGL/JASCO/Greeneridge 2014). However, smaller (<35 m) tugs (of the size class proposed for this project) produce underwater noise levels <180 dB re 1 μ Pa (rms) when pulling (Richardson *et al.* 1995, Blackwell and Greene 2003). Blackwell and Greene (2003) measured the underwater noise levels from a tug maneuvering a large barge near the Port of Anchorage and recorded maximum sound pressure levels equating to 163.8 dB re 1 μ Pa (rms) at 1-m source when the tug was pushing the barge, which increased to 178.9 dB re 1 μ Pa (rms) when thrusters were additionally operated during docking maneuvers. It is assumed that the maximum noise levels from the proposed anchor-handling barges will produce underwater noise possibly reaching, but not exceeding, 180 dB re 1 μ Pa (rms). Tug sound pressure levels will be verified at the beginning of the cable-lay season (see Appendix B).

The larger *CB Networker* cable-lay barge that will operate off Oliktok Point is equipped with three (1,000 kW) main engines and four (420 kW) maneuvering thrusters to facilitate positioning, but once location is established, it will move by winching along a 4-point anchor-mooring system and, like the other nearshore barge, will be supported by small anchor-handling tugs. There is no sound source data on the *CB Networker*, but as with the other nearshore barging system, the expected dominate underwater noise will be small tugs during anchor-handling.

Other acoustical sources include the echo sounders, transceivers, and transponders that will be used to continually reference the water depth and the position of the plow and ROV that operate behind the vessel. Based on actual field measurements or manufacturer provided values, some these equipment produce noise

levels exceeding the vessel thrusters. However, these equipment are impulsive, producing pulses every 1 to 3 sec, and the sound energy is focused downward in very narrow conical beams. There is very little horizontal propagation of the noise levels. Measured distances to the 160 dB isopleth for these or similar echo sounders and acoustical beacons ranged between 26 and 44 m (Ireland *et al.* 2007, Reider *et al.* 2013).

2. DATES, DURATION, AND SPECIFIC GEOGRAPHICAL REGION

The request for incidental harassment authorization is for the 2016 open water season (June through October). All associated activities, including mobilization, PLGR, cable-lay, PLIB, and demobilization of survey and support crews, would occur inclusive of the above seasonal dates. Operations would begin at Nome and generally follow the receding sea ice northward, although some vessels will be working at multiple locations to maximize completing the cable-lay within the open-water season. It is expected that the operations may last all season (approximately 150 days). The locations of the main trunk and branching lines are shown in Figure 1-1.

3. SPECIES AND NUMBERS OF MARINE MAMMALS

The proposed cable-laying activity will occur in three separate water bodies: the Bering, Chukchi, and Beaufort Seas, and in all cases after the ice has receded north for the season. For this application, the species of concern are the Pacific walrus and polar bear. Some male walrus summer in the Bering Sea (*e.g.*, at Round Island), and large numbers have recently begun to spend the summers hauled out on the beaches near Pt. Lay. Thus, a few feeding walrus might be observed during proposed cable-laying activity in these water bodies. Polar bears are much less of a concern. Because the marine activities will occur in the open water free of ice, and the shore end activities largely within the villages, polar bears are not expected to be encountered.

Table 3-1. Pacific walrus and polar bear abundance in the project area.

Species	Abundance	Stock	Source
Pacific Walrus (<i>Odobenus rosmarus divergens</i>)	129,000	Pacific	Speckman <i>et al.</i> (2011)
Polar Bear (<i>Ursus maritimus</i>)	2,000	Chukchi/Bering Seas	Lunn <i>et al.</i> (2002)
Polar Bear (<i>Ursus maritimus</i>)	1,526	Southern Beaufort Sea	Regehr <i>et al.</i> (2006)

4. STATUS AND DISTRIBUTION OF THE AFFECTED SPECIES

4.1. Pacific Walrus

Walrus are the second largest pinniped in the world, and the only species in the family Odobenidae. Males can weigh up to 1,500 kg (3,300 lbs) and females to 850 kg (1,875 lbs). Two subspecies are recognized: the larger Pacific walrus (*Odobenus rosmarus divergens*) and the Atlantic walrus (*O. r. rosmarus*). A third subspecies, the Laptev walrus (*O. r. laptevi*), has been proposed, but recent molecular and morphometric analysis has shown that subspecies status is not warranted, and the Laptev walrus is the westernmost

population of Pacific walrus (Lindqvist *et al.* 2009). The Pacific and Atlantic walrus diverged when separated during periods of glacial maxima (Harrington 2008).

Pacific walrus are highly pagophilic (ice-loving), depending on broken pack-ice to access offshore feeding areas (Fay 1982). Sea ice is important as a resting platform between feeding bouts, as substrate for breeding and calving, and as a means of transportation both north and south (Garlich-Miller *et al.* 2011). It is especially important for females and calves. During light ice years when the pack ice edge moves north into the deep Arctic Basin where walrus cannot feed (due to too great a water depth), walrus will move to nearshore terrestrial haulout sites on both sides of the Chukchi Sea. The increased energetic demands in swimming to nearshore sites and the increased foraging competition once arriving, can reduce the fitness of individuals, while the increased frequency of the Chukchi Sea shelf being ice-free can have an overall population effect. The most recent population estimate of 129,000 (Speckman *et al.* 2011) is much lower than previous estimates and, although recent and past estimates are not directly comparable, they do suggest a recent population decline, especially when coupled with recent observations of mortalities at haulout sites (Garlich-Miller *et al.* 2011).

The perceived population reduction and the increased number of ice-free years since 2002 (CBD 2008, Jay *et al.* 2012), was the basis for a 2008 petition submitted to USFWS to list the Pacific walrus as threatened or endangered under the Endangered Species Act (ESA; USFWS 2014). In 2011, the USFWS published a 12-month review determining that listing was warranted, but precluded due to higher listing priorities, and placed them on the candidate species list (USFWS 2011). The USFWS has agreed to list the species, or remove it from the candidate list, by 2017 (USFWS 2014).

Pacific walrus predominately prey on benthic bivalves, gastropods, and polychaetes (Sheffield and Grebmeier 2009). Walrus distribution in the Bering and Chukchi Seas is coincident with areas of high benthic biomass and waters shallow enough to where diving to the ocean bottom is energetically feasible (Costa and Gales 2003, Bluhm and Gradinger 2008). Bivalve clams of the genera *Macoma*, *Serripes*, and *Mya* appear to be the most important prey based on both stomach contents and prey availability at walrus concentration areas (Sheffield and Grebmeier 2009, Jay *et al.* 2014). Annual distribution is also dependent on sea ice conditions relative to the locations of bivalve concentrations.

During the winter, Pacific walrus inhabit the sea ice fringe in the northern Bering Sea running from Bristol Bay to the southern border of the Chukotka Peninsula (Figure 4-1). Winter breeding concentrations form in polynyas located south of Nunivak Island, St. Lawrence Island, and Anadyr Gulf (Figure 4-1). Walrus move with the ice edge as it recedes north in the spring, spending the summer in areas of high concentrations of benthic food resources such as Hanna Shoal in the northeastern Chukchi Sea. In some years, walrus could be found in the shelf waters of the Beaufort Sea as far east as 153°W (Clarke *et al.* 2013). Not all groups migrate north. A portion of the male population will remain in Bristol Bay, the Bering Strait, and along the southern edge of the Chukotka Peninsula throughout the summer they rest at terrestrial haulout sites (Figure 4-1). As many as 14,000 summering males have been counted hauled out at Round Island (Bristol Bay) alone, while 1,000 to 2,000 walrus have been observed summering at King Island (Bering Strait), although King Island haulout use is more typical in the fall (Fay and Kelly 1980). During warm years, when the sea ice recedes to the Arctic Basin where waters are too deep for walrus to forage, walrus will move to terrestrial haulout sites on both sides of the Chukchi Sea. In 2014, about 35,000 walrus hauled out onto a beach near Point Lay, and similar numbers are using the beach in 2015. Although hauling out

on terrestrial beaches in Chukchi Sea is not a new phenomenon, it is unique. Large numbers of walrus have been hauling out there every year since 2007 with the exception of two years (2008 and 2012). During these years enough remnant ice remained over shelf waters to keep walrus offshore. A continuing warming trend, and the implications it has on sea ice and walrus summer ecology, was the driving force behind the petition to list the species under ESA.

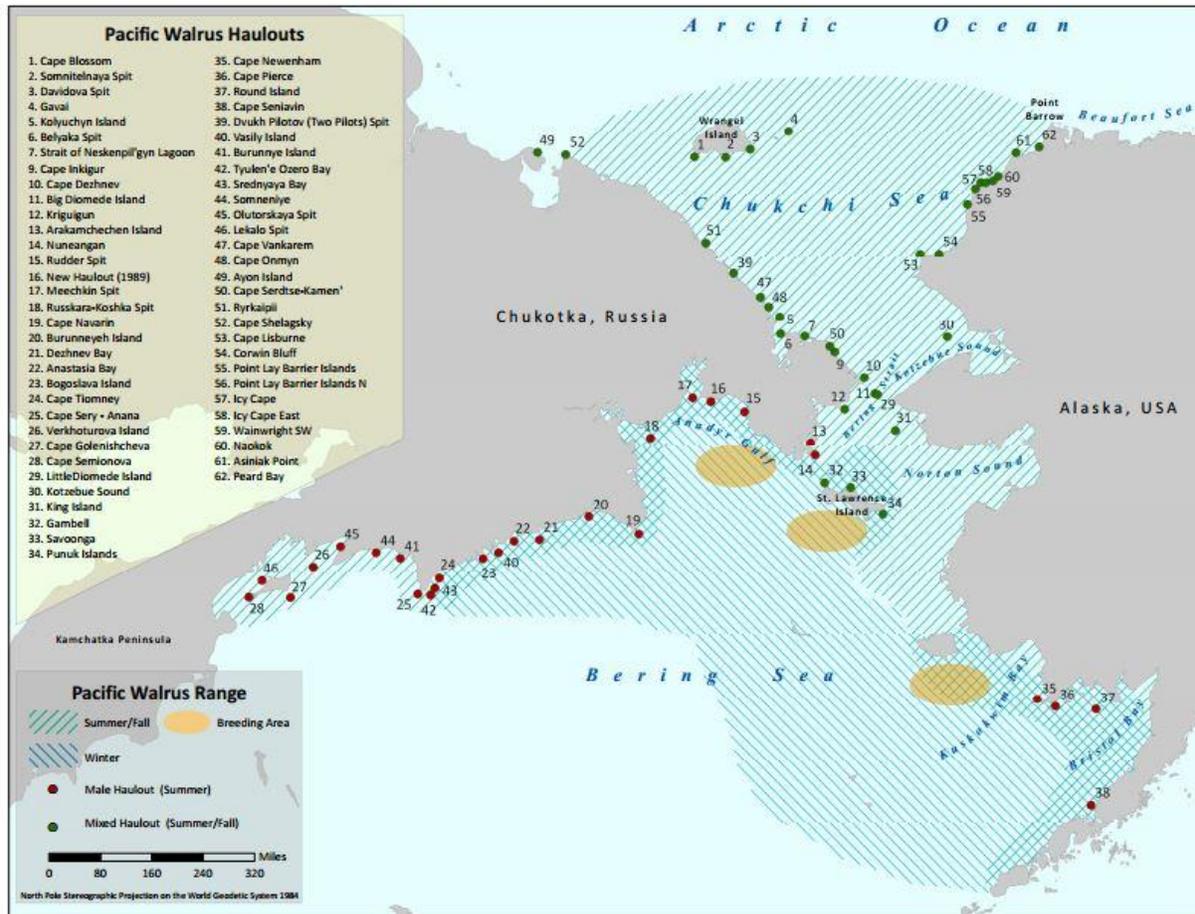


Figure 4-1. Pacific walrus range map.

Walrus encounters during QSO cable project will depend on sea ice conditions that year. The proposed cable routes occur over 700 km (435 mi) north of Round Island, over 100 km (62 mi) offshore of the terrestrial haulouts near Point Lay, and 28 km (17 mi) inshore of Hanna Shoal (Figure 4-2). Thus, the QSO cable project will avoid major walrus concentration areas regardless of sea ice. However, scattered walrus are expected to be seen near Nome and when passing near King and Little Diomede Islands. The route through Bering Strait is expected to come within about 20 to 25 km (12-16 mi) of these islands. If the cable-laying operations between Point Lay and Wainwright occur during August, and ice conditions are light, walrus leaving Hanna Shoal for terrestrial haulout near Point Lay might be encountered. During geophysical surveys along the proposed routes during September and August 2015, 55 walrus were recorded by marine mammal observers over about 50 days of activity. Most of these animals were recorded offshore of Wainwright.

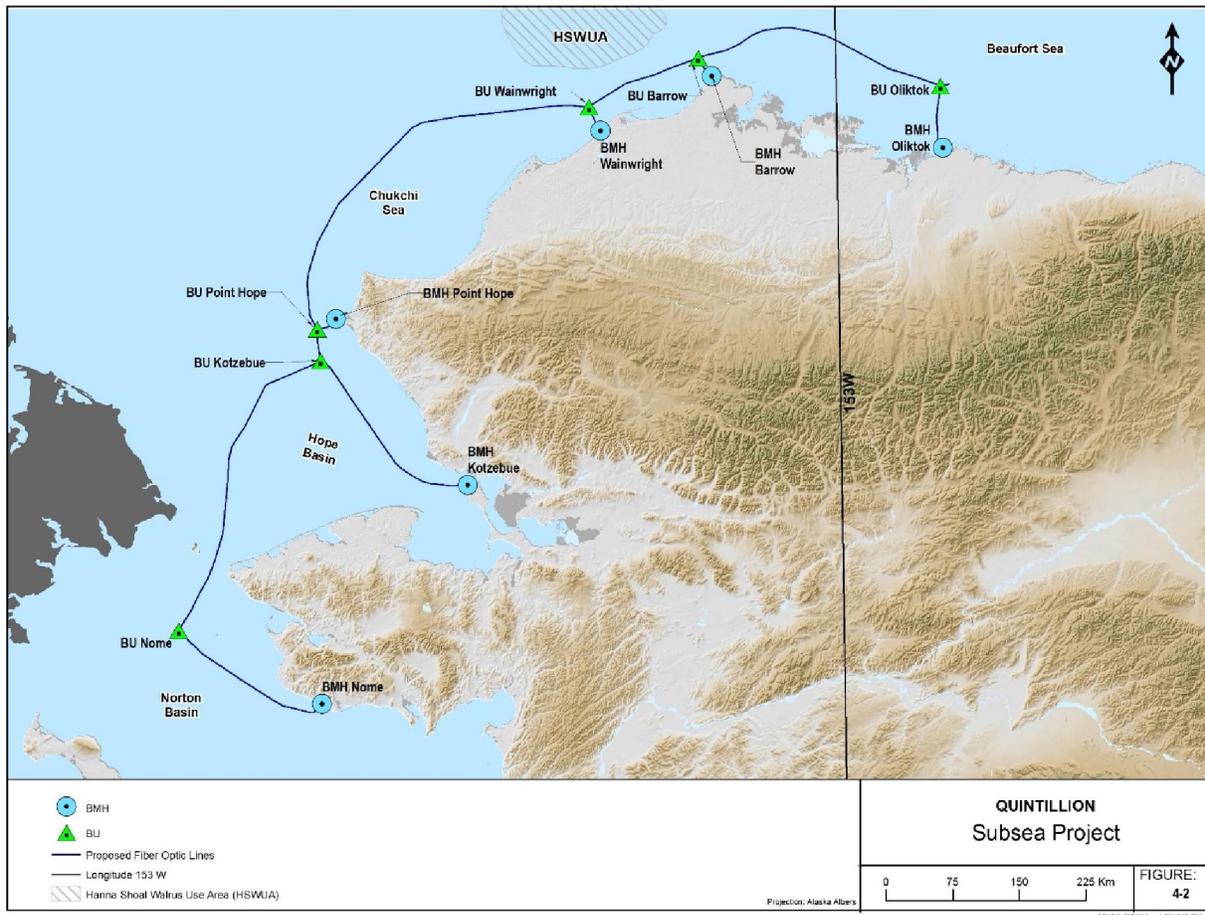


Figure 4-2. Location of the Hanna Shoal Walrus Use Area.

4.2. Polar Bear

Two stocks of polar bears inhabit the QSO cable-laying project area: the Chukchi/Bering Sea population and the Southern Beaufort Sea population. The summer range of the former population extends as far eastward as the Colville River Delta and the western edge of the latter stock extends to Point Hope, thus creating an overlap in the stocks (Amstrup *et al.* 2004; Figure 4-3). The Chukchi/Bering Sea stock is the larger at about 2,000 animals (Lunn *et al.* 202), while the Southern Beaufort Sea stock has been estimated at 1,526 (Regehr *et al.* 2006). Both stocks are highly dependent on sea ice, and both were listed 2008 as threatened under ESA due to the loss of sea ice from climate change (USFWS 2008). Some bears of the Chukchi/Bering Sea stock will move south with the ice to winter in the northern Bering Sea. Both stocks den in the winter, both on ice or coastal areas, when snow drifts are deep enough for denning (Amstrup *et al.* 2003) with the Southern Beaufort Sea stock denning mostly along the north coast of Alaska and the Chukchi/Bering Sea stock mostly in Russia (USFWS 2013). There is little denning activity along the coast of western Alaska.

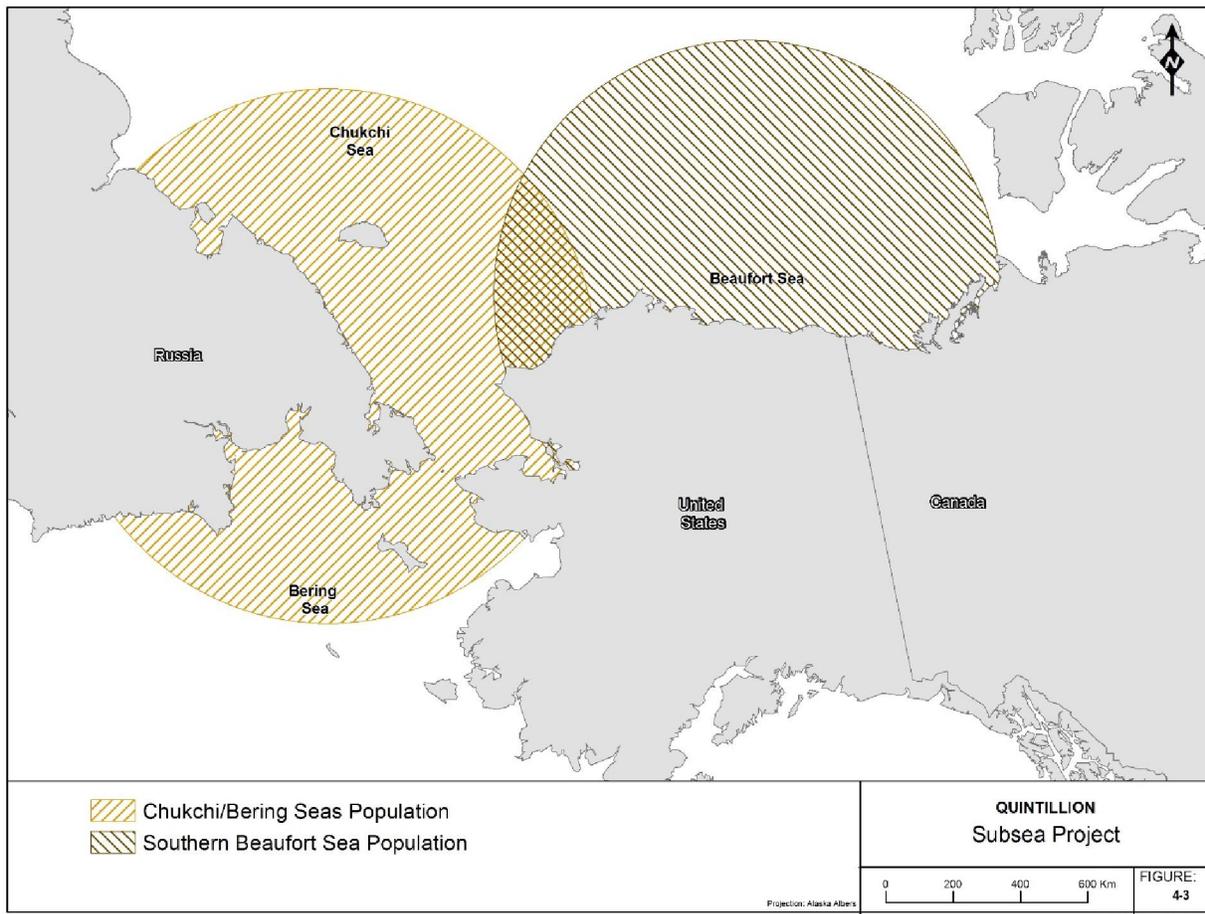


Figure 4-3. Approximate ranges of the Chukchi/Bering Seas and Southern Beaufort Sea populations of the polar bear.

Polar bears from both stocks feed primarily on ringed seals (*Pusa hispida*) and secondarily on bearded seals (*Erignathus barbatus*). Adult seals are taken by stalking hauled out animals, or by waiting for seals to appear at breathing holes. Ringed seal pups are taken by breaking through the tops of snow lairs. Bears will also occasionally take walrus calves, and scavenge walrus and whale carcasses. They will also concentrate at Point Barrow, Cross Island, and Barter Island where they feed on the remains of harvested bowhead whales. The availability of sea ice to access prey is critical to the survival polar bears. If stranded on the beach during the summer, bears will eat very little other than what they can scavenge until the ice returns.

Because polar bears are so dependent on sea ice, and the QSO cable project must avoid sea ice for safety reasons, few bears are expected to be encountered during the 2016 open water season. It is possible that polar bears might be observed near Oliktok Point given the remoteness of the location and the proximity of the barrier islands, but close encounters are unexpected.

5. TYPE OF INCIDENTAL TAKING AUTHORIZATION REQUESTED

The incidental taking authorization requested is for Level B noise harassment associated with QSO's proposed fiber optic cable project in the northern Bering, Chukchi, and Beaufort Seas. The noise source of primary concern is the operation of ship thrusters during dynamic positioning and anchor handling. The actual Level B take will depend upon number of Pacific walrus occurring within the 120 dB Zone of Influence (ZOI) at the time of cable-laying activity. Level A harassment or injury is not of concern as thruster noise is not known to exceed 180 dB re 1 μ Pa (rms) at source (see Section 6). There are no noise harassment concerns relating to polar bears, but polar bears might be visually harassed during shore end activities at or near Oliktok Point.

6. HARASSMENT ESTIMATES FOR MARINE MAMMALS

Exposure to continuous sound levels greater than 120 dB re 1 μ Pa (rms) can elicit behavioral changes in marine mammals that might be detrimental to health and long-term survival where it disrupts normal behavioral routines, and is the Level B criteria for acoustical harassment under the MMPA. Exposure to sound levels greater than 180 dB re 1 μ Pa (rms) for cetaceans and 190 dB re 1 μ Pa (rms) for pinnipeds can lead to acoustical injury including temporary loss in hearing sensitivity and permanent hearing damage. These values are the MMPA Level A criterion. However, as ship thruster noise is not expected to exceed 180 dB re 1 μ Pa (rms) at source, Level A concerns are not addressed further.

The estimate of the numbers of walrus that could be harassed (Level B) by exposure to thruster noise during cable-laying operations was determined by multiplying the maximum seasonal density by the total area in the north Bering and Chukchi Seas (and Beaufort Sea to 153°W) that will be ensonified by greater than 120 dB re 1 μ Pa (rms). It is assumed that regardless of the exact cable-laying activity occurring, thrusters will be continuously operated right to the shoreline.

6.1. Estimating Numbers of Level B Harassments

6.1.1. Ensonified Area

The acoustical footprint (total ensonified area) was determined by assuming that dynamic position would occur along all trunk and branching lines within the proposed fiber optics cable network, regardless of the cable-laying vessel used or activity conducted. The sum total of submerged cable length is 1,903 km (1,182 mi), but total cable length within Pacific walrus habitat (west of 153°W) is 1,691 km (1,051 mi). Assuming that the radius to the 120 dB isopleth is 2.3 km (1.4 mi), then the total ensonified area represents a swath that is 1,691 km (1,051 mi) in length and 4.6 km (2.8 mi) in width (2 x 2.3 km) or 7,780 km² (3,004 mi²).

All of the Nome branching line (194.7 km [121.0 mi]) and 87.1 km (54.1 mi) of the trunk line between BU Nome and BU Kotzebue fall within the Bering Sea (Figure 6-1). The combined length is 281.8 km (175.1 mi) and the total ensonified area is 1,296 km² (500 mi²). Activities along the mainline and four branching lines (Kotzebue, Point Hope, Wainwright, and Barrow) occurring within the Chukchi Sea will presumably ensonify a combined area of 5,947 km² (2,296 mi²). The Oliktok branching line (73.9 km [45.9 mi]) and 254.1 km (157.9 mi) of the trunk line between Barrow and Oliktok are found in the Beaufort Sea. Here the

combined length is 328 km (203.8 mi) and total ensonified area is 1,509 km² (583 mi²). However, only 117 km (72.7 mi) of the cable route occurs within walrus habitat (west of 153°W), with only about 538 km² (208 mi²) of this habitat ensonified.

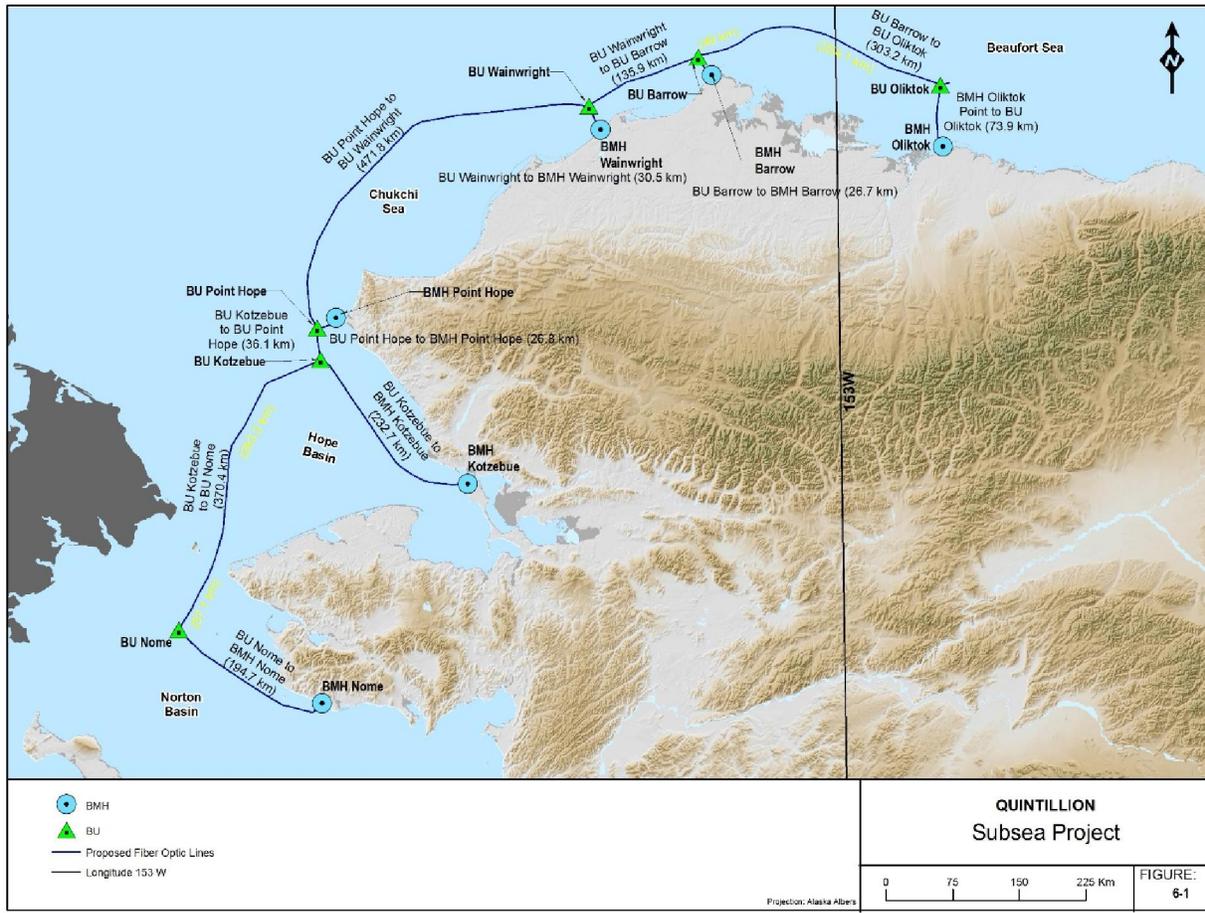


Figure 6-1. Trunk and branching lines segment lengths.

6.1.2. Pacific Walrus Density

The seasonal distribution of walrus in the project area is directly associated with the distribution and extent of broken pack-ice (Fay *et al.* 1984, Garlich-Miller *et al.* 2011, Aerts *et al.* 2014). During years that sea-ice is prevalent over the Chukchi Sea shelf all summer, most walrus are expected to remain with the ice and feed at high food concentration areas like Hanna Shoal. During years that the pack ice edge moves north over the Arctic Basin where waters are too deep for walrus to forage, the walrus leave the ice and haul out on beaches (such as near Point Lay), where they remain until the pack ice returns. Relative to the Quintillion cable laying, few walrus are expected to be encountered during heavy ice years as most of them will remain with the pack ice moving north or northwest of the lines. The exception would be where isolated floes supporting walrus were to blow back southward during storm events. During light ice years, walrus moving from the pack ice to terrestrial haulouts might intercept cable-laying activity, and beach

summering walrus might be encountered near Wainwright, or passing through the Bering Strait. In general, summer densities of walrus in the project area are unpredictable, and distributions clumpy.

