NIRB Uuktuutinga Ihivriuqhikhamut #125653

Movement and habitat use of anadromous Arctic Char (Salvelinus alpinus) and Dolly Varden (Salvelinus malma) near Kugluktuk, Nunavut

Uuktuutinga Qanurittuq: New

Havaap Qanurittunia: Scientific Research

Uuktuutinga Ublua: 2/3/2022 9:44:39 AM

Period of operation: from 0001-01-01 to 0001-01-01

Piumayaat Angirutinga: from 0001-01-01 to 0001-01-01

Havauhikhaq Ikayuqtinga: Swanson Lab
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Canada
Hivayautit Nampanga:: 9023172992, Kayumiktukkut Nampanga::

QANURITTUT

Tukihiannaqtunik havaariyauyumayumik uqauhiuyun

Qablunaatitut: Char is a key source of food for Inuit communities, and the Coppermine River supports an important subsistence char fishery for the community of Kugluktuk. The Kugluktuk Hunters and Trappers Organization (HTO) and community members have observed a decline in the fall run of migratory char, as well as changes in migration timing and locations. However, neither local fishers nor scientists know where char spawn and overwinter and the influence of climate on char migration is unknown. In 2017, to address these concerns and questions, the Swanson Lab at the University of Waterloo began a collaborative project with the Kugluktuk HTO and Fisheries and Oceans Canada, to study the migration patterns and overwintering habitat of Arctic char. In 2018 and 2019, we tagged 165 Arctic Char. Fish were caught by gill netting (checked every hour to minimize fish injury and mortalities) and angling. Tags that send out an acoustic signal were surgically implanted into fish. During the surgery, fish were immobilized with a TENS machine, which is commonly used in physiotherapy to relieve pain. Fish recover instantly when the TENS machine is turned off, so it is much faster than sedating fish using chemicals. We also do not use chemicals so fish can be safely consumed if they are caught by humans or wildlife when they are released. We installed acoustic receivers, which record when tagged fish pass by and provide information on the timing and location of char migration. Receivers were installed in the Coppermine River and the Coronation Gulf. We made anchors for the receivers by drilling holes in large rocks (at least 50 lbs) and adding metal anchor bolts. We used rocks instead of concrete to use natural materials whenever possible. The study revealed lots of interesting fish behaviour, which led to new questions from the community. To continue our research and answer these new questions, we propose to tag another 150 char using acoustic tags. Our study area is currently the Coppermine, Rae, Richardson, and Kugaryuak Rivers, as well as the nearby Coronation Gulf. We propose to add the Tree River, Nulahugyuk Creek (Bernard Harbour), Nakyoktok River (Richardson Islands), and Kimikyoak River (Reid Island) to the study area. The batteries in the new tags last for 10 years, so we propose to extend the project and deploy 75 acoustic receivers until 2032. Receivers will be checked twice a year to retrieve the data and make sure they are working properly. We will use the same methods that we used in the early years of the project, which have been approved by the Kugluktuk HTO and the many community members who have assisted with the project. This research project involves community members from Kugluktuk in all stages of the project, including planning, operations, assessment, and scientific publishing, and we will continue this close collaboration. The daily field crew will be four persons: 1-2 southern researchers and 2-3 community members. Most of the work will be done by small boat (16-20 feet). An ATV will be used to access sites in Kugluk Falls Territorial Park (accessed by ATV trail from Kugluktuk). A helicopter or small aircraft will be used for approximately 20 hours each year to reach remote, inland sites. For farther sites that are accessible by boat, a small temporary camp of four persons may be established for 1-2 nights each year.

Uiviititut: Not included, because project is taking place in Kugluktuk, in the Kitikmeot region.

Inuktitut: Not included, because project is taking place in Kugluktuk, in the Kitikmeot region.

