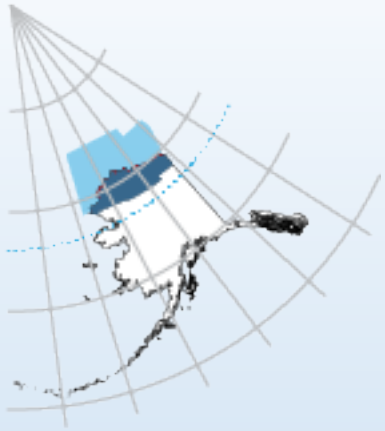
NSSI

North Slope Science Initiative



2019 Annual North Slope Science Review

Assessment, Inventory, and Monitoring – Scott Guyer

Bureau of Land Management – Stacey Fritz

Bureau of Ocean Energy Management – Cathy Coon

BPX Alaska – Chrissy Pohl

ConocoPhillips Alaska – Robyn McGhee

U.S. Fish and Wildlife Service – Wendy Loya

Hilcorp – Beth Sharp

National Oceanic and Atmospheric Administration – Robyn Angliss

National Park Service – Lois Dalle-Molle

OilSearch – Ryan French

U.S. Geological Survey – Grant Hilderbrand & John Pearce

Study Title: **Assessment, Inventory and Monitoring (AIM) for GMT2**

Lead Organization(s): Bureau of Land Management

Other Organization(s): Alaska Center for Conservation Science (UAA)

Lead Investigator(s): Jeanne Osnas (UAA), Scott Guyer (BLM)

Other Investigator(s): Anjanette Steer (UAA), Timm Nawrocki (UAA)

Investigator Contact(s): Scott Guyer BLM 907-223-6759

Duration of Study: Two-Year Data Collection and analysis

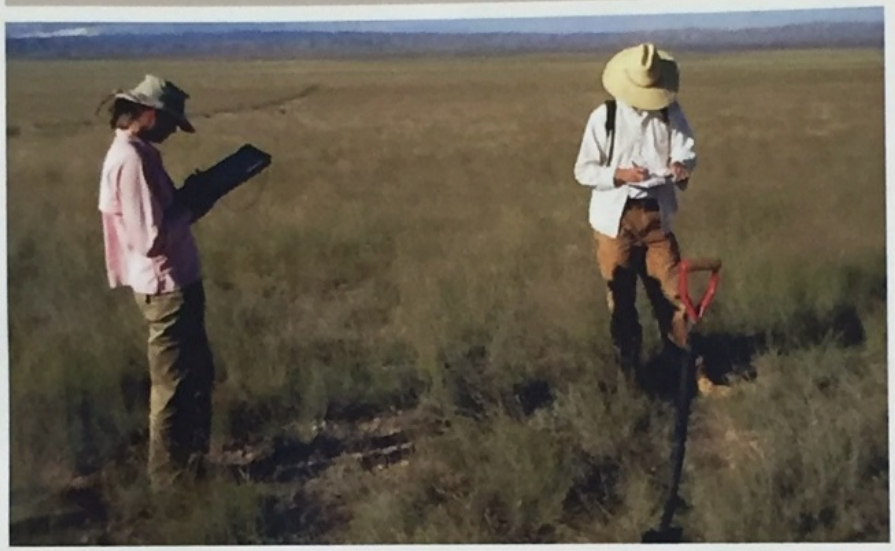
Description: On July 22, 2013, ConocoPhillips Alaska, Inc. submitted an application with BLM for a proposed drill site location and majority of the infield roads and pipeline route on BLM-managed lands. The proposed GMT1 drilling and production pad is approximately 14 miles west of the Alpine Central Facility.

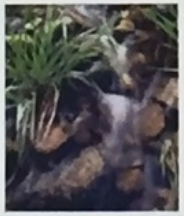
Subject of Study:
Soils, Permafrost, Wetlands, terrestrial Monitoring, climate and impacts from development

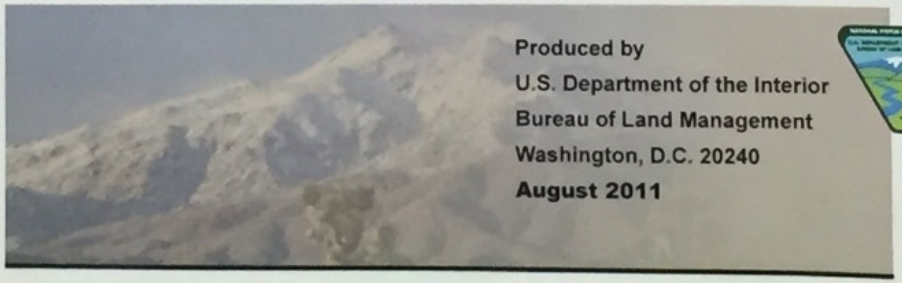
Bureau of Land Management

Assessment, Inventory, and Monitoring Strategy

For Integrated Renewable Resources Management



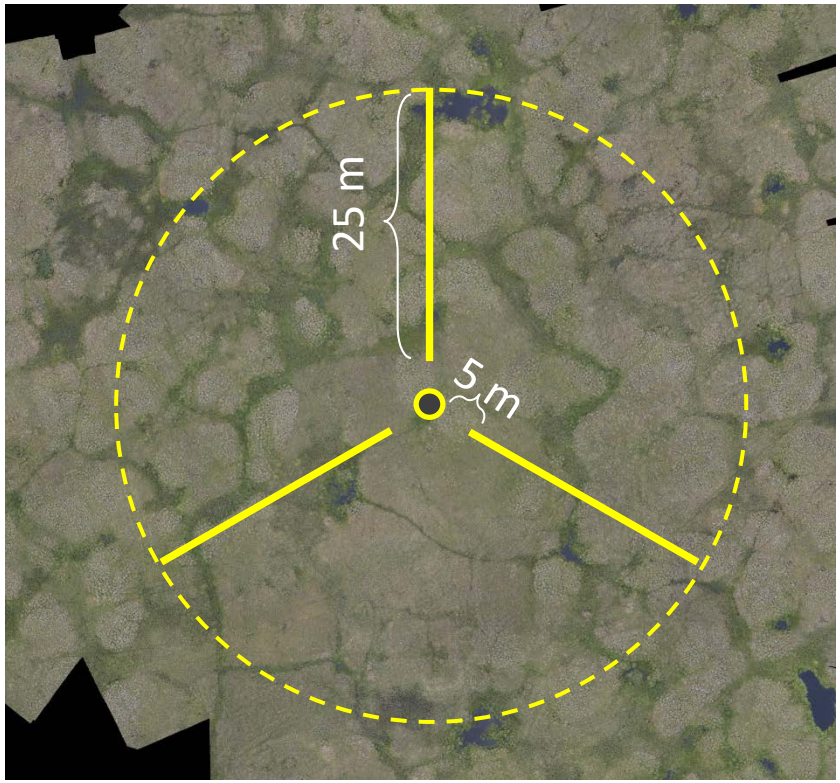




Produced by
U.S. Department of the Interior
Bureau of Land Management
Washington, D.C. 20240
August 2011

BLM

Sample Design: ground plot layout

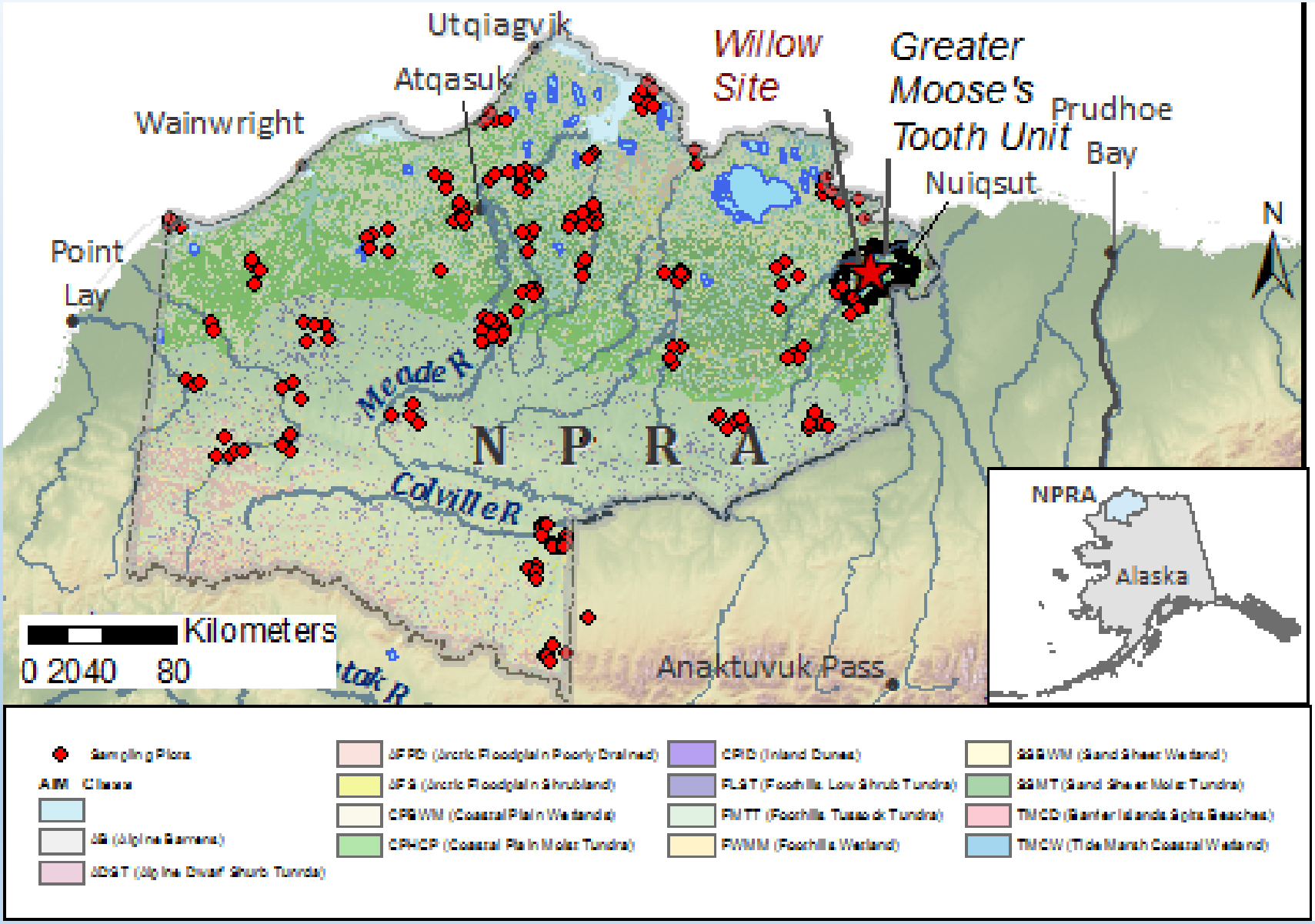


Core indicators:

Vegetation composition, Height, Canopy gap, Bare ground

Supplemental indicators:

Active layer depth, Moss duff layer thickness


Utqiagvik
Atqasuk
Wainwright
Willow Site
Greater Moose's Tooth Unit
Prudhoe Bay
Nuiqsut
Point Lay
N
Meade R
N P R A
Colville R
Kilometers
0 2040 80
Anaktuvuk Pass
NPRA
Alaska
Sampling Plots
AIM Classes
AM (Alpine Barrens)
ADGT (Alpine Dwarf Shrub Tundra)
AFPD (Arctic Floodplain Poorly Drained)
AFS (Arctic Floodplain Shrubland)
CPWM (Coastal Plain Wetlands)
CPMCP (Coastal Plain Moist Tundra)
CRD (Inland Dunes)
FLST (Foothills Low Shrub Tundra)
FMTT (Foothills Tussock Tundra)
FWMM (Foothills Wetland)
SSWM (Sand Sheet Wetland)
SSMT (Sand Sheet Moist Tundra)
TMCD (Barrier Islands Spits Beaches)
TMCW (Tide Marsh Coastal Wetland)

Study Title:

Purpose: Some of the original sample plots from the BLM 2012 AIM Pilot project are near the proposed GMT-1 development. However, a higher density of sampling prior to the construction and installation of GMT-1 is need to establish current habitat conditions to be able to assess any impacts to the local environment from this development and comply with the level of monitoring identified in the Record of Decision (ROD). Adding the higher density of sampling conforms to the intensive integrated sampling supported by the AIM Strategy to enhance ecological information associated with specific projects, developments or issues. This proposed AIM project would collect field data over a two-year period and follow established protocols and supplemental indicators developed for the pilot project.

Data Accessibility: https://www.landscapetoolbox.org/

Data Contact: Scott Guyer BLM 223-6759

Study Title:

Expected Dates of Field Work: July 30-August 11

Expected Dates of Aviation/Marine Vessel Use: Aviation via Helicopter July 31-August 11

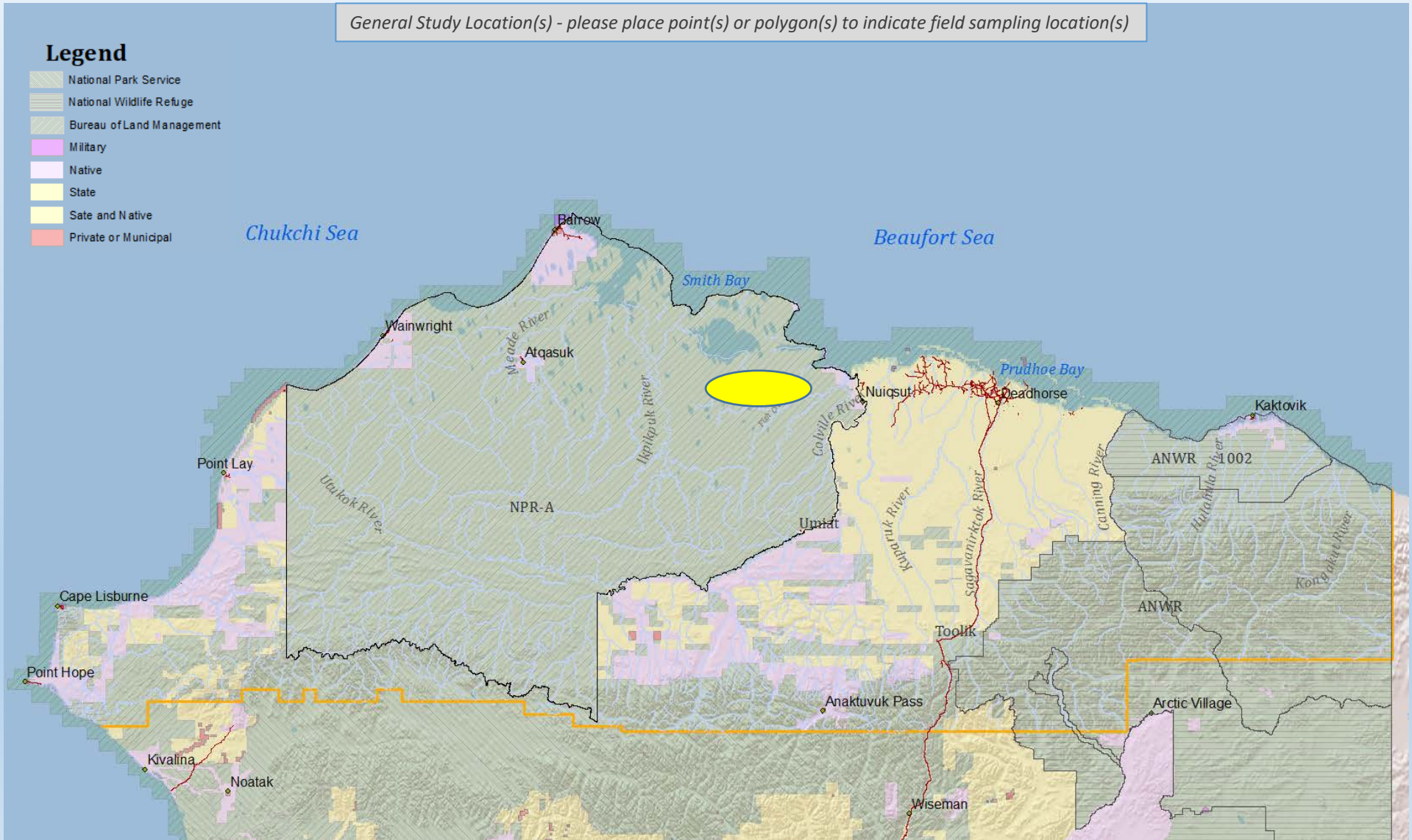
Base(s) for Field Work: Inigok Alaska

Aviation Use: Fixed wing crew and cargo transport to camp location
Helicopter used for field crew transportation

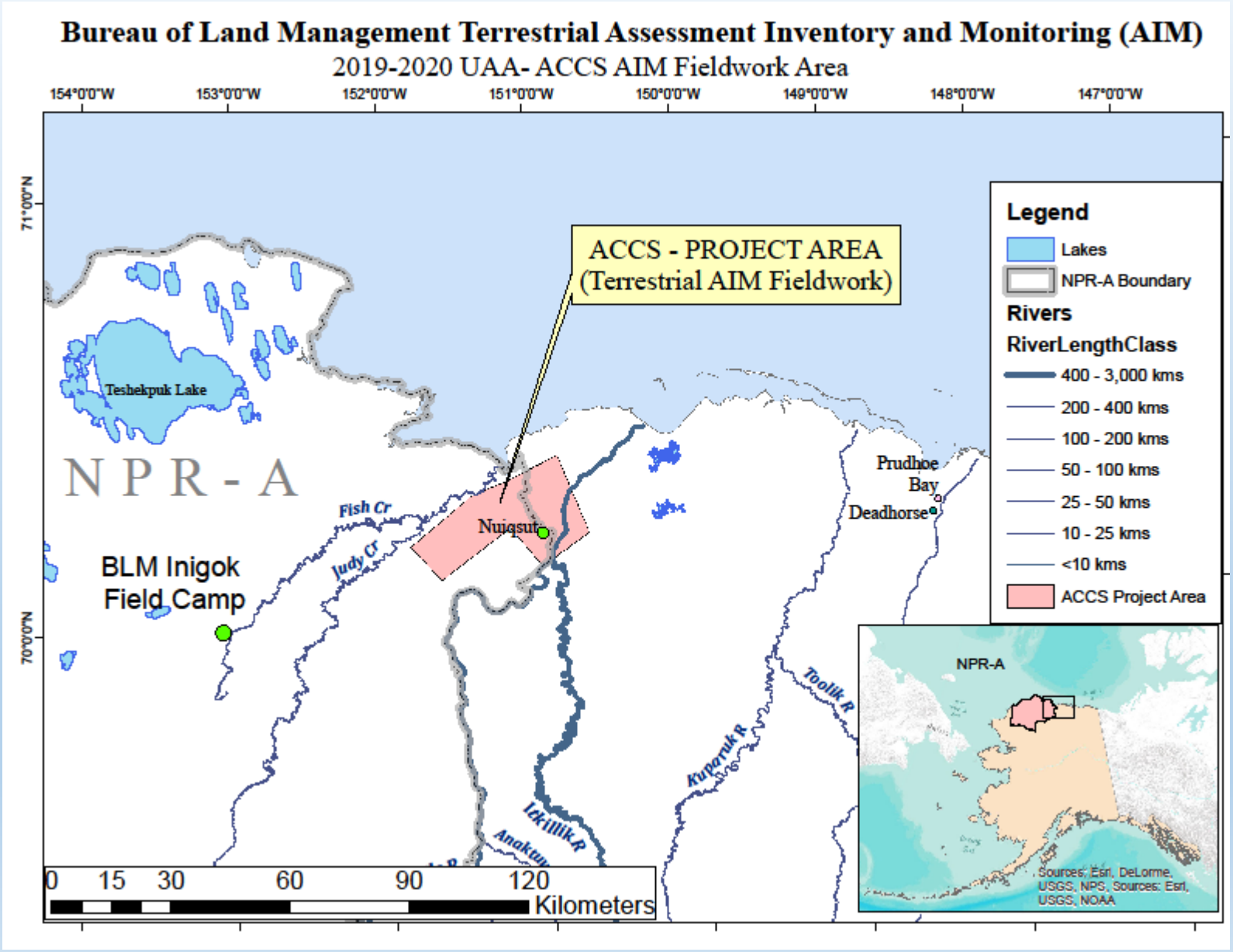
Aviation Base: Inigok Alaska

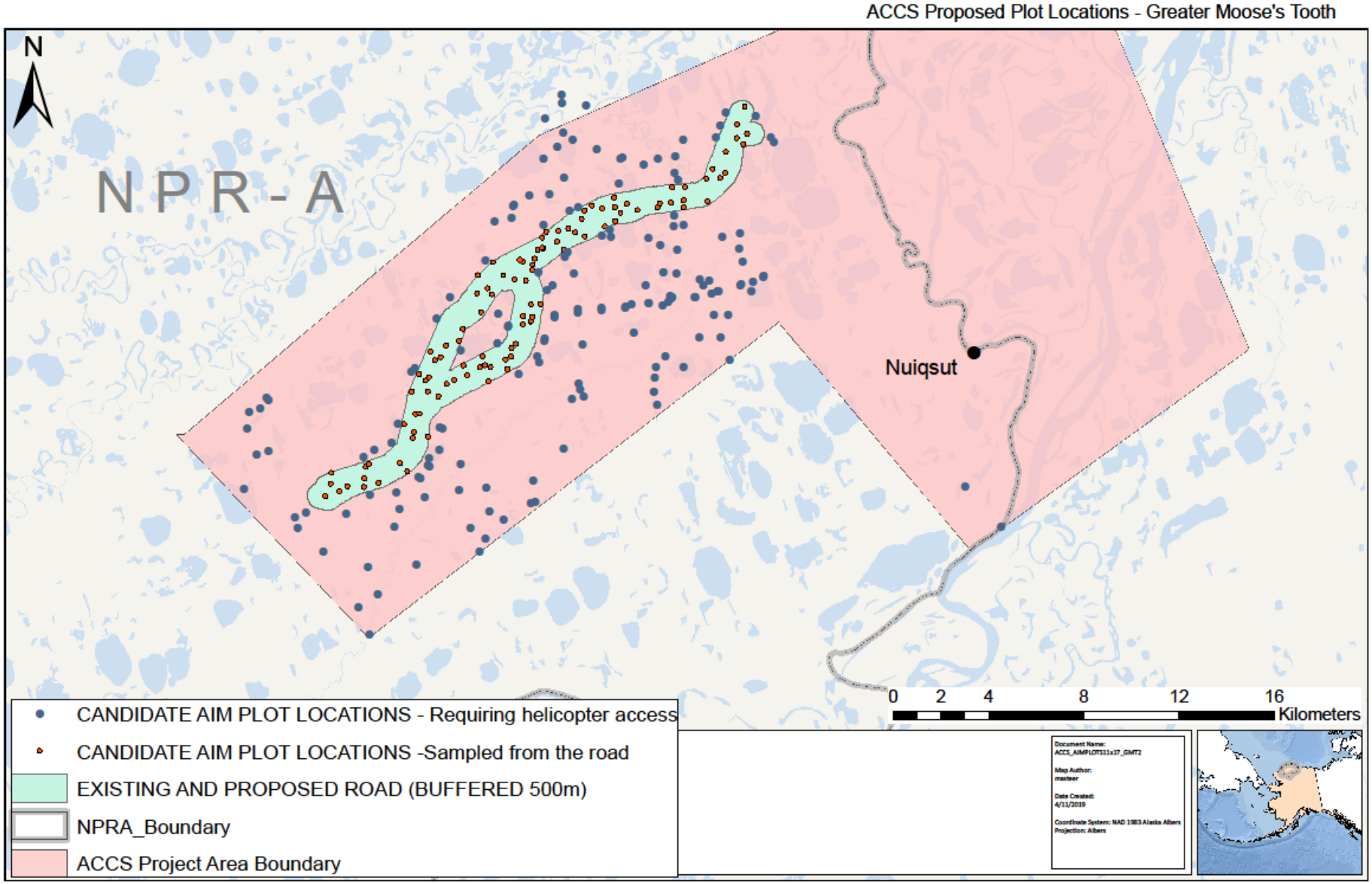
Other Logistics: Most site for year 2 will be accessed by road.

Study Title:


General Study Location(s) - please place point(s) or polygon(s) to indicate field sampling location(s)
Legend
National Park Service
National Wildlife Refuge
Bureau of Land Management
Military
Native
State
Sate and Native
Private or Municipal
Chukchi Sea
Beaufort Sea
Barrow
Smith Bay
Wainwright
Meade River
Atqasuk
Ikpikpuk River
Colville River
Nuiqsut
Prudhoe Bay
Deadhorse
Kaktovik
Point Lay
Utukok River
NPR-A
Umiat
Kuparuk River
Sagavanirktok River
Canning River
ANWR
1002
Hulahula River
Okpilak River
Cape Lisburne
Point Hope
Anaktuvuk Pass
Toolik
Arctic Village
Kivalina
Noatak
Wiseman

Study Title:


Bureau of Land Management Terrestrial Assessment Inventory and Monitoring (AIM)
2019-2020 UAA- ACCS AIM Fieldwork Area
154°0'0"W
153°0'0"W
152°0'0"W
151°0'0"W
150°0'0"W
149°0'0"W
148°0'0"W
147°0'0"W
71°0'0"N
70°0'0"N
ACCS - PROJECT AREA
(Terrestrial AIM Fieldwork)
Teshekpuk Lake
N P R - A
Fish Cr
Judy Cr
Nuiqsut
Prudhoe Bay
Deadhorse
BLM Inigok
Field Camp
Toolik R
Kuparuk R
Itkillik R
Anaktuvuk R
0 15 30 60 90 120
Kilometers
Legend
Lakes
NPR-A Boundary
Rivers
RiverLengthClass
400 - 3,000 kms
200 - 400 kms
100 - 200 kms
50 - 100 kms
25 - 50 kms
10 - 25 kms
<10 kms
ACCS Project Area
NPR-A
Sources: Esri, DeLorme, USGS, NPS, Sources: Esri, USGS, NOAA


ACCS Proposed Plot Locations - Greater Moose's Tooth
N
N P R - A
Nuiqsut
0 2 4 8 12 16
Kilometers
CANDIDATE AIM PLOT LOCATIONS - Requiring helicopter access
CANDIDATE AIM PLOT LOCATIONS -Sampled from the road
EXISTING AND PROPOSED ROAD (BUFFERED 500m)
NPRA_Boundary
ACCS Project Area Boundary

http://www.landscapetoolbox.org/

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The LandscapeToolbox

Tools & Methods for Effective Land Health Monitoring

USDA Agricultural Research Service

Jornada Basin Land Research Programs

The Nature Conservancy

METHODS & MANUALS TRAINING MONITORING DESIGN TOOLS & DATABASES PARTNER PROJECTS AND PROGRAMS

Managing and Monitoring Landscapes

Protecting and improving land health requires comprehensive landscape management strategies. Land managers have embraced a landscape-scale philosophy and have developed new methods to inform decision making such as satellite imagery to assess current conditions and detect changes, and predictive models to

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12/11/2017

Assessment, Inventory and Monitoring Strategy

Alaska

To effectively manage renewable resources, the BLM needs information at multiple scales about resource extent, condition and trend, stressors, and the location and nature of authorized uses, disturbances, and projects.

THE IMPORTANCE OF INFORMATION

Healthy, sustainable ecosystems support the diverse multiple uses and benefits of public lands. Thus, to fulfill its multiple-use mission, it is essential for the Bureau of Land Management (BLM) to gather information to determine ecosystem conditions and how they are changing over time. This knowledge (or monitoring information) is necessary to guide and justify land uses, policy actions, and adaptive management decisions.

Consistent data that can serve many monitoring objectives and can also be aggregated for use across multiple scales of management is a valuable asset for the BLM. The BLM's Assessment, Inventory, and Monitoring (AIM) Strategy, which was completed in 2011 in coordination with other agencies, is designed to provide this information.

Tina Boucher collects soils information on an AIM site in NPRA. Photo by Scott Guyer/BLM.

BENEFITS OF USING AIM

AIM Element	Benefit
Standard set of core quantitative indicators and methods	Standardized measurements allow easy comparison of data collected in different places and over time. By collecting the same core data across the BLM, the data can be used for many different purposes at many different scales.
Statistically valid sampling design	Statistically valid methods used to study lands enable data to inform land management decisions at many different scales, from individual grazing allotments to ecoregion and national levels. This also allows the BLM to combine data with other agencies that use statistically valid methods.
Integration with remote sensing	Remotely capturing information (for example, using satellite imagery) gives us a bird's-eye view of conditions across the landscape. Using this information increases the efficiency of BLM data collection.
Electronic data capture and management	Once monitoring data is collected for an area, it is stored in a central database and can be easily accessed and used, saving the BLM time and money.
Implementation process	A monitoring program built on management questions and an understanding of ecosystems will provide relevant and timely information to the decisionmaker.

Study Title: **NPR-A Aquatic Monitoring**

Lead Organization(s): **Bureau of Land Management**

Other Organization(s): **University of Alaska Fairbanks Water & Environmental Research Center**

Lead Investigator(s): **Matthew Whitman**

Investigator Contact(s): **mwhitman@blm.gov**

Other Investigator(s): **Dr. Chris Arp, Dr. Ben Jones**

Duration of Study: **long-term / ongoing**

Description:

- **Network of stream and lake monitoring sites intended for long-term maintenance**
- **Initial sites established in early 2000s, with others added as O&G activity expands**
- **Current focus is in the Fish Creek Watershed and the greater Teshekpuk Lake region**
- **6 large (high-order) stream sites** (water level, discharge, temperature)
- **7 small stream sites** (water level, discharge, temperature, and various water quality parameters – plus biological studies)
- **8 lakes** (water level, temperature, various water quality parameters, ice thickness – plus biological studies)
- **Tentative pilot study evaluating lakes for "sensitive fish species" or "resistant fish species only" with eDNA samples**

Subject of Study: **Water Resources / Fish**

Audience: **BLM management, other federal agencies, industry, academia, ADF&G, ADNR**

Purpose:

- **Development of rating curves, flood frequency, and flood magnitude**
- **Document natural conditions (trends, variability, and extremes) prior to development and monitor throughout the development timeframe**
- **Evaluate the effectiveness of Best Management Practices and adjust land-use decisions through adaptive management**

Data Accessibility: **Public**

Data Contact: **Dr. Chris Arp**

Communication Plan: **UAF WERC website (http://www.fishcreekwatershed.org), journal articles, reports**

Study Title: **NPR-A Aquatic Monitoring**

Expected Dates of Field Work: **May 23-June 8, July 11-18, Aug -28**

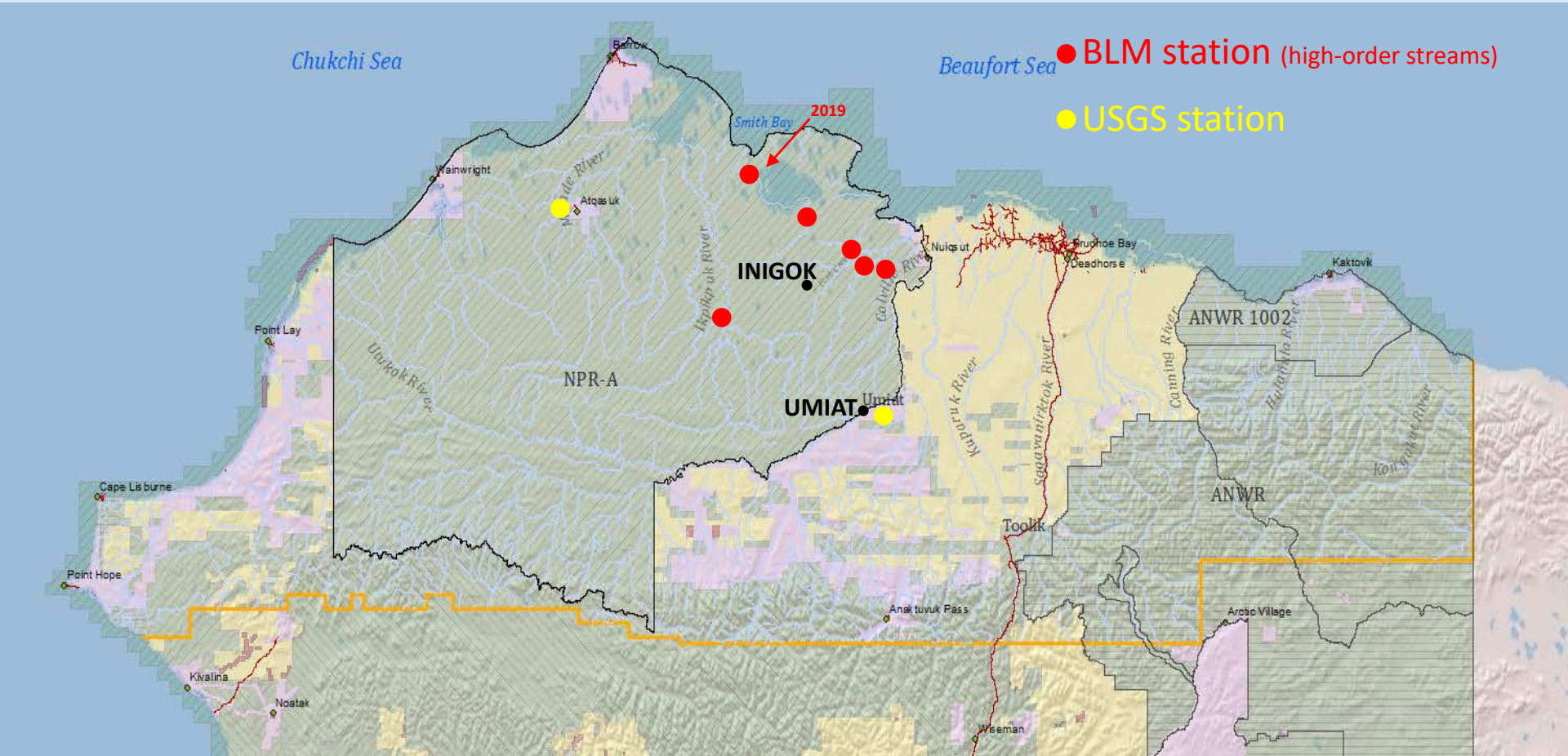
Expected Dates of Aviation Use: **May 6-June 7, July 10-16, Aug 19-25**

Base(s) for Field Work: **Umiat**

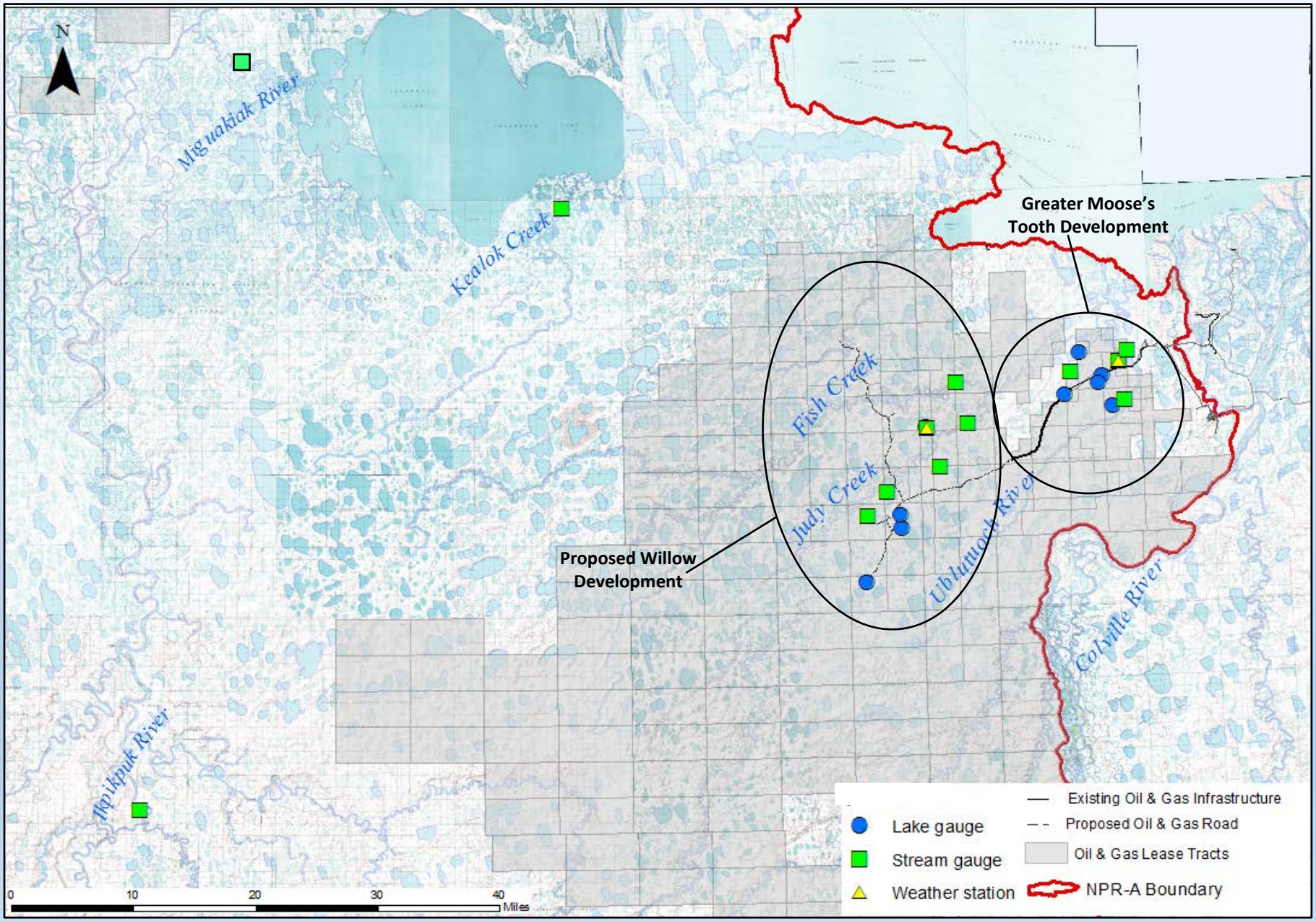
Aviation Base: **Umiat**

Aviation Use: **Helicopter N70AE**

Aviation Provider: **Pathfinder**



BLM NPR-A Aquatic Monitoring - all stream & lake sites



Study Title: NPR-A Permitted Areas Survey and Monitoring

Lead Organization(s): **Bureau of Land Management**

Other Organization(s): **NA**

Lead Investigator(s): **Joe Keeney**

Other Investigator(s): **NA**

Investigator Contact(s): **jkeeney@blm.gov**

Duration of Study: **ongoing, approximately 10 days per year**

Description:

Monitoring cultural sites in the vicinity of permitted work areas in the NPR-A (helicopter)

Survey for undocumented cultural sites in the vicinity of permitted work areas

Subject of Study: **Cultural Resources and Historic Background**

Audience: **BLM management, North Slope Communities, cultural resource managers, academia**

Purpose: **Document impacts and potential for impacts to archaeological sites by permitted activities in the NPR-A, particularly heavily-trafficked ice roads and snow trails and oil and gravel exploration**

Data Accessibility: **Some information will be publicly-available. Specific site locations are considered sensitive**

Data Contact: **Joe Keeney (jkeeney@blm.gov)**

Communication Plan: **Professional presentations; report to State of Alaska archaeologist (State Historic Preservation Officer)**

Study Title: **NPR-A Permitted Areas Survey and Monitoring**

Expected Dates of Field Work: **June 26-July 3, July 17-24**

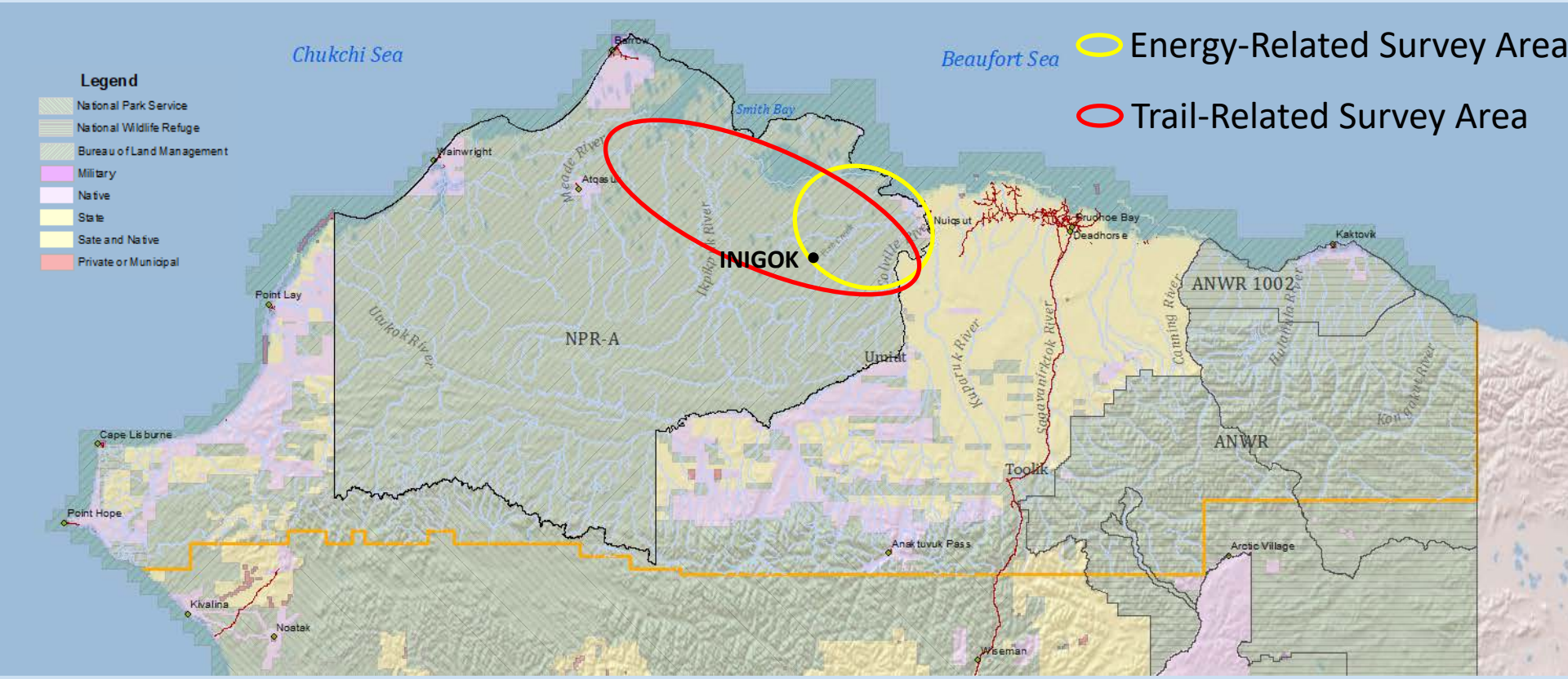
Aviation Use: **Helicopter N70AE**

Expected Dates of Aviation Use: **June 27-July 2, July 18-23**

Aviation Provider: **Pathfinder**

Base(s) for Field Work : **Inigok**

Aviation Base: **Inigok**



Study Title: **NPR-A-Colville Paleontological Survey**

Lead Organization(s): **Bureau of Land Management**

Other Organization(s): **UA Museum of the North**

Lead Investigator(s): **Joe Keeney**

Other Investigator(s): **Pat Druckenmiller**

Investigator Contact(s): **jkeeney@blm.gov**

Duration of Study: **Single season (upper Colville); work along lower Colville is ongoing**

Description:

Paleontological survey/prospecting along Colville River in collaboration with UA Museum of the North

Documentation and mapping of bone beds, along with collections

Subject of Study: **Paleontological resources, Mesozoic Vertebrates**

Audience: **BLM management, North Slope Communities, General Public, Academia**

Purpose: **Identify, document, and collect paleontological specimens, particularly before they are destroyed by erosion**

Data Accessibility: **Most information will be publicly-available. Specific site locations are considered sensitive**

Data Contact: **Joe Keeney (jkeeney@blm.gov)**

Communication Plan: **Professional presentations; Public presentations; Academic publications**

Study Title: **NPR-A-Colville Paleontological Survey**

Expected Dates of Field Work: **July 31-August 15**

Aviation Use: **Helicopter N70AE**

Expected Dates of Aviation Use: **August 1, August 15**

Aviation Provider: **Pathfinder**

Base(s) for Field Work : **N/A**

Aviation Base: **Inigok**

Study Title: **NPR-A Cultural Pingo Survey**

Lead Organization(s): **Bureau of Land Management**

Other Organization(s): **NA**

Lead Investigator(s): **Joe Keeney**

Other Investigator(s): **NA**

Investigator Contact(s): **jkeeney@blm.gov**

Duration of Study: **ongoing, approximately 5 days per year**

Description:

Survey/testing for undocumented cultural sites on extant and deflated pingos in the NPR-A

Drop-off and pick-up via helicopter. Survey will proceed opportunistically in 2019, conducted alongside Permitted Areas Survey and Monitoring work for 2019.

