

AERIAL SURVEYS OF EIDERS ON THE COLVILLE RIVER DELTA

What did you do?

ABR conducted surveys of Spectacled and King eiders on the Colville River Delta during the pre-nesting season (early June) using a small fixed-wing aircraft. We recorded species, numbers, locations, and habitats for all observed eiders. This long-term study began in 1993, prior to oil development on the delta. Spanning nearly three decades, we have identified important locations and habitats used by eiders and have monitored eider numbers throughout all phases of construction and operation of the oilfields in the Colville River Delta. ABR, Inc.—Environmental Research & Services has provided biological and ecological consulting services for more than 40 years. We have more than 35 scientists on staff and offices in Fairbanks and Anchorage.

Where did you go?

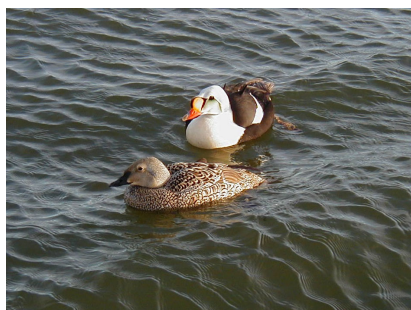
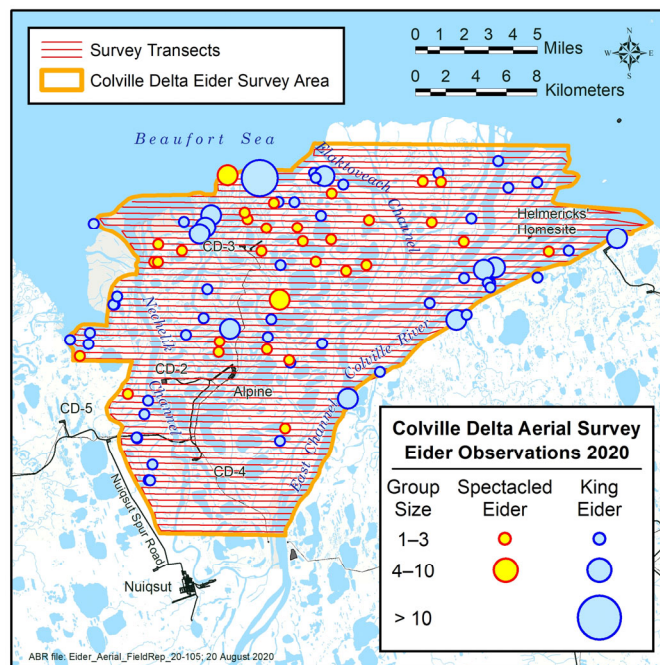
We thoroughly covered the area between the Nechelik and East channels of the Colville River. The survey area was bounded on the north by the mud flats of the outer delta, and on the south by an east-west line about two miles (3.2 km) north of the village of Nuiqsut.

Why were you working in the area?

The Colville River Delta is recognized as an important breeding area for eiders. The Spectacled Eider was listed as threatened under the Endangered Species Act in 1993. ConocoPhillips was required by the U.S. Fish and Wildlife Service to study the species when CD3 was built in the early 2000s. King Eiders are an important subsistence resource in some North Slope communities, and migration studies have indicated that the species has declined in recent decades in the Arctic. The North Slope Borough has required continued monitoring of eiders on the Colville River Delta due to the value of the delta for these sensitive species and the importance of these species to local communities.

What are your preliminary findings?

- King Eiders were more abundant than Spectacled Eiders on the Colville River Delta during the pre-nesting period in 2020. Historically, Spectacled Eiders often outnumbered King Eiders during this survey, but King Eiders have been more abundant in 11 of 27 years since 1993.
- The density of Spectacled Eiders on the Colville River Delta appeared to be near average in 2020. Spectacled Eider numbers have been stable on the delta since surveys began in 1993. In contrast, the density of King Eiders was well above average in 2020, and numbers have increased within the study area over the past 30 years.
- As in previous years, Spectacled Eiders were found primarily north of Alpine and east of the Elaktoveach Channel. King Eiders were widely distributed, with concentrations occurring in river channels and flooded areas near the coast.
- Historical studies and habitats occupied by Spectacled and King eiders suggest that most Spectacled Eiders seen during the pre-nesting survey were breeding on the Colville River Delta, whereas many King Eiders were likely moving through the area to breeding grounds elsewhere.



King Eider pair.



Aerial view of the Colville Delta in June.



Spectacled Eider pair.

AERIAL SURVEYS OF YELLOW-BILLED LOONS ON THE COLVILLE RIVER DELTA

What did you do?

ABR, Inc.—Environmental Research & Services, founded in Fairbanks, Alaska, in 1976, has provided biological and ecological consulting services for more than 40 years. We have more than 35 scientists on staff and offices in Fairbanks and Anchorage. ABR flew surveys around lakes to look for Yellow-billed Loon nests during June and chicks during August. During the surveys, a biologist flew in a helicopter along the shoreline of specific lakes, islands and peninsulas, and recorded loon observations. We first surveyed the area in 1993, prior to Alpine's development. Surveys have continued throughout the construction and operational phases of Alpine and its satellites.

Where did you go?

When surveys were first conducted, we surveyed all large lakes on the Colville River Delta. In more recent years, however, we only included the lakes where Yellow-billed Loons had been seen during the previous 20 years of surveys. The survey area is more than 200 square miles and contains roughly 120 survey lakes.

Why were you working in the area?