Inuinnaqtun: Iqalukpiit niqautauqpiarmata Inuit nunallaanit, talvanilu Kugluktuktuup Kuugani iqaluutait ikajuutauqpiangmata inungnut niqigijauplutik. Kugluktuup Anguniaqtiit Katimajiit (HTO) iqalukhiuqtiillu ilihimaliqtut Iqaluit ikiglininga mihigihimaliqtaat ukiakhami mayuugaangata, imaalu aallanguqhutik aullaningit, ukiumi kinguvaqhutik. Kihimi, iqlukhiuqtut, nainaijaijiilli nalujut qanuqtut, humilu manningmingnik anittiliriamingnik. Huqpanilu ukiiliqpangmangaat nalujait. 2017-mi apiqqutiit tahapluat apiqhuutaujut taapkununga Swanson Naunaijiinnut Hilattuqharvingmi University Waterloo pigialiqhimajut atauttikkut havaqatigiikhugit Kugluktuk HTO, Iqalukhiuqtiit Kanatamilu, naunaijaiplutik iqalukpiit aulaningninnik, ijjuhiiniglu ukiumi.2018, 2019-mi naunaitkuhiliqtuijut 165nik iqalukpingnik. Iqaluit kuvjaqtuqhutik anguvagait, ikaarniit atauhiq aniguraangat hivuuranaittumik iqalungnut. Tahapkuat naunaitkutiit naalautiqaramik tuharnaqtut iqalungnut iluanungnaqtiqhugit, pilaqpakhugit, Iqaluit aaniqtailiplugit TENS aulajjut atuqhugu aanirnaittumik iqalungnut pilaktauvaktut. Kajumitqijaujuq havauhiqtuqhimaittumik iqalungnut, Iqaluit qilamik hakugikhiinnaqpaktut TENS machine qamitaugaangat, havauhiqtujuitavullu Iqaluit havaktavut, naakuuvaquplugit niriyauniarumik inungnit, angutinillu imarmut utiqtitaugaangata.Iliuqhaivaktugut tuharnaqtunik naalautinnuanik, nuivaktut hanitqugaangata naalautiinut angitqijarnut. Taimaa iliturivaktugut Iqaluit qanuqtut aulavangamangaata, huqpanullu tikiutiliqpangmangaata imakut. Naalautiqarviit

tunngaviit iliuqtaubaktut Kugluktup kuugaani, Coronation Gulfmullu. Kihaqtauplutik hiamihimaplutik ikuutaqhimajunik uyaqqanut 50 nik uqumailitaqaqtunik. Uqumailitait tikhiqtailiplugit kivihimavaktut uyaqqanik atuqhutik taima nunamiutanik atulluaqhutik.Naunaijaijaut ilitturipkaihimajuq amihunik ilihimajakhaptingnik iqalukpiit mikhaanut, aahiittauq apiqqutikhanik nutaanik apiqhipkaiplutik nunallaangani inungnit. Taima, hivumuuriami naunaijainikkut huli 150 nik iqalukpingnik naunaituhiqhijumajugut naalautiliqtuifaarmiluta. Naunaiyaivigijumajaqqut Kugluktuk, Paaliq, Kuungnahiq, Kuugarjuaq Kuugait, tahamnilu Coronation Imautaani. Haniqpanilu Qurluqtualungmi, Nulahugjuk Kugalaanga (Bernard Harbour) Nakjuktuut Kugaa (Richardson River), taamnalu Klmiqjuaq Kugaa (Read Island) naunaijaivigijumaplugit. Battuliingnit tahapkuat naalautinit nakuujut qullinut (10) ukiunut, talva ihumavivaqqut naunaijainiq aulaninga tikittaaqtuq ilaliutiluta 75 nik 20320mut, tahapkuat naaualitait malruitturlugit ukiumi ihivriuqpangniaqtavut aulaningnit naamagiakhaita, Taimat atuqpaktavut atuqhimaarlugit naunaijaihimaarumajugut. Tahapkuat naamagijaujut Kugluktup Anguniaqtiit Katimajiinnit (HTO) inungnillu amihunit.Hamna naunaijaijaut ilaliutiqaqtuq inungnik havaqatigiiktunik Kugluktukmiutanik tamainni hulijjutaujuni, ihumaliuqatigiikhutik, hannaijaqatgiikhutik, aullaningnik, ihivriuqhinikkut, nalunaqtuniglu iliturijamingnik tuhaqtitiplutik, taima hivumut havaqatigiigumainnaqtut. Ubluq tamaat hitamauplutik pivaktut: 1-2 naunaijaijiujunik, 2-3 Kugluktukturmiutanik. Havakpaktut qayaqtuqhutiik 16-20 ft aktilaangalingnik qayarnik. ATV-kuttauq qurluliaraangata. Qulimirruurutikkullu, Tingmitikkulu aullaaqpakhutik ungahiktuliaraangata, nunamulu naunaijaijaqturaangata, Ilaani taangmaataqpaktut hitamauplutik, hiniktariamingni 1-2 upluniktauq, ukiuq tamaat.