Some potential for collaboration with UAF researchers, namely Ben Jones.

Subject of Study: **Cultural Resources and Historic Background**

Audience: **BLM management, North Slope Communities, cultural resource managers, academia**

Purpose: **Identify and document undocumented cultural sites for purposes of inventory and monitoring**

Data Accessibility: **Some information will be publicly-available. Specific site locations are considered sensitive**

Data Contact: **Joe Keeney (jkeeney@blm.gov)**

Communication Plan: **Report to State of Alaska archaeologist (State Historic Preservation Officer)**

Study Title: **NPR-A Proactive Cultural Survey**

Expected Dates of Field Work: **June 26-July 3, July 17-24**

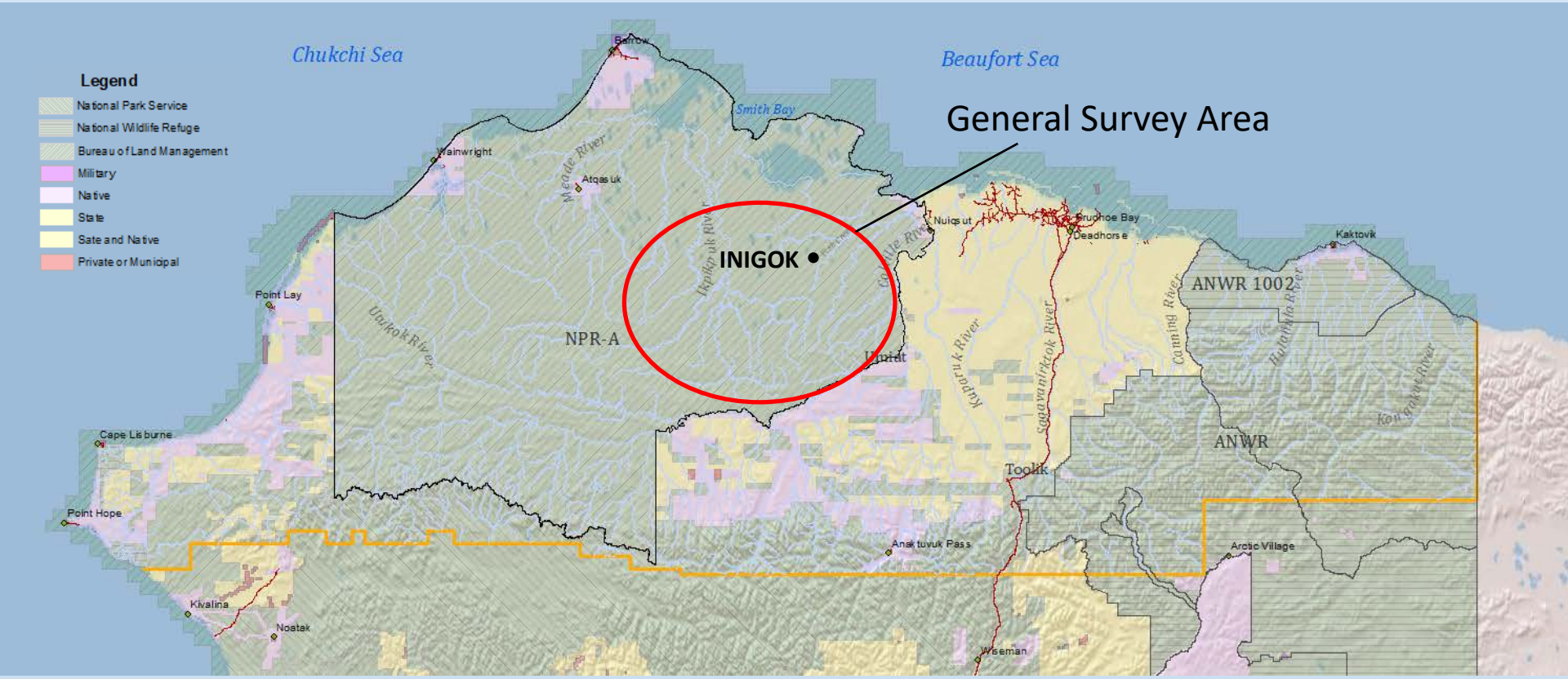
Aviation Use: **Helicopter N70AE**

Expected Dates of Aviation Use: **June 27-July 2, July 18-23**

Aviation Provider: **Pathfinder**

Base(s) for Field Work : **Inigok**

Aviation Base: **Inigok**



Study Title: Steller's eider survey in the Barrow Triangle

Lead Organization(s): **BLM and USFWS**

Other Organization(s): **North Slope Borough Dept. of Wildlife, ABR, Inc.**

Lead Investigator(s): **Debbie Nigro**

Other Investigator(s):

Investigator Contact(s): **dnigro@blm.gov**

Duration of Study: **long-term / ongoing**

Description: **Long-term collaborative study of the Steller's eider breeding population near Utqiagvik with the goal of conducting low-level aerial surveys in order to estimate and monitor the numbers of Steller's eiders in the area.**

Subject of Study: **Raptors, Resident and Migratory Birds**

Audience: **BLM and USFWS management, industry**,

Purpose**: Monitor population status of Steller's eiders in Alaska. Requirement to consult under Section 7 of the ESA requires current estimate of species population in the NPR-A**

Data Accessibility: **Public**

Data Contact: **Debbie Nigro (dnigro@blm.gov)**

Communication Plan: **Annual reports and publications**

Study Title: **Steller's eider survey in the Barrow Triangle**

Expected Dates of Field Work: **Early-mid, June**

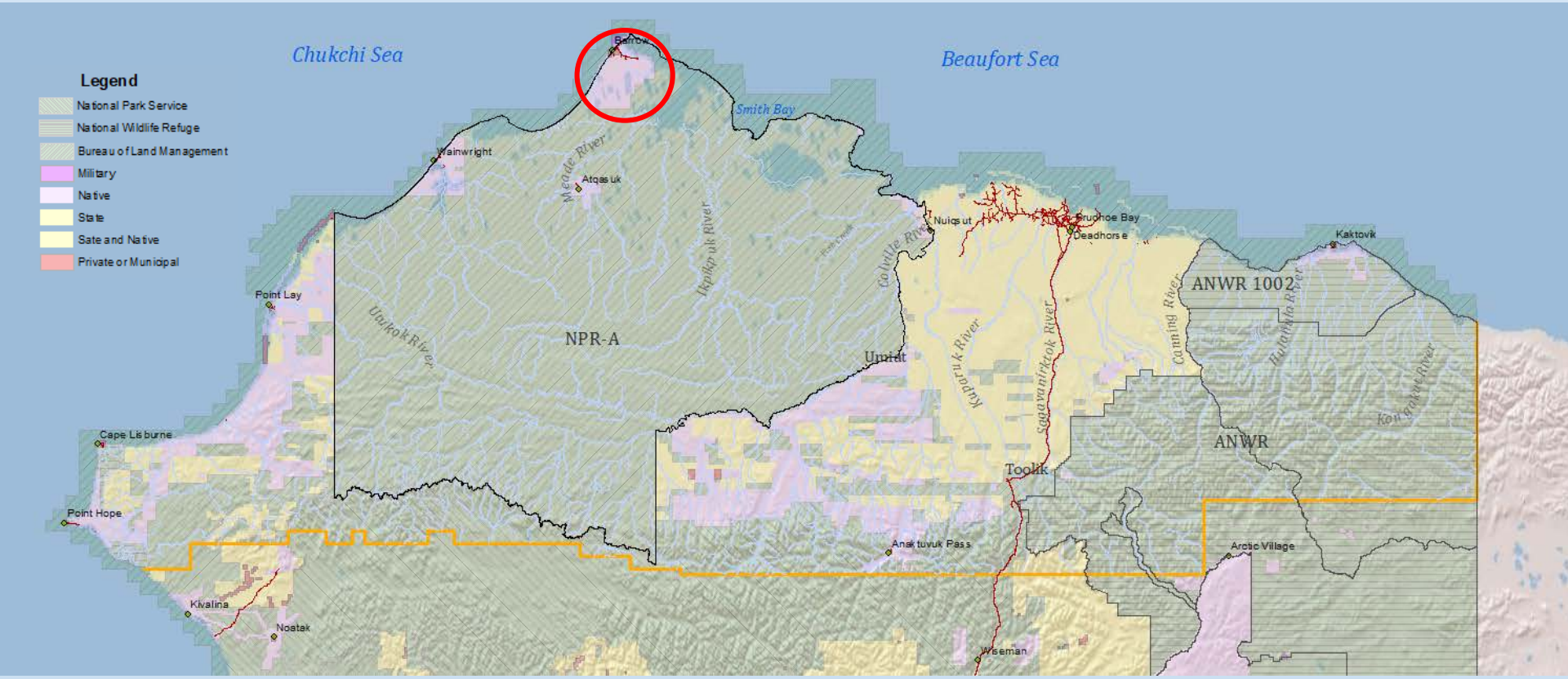
Aviation Use: **Fixed-wing**

Expected Dates of Aviation Use: **Early-mid June**

Aviation Provider: **Not known at this time**

Base(s) for Field Work : **Utqiagvik**

Aviation Base: **Utqiagvik.**



Study Title: Arctic Coastal Plain Waterbird Survey

Lead Organization(s): **BLM and USFWS**

Other Organization(s):

Lead Investigator(s): **Julian Fischer**

Other Investigator(s): **Debbie Nigro**

Investigator Contact(s): **julian_fischer@fws.gov**

Duration of Study: **long-term / ongoing**

Description: **This project provides funding for the USFWS to increase the aerial survey intensity of ongoing waterbird surveys in the Teshekpuk Lake Special Area to allow for greater accuracy of estimates of spectacled and Steller's eiders in that area.**

Subject of Study: **Raptors, Resident and Migratory Birds**

Audience: **BLM and USFWS management, industry**,

Purpose**: Obtain accurate estimates of Steller's and spectacled eider populations in the NPR-A. Requirement to consult under Section 7 of the ESA requires current estimate of species population in the NPR-A**

Data Accessibility: **Public**

Data Contact: **Julian Fischer julian_fischer@fws.gov**

Communication Plan: **Annual reports and publications, USFWS website https://www.fws.gov/alaska/mbsp/mbm/waterfowl/reports.htm**

Study Title: **Arctic Coastal Plain Waterbird Survey**

Expected Dates of Field Work: **Early-mid June**

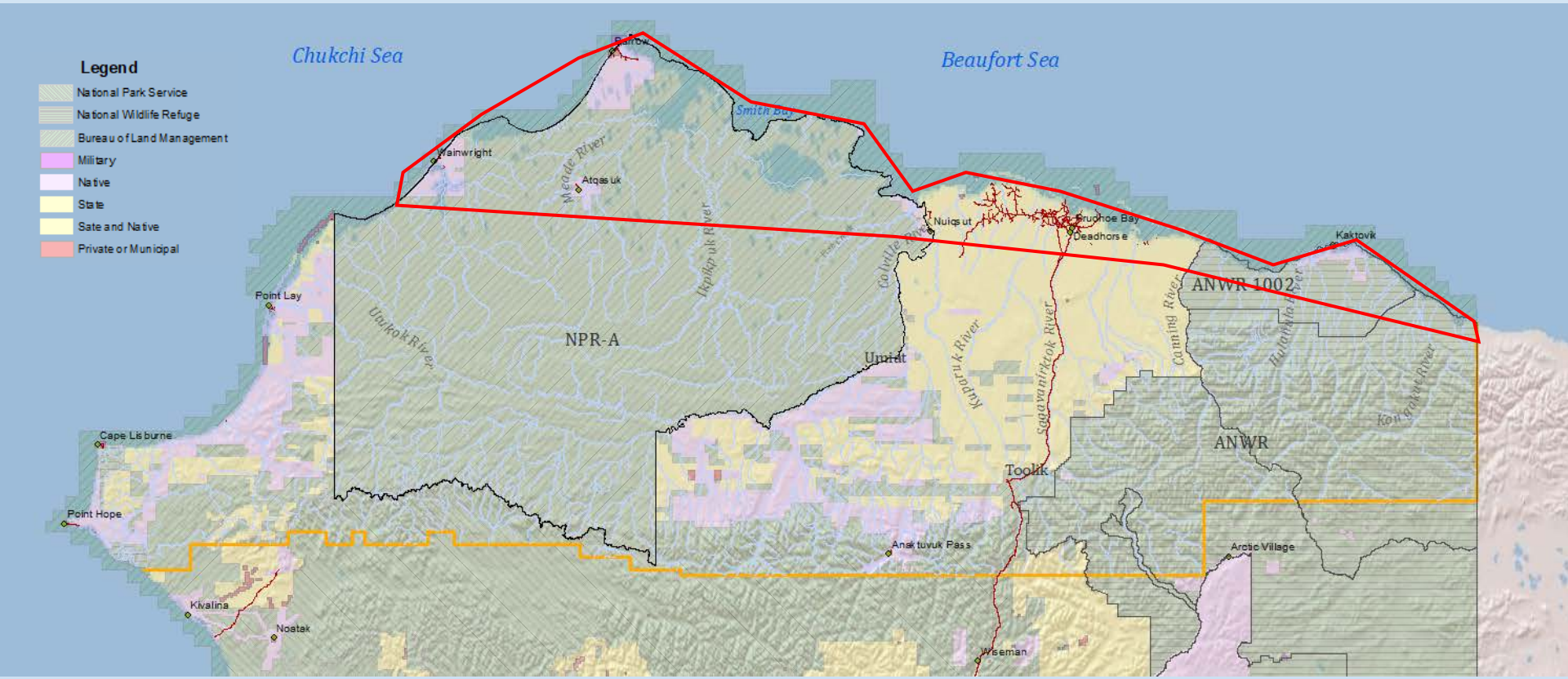
Aviation Use: **Fixed-wing**

Expected Dates of Aviation Use: **Early-mid June**

Aviation Provider: **USFWS Fleet Aircraft**

Base(s) for Field Work : **Utqiagvik**

Aviation Base: **Utqiagvik**



Study Title: **Colville River Raptor Survey**

Lead Organization(s): **BLM and USFWS**

Other Organization(s):

Lead Investigator(s): **Debbie Nigro**

Other Investigator(s):

Investigator Contact(s): **dnigro@blm.gov**

Duration of Study: **long-term / ongoing**

Description**: Long-term monitoring program conducted by boat to assess occupancy and productivity of cliff-nesting raptors using the Colville River Special Area for nesting.**

Subject of Study: **Raptors, Resident and Migratory Birds**

Audience: **BLM and USFWS management, industry**,

Purpose**: Monitoring program to track population trends of 3 species of raptors using the Colville River Special Area for nesting.**

Data Accessibility: **Public**

Data Contact: **Debbie Nigro (dnigro@blm.gov)**

Communication Plan: **Annual reports and publications**

Study Title: **Colville River Raptor Survey**

Expected Dates of Field Work: **Early-mid June and late July**

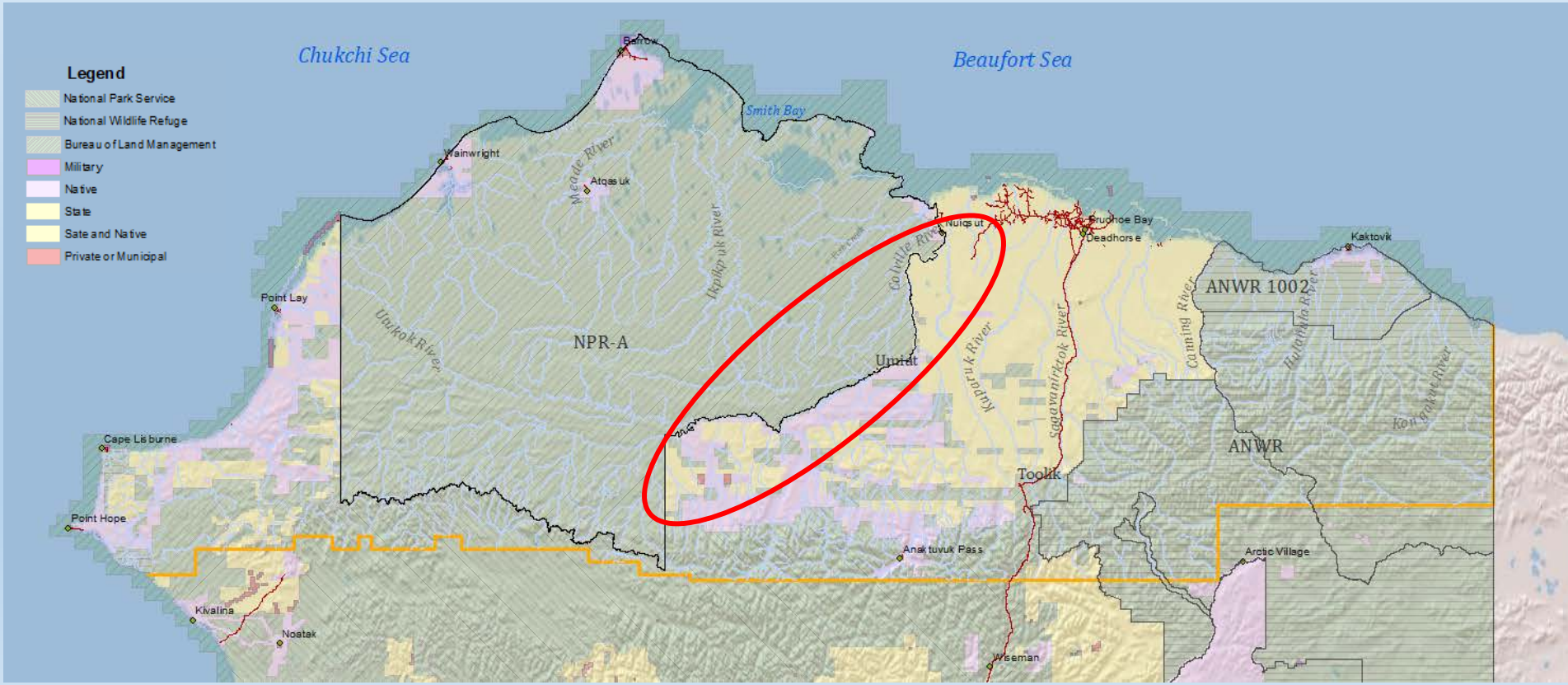
Aviation Use: **N/A**

Expected Dates of Aviation Use: **Early-mid June and late July**

Aviation Provider: **N/A**

Base(s) for Field Work : **Utqiagvik**

Aviation Base: **Utqiagvik**



Study Title: Teshekpuk Lake Goose Molting Survey

Lead Organization(s): **BLM and USFWS**

Other Organization(s):

Lead Investigator(s): **Julian Fischer**

Other Investigator(s):

Investigator Contact(s): **julian_fischer@fws.gov**

Duration of Study: **long-term / ongoing**

Description: **The primary goal of the molting goose survey is to monitor the abundance and distribution of 4 species of geese during their flightless wing molt in the area north and east of Teshekpuk Lake. A secondary goal of the survey is to detect regional shifts in distribution by periodically monitoring numbers of molting geese in 4 additional areas between Cape Simpson and the Colville River delta**
Specific objectives include:
1) acquiring annual minimum counts and locations of adult geese and goslings,
2) documenting relative species composition,
3) measuring annual local production, and
4) obtaining opportunistic counts and locations of loons and tundra swans

Subject of Study: **Raptors, Resident and Migratory Birds**

Audience: **BLM and USFWS management, industry**

Purpose**: Continue long-term data collection to determine trends in populations of molting geese.**

Data Accessibility: **Public**

Data Contact: **Debbie Nigro (dnigro@blm.gov)**

Communication Plan: **Annual reports and publications, USFWS website https://www.fws.gov/alaska/mbsp/mbm/waterfowl/reports.htm**

Study Title: **Teshekpuk Lake Goose Molting Survey**

Expected Dates of Field Work: **Early-mid June**

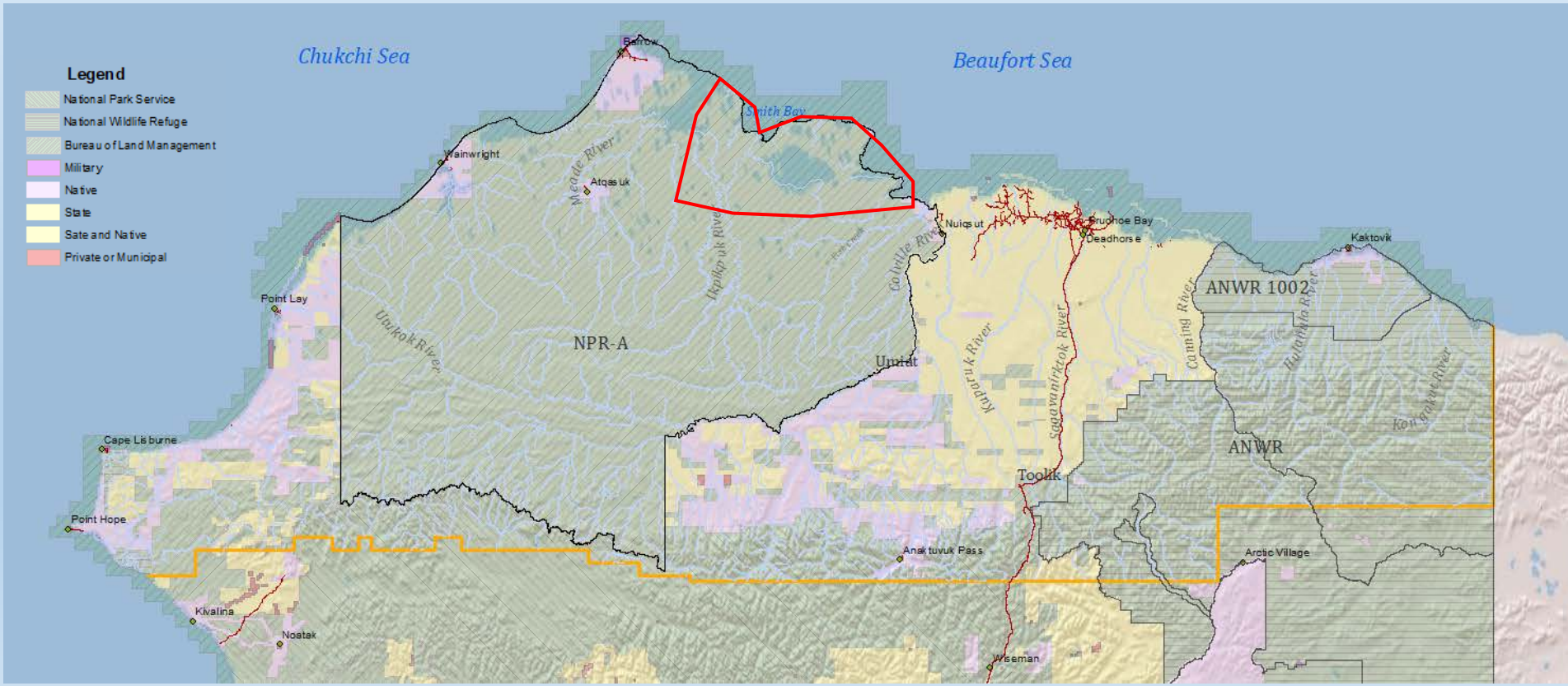
Aviation Use: **Fixed-wing**

Expected Dates of Aviation Use: **Early-mid June**

Aviation Provider: **USFWS Fleet**

Base(s) for Field Work : **Utqiagvik, Deadhorse**

Aviation Base: **Utqiagvik, Deadhorse**.



Study Title:

Characterizing on-shore ecology of polar bears of Alaska's southern Beaufort Sea

Lead Organization(s): **BLM and USGS**

Other Organization(s):

Lead Investigator(s): **Todd Atwood**

Other Investigator(s):

Investigator Contact(s): **tatwood@usgs.gov**

Duration of Study: **long-term / ongoing**

Description: **BLM is contributing to a USGS project aimed at collecting data on the demography and ecology of southern Beaufort Sea polar bears with an emphasis on:**

- **Population dynamics in Alaska;**
- **Characterizing onshore ecology;**
- **Activity patterns and feeding behavior of polar bears in the Chukchi and southern Beaufort seas;**
- **Effects of declining sea ice on polar bear behaviors and energy demands;**
- **Polar bear health investigations;**

Subject of Study: **Polar Bear**

Audience: **BLM, USGS and USFWS management, industry, Inuvialuit-Inupiat Polar Bear Joint Commission**

Purpose**: Collect and analyze data on the demography and ecology of southern Beaufort Sea polar bears**

Data Accessibility: **Public**

Data Contact: **Debbie Nigro (dnigro@blm.gov)**

Communication Plan: **Annual reports and publications, USGS website https://alaska.usgs.gov/science/biology/polar_bears/index.html**

Study Title:

Characterizing on-shore ecology of polar bears of Alaska's southern Beaufort Sea

Expected Dates of Field Work: **March/April**

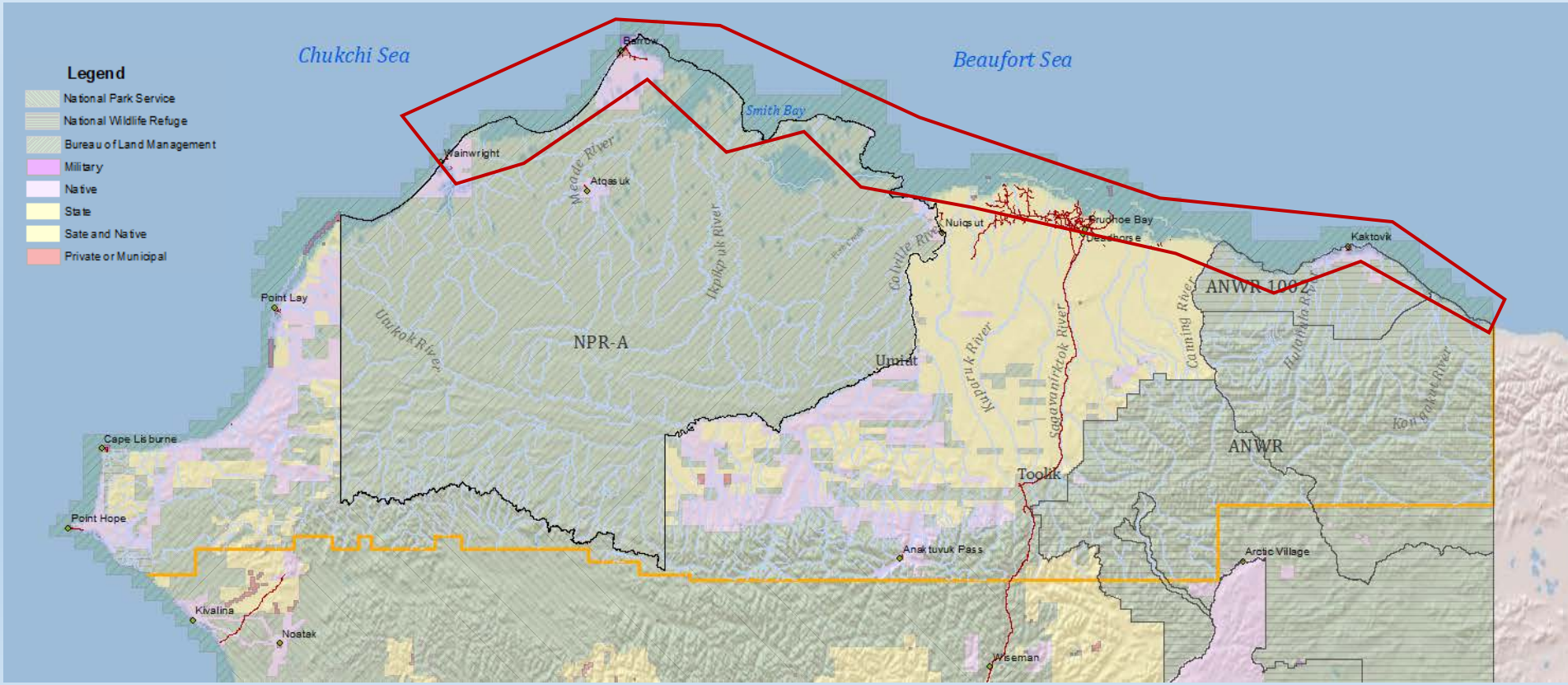
Expected Dates of Aviation Use: **March/April**

Aviation Use: **Fixed-wing and Helicopter**

Aviation Provider: **Unknown at this time**

Base(s) for Field Work : **Utqiagvik, Prudhoe Bay, Kaktovik**

Aviation Base: **Utqiagvik, Prudhoe Bay, Kaktovik**.



Study Title: **Assessing the Influence of Road Characteristics on Caribou Movement Behavior**

Lead Organization(s): **U.S. Geological Survey and Bureau of Land Management**

Other Organization(s): **Alaska Department of Fish and Game, North Slope Borough**

Lead Investigator(s): **Heather Johnson**

Other Investigator(s): **Timothy Vosburgh**

Investigator Contact(s): heatherjohnson@usgs.gov

Duration of Study: **2 years (minimum)**

Description: **To provide updated information on the influence of road design and road traffic on Central Arctic Herd caribou movement behavior, and the effectiveness of road mitigation strategies for facilitating caribou passage through energy development.**

Objectives include:

1) Collect and collate field data on road infrastructure design and traffic volumes within Kuparuk and Prudhoe Bay oil fields.

2) Deploy additional caribou collars to collect fine-scale movement data within the oil fields.

3) Spatially and temporally match caribou GPS collar location data to road and habitat information.

4) Conduct a step-selection movement analysis to assess the influence of road type, road density, adjacent infrastructure, speed limit, traffic volume, habitat features, season and reproductive status on caribou movement behavior.

Study Title: **Assessing the Influence of Road Characteristics on Caribou Movement Behavior**

Subject of Study: **Caribou**

Audience: **USGS, BLM management, industry, NSB and ADF&G**

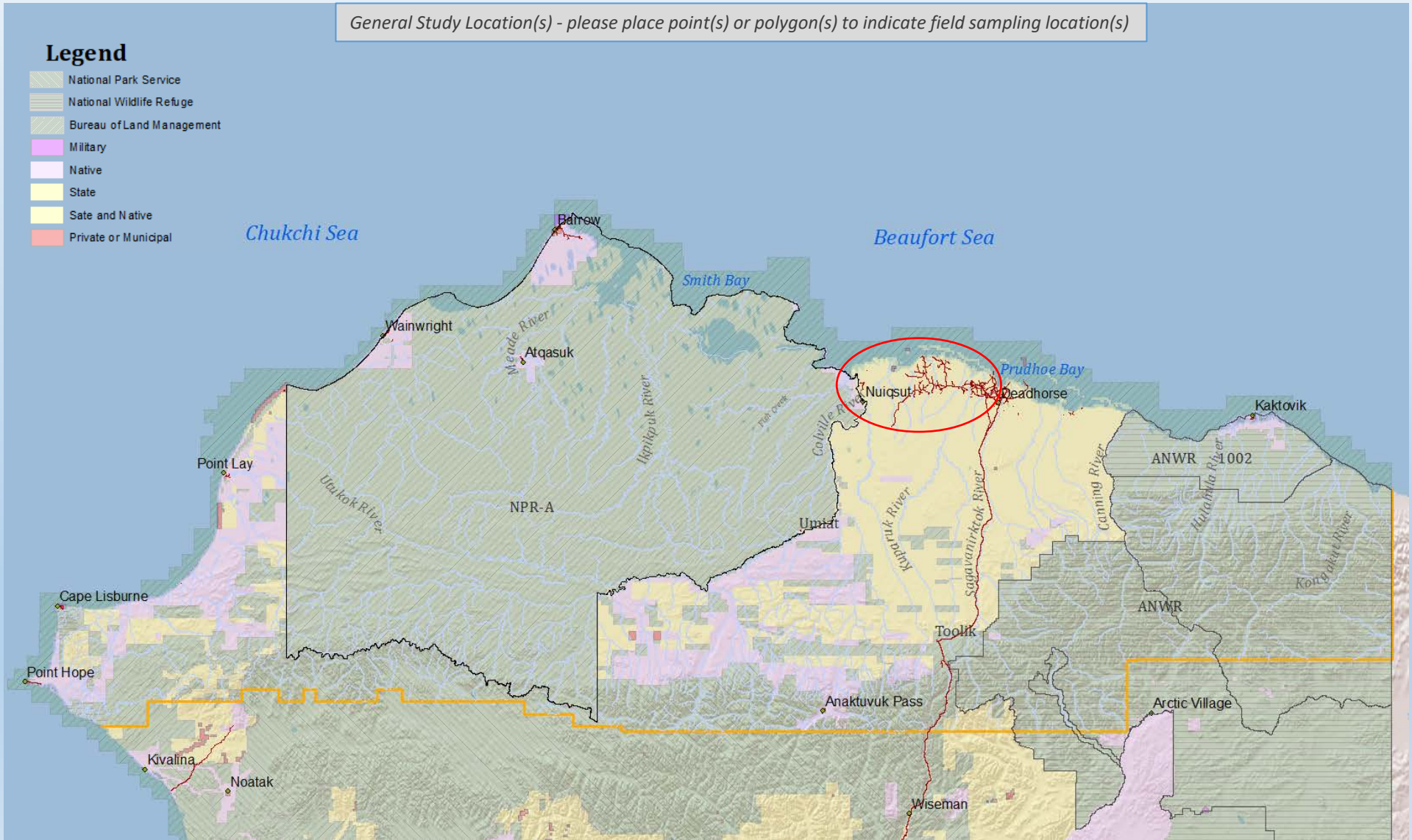
Purpose: **Study the impacts of roads and traffic, within an oil field, on caribou movement behavior.**

Data Accessibility: **Public**

Data Contact: **Heather Johnson (heatherjohnson@usgs.gov)**

Communication Plan: **Annual reports and publications**

Study Title: **Assessing the Influence of Road Characteristics on Caribou Movement Behavior**



Study Title: **Assessing the Influence of Road Characteristics on Caribou Movement Behavior**

Expected Dates of Field Work: **June through September**

Expected Dates of Aviation/Marine Vessel Use: **N/A**

Base(s) for Field Work : **Deadhorse**

Aviation Use: **none**

Aviation Base: N/A

Other Logistics: **Cooperate with collaborators to deploy additional caribou collars to collect fine scale movement data within oil fields.**

BOEM

Bureau of Ocean Energy Management

BOEM's North Slope Studies

Catherine Coon | May 16, 2019

Wave and Hydrodynamic Observations and Modeling in the Nearshore Beaufort Sea

- **Conducting Organization(s):** UAF/USGS
- **Lead Investigator(s):** Jeremy Kasper, Li Erikson
- **Duration of Study:** 2017-2022

Description: Researchers will develop and test a coupled wave-hydrodynamic-sediment transport model for Foggy Island Bay. They will collect field observations to help validate the model, including deployment of moorings that measure site-specific wave conditions over a two-year field season.

Wave and Hydrodynamic Observations and Modeling in the Nearshore Beaufort Sea

Subject of Study: Oceanography and Ice

Purpose: The overall goal of this study is to obtain a better understanding of the physical processes related to wave simulations within Stefansson Sound, Beaufort Sea, the bottom conditions and depth-induced wave breaking conditions and their effects. It will provide information to characterize wave conditions in Stefansson Sound to inform evaluation of potential changes that may occur during the expected timeframe of the Liberty Development Project.