Yellow-billed Loons breeding in Alaska belong to a small, unevenly distributed population. In 2009, the species was proposed but not listed under the Endangered Species Act (ESA). Today, state and federal agencies still consider the Yellow-billed Loon a species that warrants special management. ConocoPhillips has monitored Yellow-billed Loons on the Colville River Delta for 26 years and continued monitoring of this species is required by the North Slope Borough. These data have been critical in assessing the health of the population and may also help land managers understand how loons will react to future oilfield development in the NPR-A (National Petroleum Reserve in Alaska).

What are your preliminary findings?

- We have identified 56 lakes on the Colville Delta that are used by breeding Yellow-billed Loons.
- Adult population growth has been fairly stable over 20 years, whereas the number of young has generally declined since 2010. Predation on eggs appears to be the primary cause of decline.
- Thirty-one Yellow-billed Loon nests and 14 chicks were found during surveys in 2020. The nest count was well above the number we typically find, whereas the chick count was slightly lower than usual.



Yellow-billed Loon on its nest.



Aerial view during survey. Nest site is circled.



Yellow-billed Loon and chick.

AERIAL SURVEYS OF YELLOW-BILLED LOONS IN THE WILLOW AREA

What did you do?

ABR flew surveys around lakes to look for Yellow-billed Loon nests during June and chicks during August. The purpose of the study is to determine the abundance, distribution, and fate of loon nests in the project area. During the surveys, a biologist flew in a helicopter along the shoreline of identified lakes, islands and peninsulas, and recorded loon observations. ABR, Inc.—Environmental Research & Services, founded in Fairbanks, Alaska, has provided biological and ecological consulting services for more than 40 years.

Where did you go?

The Willow survey area includes more than 300 lakes within three miles of the proposed Willow roads and pads—an area that extends 330 square miles. A helicopter must be used to conduct surveys because the study area is large, and nests and young are most visible and best counted during short periods of the summer. It is important to fly surveys at the same time each year in order to compare the number of adults, nests, and chicks seen among survey years.

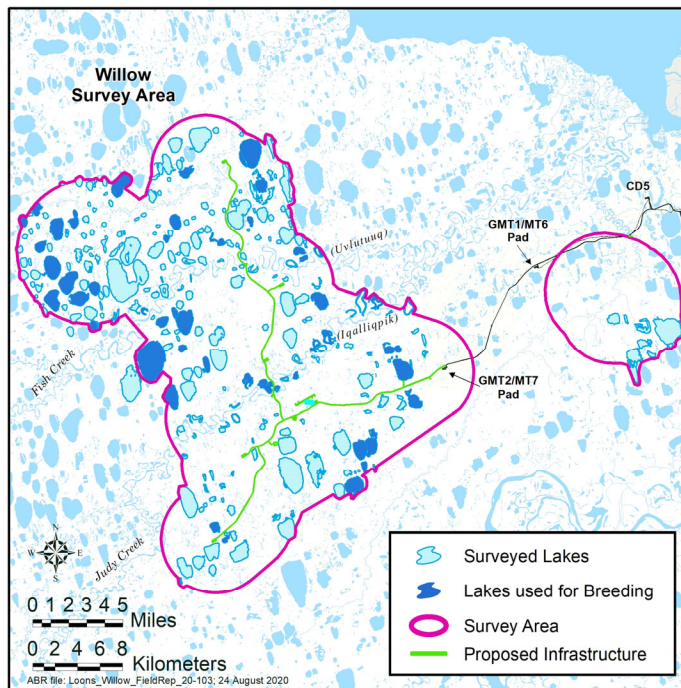
Why were you working in the area?

The Bureau of Land Management (BLM) designated the Yellow-billed Loon as a Sensitive Species, meaning that the BLM works cooperatively with other agencies and organizations to proactively conserve Yellow-billed Loons. Yellow-billed Loons are sensitive to disturbances and leave nests when people are nearby, exposing nests to predators. BLM developed a land management plan that contains several guidelines aimed at reducing the possible effects of oilfield development on breeding Yellow-billed Loons. ConocoPhillips Alaska is required under this plan to conduct three years of Yellow-billed Loon surveys for nests and young prior to development, and to avoid placing roads and pads near nest sites whenever possible. These surveys have been conducted annually in the Willow survey area since 2017. Additional lakes were added to surveys in 2018–2020 to accommodate the proposed infrastructure north of Fish Creek, making 2020 the third and final year for these additional lakes and the fourth year for the rest of lakes in the survey area.

What are your preliminary findings?

In four years of surveys in the Willow survey area, we have found:

- Yellow-billed Loons use 52 of the 302 survey lakes for nesting and raising chicks. Most lakes have a single breeding pair, but a few of the largest lakes contain as many as three breeding pairs.
- Not only do Yellow-billed Loons return to the same lakes to breed year after year, but the birds often reuse the same nest sites. During 2020, 37% of the nests were built at a site that had been used during a previous breeding season.
- Productivity (i.e., the number of nests and young) in the Willow survey area increased from 2018 to 2020. Twenty nests and 4 young were seen during 2018, whereas 35 nests and 28 young were seen during 2020.



Yellow-billed Loon.



Yellow-billed Loon nest with eggs.



Aerial view of nest site, circled.

EIDER NEST SEARCHES IN THE ALPINE OILFIELD

What did you do?

ABR conducted ground-based searches for nests focused on Spectacled Eiders. The summer of 2020 was the twelfth season that eider nest searches have been conducted in advance of off-pad work in the Alpine Oilfield. The primary objective of nest searching is to document the presence of nesting Spectacled and Steller's eiders prior to off-pad activities. If active eider nests were found, their locations would be transmitted to ConocoPhillips Alaska field environmental staff who could modify planned activities near nests as needed. ABR, Inc.—Environmental Research & Services has provided biological and ecological consulting services for more than 40 years. We have more than 35 scientists on staff and offices in Fairbanks and Anchorage.