Personnel

Personnel on site: 4
Days on site: 600
Total Person days: 2400
Operations Phase: from 2018-07-01 to 2032-10-01

Hulilukaarutit

Inigiya	Hulilukaarut Qanurittuq	Nunannga Qanurittaakhaanik	Initurlinga qanuritpa	Initurlinga utuqqarnitat unaluuniit Ingilraaqnitat Uyarannguqtut akhuurninnga	Qanitqiyauyuq qanitqiamut nunallaat kitulluuniit ahiruqtailiyainnit nuna
Rae and Richardson Rivers study area	Researching	Inuit Owned Sub-Surface Lands	Habitat for char, harvested in subsistence char fishery. Acoustic receivers will be located in this area, and char may be captured for tagging.	No known archaeological sites. If cultural sites are observed on shore, these areas will be avoided.	Study sites will be approximately 30-50 km from the community of Kugluktuk. Study sites will be accessed by boat.
Coppermine River study area	Researching	Inuit Owned Sub-Surface Lands	Location of subsistence char fishery. Acoustic receivers will be located in this area, and char will be captured for tagging.	Many archaelogical sites are known along the Coppermine River and in Kuguk Territorial Park. Cultural sites will be avoided during research activities.	Study sites will extend from the community of Kugluktuk, to approximately 100 km away along the Coppermine River. Study sites will be accessed by boat up to Kugluk Falls, or ATV at Kugluk Falls following an established route, or helicopter above Kugluk Falls.
Kugaryuak River study area	Researching	Inuit Owned Surface Lands	Habitat for char, harvested in subsistence char fishery. Acoustic receivers will be located in this area and char may be captured for tagging. A temporary camp may be established within the bear fence for 1-2 nights per year.	No known archaelogical sites. If cultural sites are observed on shore, these areas will be avoided.	Study sites will be approximately 80-100 km from the community of Kugluktuk. Access will be by boat.
Coronation Gulf study area	Researching	Marine	Summer feeding location for char, harvested in local subsistence char fishery. Acoustic receivers will be located in	No known archaeological sites. If cultural sites are observed on shore, these areas will be avoided.	Bordering the community of Kugluktuk.

			this area, and char will be captured for tagging.		
Nakyoktok River, Richardson Islands study area	Researching	Inuit Owned Surface Lands	Habitat for char, harvested by some community members. Char may be captured for tagging, and acoustic receivers will be located in this area if any char are tagged. A temporary camp may be established within the bear fence for 1-2 nights per year.	No known archaeological sites. If cultural sites are observed on shore, these areas will be avoided.	Study sites will be approximately 200 km from Kugluktuk. Access will be by boat.
Nulahugyuk Creek, Bernard Harbour study area	Researching	Inuit Owned Surface Lands	Habitat for char, harvested by some community members. River restoration activities were conducted here until 2019 by the Kugluktuk HTO and Golder Associates, to make the stream channel more accessible to migrating char. Char may be captured for tagging, and acoustic receivers will be located in this area if char are tagged.	No known archaeological sites. If cultural sites are observed on shore, these areas will be avoided.	Study sites will be approximately 100 km from Kugluktuk. Access will be by boat, with the potential for access to the upstream lake by ATV, following the route used during past restoration activities.
Kimikyoak River, Read Island study area	Researching	Inuit Owned Surface Lands	Habitat for char, harvested by some community members. River restoration activities were	Former site of small community, but no known archaeological sites. If cultural sites are observed on shore, these areas will be	Study sites will be approximately 175 km from Kugluktuk, and will be accessed by boat.