The best available estimates come from Aerts *et al.* (2014), who conducted shipboard surveys for marine mammals in the Chukchi Sea from 2008 to 2013. Their highest recorded summer density were in the low-ice years of 2009 (0.040 walrus/km²) and 2013 (0.041 walrus/km²). During the heavy ice years of 2008 and 2012, densities were only 0.001 and 0.006 walrus/km², respectively. Given the continuing trend for light summer ice conditions, it is conservatively assumed that 2016 will be similar to 2013. The 2013 density estimate of 0.041 walrus/km² is, therefore, used in the following exposure calculations.

6.1.3. Walrus Level B Exposure Calculations and Take Request

The estimated potential harassment exposure of walrus by the QSO cable project was determined by multiplying the seasonal walrus density (0.041 walrus/km²) by the total area (7,780 km²) that would be ensounded by thruster noise greater than 120 dB re 1 μ Pa (rms). The result is an estimated 48 walrus that might be exposed.

While this number was generated using a conservative in-water density value, it is not greater than the number of walrus observed during monitoring of the 2015 geophysical survey along the proposed cable routes, and it does not take into account the potential for a brief encounter of a large number of walrus moving between Hanna Shoal and Point Lay, or near the Wainwright and Barrow shore ends. During approximately 50 days of geophysical survey along the proposed routes in 2015, 55 walrus were encountered. Because the 2016 operations might last 150 days, a simple extrapolation from the 2015 monitoring results suggests that 165 walrus might be encountered. However, one of the 2015 encounters involved 30 or more walrus, indicating that because walrus are highly gregarious, a large number of animals might be exposed in a single encounter. Thus, taking into consideration the possibility that any walrus encounter might include large groups, a take authorization of 500 walrus is requested.

6.1.4. Polar Bear Take Request

Given that cable-laying will (and must) occur during the ice-free period of 2016, and that five of the six cable landfalls occur at human-populated villages, it is unlikely that polar bears drifting on ice or wandering along the shorelines, will be encountered during operations. A possible exception is the Oliktok Point landfall site. Oliktok Point itself is relatively remote and includes only a few camp facilities. Also, the route into Oliktok Point passes between Thetis and Spy Islands, both part of a 65 km (40 mi) barrier island chain running from the Colville River Delta to Prudhoe Bay that is often inhabited by summer-wandering polar bears. It is further possible that northern wind events might blow isolated ice flows supporting polar bears near operations anywhere within the project area. While any encounters with these bears would not result in undue underwater noise harassment, largely because they do not leave their head underwater for extended periods, the presence of the cable-laying fleet and shoreline human activity might be disturbing to these bears. Thus, to account for these possibilities, an authorization to harassment take up to 10 polar bears, 5 from each stock, is requested.

6.1.5. Take Request as a Percentage of Stock

The requested harassment take for both Pacific walrus and polar bear are small relative to the most recent stock abundance estimates. For both species, the requested take is well less than 1% of the stock.

Table 6-1. Level B take request as a percentage of the stock.

Species	Abundance	Requested Take	Percent Stock
Pacific Walrus	129,000	500	0.39%
Polar Bear (Chukchi/Bering Stock)	2,000	5	0.25%
Polar Bear (Beaufort Stock)	1,526	5	0.33%

Abundance sources: Lunn *et al.* (2002), Regehr *et al.* (2006), Speckman *et al.* (2011)

7. ANTICIPATED IMPACT OF THE ACTIVITY ON THE SPECIES OR STOCK

7.1. Introduction

The primary concern of the QSO cable project relative to marine mammals is the possible acoustical harassment by underwater noise generated from ship thrusters during continuous dynamic positioning. Relative to walruses, man-made noise introduced into the marine environment can result in impaired hearing, disturbance of normal behaviors (*e.g.*, feeding, resting, social interactions), and masking calls from conspecifics. Walrus have relatively low hearing frequencies when compared to other marine mammals. Their hearing thresholds overlap with most underwater industrial noise, including noise produced by ship propellers and thrusters. Noise generated from the thrusters could disrupt normal behaviors of walrus where received levels exceed 120 dB re 1 μ Pa (rms). Walrus and polar bears could also be visually disturbed if proposed activity were to occur near ice floes, terrestrial haulouts, or remote beaches.

7.2. Threshold Shift

When exposed to intense sounds, the mammalian ear will protect itself by decreasing its level of sensitivity (shifting the threshold) to these sounds. Stereocilia are the sound sensing organelles of the middle and inner ear. They are the “hairs” of the hair cells that convert sound wave energy to electrical signals. When sound intensity is low, the hairs will bend towards the incoming waves, thereby increasing sensitivity. If the sound intensity is high, the hairs will bend away in an effort to reduce wave energy damage to the sensitive organelles, which includes a reduction in sensitivity. If the sound levels are loud enough to damage the hairs, the reduction in sensitivity will remain, resulting in a shift in hearing threshold. These threshold shifts can be temporary (temporary threshold shift [TTS]) or permanent (permanent threshold shift [PTS]) (Weilgart 2007) depending on the recovery ability of the stereocilia and connecting hair cells. Over-activation of hair cells can lead to fatigue or damage that remains until cells are repaired or replaced.

Anthropogenic sources of underwater impulsive noises that could lead to TTS include seismic surveys, pile driving, and blasting. However, Quintillion’s cable-laying operation will not produce impulsive noises of consequence, so these TTS concerns do not apply. The primary underwater noise associated with the proposed cable-laying operations is the continuous cavitation noise produced from cable-laying ship’s thrusters. Cavitation noise is a potential source for PTS depending on the received noise level (a function of the distance the animal is to the vessel) and duration (dependent on the period animal and vessel are in proximity). Since underwater hearing sensitivity in most pinnipeds and odontocetes (*e.g.*, sperm, killer, and beluga whales, and sea lions) is greatest beyond 10 kHz, their effectiveness at hearing cavitation noise is

already poor, and the potential for PTS is reduced. The cavitation noise does, however, fall within the effective hearing range of walrus. Kastelein et al. (2002) measured the hearing threshold of captive walrus and found their best sensitivity to fall within the 0.125 to 15 kHz range, while Hartin et al. (2011) found that the most dominant frequencies from thruster noise ranged between 0.110 and 0.140 kHz. Thus, at the lower frequency of hearing, PTS could occur if exposure duration was long enough. However, as the cable-laying ship is continually moving, there is no long-term exposure of a given marine mammal to continuous cavitation noise leading to PTS. Further, walrus remain submerged for only short periods during diving bouts; thus, underwater noise exposure is broken as soon as the animal surfaces. Therefore, hearing loss in walrus is not of concern from the proposed oceanic cable-laying operations.

7.3. Masking

Masking occurs when louder noises interfere with marine mammal vocalizations or their ability to hear natural sounds in the environment (Richardson *et al.* 1995), thereby limiting their ability to communicate, detect prey, or avoid predation or other natural hazards. Masking is of particular concern with baleen whales because low-frequency anthropogenic noises, such as propeller noise, overlap with their communication frequencies. Some baleen whales have adjusted their communication frequencies, intensity, and call rate to limit masking effects. For example, McDonald *et al.* (2009) found that California blue whales have shifted their call frequencies downward by 31% since the 1960s, possibly in an attempt to communicate at frequencies below masking shipping noise frequencies. Melcon *et al.* (2012) found blue whales to increase their call rates in the presence of shipping noise, while Watkins (1986) found fin whales to reduce their calling rate in response to boat noise. Both killer whales (Holt *et al.* 2009) and beluga whales (Scheifele *et al.* 2005) were found to increase the amplitude of their calls (known as the Lombard effect) in response to loud vessel noise levels.

Walrus do vocalize underwater, and males will vocalize extensively underwater (repeated pulses of taps and knocks over durations that can last for hours) during the breeding season (Stirling et al. 2011). These vocalizations range in frequency from about 0.1 to 4 kHz (Stirling et al. 2011). While it is possible that thruster noise from Quintillion's vessel might overlap with these vocalization frequencies, there is considerable vocalization bandwidth remaining that does not overlap with thruster noise. Further, walrus breeding occurs during the winter (Garlich-Miller *et al.* 2011) and does not overlap with Quintillion's cable-laying schedule. Other vocalizations may be masked by thruster noise where walrus and activity co-occur, but the effects would be temporary as the cable-laying vessel is continually moving.

7.4. Chronic Disturbance

Apart from any potential for damaging marine mammal hearing, loud vessels can disrupt normal behaviors of marine mammals either through auditory or visual harassment. Disturbed animals may quit feeding, move away from feeding areas, display overt reactions, or display other behaviors that expend undue energy potentially culminating in lowered fitness. Continued disturbance can lead to chronic stress exposure, further leading to stress-related responses such as immune system suppression, reproductive failure, slowed growth, and an overall decline in fitness. Chronic stress is exposure to stressors that last for days or longer, and does not apply to a single passing ship. However, disturbance noise from a passing ship (acute stress) can add to the overall stress budget (known as the allostatic load; Romero *et al.* 2009) of an individual

marine mammal contributing to general distress and deleterious effects. Quintillion's planned cable-laying will have some limited, additive effect to the overall anthropogenic noise budget.

Most information on the reaction of pinnipeds to boats relate to disturbance of hauled out animals. There is little information on the reaction of these pinnipeds while they are in the water other than some anecdotal information that some individuals are often attracted to boats (Richardson *et al.* 1995). For walrus, disturbance of hauled out animals can be a critical issue. Whether hauled out on land or ice, walrus will often overtly react to human presence by stampeding back into the safety of water leading to the trampling death of young animals. For example, several thousand walrus hauled out on the beaches of Chukotka Peninsula in 2007 may have died from trampling trauma alone, and several trampled animals were found on Alaskan beaches in 2009 (Fischbach *et al.* 2009, Garlich-Miller *et al.* 2011). Trampling mortality at haulout sites near Point Lay have been modest, likely due in part by local villagers managing potential human disturbance (Garlich-Miller *et al.* 2011). The QSO cable project will avoid sea-ice haulout sites by operating in the summer, well away from the pack-ice edge. Also, the only terrestrial walrus haulout sites identified in Figure 4-1 that the project would come close to are those that are more than 25 km (16 mi) north and south of Wainwright. Given the Wainwright branching line will go directly to the village, haulout disturbance potential is remote.

Since all but one of the branching lines will terminate at coastal villages, there is little or no potential for disturbing polar bears. The exception is the Oliktok line running to the relatively remote camp at Oliktok Point. Here, the Oliktok branching line will run through the 7.2 km (4.5 mi) gap between Thetis and Spy Islands, coming close enough to one or both of the islands to visually or acoustically disturb any polar bear summering on these islands. Each year a small number of polar bears become stranded on the barrier islands where they wander the beaches until the sea-ice returns. However, any disturbance would be temporary, and it is expected that local bears will just move away from the active vessels.

8. ANTICIPATED IMPACTS ON SUBSISTENCE USES

The proposed cable-laying activities will occur within the marine subsistence areas used by the villages of Nome, Wales, Diomede, Kotzebue, Kivalina, Point Hope, Point Lay, Wainwright, Barrow, and Nuiqsut, all of which annually hunt walrus, except Nuiqsut. Between 1989 and 2009, approximately 1,560 walrus were harvested annually in Alaska (Garlich-Miller and Burn 1999, USFWS 2010), with two-thirds of the harvest by the St. Lawrence Island villages of Gambell and Savoonga alone. (St. Lawrence Island is located 135 km [84 mi] south of the QSO cable project.)

The villages within the project area harvested an average of 316 walrus between 1989 and 2009, with 40% (127; Table 8-1) harvested by the small village of Diomede (population of ~200) alone (or nearly one per person). Diomede is located on Little Diomede Island in the center of the Bering Strait. Twice a year the vanguard of the Pacific walrus population passes through the strait when migrating between wintering and summering grounds providing opportunity for Diomede hunters. Walrus will also occasionally haulout on Little Diomede Island during the summer and fall (Garlich-Miller and Burn 1999; Figure 4-1). The small village of Wales (population ~145), located on the eastern edge of the strait, harvests about 14 walrus annually (USFWS 2010).

Table 8-1. Average annual harvest (1989-2009) of walrus by subsistence villages occurring within the QSO project area (source: USFWS 2010).

Village	Annual Harvest
Nome	21
Wales	14
Diomedede	127
Kotzebue	4
Kivalina	7
Point Hope	7
Point Lay	5
Wainwright	44
Barrow	24
Nuiqsut	0

Relative to the village population size (556), walrus are an important staple for Wainwright inhabitants as well (although the village also harvests beluga and bowhead whales). Approximately 44 walrus are taken annually (Table 8-1). About 20 walrus were annually harvested by hunters from each Nome and Barrow between 1989 and 2009, but given both villages have populations of approximately 4,000, walrus are not as important in the subsistence diet as other resources. The remaining villages (Kotzebue, Kivalina, Point Hope, and Point Lay) took less than 10 walrus annually between 1989 and 2009, suggesting walrus hunting is more opportunistic than focused.

Taking into account the relative importance of walrus to a particular village, and the proposed routes of the QSO cable project, there are only a few locations where caution is needed to ensure the project does not disrupt local subsistence harvest of this resource. These include the portion of the route passing between the villages of Diomedede and Wales, and the branching line into Wainwright. For the remaining villages, the annual harvest is relatively low and generally occurs when ice is present (or in the case of Point Lay, the route will run well offshore of the village).

The walrus harvest at Diomedede begins each year as soon as the beaches are free of ice and boats can be launched (Merk 1983). Because ice conditions vary each year, annual harvest can begin as early as early May, or as late as early June. In 1982 and 1983, most animals were taken in the first 10 days of June (Merk 1982, 1983), and the mean harvest date over the last several decades is June 4 (Robards 2008). The best hunting conditions are when scattered ice flows pass by providing not only resting substrate for walrus, but access to the flows by hunters (Fay 1982, Merk 1982). Walrus move to the center of large compacted flows where they are inaccessible. Less ice in recent years has resulted in a shorter harvest season for Diomedede hunters (Robards 2008). There is little chance of a spatial or temporal overlap between the annual hunt and

the QSO cable project. This is supported by the facts that the proposed route location is expected to pass about 25 km (16 mi) from Little Diomed Island (and Wales), presence of ice is needed for any spring walrus hunts from Diomed, and the Quintillion cable-laying vessel cannot operate in the presence of ice.

Walrus are harvested from Wainwright and Barrow during July (most) and August from drifting ice floes (Bacon *et al.* 2009). Most walrus are killed within 32 km (20 mi) from shore, but some are taken by both villages offshore as far as 64 km (40 mi) (SRB&A 2012). The Quintillion main lay cable route will pass within 30 km (19 mi) of both villages, and the branching lines will go directly to both Wainwright and Barrow. However, given the hazard ice floes pose to a cable-laying project, Quintillion will not plan to be operating within either village's subsistence hunt area when sea ice is present. Thus, the cable-laying project is not expected to temporally overlap with the annual walrus hunts by either Wainwright or Barrow.

Based on the proposed cable-laying time table relative to the seasonal timing of the various village harvest periods for walrus, especially the need for the cable-laying fleet to avoid ice, an overlap in cable-laying with walrus hunting is not expected. However, Quintillion will work closely with the Eskimo Walrus Commission (through the Plan of Cooperation addressed in Section 12 and located in Appendix C) to minimize any effects cable-laying activities might have on subsistence harvest, including scheduling the laying of branching lines to avoid periods when walrus are present.

9. ANTICIPATED IMPACTS ON HABITAT

9.1. Pacific Walrus Habitat and Prey Resources

The QSO cable project will occur on the shelf regions of the northern Bering, Chukchi, and Beaufort Seas. The physical habitat is characterized as flat with a bottom substrate of mud, sand, or gravel, or a combination of the three (Naidu 1988, Feder *et al.* 1989, Smith 2010). The portion of the cable network within the northern Bering Sea and the Chukchi Sea just north of the Bering Strait will cross sea floor substrate dominated by gravelly muddy sand, muddy sand, and muddy gravel. The main trunk line will also encounter mud and sandy mud substrates when crossing the Hope Basin. The cable routes for the rest of the Chukchi portion of the network will cross primarily gravelly mud, gravelly muddy sand, and mud substrates. The Beaufort Sea section of the network is primarily mud, sandy mud, and gravelly mud. There are no areas dominated by silt, clay, or rock.

These habitats support benthic and epibenthic fauna. Feder *et al.* (1989) identified four benthic fauna assemblages, based on grab sampling, in the Chukchi Sea that are a reflection of the relative presence and mix of gravel, sand, and mud. Areas of muddy-sandy-gravel were dominated in abundance by the tube-dwelling amphipod *Byblis gaimardi* and the juvenile barnacle *Balanus crenatus*. The muddy areas were dominated by the polychaete *Maldane glebifex* and the clams *Macoma* spp. and *Nucula bellotti*. The sandy area assemblage was dominated by barnacles (*B. crenatus*) and tube-dwelling amphipods including *Ampelisca macrocephala*. Finally, the sandy gravel areas included sand dollars (*Echinarachnius parma*) and the cockle *Cyclocardia rjabinae*. Feder *et al.* (1989) also conducted trawl surveys in the Chukchi to characterize communities the epifaunal communities and benthic fauna near the surface. Invertebrates they found to dominate abundance were brittle stars (*Ophiura sarsi*), Tanner crab (*Chionoecetes opilio*), and crangonid shrimp.

Bivalve clams of the genera *Macoma*, *Serripes*, and *Mya* appear to be the most important prey based on both stomach contents and prey availability at walrus concentration areas, although they feed on a wide variety of prey, including non-bivalve invertebrates mentioned in the paragraph above (Sheffield and Grebmeier 2009). Feder *et al.* (1989) found walrus summer and fall feeding areas in the Chukchi Sea to be dominated by muddy substrates supporting high biomasses of *Macoma calcarea*. Hanna Shoal (Figure 4-2) is the most important foraging area for walrus (Brueggeman *et al.* 1990, 1991; MacCracken 2012; Jay *et al.* 2012), as well as bearded and ringed seals (USFWS 2013). Because of the unique bathymetric and current patterns, nutrients from the Bering Sea are deposited on the ocean floor at Hanna Shoal where they feed a rich benthic ecosystem. The USFWS delineated the area based on walrus use patterns, and designated 24,600 km² (9,500 mi²) as the Hanna Shoal Walrus Use Area (HSWUA; Figure 4-2). Because of the area's importance, the area was closed to oil and gas leasing in 2015.

9.2. Polar Bear Habitat and Prey Resources

Sea ice is the most vital component of polar bear habitat, while the availability of snow drifts is important as winter denning habitat (USFWS 2013). Sea ice provide bears access to ringed and bearded seal prey. Polar bears are not evenly distributed across the ice, but are generally found near the pack-ice edge, polynyas, and leads over relatively shallow water (USFWS 2013), where seals are also most often found.

9.3. Potential Project Impacts

Project activities that could potentially impact walrus habitats include trenching associated with laying cable on sea bottom. Cable burial operations involve the use of ploughs or jets to cut trenches in the sea floor sediment. Cable ploughs are generally used where the substrate is cohesive enough to be “cut” and laid alongside the trench long enough for the cable to be laid at depth. Jetting may occasionally be necessary to obtain the depth necessary for cable installation. The plough blade is 0.2 m (0.7 ft) wide producing a trench of approximately the same width. Jetted trenches are somewhat wider depending on the sediment type.

Specific impacts to walrus habitat and prey potentially include 1) crushing of benthic and epibenthic invertebrates with the plough blade, plough skid, or ROV track, 2) dislodgement of benthic invertebrates onto the surface where they may die, and 3) and the settlement of suspended sediments away from the trench where they may clog gills or feeding structures of sessile invertebrates or smother sensitive species (BERR 2008). However, the footprint of cable trenching is generally restricted to a width of 2 to 3 m (7-10 ft), and the displaced wedge or berm is expected to naturally backfill into the trench. Jetting results in more suspension of sediments, which may take days to settle during which currents may transport it well away (up to several kilometers) from source. Suspended sand particles generally settle within about 20 m (66 ft).

BERR (2008) reviewed the effect of offshore wind farm construction, including laying of power and communication cables, on the environment. Based on a rating of 1 to 10, they concluded that sediment disturbance from plough operations rated the lowest at 1, with jetting rating from 2 to 4, depending on substrate. (Dredging rated the highest [6] relative to sediment disturbance.)

Exactly where plough or jet trenching will occur will not be known until after the BAS is completed in 2015. The maximum amount of trenching possible is about 1,900 km (1,180 mi), but the width of primary

effect is only about 3 m (10 ft). Thus, the maximum impact footprint is less than 6 km² (2.3 mi²), an insignificantly small area given the Chukchi Sea area alone is 595,000 km² (230,000 mi²). Further, none of the activity will occur in the HSWUA. Overall, cable-laying effects to benthic resources is negligible.

The QSO cable project will not affect polar bear habitat. Alaskan polar bears are largely dependent on sea ice, a habitat that will be strictly avoided by the cable-laying activities for safety purposes.

10. ANTICIPATED EFFECTS OF HABITAT IMPACTS ON MARINE MAMMALS

Based on the conclusions of Section 9 above, modification of Pacific walrus habitat is expected to be modest and temporary, and limited to trenching activities associated with cable laying. Any impacts to prey resources is considered minor or negligible, and no long-term effects would occur. Because of the seasonal timing of the proposed cable-laying activities, there are no anticipated impacts to polar bear foraging (sea ice) or denning (winter) habitat.

11. MITIGATION MEASURES

The primary means of minimizing potential impacts from cable-laying to marine mammals is to design the routing to avoid marine mammal concentration areas or important prey habitat (BERR 2008). Most of the main trunk line will be laid 30 to 150 km (19 to 93 mi) offshore, thereby avoiding any nearshore concentrations of Pacific walrus. Also, for safety reasons, the Quintillion operations must avoid sea ice. Thus, in doing so, Quintillion is also avoiding ice habitat used by walrus and polar bears. Quintillion will communicate closely with the Eskimo Walrus Commission and the Alaska Nanuuq Commission to ensure effects walrus and polar bears (the subsistence harvest of these species) is avoided. Reducing and mitigating potential acoustical impacts to local marine mammals during cable-laying activity is fully addressed in the Marine Mammal Monitoring and Mitigation Plan (4MP) attached as Appendix B.

12. PLAN OF COOPERATION

A Plan of Cooperation (POC) was prepared specifically to address the following requirements:

- 50 CFR § 216.104 (a)(12), which requires a plan of cooperation to be submitted in support of a request for an Incidental Harassment Authorization (IHA) from the National Marine Fisheries Service (NMFS); and
- 50 CFR § 18.114, which requires a record of community consultation to be submitted in support of a request for a Letter of Authorization (LOA) from the U.S. Fish & Wildlife Service (USFWS).

The focus of the POC is to ensure that there are undue project impacts to local subsistence harvest of marine mammals. The POC can be found attached as Appendix C.

13. MONITORING AND REPORTING

Monitoring and reporting potential acoustical impacts to local marine mammals are fully addressed in the Marine Mammal Monitoring and Mitigation Plan attached as Appendix B.

14. SUGGESTED MEANS OF COORDINATION

Potential impacts of ship cavitation and other continuous noise activities on marine mammals have been studied, with the results used to establish the noise criteria for evaluating take and to support mitigation measures. However, all observations of marine mammals, including any observed reactions to the cable-laying operations will be recorded and reported in a 90-day report to the both the USFWS Office of Marine Mammal Management and the NMFS Office of Protected Species. Observation data will also be provided as requested to the NMFS National Marine Mammal Laboratory, the North Slope Borough Department of Fish and Wildlife, the Alaska Department of Fish and Game, the Eskimo Walrus Commission, and the Alaska Nanuuq Commission.

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APPENDIX A

Cable-laying Vessel Specifications

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

ALDA MARINE

ALDA MARINE S.A.S

LOUIS DREYFUS ARMATEURS S.A.S.

French

2002

140.36 m

23.40 m

8.00 m (summer draft)

9820 mt

Single cabins: 60; double cabins: 5

Main cable tank: 2 x 2500 tonnes (max cap each tank: 3500 tonnes), 2 x 1500 m³

Spare cable tank: 2 x 250 tonnes, 2 x 150 m³

2 x 100

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

1 SMD HD3 Plough - burial in all soils (including fractured rocks). Max burial: 3.00 m

Makallay

DP2 BV PDV MATAR ALSTOM

15 knots

100 tonnes

4 x 4320 kW MAK + 1 x 1360 kW MAK

2 x Lips 1500 kW Bow Thrusters, 1 x Lips 720 rpm - 1500 kW AZ Fore Thruster

2 x Lips 1500 kW Aft Thrusters

2 electrically driven fixed pitch propellers. Output 4000 kW each. Propeller diameter: 3700 mm.

Max propeller speed: 146 rpm

PROPULSION

REPEATER STORAGE CABLE MACHINERY

ACCOMMODATION CABLE TANK CAPACITY

CONSTRUCTION YEAR LENGTH OVERALL BREADTH

DRAFT

DEADWEIGHT ACCOMMODATION

REPEATER STORAGE CABLE MACHINERY

TYPE OF PLOUGH CABLE LAYING SOFTWARE DYNAMIC POSITIONING

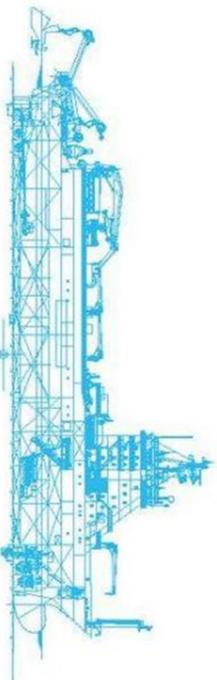
TRANSIT SPEED

BOLLARD PULL

POWER GENERATION THRUSTERS

THRUSTERS

© 2012



Installation vessels

Alcatel-Lucent



APPENDIX B

Marine Mammal Monitoring and Mitigation Plan

[Attached Separately]

APPENDIX C

Plan of Cooperation

[Attached Separately]

Marine Mammal Monitoring and Mitigation Plan

Quintillion Subsea Cable-Lay Operation 2016

INTRODUCTION

The Quintillion Subsea Operations, LLC (Quintillion) proposed marine mammal monitoring and mitigation plan (4MP) for the proposed Quintillion Subsea cable-lay program is described in this document. Quintillion understands that this 4MP will be subject to review by the National Marine Fisheries Service (NMFS), the U.S. Fish and Wildlife Service (USFWS), the North Slope Borough, the Alaska Eskimo Whaling Commission, the Alaska Beluga Committee, the Ice Seal Committee, Eskimo Walrus Commission, Alaska Nanuq Commission, and others, and that refinements may be required. The primary concern is Level B harassment noise emanating from thrusters used by the cable-lay vessels (*C/S Ile de Brehat* and *Ile de Sein*) during continuous dynamic positioning, and the cavitation noise from small anchor-handling tugs during anchor maneuvering activities associated with the cable-lay barge (during nearshore cable laying). There are no Level A harassment or injury concerns because thruster noise is expected to be less than 180 decibels (dB) at source. Quintillion will employ NMFS-approved Protected Species Observers (PSOs) to monitor the harassment zones and implement mitigation measures as needed.

Harassment Monitoring Radii

Qualified PSOs will establish and monitor a marine mammal harassment zone surrounding the active cable-lay vessel where the received levels would be 120 dB or greater. The initial monitoring zone will extend out 2.3 kilometers (km) (1.4 miles [mi]) based on previous sound source measurements of a similar ship operating thrusters in the Chukchi Sea (Hartin *et al.* 2011).

Sound Source Verification

Sound source verification (SSV) testing of the proposed cable-lay vessels have not been conducted. Hartin *et al.* (2011) physically measured dynamic positioning noise from the 104-m (341-ft) *Fugro Synergy* operating in the Chukchi Sea while it was using thrusters (2,500 kilowatt [kW]) more powerful than those used on the *C/S Ile de Brehat* and *Ile de Sein* (1,500 kW). Measured dominant frequencies were 110 Hertz (Hz) to 140 Hz, and the measured (90th percentile) radius to the 120-dB isopleth was 2.3 km (1.4 mi). Because the *Fugro Synergy* thrusters were more powerful, it is expected that the initial 2.3-km (1.4-mi) monitoring zone proposed for the project is conservative, both for the cable-lay vessels and the small anchor-handling tugs during anchor maneuvering.

Quintillion does plan to conduct an SSV on one of the cable-lay ships and the anchor-handling tugs when both are operating near Nome (early in the season). (The second cable-lay ship will start at a more remote location where it will be unreachable by the acoustic team.) An acoustical firm specializing in conducting SSVs has not been contracted yet, but the method used will follow current NMFS standards for conducting SSVs, and will be subject to approval by NMFS and USFWS.

Results from the SSV study will be used to develop new project-specific harassment zones that will be monitored during the project for marine mammals.