Where did you go?

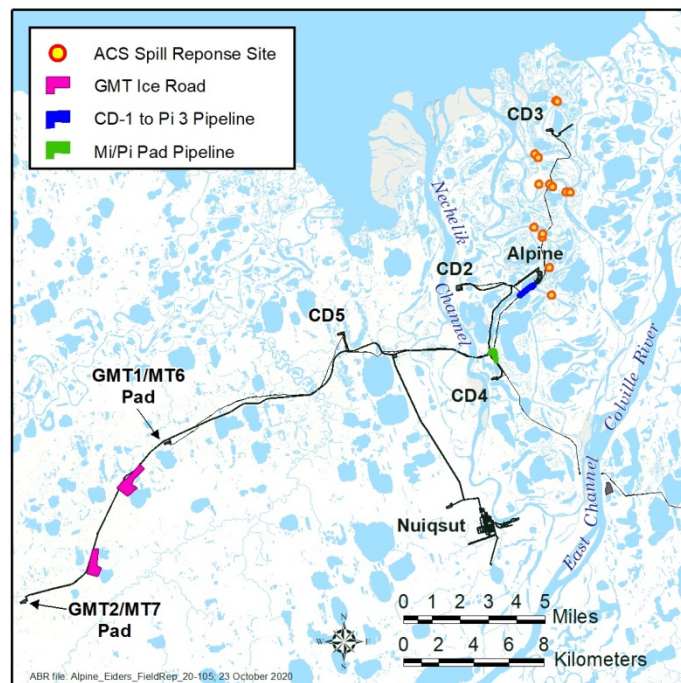
Ground nest searches were conducted on the Colville River Delta and in the Greater Mooses Tooth (GMT) area at Alaska Clean Seas (ACS) spill response sites, pipelines, and ice road sites. Biologists walked to sites near the road system and used a helicopter to access sites far from roads.

Why were you working in the area?

The Alpine Satellite Development Project (Alpine Oilfield) is within the current and historical breeding ranges of two species of eiders that are listed as threatened under the Endangered Species Act: the Spectacled Eider and the extremely rare Steller's Eider. ConocoPhillips Alaska occasionally conducts off-pad activities necessary for regulatory compliance and operational needs during the eider breeding season (June and July); for example, tundra clean-up after the ice-road season, spill-response equipment deployment, hydrological monitoring, water access, or civil surveys. Knowing where eider nests are located allows for planning to avoid accidentally damaging eggs or flushing birds from their nests, which would leave eggs exposed to predators. Nest searches are also a requirement of U.S. Fish and Wildlife Service's Biological Opinions, prior to conducting off-pad work.

What are your preliminary findings?

- We searched 12 sites in June and did not find any Spectacled or King eider nests.
- We found nests of 47 Greater White-fronted Geese, 3 Snow Geese, and 1 Tundra Swan at ACS sites. A Rough-legged Hawk nest was found on the bridge near the ALP-16 Anchor B site.
- The lemming population appeared to have crashed in 2020 compared to in 2019, which may have reduced the number of pre-nesting and nesting eiders in this season. Eiders tend to have higher nesting success when there are lots of lemmings to feed predators like foxes, jaegers, and raptors, which might otherwise prey on eider eggs and chicks.



Examining nest contents.



Female Spectacled Eider and brood.



Male Spectacled Eider.

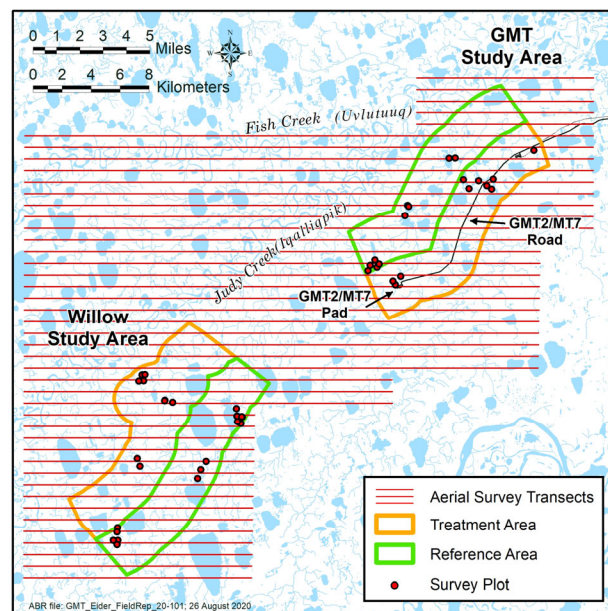
KING EIDER STUDY IN THE GREATER MOOSES TOOTH AND WILLOW AREAS

What did you do?

In early June 2020, ABR flew a survey over the Greater Mooses Tooth (GMT) and Willow development areas to search for pairs of pre-nesting King Eiders. Using the results of this survey, and locations of eiders recorded in previous years, we established plots on the ground to study nesting eiders. In mid-June we searched 19 treatment plots (near planned or existing facilities) and 22 control plots (located far from developments) for nests. The ground searches focused on King Eiders, but if a Spectacled Eider nest was found, it was also recorded. We recorded the number and distribution of nests, and whether they were successful at hatching young. The year 2020 was the first of a five-year study. We will search these same study plots each summer through 2024. ABR, Inc.—Environmental Research & Services has provided biological and ecological consulting services for more than 40 years. We have more than 35 scientists on staff and offices in Fairbanks and Anchorage.

Where did you go?

For the aerial survey, we flew a small fixed-wing aircraft along transects spaced evenly at ½-mile intervals from Fish Creek south to include the GMT and Willow development areas. For nest-searching, we drove and walked to all plots near the GMT road (within ~¼ mile) and used a helicopter to access plots that were far from the road. The map shows the study areas and the aerial survey transects.