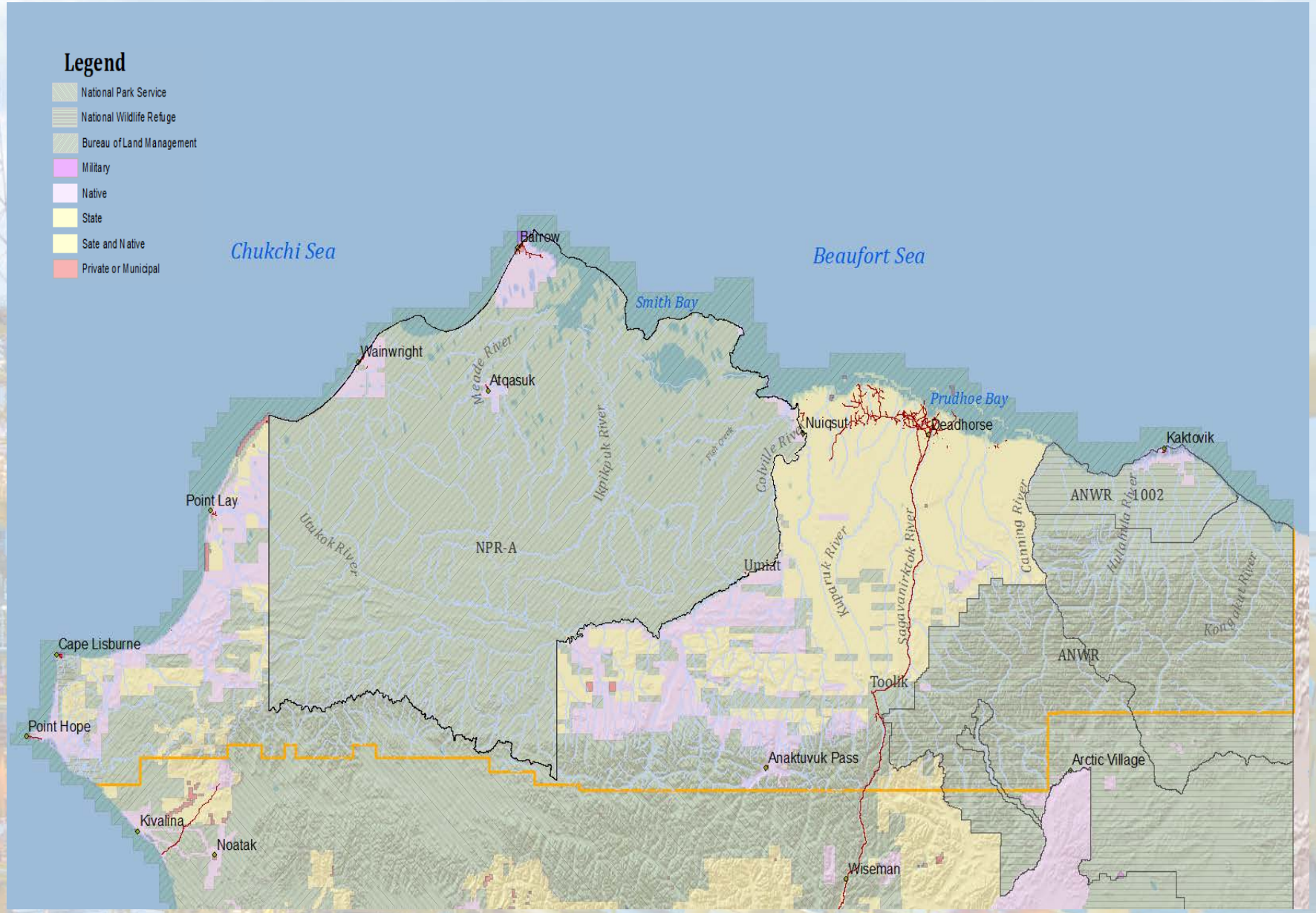
Data Accessibility: Final report will be published on BOEM's website. As appropriate, data will be archived at a Federal data repository (e.g. NCEI), and possibly at AOOS and/or other sites.

BOEM Contact: Heather Crowley, **heather.crowley@boem.gov**

Communication Plan: Reports, Publications and Presentations

Wave and Hydrodynamic Observations and Modeling in the Nearshore Beaufort Sea

- **Expected Dates of Field Work:** Summer 2019, 2020
- **Expected Dates of Aviation/Marine Vessel Use:** ~August
- **Base(s) for Field Work:** Foggy Island Bay, Liberty Prospect Drilling Area
- **Aviation Use:** None
- **Aviation Base:** None
- **Other Logistics:** Real time wave measurements will be provided from ~August through ~November in 2018 and 2019.


Legend
National Park Service
National Wildlife Refuge
Bureau of Land Management
Military
Native
State
Sate and Native
Private or Municipal
Chukchi Sea
Beaufort Sea
Smith Bay
Prudhoe Bay
Barrow
Wainwright
Atqasuk
Meade River
Ikpikpuk River
Fish Creek
Colville River
Nuiqsut
Deadhorse
Kaktovik
Point Lay
Utukok River
NPR-A
Umiat
Kuparuk River
Sagavanirktok River
Canning River
Hulahula River
Kongakut River
ANWR 1002
ANWR
Cape Lisburne
Point Hope
Toolik
Anaktuvuk Pass
Arctic Village
Kivalina
Noatak
Wiseman

Arctic Integrated Ecosystem Survey, Phase II

Conducting Organization(s): NOAA, USFWS, UAF

Lead Investigator(s): Ed Farley, Kathy Kuletz, Franz Mueter

Duration of Study: 2017-2022

Description: This study is developing a comprehensive assessment of both demersal and pelagic fish communities in the Chukchi and Beaufort Seas to improve benchmark information about the distribution, abundance, and life history of Arctic marine fish species. The goal is to improve understanding of processes that structure the Arctic ecosystem and influence the distribution, abundance, and life history of lower (phytoplankton, zooplankton) and upper trophic level species (invertebrates, fishes, seabirds, mammals), and their vulnerability to a rapidly changing environment.

Arctic Integrated Ecosystem Survey, Phase II

Subject of Study: Biotic Communities and Vegetation, Fisheries

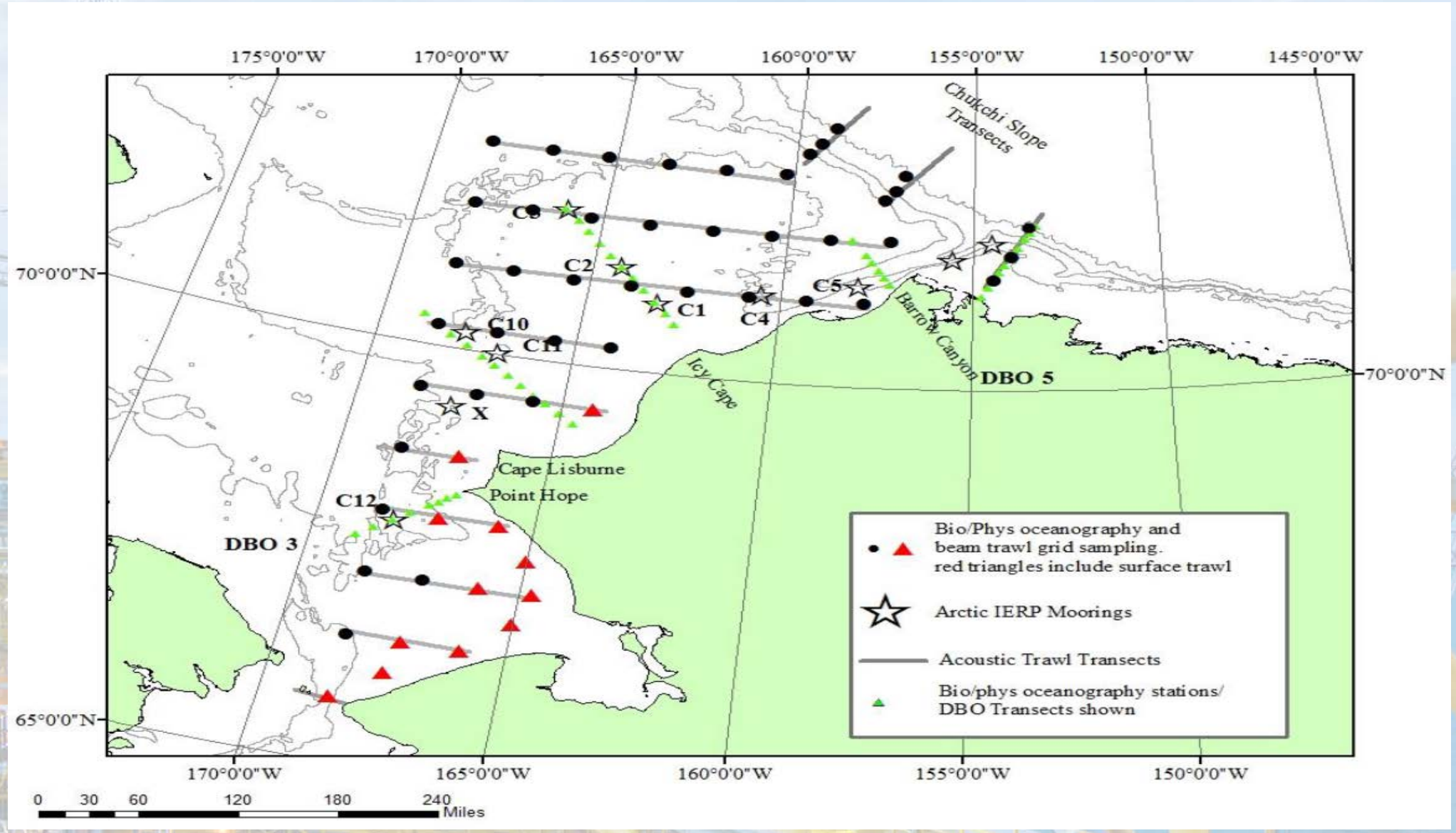
Purpose: This information is needed to enhance environmental impact assessments, particularly with respect to early life history stages of key species such as Arctic cod (*Boreogadus saida*) and forage fishes, to develop indices and benchmarks against which to compare future changes, and to identify the distribution of the vulnerable life stages to facilitate development of effective mitigation measures.

Data Accessibility: Final report will be published on BOEM's website. As appropriate, data will be archived at a Federal data repository (e.g. NCEI), and possibly at AOOS and/or other sites.

BOEM Contact: Rick Raymond, richard.raymond@boem.gov

Arctic Integrated Ecosystem Survey, Phase II

- **Expected Dates of Field Work:** Summer 2019
- **Expected Dates of Aviation/Marine Vessel Use:** Vessel, Aug-Oct 2019
- **Base(s) for Field Work:** Chukchi Sea
- **Aviation Use:** None
- **Aviation Base:** None
- **Other Logistics:** This project is coordinated with the ASGARD oceanography project (NPRB).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150°0'0"W
145°0'0"W
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Chukchi Slope
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C3
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C5
C10
C11
X
C12
Barrow Canyon
DBO 5
Icy Cape
Cape Lisburne
Point Hope
DBO 3
Bio/Phys oceanography and
beam trawl grid sampling.
red triangles include surface trawl
Arctic IERP Moorings
Acoustic Trawl Transects
Bio/phys oceanography stations/
DBO Transects shown
0 30 60 120 180 240
Miles

Monitoring the Cross Island Subsistence Whale Hunt for Effects from Liberty Development and Production

This study is planned to begin in August 2019

Conducting Organization(s): TBD

Lead Investigator(s): TBD

Duration of Study: 2019-2024

Description: This study will resume BOEM's monitoring of the annual bowhead whale hunt at Cross Island, identify any source of disturbance, and identify whaling hunters' scouting tracks and locations of strikes and landings.

Monitoring the Cross Island Subsistence Whale Hunt for Effects from Liberty Development and Production

Subject of Study: Subsistence Resources and Lifestyle

Purpose: The goal of this study is to document the harvest and processing of whales, the hunters' traditional and local knowledge (TK/LK), and other external drivers such as weather, wind, sea states, and ice conditions.

Data Accessibility: Final report will be published on BOEM's website.

BOEM Contact: Jeff Brooks, jeffrey.brooks@boem.gov

Communication Plan: The study will include explicit community engagement activities, as well as developing Reports, Publications and Presentations

Monitoring the Cross Island Subsistence Whale Hunt for Effects from Liberty Development and Production

- **Expected Dates of Field Work:** August-September 2019-2023
- **Expected Dates of Aviation/Marine Vessel Use:** None
- **Base(s) for Field work:** Cross Island and Nuiqsut
- **Aviation Use:** None
- **Aviation Base:** None
- **Other Logistics:** Methods and activities will be consistent with those used in past monitoring.


Legend
National Park Service
National Wildlife Refuge
Bureau of Land Management
Military
Native
State
Sate and Native
Private or Municipal
Chukchi Sea
Beaufort Sea
Barrow
Smith Bay
Wainwright
Meade River
Atqasuk
Prudhoe Bay
Nuiqsut
Deadhorse
Kaktovik
Colville River
Itkillik River
Point Lay
Utukok River
NPR-A
Umiat
Killik River
Sagavanirktok River
Canning River
ANWR 1002
Hulahula River
Kongakut River
ANWR
Cape Lisburne
Point Hope
Toolik
Anaktuvuk Pass
Arctic Village
Kivalina
Noatak
Wiseman

Traditional Knowledge Implementation: Accessing Arctic Community Panels of Subject Matter Experts

- **Conducting Organization(s):** Dept. of Wildlife Management, North Slope Borough
- **Lead Investigator(s):** Dr. Robert Suydam
- **Duration of Study:** 2016-2020

Description: This study will identify and organize Local and Traditional Ecological Knowledge (TK) subject matter experts from Arctic communities into recognized panels of paid consultants so they may become more widely accessible to function with authority on TK domains. By facilitating the creation of these institutional arrangements, this project will actively advance prospects for TK integration into scientific research.

Traditional Knowledge Implementation: Accessing Arctic Community Panels of Subject Matter Experts

- **Subject of Study:** Subsistence Resources and Lifestyle
- **Purpose:** By facilitating the creation of these institutional arrangements, this project will actively advance prospects for TK integration into scientific research sponsored by BOEM and other Federal agencies**:**
  - BOEM-funded *Wave and Hydrodynamic Observations and Modeling in the Nearshore Beaufort Sea*
  - NSF-funded *Beaufort Lagoon Ecosystems – Long Term Ecological Research*
- **Data Accessibility:** Final report will be published on BOEM's website. As appropriate, data will be archived at a Federal data repository (e.g. NCEI), and possibly at AOOS and/or other sites.
- **BOEM Contact:** Jeff Brooks; jeffrey.brooks@boem.gov
- **Communication Plan:** Reports, Publications and Presentations

Community Based Monitoring: LEO Network

Conducting Organization(s): Alaska Native Tribal Health Consortium

Lead Investigator(s): Michael Brubaker

Duration of Study: FY 2016-2021

Description: This study will increase understanding about climate change and other drivers of environmental conditions to facilitate development of appropriate adaptation strategies. To achieve this, LEO strives to integrate science, traditional knowledge, and modern technology to achieve an effective observation system.

Community Based Monitoring: LEO Network

Subject of Study: Socioeconomic (visitor use, public use, public health)

Purpose: This project will provide information to inform environmental analyses under NEPA, including cumulative effects.

Data Accessibility: Final report will be published on BOEM's website. As appropriate, data will be archived at a Federal data repository (e.g. NCIE), and possibly at AOOS and/or other sites.

BOEM Contact: Jim Lima, james.lima@boem.gov

Communication Plan: Report, Publications and Presentations

Marine Arctic Ecosystems Study (MARES): A Multi-Agency NOPP Partnership

Conducting Organization(s): Stantec consulting Services Inc.

Lead Investigator(s): Francis Wiese

Duration of Study: 2015-2019

Description: Moorings were deployed to collect oceanographic information in the U.S./Canada border region to help identify the influence of the Mackenzie River plume at a local and regional scale.

Marine Arctic Ecosystems Study (MARES): A Multi-Agency NOPP Partnership

Subject of Study: *Cumulative Effects*

Purpose: Through a multi-agency agreement under the National Oceanographic Partnership Program (NOPP) BOEM expects to enhance multi-lateral arctic research coordination and to improve regulatory decisions and NEPA analyses pertinent to lease sales, EPs, and DPPs in the Beaufort Sea.

Data Accessibility: Final report will be published on BOEM;s website. As appropriate, data will be archived at a Federal data Repository (e.g. NCEI), and possible at AOOS and/or other sites.

BOEM Contact: Heather Crowley, heather.Crowley@boem.gov

Communication Plan: *Reports, Publications and Presentations*

Marine Arctic Ecosystems Study (MARES): A Multi-Agency NOPP Partnership

Expected Dates of Field Work: July 2019

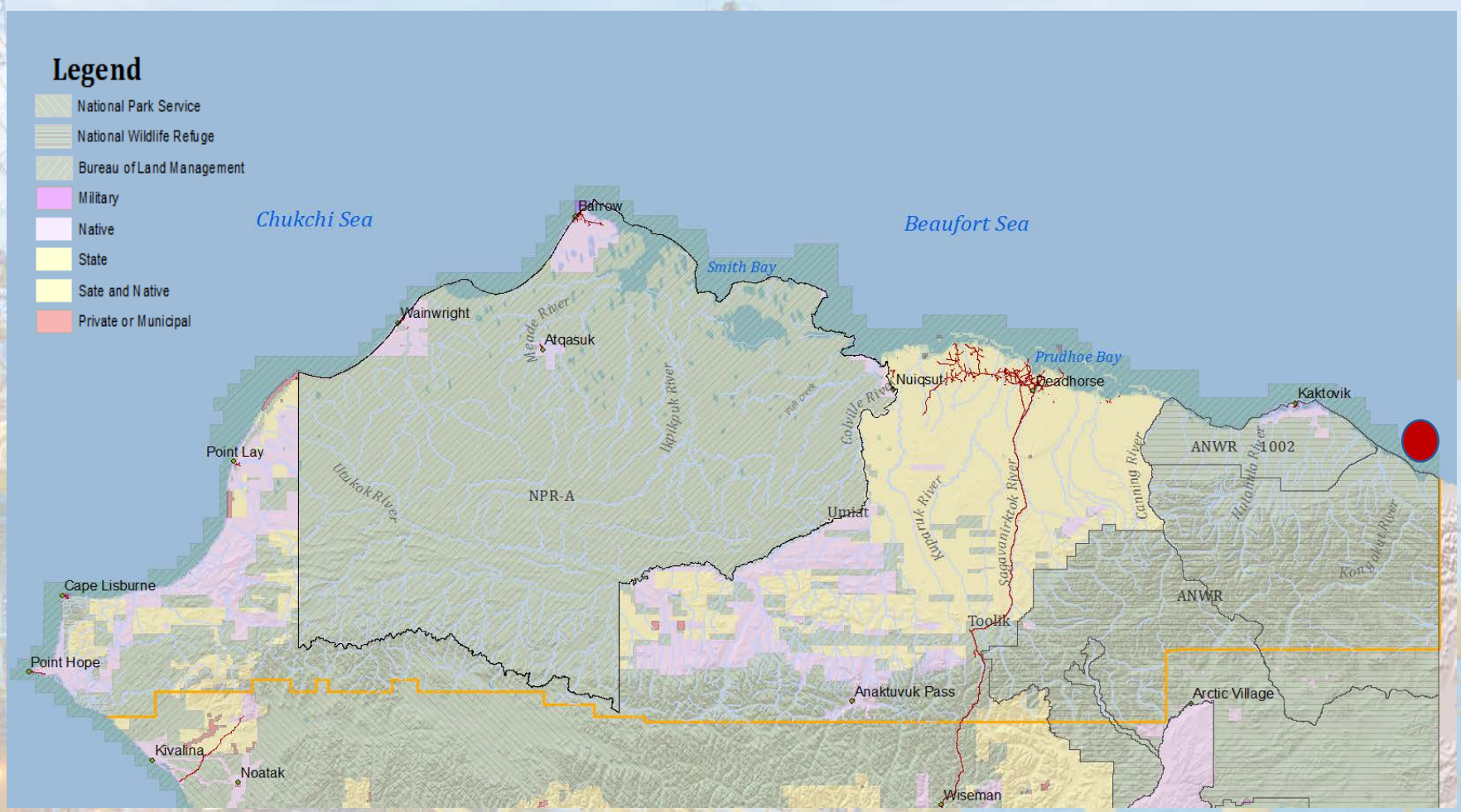
Expected Dates of Aviation/Marine Vessel Use: Vessel, July 2019

Base(s) for Field Work: U.S./Canada Border Region

Aviation Use: None

Aviation Base: None

Other Logistics: The CCGS Sir Wilfrid Laurier will retrieve one mooring was not recovered in October 2018 due to delays caused by heavy ice.


Legend
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Beaufort Sea
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Prudhoe Bay
Barrow
Wainwright
Atqasuk
Meade River
Ikpikpuk River
Colville River
Fish Creek
Nuiqsut
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Kaktovik
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Hulahula River
Kongakut River
ANWR 1002
ANWR
Cape Lisburne
Point Hope
Toolik
Anaktuvuk Pass
Arctic Village
Kivalina
Noatak
Wiseman

Other Relevant Projects

- **BOEM – USGS Partnership**
  - BOEM coordinates with USGS to develop a priority list of studies that are subsequently performed by USGS scientists using funds identified for meeting interagency research needs.
    - Environmental Resource Areas: Developing Products to Support Oil-Spill Risk Analysis and National Environmental Policy Act, John Piatt and Mayumi Arimitsu

- **Desktop Studies**
  - Hydrocarbon Seeps in the Lower Cook Inlet, Gulf of Alaska, Chukchi Sea and Beaufort Sea OCS Planning Areas
    - Literature search to identify and map locations of natural oil seeps off Alaska
  - Oil Spill Occurrence Estimators for Onshore and Offshore Crude and Refined Oil Spills on the Alaska North Slope and Cook Inlet, Alaska
    - Statistical analysis of historical rates of oil spills in Alaska

New Studies Planned for 2019

These projects are in various stages of development.

- **University of Alaska Coastal Marine Institute**
  - Cooperative program with UA, up to $1 M/year, with 1:1 match. Studies address topical issues related to oil and gas exploration and development
- **Impacts of Sedimentation and Drivers of Variability in the Boulder Patch Community, Beaufort Sea**
  - This study will monitor community variability at the Boulder Patch, evaluate potential effects from Liberty development activities, and test possible mitigation measures.
- **Landfast Ice Climatology in the Beaufort and Chukchi Seas**
  - This study will document how the landfast ice extent has changed over time and evaluate how changes in landfast ice relate to local and regional changes in temperature, pressure, and major storms, as well as to global climate shifts.
- **Model-based Essential Fish Habitat (EFH) Descriptions for Arctic Cod, Saffron Cod and Snow Crab in the Alaskan Arctic**
  - This desktop study will identify the habitat characteristics most important to distributions and habitat suitability of larval (if data is available), juvenile and adult Arctic cod, saffron cod and snow crab.

Studies that are Wrapping Up

Reports for these projects will be available in the coming months.

- **Satellite Tracking of Bowhead Whales: Habitat Use and Monitoring**
  - Tracking the movements and documenting the behavior of bowhead whales using satellite telemetry.
- **Ice Seal Movements and Foraging: Village-based Satellite Tracking of Seals**
  - Developing collaborations between local Village Councils, seal hunters, the Ice Seal Committee, NSB, ADF&G, NMFS, BOEM, to establish seal tagging projects near several communities to better understand movements and habitat use of ringed and bearded seals
- **ANIMIDA III: Boulder Patch and Other Kelp Communities**
  - Continuation of long-term monitoring of kelp communities in the Boulder Patch.
- **Measuring Wave Forces along Alaska's Coastal Sea Ice**
  - Examining mechanical properties of sea ice within the landfast ice zone and the stresses from wind, waves, coastal waves, and storm surges that cause breakout events.
- **Initiating an Arctic Marine Biodiversity Observing Network (AMBON)**
  - Collecting and evaluating information to differentiate human-induced effects from natural variability on the health of biodiversity in the Chukchi Sea.
- **Estimation of Abundance and Demographic Rates of Pacific Walruses Using a Genetics-based Mark-Recapture Approach**
  - Estimating annual abundance and demographic rates of walruses for validation and parameterization of population models.

Further Information Needs

- **Information is unavailable about timing and locations for spawning of Arctic cod.**
  - Arctic cod fill an essential ecosystem role by consuming small prey and in turn providing a food resource for larger fishes, birds, marine mammals, and to the Arctic residents subsisting on those animals.
  - Basic life history information, such as spawning time and locations, is limited due to accessibility issues during ice-covered months.
- **Accumulation of floating plastic debris is a growing concern for the world's oceans.**
  - The "Great Pacific Garbage Patch," discovered in the mid-1980s, is characterized by high concentrations of pelagic plastics and other debris in the water column trapped by currents of the North Pacific.
  - Although plastic debris is generally less in Arctic waters than in temperate regions, high concentrations have been seen in areas of the Greenland and Barents seas.
  - Seabirds, especially offshore foragers such as fulmars, albatrosses, petrels and shearwaters, are often found with elevated levels of ingested plastics.

Further Information Needs

- **Population of red-throated loons in northern Alaska is declining at an accelerated rate.**
  - Existing data has shown that adult red-throated loons have high survival rates, but the negative population trend suggests that reproductive success is poor.
  - Clutch size of red-throated loons appear stable, implying an inability of red-throated loon parents to acquire sufficient resources for their young, either from numerically few prey or from prey of insufficient nutritional quality
- **Introductions of Marine Non-Native Species on the Arctic.**
  - The threat of introductions of marine Non-Native Species (mNNS) in the Arctic is increasing with the uptick in Arctic shipping activity and infrastructure development.
  - Coastal communities that are reliant on the services that marine ecosystems provide are particularly vulnerable.
  - Early detection of mNNS is vital for potential control, eradication and prevention of further spread.

BOEM

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BOEM.gov

Catherine Coon | Catherine.coon@boem.gov | 907.334.5245

2019 BP Environmental Studies on Alaska's North Slope (GPB)

Christina Pohl / Eric Van Dongen
BPXA Environmental

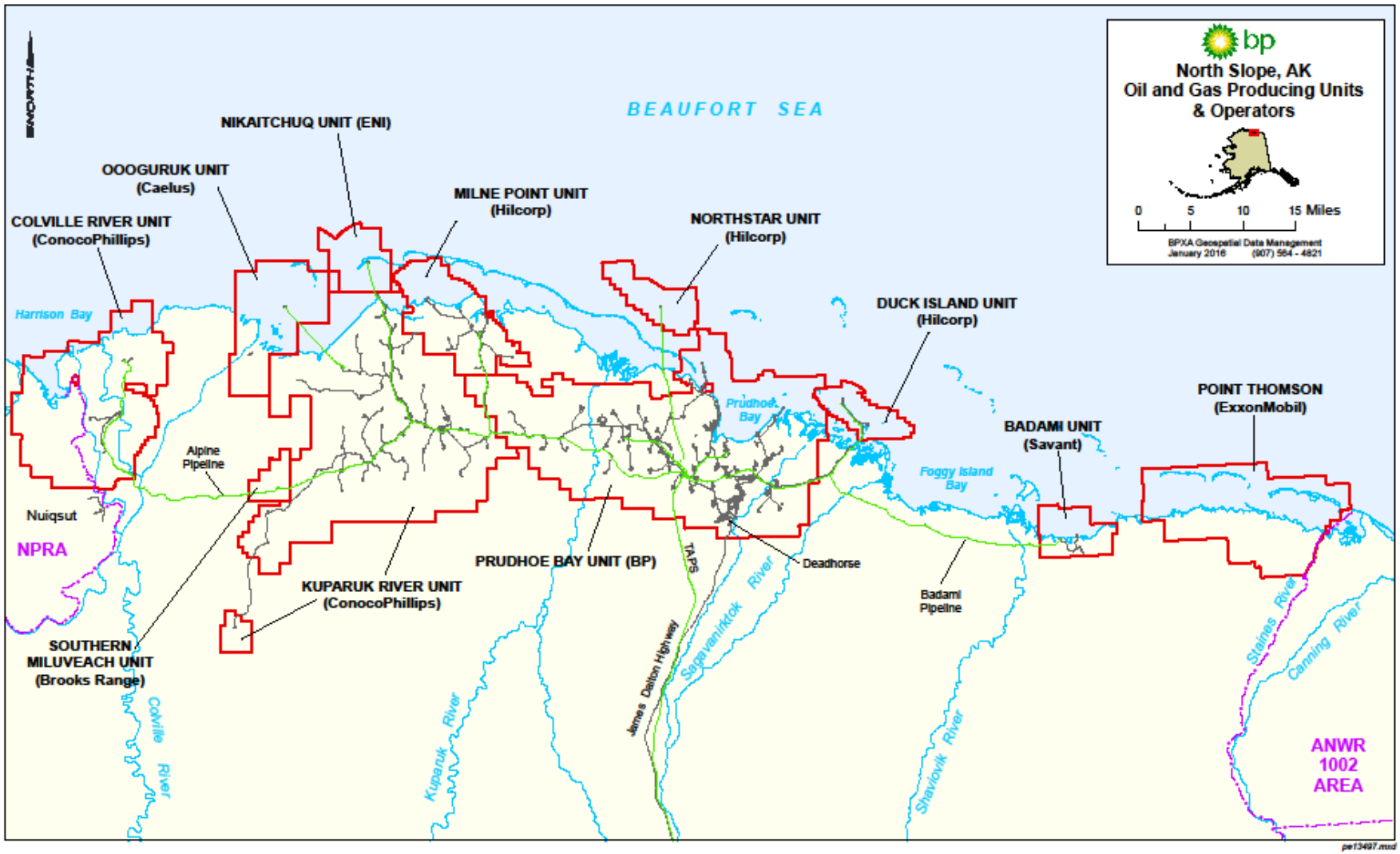
BP Sponsors and Supports Environmental Studies

Please note that this may not reflect all studies for 2019 but rather gives you an idea of activities being performed. Not all groups for 2019 have contacted us and thus may not be reflected.

Why we support:

- No harm to environment
- Realistic appraisal of impacts
- Developing approaches for mitigating impacts
- Compliance
- Permit application support
- Control risk of prosecution
- Informing policy & regulations
- Litigation
- Public perception
- Managing risk

Map – See Prudhoe



BPXA Contracted Parties

Polar Bear Maternal Den Detection Aerial Infrared Surveys (2018-2019 Season)

- Conducted aerial infrared surveys for maternal polar bear dens in GPB. Imagery from infrared cameras are used to detect heat signatures (hotspots) permeating through drifted snow in den habitat (i.e. coastal bluffs, river banks, lake edges, etc.) which are conducive to polar bear denning. Stipulation of USFWS LoA.
- Fairweather Science - December 2018 and January 2019

Tundra Rehabilitation

- 16 sites are planned for 2019 including old exploration, trench, tundra damage and spill sites. Quantitative and qualitative data, along with photos points will be taken. This is part of BPXA's ongoing monitoring program.
- ABR, Weston Solutions Inc., Other - July and August

PBS40 Seismic Cultural Resources Survey (2018)

- BPXA conducted a terrestrial 3D seismic program in the winter of 2019. The seismic survey area encompassed approximately 553 square miles. A cultural resources (archaeological) survey to was completed in the summer of 2018.
- SAExploration - January – April 2019 for Seismic and Summer 2018 for Archeological Survey

BPXA Contracted Parties (continued)

Air Monitoring and Air Emissions

- Perform air monitoring such as ambient gas calibrations, QC checks of particulate samplers, and maintenance at select facilities. Conduct air emissions testing of turbines.
- SLR - Year round

Fish Habitat Road Crossing (Culvert) Inspections

- Evaluate culvert conditions in fish bearing streams to ensure that the structures are not adversely affecting the movement of fish and their ability to access habitat for completion of their life history requirements. 5 passage criteria. ADFG Fish Habitat Permit compliance.
- ERM – Usually July

Solid Waste Facility Compliance Monitoring and Water Sampling

- Conduct annual water quality sampling to support Solid Waste Disposal Permit Compliance assessment.
- ERM - September? And as needed

Raven Roosting Issues Consult – CGF

- USDA agent Cory Walch conducted an on-site consult and advisory visit regarding Raven roosting issues.
- United States Department of Agriculture (USDA) – February 2019 1st visit

Third Party Groups (Sponsored)

Wildlife Conservation Society - Long-term Tundra Bird Monitoring

- Monitor long-term changes in avian nest biology and nest predator abundances in relation to human infrastructure/activities and climate change in the AK Arctic. This includes the Buff-breasted Sandpiper.
- Wildlife Conservation Society (WCS) and BPXA Sponsored Study
- June - August

- 2019 is the 17th season of the study. Manuscript in progress for retrospective paper of LTNM.
- Long-term dataset is important for evaluating potential impacts to tundra-nesting birds from industry, climate change, and predators.
- Study helps document changes in birds successfully nesting in the oilfield
- Nest initiation dates correlate positively with timing of snowmelt
- Predation (gulls, lemmings, jaegers, ravens, fox) is most common cause of nest failure across all years.

Third Party Groups - NASA Funded and Conducted By WHOI

WHOI NASA On Ice Study

- Understand the riverine contribution of organic carbon into Arctic Ocean coastal margins.
- Deploy 5 instrument packages for testing in the springs of 2018-2020. Each instrument package will include mooring hardware, electronic data logger, underwater sensor packages deployed through the sea ice, and a satellite radio modem for transmission of data back to shore.
- The equipment will be located in the outflows of the Sag and the Kuparuk Rivers.
- National Aeronautics and Space Administration (NASA) funded that is being conducted by the Woods Hole Oceanographic Institution (WHOI) with support from the University of Alaska Fairbanks (UAF) and Kinnetic Laboratories, Inc. (KLI)
- 4/17 – 4/24 and 5/20 – 5/25 (after sea ice reaches maximum, but before the spring melt and freshet)

Optical assessment of riverine inputs into Arctic coastal margins

Samuel Laney[1,*], Steve Okkonen[2], Krista Longnecker[1], Dariusz Stramski[3], Daniel Koestner[3] slaney@whoi.edu

1) Woods Hole Oceanographic Institution, Woods Hole MA, USA 2) University of Alaska Fairbanks, AK 3) Scripps Institution of Oceanography, La Jolla CA

Third Party Groups - NASA Funded and Conducted By WHOI (continued)

WHOI River Sampling

- Quantify the seasonality and variability in the riverine contribution of organic carbon into Arctic Ocean coastal margins. By examining the Kuparuk River and the Sagavanirktok River, two rivers that drain different types of terrestrial biomes, this study will provide insight into possible source-river differences in organic carbon transport into these seasonally ice-covered Arctic coastal margins. Having such direct, long-term observations of proxies for the POC and DOC delivered by the spring freshet is essential for reducing uncertainties about key aspects of the organic carbon cycle on the Alaskan Arctic coastal margin.
- NASA funded, PI WHOI
- 5/18 - 5/28

WHOI NASA Riverine Carbon Project *(Riverine Carbon Contributions to Alaksan Arctic Coastal Margins)*

- Quantify the seasonality and variability in the riverine contribution of organic carbon into US Arctic Ocean coastal margins.
- Collect data loggers, Open water ocean-sampling
- NASA funded, PI WHOI/UAF
- September via *R/V UKPIK*

Third Party Groups – Government

USGS Den Study

- Better understand impacts of sound and vibration on maternal denning bears.
- Three USGS personnel (Todd Atwood, George Durner, and Ethan Ducharme) dug artificial dens, equipping them with sound and vibration meters.
- Coordinate closely with BP and the PBS40 Seismic project to ensure the dens are placed in a safe location. Collect data as seismic vibes and tuckers move through the area.
- United States Geological Survey (USGS)
- 3/25/2019 – 4/27/2019

ADFG Grizzly Bar Collaring

- Collar grizzly bears on North Slope and retrieve data on their life cycle such as denning locations and movements. Life-history genetics
- Alaska Department of Fish and Game (ADFG)
- Ongoing

Third Party Groups – Government (continued)

U.S. Navy Water Sampling Sagavanirktok and Kuparuk Rivers

- Year one of a three-year study, working out of Toolik Lake collecting water samples from the Sagavanirktok River and Kuparuk River and other small creeks and streams near the Dalton Highway from the Brooks Range north towards Prudhoe Bay. Sampling would consist of simply measuring river flow and collecting surface water.
- U.S. Naval Academy, West Point Military Academy, and the U.S. Army Corps of Engineers (USACE) Engineer Research & Development Center (ERDC) Cold Regions Research & Engineering Laboratory (CRREL)
- June 1-15, July 28 - August 12, Sept

U.S Navy Coastal Studies

- Study coastal waters in the North Slope region. They will be operating out of Prudhoe Bay and using *R/V Ukpik*. They are planning a site visit in 2019 and will be performing their data collection in 2020.
- U.S. Naval Research Laboratory
- 8-5 to 8-15

USGS/UAF WERC hydrology monitoring of Sag & Kuparuk Rivers– Jeff Conway USGS

USGS Caribou Road Crossing Study – Heather Johnson (CPAI, Hilcorp)

Third Party Groups - University

UAF Soundscape Ecology *(Navigating the New Arctic (NNA): Soundscape ecology to assess environmental and anthropogenic controls on wildlife behavior.)*

- Use soundscape ecology to assess environmental and anthropogenic controls on wildlife behavior via observations and analyses to quantify the influence of changing environmental dynamics and increasing anthropogenic activity on the behavior and phenology of migratory caribou, waterfowl, and songbird communities in Arctic-Boreal Alaska and northwestern Canada. Research teams of two will use soundscape instrumentation consisting of cameras and acoustics to collect data from caribou calving grounds. Three (3) of their sites are in Prudhoe Bay, in which two are accessible by helicopter and one is accessible via the road.
- University of Alaska Fairbanks (UAF) - 5/2 – 5/5, Mid July, and Early October. Todd Brinkman

University of Notre Dame Vegetation Research

- Better understand Arctic carbon cycle - distribution of species and their biomass in space and time. Statistical niche models which predict species abundance and biomass as a function of environmental conditions are a means of filling this knowledge gap. These models are usually developed based on patterns of species abundance in space and rarely include patterns of abundance in time (e.g. historical data). Their goal is to resurvey the abundance of E. vaginatum in plots surveyed in the early 80's (see: Shaver and Fetcher 1986 in Ecology) as a step toward filling this gap.
- University of Notre Dame - 8/15 to 9/6 (Wilkes University Plots)

Third Party Groups - University

UAA Caribou Forage Study

- Vegetation plot monitoring and sampling
- Jeff Welkes/Katherine Casey
- June – August 2019

UAF Permafrost Monitoring at West Dock

- West Dock Borehole monitoring by UAF permafrost lab.
- Vlad Romanovsky, UAF August 2019

Miscellaneous third party access via. *R/V Ukpik*

Thanks . . . .Questions?