Passive Acoustical Monitoring

In the Incidental Harassment Authorization (IHA) application, one of the objectives described in *Section 13: Monitoring and Reporting* is to “increase our knowledge of the species” present in the project area. The implication is that the applicant would “include a description of the survey techniques that would be used to determine the movement and activity of marine mammals near the activity site(s) including migration and other habitat uses, such as feeding”, thus collecting additional marine mammal data beyond the observations collected by the PSOs aboard the active vessels (see below). After consulting with NMFS Office of Protected Resources, the National Marine Mammal Laboratory (NMML), and the North Slope Borough Department of Wildlife, Quintillion proposes to meet the above objective by contributing to the 2016 joint Arctic Whale Ecology Study (ARCWEST)/Chukchi Acoustics, Oceanography, and Zooplankton Study-extension (CHAOZ-X).

The summer minimum extent of sea ice in the northern Bering Sea, Chukchi Sea, and western Beaufort Sea has diminished by more than 50% over the past two decades. This loss of ice has sparked concerns for long-term survival of ice-dependent species like polar bears, Pacific walrus, bearded seals, and ringed seals. In contrast, populations of some Arctic species such as bowhead and gray whales have increased in abundance, while subarctic species such as humpback, fin, and minke whales have expanded their ranges into the Arctic in response to warmer water and increased zooplankton production. The joint ARCWEST/CHAOZ-X program has been monitoring climate change and anthropogenic activity in the Arctic waters of Alaska since 2010 by tracking satellite tagged animals, sampling lower trophic levels and physical oceanography, and passively acoustically monitoring marine mammal and vessel activity.

The current mooring locations for the passive acoustical monitoring (PAM) portion of the joint program align closely with the proposed Quintillion cable-lay route (Figure 1). Operating passive acoustical recorders at these locations in 2016 would provide information not only on the distribution and composition of the marine mammal community along the proposed cable-lay route at the time cable-lay activities would be occurring, but it they could also record the contribution of the cable-lay activity on local acoustical environment where the route passes close to these stations.

The number of PAM stations that would operate in 2016 is limited by the funding available. The increase in fuel and vessel costs, and the availability of funding for staff, challenge the breadth of the 2016 program. Fuel, vessel, and mooring costs have doubled since 2010. Quintillion is proposing to meet their IHA obligations by funding an additional staff position to the 2016 ARCWEST/CHOAZ-X, which will allow the operation of an additional three PAM positions (ensuring operation of those nearest the cable-lay route). In addition, Quintillion is proposing to provide funding to cover the analysis cost for those additional stations. Quintillion will also provide real-time tracking data on cable-lay vessel movements to NMML such that Quintillion’s activities can be specifically monitored as they pass the PAM stations and, therefore, reported separately in the 2016 field reports.

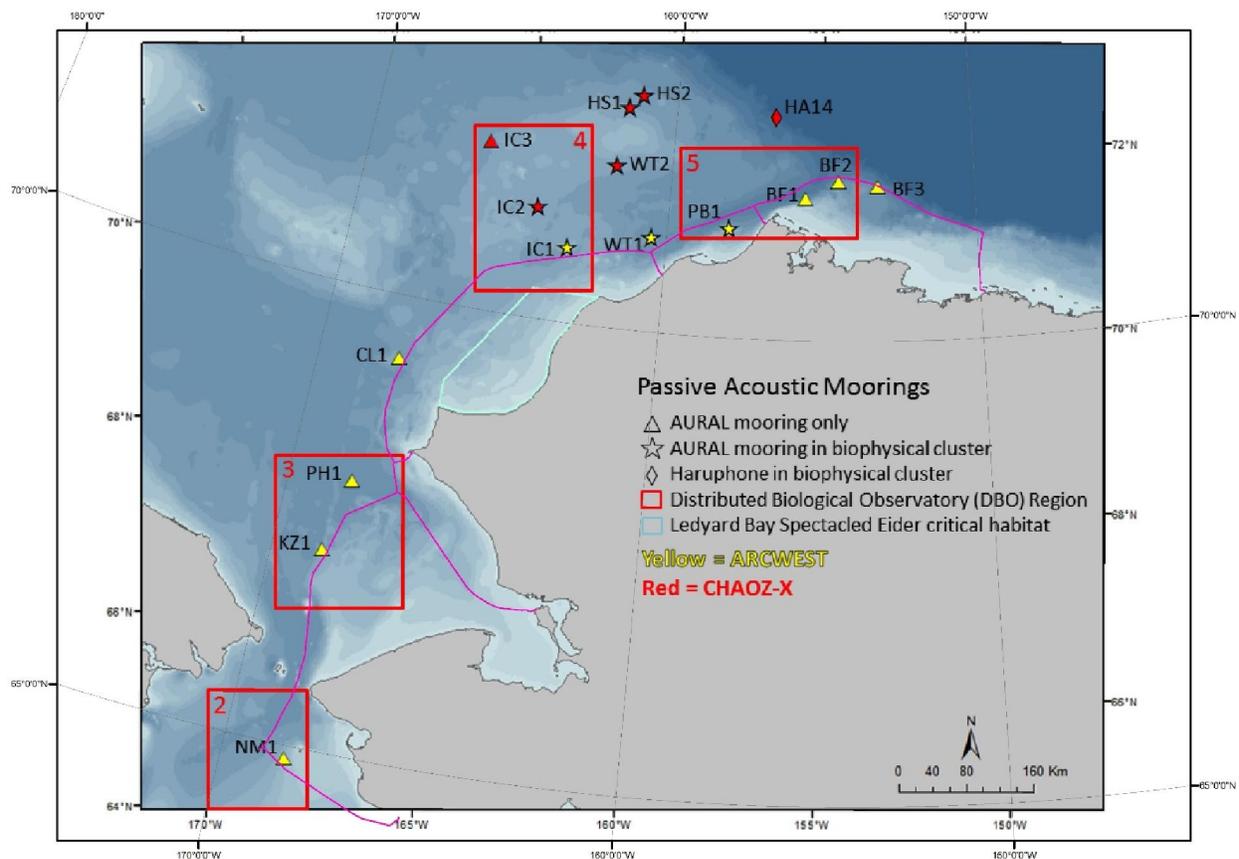


Figure 1. Passive acoustical moorings for the ARCWEST/CHAOZ-X program.

Visual Vessel-Based Monitoring

The vessel-based monitoring will be designed to cover the requirements of the IHA for this project. The objectives of the vessel-based monitoring will be to:

- ensure that disturbance to marine mammals is minimized and all permit stipulations are followed
- document the effects of the proposed cable-laying activities on marine mammals
- collect data on the occurrence and distribution of marine mammals in the proposed project area.

The monitoring and mitigation plan will be implemented by a team of experienced PSOs, including both biologists and Inupiat communicators. A team of three PSOs will be stationed aboard each the two cable-lay ships and the powered cable-lay barge operating from Oliktok Point to monitor and implement mitigation measures during all daytime cable-lay operations. Monitoring will not occur from the unpowered cable-lay barge operating in the nearshore waters off the villages. There are no berthing facilities available on the barge for PSOs. A lead PSO will be designated to oversee the monitoring and mitigation program. With NMFS and USFWS consultation, PSOs will be hired by Quintillion. PSOs will follow a schedule to

enable observers to monitor marine mammals during all (daylight) cable-lay activities. PSOs will normally be on duty in shifts no longer than 4 hours and no more than a total of 12 hours per day.

It is important to note that thrusters cannot be shut down or powered down during cable-lay operations, nor can the course of the cable-lay vessel be altered. Cable laying is a tethered operation and any loss of position can result in dangerous risk to cable, equipment, vessel, and personnel onboard. Also, ramping up does not apply to thrusters.

The source and support vessels are suitable platforms for marine mammal observations. When stationed on the flying bridge, the observer will have an unobstructed view around the entire vessel. If surveying from the bridge, the observer's eye level will be about 28 meters (m) (90 feet [ft]) above the waterline. During operation, the PSO(s) will systematically scan the area around the vessel with standard reticle binoculars or long-range big-eye binoculars. Laser range finders (Leica LRF 1200 laser rangefinder or equivalent) will be available to assist with distance estimation. Range finders will be used for training observers to estimate distances visually, but are generally not useful in directly measuring distances to animals.

All observations and notable vessel activity will be recorded in a standardized format. Data will be entered into a custom database using a notebook computer. The accuracy of the data entry will be verified daily by the lead PSOs by a manual checking of the database. These procedures will allow initial summaries of data to be prepared during and shortly after the field program, and will facilitate transfer of the data to statistical, graphical, or other programs for further processing and archiving.

The vessel-based observation will provide:

- 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-laying activity
- a communication channel to coastal communities as needed, including Inupiat hunters
- employment opportunities for local residents and development/experience for local PSOs.

Protected Species Observers

Vessel-based monitoring of marine mammals will be by trained PSOs throughout the period of cable-lay operation to comply with expected provisions in the IHA. The observers will monitor the occurrence and behavior of marine mammals near the cable-lay vessel during all daylight periods. PSO duties will include watching for and identifying marine mammals; recording their numbers, distances, and reactions to the cable-laying operations; and documenting exposures of animals to sound levels that may constitute harassment as defined by NMFS and USFWS.

PSO teams will consist of Inupiat observers and experienced field biologists. An experienced field crew leader and an Inupiat observer will be onboard each source vessel during the cable-lay operation. Inupiat

PSOs will also function as Native language communicators with hunters and whaling crews and with the Communications and Call Centers (Com Centers) in Native villages along the Beaufort Sea coast (if the Com Centers actually operate in 2016).

A sufficient number of PSOs will be required onboard each cable-lay vessel to meet the following criteria:

- 100% monitoring coverage during all periods of cable-lay operation in daylight
- maximum of 4 consecutive hours on watch per PSO
- maximum of about 12 hours of watch time per day per PSO.

PSO Role and Responsibilities

When onboard the cable-lay vessels, there are two major parts to the PSO position:

- observe and record observations of sensitive wildlife species
- follow monitoring and data collection procedures.

The main roles of the PSO and the monitoring program are to ensure compliance with regulations set in place by NMFS, USFWS, and other agencies to ensure that disturbance of marine mammals is minimized, and potential effects on marine mammals are documented. The PSOs will implement the monitoring and mitigation measures specified in both the NMFS-issued and USFWS-issued IHAs and in this 4MP. The primary purpose of the PSOs on board the vessels is:

- **Monitoring:** Observe for marine mammals and determine numbers of marine mammals exposed to vessel noise and their reactions (where applicable) and document those as required.

The PSOs will observe for marine mammals, stationed at the best available vantage point on the lay-vessel. Ideally, this vantage point is an elevated stable platform such as the bridge or flying bridge from which the PSO has an unobstructed 360-degree view of the water. The observer(s) will scan systematically with the unaided eye and 7x50 reticle binoculars.

The following information about marine mammal sightings will be carefully and accurately recorded:

- species, group size, age/size/sex categories (if determinable)
- physical description of features that were observed or determined not to be present in the case of unknown or unidentified animals
- behavior when first sighted and after initial sighting, including heading (if consistent)
- bearing and distance from observer, apparent reaction to activities (*e.g.*, none, avoidance, approach, paralleling), closest point of approach, and behavioral pace
- time, location, speed, and activity of the source vessels; sea state, ice cover, visibility, and sun glare; and positions of other vessel(s) in the vicinity.

Mitigation Measures

The primary mitigation measure is to conduct most of the cable-lay activity in offshore waters away from nearshore marine mammal concentration areas (*e.g.*, beluga breeding lagoons and spotted seal haulout

sites). Also, PSOs will implement a marine mammal monitoring program to document marine mammal interactions with the cable-lay operations.

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

- avoid concentrations or groups of whales by all vessels under the direction of Quintillion
- take reasonable precautions to avoid potential interaction with the bowhead whales observed within 1.6 km (1 mi) of a vessel
- 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.

Measures to Reduce Impacts to Subsistence Users

Cable-lay activities will follow mitigation procedures to minimize effects on the behavior of marine mammals and; therefore, opportunities for subsistence harvest by Alaska Native communities. These activities include:

- operating mostly in offshore waters well away from nearshore subsistence harvest areas
- coordinating with various Inupiat committees and commissions through the Plan of Cooperation process to develop operational schedules that least conflict with subsistence harvest.

There are no plans for a Com Center to operate in 2016, so Quintillion will work through the Plan of Cooperation process to develop an alternative means of communicating with local Inupiat interests.

Reporting

Weekly Reports

Weekly reports will be prepared by the PSOs, reviewed by Quintillion, and submitted to NMFS and USFWS no later than the close of business (Alaska time) each Thursday during the weeks that cable-lay activities take place. The field reports will summarize species detected, in-water activity occurring at the time of the sighting, behavioral reactions to in-water activities, and the number of marine mammals exposed to harassment level noise.

Monthly Reports

Monthly reports will be prepared by the PSOs, reviewed by Quintillion, and submitted to NMFS and USFWS for all months during which cable-laying activities take place. The monthly report will contain and summarize the following information:

- Dates, times, locations, heading, speed, weather, sea conditions (including Beaufort Sea state and wind force), and associated activities during the cable-lay operation and marine mammal sightings
- Species, number, location, distance from the vessel, and behavior of any sighted marine mammals, as well as associated cable-lay activity, observed throughout all monitoring activities.

- An estimate of the number (by species) of cetaceans and pinnipeds that have been exposed to the thruster noise (based on visual observation) at received levels greater than or equal to 120 dB re 1 μ Pa (rms) (decibels relative to 1 microPascal root mean square) with a discussion of any specific behaviors those individuals exhibited.
- A description of the implementation and effectiveness of the: (i) terms and conditions of the Biological Opinion's Incidental Take Statement; and (ii) mitigation measures of the IHA. For the Biological Opinion, the report shall confirm the implementation of each Term and Condition, as well as any conservation recommendations, and describe their effectiveness, for minimizing the adverse effects of the action on ESA-listed marine mammals.

90-Day Technical Report

A report will be submitted to NMFS and USFWS within 90 days after the end of the project or at least 60 days before the request for another Incidental Take Authorization for the next open water season to enable NMFS and USFWS to incorporate observation data into the next Authorization. The report will summarize all activities and monitoring results (*e.g.*, vessel-based visual monitoring) conducted during cable-lay activity. The 90-Day Technical Report will include the following:

- Summaries of monitoring effort (*e.g.*, total hours, total distances, and marine mammal distribution through the study period, accounting for sea state and other factors affecting visibility and detectability of marine mammals).
- Analyses of the effects of various factors influencing detectability of marine mammals (*e.g.*, sea state, number of observers, and fog/glare).
- Species composition, occurrence, and distribution of marine mammal sightings, including date, water depth, numbers, age/size/gender categories (if determinable), group sizes, and ice cover.
- Analyses of the effects of survey operations.

Notification of Injured or Dead Marine Mammals

In the event that during the cable-lay operation a discovery is made of an injured or dead marine mammal, and the lead PSO determines that the injury or 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 Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS, and the NMFS Alaska Stranding Hotline and/or by email to the Alaska Regional Stranding Coordinators, within 24 hours of the discovery. If a walrus is involved, then USFWS will be contacted. The Applicant would provide photographs or video footage (if available) or other documentation of the stranded animal sighting to NMFS, USFWS, and the Marine Mammal Stranding Network. The report would include the following information:

- Time, date, and location (latitude/longitude) of the incident
- Name and type of vessel involved
- Vessel 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)
- Photographs or video footage of the animal(s) (if equipment is available).

Plan of Cooperation

Quintillion Subsea Operations Cable Project

Bering, Chukchi, and Beaufort Seas, Alaska

March 2016

Version 3.0

Prepared for

Quintillion Subsea Operations, LLC

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Anchorage, Alaska 99518

Prepared by



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Appendices

Appendix A – Figures 2 through 6

Appendix B – Daily Report

Appendix C – Meeting Minutes

1. Introduction

Quintillion Subsea Operations, LLC (Quintillion), is proposing to install a subsea fiber optic network along the northern and western coasts of Alaska that will provide connectivity to six rural Alaskan communities by linking them with a terrestrial fiber optic line. A draft Plan of Cooperation (POC) was included with the Incidental Harassment Authorization (IHA) application on November 5, 2015 and was presented to the affected communities of Nome, Kotzebue, Pt. Hope, Wainwright, Barrow and Nuiqsut during meetings in February 2016. It was also discussed in a meeting with leadership from Nuiqsut during a meeting in Anchorage.

This revised POC includes the operational mitigations adopted by Quintillion as a result of the community meetings to prevent interruption of traditional uses of the area to the greatest extent possible during the 2016 cable laying operations. Quintillion continues to be committed to communicating and cooperating with local communities and co-management organizations through the life of the project. This POC was prepared specifically to address the following requirements:

- 50 CFR § 216.104 (a)(12), which requires a plan of cooperation to be submitted in support of a request for an Incidental Harassment Authorization (IHA) from the National Marine Fisheries Service (NMFS); and
- 50 CFR § 18.114, which requires a record of community consultation to be submitted in support of a request for an IHA from the U.S. Fish & Wildlife Service (USFWS).

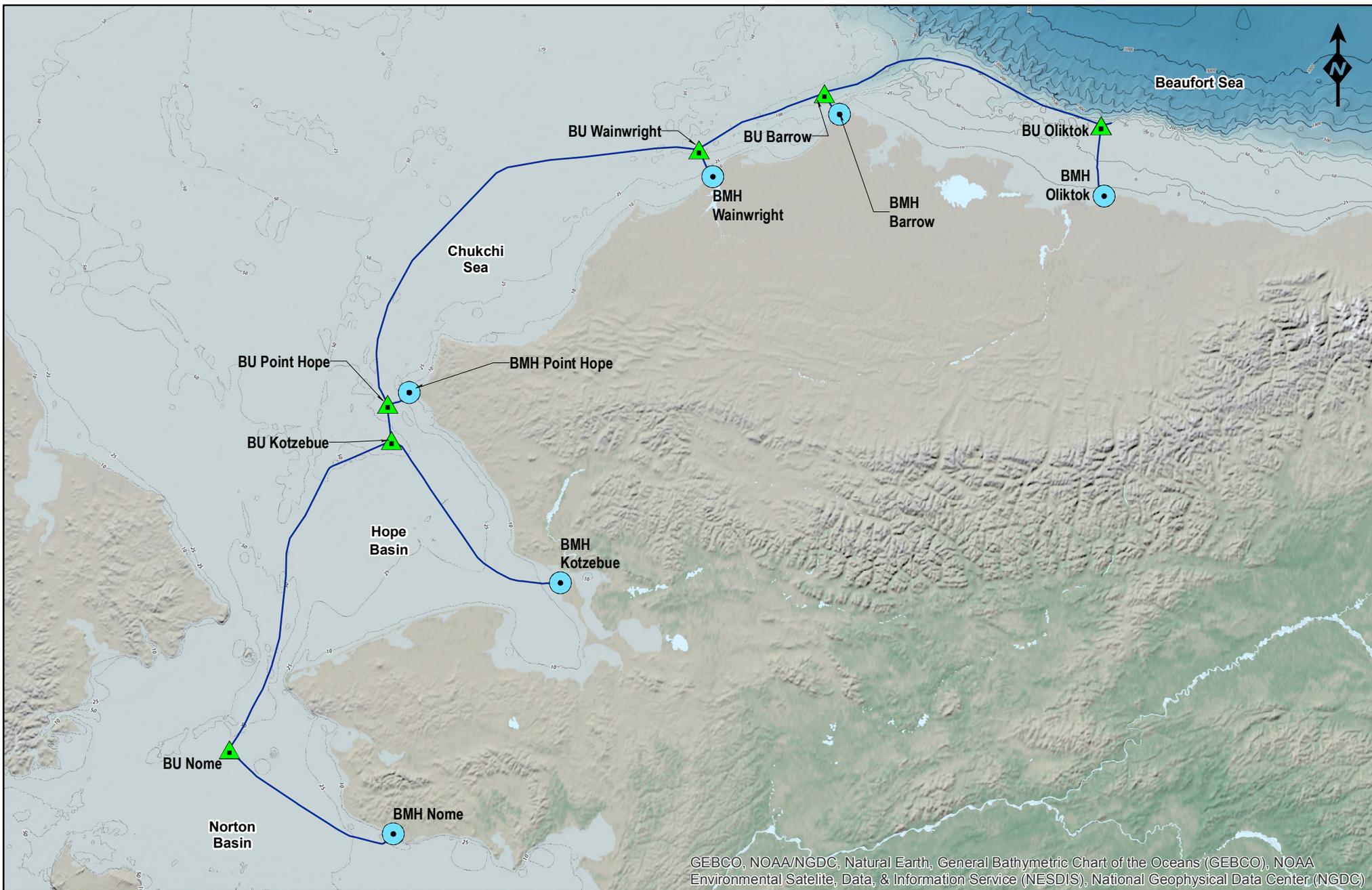
Quintillion's IHA applications describe the monitoring and mitigation procedures that will be implemented during the installation program to prevent conflicts with subsistence activities. This POC sets out procedures for Quintillion and contract staff to work in cooperation with the Chukchi, Bering and Beaufort Sea coastal communities through mutual sharing of information (project schedule, activity location/timing), with the objective of preventing conflicts between the installation program and subsistence hunting.

This POC also acts as a record of consultation as required by the USFWS and NMFS before issuance of an IHA to an applicant. Quintillion project staff has conducted several meetings in the coastal communities as well as with co-management groups. A summary of these meetings can be found in Section 5 of this document.

2. Project Description

The Quintillion Fiber Optic Project will consist of installing 1,904 km of submerged fiber optic cable that includes a main trunk line laid on the sea floor at a range of approximately 26 to 100 kilometers offshore; and six branching lines to onshore facilities in Nome, Kotzebue, Point Hope, Wainwright, Barrow, and Oliktok Point (Figure 1). The undersea cable installation will begin July 2016 at Nome and will continue until completion of the project in October 2016.

Laying of the cable offshore is planned to be conducted from cable laying vessels and nearshore cable laying by shallow draft barge and support spread. Installation of the branching lines, Branching Units (BU), and Beach Manholes (BMH) require onshore equipment and support, which is transported via a 32 ft runabout or a large 85 -125 ft landing craft to established landing sites at the villages. Each section of cable has unique characteristics such as armoring, burial, and anchoring; and it is loaded aboard the vessels in the order of installation.

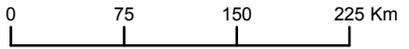


GEBCO, NOAA/NGDC, Natural Earth, General Bathymetric Chart of the Oceans (GEBCO), NOAA Environmental Satellite, Data, & Information Service (NESDIS), National Geophysical Data Center (NGDC)

-  BMH
-  BU
-  Fiber Optic Lines



Projection: Alaska Albers

QUINTILLION SUBSEA LLC	
Route Map	
	FIGURE: 1

3. Statement of Notification

Quintillion will submit copies of this revised POC to each of the affected communities and co-management groups listed in Table 1 and other interested stakeholders identified in the pre-operation meetings held in January and February.

4. Operational Mitigation

Installation of subsea cable is a slow methodical process with very prescriptive procedures that do not allow variation. Preventing disturbance of subsistence activities relies upon effective communication to local communities regarding vessel(s) location and speed of progress. Quintillion has adopted the following operational changes and mitigation measures to decrease the potential for disruption of subsistence activities. The following operating guidelines apply during Quintillion's activities in the Chukchi, Bering and Beaufort Seas, except as otherwise specified, and in all cases is subject to the flexibility needed to address environmental conditions and operational safety.

- Quintillion will use a total of three cable laying vessels to avoid scheduling commonality with whaling and subsistence activities.
- Cable laying will be done in segments strategically designed to avoid areas of active subsistence hunting to the greatest extent possible as seen in Figures 2 through 6 in Appendix A.
- Quintillion has contracted Alcatel-Lucent Submarine Networks to furnish and install the cable system. Alcatel-Lucent's vessels participate in the Automatic Identification System (AIS) vessel tracking system allowing the vessel to be tracked and located in real time.
- Quintillion has sponsored memberships for the Marine Exchange of Alaska (MEA) so that cable laying vessels and all other commercial vessels participating in the AIS vessel tracking system can be monitored in real time.
- Quintillion will distribute a daily report by email to all interested parties. Daily reports will include: vessel activity, location, subsistence/local information and any potential hazards. An example of the Daily Report can be found in Appendix B.
- Vessel speed is slow, less than 1 kt for barge operations, 0.25 kt during plowing operations, and 3-4 kt during surface laying.
- Quintillion project vessels will monitor marine VHF Channel 16 for local traffic and will use log books to assist in the standardization of record keeping.

5. Monitoring

Quintillion proposes to sponsor marine mammal monitoring during the cable installation in order to satisfy the anticipated monitoring and reporting requirements of the USFWS and NMFS IHAs. Each cable laying vessel will have on-board Protected Species Observers (PSO) during the operating season. The PSOs will be responsible for monitoring and documenting marine mammals and to communicate with subsistence hunters, if necessary.

Prior to mobilization, all PSOs will receive training on operations, monitoring protocols, data recording, and a marine mammal identification. An Observer's Handbook, adapted for the specifics of Quintillion's operation, will be prepared and distributed to all PSOs as preparation for the training and as a reference

document in the field. This Observer’s Handbook will be available to NMFS/USFWS or other stakeholders. All PSOs will meet the NMFS/USFWS requirements.

6. Resolution and Mitigation

Any disputes arising during or after Quintillion’s program will be resolved through direct communication between designated representatives and Quintillion. Proactive mitigation and reactive resolution may involve: consultation and information sharing, village visits and meetings, and operating protocols designed to reduce interference with subsistence activities.

7. Community and Co-management Meetings

Quintillion has been meeting with landing village communities and organizations for three years in preparation for the fiber optic cable laying project. In February 2016 meetings were conducted to present the plan of cooperation to those affected by the cable installation process. Table 1 below includes the communities and organizations that a representative of Quintillion has met with to discuss the project and address any comments or concerns. The community meetings included a presentation of the installation process and approximate schedule of activity. The presentations included all relevant information so the attendees could understand that the slow, methodical cable-laying process significantly reduces the potential for interaction or interference with traditional uses near the active cable installation areas.

TABLE 1: MEETING REPRESENTATIVES

Organization/Community	Date	Location
AEWC	October 19, 2015	Captain Cook Hotel, Anchorage, AK
AEWC	December 8, 2015	Anchorage, AK
Barrow Whaling Captains Association Board	January 19, 2016	Barrow, AK
Barrow Whaling Captains Association Members	January 25, 2016	Barrow, AK
AWEC	February 4, 2016	Barrow High School, Barrow, AK
Wainwright Community	February 8, 2016	Community Center, Wainwright, AK
Wainwright Whaling Captains	February 8, 2016	Olgoonik Camp, Wainwright, AK
Point Hope Community	February 9, 2016	Qalgi Community Center, Pt. Hope, AK
Tikigaq Whaling Captains	February 9, 2016	Restaurant, Pt. Hope, AK
City Management	February 10, 2016	NWAB Assembly Chambers Kotzebue, AK
Kotzebue Community	February 10, 2016	NWAB Assembly Chambers Kotzebue, AK
Maniilaq Association	February 10, 2016	Kotzebue, AK
Northwest Arctic Borough	February 10, 2016	NWAB, Kotzebue, AK
Kawerak Inc.	February 11, 2016	Nome, AK
Nome Community	February 11, 2016	Nome, AK
Kuukpik Corporation	February 25, 2016	Anchorage, AK

Additional matters that were identified by the stakeholders and addressed at the February meetings included:

- A beluga hunt in late July that coincides with the beluga migration from Icy Cape on to Wainwright,
- The June and July hunt for ooganuk and walrus,
- Commercial fishing that begins in July and goes until the third week in August in the Kotzebue Sound,
- The migration of white fish to the Colville Delta in June and July, and
- Seal hunting in the Colville Delta, out to Thetis Island that occurs in June and July.