Why were you working in the area?

As part of the rezone ordinance for GMT2, the North Slope Borough (NSB) required a waterfowl study to examine the potential impacts of oil development on nesting birds. ConocoPhillips Alaska and the NSB biologists decided that King Eiders—an important subsistence species in some NSB communities and a species that commonly occurs in the area—would be the focal species of the study. The goal of the study is to determine if construction, and post-construction activities of GMT2 and Willow developments would affect the nest site selection or reproductive success of King Eiders.

What are your preliminary findings?

Aerial Surveys:

- King Eiders were broadly distributed in the study area. We counted 157 King Eiders, mostly as pairs or single males (assumed to be paired with females that are more difficult to see).
- No Spectacled Eiders were seen.

Ground Surveys:

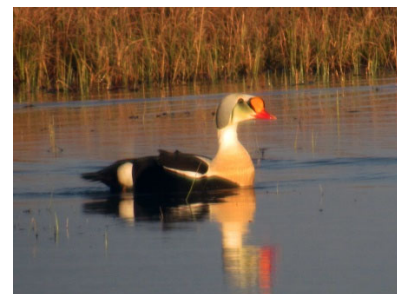
- In 10 days of nest-searching, we found 7 King Eider and no Spectacled Eider nests. We installed 6 game cameras on nests and 7 temperature monitors (a fake egg that the eider sits on) in nests.
- Of the seven nests, three were successful, three failed from predation (game cameras showed ravens were responsible for two failed nests), and one nest was abandoned by the female soon after we found it.
- This year we saw few lemmings in our searches: Lemmings are an important food for foxes, jaegers, and other birds that may prey on eider nests. When lemming numbers are low, predators may eat more eggs and young from eider nests.
- We observed or heard reports of groups of female eiders that appeared to not be nesting. These females may have had failed nests, or perhaps did not attempt to nest this year.



Female King Eider leaving her nest as a Common Raven approaches.

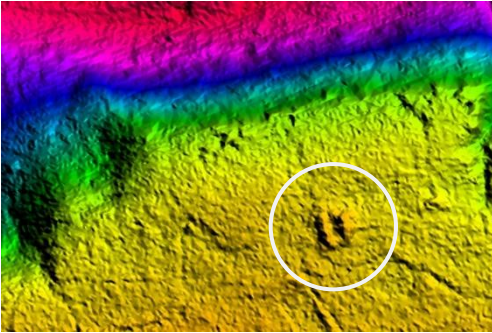


Biologist gathering nest data.



Male King Eider.

CULTURAL RESOURCES SURVEYS FOR THE WILLOW DEVELOPMENT

***What did you do?***

The Willow Development area was examined for archaeological sites in 2017, 2018, and 2019. Examinations of the area date back to 1976 – only three years after Nuiqsut was re-settled and the first year that Dr. Rick Reanier worked in the Nuiqsut area. The 1976 study recorded a sod house ruin on the shore of a lake near the Willow area. In 2020, existing lidar data was processed over this sod house ruin to assess lidar’s capability to identify these important cultural sites (see photo, left). That ruin was visited by elders in 2002 who thought the sod house might have been built by Billy Egowa (Igaugak), the grandfather of Amy Taalak, a herder and trapper who traveled widely in this area (see photos below).

Where did you go?

From 2017 to 2019, all of the areas for proposed Willow gravel roads and pads, including the airstrip and gravel mine, were searched for evidence of these old sites. Both aerial and on-the-ground survey were conducted. As development plans evolved, new studies were conducted on the revised areas. No fieldwork was conducted in 2020.

Why were you working in the area?

Archaeological and historic sites are places where people once lived and worked, leaving behind traces of their presence. Many such sites are also part of the cultural heritage of the village of Nuiqsut. There are numerous borough, state, and federal laws and regulations that prevent damage to archaeological sites. Locating and identifying these resources helps protect them. In order to adequately protect such sites, their locations must be precisely known, which requires an archaeological survey to find and record them. Visiting previously recorded sites to verify locations with modern GPS coordinates is also an ongoing part of the program.

What are your preliminary findings?

- Although there are a few cultural resource sites near the Willow area, no sites were found that would be affected by the Willow Development plans.
- Sites in the area are generally located near lakes and streams, away from the proposed locations for development.
- Humans have lived on the North Slope for thousands of years, but the sites found in the Willow area relate mostly to historic Iñupiat use of the region and to the initial phase of oil exploration in the 1940s.
- This data is shared with the NSB IHLC and State and Federal State Historic Preservation Offices, but reports are not available on the North Slope Science Initiative website due to confidentiality and protection requirements.



Edwin S. Hall, Jr. records the sod house ruin in 1976. Note the sheet metal wood stove on the right. This site is in the Willow area.



Paul Ogroogak of Nuiqsut examines a lamp part in 2002 that he thought had been modified to make a reindeer bell, as Emily Wilson looks on from the sod house.

UBLUTUOCH/TINMIAQSIUGVIK RIVER GMT2 REZONE FISH SURVEYS

What did you do?

Summer 2020 was the first year of a five-year monitoring project in the Ublutuoch River (Tinmiaqsiugvik) drainage in the NPR-A, National Petroleum Reserve-Alaska, and builds on earlier studies in the area that began in 2001.

We sampled three times: after break-up in June, during mid-summer in July, and just before freeze-up in late August. Fish were captured as they moved both upstream and downstream using specialized nets, called fyke nets, that funnel fish into a live-trap end. Water chemistry was recorded each day at each site. All fish captured were identified and measured. Most fish were released, except for a portion of different-sized fish that were analyzed for age and maturity in a laboratory. We tagged fish longer than about 7 inches with a unique number to help evaluate seasonal and annual movements within and between drainages. Local residents who catch a tagged fish can call the phone number printed on the tag to help us understand fish movement.