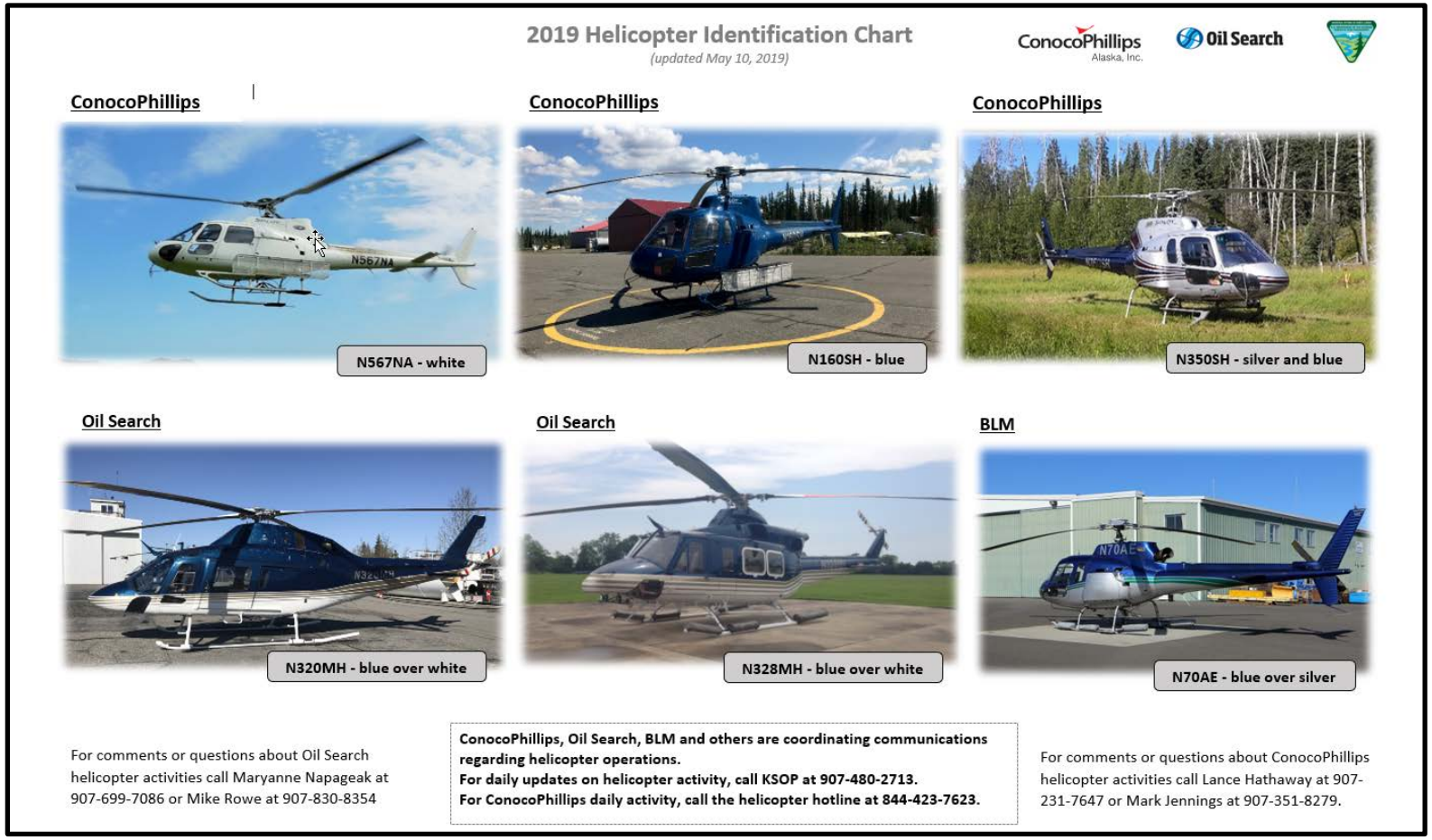
ConocoPhillips

ConocoPhillips Summer Environmental Studies

May 2019

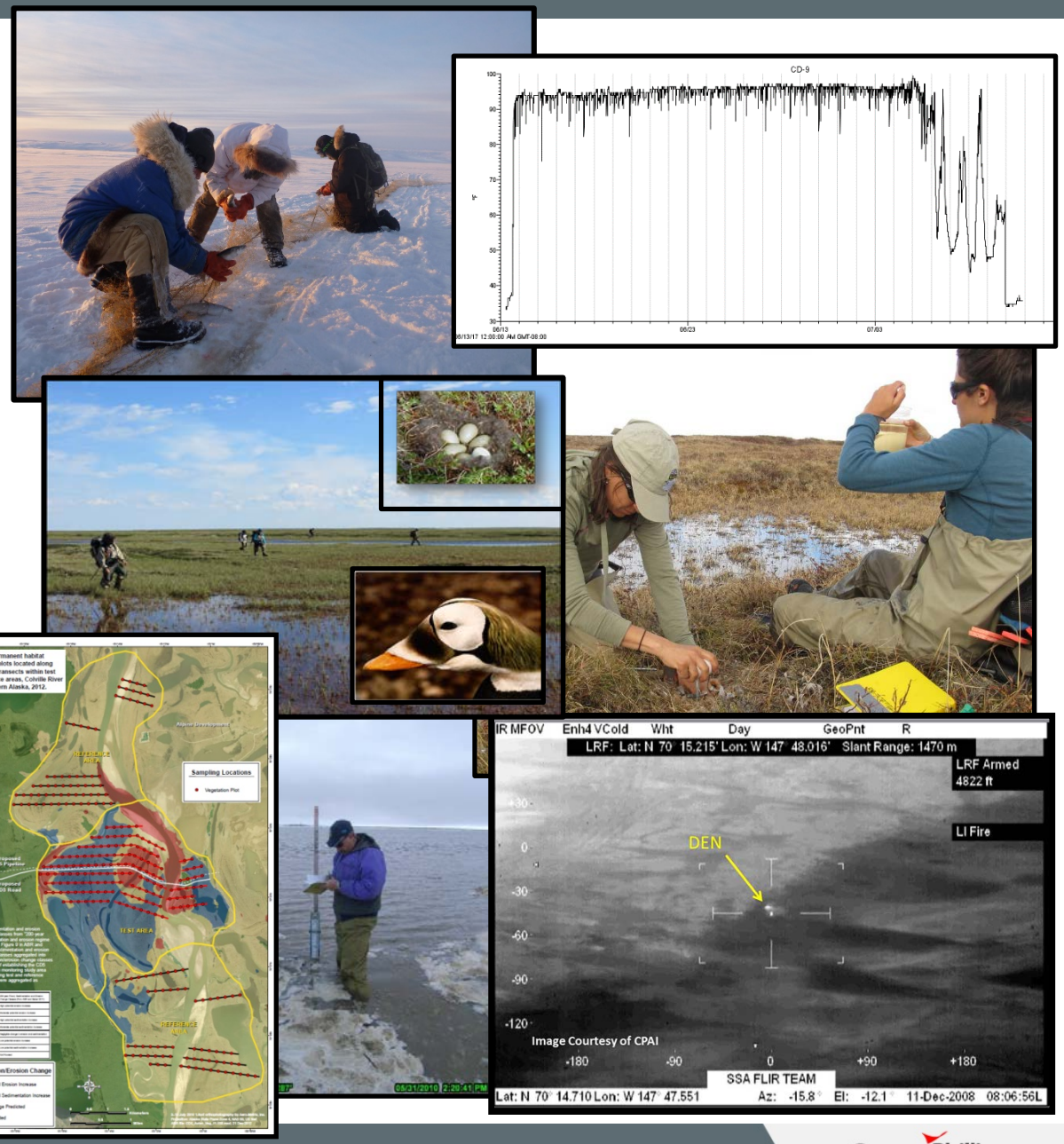
General Information for All Studies

- Lead Organization: ConocoPhillips
- Duration: April – December
  - Helicopter operations began May 10
- Field Work based out of Alpine
  - One Kuparuk project
  - Fixed-wing support based out of Deadhorse (Cessna)
  - Soloy A-Stars @ Alpine
  - Otter for FLIR surveys
  - Casa or Otter for personnel transport to Alpine
- Contact - Robyn McGhee



2019 Ongoing Field Studies

- Hydrology/Water
  - Colville River Delta Breakup Monitoring (USACE POA-2004-253)
  - CD5 AMS Requirements (USACE POA-2005-1576)
  - GMT1 Stream Crossing Monitoring (USACE POA-2013-461)
  - GMT2 Culvert Monitoring (USACE POA-2015-00486)
  - Colville Ice Bridge Monitoring (ADFG FH Permit)
  - Alpine Drinking Water Lakes Monitoring (ADFG FH Permits)
- Avian
  - Spectacled eider nest searches at CD3, CD4, CD5, & GMT1 Biological Opinion requirement for off-pad work (including foot traffic)
  - CD5 Greater White-fronted Goose (NSB Rezone Ordinance)
  - Kuparuk Spectacled eider nest searches by likely use areas (voluntary)
  - Colville River Delta Avian Survey for Eiders, Loons, and Gulls (voluntary)
- Fisheries
  - Nuiqsut Fall Fishery October - November (NSB Rezone Ordinance)
- Mammals
  - Caribou abundance and distribution plus collaring (funding) – Colville River Delta, NPRA, new lease areas (IAP requirement)
  - Polar bear FLIR den surveys (LOA requirement)
- Air Quality
  - Ambient air quality and meteorological station at Nuiqsut
  - Monthly VOC collection at Alpine and in Nuiqsut



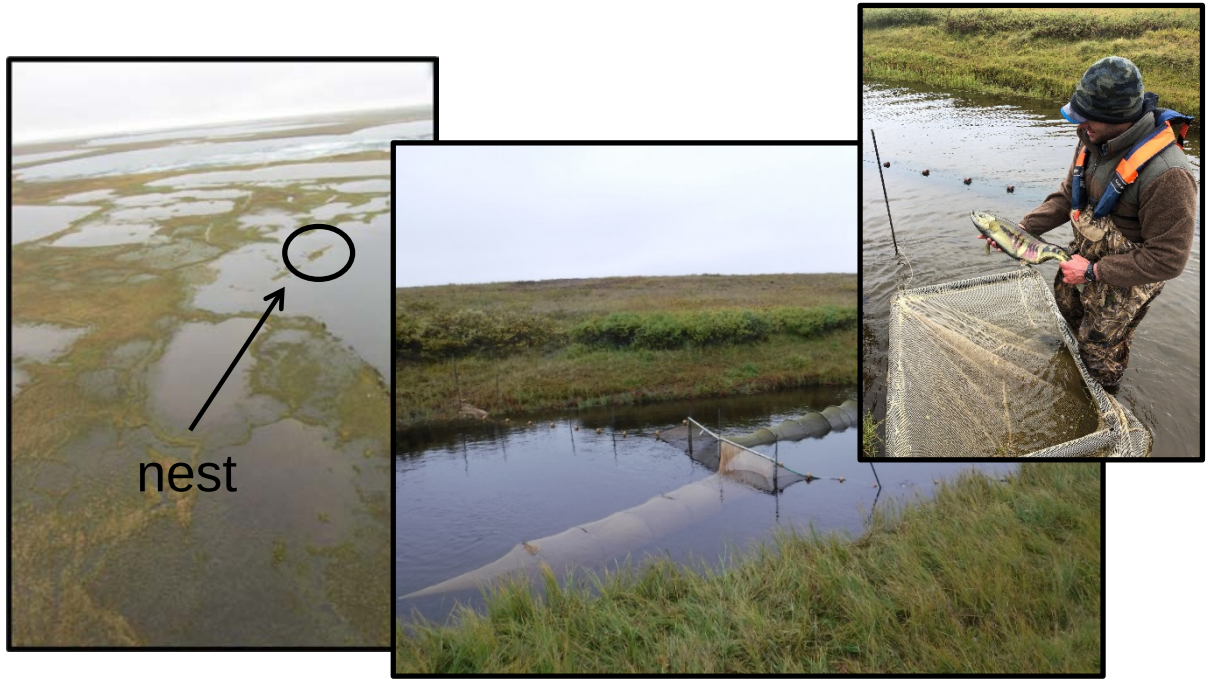
ConocoPhillips

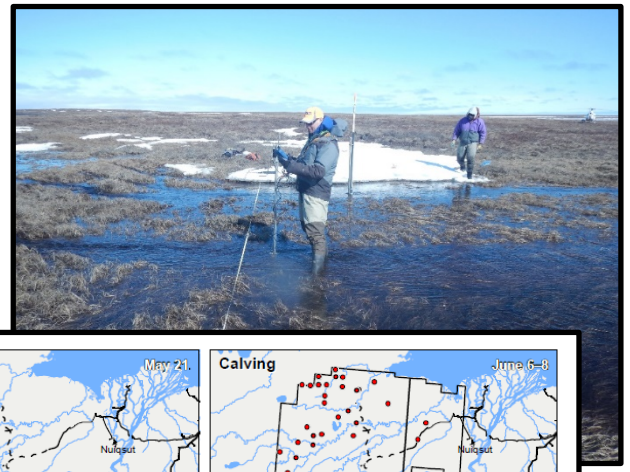
Exploration Environmental Studies

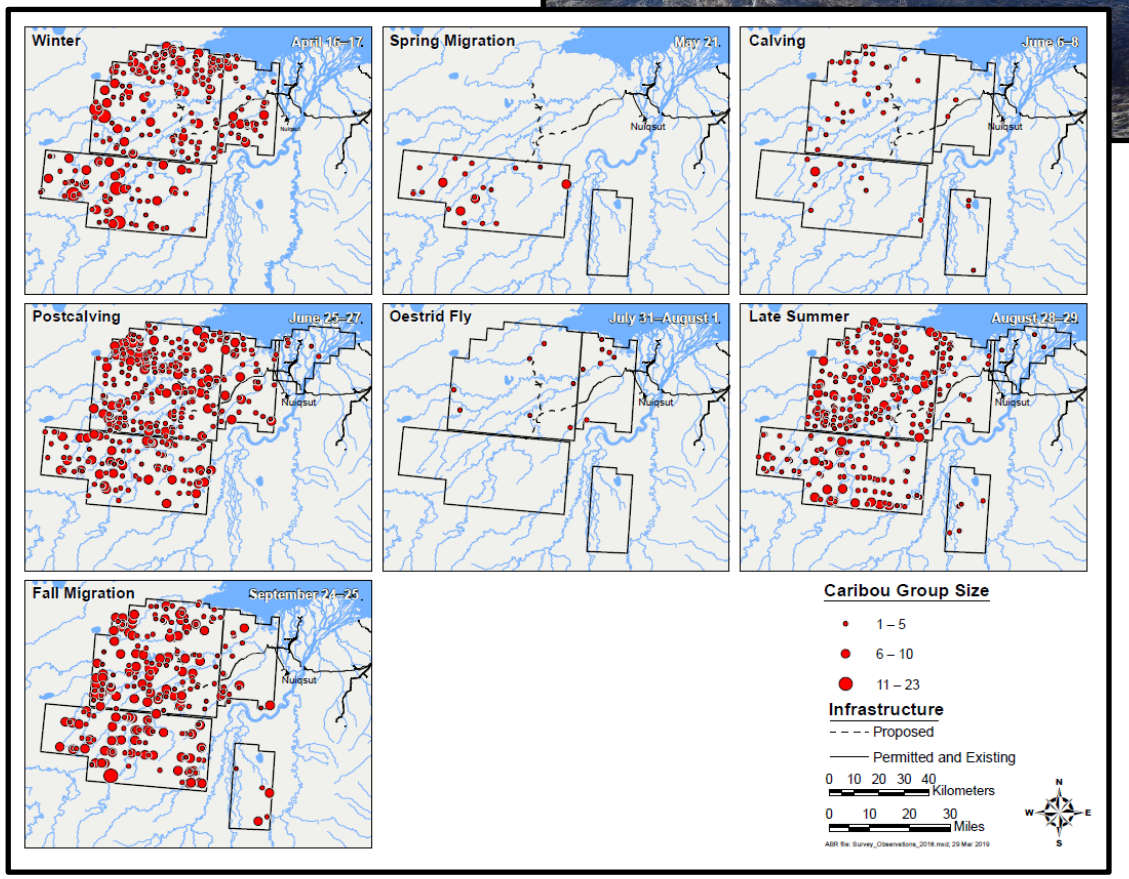
- Exploration Permitting
  - Archaeology Surveys – (National Historic Preservation Act Section 106 and North Slope Borough IHLC)
  - Lake Surveys for Fish Presence & Bathymetry (ADFG and ADNR permitting)

NPR-A Specific Studies

- Avian - Spec Eider & Yellow-billed loon (IAP E-11)
  - Pre-nesting eider surveys in June and loon nesting surveys in June and brood surveys in August.
- Hydrology (IAP E-14)
  - Stream and ephemeral flows/swales monitored for seasonal discharge, stage, flooding extents, and ice and snow effects.
- Fish Abundance and Distribution (IAP E-14)
  - Seasonal distribution and composition of fish populations in streams.
- Caribou (IAP K-5) – continuing a long-term data set
  - Abundance and distribution, collaring

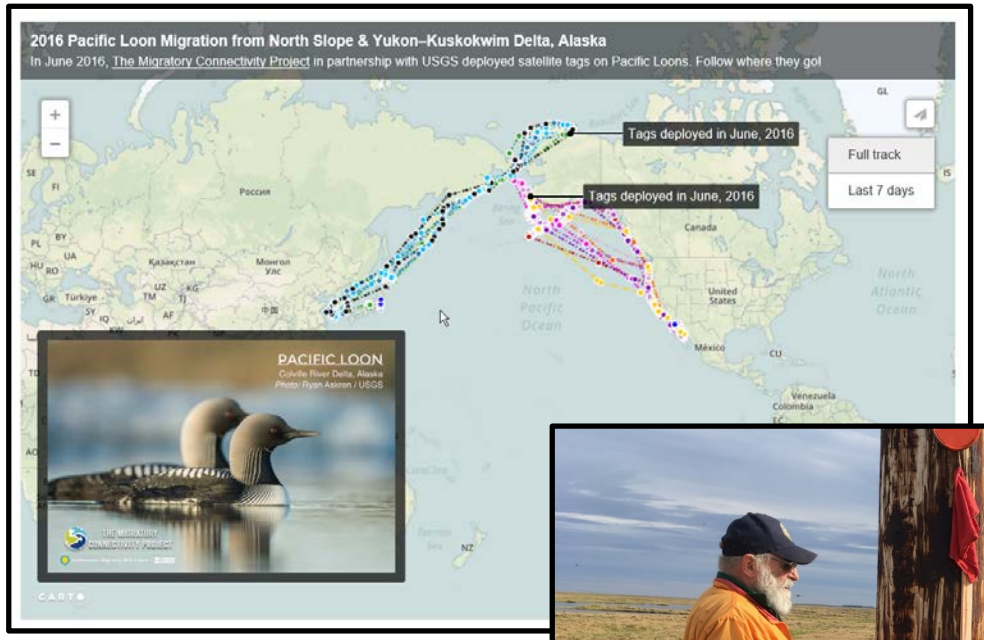






Third-Party Studies

- Smithsonian Migratory Connectivity Project
  - Bird Tagging at Alpine - June
- Ducks Unlimited
  - Goose tagging at Alpine – June
- USGS/BLM
  - Installing traffic counters at Kuparuk
- UAF
  - Dr. Brinkman's graduate students
- ADFG Grizzly Collaring
  - Kuparuk-based fueling
- ASAMM Surveys
  - Funding additional nearshore transects in Harrison Bay
- Potentially Others
  - WCS Wolverine collaring



ConocoPhillips

Study Title: Updated vegetation, wetlands and hydrography mapping for the Arctic National Wildlife Refuge Coastal Plain

Lead Organization(s): US Fish and Wildlife Service

Other Organization(s): ABR, St. Mary's University, USGS, BLM

Lead Investigator(s): Wendy Loya

Investigator Contact(s):wendy_loya@fws.gov

Duration of Study: 2018-2020

Description: Develop an updated vegetation and wetlands map and a digital dataset representing the natural and human altered hydrologic features

Study Title: Updated vegetation, wetlands and hydrography mapping for the Arctic National Wildlife Refuge Coastal Plain

Subject of Study: Biotic Communities and Vegetation; Soils, Permafrost, Wetlands; Water Resources

Audience: FWS-Arctic National Wildlife Refuge, BLM, DNR, Industry

Purpose: To allow for updated habitat analyses; permit and/or guide winter tundra travel; understand snow distribution patterns; and infrastructure planning

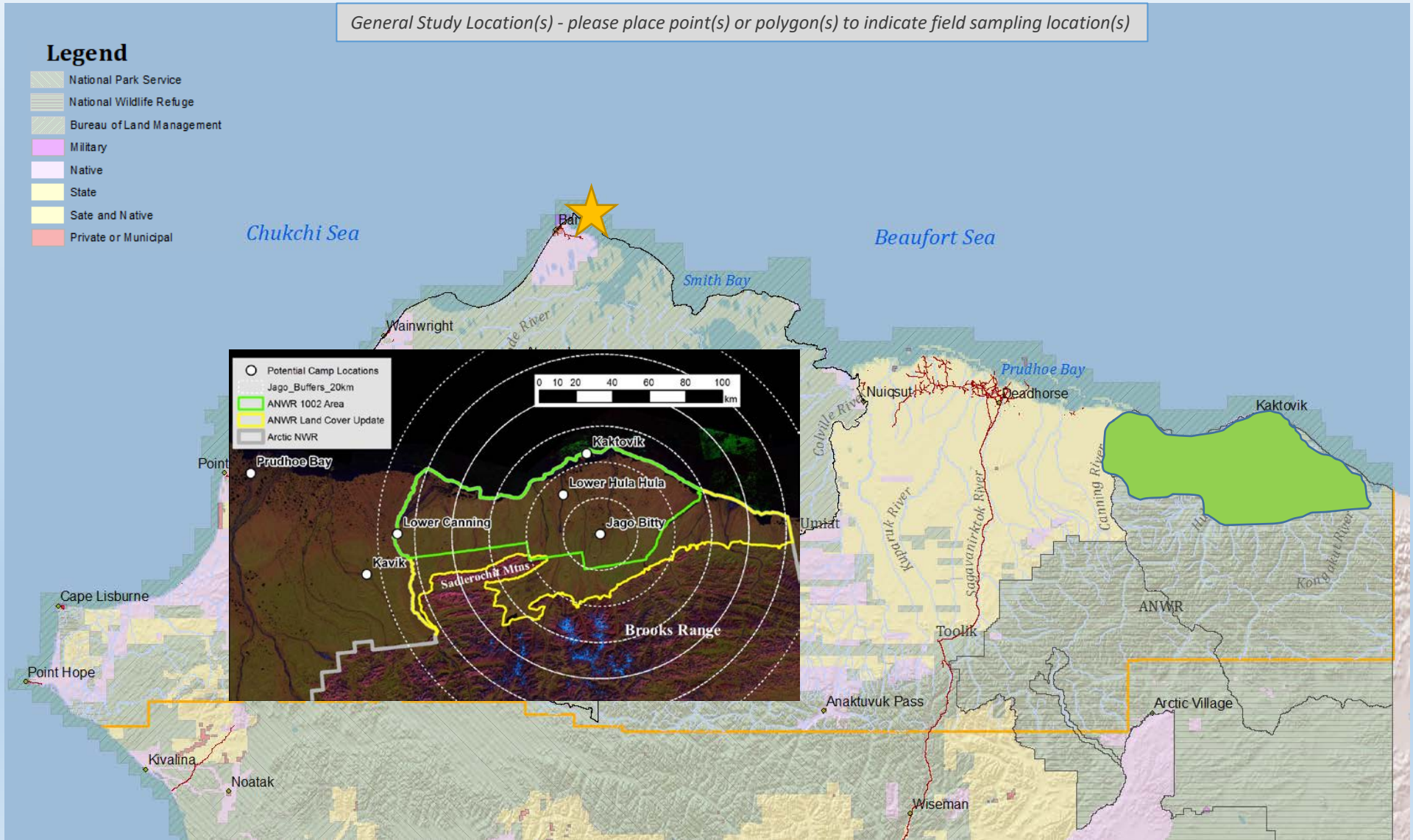
Data Accessibility: Maps, data, reports will be publically available

Data Contact: Science Base

Communication Plan: Report

Study Title: Updated vegetation, wetlands and hydrography mapping for the Arctic National Wildlife Refuge Coastal Plain

General Study Location(s) - please place point(s) or polygon(s) to indicate field sampling location(s)



Study Title: Arctic Coastal Plain Breeding Pair & Aerial Waterfowl Surveys

Lead Organization(s): US Fish and Wildlife Service

Other Organization(s): BLM

Lead Investigator(s): Julian Fischer

Investigator Contact(s): Julian_Fischer@fws.gov

Duration of Study: Annual monitoring

Description: The USFWS initiated this survey in 1986 to supplement an annual aerial survey of waterfowl that has been conducted throughout North America since the 1950s. The primary objectives of the survey are to provide information about population trends and geographic distribution for waterfowl and loons that breed on the Arctic Coastal Plain of Alaska. Within the survey area, transect spacing ranges from 5 miles apart (in high density wetlands such as the Teshekpuk Lake Special Area), to 30 miles apart (in more sparse wetland areas, such as the foothills of the Brooks Range). A total population index for each species is generated from the number of birds counted along the aerial transects. Surveys will be conducted with a crew of two biologists flying an amphibious Cessna 206 aircrafts.

Study Title: Arctic Coastal Plain Breeding Pair & Aerial Waterfowl Surveys

Subject of Study: Raptors, Resident and Migratory Birds

Audience: The USFWS shares this information with the North Slope Borough, Alaska Migratory Bird Co-management Council, Pacific Flyway Council, and others

Purpose: who are responsible for establishing hunting regulations, monitoring status of listed spectacled eiders and Steller's eiders, and reviewing potential impacts from development projects.

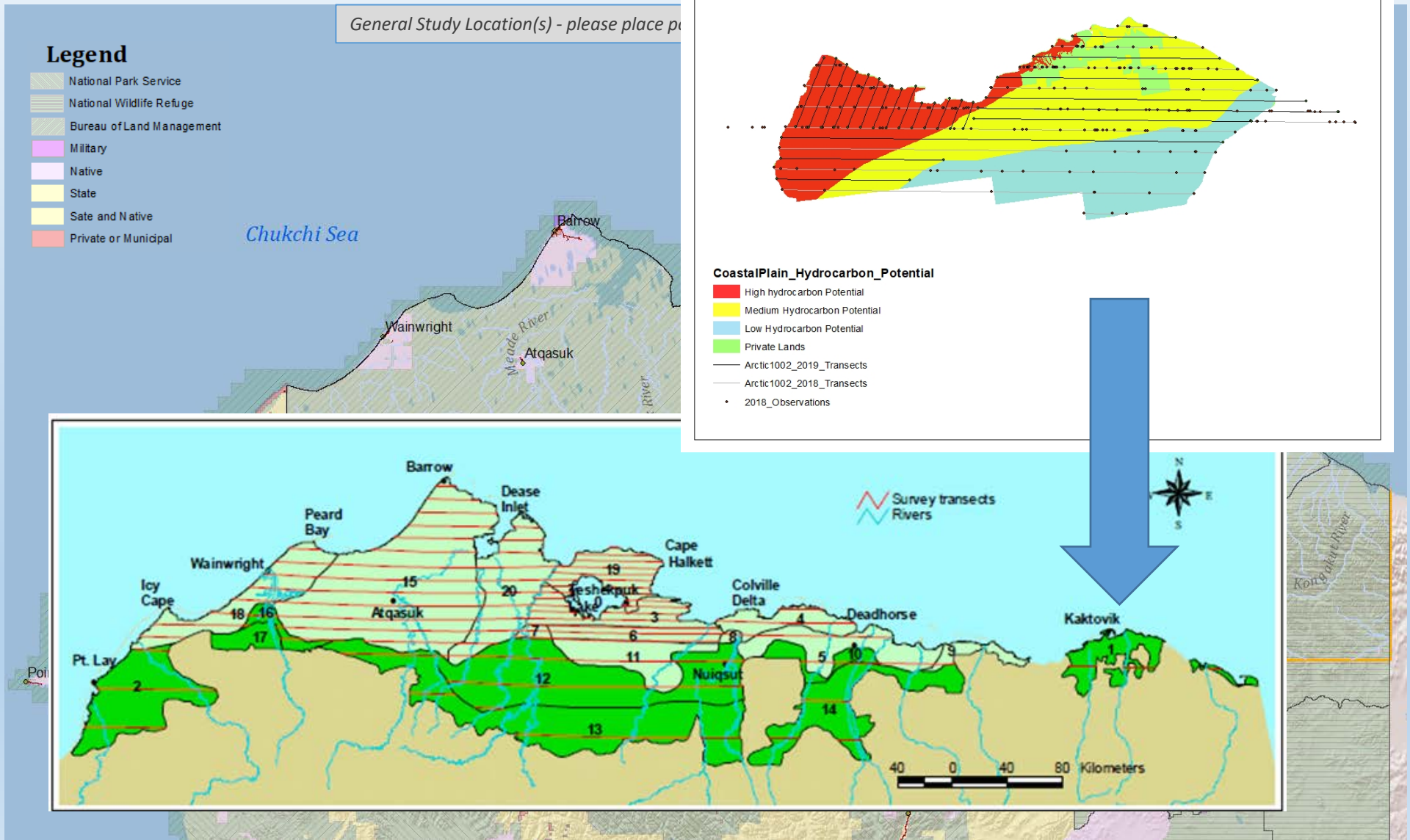
Data Accessibility: Annual reports, database, research articles all publically available

Communication Plan: Current results are published in FWS and USGS reports; data will be used in future scientific studies.

Expected Dates of Field Work: Mid-June

Aviation Use: amphibious Cessna 206

Study Title: Arctic Coastal Plain Breeding Pair & Aerial Waterfowl Surve



Study Title: Avian studies in Canning River Delta & Beaufort Sea Barrier Islands

Lead Organization(s): US Fish and Wildlife Service

Other Organization(s): Federal, State, University, Non-Profits

Lead Investigator(s): Chris Latty & Rick Lanctot

Investigator Contact(s): christopher_latty@fws.gov; richard_lanctot@fws.gov

Duration of Study: Annual monitoring

Description:

- Ecology of common eiders nesting on Beaufort Sea barrier islands
- Ecology of tundra nesting birds breeding at the Canning River delta
- Migration ecology of cackling geese breeding in eastern Arctic Alaska
- Arctic and Red fox abundance at the Canning River Delta and their role as nest predators in a changing climate
- Lemming abundance at the Canning River Delta and their role in driving predator abundance and affecting tundra nesting bird egg loss
- Post-breeding movements of Shorebirds along the Arctic Coast of Alaska
- Annual Migratory movements of Dunlin

Study Title: Avian studies in Canning River Delta & Beaufort Sea Barrier Islands

Subject of Study: Raptors, Resident and Migratory Birds

Audience: The USFWS shares this information with the North Slope Borough, BLM, ADFG, USGS

Purpose: This survey is used to monitor molting habitat use and to evaluate changes in abundance and distribution as a result of habitat change or potential future resource development.

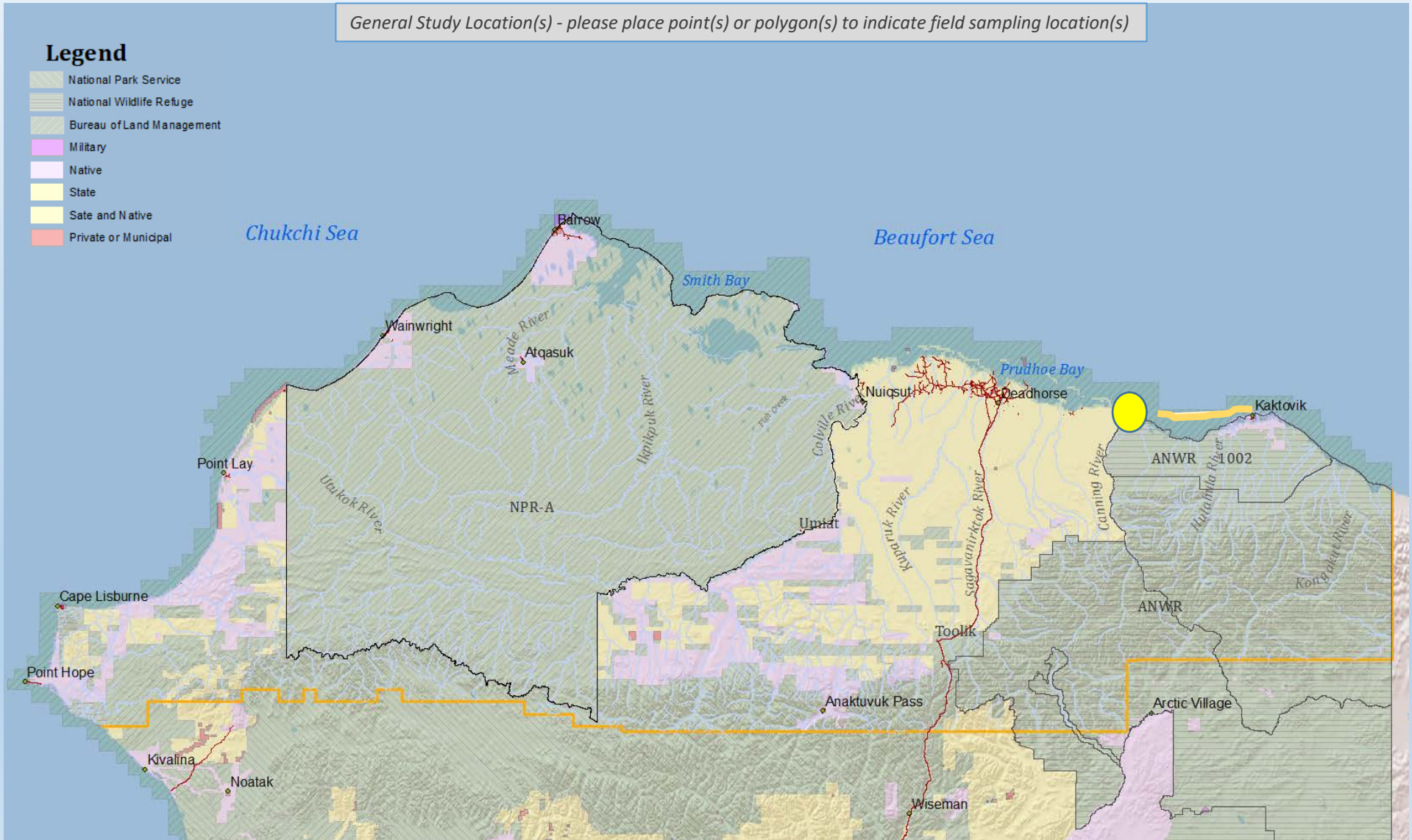
Data Accessibility: Annual reports, database, research articles all publically available

Communication Plan: Current results are published in FWS reports; data will be used in future scientific studies.

Expected Dates of Field Work: June-July

Aviation Use: Helicopter

Study Title: Avian studies in Canning River Delta & Beaufort Sea Barrier Islands



List of other FWS Studies

Steller's and Spectacled Eider Breeding Biology Project in Barrow	Porcupine Caribou Herd monitoring
Steller's Eider Aerial Survey of the Barrow Triangle	Dall sheep aerial census
Arctic fox occupancy study at Utqiagvik, Alaska	Moose survey - North Slope
Eider Recovery Outreach and Education	Hulahula Stream Gage (USGS)
Baseline Contaminants and Water Quality in the Arctic Refuge Coastal Plain	Teshekpuk Lake Area Molting Goose Survey
Overwintering Habitats of Dolly Varden in the Canning River	Snow Depth and Climate Monitoring (USGS, UAF)

Study Title: Northstar Island Acoustic Monitoring

Lead Organization(s): Hilcorp Alaska, LLC

Other Organization(s): Greeneridge Sciences

Lead Investigator(s): Katherine Kim, previously Suzanna Blackwell

Other Investigator(s): Alex Conrad

Investigator Contact(s): Inquiries should be directed through Hilcorp

Duration of Study: Original intent from NMFS and USACE was "during construction and initial operation"; NSB Ordinance specified unattainable end date; therefore end of field life.

Description: Directional Autonomous Seafloor Acoustic Recorders (DASAR) deployed in two locations – near the island and offshore:

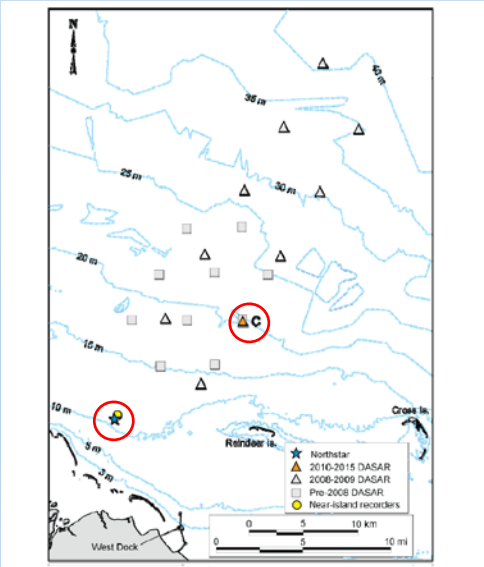


FIGURE 2.1. Locations of offshore and near-island DASARs with respect to Northstar Island, Aug.–Sept. 2015. Two DASARs were deployed at location C and three at the near-island location just north of Northstar (see Fig. 2.2). For comparison, DASAR locations used in prior monitoring years are also shown.

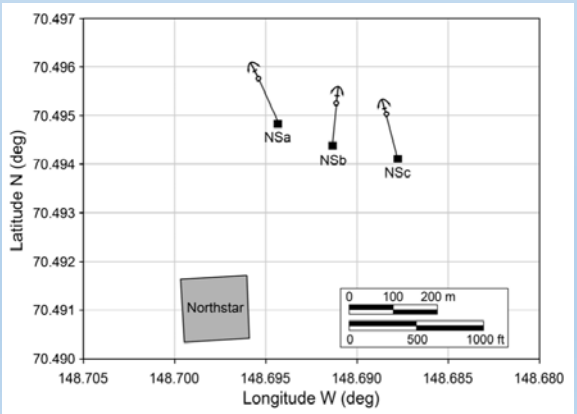


FIGURE 2.2. Locations of the three near-island DASARs (■) and their associated ground lines and anchors in relation to Northstar, Aug.–Sept. 2015. The primary function of these DASARs was to provide a continuous acoustic record of sounds produced by Northstar and its attending vessels.

Study Title: Northstar Island Acoustic Monitoring

Subject of Study: Acoustic Environment, Bowhead Whales

Audience: Originally NMFS, USACE, and NSB, now just NSB

Purpose: **Measure acoustics of Northstar Island and acoustics of bowhead whales migrating past the island.**
USACE/NMFS: The permittee shall develop and conduct an acoustic monitoring study to measure the frequency composition of noise and noise levels as a function of distance from the Seal Island facility during construction and initial operation. The permittee shall conduct or support studies to describe the impact of the Northstar facility on the migrational path of the bowhead whale in the Beaufort Sea.
NSB: Documentation of the noise put into the water by island activities (in particular frequency spectrums and received levels at various distances from the island, such as 1, 2, 4, 6, 8, 10, 12 miles);
distribution of fall migrating bowhead whales within something like 15-20 miles of the island. *The monitoring should exist for as many years as needed to clearly show that there is no impact*; and
design of the monitoring program and draft of the final report shall be subjected to peer review. Peer reviewers shall include representatives of the NSB and AEWC. The monitoring program and report shall be modified in accord with peer reviewers comments.

Data Accessibility: Hilcorp collected data (post-2014) is publically available

Data Contact: Pre-2014 = Christina Pohl, BP Alaska Inc.; post-2014 = Beth Sharp, Hilcorp AK LLC.

Communication Plan: Reports submitted to NSB and published on NSB Department of Wildlife website

Study Title: Northstar Island Acoustic Monitoring

Expected Dates of Field Work: Recorder deployment = end of August; recorder retrieval = end of September

Expected Dates of Aviation/Marine Vessel Use: Recorder deployment = end of August; recorder retrieval = end of September

Base(s) for Field Work : Endicott Island

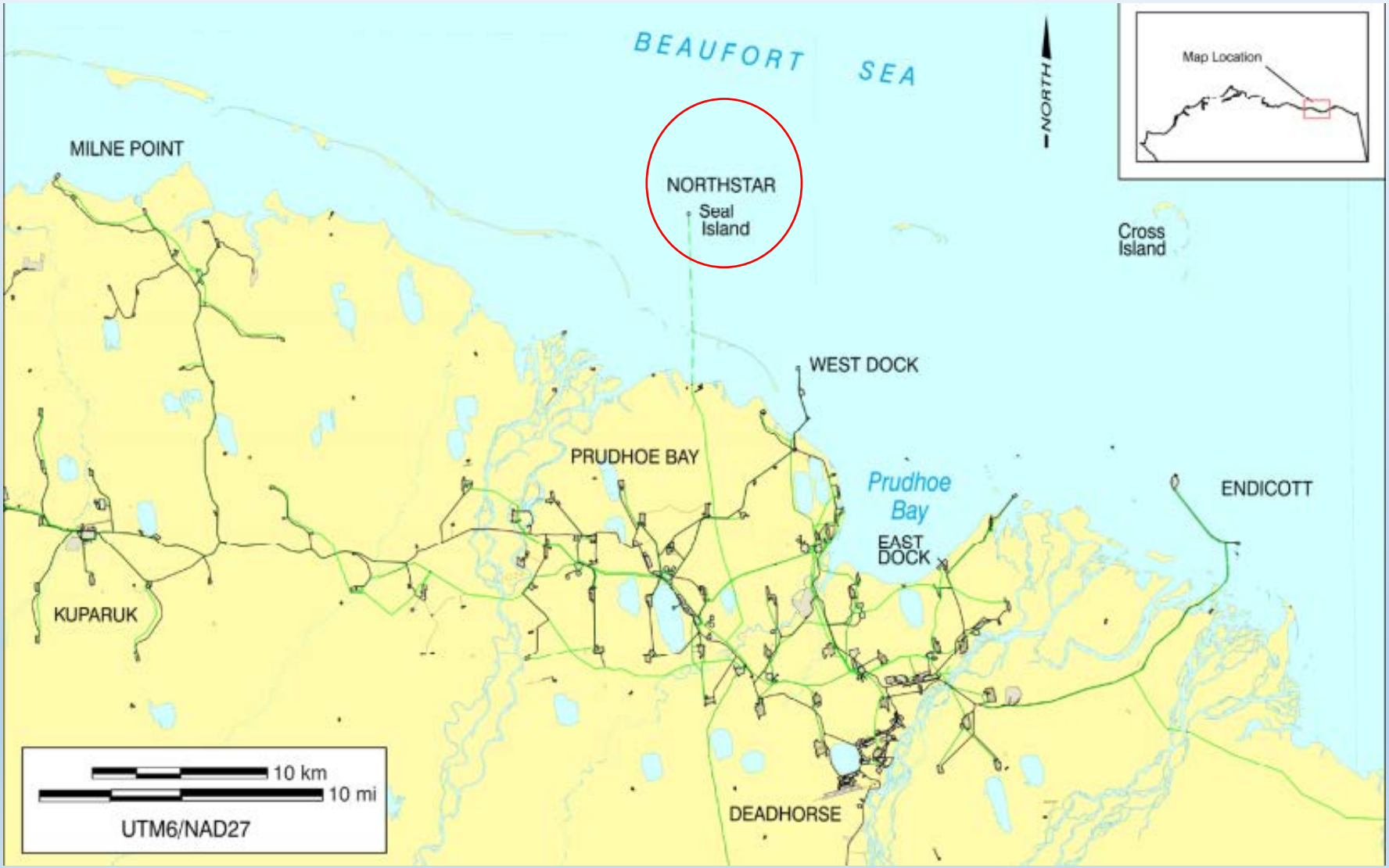
Aviation Use: none

Aviation Base: none

Other Logistics: Recorders deployed from vessel, typically Northstar Island crew-boat

Study Title: Northstar Island Acoustic Monitoring

Study Title: Northstar Island Acoustic Monitoring



Study Title: Northstar Island Acoustic Monitoring

Data Collected

- Broadband acoustic signature of Northstar Island and passing bowhead whales - DASARs record X to xx kHz
- Number and type of bowhead whale calls

General Trends Over 15+ Years

- Level of broadband sounds near and offshore is dependent on wind speed/sea state and by the occurrence of transient high-level sound spikes from passing vessels
- Baseline broadband levels fluctuate approximately in parallel with wind speed
- One-third octave band levels and spectral density levels are generally consistent across the years
- The types and seasonal timing of bowhead whale calls are similar across the years
- The number of whale calls is variable over the years; low call years appear to be related to heavy ice in the Northstar area
- Data from 2001-2004 shows there were limited but statistically detectable changes in the distribution of localized bowhead whale calls in the southernmost part of the migration corridor*

  * The change in call detection could be the result of whales deflecting away from the island, the nearest whales merely reducing their calling rates (and not deflecting) in response to increased sounds, or both in combination. The effect might also be at least partly related to changes in whale headings, given newfound evidence of directionality in bowhead whale calls.