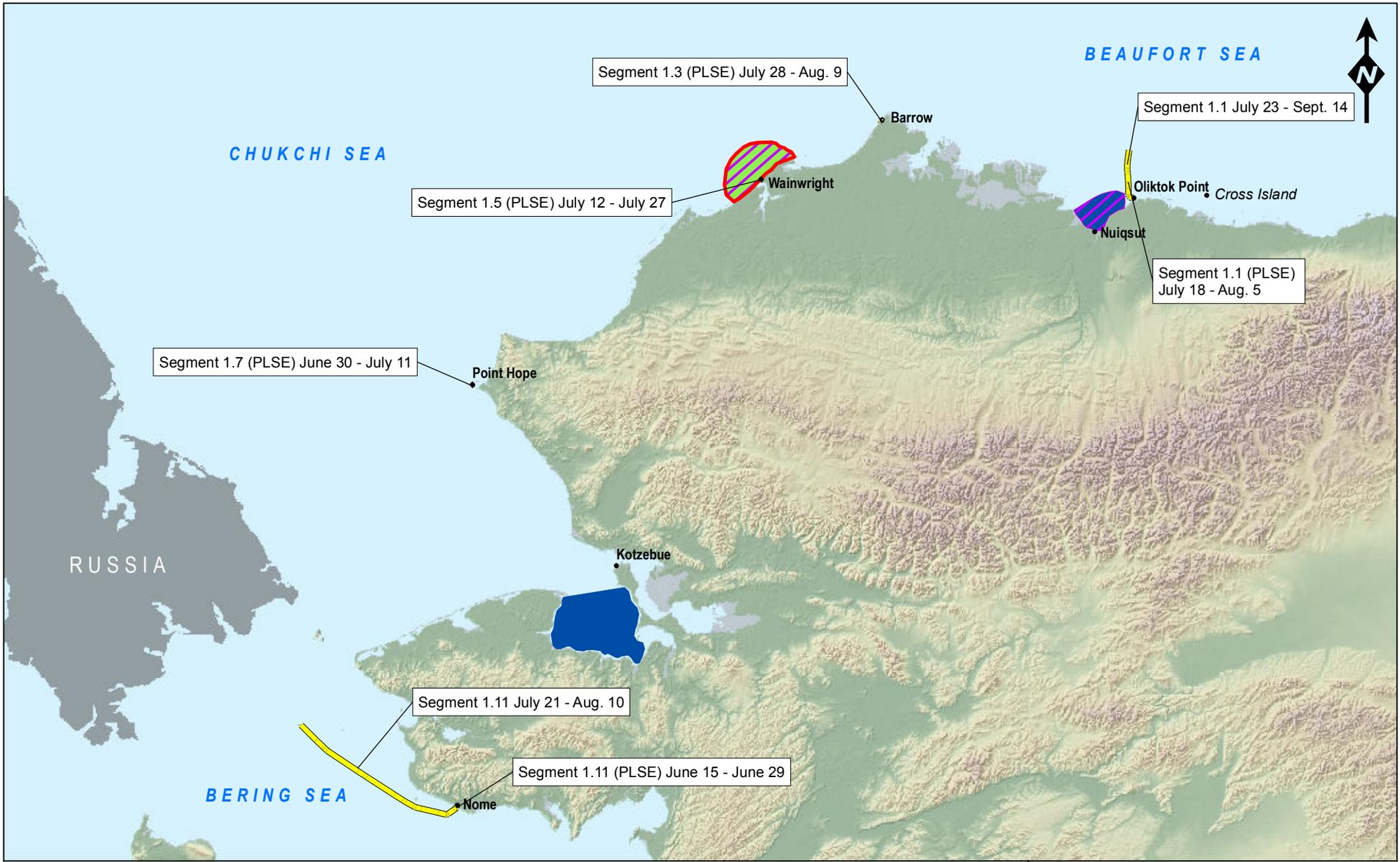
Each community and stakeholder expressed support of the project with hopes that installation would be completed on schedule. Commenters at the community meetings concurred that the mitigation measures and communication tools that Quintillion will be using will be sufficient to avoid interference with traditional uses. Quintillion explained to each community that despite best efforts there is still a small possibility of inconvenience for the villages at times during the cable laying process. Communities understand and accept this possibility with the knowledge that the project will result in improved communication and connectivity.

As opportunity arises meetings may be conducted with stakeholders during conferences, community meetings, and other course of business gatherings; currently there are no plans of additional organized meetings. Other communications that will continue throughout project execution may include: public service announcements on KBRW and KOTZ radio stations; messaging on the Alaska Rural Communications Service television network; and newsletters and 1-800 comment lines. At the end of the cable installation process Quintillion will conduct community meetings at the affected landing villages identified in this document for a final meeting to discuss and summarize project completion.

8. Contact Information

During operations, Quintillion will maintain an onshore presence and the contact information will be provided when available. Quintillion will set up a Toll Free 24-hour contact line to leave messages on issues at any time. If there are any questions regarding the POC please contact Quintillion at 1-800-673-4394 or info@Qexpressnet.com or our consultant, Glenn Ruckhaus, at 907-891-7265 or gruckhaus@owlridgenrc.com

APPENDIX A



BEAUFORT SEA

CHUKCHI SEA

BERING SEA

RUSSIA

Segment 1.3 (PLSE) July 28 - Aug. 9

Segment 1.5 (PLSE) July 12 - July 27

Segment 1.7 (PLSE) June 30 - July 11

Segment 1.1 July 23 - Sept. 14

Segment 1.1 (PLSE) July 18 - Aug. 5

Segment 1.11 July 21 - Aug. 10

Segment 1.11 (PLSE) June 15 - June 29

• Villages and Places of Interest

— Cable Lay Operations (Late June - July)

Subsistence Use By Type (July)

Beluga Whales

Seals

Fishing

Walrus

PLSE: Pre-laid Shore Ends

PLAN OF COOPERATION

LATE JUNE - JULY ACTIVITIES

Scale:

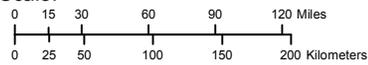
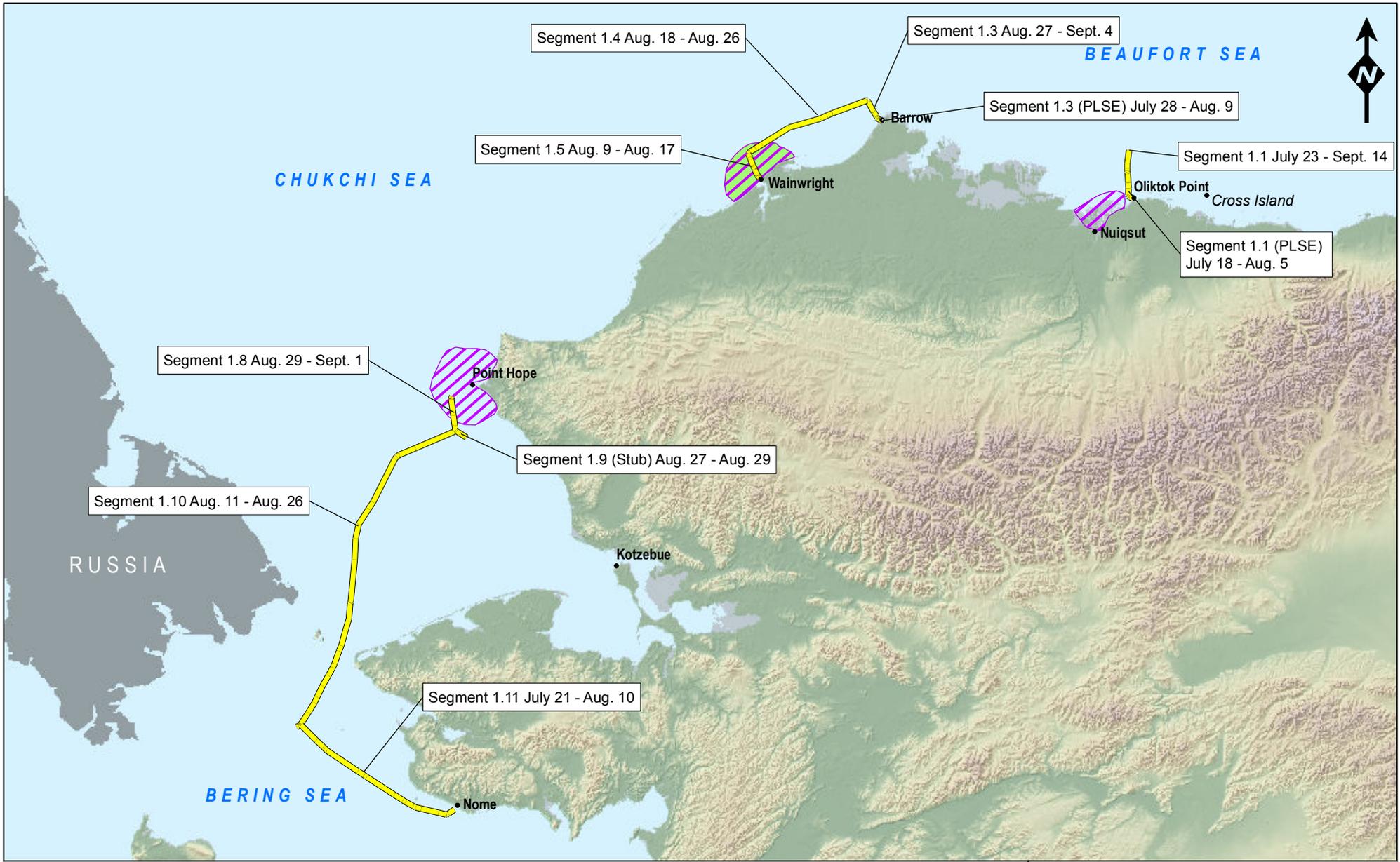


Figure:

2

PCS: Alaska Albers, NAD83



• Villages and Places of Interest

— Cable Lay Operations (August)

Subsistence Use By Type (August)

Seals

Walrus

PLSE: Pre-laid Shore Ends

PLAN OF COOPERATION

AUGUST ACTIVITIES

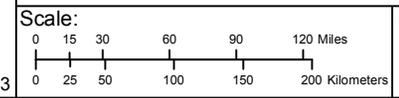
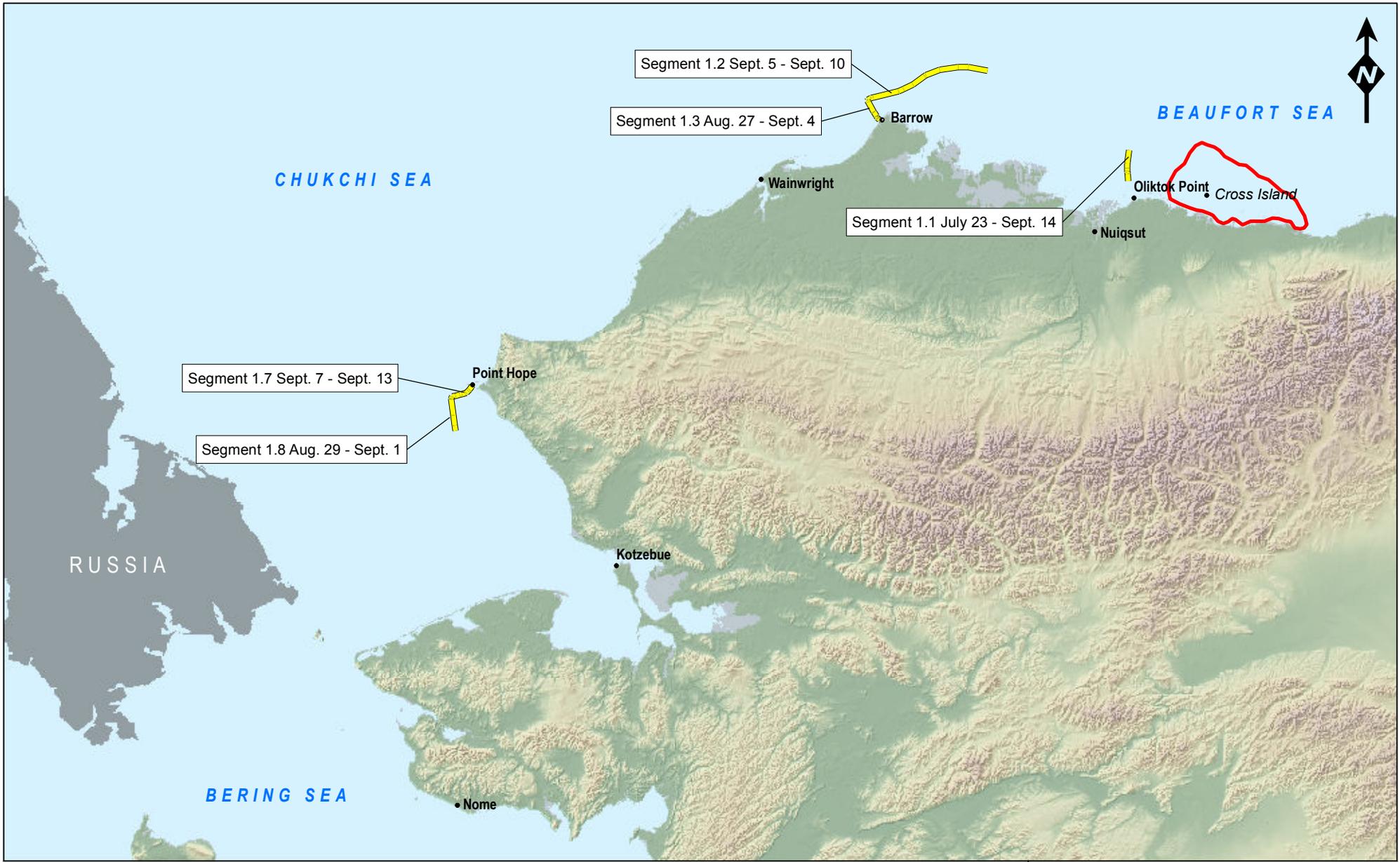


Figure: **3**

PCS: Alaska Albers, NAD83



- Villages and Places of Interest
- Subsistence Use By Type (Early September)
- Cable Lay Operations (September)
- ▭ Bowhead Whales

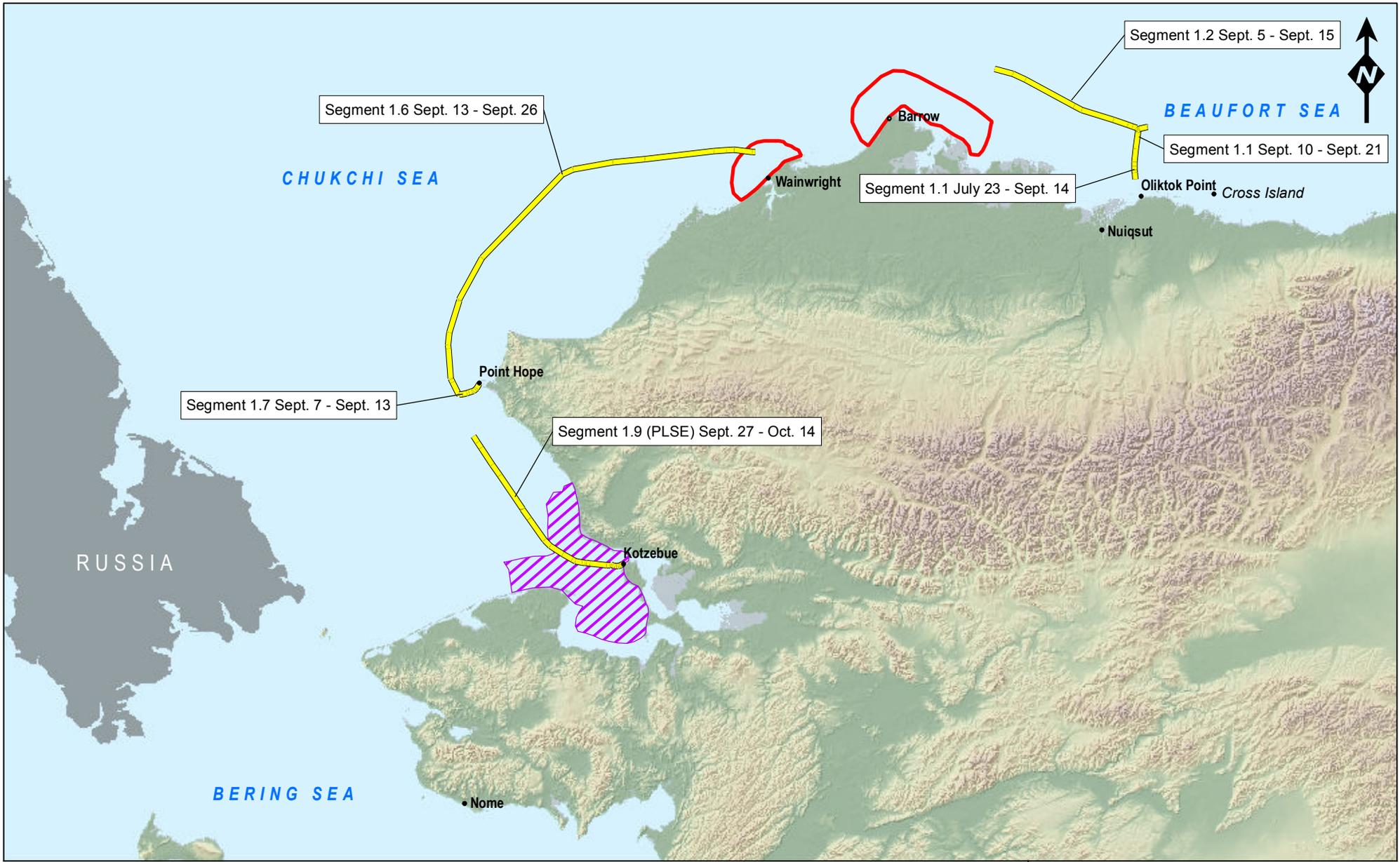
PLAN OF COOPERATION

EARLY SEPTEMBER ACTIVITIES

Scale: 0 15 30 60 90 120 Miles
0 25 50 100 150 200 Kilometers

Figure: **4**

PCS: Alaska Albers, NAD83



PLAN OF COOPERATION

LATE SEPTEMBER ACTIVITIES

- Villages and Places of Interest
 - Cable Lay Operations (September)
- Subsistence Use By Type (Late September)**
- Bowhead Whales
 - Seals

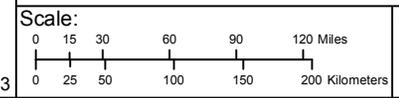
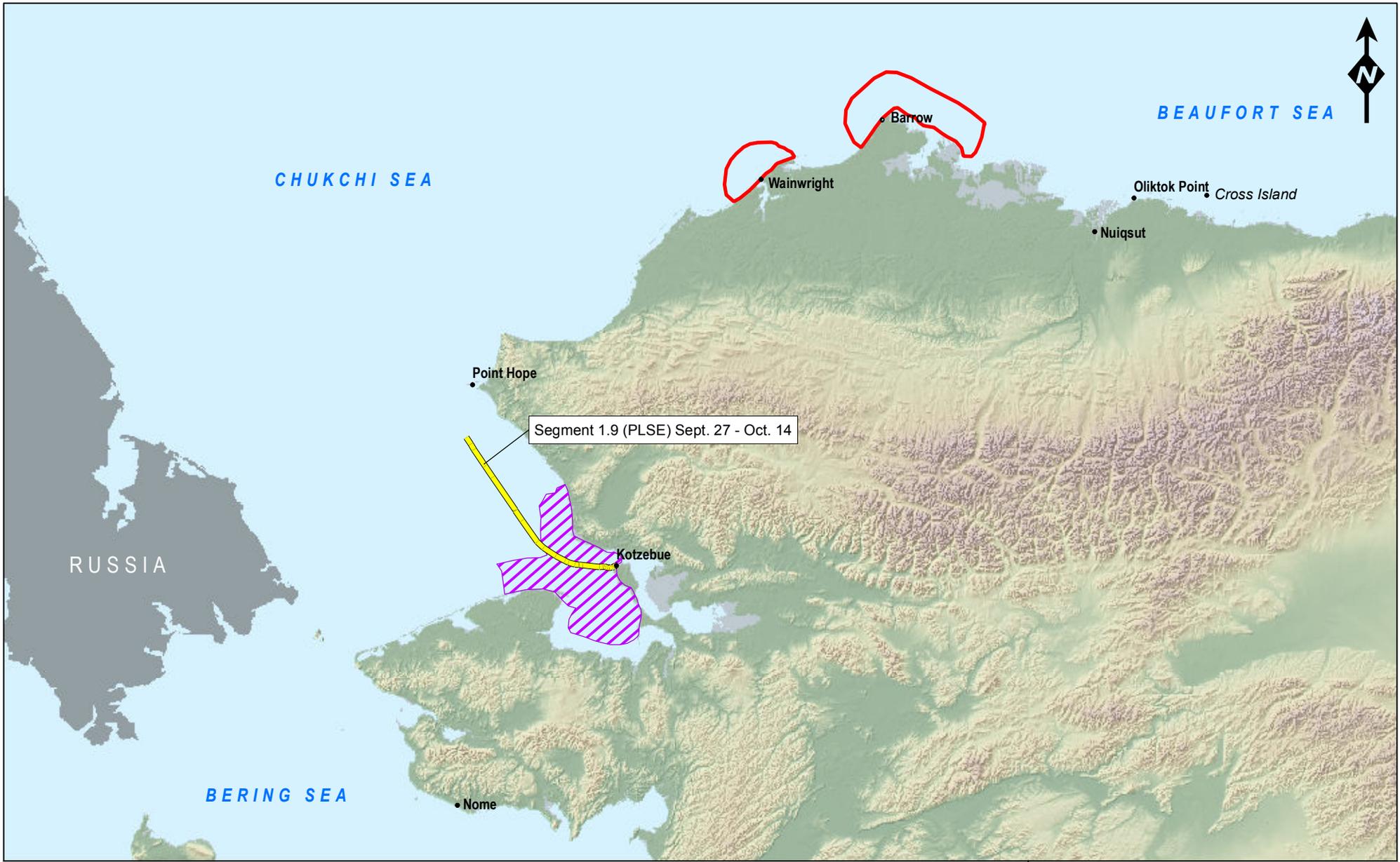


Figure: **5**

PLSE: Pre-laid Shore Ends

PCS: Alaska Albers, NAD83



- Villages and Places of Interest
- Cable Lay Operations (October)
- ▭ Subsistence Use By Type (October)
- ▭ Bowhead Whales
- ▨ Seals

PLSE: Pre-laid Shore Ends

PLAN OF COOPERATION

OCTOBER ACTIVITIES

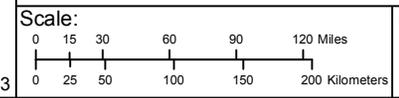


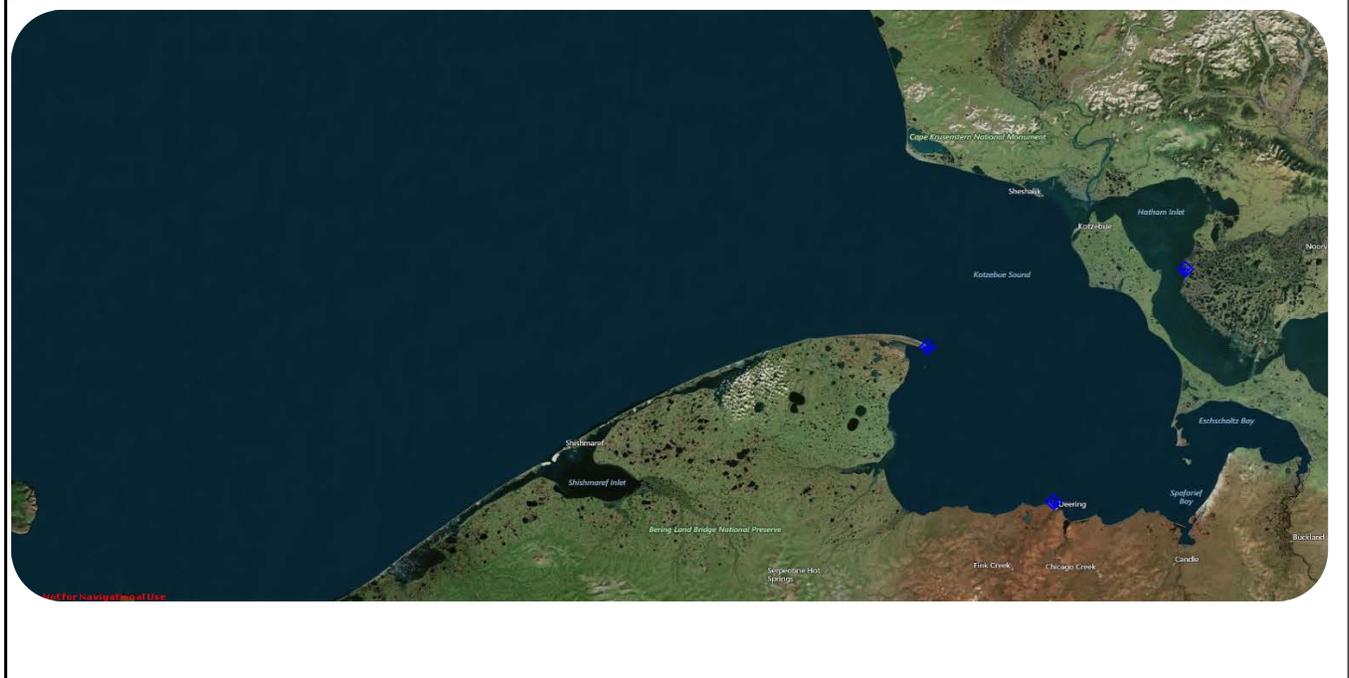
Figure: **6**

PCS: Alaska Albers, NAD83

APPENDIX B

QUINTILLION CABLE LAY PROJECT DAILY ACTIVITY REPORT

	REPORT DATE (DD/MM/YR):	REPORT TIME (24 HR):
--	-------------------------	----------------------

IL DE SEINE

VESSEL PROGRESS INFORMATION

VESSEL ACTIVITY	LOCATION			
	Latitude	Longitude	Vessel Course	Nearest Village

VESSEL PROGRESS -- REMARKS: Include unresolved issues / factors contributing to delays, communication and significant decisions.

SUBSISTENCE/ LOCAL INFORMATION
POTENTIAL HAZARDS
CONTACT INFORMATION

Activity Report Contact: Glenn Ruckhaus Email: glenn@owlridgenrc.com

APPENDIX C



Meeting Agenda and Minutes			
Client/Project	Quintillion	Date	October 19, 2015
Subject	Plan of Cooperation	Location:	Captain Cook Hotel, Anchorage
Attachments	AEWC Agenda – Quintillion Presentation		

Name	Representing	Name	Representing
Elizabeth Pierce	Quintillion - Presenter	AEWC Commissioners	AEWC
Edith Vordestrasse	Quintillion - Audience	Jessica Lefevre	AEWC – Legal Council
Glenn Ruckhaus	Owl Ridge	Interested Public	Various

Minutes –
<p>Quintillion was a small part of a two day agenda, they were asked to present to the AEW 3rd Quarter Commissioners meeting on their activity in the Chukchi and Beaufort Seas.</p> <ol style="list-style-type: none"> 1. Elizabeth Pierce was introduced by Harry Brower, president of AEW. 2. Presentation was shown and discussed to all in attendance. 3. Key Questions included: <ol style="list-style-type: none"> a. John Hopson – Wainwright – the village of Wainwright is anxious for this service to be provided. Quintillion should consider some sort of message to the community that the project is on track despite the Shell decision. b. Harry Brower – AEW President – requested clarification, he thought the project was a one time effort. Elizabeth answered that there is continuing activity in fall of 2015 to complete the geotechnical portions of the project. Also, next summer, a drilling rig will be barged to Barrow to drill the HDD for the near shore installation and connection to shore based facilities. c. Jessica Lefevre – asked if Quintillion would attend the February conflict avoidance meeting in Barrow. Elizabeth answered that they will follow the advice of Glenn Ruckhaus for the Plan of Cooperation. 4. <i>Off line discussions included:</i> <ol style="list-style-type: none"> a. BOEM director James Kendall requested discussion with Elizabeth at the completion of the meeting. b. Gay Sheffield with UAF-Nome (card attached) asked who was the Quintillion representative in Nome. Glenn explained that there currently are no village representatives. Information should be directed to the address on the presentation.

Action Items			
Item	Action	Responsible	Due Date
1	Prepare meeting minutes and letter to USCG describing details of the meetings and actions items.	Owl Ridge	9/4/15
2	USCG will responded to the letter (#1 listed above) to concur with permit process approach or recommend changes of the action items, schedule, and details.	USCG	9/11/15

Action Items			
Item	Action	Responsible	Due Date
3	Process as defined proceeds to resubmittal of application, completeness determination, and agreement of process forward.	USCG & City of Nenana with Owl Ridge	10/2/2015
4	Recommendation to Elizabeth if a communication to villages to verify the project remains active for 2016 installation is warranted	Sarah-Glenn	11/1/2015
5	Follow up on February CAA meeting timing and value to Quintillion	Glenn	11/1/2015
6			
7			
8			
9			
10			



ALASKA ESKIMO WHALING COMMISSION
P.O. Box 570 BARROW, ALASKA 99723

Third Quarterly AEWK Commissioners Meeting
Captain Cook – AFT Deck, Anchorage, Alaska
Monday, October 19, 2015
9:00 A.M. – 5:00 P.M.
AGENDA

- 9:00-9:15** **CALL TO ORDER**
ROLL CALL
INVOCATION
APPROVAL OF AGENDA
- 9:15-9:30** **APPROVAL OF MINUTES: 2nd Quarter Meeting Minutes**
- 9:30-9:45** **CHAIRMAN’S REPORT**
- 9:45-10:00** **EXECUTIVE DIRECTOR’S REPORT**
- 10:00-10:15** **BREAK**
- 10:15-10:30** **NOAA PRESENTATION (JENN HALL-BROWN)**
- 10:30-10:45** **OAK FOUNDATION (ANNE HENSHAW)**
- 10:45-11:00** **GRANT WRITERS REPORT**
- 11:00-11:30** **FINANCE DIRECTORS REPORT**
- 11:30-12:00** **ACCOUNTING POLICY AND PERSONNEL POLICY REVIEW**
- 12:00-1:30** **LUNCH**
- 1:30-2:15** **LEGAL REPORT**
- 2:15-2:45** **WIP VIDEO PRESENTATION**
- 2:45-3:00** **QUINTILLION**
- 3:00-3:30** **BREAK**
- 3:30-4:00** **USCG and AEWK Coordination: CDR James Houck**
- 4:00-4:15** **HILCORP: UPDATE ON LIBERTY PROJECT**

4:15-4:30	Peter Boveng PROPOSED AERIAL SURVEYS FOR SEALS AND POLARBEARS, AND DISCUSS WAYS TO PREVENT CONFLICTS WITH SPRING WHALING
4:30-4:45	CAROL FAIRFIELD - BOEM
4:45-5:00	WRAP UP
5:00	ADJOURN

ALASKA ESKIMO WHALING COMMISSION

P.O. Box 570 BARROW, ALASKA 99723

Third Quarterly AEWK Commissioners Meeting

Captain Cook – AFT Deck, Anchorage, Alaska

Tuesday, October 20, 2015

9:00 A.M. – 5:00 P.M.