Why were you working in the area?

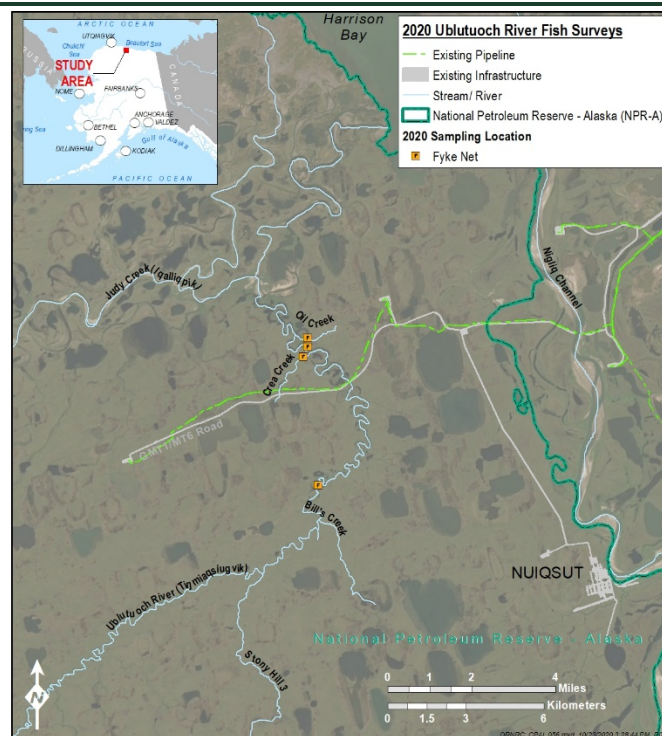
The goal of this study is to better understand how, when, where, and what species, numbers, and ages of fish are using the Ublutuoch River drainage. Data collected will support Greater Mooses Tooth 2 Rezone monitoring conditions from the North Slope Borough. Fish tagging data is used to develop population estimates that can be compared to past and future estimates. Continued monitoring of fish using the Ublutuoch River may also allow an assessment of the potential effects of development activities and climate change on these fish populations.

Where did you go?

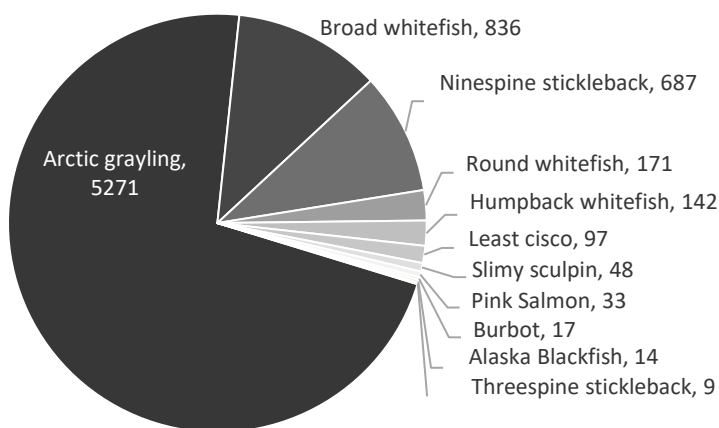
Four sites along the mainstem of the Ublutuoch River and in small creeks flowing into the river, such as Oil and Crea creeks, were sampled throughout the open water season. Sites were located both downstream and upstream of the Ublutuoch River Bridge and accessed by boat.

What are your preliminary findings?

- 2,500 hours of fyke net sampling effort to capture a total of 7,325 fish comprised of 11 species.
- Arctic grayling were the most abundant species, comprising 72 percent of the total catch, followed by broad whitefish (11 percent), ninespine stickleback (9 percent), round whitefish (2 percent), and humpback whitefish (2 percent). All other species accounted for about 4 percent of the catch, including 33 pink salmon.
- 947 fish were tagged, and an additional 224 fish were recaptured from previous tagging.
- Species diversity was typically greatest at downstream mainstem areas of the river and was lowest in upstream reaches and in small creeks.
- Laboratory analysis will be conducted to determine the age and other population structure characteristics of fish using the drainage.



Breakdown of captured fish



WILLOW FISH SURVEYS

What did you do?

Summer 2020 was the fourth year of a project to study how fish use streams in the Willow area. Within the study area, we identified the composition of fish species, their seasonal distribution and movements, and population characteristics - such as the size and numbers of fish using streams.

We sampled fish three times: after break-up in June, mid-summer in July, and just before freeze-up in late August. Fish were captured as they moved both upstream and downstream using specialized nets, called fyke nets, that funnel fish into a live-trap end. Each fish was identified, measured, and released. Fish longer than about 7 inches were tagged with a unique number to help evaluate seasonal and annual movements within and between drainages. Local residents who catch a tagged fish can use the phone number printed on the tag to help us understand fish movement.

Why were you working in the area?