Study Title: Endicott Nearshore Fish Migration Monitoring

Lead Organization(s): Hilcorp Alaska, LLC

Other Organization(s): University of Alaska, Fairbanks – College of Fisheries and Ocean Sciences

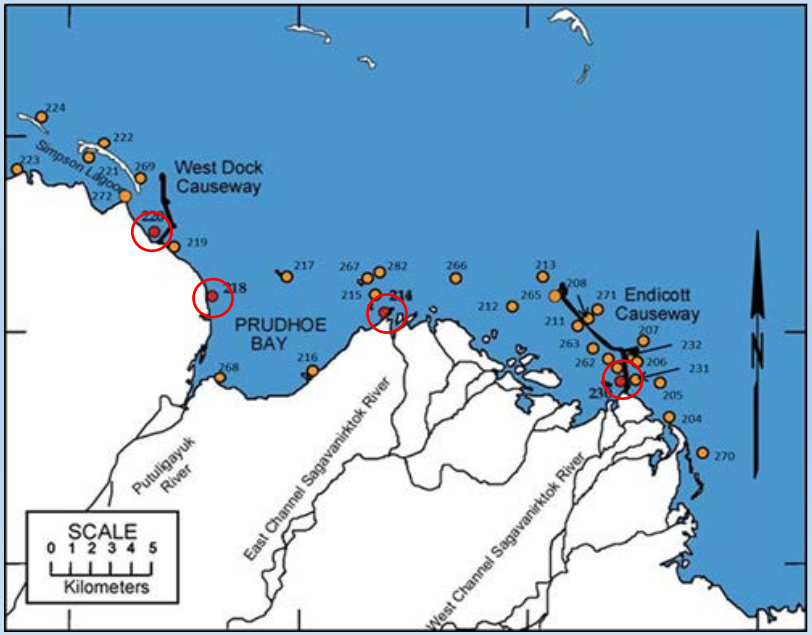
Lead Investigator(s): Trent Sutton

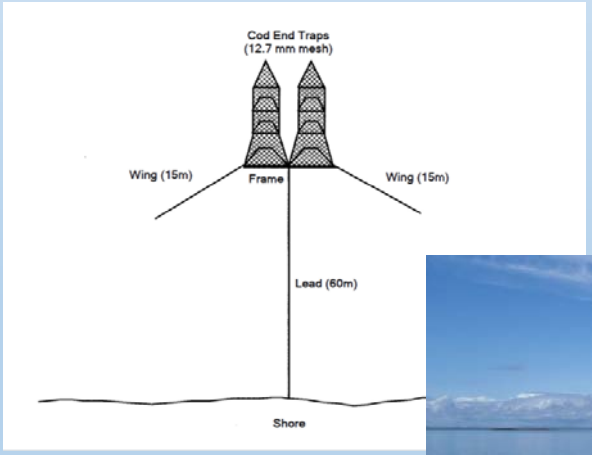
Other Investigator(s): Duncan Green, Justin Priest

Investigator Contact(s): Inquiries should be directed through Hilcorp

Duration of Study: Until the Administrator (NSB) determines, in consultation with the Endicott owners and State and Federal agencies, that the assessment will no longer be necessary (i.e., end of field life)

Description: Fyke nets are deployed in four locations along the shore from Endicott to West Dock:





Study Title: Endicott Nearshore Fish Migration Monitoring

Subject of Study: Fisheries,

Audience: Originally USACE, and NSB, now just NSB

Purpose: **Assess region-wide fish population and migration fluctuations, and impact on various fish species, due to the Endicott Causeway, and later, due to Liberty SDI pad expansion**

USACE-Endicott: The fish monitoring program will include, but not be limited to distribution and abundance of the key fish species in… an area bounded by Tigvariak Island and Gwyder Bay. This will include movement to and from overwintering areas during fall and spring periods, spawning migratory movements, movements in association with the Sag River plume under the various wind conditions, and movements through the proposed breach structure. Sampling points to the west of the Sag River delta (in Prudhoe Bay Stump Island lagoon, and Gwydyr Bay) will compliment those of previous monitoring studies to provide a control feature for the determination of possible migratory/utilization changes resulting from the Endicott Project.

USACE-Liberty: The permittee shall work with North Slope Borough Wildlife Department and the Corps to develop a monitoring program that [shows] the island and bridge construction activities do not adversely impact fish and marine mammals in the vicinity of the authorized activities.

NSB-Endicott: The Endicott Project Owners shall, at a minimum assess region-wide population fluctuation and impact of various fish species over the life of the project until the Administrator determines, in consultation with the Endicott owners and State and Federal agencies, that the assessment will no longer be necessary. Identify Arctic Cisco and other fish overwintering areas in the Sagavanirktok River Delta.

Data Accessibility: Hilcorp collected data (post-2014) is publically available

Data Contact: Pre-2014 = Christina Pohl, BP Alaska Inc.; post-2014 = Beth Sharp, Hilcorp AK LLC.

Communication Plan: Reports submitted to NSB and published on NSB Department of Wildlife website

Study Title: Endicott Nearshore Fish Migration Monitoring

Expected Dates of Field Work: Nets deployed as soon as possible after breakup (end of June/beginning of July and remaining in place until end of September/beginning of October depending on freeze-up. Nets are checked once every day.

Expected Dates of Aviation/Marine Vessel Use: Only small inflatable with small motor used from shore out to nets (~60 m off shore).

Base(s) for Field Work : Endicott Island

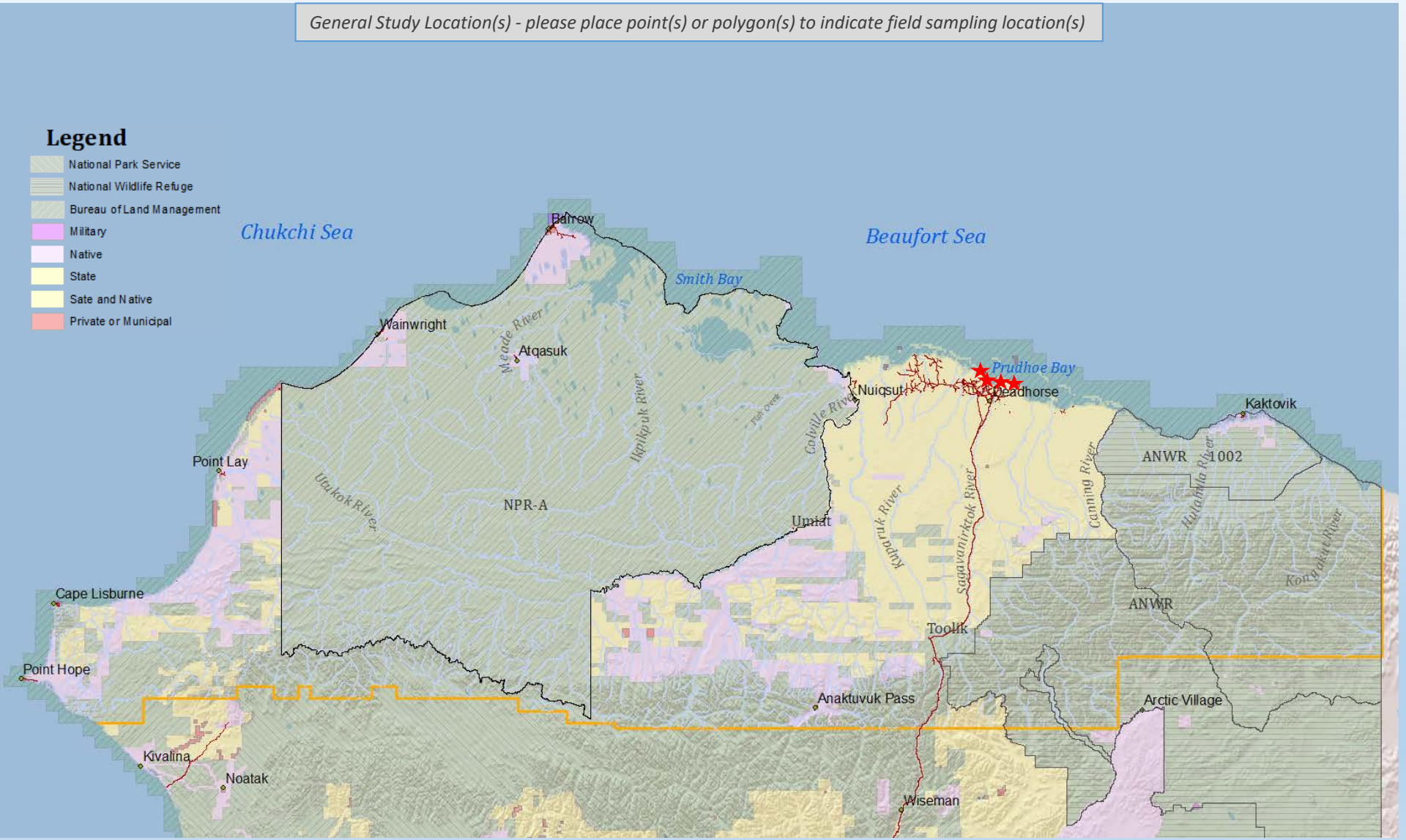
Aviation Use: none

Aviation Base: none

Other Logistics: none

Study Title: Endicott Nearshore Fish Migration Monitoring

General Study Location(s) - please place point(s) or polygon(s) to indicate field sampling location(s)



Study Title: Endicott Nearshore Fish Migration Monitoring

Data Collected

- Catch per unit effort
- Species and age class
- Water temperature and salinity

General trends over 30+ years

- Much variability over the years in CPUE
- Wind-driven currents affect YOY-class recruitment of Arctic Cisco, which is reflected in Nuiqsut under-ice fall gill net fishery in the Colville River after 5-7 years
  - Weak east to west winds result in lower YOY-class recruitment
- Water temperature and salinity fluctuate within a typical ranges – both affected by the warmer, lower-salinity plume of discharge from the Sagavanirktok River
- No detectable effects of Endicott Causeway on fish migration after breaches installed
- No detectable gross changes of fish communities from expansion of Endicott satellite drilling inland (SDI) in 2009.

Study Title: Hilcorp Sea Ice Prediction Study

Lead Organization(s): Hilcorp Alaska, LLC

Other Organization(s):University of Alaska, Fairbanks International Arctic Research Center (IARC)

Lead Investigator(s): Peter Bieniek, Research Assistant Professor, UAF

Other Investigator(s): John Walsh, Uma Bhatt, Andy Mahoney, Josh Jones, Meibing Jin, Haio Eicken.

Investigator Contact(s): pbieniek@alaska.edu

Duration of Study: 4 years

Description: Hilcorp proposes to develop the Liberty Project beginning in Winter 2019/2020, pending federal, state, and local regulatory approvals. The proposed winter construction schedule depends on the timing of freeze up, evolution of sea ice conditions and timing of breakup. Long range forecasts of sea ice conditions are needed to help plan the construction schedule.

UAF IARC will analyze existing observational data, collect real time measurements at the proposed Liberty island location in Foggy Island Bay, and integrate this data for use in sea ice modeling to allow for targeted forecasting of ice conditions in the project area.

Study Title: Hilcorp Sea Ice Prediction Study

Subject of Study: Climate and Snow/Ice

Audience: Hilcorp Operations, Liberty Development Project

Purpose: Provide a prediction of the date of the onset of freeze up, growth of ice to thickness sufficient for on ice operations and ice break up with lead times between a few weeks to several months for landfast ice in the Liberty prospect and Northstar Island region.

Data Accessibility: TBD

Data Contact: Kate Kaufman, Hilcorp Liberty Development Permitting Lead. kkaufman@hilcorp.com (907)-777-8329

Communication Plan: TBD

Study Title: Hilcorp Sea Ice Prediction Study

Expected Dates of Field Work: Winter 2017/2018 - Winter 2020/2021,
Buoy deployment – at onset of frozen ice conditions, Buoy retrieval – open water/early July

Expected Dates of Aviation/Marine Vessel Use: Helicopter use for SIMB Buoy deployment upon freeze up, and vessel use for buoy retrieval upon open water.

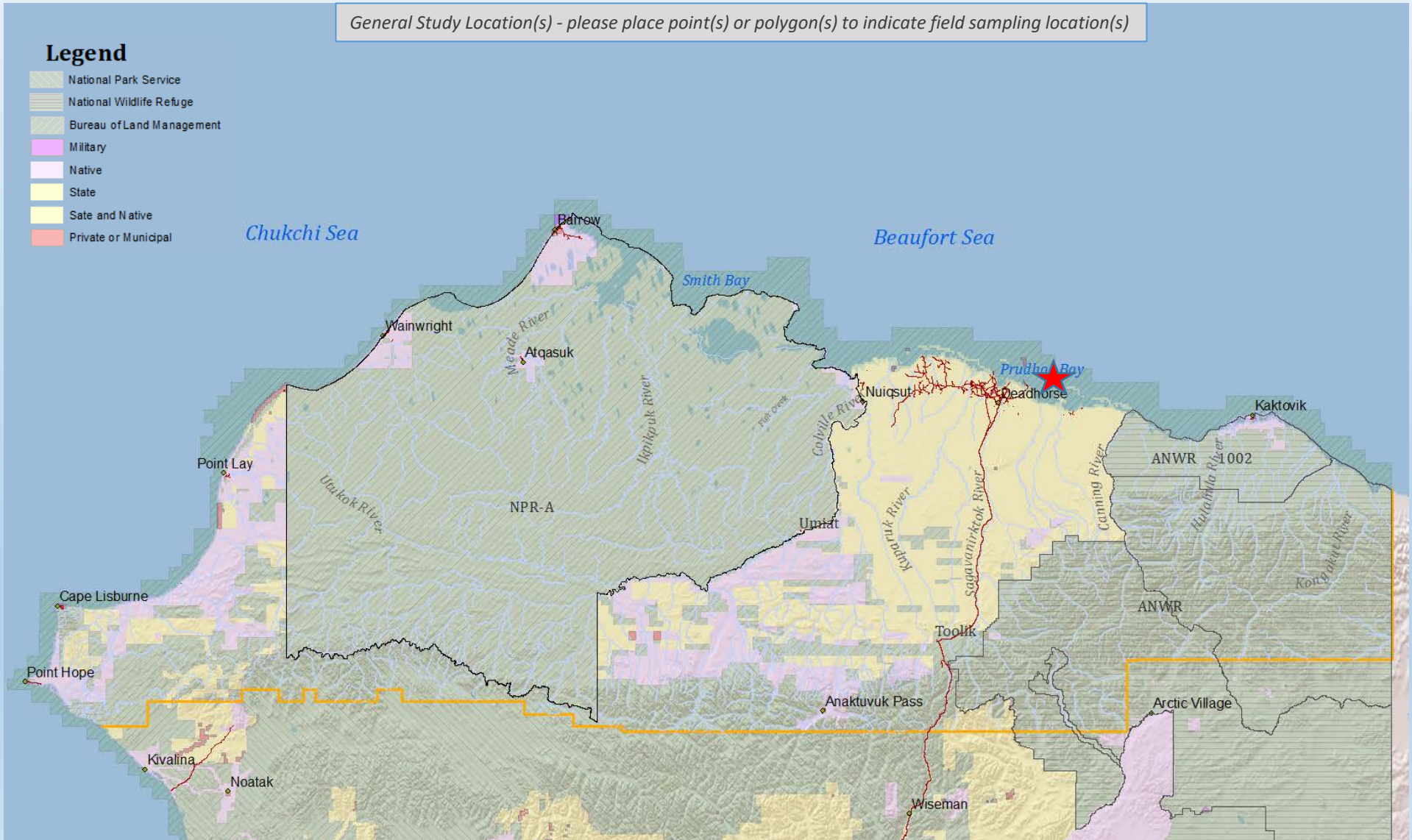
Base(s) for Field Work : Deadhorse/Endicott

Aviation Use: Helicopter transport to Foggy Island Bay for buoy deployment.

Aviation Base: Deadhorse, Alaska

Other Logistics: Water sample collection along Northstar winter ice road, conducted by Northstar operations personnel.

Study Title: Hilcorp Sea Ice Prediction Study



Study Title: Hilcorp Sea Ice Prediction Study

Study Title: Hilcorp Sea Ice Prediction Study

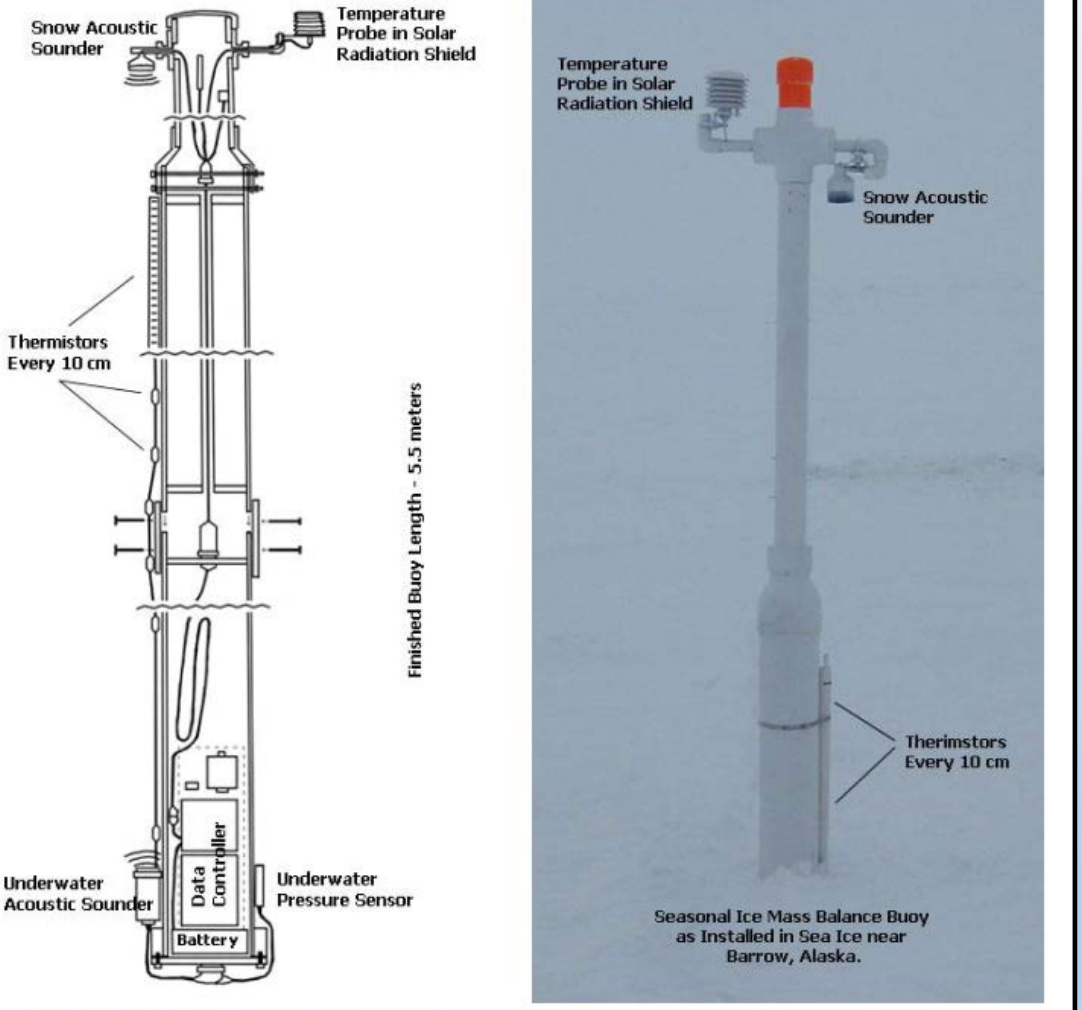


Figure 3. Sketch of Seasonal Ice Mass Balance (SIMB) buoy, and picture of a deployed SIMB.

http://imb-crrel-dartmouth.org/imb.crrel/SeasonalIBinst.htm

Study Title: Cross Island Subsistence Whaling Study

Lead Organization(s): Hilcorp Alaska, LLC (Previously BOEM and BPXA)

Other Organization(s): Applied Sociocultural Research

Lead Investigator(s): Michael Galginaitis

Other Investigator(s):

Investigator Contact(s): msg-gci@gci.net

Duration of Study: 2000 – Present

Description: Annual study of the subsistence whaling activities at Cross Island.

Study Title: Cross Island Subsistence Whaling Study

Subject of Study: Subsistence Resources and Lifestyle

Audience: Hilcorp, BOEM, AEWC, Nuiqsut Whaling Captains Association

Purpose: The purpose of this study is to better understand potential impacts to subsistence whaling at Cross Island. Cross Island is located near the industrial activities of Prudhoe Bay, and is 17 miles east of the Northstar Island, currently operated by Hilcorp. Nuiqsut hunters have shared concerns about potential interference with subsistence hunting from industrial activities including vessel and aircraft traffic. Mr. Galginaitis spends most or all of each fall whaling season at Cross Island with the Nuiqsut whalers, documenting their activities and interpretation of events. As part of the study, GPS data loggers are placed on most whaling vessels to document the tracks of the whalers as they scout for and harvest whales.

Data Accessibility: Hilcorp collected data (post-2014) is publically available.

Data Contact: 2000-2005 = BOEM, 2005-2014 = Christina Pohl, BP Alaska Inc.; post-2014 = Beth Sharp, Hilcorp AK LLC.

Communication Plan: Reports submitted to NSB and published on NSB Department of Wildlife website

Study Title: Cross Island Subsistence Whaling Study

Expected Dates of Field Work: Field work commences approximately August 25, or the beginning date of Cross Island subsistence activities, as determined by the Nuiqsut whaling captains through the duration of the subsistence hunt.

Expected Dates of Aviation/Marine Vessel Use: Approximately August 25 through duration of subsistence hunt.

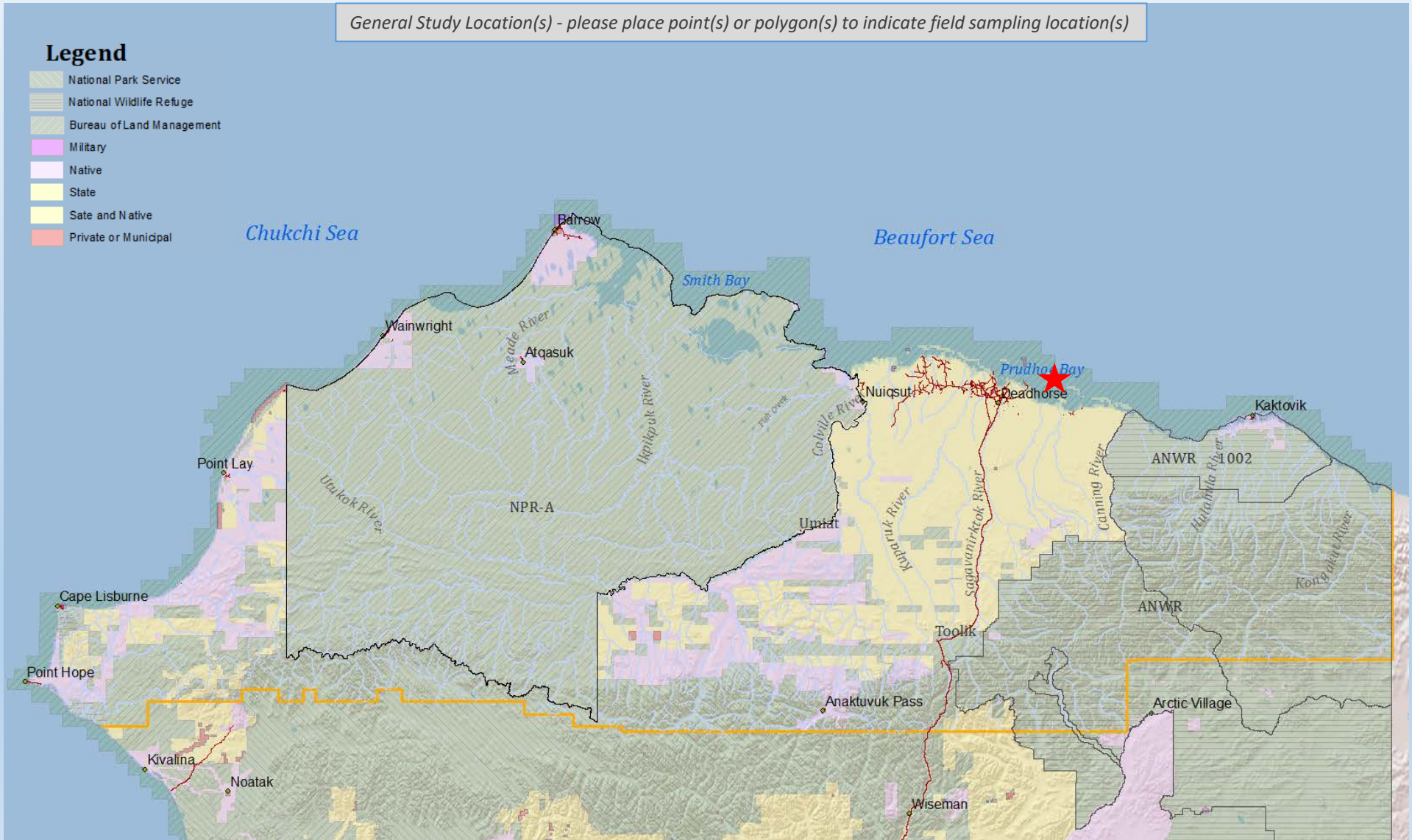
Base(s) for Field Work : Nuiqsut and Cross Island

Aviation Use: None.

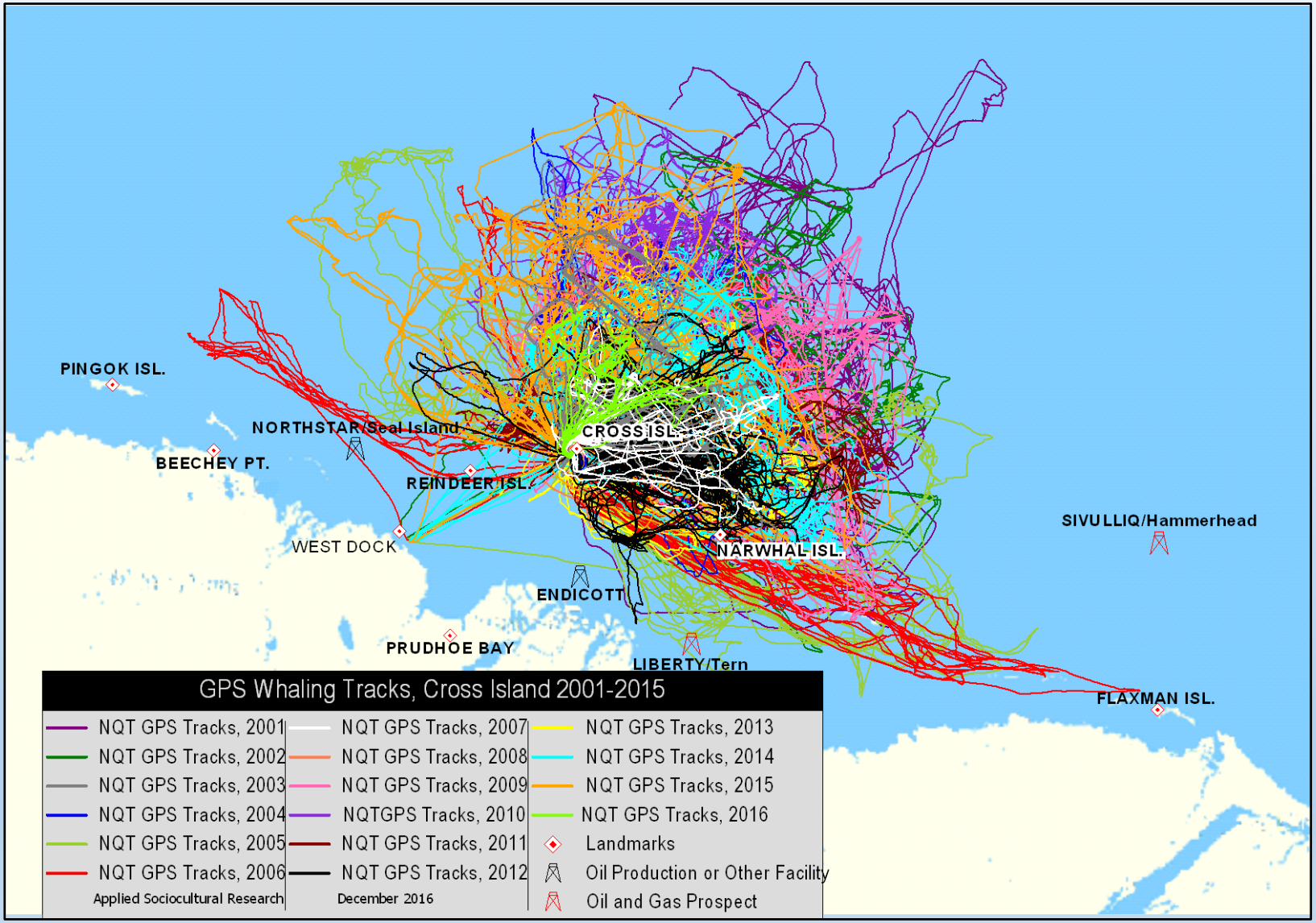
Aviation Base: None.

Other Logistics: Communications Center hosted at Endicott Facility for duration of subsistence hunt.

Study Title: Cross Island Subsistence Whaling Study



Study Title: Cross Island Subsistence Whaling Study



All Cross Island Subsistence Whaling GPS Tracks from 2001–2016

Table 4. Selected Analytical Measures of Cross Island Subsistence Whaling Seasons, 2001–2016.

Metric	Type	Season															
		2001	2002	2003	2004[7]	2005[7]	2006	2007	2008[8]	2009[9]	2010[10]	2011	2012	2013[12]	2014[13]	2015[14]	2016
# boat days[1]	count	57	65	34	41	35	48	16°	29 (27)	89	29 (26)	44	53	47/55	62	45	11 (12)
# boat trips (possible # of GPS tracks)[2]	count	59	67	42	46	48	53	22	33 (31)	113	30 (27)	57	66	56/65	77	49 (46)	11 (14)
Actual # of GPS tracks collected	count	49	52	37	44	48	51	20	30	93	26 (24)	52[11]	63	40/45	74	49 (46)	11 (14)
Length of trip (miles[3])	avg	84	64.3	37.2	45.3	60.7	60.8	30.1	32.1	61.6	70.1 (78.5)	46.7	47	59.1/55.9	60.7	74.2 (75.9)	36.6 (32.0)
Duration of trip (hr:min)	avg	9:43	7:58	4:31	6:51	7:07	8:13	5:39	5:03	6:43	10:14 (11:13)	5:53	5:13	6:19/5:41	6:19	7:53 (8:08)	10:27 (9:22)
Furthest point from Cross Isl. (miles[3])	avg	23.6	19.5	11.6	12.1	19.1	22.2	10.4	8.3	15.8	18.8 (21.0)	12.7	11.2	14.2/13.6	15.8	19.1 (19.4)	10.5 (9.4)
Strike distance from Cross Isl. (miles[3])[4]	avg	19.5	13.4	9.3	9.7	25.9	17	12	6.5	13.8	16.5	9.1	10.2	12.4	13.5	25.0	8.4
Mean strike direction from Cross Isl. (degrees)[4,5]	vector mean	63°	68°	57°	36°	82°	59°	80°	02°	69°	25°	52°	100°	40°	43°	356°	42°
Total seasonal boat effort (Boat-hr)[6]	sum	572.9	533.6	162.9	301.2	341.3	427.1	124.3	158	751.7	307 (302.7)	335	338.6	353.6/369.8	476.7	386.1 (373.9)	58.4 (62.7)
Boat-hours/Strike	avg	191	106.7	40.7	100.4	341.3	106.8	31.1	39.5	250.6	76.7 (75.7)	111.7	84.7	70.7/73.0	95.3	128.7 (124.6)	14.6 (15.7)

[1] Each boat scouting for whales on any given day counts as one "boat day". Thus if two boats scout on one day, and four boats scout on the next, the total is six boat days.

[2] Some boats made more than one scouting trip on a single day.

[3] Statute miles were used (rather than nautical miles or km) because that is the measure the whalers used.

[4] Includes "struck and lost" whales in 2002, 2007, 2009 and 2013.

[5] Due north is 0º (and 360º), due east is 90º—includes struck and lost as well as landed strikes.

[6] Yearly total equals aggregate sum of duration of all whaling trips by all boats; includes estimates for missing information.

[7] One crew went to Cross Island well before other crews, so total season measures may be somewhat misleading. See 2004 and 2005 Annual Reports.

[8] Figures in parentheses ( ) are values excluding seven days when only one crew was on Cross Island.

[9] Figures in parentheses ( ) are values reclassifying two marginal scouting days (one a "weather day" and one a "travel/preparation day").

[10] Figures in parentheses ( ) are values excluding certain "marginal" data—one "boat trip" that only aided a tow and with no other information, one "boat trip" that only aided a tow and was only 98 min, and one "boat trip" of only 13 min terminated by engine trouble.

[11] Five boat trips in 2011 were not documented with GPS information. Only partial GPS tracks were collected for two additional boat trips.

[12] Technically, in 2013 there were 10 "scouting days", but three days were after the "cease fire", looking for the sunk whale. Also, on 10 Sept., two boats went out in poor conditions on trips of less than 30 min. This was counted as a "weather day" and not a "scouting day". Pertinent values are given for both in the format 7 scouting days/10 scouting days; Seven days are used in the text.

[13] In 2014, 1 day spent looking for a sunk whale is counted as a "scouting day", due to complicated seasonal circumstances—see text. Effort metrics are little affected, but using 5 scouting days instead of 6 would alter all metrics slightly. Overall, these differences would not affect the discussion in the text.

[14] In 2015, three boats trips were made solely to help tow a whale. Metrics excluding these trips are in parentheses (). Totals including them are not greatly different and are used in the text.

FY19 NOAA research in the Arctic (focused on NOAA Fisheries and FY19)

NOAA FISHERIES

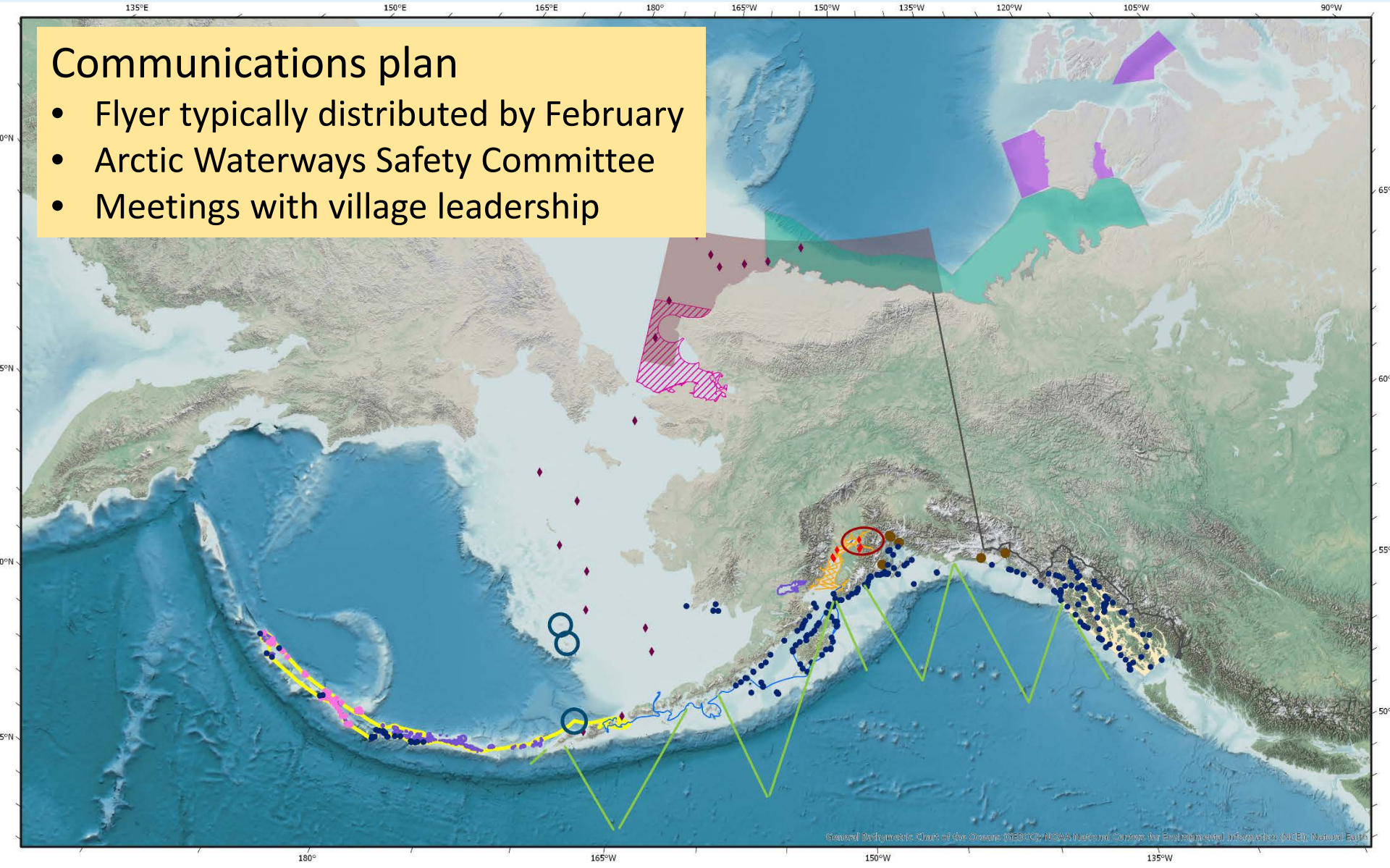
AFSC

Marine Mammal Laboratory

NSSI meeting, May 2019

Robyn Angliss & Johanna Vollenweider

NOAA Fisheries, Alaska Fisheries Science Center, Marine Mammal Laboratory, FY19 field research



Consistent aspects of many NOAA projects

Audience: Domestic wildlife managers, marine scientists, BOEM, USGS, NOAA, Navy

Data repository: NCEI

Data contact: Typically the POC for the project

Communication plan: Publications, community outreach prior to surveys, other media TBD

Study Title: Arctic Long-Term Integrated Mooring Array (ALTIMA; formerly CHAOZ)

Lead Organization(s): North Pacific Research Board (NPRB)

Other Organization(s): NOAA, National Marine Fisheries Service

Lead Investigator(s): Phyllis Stabeno

Investigator Contact(s): Catherine.Berchok@noaa.gov; 206-526-6331

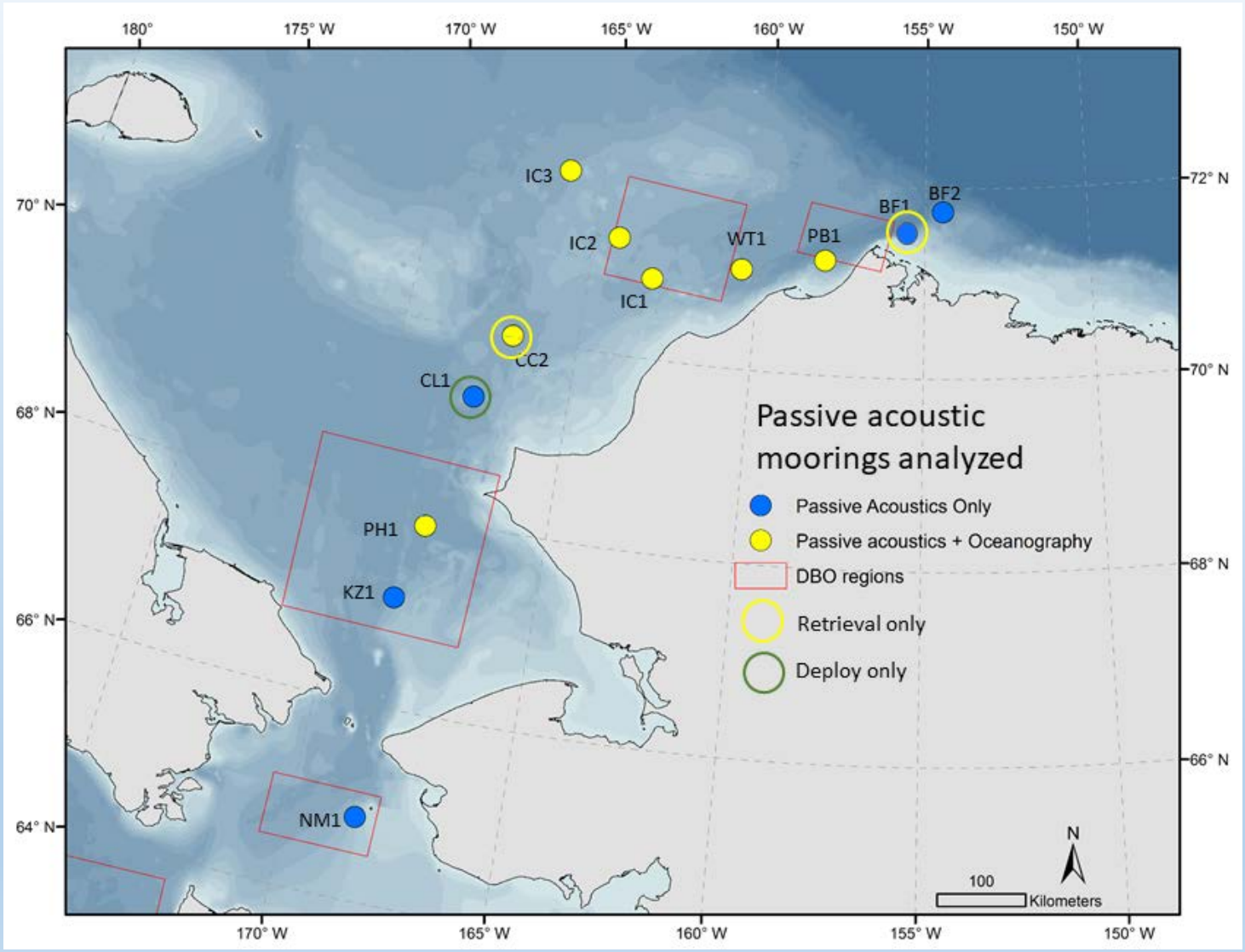
Duration of Study: *August 2017 & 2019*

Description:

- We are piggybacking on cruise to continue decade long, year-round, passive acoustic data record (historically BOEM funded).
- Main cruise activities include: Oceanographic mooring deployment, CTDs, plankton and larval fish tows, underway water sampling, marine mammal and seabird surveys, float deployments, and Oculus glider retrieval/deployment.