AGENDA

- 9:00-9:15** **CALL TO ORDER**
ROLL CALL
INVOCATION
APPROVAL OF AGENDA
- 9:15-9:30** **BETH SPANGLER – ALASKA NATIVE SCIENCE & ENGINEERING PROGRAM (ANSEP)**
- 9:30-10:00** **TRIP REPORT FROM IWC ASW WORKING GROUP MTG JOHN HOPSON, JR.**
- 10:00-10:30** **IWC SCIENTIFIC COMMITTEE REPORT**
Dr. Craig George
- 10:30-11:30** **WEAPONS IMPROVEMENT PROGRAM**
- 11:30-12:00** **EXECUTIVE SESSION: INTERNAL REVIEW OF CAA**
- 12:00-1:30** **LUNCH**
- 1:30-3:30** **EXECUTIVE SESSION: COOPERATIVE AGREEMENT, MANAGEMENT PLAN, AND AEWK BYLAWS; CONFIDENTIALITY AGREEMENT**
- 3:30-3:45** **BREAK**
- 3:45-4:15** **NEW BUSINESS: ELECTIONS OF THE BOARD**
- 4:15-4:30** **OLD BUSINESS:**
- 4:30-5:00** **VILLAGE CONCERNS:**
- | | | | |
|----------|---------------|----------|------------|
| Kaktovik | Kivalina | Pt. Hope | Wainwright |
| Nuiqsut | Wales | Gambell | Savoonga |
| Barrow | Little Diomed | Pt. Lay | |

5:00-5:05 CORRESPONDENCE

**5:05-5:10 DETERMINE DATE, TIME, AND LOCATION OF 4TH
QUARTERLY AND MINI-CONVEDNTION**

5:10 ADJOURN

Quintillion Subsea Cable System Project Update

PRESENTED BY:

Elizabeth Pierce, Chief Executive Officer



ALASKA ESKIMO WHALING COMMISSION

Third Quarter Commissioners Meeting

Anchorage, Alaska

October 2015



About Quintillion

- Headquartered in Anchorage, Alaska
- Carrier for the local provider – we provide high speed “broadband” capacity to the local providers – ASTAC, ACS, GCI, etc.
- Managed by Elizabeth Pierce, CEO and Founding Partner
- Funded by US private investment group and select Alaska investors including Arctic Slope Regional Corporation (ASRC)



Purpose and Benefit to Community

High-speed Bandwidth stimulates community development:

- Enables extensions to connect more communities
- Carrier neutral: All telecoms can use the networks
- Substantially improve communication/Internet service while reducing costs
- Enables improvements in education, health care, public safety, search and rescue
- Stimulates economic growth

User Pays Business

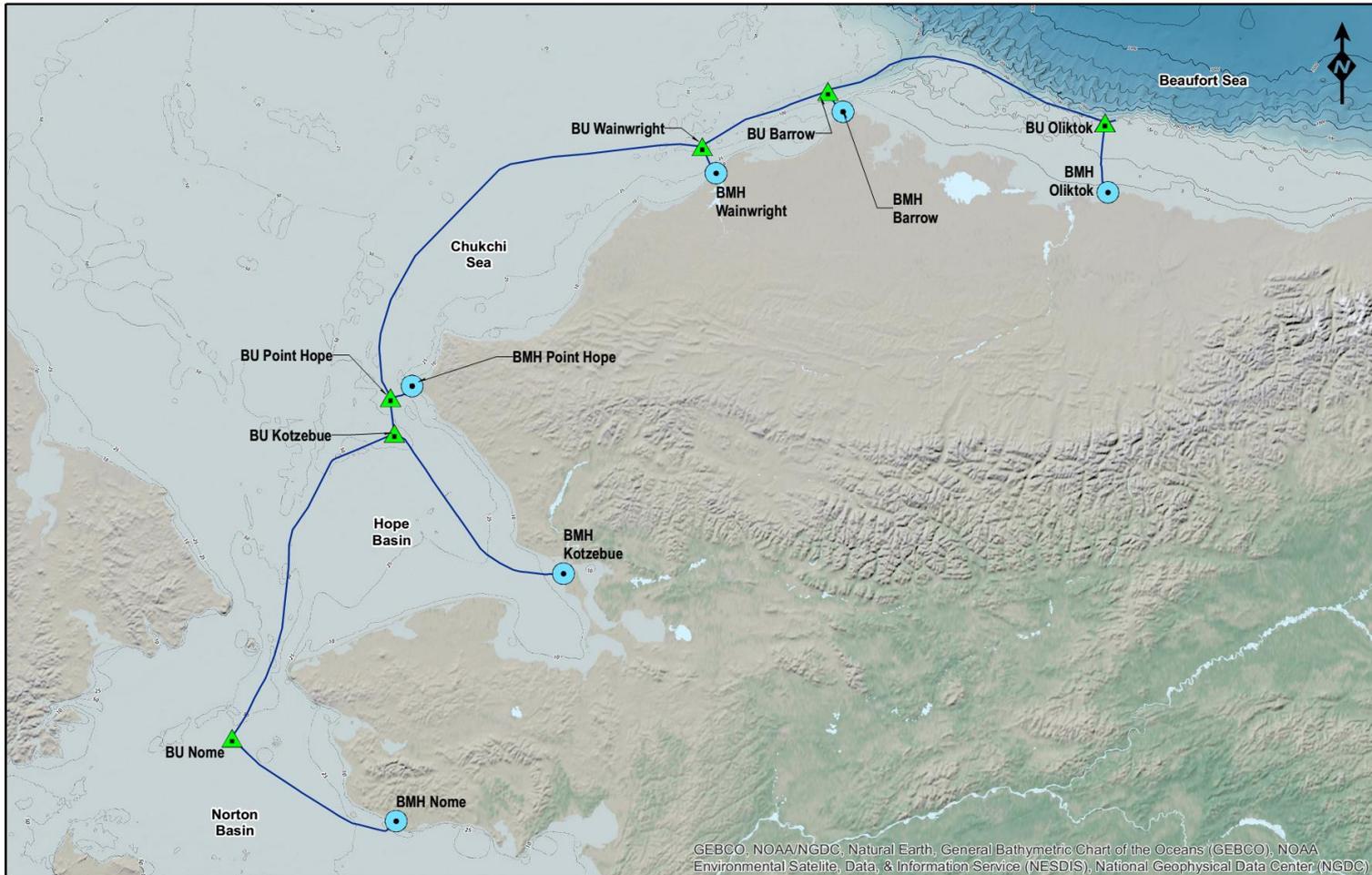
- All costs that go into delivering Broadband are passed on to the users at each landing

Short Term Activity for Long Term Benefit

- One summer to install
- No return work except for damage



Route Map – Phase I Alaska



GEBCO, NOAA/NGDC, Natural Earth, General Bathymetric Chart of the Oceans (GEBCO), NOAA Environmental Satellite, Data, & Information Service (NESDIS), National Geophysical Data Center (NGDC)

-  BMH
-  BU
-  Fiber Optic Lines

QUINTILLION
Route Map



FIGURE:
X-X

Projection: Alaska Albers



2015 Project Work

- 1. Marine Survey:** confirms cable route and required burial depth
 - **Geophysical Survey:** map the sea floor using side scan and multi beam sonar
 - Completed July and August 2015
 - **Geotechnical Survey** analyze sea floor soil properties to design the cable burial plan
 - Ongoing through late October/early November
 - **Fugro**, subcontractor to Alcatel Submarine Networks, conducting Marine Survey work

- 2. Horizontal Directional Drilling:** install conduit in shallows near shore to protect cable
 - Drill from shore side with a surface drilling rig: up to 1 mile offshore
 - Bore drilled 60 – 80 feet deep below sea floor and steel casing installed for cable
 - Minimal impact on the surrounding area and shoreline

- 3. Cable Landing Stations:** work continues to install buildings and equipment



Why do we need to bury the cable?

- Human activities present the greatest risk to subsea cables
- In the Arctic, ice gouging presents a serious risk
- Cable must be protected by burying it in the sea floor in the shallow waters

Causes of service-impacting cable breaks	Percentage
Fish trawling	40%
Ship anchorages	28%
Subsea earthquakes or subsidence	8%
Shunt (electrical faults) failures	8%
Amplifier or branching unit failure	4%
Abrasion (wave, seabed, ice)	3%
Other factors, sabotage, etc.	9%
Total	100%

*International Submarine Cable Protection Committee, 2013



2016 Summer Activities: Cable Installation

Details on the cable lay are still being finalized

- Cable laying vessel details to be determined
- Final route of cable to be confirmed
- Target cable lay late June through early September

System Builder: Alcatel Submarine Networks

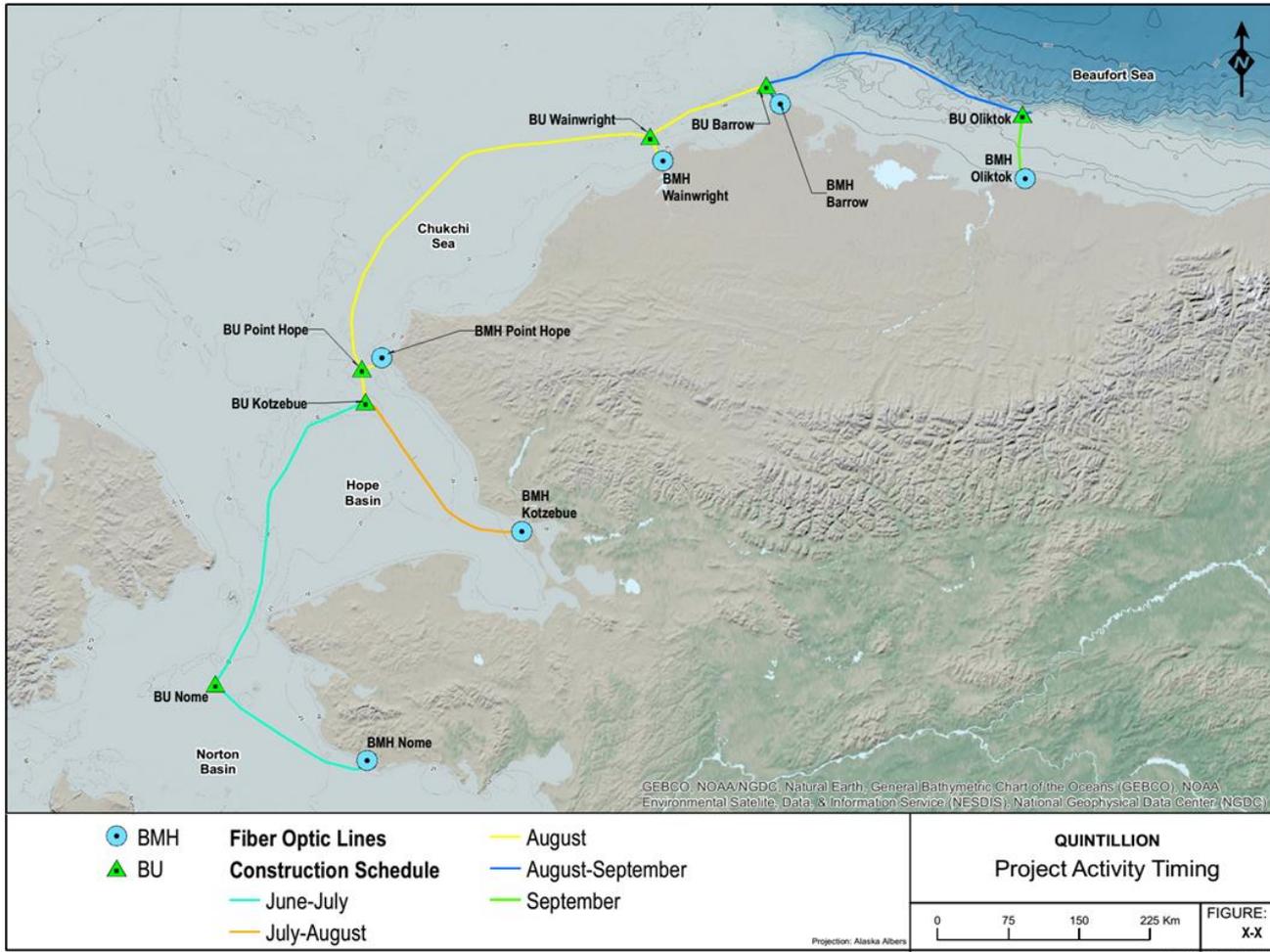
- A leading global supplier of subsea cable systems
- Progress is slow and steady
- Systematic process to be successfully installed
- Must be conducted as a continuous operation

Coordinating our Plan of Cooperation

- Glenn Ruckhaus at Owl Ridge is leading our planning efforts
- Community information meetings starting in March/April 2016



Preliminary 2016 Summer Schedule



IHA and Plan of Cooperation

Quintillion has applied for an IHA

- Cable laying vessel details to be determined

Plan of Cooperation

- Gathering input from Whaling Captains
- Early and frequent communication

Coordinating our Plan of Cooperation

- Glenn Ruckhaus at Owl Ridge is leading our planning efforts
- Community information meetings will be scheduled in 2016



MMO onboard marine survey vessel



For more information

Please contact Quintillion for more information

info@Qexpressnet.com

Quintillion Subsea Operations
201 East 56th Avenue, Suite 300
Anchorage, Alaska 99518



QUYANAQPAK





Meeting Agenda and Minutes			
Client/Project	Quintillion	Date	December 8, 2015
Subject	Plan of Cooperation	Location:	Sheraton Hotel, Anchorage
Attachments	Quintillion Presentation		

Attendees			
Name	Representing	Name	Representing
Elizabeth Pierce	Quintillion - Presenter	AEWC Commissioners	AEWC
Edith Vordestrasse	Quintillion - Audience	Jessica Lefevre	AEWC – Legal Council
Glenn Ruckhaus	Owl Ridge	Interested Public	Various

Minutes –
<p>Elizabeth Pierce presented the Plan of Cooperation presentation to the Attendees.</p> <ul style="list-style-type: none"> • Comments received – <ul style="list-style-type: none"> ○ Quintillion should present this presentation at the Barrow Whaling Captains meeting

Quintillion Subsea Cable System Project Update

PRESENTED BY:

Elizabeth Pierce, Chief Executive Officer



ALASKA ESKIMO WHALING COMMISSION
Fourth Quarter Commissioners Meeting
Anchorage, Alaska
December 2015

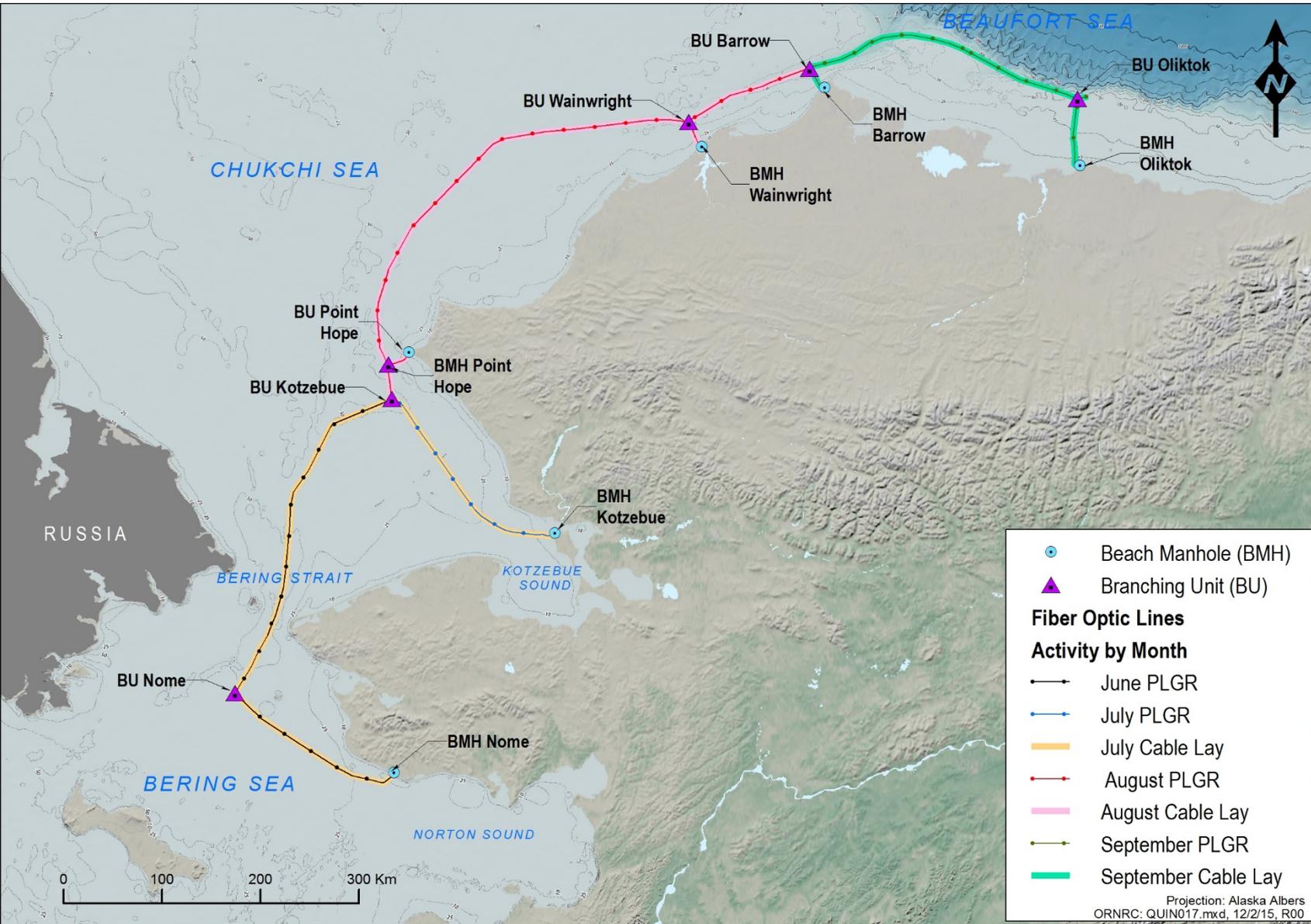


Review of September Presentation

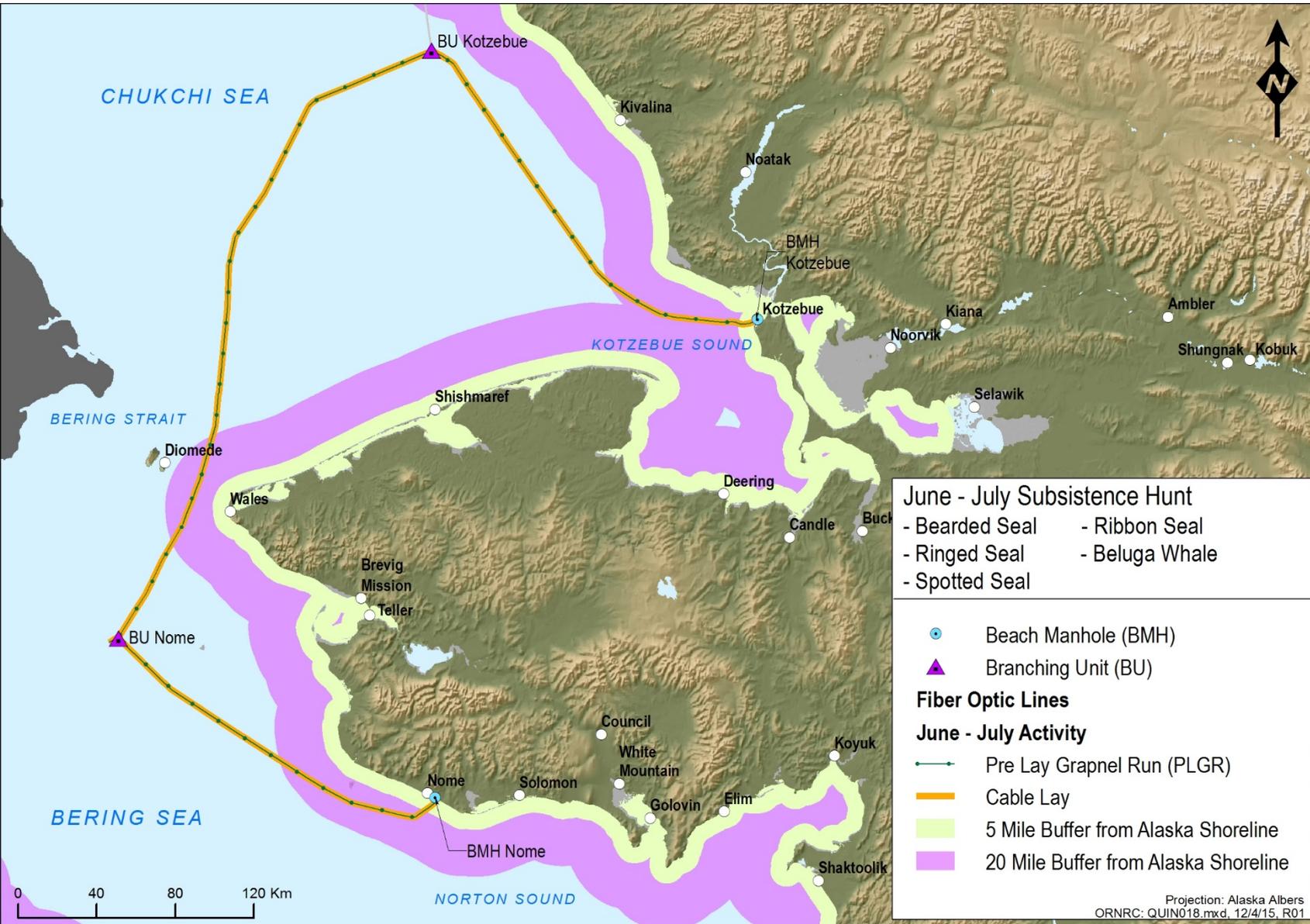
- Headquartered in Anchorage, Alaska
- Carrier for the local provider – we provide high speed “broadband” capacity to the local providers.
- Funded by US private investment group and select Alaska investors
- User-Paid Business
 - All costs that go into delivering broadband are passed on to the users
- Short Term Activity for Long Term Benefit
 - One summer to install
 - No return work except in the event of damage
- Cable lay cannot stop or slow down once begun
 - Ship moves very slowly, less than 15 kilometers per day
- Communication is our only form of mitigation to subsistence activities
 - We want to focus our efforts and discussions on how to effectively share information and communicate.



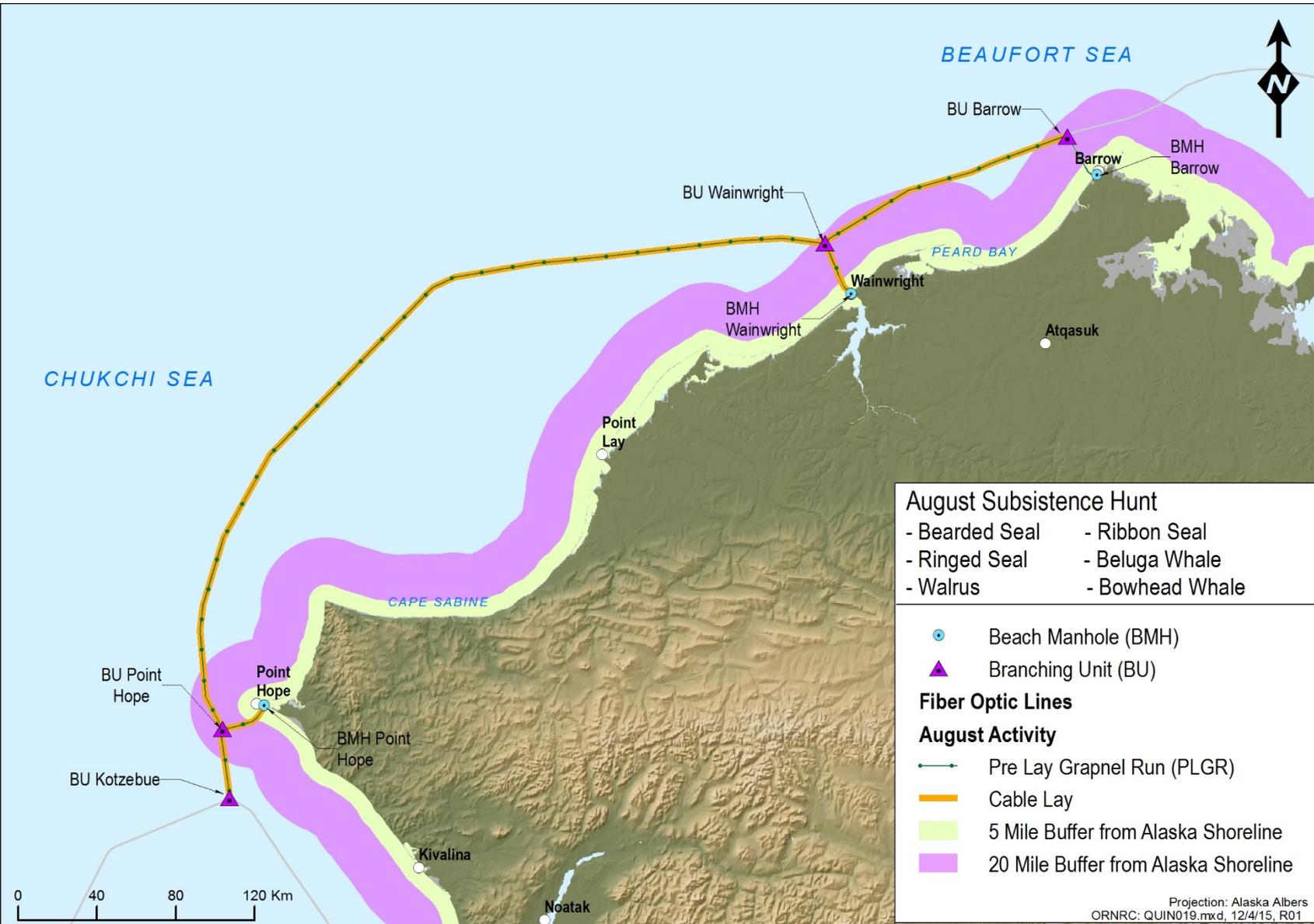
Preliminary 2016 Summer Schedule



June and July 2016 Activity



August 2016 Activity



August Subsistence Hunt

- Bearded Seal
- Ringed Seal
- Walrus
- Ribbon Seal
- Beluga Whale
- Bowhead Whale

Fiber Optic Lines

- Beach Manhole (BMH)
- ▲ Branching Unit (BU)

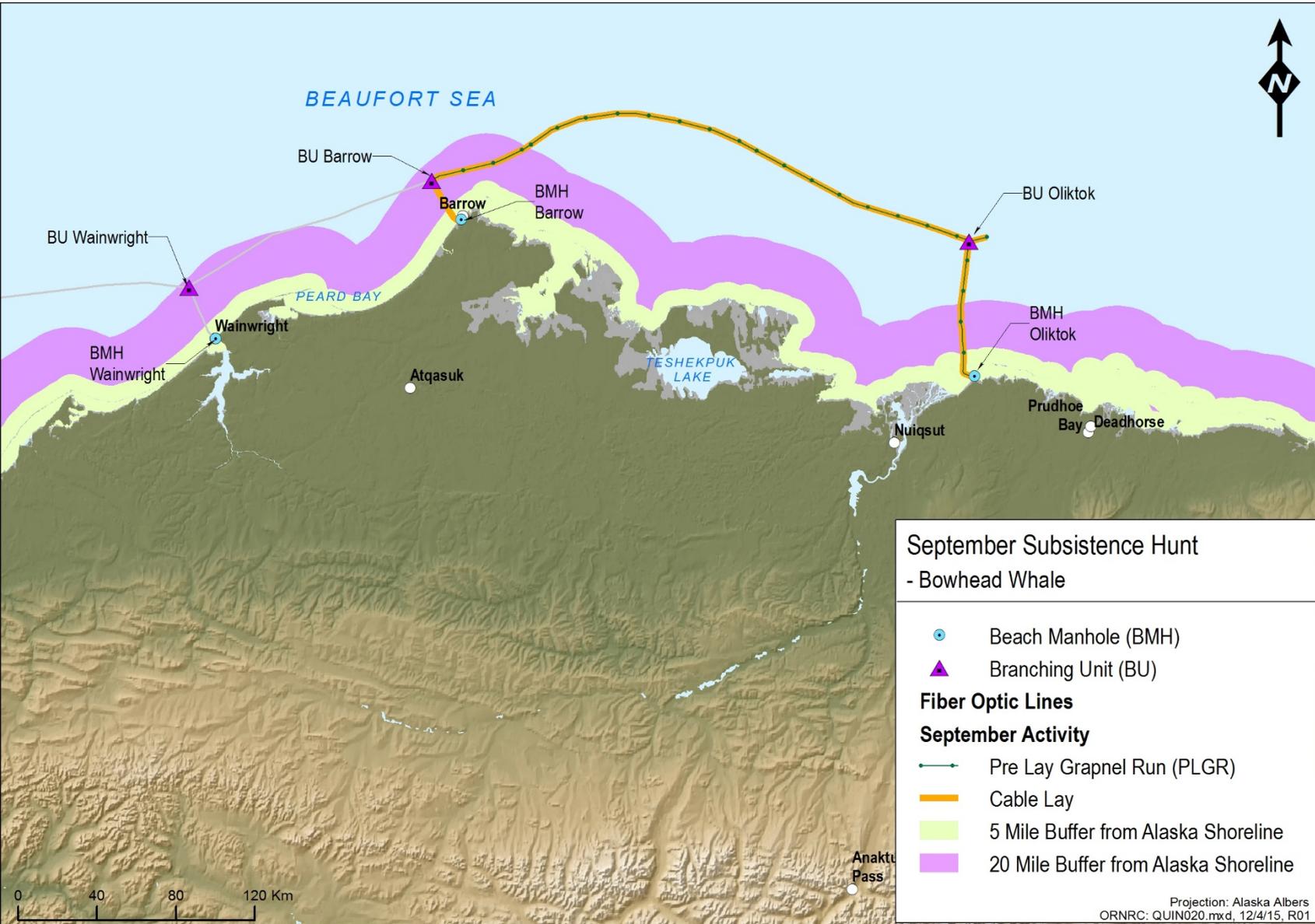
August Activity

- Pre Lay Grapnel Run (PLGR)
- Cable Lay
- 5 Mile Buffer from Alaska Shoreline
- 20 Mile Buffer from Alaska Shoreline

Projection: Alaska Albers
 ORNRC: QUIN019.mxd, 12/4/15, R01



September 2016 Activity



Information Sharing Prior to Start

- Newsletters and Mailings
- Television and Public Radio Announcements
- Will attend all land village meetings to which we are invited
- Conduct Plan of Cooperation Meetings at all landing villages in 2016

Quintillion Subsea Fiber Project

Quintillion Fiber Optic Installation Progress



Thank you 

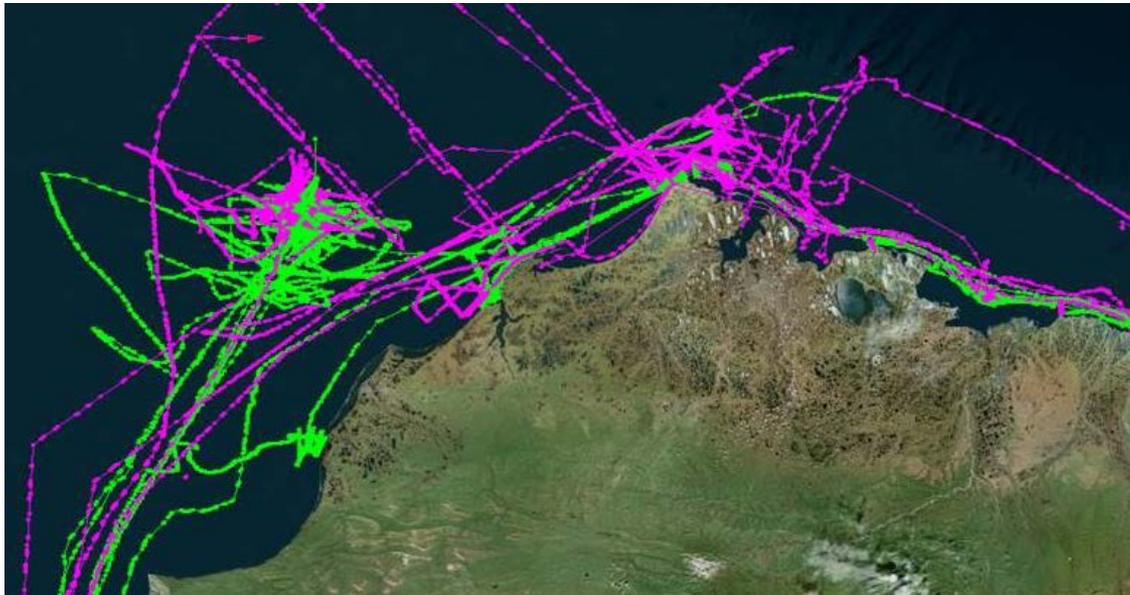
We would like to thank the residents, and city and tribal governments of the landing communities of Barrow, Wainwright, Pt Hope, Kotzebue and Nome. We also appreciate the important work of all our contractors including New Horizons Telecom, Umiq, Alcatel Submarine Networks, and RT Casey for their safe and successful work this season.