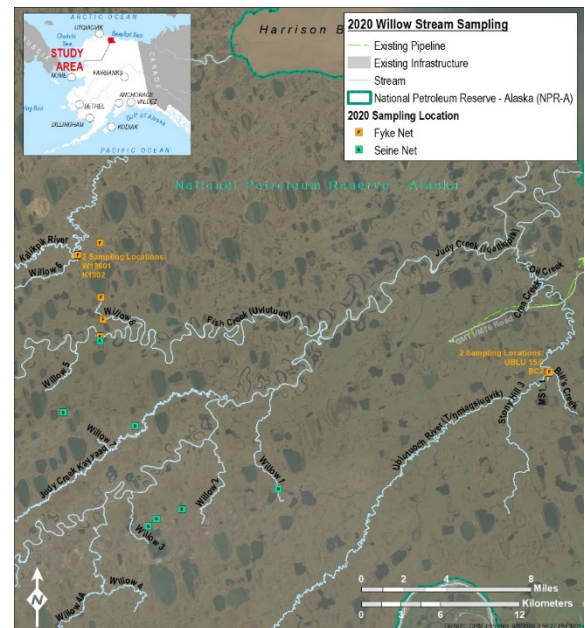
This study provides a baseline to understand how fish currently use streams in the Willow area and assesses potential future impacts to fish by development activities and climate change. This kind of information helps inform engineering design for fish passage at stream crossings and is required by the Bureau of Land Management and the Alaska Department of Fish and Game.

Where did you go?

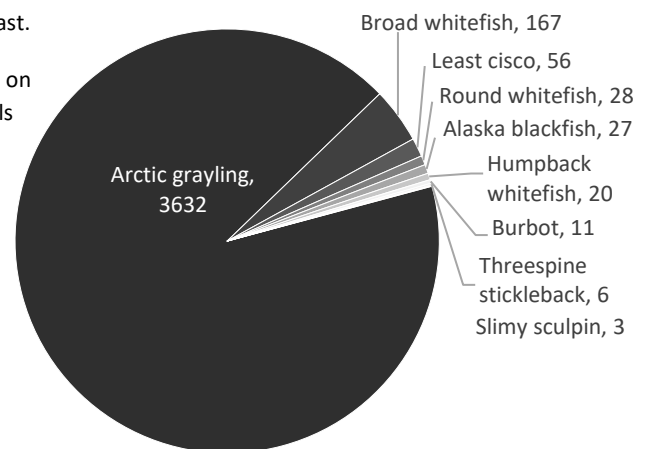
In the 2020 season we sampled eight fyke net sites and seven seine net (net pulled by hand in shallow areas) sites distributed across the mainstem and tributaries of the Kalikpik River, Fish Creek (Uvlutuuq), Judy Creek (Iqalliqpik), and the Ublutuooh River (Tinmiaqsiugvik) drainages.

What are your preliminary findings?

- We captured 15,371 fish made up of 10 species from more than 4,000 hours of net soaking time.
- 1,011 fish were tagged, and another 288 fish were recaptured from previously being tagged either earlier in the 2020 season or during past seasons.
- Ninespine stickleback were the most abundant fish captured and accounted for 75 percent of total catch. Excluding stickleback, Arctic grayling accounted for 92 percent, followed by broad whitefish (4 percent), least cisco (1 percent), and round whitefish (1 percent). All other species accounted for less than 2 percent of the remaining catch.
- No salmon were caught in the Willow area during 2020, however, small numbers of pink, chum, and sockeye salmon have been captured in the past.
- Fish were widely distributed across the study area and depended on species, size, and season. We know from tagged fish that individuals readily moved within and between drainages. Fish production and growth mostly depends on water temperatures and flow.
- Results from 2020, and previous years, highlight the importance of maintaining habitat connectivity and season-long fish passage.



Breakdown of captured fish*



*Ninespine stickleback not shown

SPRING BREAKUP MONITORING & HYDROLOGICAL ANALYSIS

What did you do?

We deployed remote equipment and field personnel to monitor and assess spring breakup flooding within the existing Alpine and Greater Mooses Tooth developments as well as in the proposed Willow development. We measured hydrologic data including stage and discharge; observed breakup flooding around oil and gas facilities—pipelines, roads, pads, and locations of hydraulic importance; monitored performance of culverts and bridges; and documented breakup flood extents, ice jams, and associated backwater effects. We additionally monitored proposed stream crossing locations during the summer to document base flow conditions.

Where did you go?

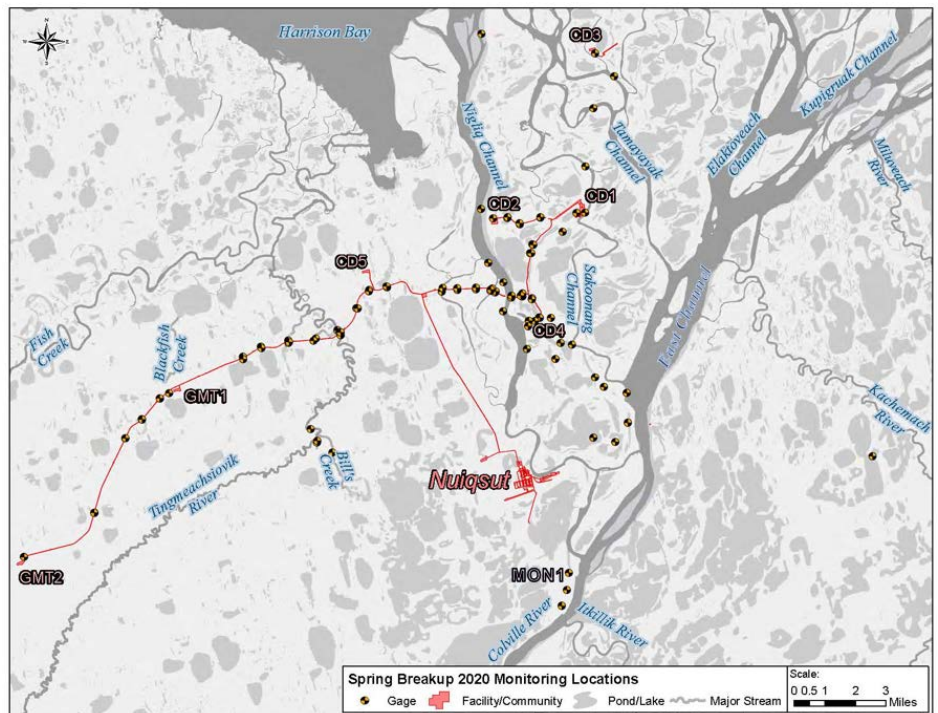
We worked at lakes, streams, and flow paths throughout the Colville River Delta and west into the National Petroleum Reserve in Alaska. We used the road system to access sites along the CD2, CD4, CD5, and GMT1/MT6 roads. Helicopter use was required to access sites in the Delta not on the road system, sites along the GMT2/MT7 road, and the Willow development area.