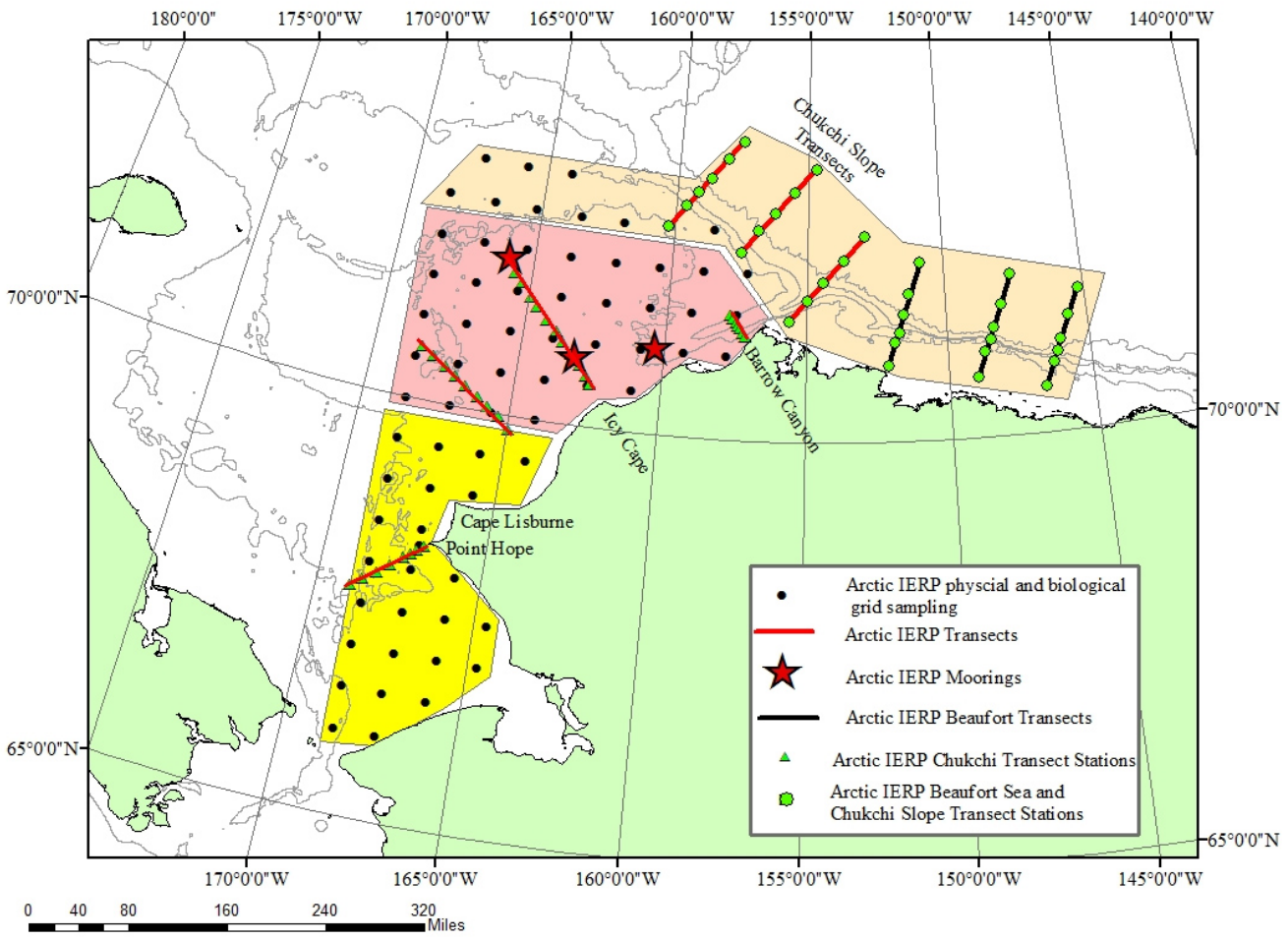
Purpose: To understand the distribution and abundance of marine mammals in the Chukchi and western Beaufort Seas and the oceanographic drivers of changes in distribution; Turn around moorings; collecting oceanographic data; collect larvae and zooplankton to understand recruitment

Study Title: Arctic Long-Term Integrated Mooring Array



Study Title: Arctic Long-Term Integrated Mooring Array

Survey transects for CTD casts and larval sampling, and moorings



Study Title: Aerial Surveys of Arctic Marine Mammals (ASAMM)

Lead Organization(s): BOEM, NOAA/NMFS

Other Organization(s):

Lead Investigator(s): Megan Ferguson, NOAA/NMFS

Other Investigator(s): Janet Clarke, JISAO

Investigator Contact(s): Megan.Ferguson@noaa.gov; 206-526-6274

Duration of Study: Annually since 1979

Description:

Aerial line transect surveys to evaluate distribution, density, behavior, and habitat of bowhead whales and other marine mammals in the Arctic

Purpose: To describe the density, behavior, and habitat of bowhead whales and other marine mammals in the Arctic

Study Title: Aerial surveys of Arctic marine mammals (ASAMM)

Study Title: ASAMM Bowhead Abundance Aerial Survey

Lead Organization(s): NOAA/NMFS, BOEM, North Slope Borough Department of Wildlife Management, Alaska Eskimo Whaling Commission

Other Organization(s):

Lead Investigator(s): Megan Ferguson, NOAA/NMFS

Other Investigator(s): Janet Clarke, JISAO

Investigator Contact(s): Megan.Ferguson@noaa.gov; 206-526-6274

Duration of Study: August 2019

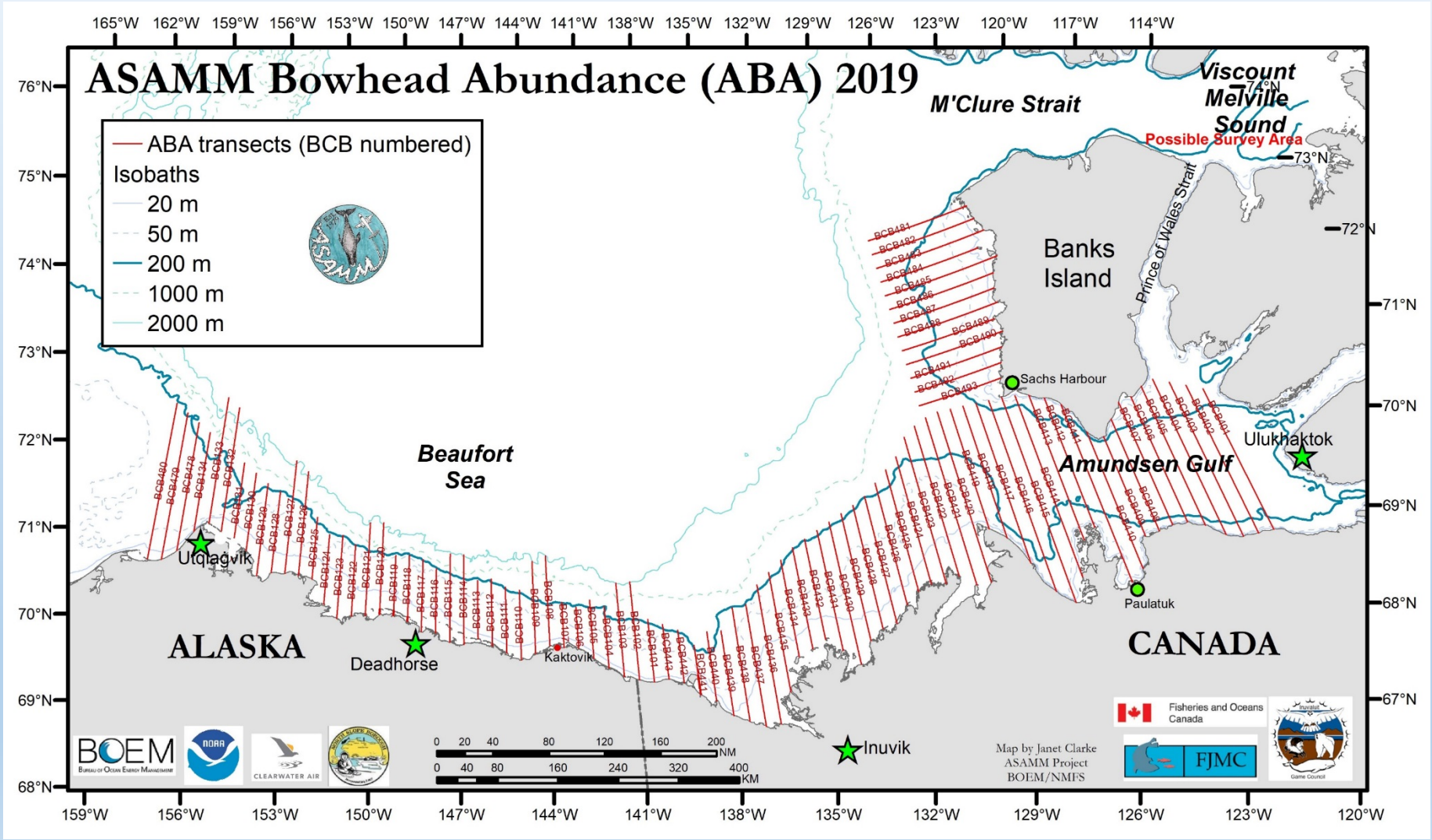
Description:

Aerial line transect surveys to estimate abundance of the Western Arctic stock of bowhead whales

Purpose: To estimate the abundance of the Western Arctic stock of bowhead whales

Study Title: Western Arctic Bowhead Whale Abundance Aerial Survey

General Study Location(s) - please place point(s) or polygon(s) to indicate field sampling location(s)



Study Title: US-Canada Joint Surveys for Seals and Polar Bears

FY20

Lead Organization(s): NOAA/NMFS, DFO

Other Organization(s): Potential partnership with USFWS, USGS, Canadian agencies

Lead Investigator(s): Peter Boveng, NOAA/NMFS

Other Investigator(s): TBD

Investigator Contact(s): Peter.Boveng@noaa.gov; 206-526-4244

Duration of Study: Spring 2020

Description:

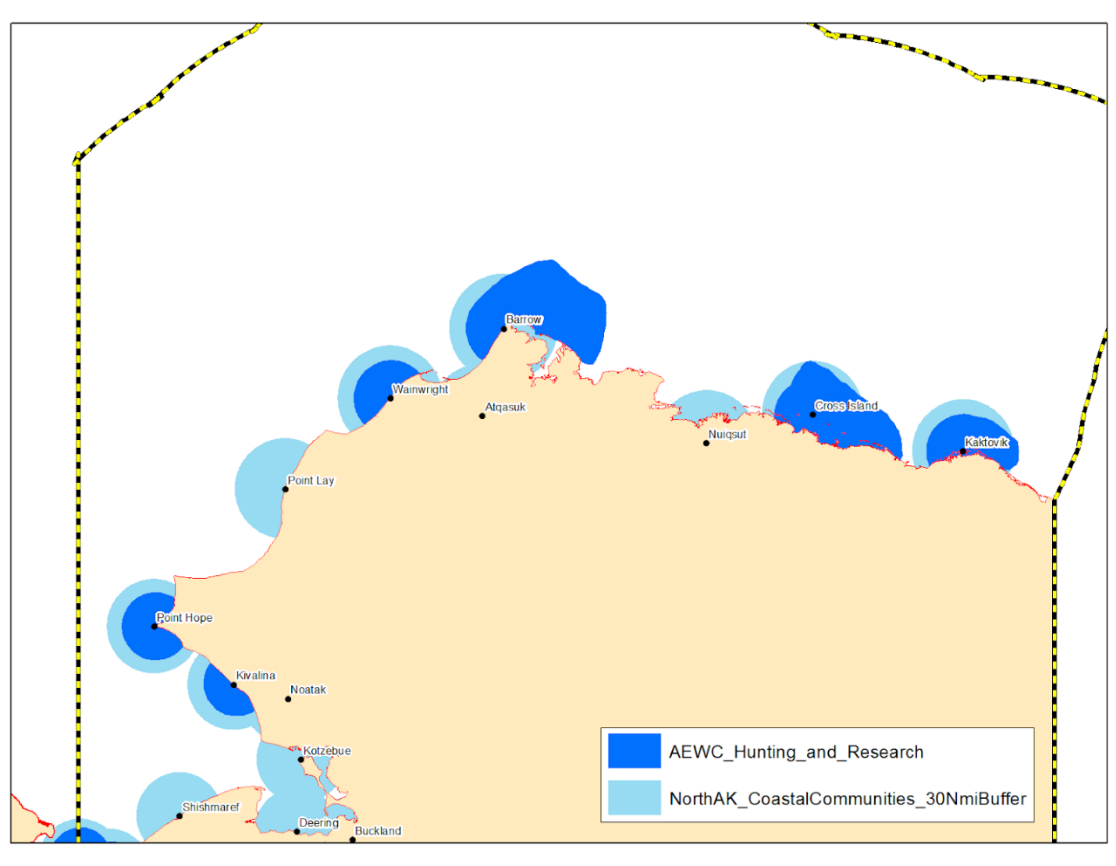
Conduct aerial photographic and thermal surveys of ice-associated seals and polar bears with twin-engine aircraft operating at 1000ft altitude

Equipment testing conducted in April/May of FY19

Purpose: To describe the distribution and density of ice-associated seals and polar bears

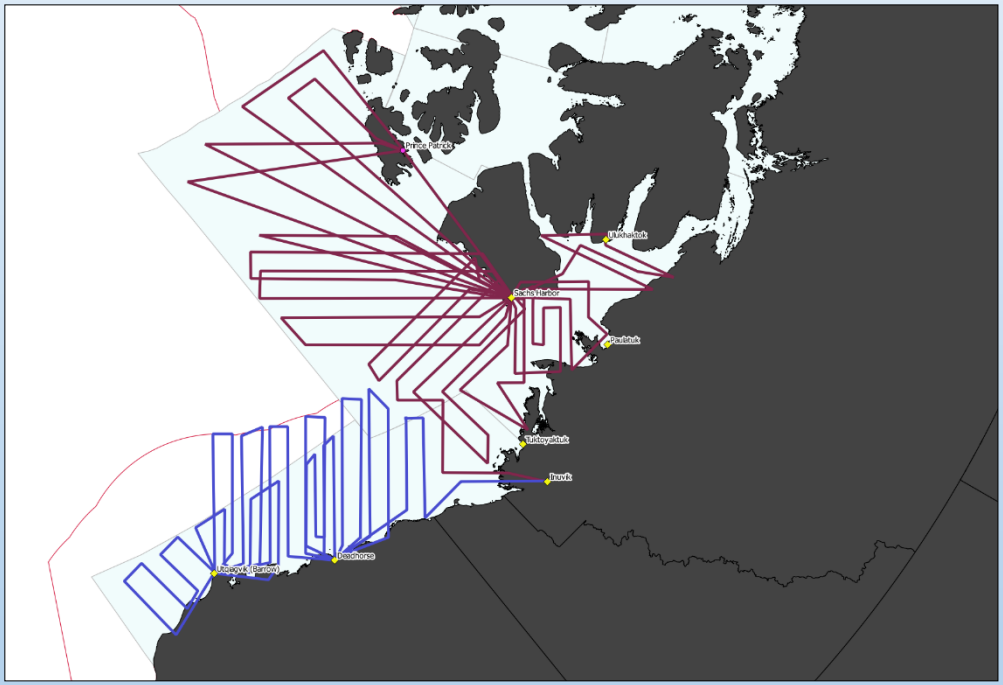
Study Title: US-Canada Joint Surveys for Seals and Polar Bears

Equipment testing in April/May 2019



Study Title: US-Canada Joint Surveys for Seals and Polar Bears

Example track lines for surveys of the Southern and Northern Beaufort Sea for bearded seals, ringed seals and polar bears. The blue (US) and violet (Canadian) survey tracks would be flown by separate aircraft. The thin curved red line indicates the US and Canadian exclusive economic zones, while the thin grey lines around areas of light blue shading indicate polar bear sub-population boundaries. Total track length shown exceeds 27,000 km.



Study Title: Abundance and health of spotted, bearded and ribbon seals

FY20

Lead Organization(s): NOAA/NMFS

Other Organization(s):

Lead Investigator(s): Peter Boveng, NOAA/NMFS

Other Investigator(s):

Investigator Contact(s): Peter.Boveng@noaa.gov; 206-526-4244

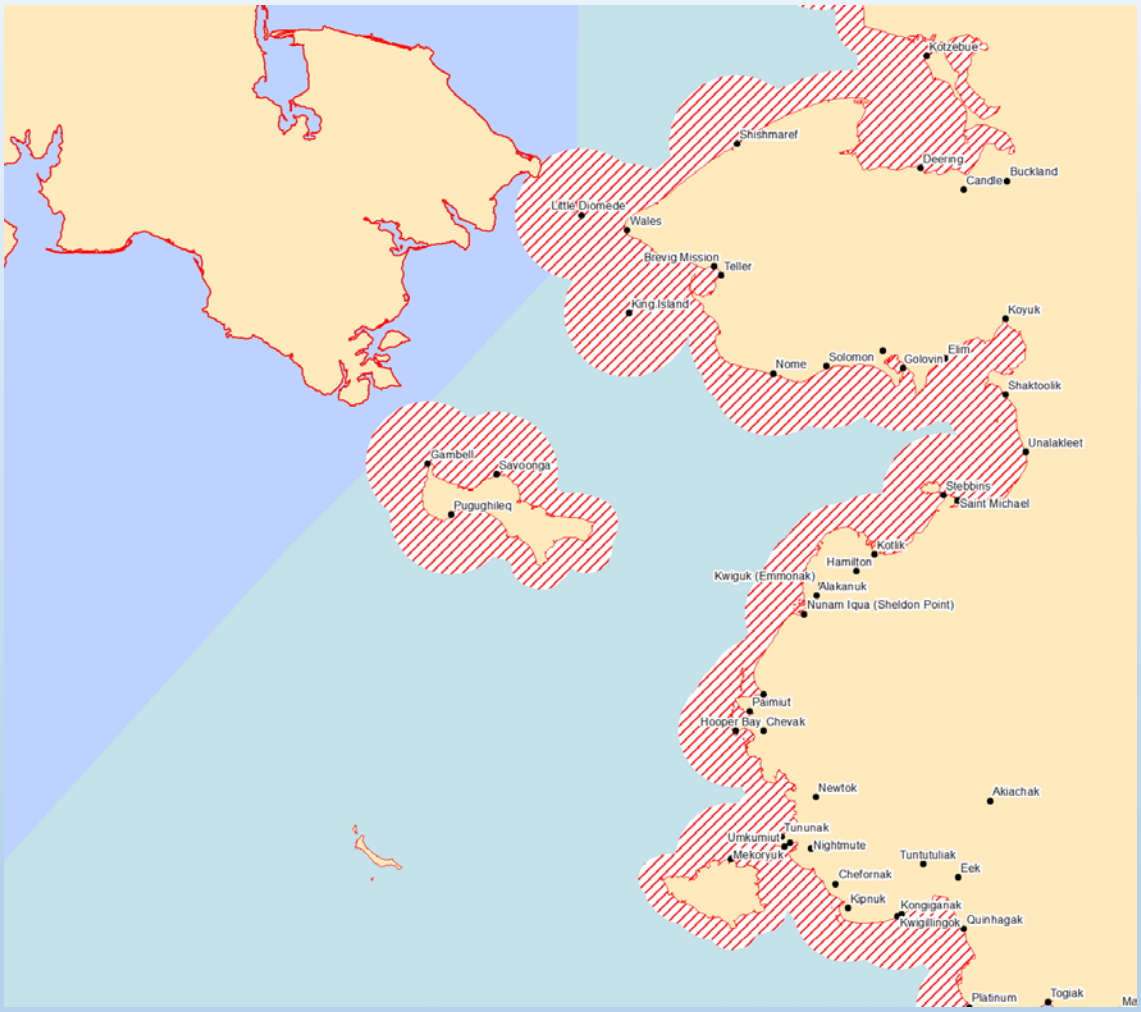
Duration of Study: Similar projects conducted in 2014, 2016, 2018

Description:

Small boats with researchers will be launched from the NOAA ship *Oscar Dyson* to sample, tag, and satellite track seals. This will improve estimates of haul-out timelines and understanding of seals' dependence on sea ice for reproduction and molting. Impacts of the extreme low ice years in 2018-19 will be assessed as feasible, based on body condition and presence/absence of juvenile age class.

Purpose: To describe the abundance and health of spotted, bearded and ribbon seals, and to assess responses to recent extreme low ice years

Study Title: Abundance and health of spotted, bearded and ribbon seals



Area of operations (aqua shading); tentative exclusion zones are hatched in red. NMFS-AFSC is collaborating with Kawerak on a research coordination and communication plan to refine the areas in the northern Bering Sea.

Study Title: Arctic HEAT

Lead Organization(s): NOAA Pacific Marine Ecology Laboratory (PMEL)

Other Organization(s): Wood Hole Oceanographic Institute, JSIAO

Lead Investigator(s): Kevin Wood

Other Investigator(s): Nick Bond

Investigator Contact(s): Kevin.wood@noaa.gov, Nicholas.bond@noaa.gov

Duration of Study: 2016-2019

Description: This project aims to bridge the upper ocean observation gap in the Arctic marginal seas through the deployment of innovative new autonomous platforms like Marine Robotic Vehicles (MRV) Air-Launched Autonomous Micro-Observer (ALAMO) float, in combination with a more traditional suite of weather and ocean-sensing instrumentation carried aboard a specially-modified NOAA Twin Otter aircraft(NOAA 56).

Study Title: Arctic HEAT

Subject of Study: Climate and Snow

Audience: NOAA OAR, National Weather Service

Purpose: Monitoring rates of upper ocean temperature change and water mass transformation over entire seasons, from the time the sea ice begins to retreat in the spring through freeze-up in the autumn, and even over the winter.

Data Accessibility: As soon as it is collected at https://alamo.whoi.edu/

Data Contact: oar.pmel.arctic-heat.webmaster@noaa.gov

Communication Plan: Data are provided to the public in real time. Data also available to researchers producing peer reviewed publications

Study Title: Arctic HEAT

Expected Dates of Field Work: Deployment of floats is June through September

Expected Dates of Aviation/Marine Vessel Use : June thru September.

Base(s) for Field Work : Kotzebue, Utqiavik.

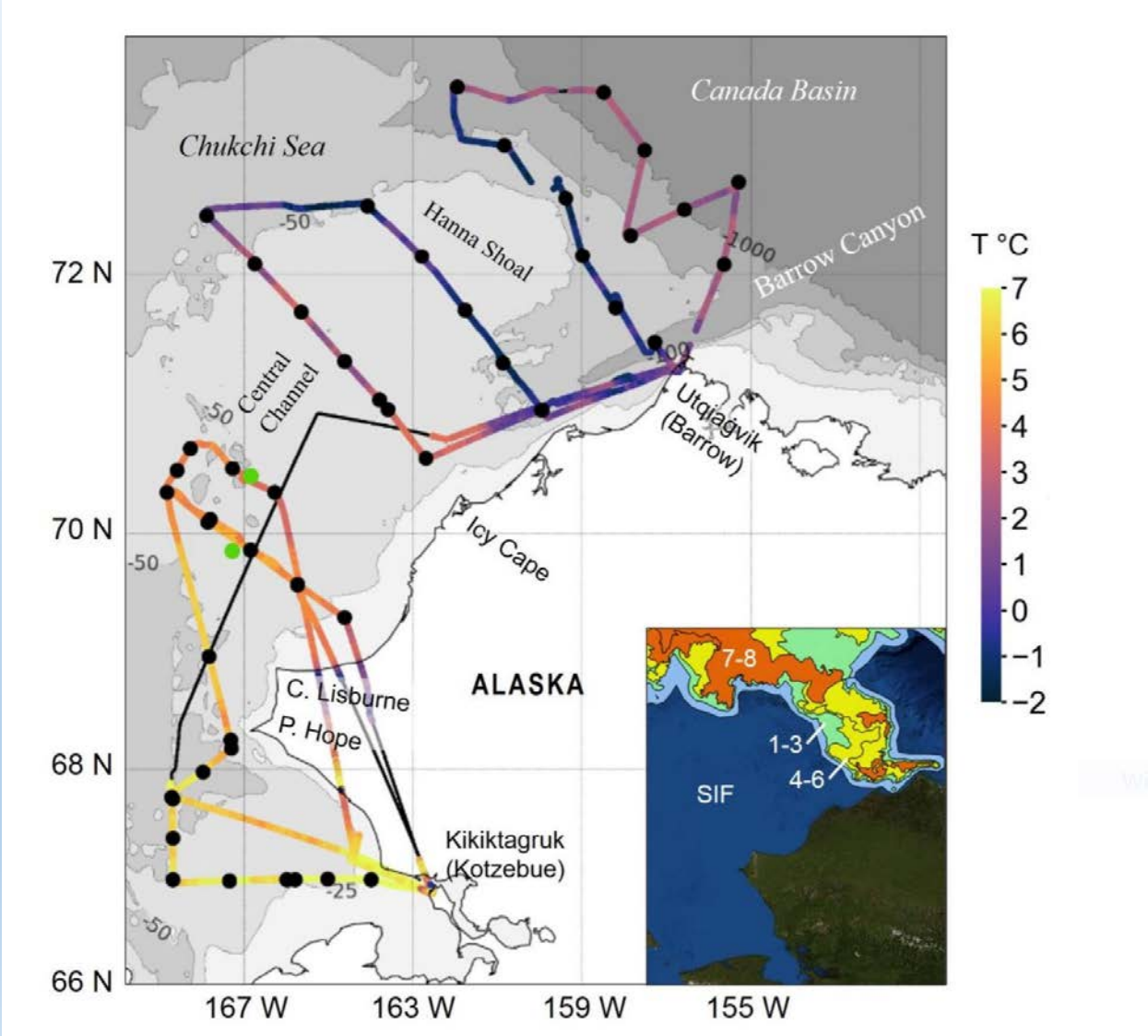
Aviation Use: NOAA Twin Otter

Aviation Base: Kotzebue

Other Logistics: ALAMO Floats remain at sea.

Study Title: Arctic HEAT

General Study Location(s) – Aerial survey tracks and deployment locations from 2016. Thin black lines show tracks where altitude > 800 feet



Study Title: Arctic Integrated Ecosystem Survey

Lead Organization(s): NOAA/NMFS/AFSC/Auke Bay Labs

Other Organization(s): NOAA PMEL, Oregon State University, UAF

Lead Investigator(s): Ed Farley

Other Investigator(s): Carol Ladd (NOAA), Louise Copeman (Oregon State Univ)

Investigator Contact(s): ed.farley@noaa.gov

Duration of Study: 2017 & 2019 field seasons

Description: This is the fall component of an integrated ecosystem survey funded by NPRB, BOEM, NOAA and UAF. The goal of the program is to better understand the mechanisms and processes that structure the Arctic marine ecosystem and influence the distribution, life history, and interactions of biological communities in the Chukchi Sea. The research addresses the phenology and alignment in space and time of primary production, secondary producers, and upper trophic level predators while evaluating the impacts of change on local communities.

Study Title: Arctic Integrated Ecosystem Survey

Subject of Study: Fisheries, Acoustic Environment, Climate

Audience: NOAA, BOEM, USGS, UAF, NPRB

Purpose: Develop conceptual model for function of Chukchi Sea.

Data Accessibility: Data will be available to the public one year after the end of the project - 2022

Data Contact: NPRB – Danielle Dickson

Communication Plan: Data will be published in peer reviewed reports, community outreach is ongoing and the project includes local villages, communication with vessels adheres to Alaska Waterways Safety Committee

Study Title: Arctic Integrated Ecosystem Survey

Expected Dates of Field Work: Aug 1 – Oct 3, 2019

Expected Dates of Marine Vessel Use: Aug 1 – Oct 3, 2019

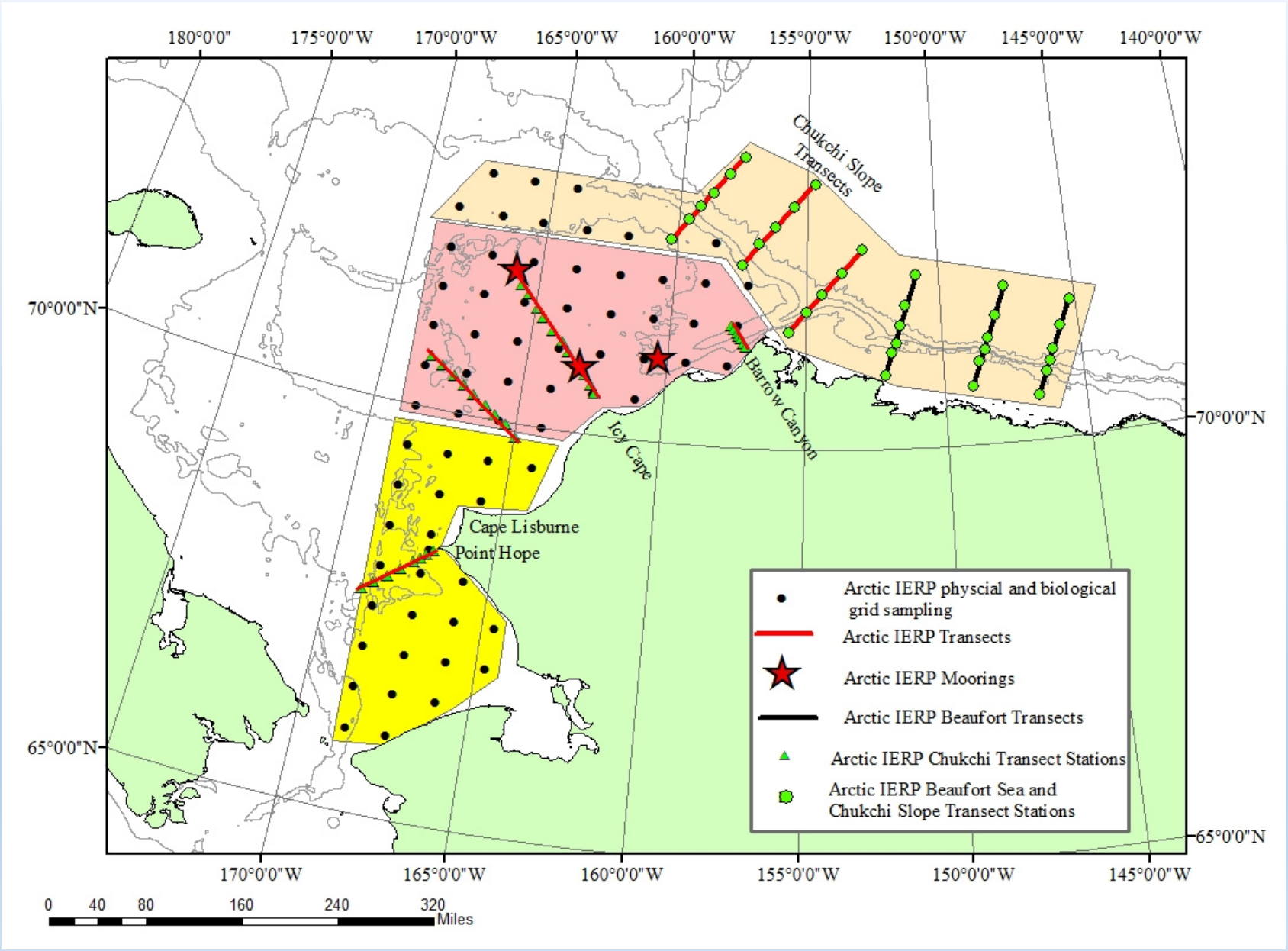
Base(s) for Field Work : Dutch Harbor & Nome

Aviation Use: No aviation required

Aviation Base:

Other Logistics:

Study Title: ASGARD Integrated Ecosystem Survey



Study Title: ASGARD Integrated Ecosystem Survey

Lead Organization(s): University of Alaska

Other Organization(s): NOAA PMEL, NOAA AFSC

Lead Investigator(s): Seth Danielson

Other Investigator(s): Lisa Eisner, Johanna Vollenweider

Investigator Contact(s): Sldanielson@Alaska.edu

Duration of Study: 2017-2021, 2018 was last field year

Description: This is the spring component of an integrated ecosystem survey funded by NPRB, BOEM, NOAA and UAF. The goal of the program is to better understand the mechanisms and processes that structure the Arctic marine ecosystem and influence the distribution, life history, and interactions of biological communities in the Chukchi Sea. The research addresses the phenology and alignment in space and time of primary production, secondary producers, and upper trophic level predators while evaluating the impacts of change on local communities.

Study Title: ASGARD

Subject of Study: Fisheries, Acoustic Environment, Climate

Audience: NOAA, BOEM, USGS, UAF, NPRB

Purpose: Develop conceptual model for function of Chukchi Sea

Data Accessibility: Data will be available to the public one year after the end of the project - 2022

Data Contact: NPRB – Danielle Dickson

Communication Plan: Data will be published in peer reviewed reports, community outreach is ongoing and the project includes local villages, communication with vessels adheres to Alaska Waterways Safety Committee

Study Title: ASGARD

Expected Dates of Field Work: completed (2017 & 2018)

Expected Dates of Aviation/Marine Vessel Use: completed

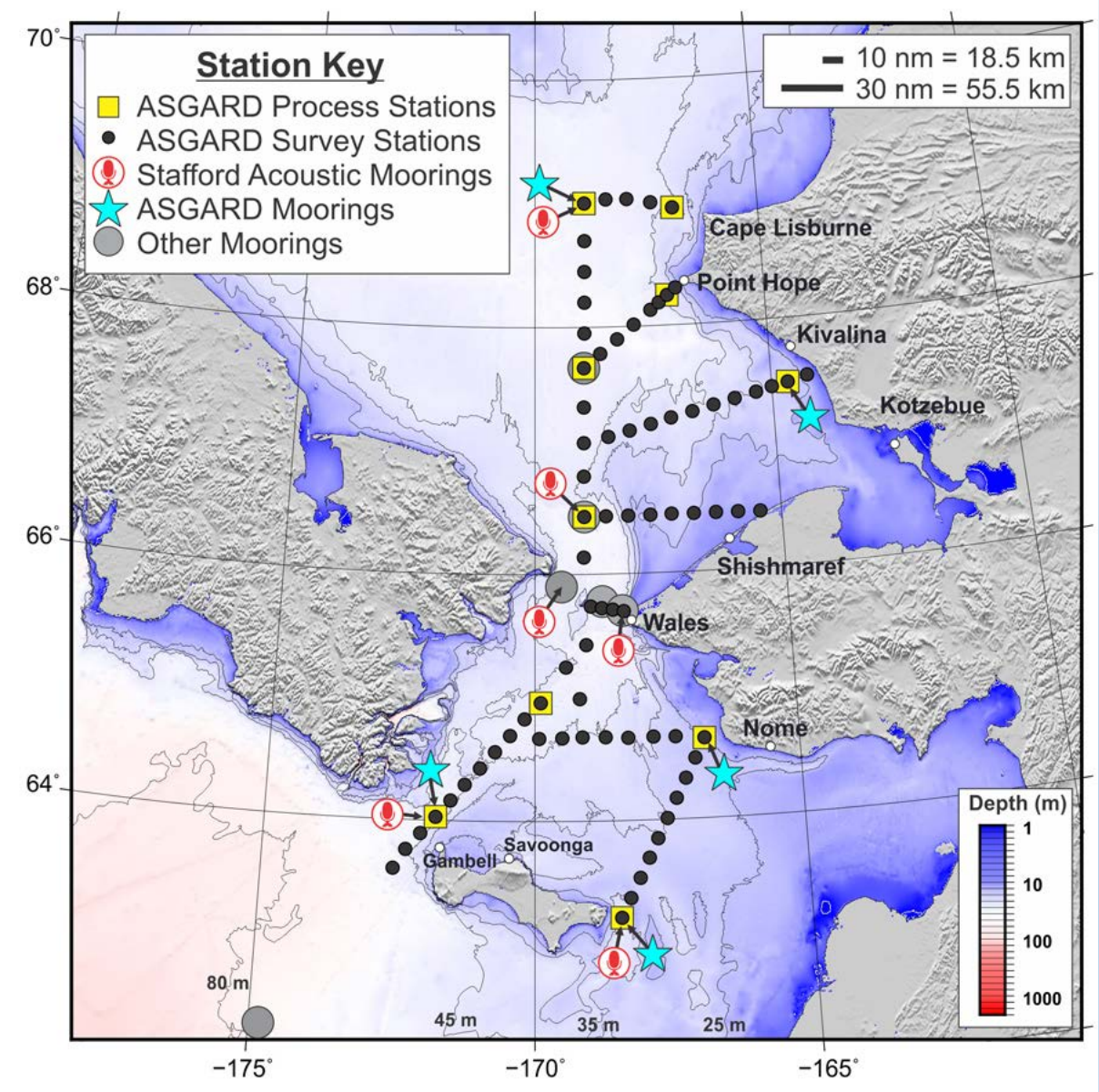
Base(s) for Field Work : n/a

Aviation Use No aviation required

Aviation Base:

Other Logistics:

Study Title: ASGARD Integrated Ecosystem Survey



Study Title: Saildrone Survey

Lead Organization(s):): NOAA Office of Oceans and Atmospheric Research

Other Organization(s): JISAO

Lead Investigator(s): Jessica Cross, Chidong Zhang

Other Investigator(s): Calvin Mordy, Dongxiao Zhang

Investigator Contact(s): Jessica.Cross@noaa.gov, Chidong.Zhang@noaa.gov

Duration of Study: 2017 - ? Depending on budgets

Description: Four Saildrones operated by NOAA-PMEL and UW will be launched from Dutch Harbor. One will remain in the Bering Sea, one will sample the DBO lines in the N. Bering and Chukchi Sea, and two will be operating near the ice-edge in the Chukchi Sea. The vehicles will examine currents, heat flux and ocean acidification. Two additional Saildrones will be working in the Chukchi Sea and be operated by Chelle Gentemann (Earth and Space Research).