			conducted here in the past by private community members, to make the stream channel more accessible to migrating char. Char may be captured for tagging, and acoustic receivers will be located in this area if char are tagged. A temporary camp may be established 1-2 nights per year.	avoided.	
Tree River study area	Researching	Inuit Owned Surface Lands	Habitat for char, harvested by community members from Kugluktuk and Cambridge Bay. Char will be captured for tagging and acoustic receivers will be located in this area. A temporary camp may be established at the former guide camp for Plummer's Lodge, for 1-2 nights per year.	Former site of small community, but no known archaeological sites. If cultural sites are observed on shore, these areas will be avoided.	Study sites will be approximately 135 km from the community of Kugluktuk. Access will be by boat.

Nunaliin Ilauyun, Aviktuqhimayuniitunullu Ikayuuhiarunguyun

Nunauyuq	Atia	Timiuyuq	Upluani Uqaqatigiyaungmata
Kugluktuk	Amanda Dumond	Kugluktuk Hunters and Trappers Organization	2021-12-02
Kugluktuk	Amanda Dumond	Kugluktuk Hunters and Trappers Organization	2020-01-29
Kugluktuk	Amanda Dumond	Kugluktuk Hunters and Trappers Organization	2019-03-20
Kugluktuk	Amanda Dumond	Kugluktuk Hunters and Trappers Organization	2017-03-20

Angiuttauvaktunik

Naunaiqlugu nunanga talvani havauhikhaq ittuq:

Kitikmeot

Angiuttauvaktunik

Munariniqmut Ayuittiaqtuq	Angirutinga Qanurittuq	Tadja Qanurittaakhaanik	Ublua Tuniyauyuq/Uuktuqtuq	Umikvikhaa Ublua
Kitikmeot Inuit Katimayiingit	Certificate of Exemption to access Inuit Owned Land	Active	2021-09-07	2022-10-01
Alaanut	University of Waterloo Animal Care Committee - Animal Use Protocol	Applied, Decision Pending		
Iqalukhiurniqmut Tariuqmilu Kaanata	Licence to Fish for Scientific Purposes	Not Yet Applied		
Nunavunmi Ihivriuqniqmut Timiqutigiyanga	NRI indicated that a Nunavut scientific research license is not required for fish tagging and tracking projects.	Not Yet Applied		

Project transportation types

Transportation Type	Qanuq Atuqtauniarmangaa	Length of Use
Air	Helicopter transportation to remote inland study sites	
Water	Transport in small boats (16-20 feet) to study sites	
Land	ATV along established trails	

Project accomodation types

Temporary Camp

Nunauyuq

Ihuaqutivaluin Atuqtauyukhan

Hanalrutit atuqtaunahuat (ukuallu ikuutat, pampiutainnik, tingmitinik, akhaluutinik, hunaluuniit)