Why were you working in the area?

This work meets permit stipulations set by the U.S. Army Corps of Engineers and the Alaska Department of Fish and Game to monitor and mitigate the impacts of installing infrastructure in and around water bodies and to support maintenance of fish habitat. Flood monitoring also informs facility design. Spring breakup monitoring is required at Alpine facilities annually throughout the life of the project and for three years at facilities outside the Colville River Delta. This was the 29th consecutive year of monitoring in the Colville River Delta.

What are your preliminary findings?

- The 2020 spring breakup flood lasted a short time, but water levels were high in the Colville River Delta due to ice jams.
- Peak flooding in 2020 occurred May 28-29. Peak breakup flooding typically occurs between May 23 and June 5.
- Coincident ice jams in the East Channel and the Nigliq Channel caused floodwater to back up, resulting in widespread flooding.
- Preliminary 2020 peak stage (water level) at MON1 (see map) was 21.40-ft, the second highest on record; the highest observed stage on record was 23.47-ft in 2015.



Study area and sites within the Colville River Delta and National Petroleum Reserve in Alaska.

Ice jam spanning the entire East Channel of the Colville River.



Measuring flow at an Alpine facilities bridge.



CARIBOU IN THE BEAR TOOTH UNIT

What did you do?

ABR used a combination of aerial surveys, satellite imagery, and analysis of radio collars deployed on caribou to assess the seasonal distribution and movements of caribou in northeastern NPRA, the National Petroleum Reserve in Alaska. Since 2001, we have been conducting periodic aerial surveys annually between April and October to count caribou in the area and determine how the densities of caribou vary seasonally and annually (Figure 1). We also use satellite imagery to map the timing of spring snowmelt and the growth of vegetation in the spring and summer. Using radio collar data, we track the movements of individual caribou and examine how their seasonal movements are influenced by snow cover, vegetation, terrain ruggedness, insect harassment, and distance to coast. This multiyear dataset provides detailed information on which areas are used consistently during different seasons, how those areas correspond with proposed development, and if patterns change after construction. ABR, Inc.—Environmental Research & Services, founded in Fairbanks, Alaska, has provided biological and ecological consulting services for more than 40 years.

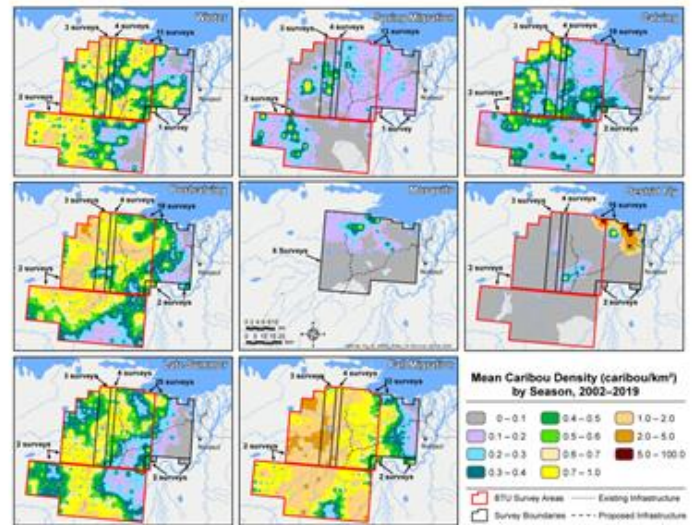


Figure 1. Average seasonal caribou densities from aerial surveys for caribou conducted April through October from 2002–2019. Surveys continued in 2020.

Where did you go?

For this project, we studied caribou in the Bear Tooth Unit, which includes the area of the proposed Willow Development and an area to the south. A separate but related project studied caribou use of the Greater Mooses Tooth Unit and the Colville Delta.

Why were you working in the area?

Caribou are a culturally important subsistence species and the most abundant large terrestrial mammal in the area. The potential impacts of oilfield development on caribou distribution, movements, or abundance are of great interest to stakeholders. Caribou studies conducted prior to construction are necessary to understand how caribou use the area prior to development. Such information can be used to understand and minimize potential changes to caribou movements and abundance from new construction.

What are your preliminary findings?

- Most caribou in this area are from the Teshekpuk Herd, and this herd has fairly distinct seasonal patterns of use, but movement patterns can also vary among years.
- Most calving occurs near Teshekpuk Lake, and the area north of the lake is an important area during periods of mosquito harassment.
- Most of the herd remains on the Coastal Plain during winter, but a substantial number of animals winter in the Brooks Range in most years.
- Caribou are generally found in drier landcover types although riverine areas can be important for caribou in late summer.
- Preliminary results suggest that seasonal use of the area in 2020 was similar to other recent years. Caribou densities in the area were high during parts of the summer, but most caribou moved south during fall. Caribou movements and distribution will be analyzed in relation to factors such as snow cover, vegetation, and distance to coast.



Caribou bull.



Grazing caribou.



Aerial view of study area.