Study Title: Saildrone Survey

Subject of Study: Heat flux, ocean acidification, ocean currents

Audience: NOAA, oceanographers, marine ecologists

Purpose: Improve ice forecasts and models of ocean acidification.

Data Accessibility: Some data is experimental, some data is available through the GTS, other data will become public 12 months after completion of QA through NCEI.
Data Contact: Jessica.Cross@noaa.gov; Eugene.Burger@noaa.gov

Communication Plan: TBD

Study Title: Saildrone Survey

Expected Dates of Field Work: May - October

Expected Dates of Aviation/Marine Vessel Use: May - October

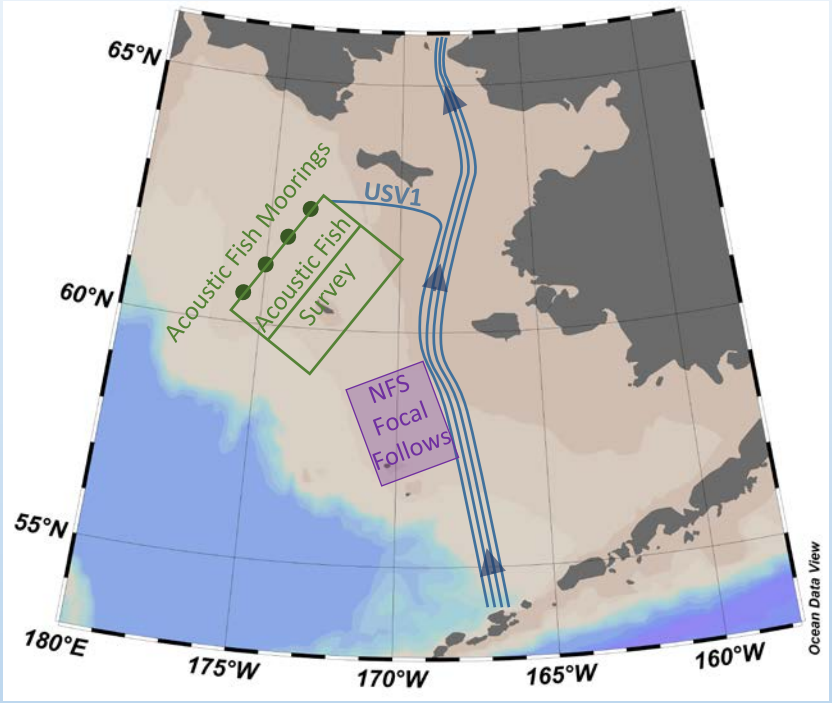
Base(s) for Field Work : Dutch Harbor

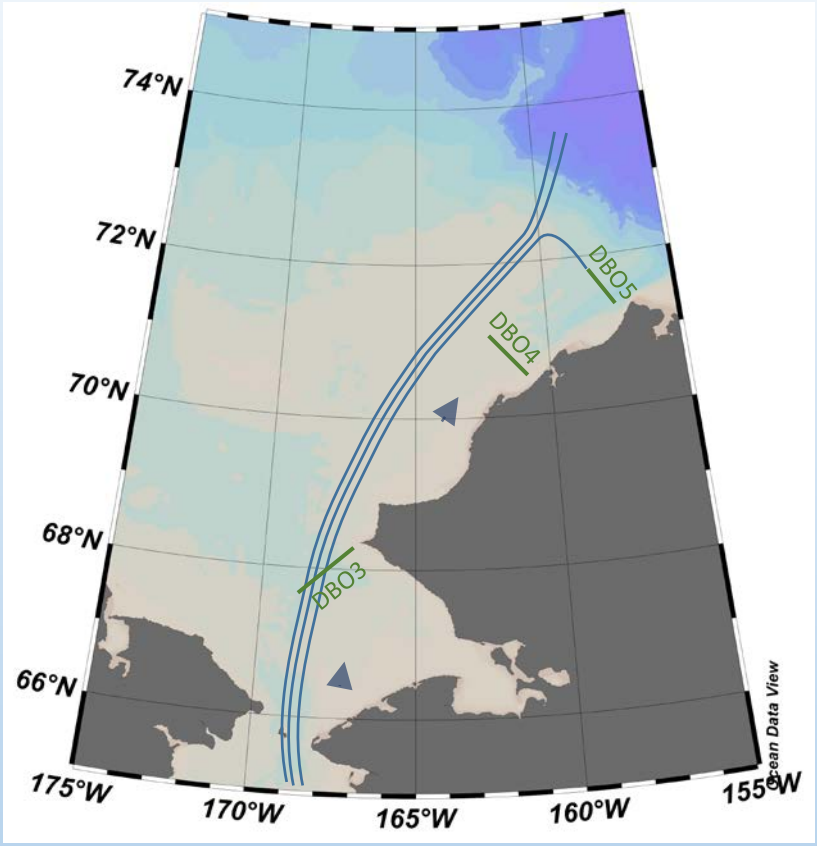
Aviation Use

Aviation Base:

Other Logistics:

Study Title: Saildrone deployment





Bering Sea

May: Four USVs depart Dutch Harbor heading north.
Ice Edge: Four USVs sample near the retreating ice.
Jun: USV1 breaks-off to conduct an acoustic fish survey (green lines) that complements AFSC acoustic fish moorings (green dots).
Jul-Aug: USV1 conducts focal follows of tagged N. fur seals (purple).
Sep: USV1 repeats the acoustic fish survey.

Chukchi Sea

Jun-Sep:
Three USVs pass Bering Strait
USV2 and USV3 work near the ice edge
USV4 samples along the DBO lines before joining the other USVs near the ice edge (green; DBOs 1, 2 and 6 not shown).

2019 PAG and DBO Cruise Plan Table (03-14-19)

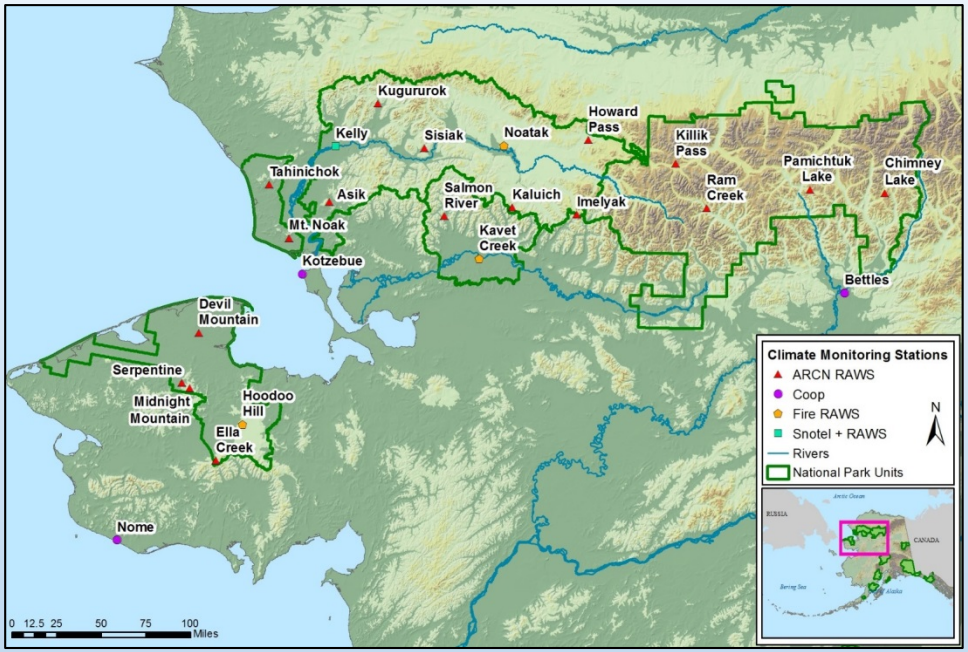
2019 PAG and DBO Field Season (version 02_01_19): Sampling Contributors. Projects Key: AON=US Arctic Observing Network (National Science Foundation); ArCS=Arctic Challenge for Sustainability; ArcticEIS2=Arctic Ecosystem Integrated Survey, C30=Canada's Three Oceans; CHINARE=Chinese Arctic Research Expedition; DBO=Distributed Biological Observatory; EcoFOCI= JAMSTEC= Japan Agency for Marine-Earth Science and Technology; JOIS=KOPRI = Korea Polar Research Institute; MOSAiC= Multidisciplinary drifting Observatory for the Study of Arctic Climate (MOSAiC); NIPR = National Institute of Polar Research; NOAA=National Oceanic and Atmospheric Administration; Office of Naval Research (ONR) Marginal Ice Zone (MIZ) project; PMEL=Pacific Marine Environmental Laboratory. **DBO Region Key**: DBO1=So. St. Lawrence Is., DBO2=Chirikov Basin, DBO3=So Chukchi Sea, DBO4=NE Chukchi Sea, DBO5=Barrow Canyon, DBO6=East Beaufort Sea, DBO7-Beaufort Sea Central, DBO8=Bathurst polynya region.

Dates 2019 (Port calls)	Ship	DBO Region	Projects	PAG contact	Chief Scientist
July 12-24 (Dutch Harbor-Utqiaġvik)	Sir Wilfrid Laurier	1,2,3,4,5	C30/DBO (AON)	Jackie Grebmeier jgrebmei@umces.edu	John Nelson John.Nelson@dfo-mpo.gc.ca
June-Sept (Shanghai-Shanghai)	Xuelong	-	CHINARE/MoSAIC	Jianfeng He hejianfeng@pric.org.cn	Jianfeng He hejianfeng@pric.org.cn
Aug 1-Oct 2 (Dutch Harbor-Nome-Nome-Nome-Dutch Harbor)	R/V Ocean Starr	2,3,4,5	Arctic IES (Integrated Ecosystem Survey)	Ed.Farley@noaa.gov	Geoff Lebon, Geoff.t.lebon@noaa.gov Ed Farley, ed.farley@noaa.gov Kris Cieciel, Kristin.cieciel@noaa.gov
Aug 1-25 draft (Dutch Harbor-Utqiaġvik)	Araon	1,2,3	K-AOOS (Korea-Arctic Ocean Observing System	Sung-Ho Kang shkang@kopri.re.kr	Eun Jin Yang ejyang@kopri.re.kr
Aug 27 – Sept 20 (Dutch Harbor-Nome-Nome-Dutch Harbor)	F/V Northwest Explorer	2	Northern Bering Sea Assessment	Ed.Farley@noaa.gov	Jim Murphy, jim.murphy@noaa.gov
Aug 2-23 (Utqiaġvik - Utqiaġvik)	Healy	1,2,3,4,5	DBO/NCIS=Northern Chukchi Integrated System	Jackie Grebmeier jgrebmei@umces.edu	Robert Pickart rpickart@whoi.edu and Jackie Grebmeier jgrebmei@umces.edu
Sept (Nome-Nome)?	Norseman II	3	Bering Strait Mooring Project/AON	Rebecca Woodgate woodgate@apl.washington.edu	Rebecca Woodgate woodgate@apl.washington.edu
Sept 18-Oct 6 (Dutch Harbor-Kodiak)	Dyson	1 and M8	EcoFOCI	Phyllis Stabeno, Phyllis.stabeno@noaa.gov	Geoff Lebon geoffrey.t.lebon@noaa.gov
Sept -Oct?	Louis S. St-Laurent	-	JOIS/AON-BGOS	Bill.Williams@dfo-mpo.gc.ca	Bill.Williams@dfo-mpo.gc.ca
Oct?	Sir Wilfrid Laurier	4,8	C30	Bill.Williams@dfo-mpo.gc.ca	Humfrey.Melling@dfo-mpo.gc.ca
Sep 27- 10 Nov 2019 (Sekinehama, Japan, return Sekinehama, Japan)	Mirai	1,2,3	Japanese Atmospheric cruise; National Institute of Polar Research (NIPR)	Takashi Kikuchi takashik@jamstec.go.jp	Dr. Kazutoshi Sato satokazu@mail.kitami-it.ac.jp

Ongoing collaborative fish research not otherwise mentioned

- Beaufort Lagoon Ecosystem LTER – NSF funded, multiagency collaboration – Utqiagvik, Deadhorse, Kaktovik
- Wildlife Conservation Society – Kotzebue lagoon fish communities
- Woods Hole Oceanographic Institute – Carin Ashjian, zooplankton & bowhead ecology, Utqiagvik
- UAF
  - Franz Meuter – under-ice Arctic Cod sampling for spawning ecology, fall 2019
  - Seth Danielson, Steve Okkenen – oceanography, windfields, remote sensing
  - Terrestrial studies?

Study Title: NPS Arctic Network Climate Monitoring



Location: Gates of the Arctic, Noatak Kobuk Valley, Cape Krusenstern, Bering Land Bridge

Objective: Estimate the population size and composition of herds.

Dates: Late March, April 2019

Operations: Helicopter

Partners: NPS, ADFG

Annual Field Site Visits 2019

The NPS Arctic Network climate sites are visited annually to download data, swap/calibrate sensors, and complete basic station maintenance.

Gates of the Arctic: Chimney Lake, Pamichtuk Lake, Ram Creek, and Killik Pass

Noatak: Howard Pass, Imelyak, Kaluich, Noatak, Sisiak, Kelly, Asik, and Kugururuok

Kobuk Valley: Salmon River, Kavet Creek

Cape Krusenstern: Tahinichok, Mt. Noak

Bering Land Bridge: Devil Mtn., Ella Creek, Hoo Doo Hills, Serpentine, Midnight Mtn.

Red = Fire weather stations, ARCN staff does maintenance on these sites.

Measurements:

- Air temp./Rel. humidity
- Secondary air temp
- Wind speed and direction
- Solar radiation
- Snow depth
- Soil temp. 10, 20 and 50 cm depths
- Phenology camera at 4 sites (stored images)
- Summer rain

Study Title: **NPS Arctic Inventory and Monitoring Network - Climate Monitoring**

Lead Organization(s): National Park Service
Lead Investigator(s): Pam Sousanes, Ken Hill
Investigator Contact(s): pam_sousanes@nps.gov; 907-455-0677
Duration of Study: Long term 20+ years

The NPS has 17 remote automated weather stations in the five Arctic parks that measure air temperature, relative humidity, summer rainfall, snow depth, solar radiation, wind speed, wind direction, and soil temperature at 3 depths (10, 20 and 50 cm). These sites operate year-round with real-time data available from various web portals including Mesowest Current Weather Summary and NWS Mesonet. The QA/QC data and metadata are archived and available to the public.
All of the stations are visited on an annual basis during the summer months to swap sensors, perform maintenance, download data, and make any necessary repairs.

Subject of Study: Climate and snow

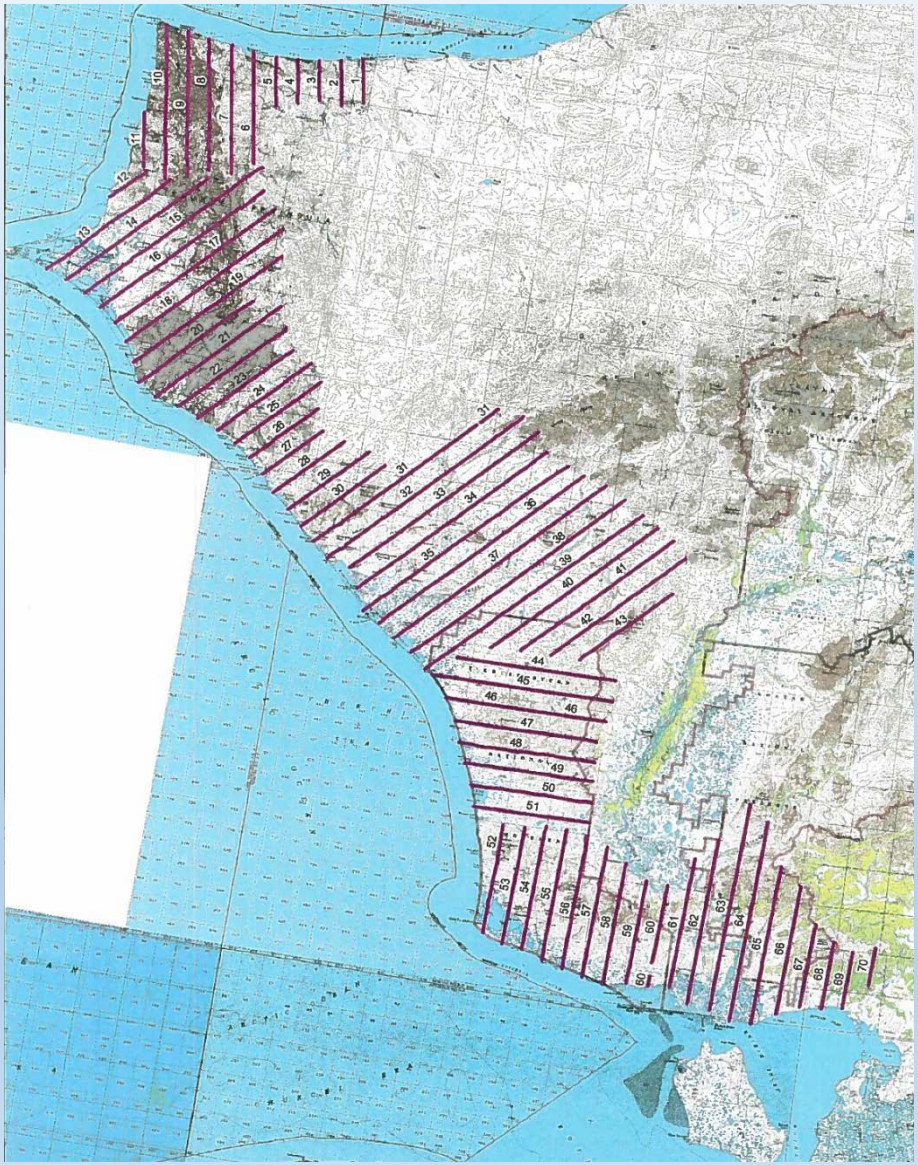
Audience: Park managers, researchers, peers, and the general public.

Purpose: Monitor and record weather conditions at representative locations in Alaska national parks in order to identify long and short-term trends, provide reliable climate data to other researchers and to participate in larger scale climate monitoring and modeling efforts.

Data Accessibility: All QA/QC data and metadata are available to the public. The most recent data are available at: https://irma.nps.gov/DataStore/Reference/Profile/2247898
Data Contact: Pam Sousanes 907-455-0677 pam_Sousanes@nps.gov

Communication Plan: Information, reports, data links available at: Arctic Inventory and Monitoring Network website

National Park Service – Muskoxen Surveys



Location: Cape Krusenstern National Monument and western Noatak National Preserve.

Objective: Estimate the population size and composition of herds.

Dates: Late March and April 2019

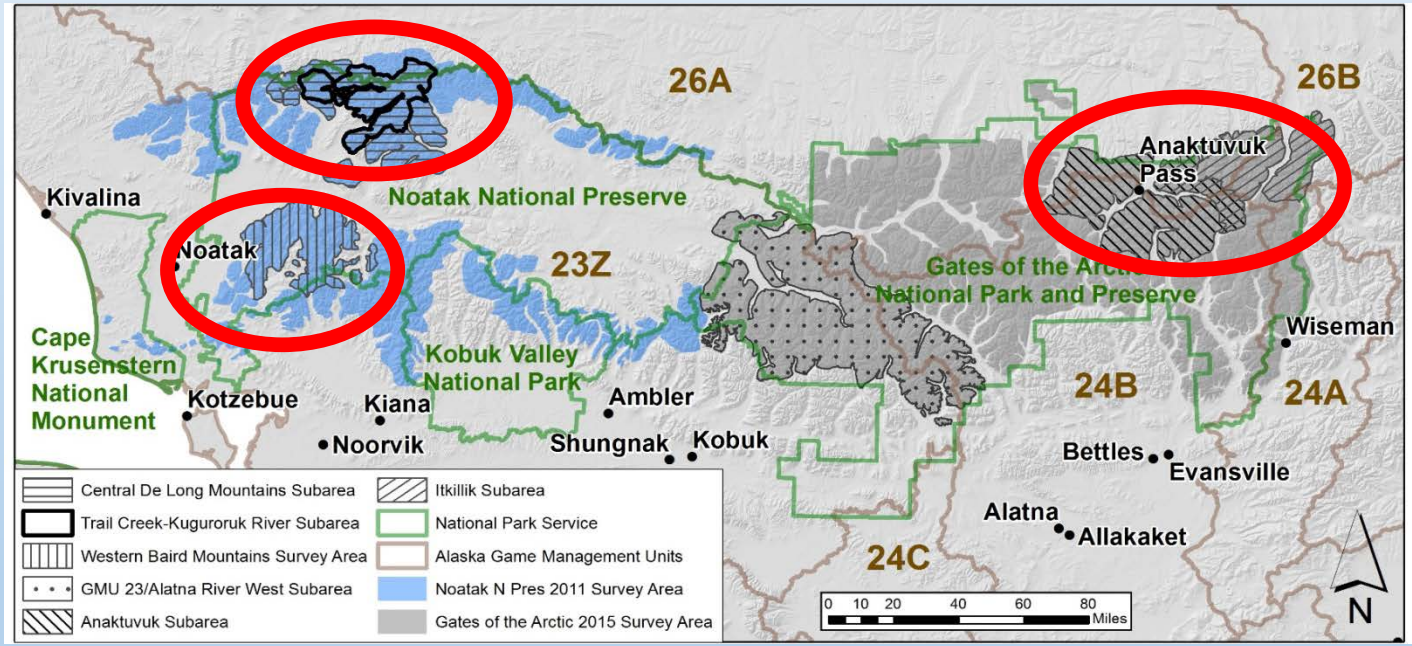
Operations:
Fixed-wing aerial support and helicopter

Partners: National Park Service, ADFG

The NPS and ADFG complete annual population counts and composition surveys for the Cape Thompson muskox population located in the “core area,” which ranges from Sisaulik to Cape Lisburne and overlaps Cape Krusenstern National Monument and western Noatak National Preserve.

Contact: Letty Hughes (letty_hughes@nps.gov)

National Park Service – Dall's Sheep Surveys



Surveys have been conducted annually in the Itkillik area since 2009, and in most years for the other areas since 2010. Sheep declined more than 60% in all areas following severe winter weather and a cold spring in 2013.

Contact: Eric Wald (eric_wald@nps.gov) or Raime Fronstin (raime_fronstin@nps.gov)

Location: Itkillik and Anaktuvuk areas in Gates of the Arctic National Park and Preserve and in the western Baird Mountains and central De Long Mountains in Noatak National Preserve

Objective: These surveys are part of a long-term monitoring program and will provide valuable information about sheep recruitment, survival and the potential for recovery of these sheep populations.

Dates:
July 2019

Operations:
Fixed-wing aircraft (2 Super Cub planes); 3-4 day period.

Partners:
National Park Service,
Bureau of Land Management

National Park Service – Coastal Ecological Classification for Spill Preparedness

Lead Investigator(s): Peter Neitlich, Tahzay Jones, David Swanson, Chad Hults

Investigator Contact(s): peter_neitlich@nps.gov

Location: Coastline, Bering Land Bridge NM, Cape Krusenstern NM

Objective: Mapping and classifying coastal vegetation

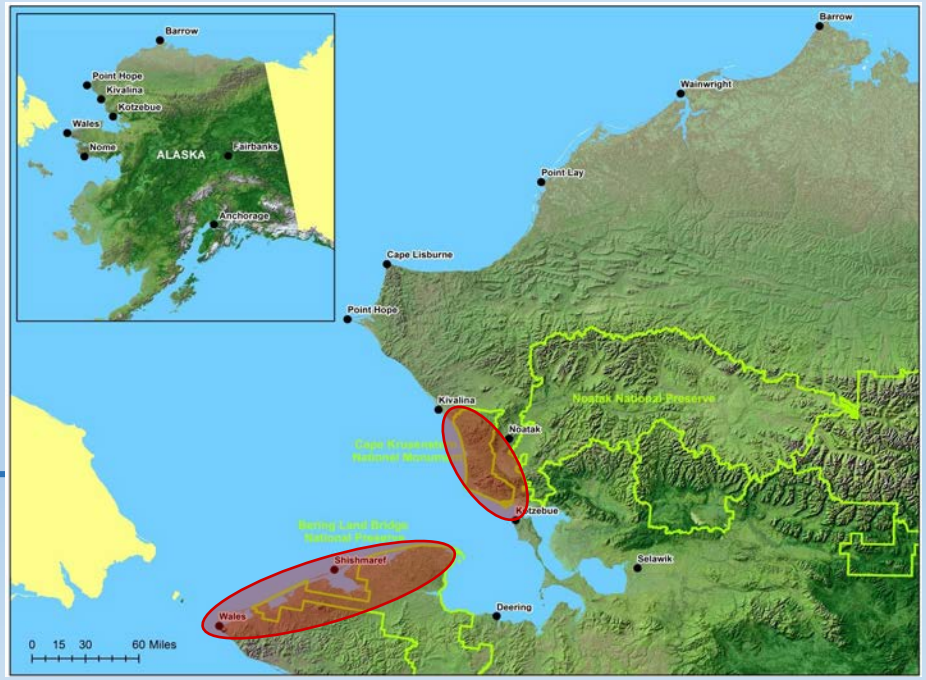
Dates: July 2019

Operations: Helicopter

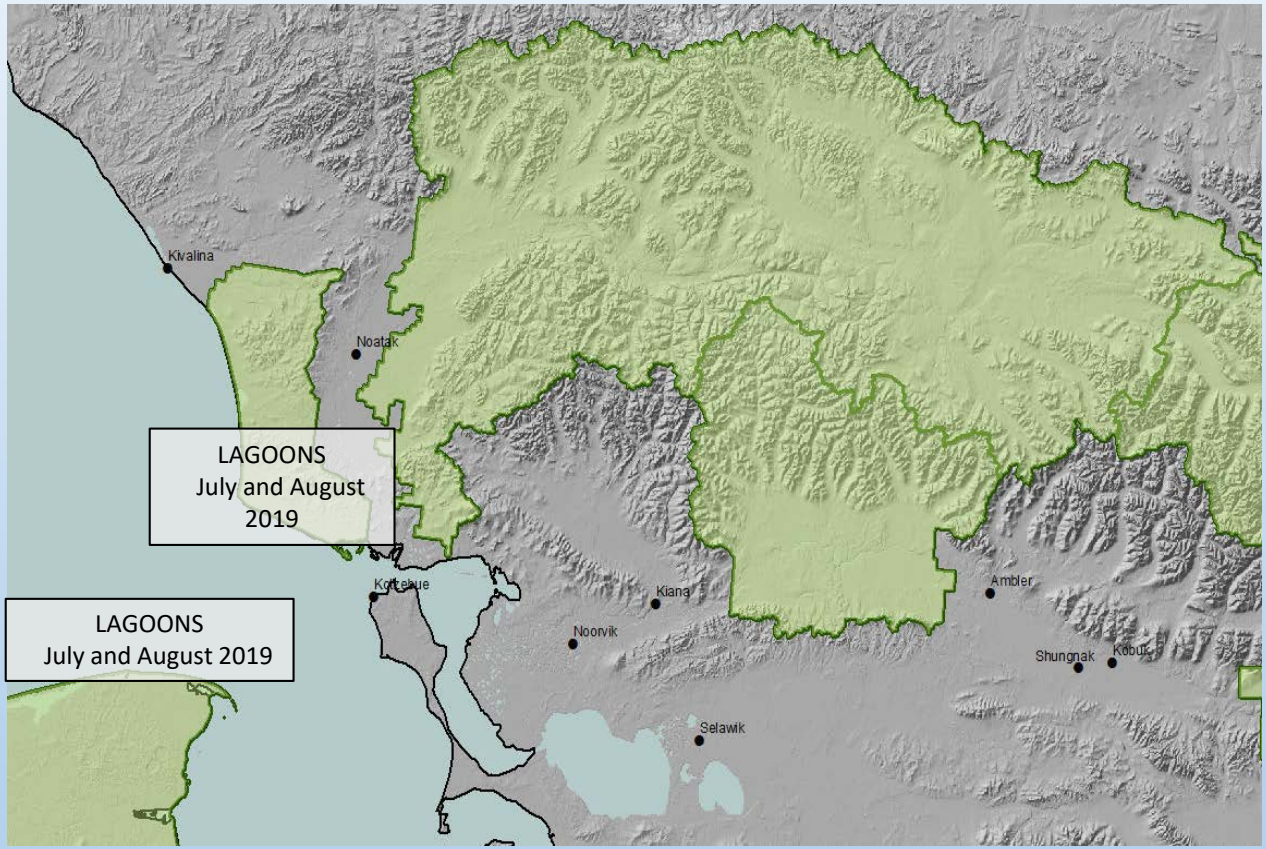
Bering Land Bridge National Preserve and Cape Krusenstern National Monuments have approximately 1600 km of predominantly soft-sediment Arctic coastlines rich in biological resources. Over the past decade, marine vessel traffic through the Bering Strait has grown exponentially to take advantage of new ice-free, Arctic summer shipping routes.. Given the proximity of shipping and nascent industrialization to these formerly remote conservation units, the National Park Service (NPS) seeks preparation for spill response, mitigation, and restoration.

A major unmet need in the parks' coastal strategic plan is a detailed ecological lands classification of coastal vegetation based on geomorphologic and vegetation units. This 2 year project will result in geospatial data layers presenting the coastal classification as well as high resolution imagery that, following its use in the classification, will be available for spill response, restoration, and other purposes.

These data will be posted online through AOOS and Arctic ERMA in order to assist spill response capabilities. They will also provide baseline data for a variety of NPS uses.



National Park Service – Lagoon Ecology



Location: Bering Land Bridge National Preserve; Cape Krusenstern National Monument (Kotlik, Aqulaaq, and Krusenstern lagoons)

Objective: Develop and implement a long-term monitoring program to document changes in coastal lagoons. Including fish, water quality, contaminate, and phytoplankton.

Dates:
July and August 2019

Operations:
Fixed-wing aircraft (floatplane) and boats.

Partners:
National Park Service

Implementation of this monitoring protocol will again include lagoon surveys during summer and fall 2019. The protocol is the basis for this project to addresses issues important to subsistence communities, and additional NPS projects will include work to identify overwintering habitat for whitefish.

Contact: Tahzay Jones (tahzay_jones@nps.gov)

Oil Search

OIL SEARCH LEASES

N W E S

0 4 8 Miles

0 4 8 Miles

Coordinate System: NAD 1983 StatePlane Alaska 4 FIPS 5004 Feet

- OSA LEASES
- 2018 ACQUISITIONS
- 2017 REPSOL ACQUISITIONS
- PROSPECT AREA OUTLINE
- NORTH SLOPE LEASES
- PRODUCTION UNIT
- NPRA BOUNDARY

Thetis
Harrison Bay
Pikka
Atlas A
Atlas B
Antigua
Kachemach
Horseshoe
Grizzly
Hue Shale

NUKAITCHUQ
OOOGURUK
NORTHSTAR
MILNE POINT
BEECHEY POINT
DUCK ISLAND
PIKKA
PLACER
COLVILLE RIVER
KUPARUK RIVER
PRUDHOE BAY
LIBERTY
POINT THOMSON
GREATER MOOSES TOOTH
S. MILUVEACH
GUITAR
BADAMI

For all USGS studies:

Audience: *Bureau of Land Management, U.S. Fish and Wildlife Service, Alaska Department of Fish and Game, Oil and Gas Industry, North Slope Borough.*

Purpose: *Status of abundance and distribution of wildlife and habitats on the North Slope that is relevant to agency and industry partners and response of wildlife to environmental change and infrastructure.*

Data Accessibility: *Publicly available via USGS and journal websites or via request following peer-review and USGS approval. Typically, USGS data is published in association with final publications.*

Data Contact: https://www.usgs.gov/centers/asc/data-tools, ascweb@usgs.gov or jpearce@usgs.gov

Communication Plan: *Publications, public meetings, emails to agency and industry partners, emails to North Slope Borough, posts to IARPC web site.*

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1. Spatio-temporal population change of arctic-breeding waterbirds on the North Slope of Alaska

Lead Organization(s): U.S. Geological Survey Alaska Science Center

Other Organization(s): U.S. Fish and Wildlife Service Migratory Bird Management

Lead Investigator(s): Courtney Amundson (USGS), Robert Stehn (USFWS retired)

Other Investigator(s): Paul Flint (USGS), Robert Platte (USFWS), Heather Wilson (USFWS), Julian Fischer (USFWS)

Investigator Contact(s): camundson@usgs.gov, jpearce@usgs.gov

Duration of Study: Study completed; paper accepted last week

Description: We estimated distribution, abundance, and spatially-explicit population trends of 20 breeding waterbird species using 25 years (1992–2016) of aerial survey data collected by USFWS across the North Slope. Important areas for most species included the coastal fringe near Teshekpuk Lake, the Colville River Delta, and Admiralty Bay. Annual population growth rates increased for 13 species, decreased for one, and were stable for six.

Other: No field work.

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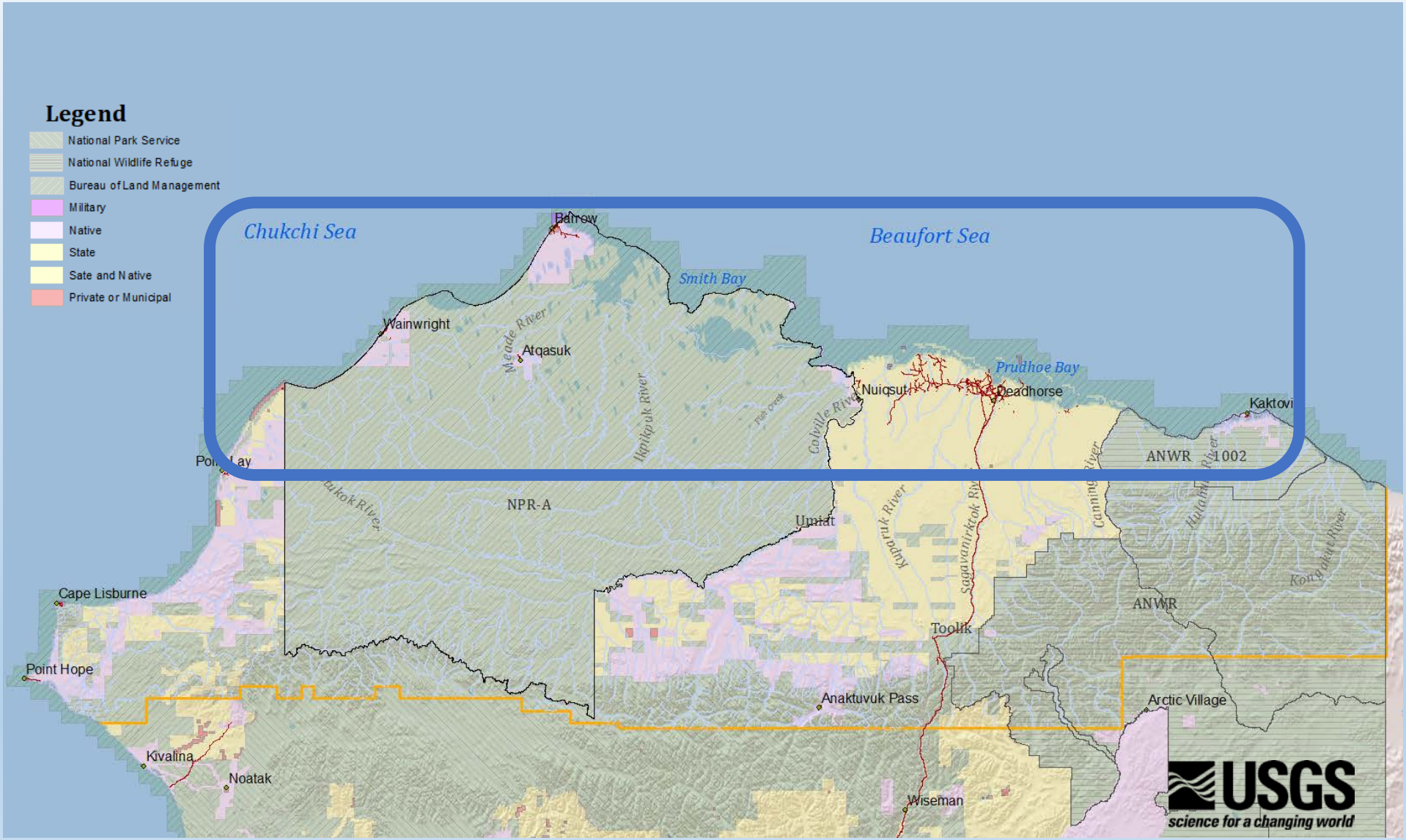
1. Spatio-temporal population change of arctic-breeding waterbirds on the North Slope of Alaska



2. Assessing caribou use of habitat near energy development in the Arctic

Lead Organization(s): U.S. Geological Survey Alaska Science Center

Other Organization(s): Alaska Department of Fish and Game

Lead Investigator(s): Heather Johnson (USGS), Beth Lennart (ADF&G)

Investigator Contact(s): heatherjohnson@usgs.gov

Duration of Study: Study completed; paper about to be submitted

Description: To understand the long-term effects of energy development on Central Arctic Caribou Herd in northern Alaska. Using recent (2015-2017) location data from 56 GPS collared females, we conducted a zone of influence analysis to assess whether caribou reduced their use of habitat near energy development, and if so, by what distance. We conducted this analysis for the calving, post-calving and mosquito periods when caribou exhibit distinct resource selection patterns.

Other: No field work.