Hanalrutit Qanurittuq	Qaffiuyut	Aktikkulaanga – Qanurittullu	Qanuq Atuqtauniarmangaa
Helicopter	1	A-star	Helicopter will be used for field transport to remote locations. It is anticipated that a maximum of 20 helicopter hours will be used per year.
ATV	1	Utility, 2-Up	An ATV will be rented for transport to accessible research sites near Kugluktuk.
Pick-up truck	1	4x4	A pick-up truck will be rented in Kugluktuk for transport of researchers and gear between the airport, town, and staging areas.
Boat	2	16-20 feet	Access study sites
V16 acoustic transmitter tags	150	16 mm x 54 mm	These acoustic tags will be implanted into char, allowing them to be tracked when in range of the acoustic receivers
VR2AR acoustic release receiver	75	40 cm x 8 cm x 8 cm	Receivers will be deployed year-round to detect transmissions from tagged fish
VR2Tx acoustic receiver	14	30 cm x 7 cm x 7 cm	These receivers will be deployed during the summers to detect transmissions from tagged fish

Qanurittuq Urhuqyuaq unalu Qayangnaqtut Hunavaluit Aturninnga

Qanurittuq urhuqyuaq hunavaluit aturninnga:	Urhuqyuaq Qanurittuq	Qaffiuyut qattaryut	Qattaryuk Aktikkulaanga	Atauttimut Qaffiuyut	Ilanga	Qanuq Atuqtauniarmangaa
Aviation fuel	fuel	30	200	6000	Liters	For contracted A-star helicopter. All fuel will be stored at the Kugluktuk airport. No fuel will be cached.
None	hazardous	0	0	0	Kg	No hazardous materials or chemicals will be used for this research project.
Gasoline	fuel	1	400	400	Liters	For boats, rented truck, and ATV. All fueling will be done in Kugluktuk when possible.
Gasoline	fuel	4	20	80	Liters	Jerry cans of fuel for rented boats and ATV. For emergency refueling.
White gas	fuel	10	4	40	Liters	Coleman stoves for overnight camping

Imaqmik Aturninnga

Ubluq qanuraaluk (m3)	Aturumayain imavaluin utiqtittagaani qanuq	Atulirumayain imavaluin utiqtittagani humi
1	Water will be retrieved by hand-filling jugs from nearby streams. A maximum of 1 m3/day will be retrieved for the 1-7 days each year when personnel will be camping overnight while deploying equipment.	Tree River, Nulahugyuk Creek, Nakyoktok River, Kimikyoak River, Kugaryuak River

Iqqakuq

Ikkakunik Munakgiyauyunik

Havauhikhaq Hulilukaarut	Qanurittuq Iqqakut	Ihumagiyauyuq Qanuraaluktut Atuqtait	Qanuq Iqqakuurniarmangaa	Halummaqtirarnirutikhan piyutin
Researching	Ikulalaaqtun iqqakuuvaluin	75/year	Recycling	Lithium batteries will be transported to Waterloo, where they will be recycled appropriately
Camp	Qirnarivyaktuq imaq	< 1 m3/year	Kugluktuk facilities	Food particles will be filtered out and transported to Kugluktuk for disposal at Hamlet facilities. Filtered greywater will be poured into shallow pit, > 100 m away from any water bodies.
Camp	Anaagun (inuin anaaguin)	< 1 m3/year	Kugluktuk facilities	Human waste will be transported to Kugluktuk for disposal at Hamlet facilities.

Avatiliriniqmut Ayurhautingit:

Transportation by ATV will only occur on hard-packed substrate and established trails, so minimal damage to wetlands and vegetation will occur. Travel overland will avoid cultural and archaeological sites. All fueling will be done away from water sources. All project activities will be conducted with minimal impacts to large mammals (terrestrial and marine). Wildlife will not be approached and participants will leave the area if wildlife show signs of being disturbed by human presence and/or project activities. Spawning habitat will be avoided. Receivers will be anchored using rocks, to minimize the amount of artificial materials. Equipment will be retrieved and checked for damage each year, to minimize the potential for equipment loss and unintentional littering.