We are on schedule to deliver broadband service to the landing communities in 2017.



Information Sharing During Operations

- Television and Public Radio Announcements
- Regular Ship to Shore Communication with the Landing Villages and AEWC on progress and schedule updates
 - Updates provided a minimum of every 24 hours
- Provide Membership to AEWC to Alaska Marine Exchange
 - Allows 24/7 Access to location of all commercial vessels



For more information

Please contact Quintillion for more information

info@Qexpressnet.com

Quintillion Subsea Operations, LLC
201 East 56th Avenue, Suite 300
Anchorage, Alaska 99518





Meeting Minutes			
Location:	Barrow, Alaska	Date	January 19, 2016
Subject	Barrow Whaling Captain Assoc. Board Meeting	Call-in #	N/A
Attachments	Presentation		

Attendees					
Name	Company	Present	Name	Company	Present
Glenn Ruckhaus	Owl Ridge NRC	X	Eugene Brower	BWCA	X
Crawford Patkotak	BWCA	X	Jake Adams	BWCA	X
Tommy Nageak	BWCA	X	Edward ?	BWCA	
Charlie Hopson	BWCA	X			
Joe Leavitt	BWCA	X			

Meeting
<p>I. Presentation provided in hard copy (Attached)</p> <ul style="list-style-type: none"> • Communication is the primary mitigation available to Quintillion – • AEWC will have membership to Alaska Marine Exchange and can track all commercial vessels 24/7 <p>II. Key Issues Identified by BWCA Board</p> <ol style="list-style-type: none"> a. Maps should show the distance from shore b. Be explicit on speed of vessels c. Size – How big is the cable laying vessel? d. Provide a comparison of cable laying to Seismic – What is the difference in level of sound and speed of travel e. Provide Schedule updates f. Start as early as possible and try to be out of the area before whaling begins in mid-September <p>III. Requests from Board</p> <ol style="list-style-type: none"> a. Board recommends to attend the full membership meeting on January 25 and have presentation that addresses issues above. Would be best if Elizabeth Pierce the CEO of Quintillion could attend, if not a video introduction would suffice. b. Become a true partner with whalers, communication and understanding of activities. c. Field Discounts into accounts <p>IV. Communication</p> <ul style="list-style-type: none"> • Crawford Patkotak as secretary of the BWCA is the point of contact for communication.

Quintillion Subsea Cable System



BARROW WHALING CAPTAINS ASSOCIATION

Barrow, Alaska

January 2016



About Quintillion

- Headquartered in Anchorage, Alaska
- Carrier for the local provider – we provide high speed “broadband” capacity to the local providers.
- Managed by Elizabeth Pierce, CEO and Founding Partner
- Funded by US private investment group and select Alaska investors including Arctic Slope Regional Corporation (ASRC)



Purpose and Benefit to Community

High-speed Bandwidth stimulates community development:

- Enables extensions to connect more communities
- Carrier neutral: All telecoms can use the networks
- Substantially improve communication/Internet service while reducing costs
- Enables improvements in education, health care, public safety, search and rescue
- Stimulates economic growth

User Pays Business

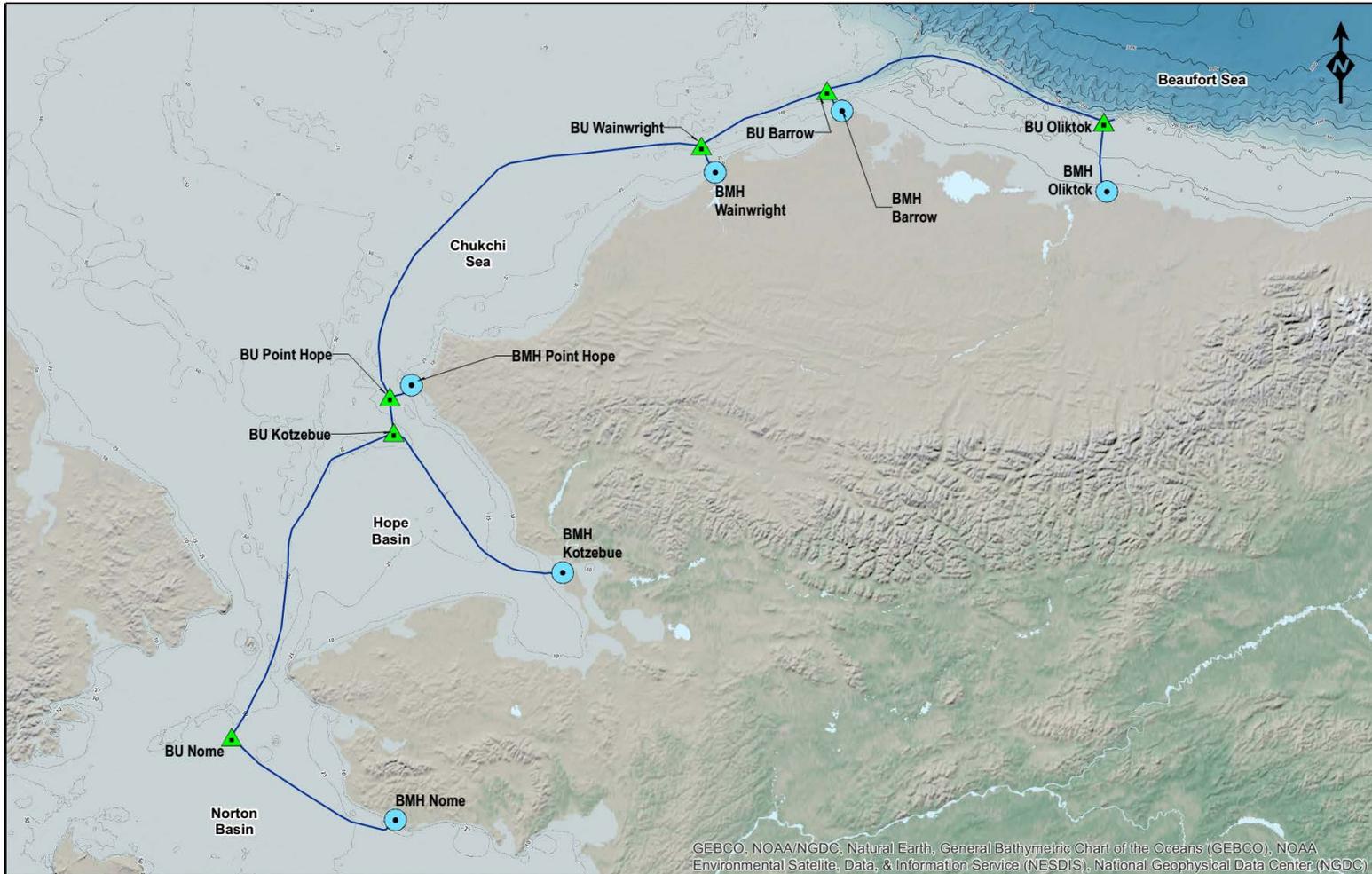
- All costs that go into delivering Broadband are passed on to the users

Short Term Activity for Long Term Benefit

- One summer to install
- No return work except for damage



Route Map – Phase I Alaska



GEBCO, NOAA/NGDC, Natural Earth, General Bathymetric Chart of the Oceans (GEBCO), NOAA Environmental Satellite, Data, & Information Service (NESDIS), National Geophysical Data Center (NGDC)

<ul style="list-style-type: none"> ● BMH ▲ BU — Fiber Optic Lines 	<p>Projection: Alaska Albers</p>
---	----------------------------------

<p>QUINTILLION Route Map</p>	
<p>0 75 150 225 Km</p>	<p>FIGURE: X-X</p>



2015 Project Work Completed

- 1. Marine Survey:** confirms cable route and required burial depth
 - **Geophysical Survey:** map the sea floor using side scan and multi beam sonar
 - **Geotechnical Survey** analyze sea floor soil properties to design the cable burial plan
- 2. Horizontal Directional Drilling:** install conduit in shallows near shore to protect cable
 - Drill from shoreside with a surface drilling rig: up to 1 mile offshore
 - Completed: Nome, Kotzebue, and Wainwright
 - Bore drilled 60 – 80 feet deep below sea floor and steel casing installed for cable
 - Minimal impact on the surrounding area and shoreline
- 3. Cable Landing Stations:** work continues to install buildings and equipment



Why do we need to bury the cable?

- Human activities present the greatest risk to subsea cables
- In the Arctic, ice gouging presents a serious risk
- Cable must be protected by burying it in the sea floor in the shallow waters

Causes of service-impacting cable breaks	Percentage
Fish trawling	40%
Ship anchorages	28%
Subsea earthquakes or subsidence	8%
Shunt (electrical faults) failures	8%
Amplifier or branching unit failure	4%
Abrasion (wave, seabed, ice)	3%
Other factors, sabotage, etc.	9%
Total	100%

*International Submarine Cable Protection Committee, 2013



2016 Summer Activities: Cable Installation

Complete HDD

- Barrow
- Point Hope
- Oliktok

Details on the cable lay are still being finalized

- Cable laying vessel details to be determined
- Final route of cable to be confirmed
- Target cable lay late June through early September

System Builder: Alcatel Submarine Networks

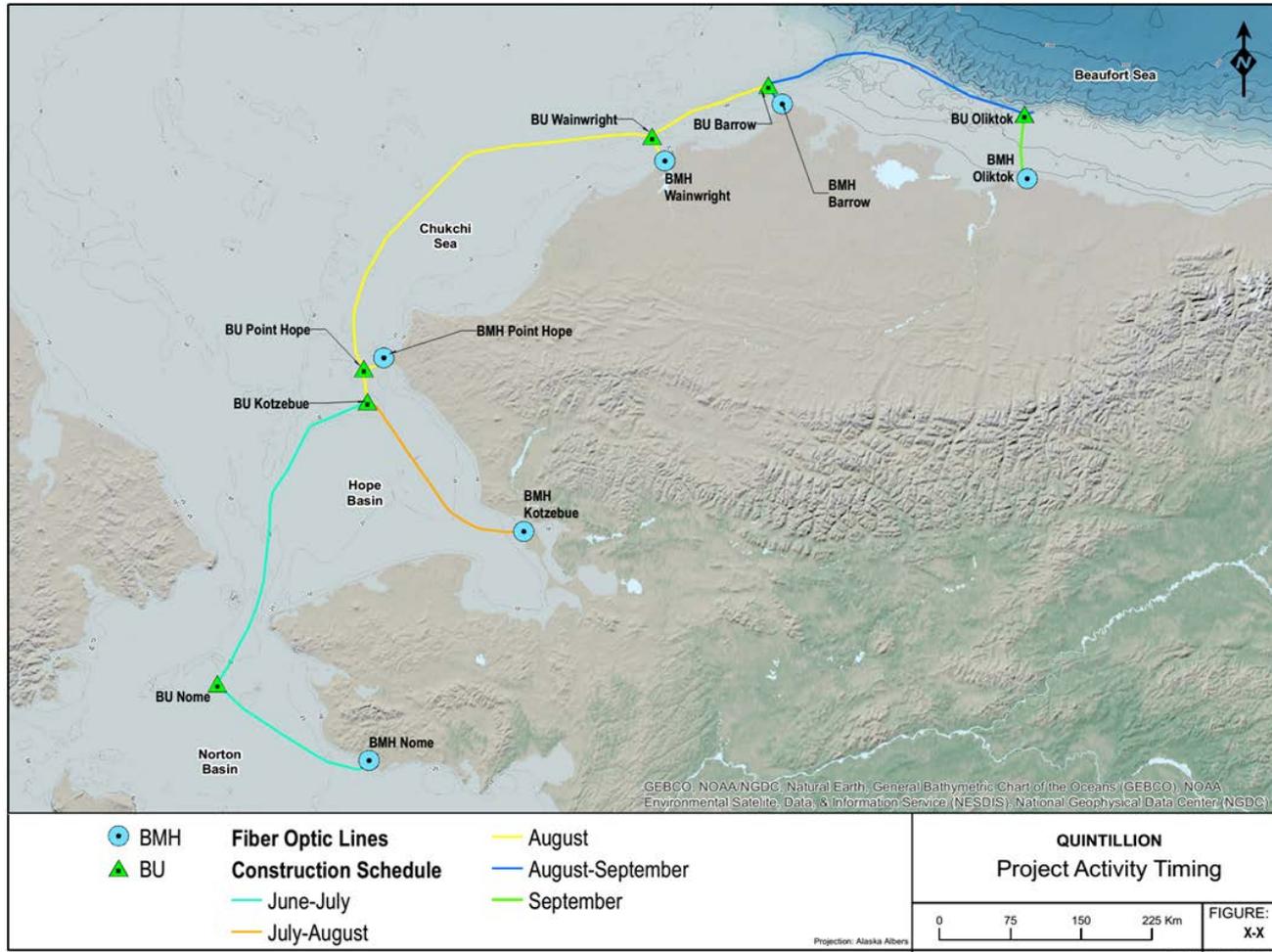
- A leading global supplier of subsea cable systems
- Progress is slow and steady
- Continuous systematic process to install

Coordinating our Plan of Cooperation

- Meetings start in January 2016 with this meeting
- AEWG Min Convention February 1-4
- Landing Communities in February



Preliminary 2016 Summer Schedule



IHA and Plan of Cooperation

Quintillion has applied for an IHA

- Integrating data from summer program and obtaining vessel data
- Assessing potential to add another vessel
- 4MP Developed
- Peer Review Meeting slated for early March

Plan of Cooperation

- Gathering input from Whaling Captains
- Quintillion will donate membership to the Alaska MEarly and frequent communication

Coordinating our Plan of Cooperation

- Glenn Ruckhaus at Owl Ridge is leading our planning efforts
- Community information meetings whaling captains will be scheduled in 2016



Information Sharing

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Quintillion Subsea Fiber Project

Quintillion Fiber Optic Installation Progress

Thank you 

We would like to thank the residents, and city and tribal governments of the landing communities of Barrow, Wainwright, Pt Hope, Kotzebue and Nome. We also appreciate the important work of all our contractors including New Horizons Telecom, Umiag, Alcatel Submarine Networks, and RT Casey for their safe and successful work this season.

We are on schedule to deliver broadband service to the landing communities in 2017.



For more information

Please contact Quintillion for more information

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201 East 56th Avenue, Suite 300
Anchorage, Alaska 99518

Or

Glenn Ruckhaus

glenn@owlridenrc.com

907-891-7265



Meeting Minutes					
Location:	Barrow, Alaska		Date	January 25, 2016	
Subject	Barrow Whaling Captain Assoc.		Call-in #	N/A	
Attachments	Presentation				
Attendees					
Name	Company	Present	Name	Company	Present
Glenn Ruckhaus	Owl Ridge NRC	X	Eugene Brower	President -BWCA	X
Crawford Patkotak	Secretary - BWCA	X	Full Membership - approximately 50 present		X
Tommy Nageak	Board BWCA	X	Robert Suydam,	NSB Wildlife	X
Charlie Hopson	Board BWCA	X			
Joe Leavitt	Board BWCA	X			

Minutes
<p>Meeting began with invocation and call for prayers for Jake Adams and Edward Itta, both could not be present with health concerns.</p> <p>These minutes provided only related to the Quintillion project. Numerous other discussion occurred along with a presentation from Dr. Suydam with the NSB Wildlife on revised population estimates of the bowhead.</p> <p>Apology provided to membership from Elizabeth Pierce that she could not present in person to the BWCA. Elizabeth will be in Barrow for the AEWC mini convention on February 4-5, and will happy to meet with anyone during that time.</p> <p>Presentation provided in hard copy (Attached) and discussed</p> <ul style="list-style-type: none"> • Communication is the primary mitigation available to Quintillion – • AEWC will have membership to Alaska Marine Exchange and can track all commercial vessels 24/7 <p>Most of the questions were related to when high speed internet will be available in Barrow and at what cost?</p> <p>Many focused on Slide 4 wanting to know if their costs would be down to \$30 per month. It was emphasized that the slide is only a representation of their current costs shown on the GCI website and what other communities in the lower 48 with broadband pay for service. Final consumer costs will depend upon the cost to install, user pay system.</p> <p><u>Specific Questions and Answers:</u></p> <ol style="list-style-type: none"> 1. How loud is the noise from the ship and plowing and whether the plowing was a significant sound source? <ol style="list-style-type: none"> a. It was explained that the cable lay vessel is a dynamic positioning vessel and the noise is from propulsion and thrusters. Plowing is a significantly lower sound level than the propulsion and is masked by the noise from propulsion and thrusters. 2. Walrus dive deep and feed from bottom, are we sure that there will not be any impacts to cable from walrus feeding?

Minutes

- a. Answer: the cable has significant armouring with steel and HDPE to prevent damage from numerous potential incident. This specific question has not been asked previously and we will verify the armouring is sufficient to withstand the effects of bottom feeding walrus.
- b.
- 3. Are you applying for an IHA?
 - a. Yes the application was submitted in October 2015 and is in process.
- 4. Will Quintillion sign the CAA?
 - a. No, as there are shut down provisions in the CAA which Quintillion cannot agree too. As explained in the presentation, the installation must be continuous, breaking off is possible but will require abandoning the project in 2016 and potential long delay to return and repair. Requires continuous operation.

One whaler made the comment to the Board and president of the AEWFC of whether BWCA was going to allow the precedent to be set that cable laying does not need to have a CAA. He felt this sets a bad precedent. The answer from the president was that the AEWFC cannot force any operator to sign the CAA. In this particular case, the operation is significantly offshore and beyond their typical whaling grounds. They do not have any examples of activities that occur that far offshore and it is unknown whether the whales will be deflected from the cable lay activity. While whales typically deflect away from noise, they can also be curious and may be attracted. This is an unknown.

Final comments from BWCA were that they support the project, but would encourage Quintillion to conduct their installation in the Beaufort as early as possible in the open water and do everything possible to avoid activity in Mid-September to Mid-October.

Quintillion committed to continue to conduct communication with the whalers and will attend the Fall pre-fire meeting to provide an update on the progress and address any potential issues that have arisen.

Quintillion Subsea Cable System



BARROW WHALING CAPTAINS ASSOCIATION

Barrow, Alaska

January 2016



About Quintillion

- Headquartered in Anchorage, Alaska
- Carrier for the local provider – we provide high speed “broadband” capacity to the local providers.
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Purpose and Benefit to Community

High-speed Bandwidth stimulates community development:

- Enables extensions to connect more communities
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- Stimulates economic growth

User Pays Business

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Short Term Activity for Long Term Benefit

- One summer to install
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Why Alaska Needs Fiber...

Location	Monthly Cost	Speed (Mbps)	Monthly Capacity Limit	Price Per Mbps
Barrow, Alaska ²	\$215.00	6	60 Gbps	\$35.84
Kansas City, MO ¹	\$70.00	1000	No Cap	\$0.07
Chattanooga, TN ¹	\$69.69	1000	No Cap	\$0.06
San Francisco, CA ¹	\$30.00	200	No Cap	\$.015
Seoul, South Korea ¹	\$30.30	1000	No Cap	\$0.03

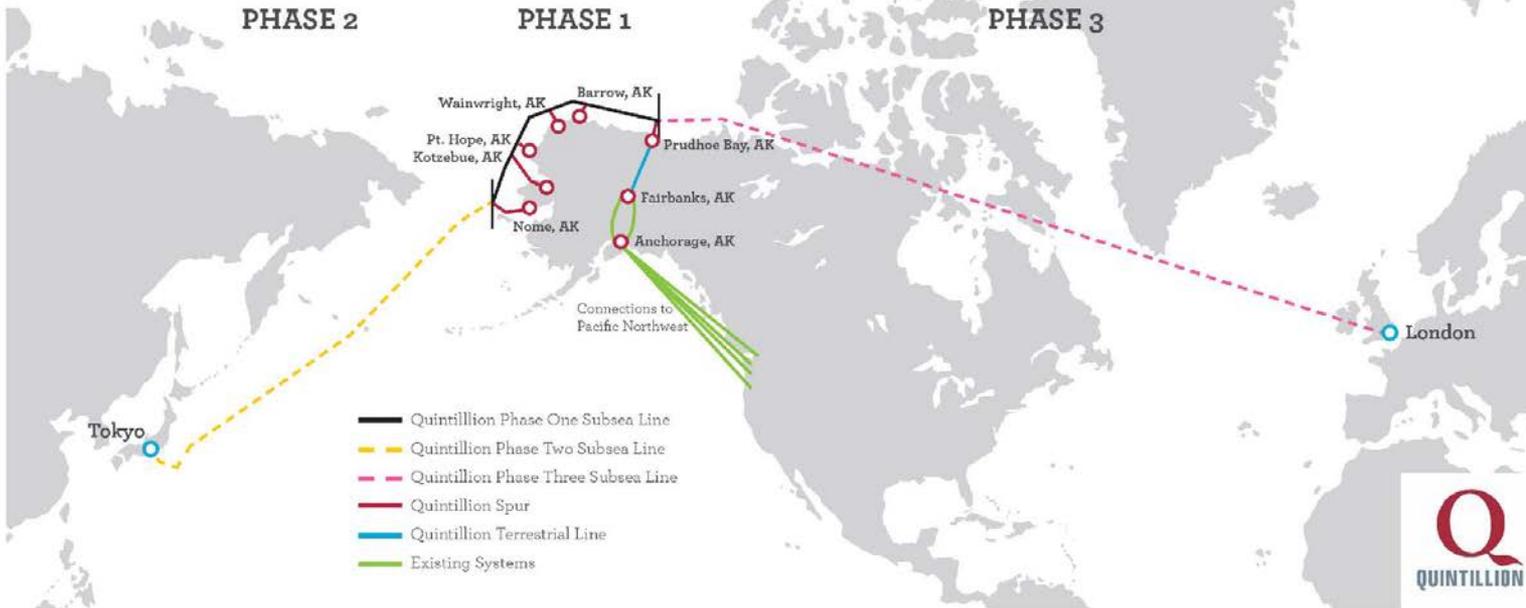
(1) As published by Open Technology Institute, New America Foundation; "The Cost of Connectivity 2014"

(2) Quoted on GCI website, October 2014



PLANNED SEGMENTS—PHASED APPROACH
ALASKA—JAPAN—EUROPE

TOKYO-ALASKA-CANADA-LONDON



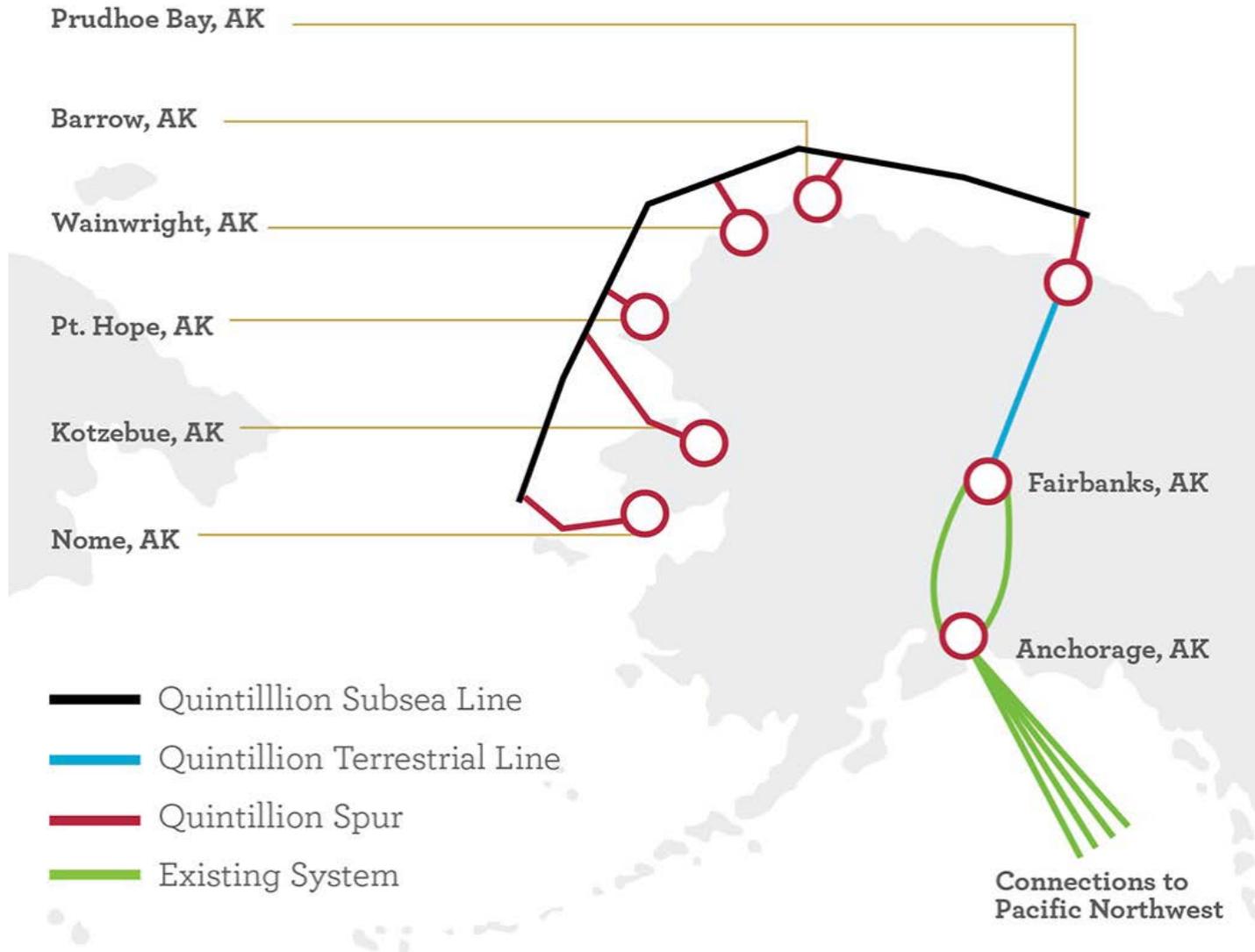
Phase 1 —
Nome to Prudhoe Bay, Alaska with spurs to Kotzebue, Point Hope, Wainwright and Barrow. Prudhoe Bay connects to new fiber extending to Fairbanks. Fairbanks connects to existing fiber optic cable systems to Anchorage and the US Pacific Northwest.