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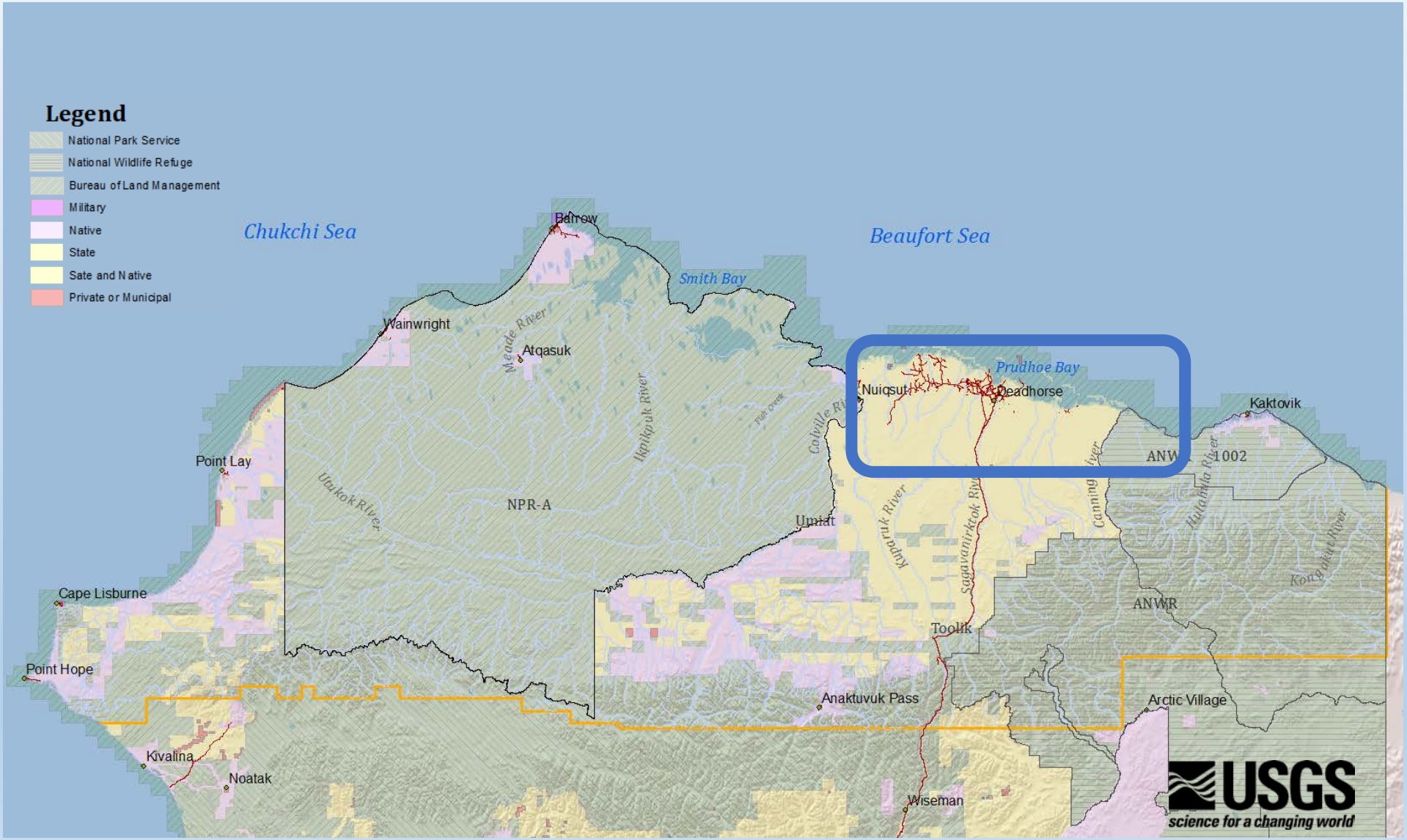
2. Assessing caribou use of habitat near energy development in the Arctic



3. Movements of three loon species in the North Slope region inferred via satellite telemetry day

Lead Organization(s): U.S. Geological Survey Alaska Science Center

Other Organization(s): Smithsonian Institution

Lead Investigator(s): Sharon Poessel (USGS) Brian Uher-Koch (USGS)

Other Investigator(s): Joel Schmutz (USGS), John Pearce (USGS), Autumn-Lynn Harrison (Smithsonian Institution), David Douglas (USGS), Todd Katzner (USGS)

Investigator Contact(s): buherkoch@usgs.gov, jpearce@usgs.gov

Duration of Study: Study completed; paper in review by coauthors

Description: Using data from over 70 marked loons, we quantified phenology, movements and habitat use of Pacific, Yellow-billed, and Red-throated Loons in northern Alaska (defined as the area bounded on the west by the community of Point Lay and on the east at the U.S. Canadian border). We determined marine and terrestrial home ranges, assessed the 1.6 km no infrastructure buffer placed around loon nests in the NPR-A, and evaluated environmental variables that may influence marine habitat use.

Other: No field work.

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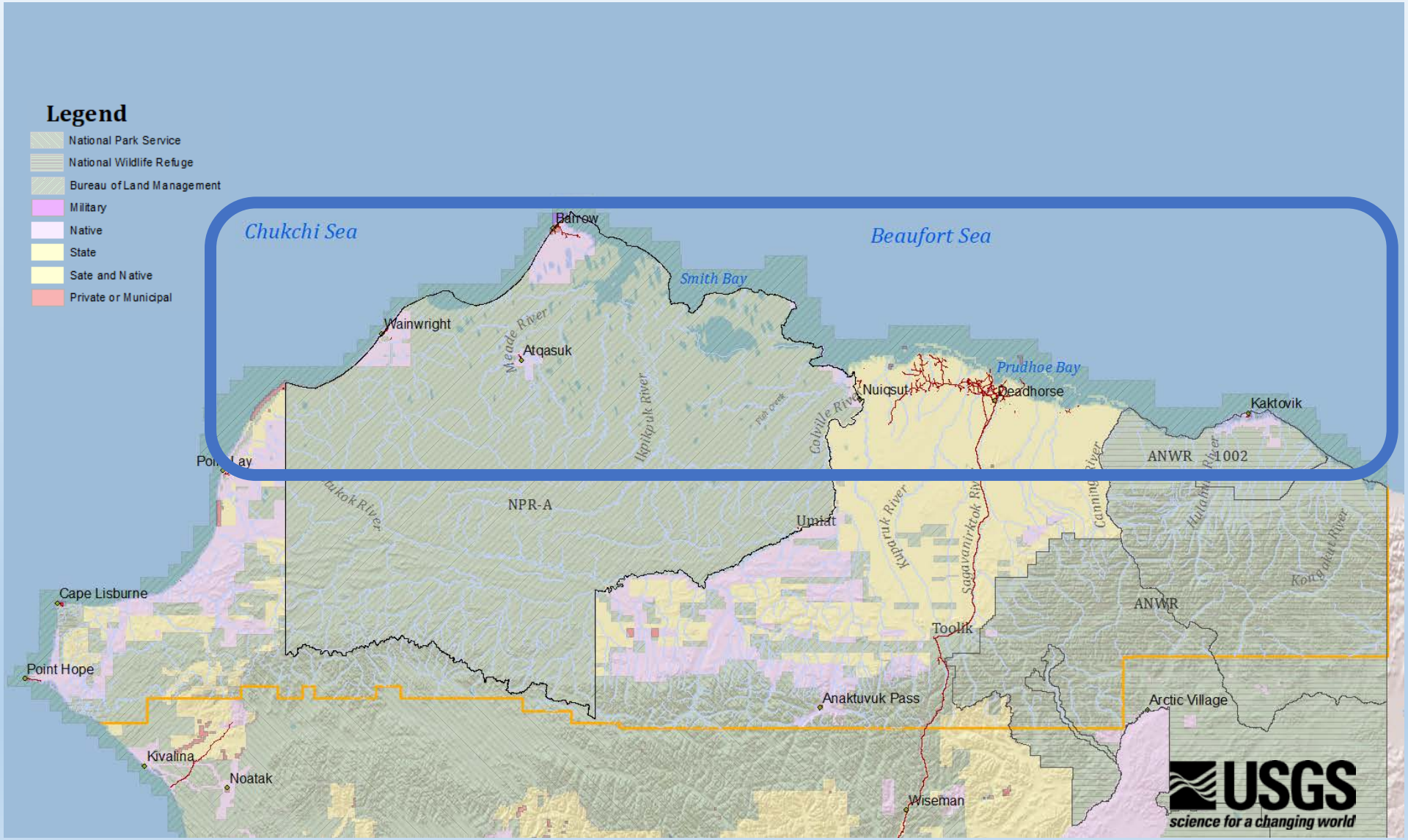
3. Movements of three loon species in the North Slope region inferred via satellite telemetry day



4. Mark-recapture of snow geese and black brant on the Colville River Delta

Lead Organization(s): U.S. Geological Survey Alaska Science Center

Other Organization(s): U.S. Fish and Wildlife Service

Lead Investigator(s): Dan Ruthrauff (USGS), Vijay Patil (USGS)

Other Investigator(s): U.S. Fish and Wildlife Service

Investigator Contact(s): druthrauff@usgs.gov , vpatil@usgs.gov, jpearce@usgs.gov

Duration of Study: 2019-2020

Description: Capture work has been funded for 2019 and possibly 2020 through the Arctic Goose Joint Venture, a stakeholder group of waterfowl management agencies from the U.S. and Canada. Capture up to 1,200 of each species in late July 2019, look for recaptures, and continue to monitor the growth, harvest rates, recruitment and growth rates of snow geese and black brant on the Colville River Delta.

Aviation: R-44 helicopter and fixed-wing.

Other: In the field from 29 July to 1 August (6 people).

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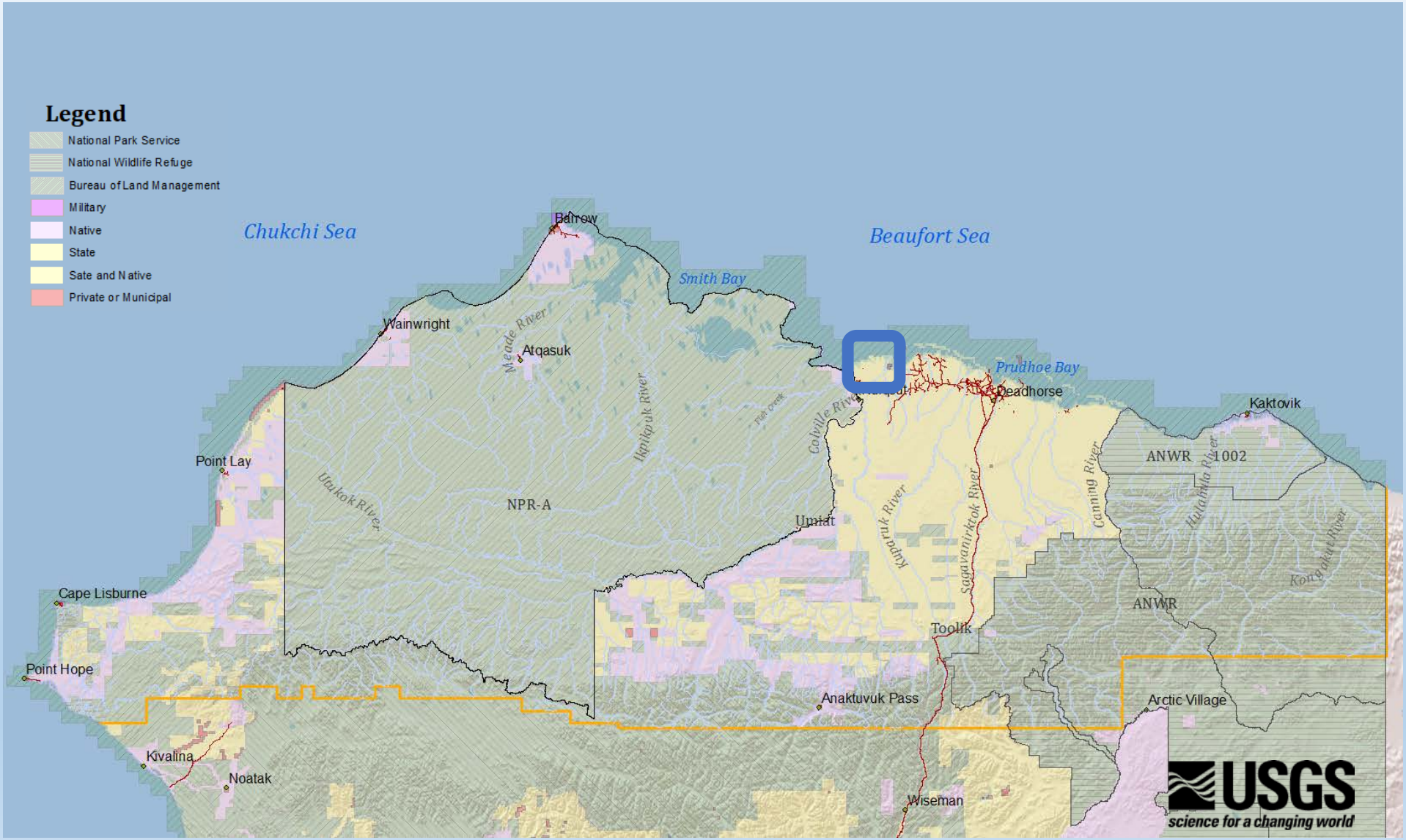
4. Mark-recapture of snow geese and black brant on the Colville River Delta



5. Assessing the influence of road characteristics on caribou movement behavior

Lead Organization(s): U.S. Geological Survey Alaska Science Center

Other Organization(s): Bureau of Land Management, ConocoPhillips, BP, and Hilcorp

Lead Investigator(s): Heather Johnson (USGS)

Investigator Contact(s): heatherjohnson@usgs.gov

Duration of Study: 2019-2022

Description: To provide updated information to BLM, collaborating agencies (ADFG, North Slope Borough), and industry (CP, BP, Hilcorp) on the influence of road design and traffic on CAH caribou movement behavior, and the effectiveness of road mitigation strategies for facilitating caribou passage through energy development (i.e., separating roads from pipelines). To meet this objective, we also will assess whether caribou responses to roads differ based on environmental features (i.e., vegetation type), times of year (i.e., calving versus post-calving season) or female reproductive status (based on calving surveys).

Other: Road-based within Kuparuk.

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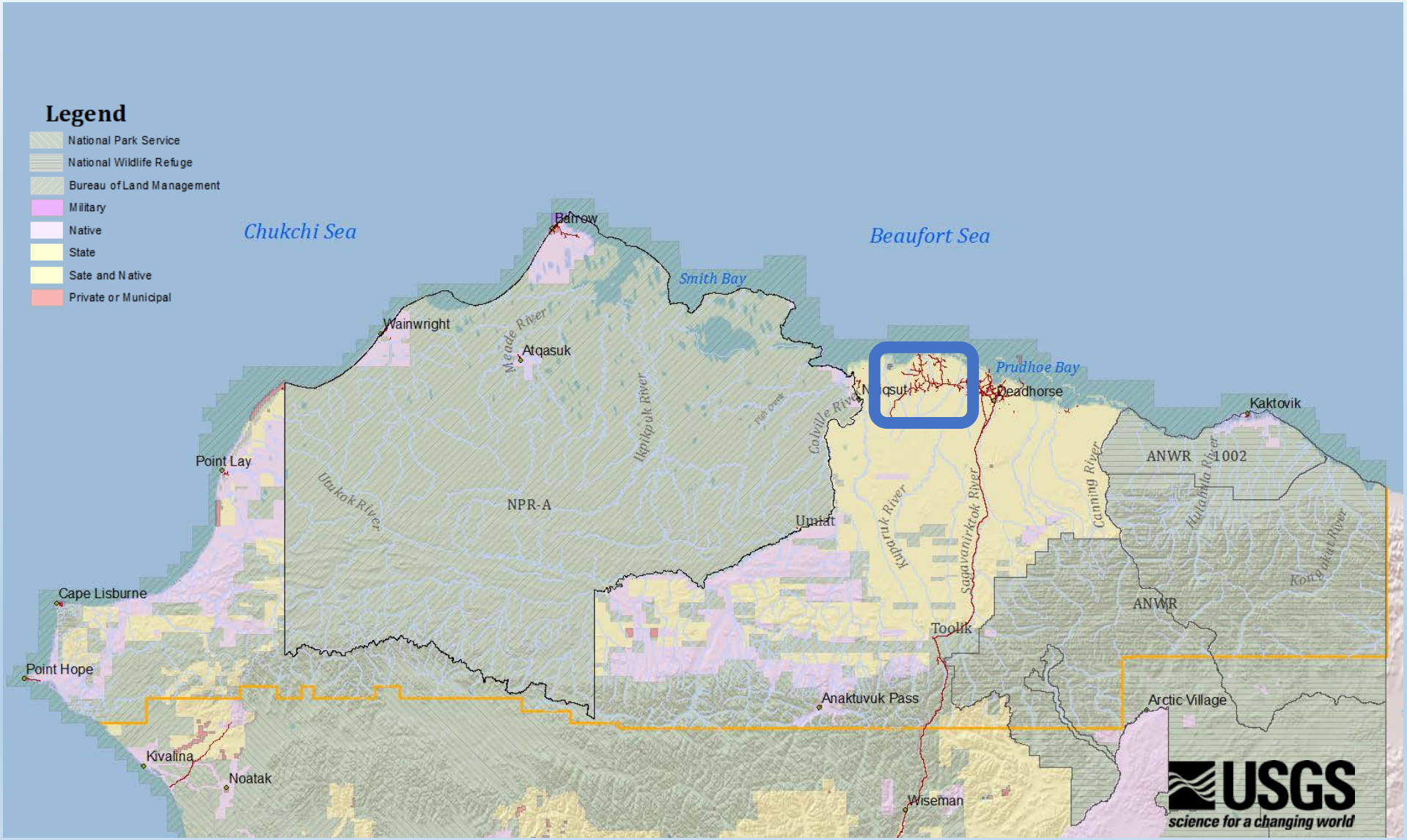
5. Assessing the influence of road characteristics on caribou movement behavior



6. Experimental assessment of helicopter-induced disturbance on molting black brant in the NPR-A

Lead Organization(s): U.S. Geological Survey Alaska Science Center

Other Organization(s): Bureau of Land Management

Lead Investigator(s): Brandt Meixell (USGS)

Investigator Contact(s): bmeixell@usgs.gov, jpearce@usgs.gov

Duration of Study: 2019-2022

Description: An experimental approach for quantifying potential population-level impacts of helicopter-induced disturbance on molting black brant in the NPR-A near Teshekpuk Lake. The study will: (1) use helicopter flights in the TLSA to experimentally test disturbance effects, (2) use GPS-logging transmitters for assessing within-year disturbance effects on home range size and movement rates and (2) use a mark-recapture framework for assessing across-year effects of disturbance on molting site fidelity and survival.

Aviation: helicopter (2019) and helicopter and fixed-wing in 2020 – 2022

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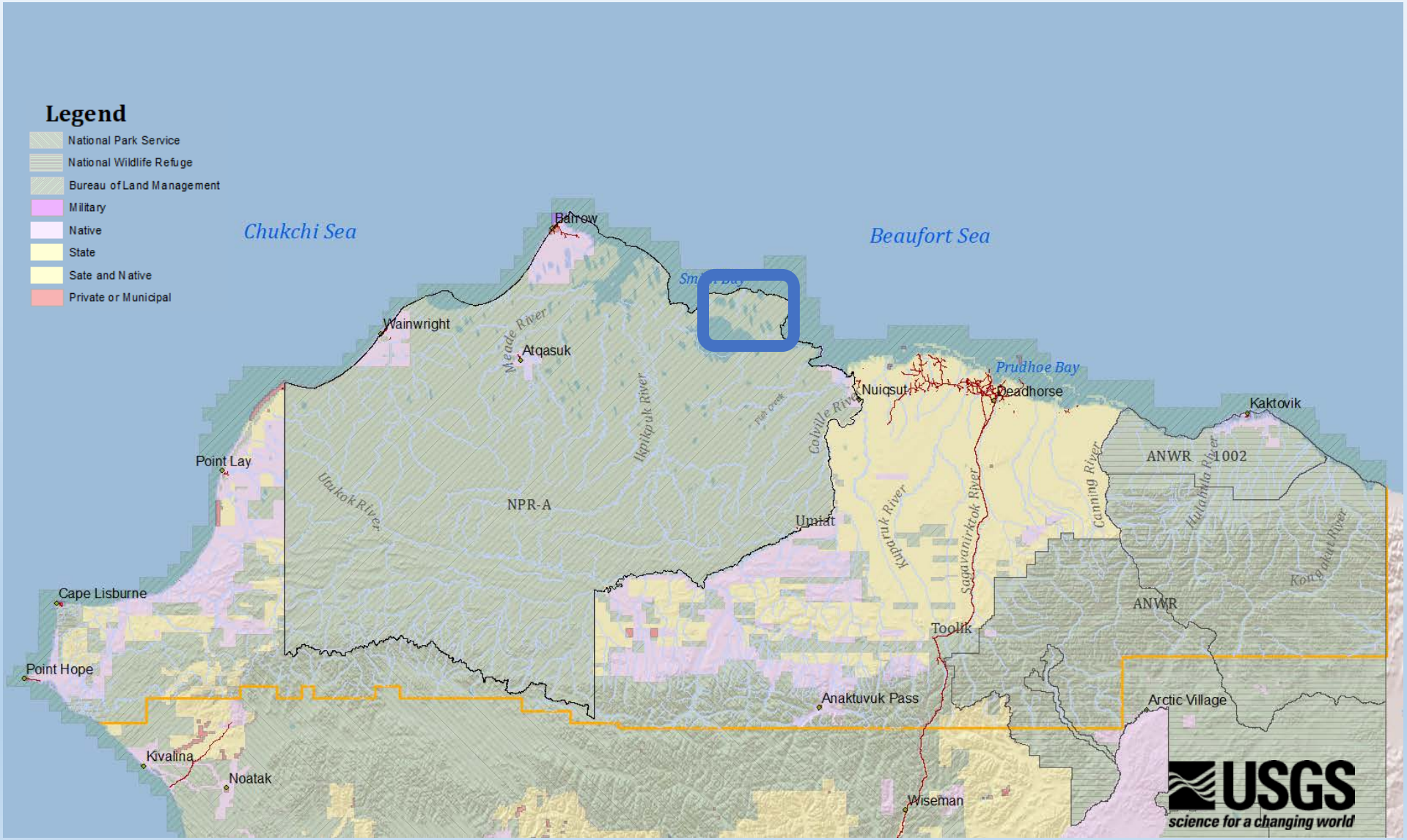
6. Experimental assessment of helicopter-induced disturbance on molting black brant in the NPR-A



7. USGS/USFWS Science Support & Quick Response Studies

Lead Organization(s): U.S. Geological Survey Alaska Science Center, U.S. Fish and Wildlife Service Alaska Region

Lead Investigator(s): V. von Biela (USGS), J. Koch (USGS), M. Carey (USGS), H. Johnson (USGS), C. Amundson (USGS), S. Arthur (USFWS), R. Wilson (USFWS), R. Brown (USFWS), J. Rose (USFWS), C. Frost (USFWS)

Investigator Contact(s): jpearce@usgs.gov

Duration of Study: 2019 to 2020-2022

Description: USGS funded studies directed at USFWS identified priorities.

Field based:

- Overwinter distribution of juvenile Dolly Varden in the Canning River.
- Quantification of groundwater and aufeis in the 1002 Area and contributions to surface water availability and habitats.

Office based:

- Map calving and post-calving habitat quality of Porcupine Caribou Herd and assess the influence of habitat on calf survival using existing collar data.
- Distribution and abundance of breeding waterbirds in relation to habitat use using USFWS data.

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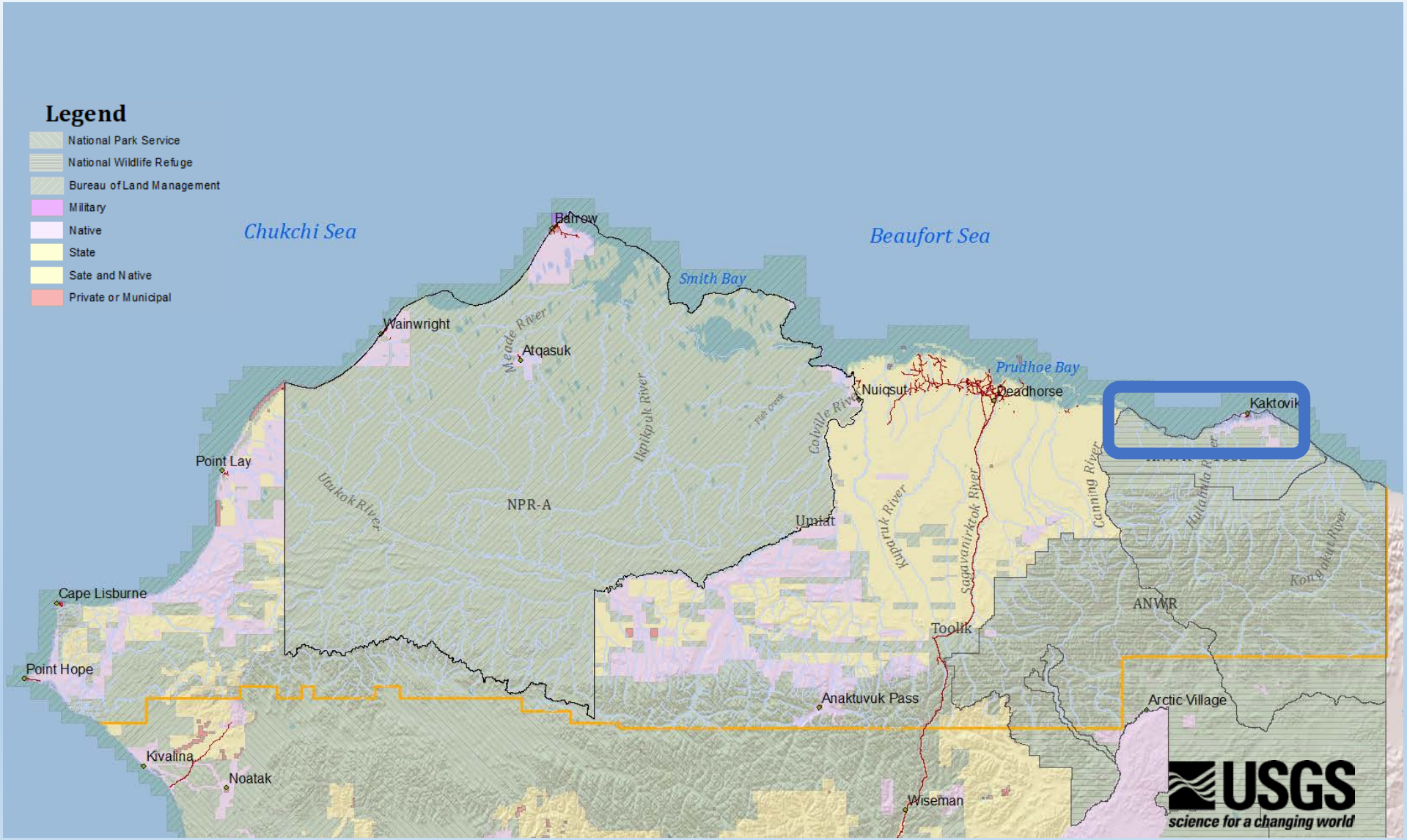
7. USGS/USFWS Science Support & Quick Response Studies



8. Habitat use, diet and contaminants of red-throated loons

Lead Organization(s): U.S. Geological Survey, U.S. Fish and Wildlife Service

Lead Investigator(s): Brian Uher-Koch (USGS), Angela Matz (USFWS)

Investigator Contact(s): buherkoch@usgs.gov, angela_matz@fws.gov, jpearce@usgs.gov

Duration of Study: 2019 pilot study

Description: To address current decline of red-throated loon on the North Slope of Alaska, we will capture adult red-throated loons and deploy 10 GPS-UHF transmitters to obtain foraging locations and fine-scale habitat data in the Beaufort Sea as part of a pilot study for a multi-year effort to begin in 2020. Additionally, we will collect one egg from a sample of nests for contaminant analyses to compare with USGS/USFWS finding 15 years ago of PCB contamination in North Slope red-throated loons that is thought to be derived from East Asia wintering ground.

Other: Based out of USFWS camp on the Canning River at the western edge of the Arctic National Wildlife Refuge.

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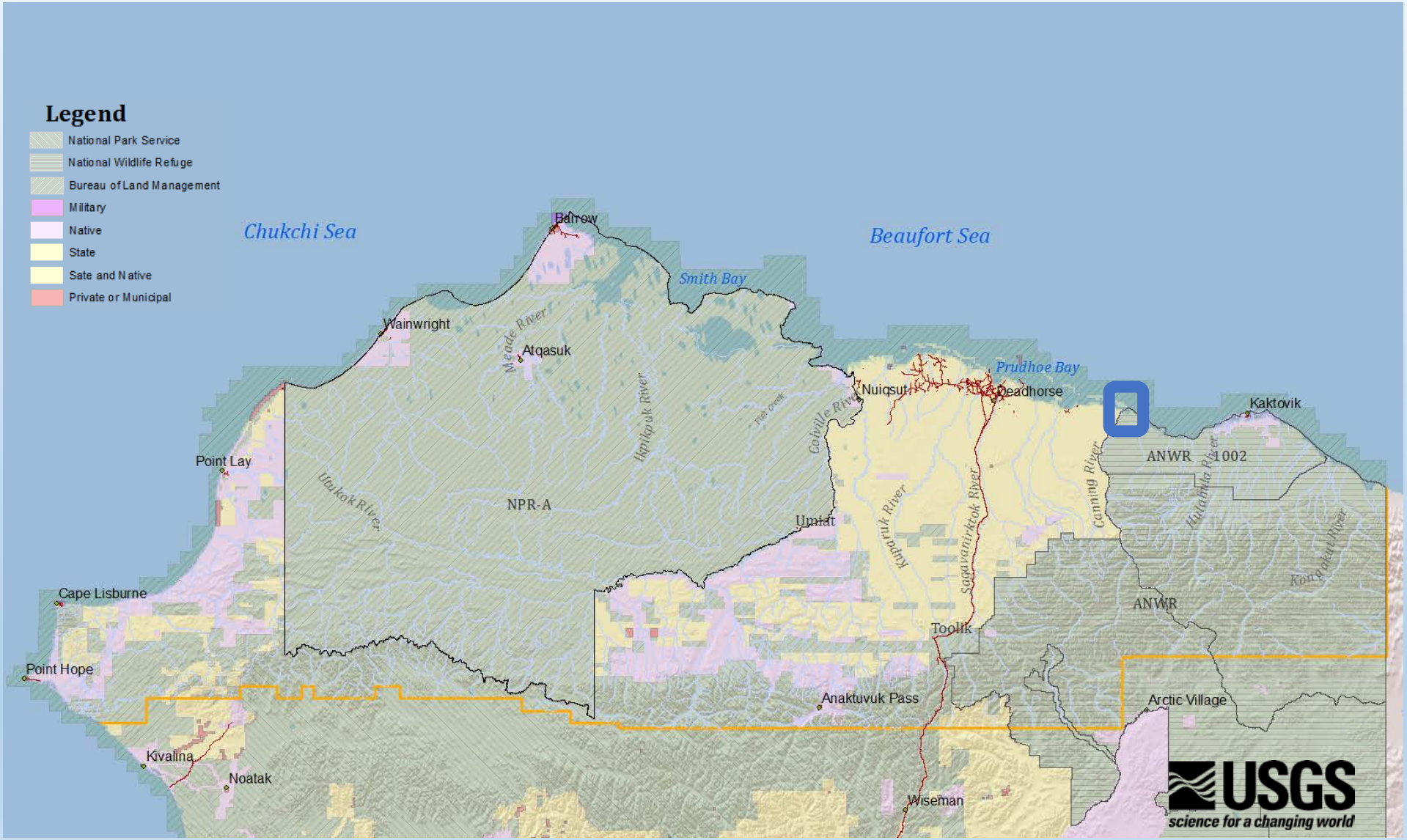
8. Habitat use, diet and contaminants of red-throated loons



9. Abundance of southern Beaufort Sea polar bears

Lead Organization(s): U.S. Geological Survey Alaska Science Center

Other Organization(s): NSB-DWM, Environment Yukon, NWT-ENR

Lead Investigator(s): Todd Atwood(USGS)

Other Investigator(s): Andy Von Duyke (NSB), Tom Jung (Yukon), Steve Baryluk (NWT), Marsha Branigan (NWT)

Investigator Contact(s): tatwood@usgs.gov

Duration of Study: spring of 2019-2021; first year completed

Description: An accurate and current understanding of population dynamics is needed to estimate the impact of anticipated take (i.e., harvest, incidental) and inform required determinations under the MMPA and ESA. The most recent abundance estimate for the southern Beaufort subpopulation is from 2010. Since then, the availability of sea ice habitat has continued to decline and anthropogenic activities (development, recreation) have increased. Accordingly, an updated estimate of abundance is a high priority for stakeholders. This joint US-CA effort (biopsy mark-recapture) will provide population-wide abundance estimates for 2019-2021 that can be used to sustainably manage the subpopulation.

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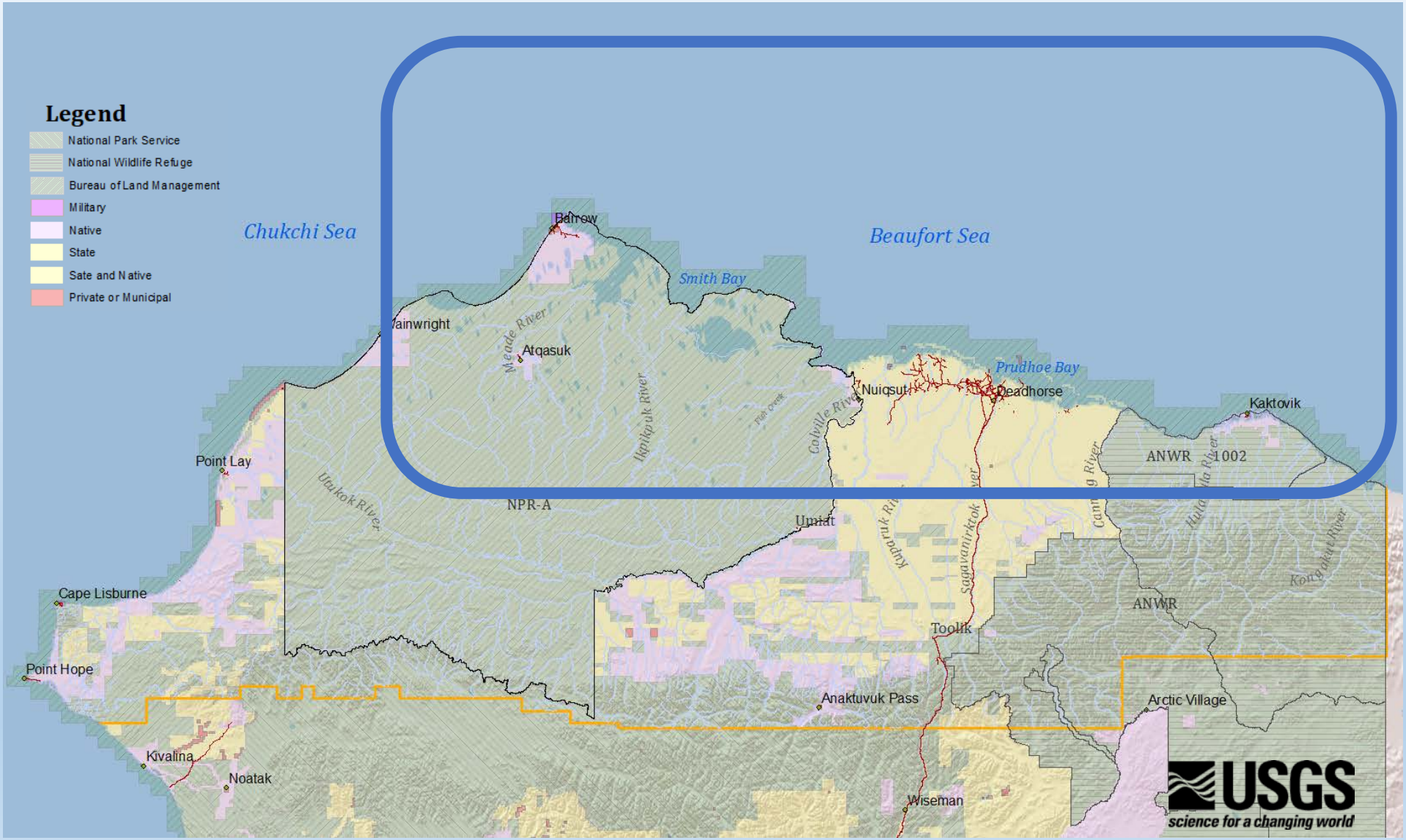
Aviation: A-star, fixed-wing fuel support; all work over sea ice; multiple bases

9. Abundance of southern Beaufort Sea polar bears



10. Characterization of sound and vibration detectable within polar bear maternal dens

Lead Organization(s): U.S. Geological Survey Alaska Science Center

Other Organization(s): U.S. Fish and Wildlife Service, BP

Lead Investigator(s): Todd Atwood (USGS)

Other Investigator(s): Ryan Wilson (USFWS), Jim Wilder (USFWS), Christopher Putnam (USFWS), Chrissy Pohl (BP), Eric Van Dongen (BP)

Investigator Contact(s): tatwood@usgs.gov

Duration of Study: spring of 2019-2021; first season completed

Description: Limited data are available on sounds and vibrations detectable within polar bear maternal dens: sample sizes in earlier studies were small and sound/vibration-distance thresholds were not examined. This project will characterize within-den sound and vibration thresholds from human-related activities. Data will be collected from up to 15 artificial dens/yr for 3 years, and used to model the disturbance risk to denned bears from varying intensities of sounds and vibrations. This project will provide information for enabling a proactive approach to mitigate the potential for disturbance of denned bears.

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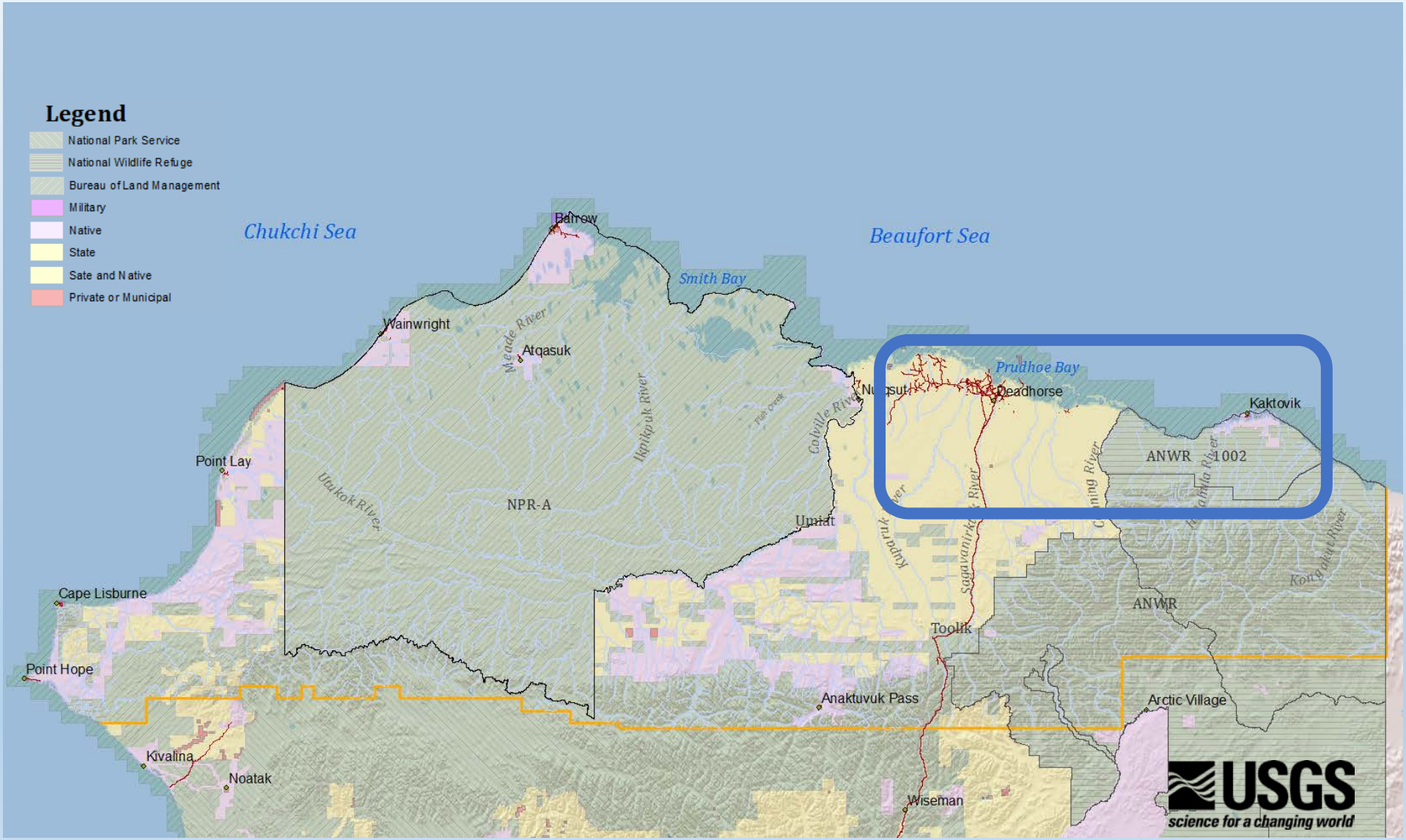
Aviation: none

10. Characterization of sound and vibration detectable within polar bear maternal dens



11. Development of an integrated population monitoring plan for the southern Beaufort Sea polar bear subpopulation

Lead Organization(s): U.S. Geological Survey Alaska Science Center

Other Organization(s): U.S. Fish and Wildlife Service

Lead Investigator(s): Todd Atwood (USGS), Jim Wilder (USFWS)

Other Investigator(s): George Durner (USGS), Karyn Rode (USGS), Ryan Wilson (USFWS)

Investigator Contact(s): tatwood@usgs.gov

Duration of Study: 1 year

Description: Cost, logistics, and deteriorating ice conditions make it difficult to monitor population-wide status. Advances in demographic analyses hold promise for helping to overcome a number of these issues by facilitating the integration of multiple data streams into a monitoring and modeling framework. We will use simulations and power analyses to develop a long-term (i.e. 10 year) monitoring plan that incorporates multiple sources and types of data within an integrated population modeling framework to monitor subpopulation status and trends.

Other: No field work.

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11. Development of an integrated population monitoring plan for the southern Beaufort Sea polar bear subpopulation