Additional Information

SECTION A1: Project Info

SECTION A2: Allweather Road

SECTION A3: Winter Road

SECTION B1: Project Info

SECTION B2: Exploration Activity

SECTION B3: Geosciences

SECTION B4: Drilling

SECTION B5: Stripping

SECTION B6: Underground Activity

SECTION B7: Waste Rock

SECTION B8: Stockpiles

SECTION B9: Mine Development

SECTION B10: Geology

SECTION B11: Mine

SECTION B12: Mill

SECTION C1: Pits

SECTION D1: Facility

SECTION D2: Facility Construction

SECTION D3: Facility Operation

SECTION D4: Vessel Use

SECTION E1: Offshore Survey

SECTION E2: Nearshore Survey

SECTION E3: Vessel Use

SECTION F1: Site Cleanup

SECTION G1: Well Authorization

SECTION G2: Onland Exploration

SECTION G3: Offshore Exploration

SECTION G4: Rig

SECTION H1: Vessel Use

SECTION H2: Disposal At Sea

SECTION I1: Municipal Development

Qanurittuq Ittunik Avatinga: Avatingalluanga

An established road and ATV trail exists from Kugluktuk to Kugluk Territorial Park. An ATV trail also exists at Nulahugyuk Creek. Cabins and camps are located at all study locations and are used for hunting and fishing by community members.

Qanurittuq Ittunik Avatinga: Inuuhimayunut Avatinga

Arctic char migrate through all rivers and marine environments in the study area. Other wildlife, including caribou, muskox, wolves, and grizzly bears are also observed throughout the study area.

Qanurittuq Ittunik Avatinga: Inungit-maniliurutingit Avatinga

Community members from Kugluktuk use all locations in the study area for recreation, as well as subsistence hunting and fishing. Community members from Cambridge Bay also use some sites, in particular the Tree River.

Miscellaneous Project Information

Naunaiyainiq ukuninnga Ayurhautingit unalu Piumayaat Ikikliyuumiutinahuarutit

Transportation by ATV will only occur on hard-packed substrate and established trails, so minimal damage to wetlands and vegetation will occur. Travel overland will avoid cultural and archaeological sites. All fueling will be done away from water sources. All project activities will be conducted with minimal impacts to large mammals (terrestrial and marine). Wildlife will not be approached and participants will leave the area if wildlife show signs of being disturbed by human presence and/or project activities. Receivers will be anchored using rocks, to minimize the amount of artificial materials. Equipment will be retrieved and checked for damage each year, to minimize the potential for equipment loss and unintentional littering.

Tamatkiumayunik Ihuikgutivaktunik

The project is not expected to have lasting effects.