Phase 2 —
Additional subsea fiber would extend from Phase 1 by starting at Nome, Alaska to Japan, with options for additional Alaska spurs. *Currently in development.*

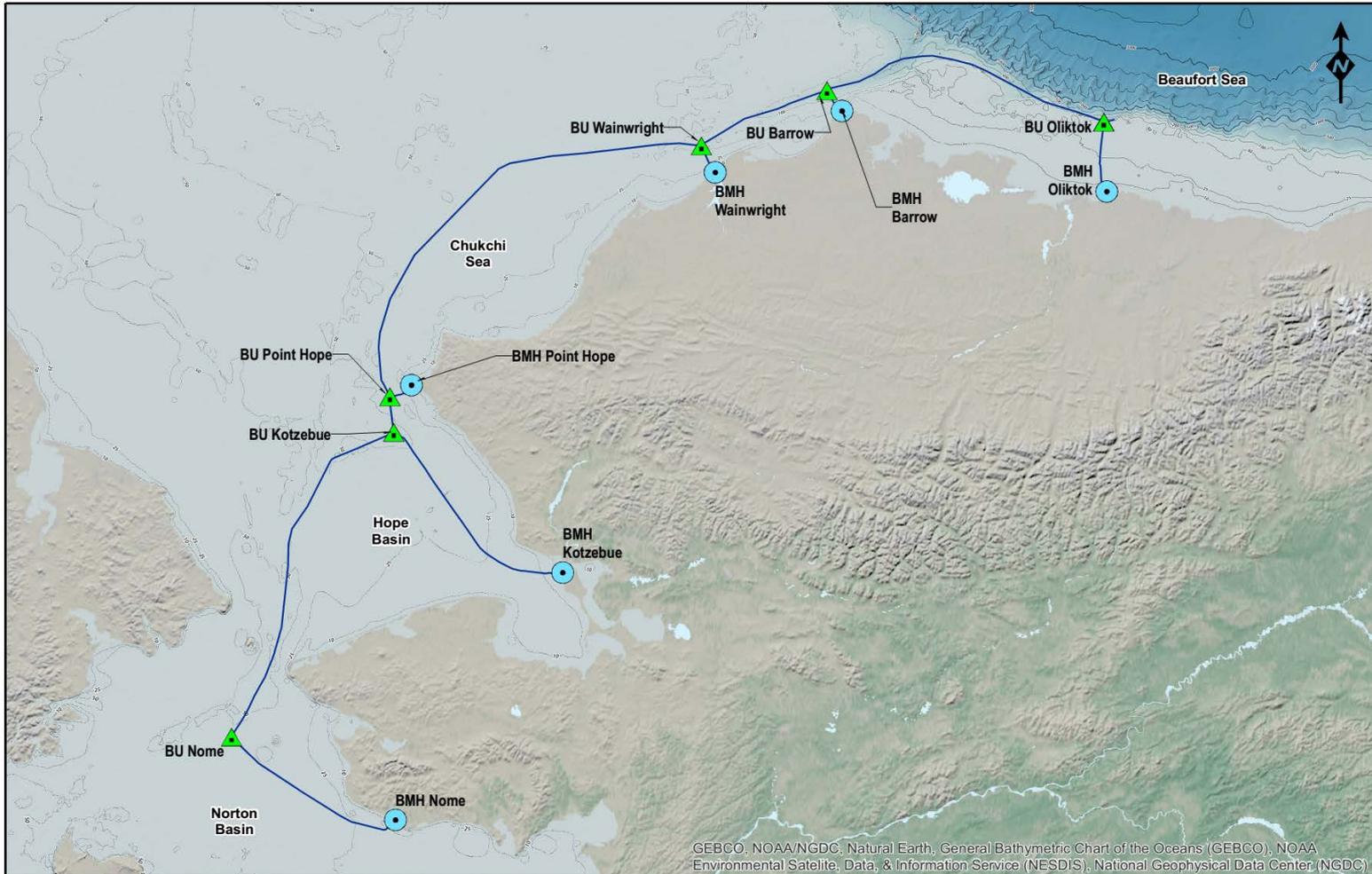
Phase 3 —
This phase would lay additional subsea fiber starting from Prudhoe Bay, Alaska to Canada and Europe, with planned spurs into the Canadian Arctic.



ALASKA SYSTEM



Route Map – Phase I Alaska



GEBCO, NOAA/NGDC, Natural Earth, General Bathymetric Chart of the Oceans (GEBCO), NOAA Environmental Satellite, Data, & Information Service (NESDIS), National Geophysical Data Center (NGDC)

<ul style="list-style-type: none"> ● BMH ▲ BU — Fiber Optic Lines 	<p>QUINTILLION Route Map</p>	<p>0 75 150 225 Km</p>	<p>FIGURE: X-X</p>
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- Point Hope
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- Final route of cable to be confirmed
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System Builder: Alcatel Submarine Networks

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- Progress is slow and steady
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Coordinating our Plan of Cooperation

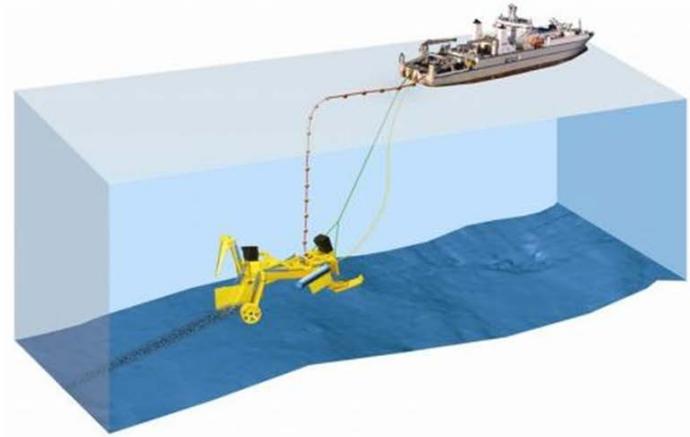
- Meetings start in January 2016 with this meeting
- AEWG Min Convention February 1-4
- Landing Communities in February



Cable Laying vs. Seismic Operations

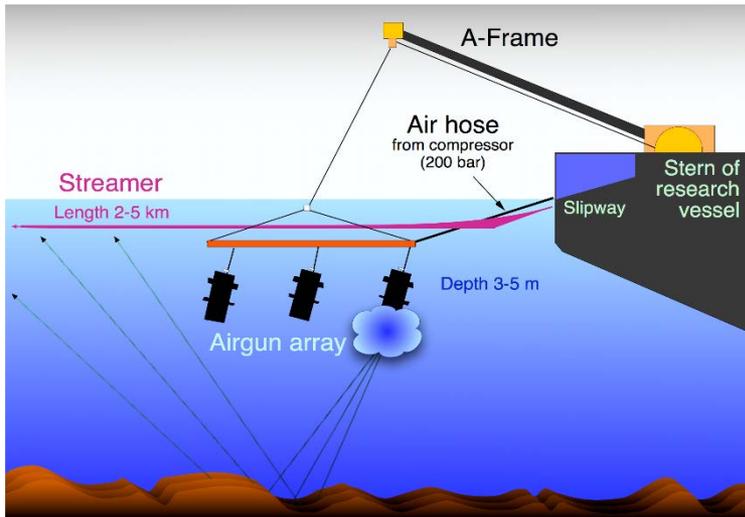
Cable Laying

- Vessel travels at 0.5 kt
- Produce noise in the 170 to 180 dB re 1 μ Pa (rms) range Seismic vessels



Seismic

- Vessel towing an array travel at 5 kt, 10 times faster
- Seismic operations produce noise in the 220 to 240 dB re 1 μ Pa (rms) range

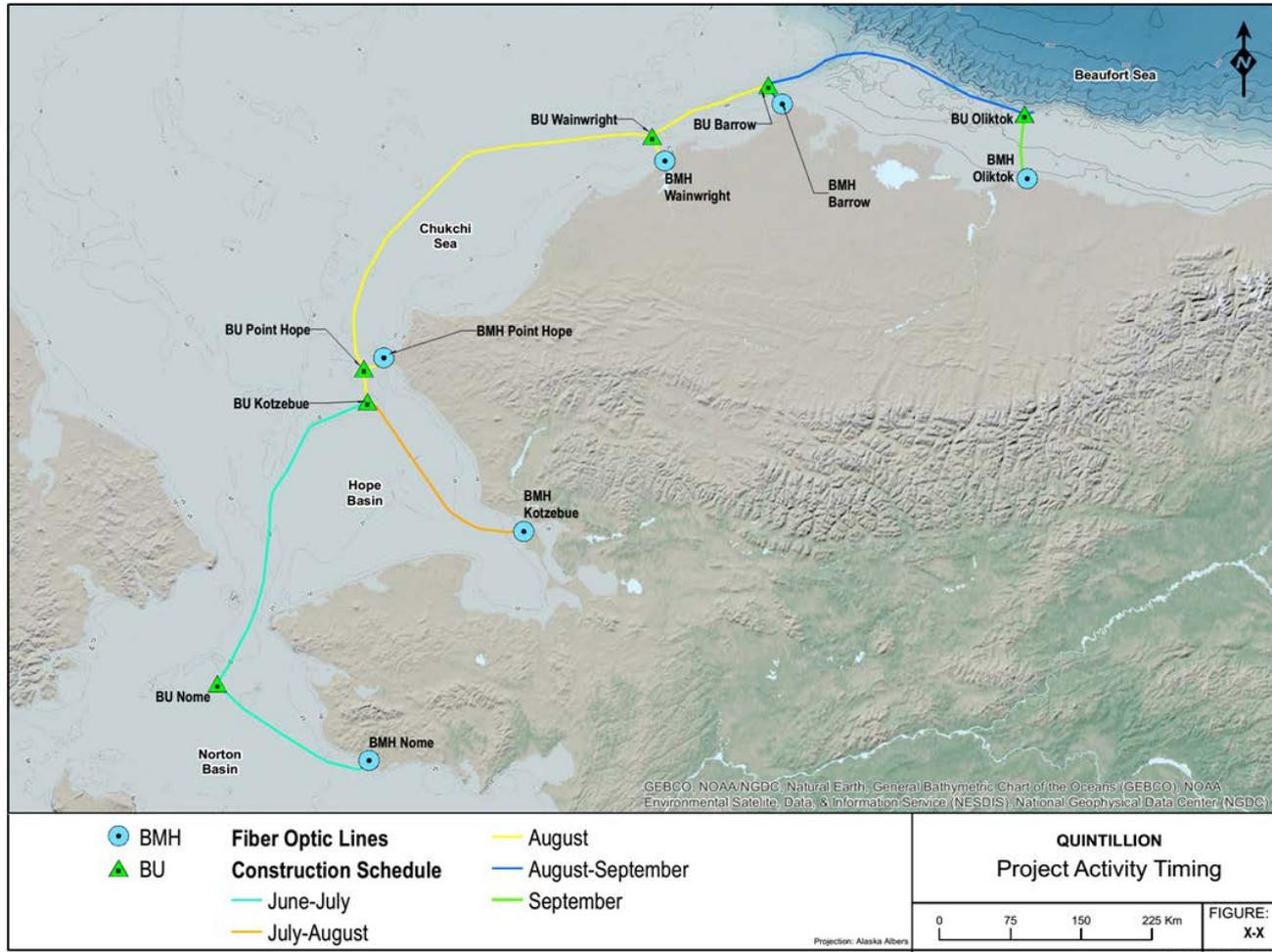


Ship Specifics

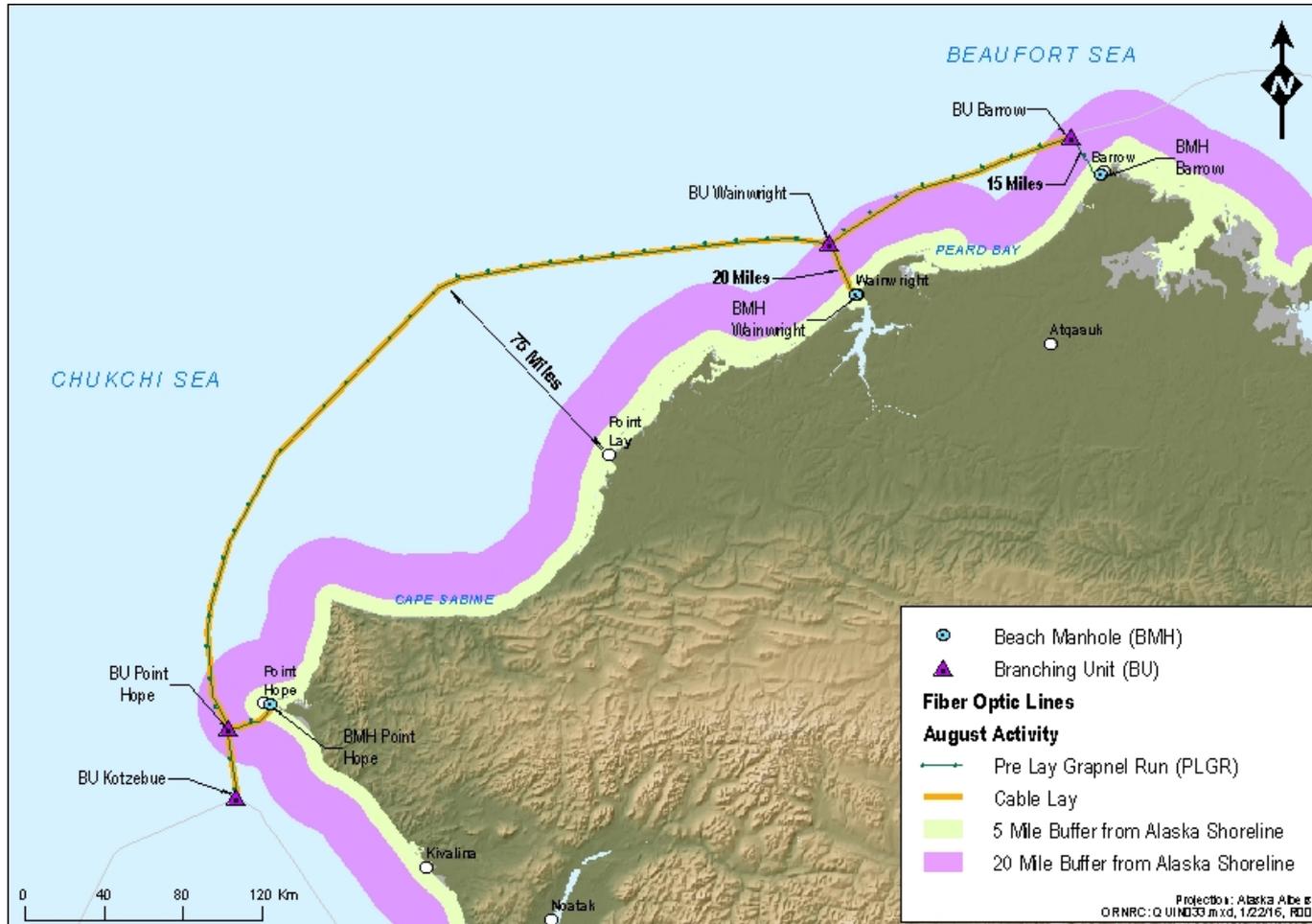
- **Name** – Ile De Brehat
- **Length Overall** – 460 ft.



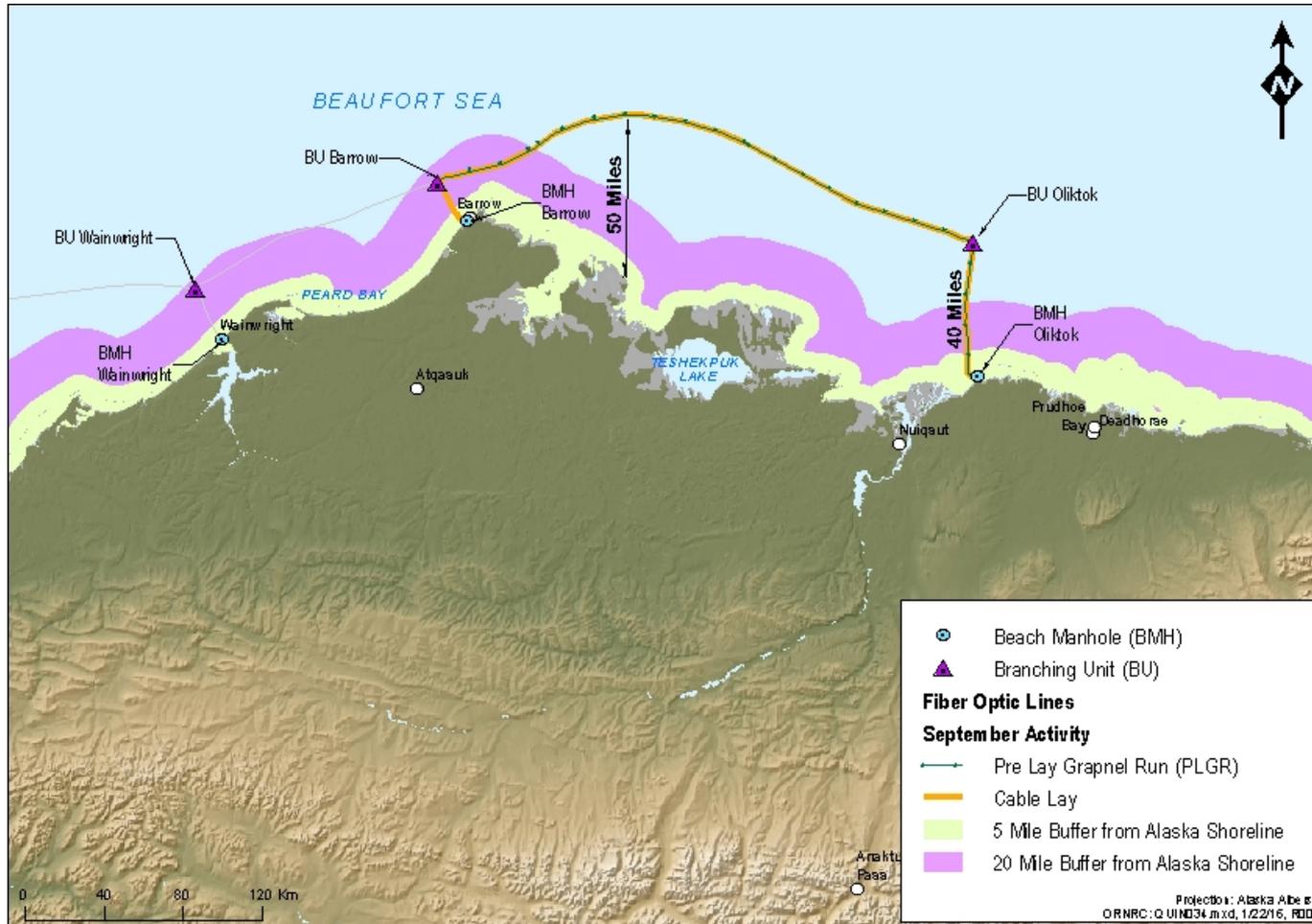
Preliminary 2016 Summer Schedule



Wainwright to Barrow



Barrow to Olitok



IHA and Plan of Cooperation

Quintillion has applied for an IHA

- Integrating data from summer program and obtaining vessel data
- Assessing potential to add another vessel
- 4MP Developed
- Peer Review Meeting slated for early March

Plan of Cooperation

- Gathering input from Whaling Captains
- Quintillion will donate membership to the Alaska Marine Exchange
- Early and frequent communication

Coordinating our Plan of Cooperation

- Glenn Ruckhaus at Owl Ridge is leading our planning efforts
- Planned Meeting:
 - AEWC and Whaling Associations
 - Community information meetings
 - Commission Meetings – Nanuuq, Kawerak, Ice Seal
 - NSB Planning Department
 - NSB Wildlife Department



Information Sharing

- Newsletters and Mailings
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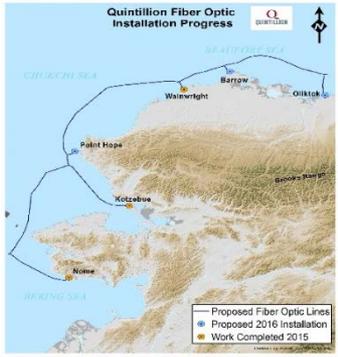


Quintillion Subsea Fiber Project

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We are on schedule to deliver broadband service to the landing communities in 2017.



The map shows the Quintillion Fiber Optic Installation Progress along the Alaskan coast. It includes a legend with three categories: Proposed Fiber Optic Lines (indicated by a blue line), Proposed 2016 Installation (indicated by a blue circle), and Work Completed 2015 (indicated by a yellow circle). The map also shows the locations of Barrow, Wainwright, Pt Hope, Kotzebue, and Nome, and labels the Chukchi Sea, Beaufort Sea, and Bering Sea.



For more information

Please contact Quintillion for more information

info@Qexpressnet.com

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201 East 56th Avenue, Suite 300
Anchorage, Alaska 99518
www.Qexpressnet.com

Or
Glenn Ruckhaus
glenn@owlridenrc.com
907-891-7265





Meeting Minutes			
Location:	Barrow High School, Barrow, AK	Date	February 4, 2016
Subject	AEWC - Industry Meeting on The 2016 Conflict Avoidance Agreement	Call-in #	
Attachments	Meeting Itinerary		
Attendees			
This meeting consisted of whaling captains from all the different whaling villages and was open to the public. There was not a sign in sheet.			

Minutes
<p>Presentation was given by Elizabeth Pierce at the AEWC Industry Meeting</p> <ul style="list-style-type: none"> There was one comment by John Hopson from Wainwright to “Hurry up” and complete the project quickly

Slides of Interest	
Slide Number	Concern / Interest
N/A	N/A

Action Items	
Item	Action
1	N/A



**ALASKA ESKIMO WHALING COMMISSION
AEWC – INDUSTRY MEETING ON
THE 2016 CONFLICT AVOIDANCE AGREEMENT
Barrow High School, Barrow, AK
February 4, 2016
9:00 A.M. – 5:00 P.M.**

Thursday, February 4

- 8:00** **BREAKFAST – Provided by ConocoPhillips**
- 8:30-8:45** **CALL TO ORDER
INVOCATION
INTRODUCTIONS
Harry Brower Jr., AEWK Chairman**
- 8:45-9:15** **USCG DISTRICT 17 - Admiral Dan Abel**
- 9:15-10:00** **AEWC & WHALING CAPTAINS MEETING (closed)**
- 10:00-10:15** **Break Provided Iiisagvik**
- 10:15-11:00** **BOEM PANEL & UPCOMING RESEARCH PROJECTS**
- Discussion with Whaling Captains on Research and Analysis
supporting decision-making for the Liberty Project, including:
Traditional Knowledge, Marine Mammals, Fisheries, and Benthos**
- Panel Chair: Dr. James J. Kendall
Panel Members: Ms. Carol Fairfield; Ms. Frances Mann; Ms. Kate
Wedemeyer; and, Dr. Dee Williams**
- 11:00-11:30** **Peter Boveng – NOAA Aerial Seal and Polar Bear Surveys**
- 11:30-11:45** **ALASKA BERING SEA CRABBERS: Mark Gleason**
- 11:45-12:00** **SAEXPLORATION: Rick Trupp**
- 12:00 – 1:15** **Lunch – Provided by Exxon Mobil**
- 1:15 – 1:30** **HILCORP: Jim Winegarner**
- 1:30-1:45** **EXXON MOBIL: Mark Brundage**

- 1:45-2:15** **NATIONAL SCIENCE FOUNDATION: Sikuliaq
Laurie Juranek and Rachel Sipler**
- 2:15-2:45** **NOAA: Overview of Upcoming NOAA Research Projects
Doug Demaster**
- 2:45-3:00** **FAIRWEATHER SCIENCE: Sheyna Wisdom, Operating Manager**
- 3:00-3:15** **QUINTILLION: Elizabeth Pierce**
- 3:15-3:30** **BREAK Provided by Ilisagvik**
- 3:30-4:00** **NOAA: Report on Unmanned Aerial Survey of Whales
Robyn Angliss**
- 4:00-4:30** **Arctic Waterway's Safety Committee**
- 4:30** **ADJOURN**



Meeting Minutes					
Location:	Community Center- Wainwright, AK		Date	February 8, 2016	
Subject	Community Informational Meeting		Call-in #		
Attachments					
Attendees					
Name	Company	Present	Name	Company	Present
Elizabeth Pierce	Quintillion	X	Glenn Ruckhaus	Owl Ridge	X
Edith Vorderstrasse	Quintillion	X	Emmanuel Danjou	Alcatel-Lucent	X
Amyanne Pierce	Quintillion	X			
See Attached Sign In Sheet for Community Attendees and Contact Information					

Minutes
<p>Elizabeth Pierce presented the attached presentation: Comments from the presentation are below:</p> <ul style="list-style-type: none"> • Why is the project starting in Alaska? <ul style="list-style-type: none"> ○ Starting in Alaska because it is a more complex system ○ After the work is completed Quintillion will be coming back to the villages for to celebrate turning on the service • Another benefit expected is the lowering of costs and an improvement of quality for services <ul style="list-style-type: none"> ○ QSN was clear that the lowering of costs will occur over time, it will not be instantaneous when the fiber optic service is turned on • While comparing seismic activity to cable laying there was concern from an attendee (Raymond) about the impact that would occur <ul style="list-style-type: none"> ○ His concern was directed at the impact of seismic activities, it was clarified that seismic was not occurring. The seismic information was only there to show that cable laying is less disruptive. • Quintillion will be working with the community to ensure that activities do not interfere with the subsistence hunts. Daily reports will be distributed to whaling captains and other community leaders. • Work in Wainwright is targeted for July-August but with consideration of the beluga activity • Questions / Comments: <ul style="list-style-type: none"> ○ Schedule does not conflict with bowhead hunt ○ Request to avoid beluga hunt which occurs over one to two days ○ Residents asked to see the cost of service examples and comparisons again for further explanation. ○ The depth cable will be buried - <ul style="list-style-type: none"> ▪ Around Wainwright the cable will be buried around 1 meter to 2 meters deep ▪ The HDD on the shore side is 80 feet below the surface and goes out about a kilometer ○ Community is supportive of the project and want it completed, "Hurry up" (John Hopson) ○ One resident: wanted QSN to be aware of walrus foraging near Hannah Shoal July and August

Slides of Interest	
Slide Number	Concern / Interest
4	Benefits to the community (health and emergency services, education and entertainment value)
13	Schedule

Action Items	
Item	Action
1	Quintillion will work with the community to for the daily report distribution
2	Quintillion assured the community the work will happen with consideration to traditional activities



Meeting Minutes					
Location:	Olgoonik Camp - Wainwright, AK	Date	February 8, 2016		
Subject	Wainwright Whaling Captains Meeting	Call-in #			
Attachments	Sign In Sheets				
Attendees					
Name	Company	Present	Name	Company	Present
Elizabeth Pierce	Quintillion	X	Glenn Ruckhaus	Owl Ridge	X
Edith Vorderstrasse	Quintillion	X	Emmanuel Danjou	Alcatel-Lucent	X
Amyanne Pierce	Quintillion	X			
See Attached Sign In Sheets for Wainwright Whaling Attendees and Contact Information					

Minutes
<p>Elizabeth Pierce presented the attached presentation: Comments from the presentation are below:</p> <ul style="list-style-type: none"> • An example of the cable was presented to the whaling captains • Access opportunity <ul style="list-style-type: none"> ○ Landing in Wainwright will allow for connection to Atqasuk • The late July beluga hunt was addressed <ul style="list-style-type: none"> ○ The beluga hunt lasts 1 to 2 days ○ The belugas feed at Icy Cape before moving on to Wainwright ○ Alcatel stated that the Wainwright landing would occur in August • Discussion on Oliktok installation <ul style="list-style-type: none"> ○ It was committed that the Oliktok section of installation would be completed in 49 days • Whaling Captains questioned the installation method <ul style="list-style-type: none"> ○ Why not go overland with fiber optic cable instead of subsea installation? (John Hopson) • Communication throughout the project <ul style="list-style-type: none"> ○ The best form of communication is email ○ Communication emails should go to all captains

Slides of Interest	
Slide Number	Concern / Interest
8	Differences between cable laying and seismic activities
12	Schedule - There is a late July beluga hunt in the project area
13	Oliktok installation
14	IHA and Plan of Cooperation - input from whaling captains and subsistence hunters

Action Items	
Item	Action
1	Alcatel current schedule is that the Wainwright landing would occur in August
2	Alcatel offered to have delegates tour a vessel while it is docked in Nome



Meeting Minutes					
Location:	Qalgi Community Center - Point Hope, AK	Date	February 9, 2016		
Subject	Community Informational Meeting	Call-in #			
Attachments					
Attendees					
Name	Company	Present	Name	Company	Present
Elizabeth Pierce	Quintillion	X	Glenn Ruckhaus	Owl Ridge	X
Edith Vorderstrasse	Quintillion	X	Emmanuel Danjou	Alcatel-Lucent	X
Amyanne Pierce	Quintillion	X			
See Attached Sign In Sheet for Point Hope Community Attendees and Contact Information					

Minutes
<p>Elizabeth Pierce presented the attached presentation which was translated by Dorcas Rock. Comments from the presentation are below:</p> <ul style="list-style-type: none"> • The project schedule has been planned around subsistence activities • The audience seemed skeptical and had a lot of questions: <ul style="list-style-type: none"> ○ Many questions regarding how this cable network will effect cost and competition ○ How long will the cable last? <ul style="list-style-type: none"> ▪ A minimum of 30 years, it is the highest quality cable available in the market to extend service life ○ Is there collaboration between Quintillion and scientific studies in the area? ○ Will there be floating markers to identify the cable route? <ul style="list-style-type: none"> ▪ There will not be floating markers • Most of the questions came from Caroline Cannon and Jack Schafer • The Native Village of Point Hope executive director asked questions regarding the USACE application <ul style="list-style-type: none"> ○ She had received the Public Notice for the application and had questions regarding distance requirements and disturbance that could occur • The community is hoping that the service is delivered as scheduled. • The community does not want any setbacks or delays and believes that Quintillion has done their research on the area and are properly prepared • Key communicators in the meeting included: <ul style="list-style-type: none"> ○ Caroline Cannon – [REDACTED] ○ Peggy Frankson – Native Village of Point Hope – [REDACTED]

Slides of Interest	
Slide Number	Concern / Interest
N/A	N/A

Action Items	
Item	Action
1	Recommend for ASTAC will go to Point Hope for a meeting to address costs.



Meeting Minutes					
Location:	Restaurant – Point Hope, AK	Date	February 9, 2016		
Subject	Tikigaq Whaling Captains Meeting	Call-in #			
Attachments					
Attendees					
Name	Company	Present	Name	Company	Present
Elizabeth Pierce	Quintillion	X	Glenn Ruckhaus	Owl Ridge	X
Edith Vorderstrasse	Quintillion	X	Emmanuel Danjou	Alcatel-Lucent	X
Amyanne Pierce	Quintillion	X			
See Attached Sign In Sheet for Tikigaq Attendees and contact Information					

Minutes
<p>Elizabeth Pierce presented the attached presentation: Comments from the presentation are below:</p> <ul style="list-style-type: none"> • Company and project history <ul style="list-style-type: none"> ○ Quintillion was affiliated with Arctic Fiber and has sense taken over the company and will continue pursuing their project but now the system will run out of Alaska ○ All private investors ○ System must be done in phases and since there is already a fiber optic network in Alaska the first Phase will be done here • An attendee asked why other villages are not included, it was explained that as a privately funded project investors require a business plan to ensure they will get a return on their investment. <ul style="list-style-type: none"> ○ After the initial system is in place there may be opportunities to expand to the other villages • The fire chief brought attention to a letter that he received from Quintillion regarding requirements for a communications building and generator building, those issues will be addressed separately with him. • Reviewed future benefits for health care and lower service costs <ul style="list-style-type: none"> ○ Quintillion provides service to all providers so there is a competition among providers that leads to better options and service for their customers. • The possible risks to the system includes sabotage and earthquakes • Work in Point Hope this summer will include a HDD bore and the completion of buildings along with cable laying in the open water. • As of now these systems are lasting a minimum of 30 years • Quintillion is partnered with Alcatel who has the most reliable repeater in the industry • 150 tons is the breaking point for the cable that is being installed • The whaling captains concern regarding the schedule is the June and July hunting ooganuk and walrus (Clark Lane) <ul style="list-style-type: none"> ○ Early August is the likely timing for cable laying • Communication is the form of mitigation <ul style="list-style-type: none"> ○ Quintillion will be back after the spring whaling season for another meeting ○ If there are any questions or concerns do not hesitate to contact Quintillion • Questions / Comments <ul style="list-style-type: none"> ○ The captains are surprised at the small size of the cable ○ It would have been nice if all of the cable out there was buried but they

Minutes	
	<ul style="list-style-type: none"> ▪ The risk factor of a depth of over 60 meter water depth does not warrant a burial ▪ Another consideration is that if something were to happen the wire would need to be brought back up. ○ Cables last over 30 years ○ How do you fix a broken line? Does it have to be completely replaced? <ul style="list-style-type: none"> ▪ No, cables can be fixed with a “joint” ○ What was the driving point of this project? <ul style="list-style-type: none"> ▪ A lot of demand in the area ○ RT Casey is the contractor for the HDD drilling that will occur earlier than cable laying in the open water.

Slides of Interest	
Slide Number	Concern / Interest
N/A	N/A

Action Items	
Item	Action
1	Quintillion will be back for another community meeting after the spring whaling season
2	Quintillion will communicate with RT Casey to get the anticipated schedule for the HDD drilling and inform the Captains



Meeting Minutes					
Location:	NW Arctic Borough Assembly Chambers Kotzebue, AK			Date	February 10, 2016
Subject	City Management Meeting			Call-in #	
Attachments	Business Cards, 2 Maps				
Attendees					
Name	Company	Present	Name	Company	Present
Elizabeth Pierce	Quintillion	X	Glenn Ruckhaus	Owl Ridge	X
Edith Vorderstrasse	Quintillion	X	Emmanuel Danjou	Alcatel-Lucent	X
Amyanne Pierce	Quintillion	X	Mike Cooper	Acting City Manager	X
Randy Walker	Public Works Director	X	Grant Hildreth	City Planner	X

Minutes
<p>The presentation was not provided in this meeting. Comments from the meeting are below:</p> <ul style="list-style-type: none"> • Has a Tidelands Permit been obtained- <ul style="list-style-type: none"> ○ The HDD has already been installed • Building Permit- <ul style="list-style-type: none"> ○ This past fall utilities were located but city management is not sure if that was for this project. ○ Will additional locates be required this year? • Quintillion showed city management representatives the onshore route of the cable that is to be installed on a figure that the city provided (attached) • The city provided Quintillion with a copy of their tidelands map (attached) • City management asked what the required width will be for the utility ROW <ul style="list-style-type: none"> ○ NHTI are the design engineers and can provide this information • NHTI will be doing the remainder of the outside work and will provide a schedule and as-builts to the City • City management asked how internet service will be provided from OTZ to the consumers <ul style="list-style-type: none"> ○ That is a question for OTZ, Quintillion provides service to all providers then individual companies decide what to offer their customers • Some utility lines will need to be relocated prior to work starting • The Il de Brehat and the sister ship that will be used in cable laying have a draft of 15 meters • Can the city get the bathymetry information for the area? <ul style="list-style-type: none"> ○ Fugro did the survey and Quintillion is trying to get the raw data to submit to NOAA, which would make the raw data available to the public ○ NOAA will be back in the area this summer but their work is unknown • Quintillion contacted George Herr and sent City management's contact information and questions <ul style="list-style-type: none"> ○ George will be contacting them to set up a call to answer their questions • All three people in the meeting and Derek Martin (City Manager) will be added to the Owl Ridge list of people interested in receiving daily reports • The planning commissioner chairman Sandy Huss will be attending the community meeting

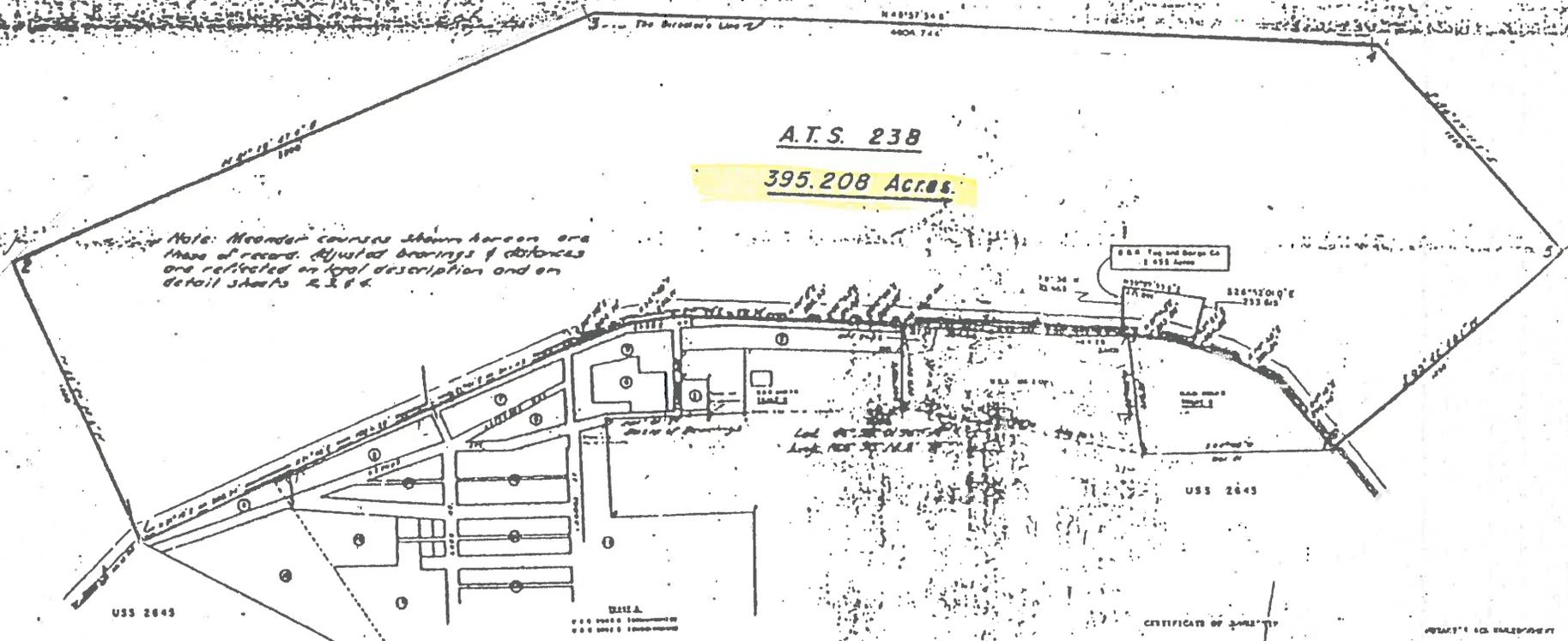
Slides of Interest	
Slide Number	Concern / Interest
N/A	The presentation was not given during this meeting.

Action Items	
Item	Action
1	Quintillion will follow up with NHTI to make sure information for a building permit is supplied to NWAB
2	Quintillion will get the width of the utility ROW from NHTI
3	NHTI will provide a schedule and as-builts to the City
4	Owl Ridge will send out regular updates/schedule of activities to the meeting attendees and Derek Martin

TIDE

Kotzebue

Sound



TOWNSITE OF KOTZEBUE

CERTIFICATE OF CORRECTION
The City of Kotzebue hereby certifies that it is the legal claimant of the tide and submerged lands shown hereon, and that the plat of survey is hereby approved by act of the City Council.

STATE OF ALASKA
This is to certify that on the 23rd day of February 2016 before me, the undersigned, a Notary Public in and for the State of Alaska, personally appeared _____ and _____ known to me to be the Mayor and City Clerk of the City of Kotzebue, Alaska, and that they acknowledged the contents of the foregoing plat of survey to be their act and deed.

CERTIFICATE OF CORRECTION
The City of Kotzebue hereby certifies that it is the legal claimant of the tide and submerged lands shown hereon, and that the plat of survey is hereby approved by act of the City Council.

NOTARY PUBLIC

Notary Public in and for the State of Alaska

WITNESSES

City Clerk and Mayor

DEED

For the City of Kotzebue



Meeting Minutes					
Location:	NW Arctic Borough Assembly Chambers Kotzebue, AK			Date	February 10, 2016
Subject	Community Informational Meeting			Call-in #	
Attachments					
Attendees					
Name	Company	Present	Name	Company	Present
Elizabeth Pierce	Quintillion	X	Glenn Ruckhaus	Owl Ridge	X
Edith Vorderstrasse	Quintillion	X	Emmanuel Danjou	Alcatel-Lucent	X
Amyanne Pierce	Quintillion	X			
See Attached Sign In Sheet for NWAB Community Attendees and Contact Information					

Minutes
<p>Elizabeth Pierce presented the attached presentation: Comments from the presentation are below:</p> <ul style="list-style-type: none"> • Audience stated that the commercial fishing was conducted before and well outside of the fiber optic line installation. All Fishing is set net from shore, no conflicts with fishing activity • From the start of open water until freeze up, there are boats, fuel barges, and supply barges constantly active in the Bay. The cable lay vessels will not be noticed and are minimal addition to the usual maritime activity. • Audience do not identify any potential subsistence conflicts. They are anxious to see the fiber optic cable installed and available in the community

Slides of Interest	
Slide Number	Concern / Interest
N/A	N/A

Action Items	
Item	Action
1	No Action Items were Identified



Meeting Minutes					
Location:	Kotzebue, AK			Date	February 10, 2016
Subject	Maniilaq Meeting			Call-in #	
Attachments	Business Cards				
Attendees					
Name	Company	Present	Name	Company	Present
Elizabeth Pierce	Quintillion	X	Glenn Ruckhaus	Owl Ridge	X
Edith Vorderstrasse	Quintillion	X	Emmanuel Danjou	Alcatel-Lucent	X
Amyanne Pierce	Quintillion	X	Charlie Nelson	Tribal Government Administrator	X
Cyrus Harris	Beluga Commission Ice Seal Commission Migratory Bird Hunter Support - W. Arctic Caribou	X	Timothy Schuerch	President/CEO	X
Todd ?		X	Tom ?		X

Minutes
<p>Elizabeth Pierce presented the attached presentation: Comments from the presentation are below:</p> <ul style="list-style-type: none"> • Attendees would all like to be added to the Daily and weekly distribution lists • The attendees recognize that there is a need for high speed, low latency service in all of the villages to meet demands of eHealth systems • Commercial fishing begins in July and goes until the third week in August <ul style="list-style-type: none"> ○ 30 to 50 commercial fisherman participate • Kotzebue Sound Fisherman Association should be consulted regarding commercial fishing in the area • Seals arrive when salmon do • Send contact information to Charlie

Slides of Interest	
Slide Number	Concern / Interest
N/A	N/A

Action Items	
Item	Action
1	Members of Maniilaq will be added to the project distribution lists
2	Kotzebue Sound Fisherman Association should be contacted
3	Contact information should be sent to Charlie ???



Meeting Minutes					
Location:	NW Arctic Borough			Date	February 10, 2016
Subject	Met with Mayor's Chief of Staff and Director of Economic Development			Call-in #	
Attachments	Eugene Smith's Business Card				
Attendees					
Name	Company	Present	Name	Company	Present
Elizabeth Pierce	Quintillion	X	Glenn Ruckhaus	Owl Ridge	X
Edith Vorderstrasse	Quintillion	X	Emmanuel Danjou	Alcatel-Lucent	X
Amyanne Pierce	Quintillion	X	Eugene Smith	Chief of Staff	X
Kathy McConnell	Director of Economic Development	X			

Minutes
<ul style="list-style-type: none"> • Quintillion provides service to all providers but has no control over them • NOTAMS <ul style="list-style-type: none"> ○ The NWAB has nonconventional traffic notifications ○ Contact NAB to get VHS Notifications • A local liaison will be hired to assist in communication <ul style="list-style-type: none"> ○ Kathy McConnell can assist with candidates for the position • The mayor's office would like to know what they can do to help and insure this project happens

Slides of Interest	
Slide Number	Concern / Interest
N/A	No slides were identified in the meeting notes

Action Items	
Item	Action
1	Quintillion will contact NAB to get VHS notifications
2	Quintillion to coordinate with Kathy McConnell on candidates for local liaison



Meeting Minutes					
Location:	Nome, AK			Date	February 11, 2016
Subject	Quintillion Project Presentation			Call-in #	
Attachments	Kawerak Pamphlet provided by Kawerak				
Attendees					
Name	Company	Present	Name	Company	Present
Elizabeth Pierce	Quintillion	X	Glenn Ruckhaus	Owl Ridge	X
Edith Vorderstrasse	Quintillion	X	Emmanuel Danjou	Alcatel-Lucent	X
Amyanne Pierce	Quintillion	X			
See Attached Sign In Sheet for Kawerak Attendees and Contact Information					

Minutes
<p>Elizabeth Pierce presented the attached presentation: Comments from the presentation are below:</p> <p>Attendees questioned the route of Tokyo to London why it is part of the program</p> <ul style="list-style-type: none"> ○ Currently insufficient capacity in the US ○ The route allows for quicker installation ○ Fewer hand-offs ○ Allows traffic without going through the US (NSA) <ul style="list-style-type: none"> ● There is a possible conflict between Phase 2 of the project and the Pollock fishery ● Whaling in Nome is completed in April, there won't be any conflicts with the late June project start date. ● There is a fall whaling season for beluga ● Attendees recommended that the Alaska waterfowl co-management group be included in consultations ● Share the cable laying plan with ADNR and local mining associations so that they know where it is located and can verify there aren't any conflicts <ul style="list-style-type: none"> ○ There is a miners meeting in Nome that may be good to attend to explain QSN activities ○ Contact AMA regarding placer mining, Blake Bogart is the Section Chairman ○ Blake Bogart – [REDACTED]

Slides of Interest	
Slide Number	Concern / Interest
N/A	N/A

Action Items	
Item	Action
1	Quintillion coordinate meetings with local mining associations

Our Mission: To assist, promote and provide programs and services to improve the social, economic, educational, cultural and governmental self-sufficiency for the betterment of the Native people within the region; to preserve the traditional culture, languages and values.

Our Core Purpose: To work together to achieve the highest quality of life in partnership with our tribal members and communities while living and celebrating our Native cultures.

Our Goals:

1. Strengthen culture, wellness and pride.
2. Diversify and enhance regional economies.
3. Enhance tribal and organization effectiveness.
4. Develop community infrastructure.
5. Protect, enhance and control our resources.

The Board of Directors decided when our vision was accomplished we would have strong, healthy, proud, caring, unified, pro-active, self-sufficient Native people, leaders and communities who know where we are going and who will take necessary steps to achieve it.

We will live and transmit our language and culture to our children, with councils actively governing at the local level and cooperating at the regional level to make life better for our people.

This is what being a true Inupiaq, St. Lawrence Island Yupik & Central Yup'ik means.



PO Box 948
504 Seppala Street
Nome, Alaska 99762

Phone (907)443-5231
Fax (907)443-4452
www.kawerak.org

1march 2014

KAWERAK, INC.

established 1973



An overview of programs
and services for the people
of the Bering Strait region.



Our Vision:

Building on the inherent strength of our cultural values, we shall assist our tribes and residents to create a positive future.

In keeping with our vision statement Kawerak is moving from a direct service provider to a provider of training and technical assistance with six divisions:

CHILDREN & FAMILY SERVICES
COMMUNITY SERVICES
EDUCATION, EMPLOYMENT & TRAINING

NATURAL RESOURCES
TRANSPORTATION
ADMINISTRATION

CHILDREN & FAMILY SERVICES DIVISION

The CFS Division provides services to address the needs of children and families. To learn more call: 907-443-4247.

Children & Family Services Program Tribal Family Coordinators within participating villages assist with ICWA cases and workers in Nome help families in identifying needs and to connect them with necessary and appropriate services to help restore and maintain family preservation. To learn more call: 800-478-5153 or 443-4352.

Child Advocacy Center operates a child-friendly, culturally-respectful place where caring professionals work together in one location, to help children and families cope with sexual abuse, severe physical abuse and exposure to violence. To learn more call: 907-443-4379.

Head Start Program is a pre-school program that promotes social competence and structure among 3 & 4 year old children. Services are provided in Nome and 12 village sites. Strong parental involvement, health and social services are primary components of Head Start's well-rounded program. To learn more call: 800-443-9050.

Wellness Program's focus is to restore a culture of wellness through promotion of healthy living, development of wellness courts, education and prevention. To learn more call: 907-443-4325.

COMMUNITY SERVICES DIVISION

The Community Services Division (CSD) provides technical assistance and services to build on tribal capacity, ensuring public safety and working with communities to improve their infrastructure, community's services, economic and social conditions. To learn more call: 877-219-2599 for all CSD Programs or 443-4246.

Tribal Affairs Program assists tribal councils in exercising self-governance and provides training and technical assistance, for 18 of the 20 federally-recognized tribes. This includes passing thru funds and helping to ensure the funds for these programs are properly maintained. Call: 907-443-4257.

Community Planning and Development Program provides training and technical assistance such as: business start-up and expansion, economic development planning, project implementation, grant writing assistance, energy planning and e-commerce support. To learn more call: 877-219-2599 or 443-4248.

Village Public Safety Officer Program provides community public safety, law enforcement, search and rescue, emergency services, probation/parole and fire fighting programs for up to 15 communities. To learn more call:443-4252.

EDUCATION, EMPLOYMENT & TRAINING DIVISION

The EET Division provides support and assistance to tribal members who are pursuing employment opportunities or who are continuing their education. Call: 800-450-4341 or 443-4358.

Child Care Services provides financial assistance for child care to tribal members who are employed, seeking work, attending training, enrolled in educational programs, or participating in treatment programs. CCS also runs the Uivilat Play & Learn Center in Nome, and provides technical assistance to home care providers in the region. To learn more call: 866-283-2273.

Community Education Program provides Adult Basic Education (ABE) services to residents throughout the Bering Strait Region. Services include remediation in reading, writing, and math, General Educational Development (GED) preparation and guidance to students enrolled and English as a Second Language (ESL) to the immigrant population in Nome. We also administer the Test of Adult Basic Education (TABE) by appointment. Our staff is located at the UAF Northwest Campus in Nome. To learn more call toll free: 800-478-7574 or (907)443-4467/4468/4469/4470.

Employment and Training Program services include career development, employability skills, and subsidized work activities for youth, grants for tribal members attending training programs and college, financial assistance for persons who have obtained or are seeking work, and Tribal Employment Rights Ordinance (TERO) advocacy. Village-based training programs are also offered throughout the Bering Strait region as funding permits. To learn more call: 800-450-4341 or 443-4358.

Tribal Welfare Assistance Department has three Welfare assistance programs which include: General Assistance-food clothing & shelter; Burial Assistance-assists in purchasing a casket; Emergency Assistance which helps during a flood/fire damage, those who have suffered damage to personal possessions. We provide temporary assistance to income-eligible tribal members who reside in one of our service areas. Call 1.800.478.5230 or 443.4370 for more info.

Vocational Rehabilitation Program provides vocational guidance and services to individuals who have disabilities that are barriers to employment. Services to eligible participants may include, but are not limited to, specialized training or education to improve job-related skills, assistive technology and/or assessments. All services are provided on an individualized basis. Call 877-759-4362 or 443-4362 for more information.

NATURAL RESOURCES DIVISION

The Natural Resources Division conducts research and provides services relating to natural resources including land, fish, land mammals, marine mammals and birds in the Bering Strait region. Through advocacy and education, they strive to protect tribal members' access to these resources and assure that future use and harvests are sustained and promoted. To learn more call: 907-443-4377.

Eskimo Heritage Program (EHP) was created in 1981. Local Native fieldworkers were hired in six communities to document and record Elders. Since the 80's, the EHP collection has increased and work continues to index, transcribe and translate files. Staff are digitizing the entire collection, to make the collection more accessible for education and public use. To learn more call: 907-443-4386.

Eskimo Walrus Commission - Created in 1978 by Kawerak, the Eskimo Walrus Commission (EWC) represents Alaska's coastal walrus hunting communities from Barrow to Dillingham. EWC works on resource co-management issues. Walrus is a primary resource for Alaska Natives, providing meat for sustenance; ivory and bone for handcrafts/artwork and the hide is used to make skin boats. To learn more call: 877-277-4392 or 443-4380.

Land Management Services provides technical assistance to owners and heirs of Native allotments and restricted town site lots. Services include: property sales, gift deeding, leasing and permitting, contracting for BLM survey, title recovery, mortgages, BLM adjudication information, removal of restrictions, resolving trespass settlements, granting rights-of-way, probating restricted estates, wills, forestry, fire suppression and environmental consulting. To learn more call: 800-443-4316 or 443-4327.

Reindeer Herders Association provides assistance to its twenty-one members, who own reindeer herds on the Seward Peninsula, in the development of a viable reindeer industry, to enhance the economic base for rural Alaska and to improve the management of the herds. To learn more call: 907-443-4378.

Subsistence Resources Program conducts research on resources use, and advocates on behalf of subsistence users for the protection of the customary and traditional harvest of all resources. The program also provides information on subsistence uses to state and federal programs in support of proposals and projects which will result in improved management of subsistence resources. To learn more call: 907-443-4265.

Social Science staff work with communities to document local and traditional knowledge about resources, environment and culture. This program also advocates for protections of subsistence rights and for the inclusion of local and traditional knowledge in resource management and policy making. To learn more call: 907-443-4273.

TRANSPORTATION

Transportation provides comprehensive transportation services including: project planning; infrastructure coordination; construction and construction management of transportation projects. To learn more call: 907-443-4395.

ADMINISTRATION DIVISION oversees operations, develops strategic actions and works with the Kawerak Board to insure tribal input and direction to Kawerak services. The administration division supports the other five divisions of Kawerak with the following services: Accounting, Human Resources, Information Technology, Legal Services and Planning.

Beringia Center of Culture & Science coordinates traveling exhibits, cares for cultural collections and plans a future museum and cultural center to preserve, promote and celebrate the cultures of the Bering Strait Region. To learn more call: 907-443-4340

**LIST OF FEDERALLY RECOGNIZED TRIBES
IN THE BERING STRAIT REGION**

Chinik Eskimo Community (aka Golovin)	779-2214
King Island Native Community	443-5494
Native Village of Brevig Mission	642-4301
Native Village of Council	443-7649
Native Village of Diomedea (aka Inalik)	686-2175
Native Village of Elim	890-3737
Native Village of Gambell	985-5346
Native Village of Koyuk	963-3651
Native Village of Mary's Igloo	642-3731
Native Village of Saint Michael	923-2304
Native Village of Savoonga	984-6414
Native Village of Shaktoolik	955-3701
Native Village of Shishmaref	649-3821
Native Village of Teller	642-3381
Native Village of Unalakleet	624-3622
Native Village of Wales	664-2185
Native Village of White Mountain	638-3651
Nome Eskimo Community	443-2246
Stebbins Community Association	934-3561
Village of Solomon	443-4985



Meeting Minutes					
Location:	Nome, AK	Date	February 11, 2016		
Subject	Community Informational Meeting	Call-in #			
Attachments					
Attendees					
Name	Company	Present	Name	Company	Present
Elizabeth Pierce	Quintillion	X	Glenn Ruckhaus	Owl Ridge	X
Edith Vorderstrasse	Quintillion	X	Emmanuel Danjou	Alcatel-Lucent	X
Amyanne Pierce	Quintillion	X			
See Attached Sign In Sheet for Nome Community Attendees and Contact Information					

Minutes
<ul style="list-style-type: none"> • Will Fairbanks have faster internet? • What kind of on-shore work can be expected? <ul style="list-style-type: none"> ○ Roads will be torn up a little bit as is typically seen with normal utility work • The service is expected to be turned on this time next year • The attendees were concerned about commercial, cost and competition issues <ul style="list-style-type: none"> ○ Quintillion explained that if the market does not react to the new service they reserve the right to re-enter the retail market • Does the State's budget woes affect the business case for this project? <ul style="list-style-type: none"> ○ no • Phase 1-b will consist of connecting other terrestrial villages • Planning for Phase 2 is already under way

Slides of Interest	
Slide Number	Concern / Interest
N/A	N/A

Action Items	
Item	Action
1	May 6 th will be an AMA Nome branch meeting



Meeting Minutes					
Location:	Anchorage, AK			Date	February 24, 2016
Subject	Quintillion Cable Laying Project			Call-in #	
Attachments					
Attendees					
Name	Company	Present	Name	Company	Present
Glenn Ruckhaus	Owl Ridge NRC	X	Isaac Nukapiak	Kuukpik	X
Lanston Chinn	Kuukpik	X	Andy Mack	PT Capital	X

Minutes
<p>Glenn Ruckhaus had a lunch meeting with the Leadership from Kuukpik Corporation from the village of Nuiqsut: Comments from the meeting are below:</p> <ul style="list-style-type: none"> • There was concern that installation of the fiber-optic cable would interfere with the migration of white fish to the Colville Delta at a time when people are fishing • Seal hunting occurs in June and July in the Delta and out to Thetis Island • The best time for Quintillion to install the Oliktok section is the month of August • They recommend meeting with the Trilateral Committee the consist of Kuupik Corporation (Isaac Nukapiak), City of Nuiqsut (Thomas Nupagiak Jr.), and Native Village of Nuiqsut (Martha Itta) but their calendar is full through March and probably not available until sometime in April • They recommend having the fundamental business plan for delivering fiber optic to Nuiqsut firmed up before meeting with the Trilateral Commission, if they want it to go smoothly

Action Items	
Item	Action
1	N/A