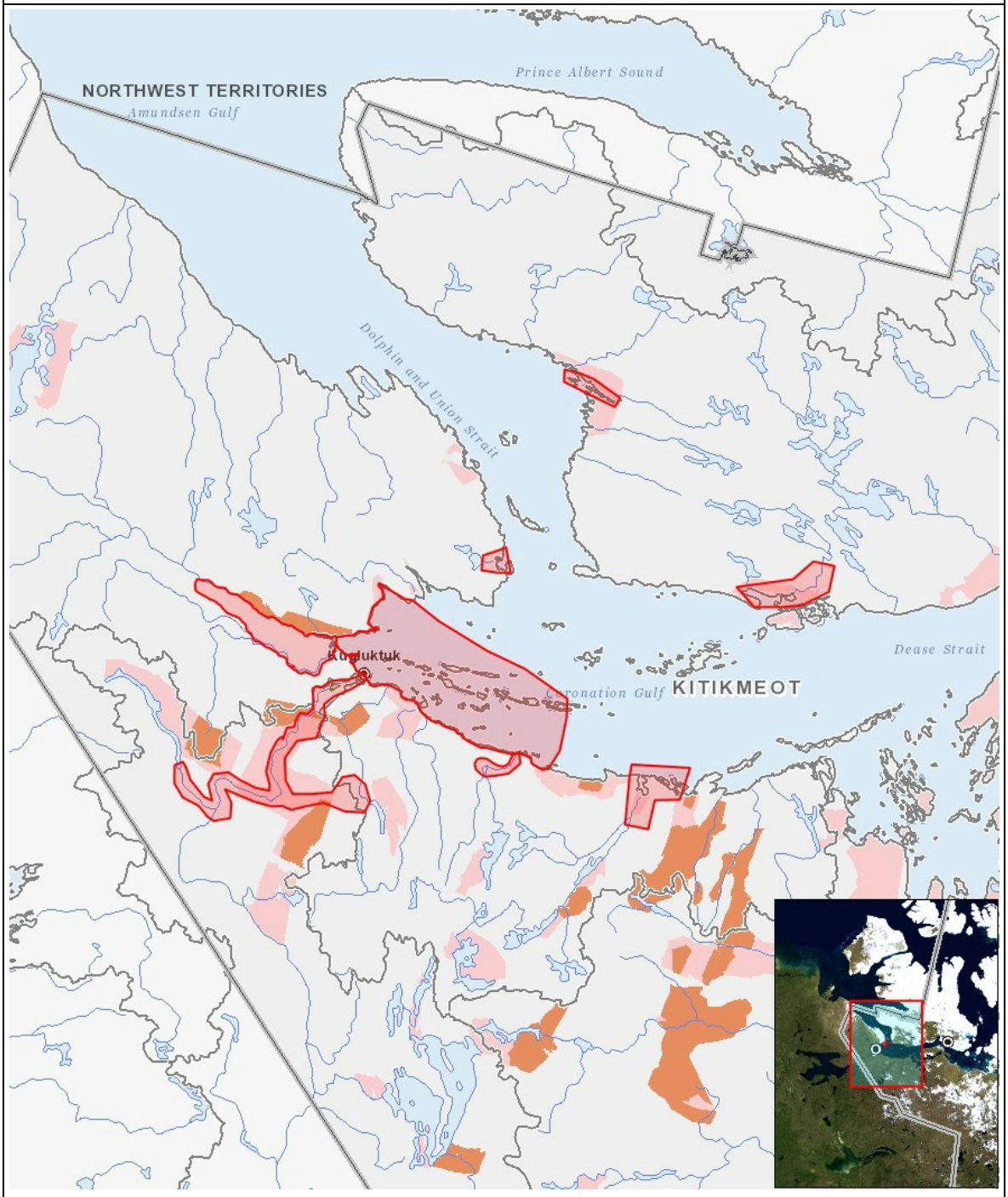
Impacts

Ilitariyauniq Avatiliriniqmut Ayurhautingit

	PHYSICAL	Designated environmental areas	Ground stability	Permafrost	Hydrology / Limnology	Water quality	Climate conditions	Eskers and other unique or fragile landscapes	Surface and bedrock geology	Sediment and soil quality	Tidal processes and bathymetry	Air quality	Noise levels	BIOLOGICAL	Vegetation	Wildlife, including habitat and migration patterns	Birds, including habitat and migration patterns	Aquatic species, incl. habitat and migration/spawning	Wildlife protected areas	SOCIO-ECONOMIC	Archaeological and cultural historic sites	Employment	Community wellness	Community infrastructure	Human health
Havakvinga																									
-		-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-		-	-	-	-	-
Aulapkaininnga																									
Researching		-	-	-	-	-	-	-	-	-	-	-	-		-	M	-	M	-		-	P	-	-	-
Piiqtauniq																									
-		-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-		-	-	-	-	-

(P = Nakuuyuq, N = Nakuungittut unalu mikhilimaittuq, M = Nakuungittut unalu mikhittaaqtuq, U = Naluyauyuq)

Havaariyauyukhamut Nayugaa



List of Project Geometries

1	polygon	Rae and Richardson Rivers study area
2	polygon	Coppermine River study area
3	polygon	Kugaryuak River study area
4	polygon	Coronation Gulf study area
5	polygon	Nulahugyuk Creek, Bernard Harbour study area
6	polygon	Nakyoktok River, Richardson Islands study area
7	polygon	Kimikyoak River, Read Island study area
8	polygon	Tree River study area