CARIBOU IN THE COLVILLE RIVER DELTA AND GREATER MOOSES TOOTH UNIT

What did you do?

ABR used a combination of aerial surveys, satellite imagery, and analysis of radio collars deployed on caribou to assess the seasonal distribution and movements of caribou in the Colville River Delta and Greater Mooses Tooth Unit. Since 2001, we have been conducting periodic aerial surveys annually between April and October to count caribou in the area and determine how the densities of caribou vary seasonally and annually. We also use satellite imagery to map the timing of spring snowmelt and the growth of vegetation in the spring and summer. Using radio collar data, we track the movements of individual caribou and examine how their seasonal movements are influenced by snow cover, vegetation, terrain ruggedness, insect harassment, and distance to coast. This multiyear dataset provides detailed information on which areas are used consistently during different seasons, how those areas correspond with proposed development, and if patterns change after construction. ABR, Inc. — Environmental Research & Services, founded in Fairbanks, Alaska, has provided biological and ecological consulting services for more than 40 years.

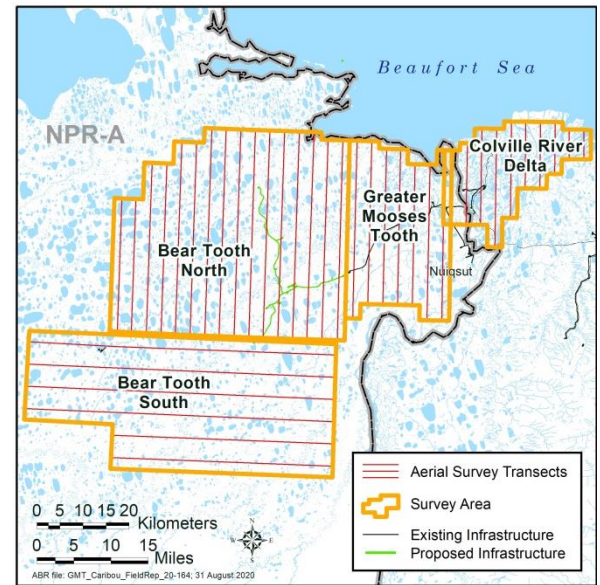


Figure 1. Map of survey area.

Where did you go?

For this project, we studied caribou in the Greater Mooses Tooth Unit and the Colville Delta, which includes the GMT1/MT6 and GMT2/MT7 pads as well as the Alpine and Alpine Satellite Development pads. A separate but related project studied caribou use of the Bear Tooth Unit to the west (Figure 1).

Why were you working in the area?

Caribou are a culturally important subsistence species and the most abundant large terrestrial mammal in the area. The potential impacts of oilfield development on caribou distribution, movements, or abundance are of great interest to stakeholders. Data can help address public concerns related to potential impacts from oil development on caribou. Caribou studies conducted prior to construction are necessary to understand how caribou use the area prior to development in order to minimize and assess potential changes after development occurs.

What are your preliminary findings?

- Most caribou in this area are from the Teshekpuk Herd. Most calving occurs near Teshekpuk Lake and the area north of the lake is an important area during periods of mosquito harassment.
- Most of the herd remains on the Coastal Plain during winter, but a substantial number of animals winter in the Brooks Range in most years. Caribou are generally found in drier landcover types, although riverine areas can be important for caribou in late summer.
- Preliminary results suggest that seasonal use of the area in 2020 was similar to other recent years. Caribou densities in the area were high during parts of the summer, but most caribou moved south during fall.
- Caribou movements and distribution will be analyzed in relation to factors such as snow cover, vegetation, and distance to coast as well as distance to the road to GMT2/MT7.



Aerial view of caribou.



Cow and calf.



Caribou feeding.

CARIBOU IN THE GREATER KUPARUK AREA

What did you do?

ABR has been studying caribou near the Kuparuk oilfield since the 1980s. We conducted aerial surveys in the area from 1993 to 2017 and are collaborating with the Alaska Department of Fish and Game to monitor caribou in and near the Kuparuk oilfield using radio collars deployed on caribou of the Central Arctic Herd to describe seasonal movements and distribution in relation to infrastructure. ABR, Inc.—Environmental Research & Services, founded in Fairbanks, Alaska, has provided biological and ecological consulting services for more than 40 years.

Where did you go?

We studied caribou distribution and movements near the Kuparuk Oilfield, between the Colville and Kuparuk rivers (Fig. 1). The main herd in this area is the Central Arctic Herd, currently estimated to have a population of 30,000 caribou. We analyzed data from radio collars to expand our knowledge of caribou movements in this area. No fieldwork was conducted in 2020.

Why were you working in the area?

Caribou are a culturally important subsistence species and the most abundant large terrestrial mammal in the area. Information on caribou use of existing oilfields may help minimize potential impacts of oilfield development on caribou distribution, movements, or abundance. The Central Arctic Herd has been living among oil development in the Prudhoe Bay, Milne Point, and Kuparuk oilfields for more than 40 years. This herd, therefore, provides an opportunity to study caribou distribution and movements within existing oilfield infrastructure to see how those findings can be applied to new development.

What are your preliminary findings?

- We analyzed 12 years of existing high-resolution GPS radio collar data from the Central Arctic Herd and published the results, “Caribou distribution and movements in a northern Alaska oilfield,” in the *Journal of Wildlife Management* in 2020.
- The results were generally consistent with previous studies in the area showing different behaviors and response to oilfields during different seasons.
- During calving, caribou tended to avoid roads and pads, but the avoidance declined after calving.
- In late June and early July caribou moved rapidly through the oilfields and crossed roads frequently to reach coastal mosquito-relief habitat.
- In late July and early August, some caribou used gravel roads and pads to avoid harassment by oestrid flies.

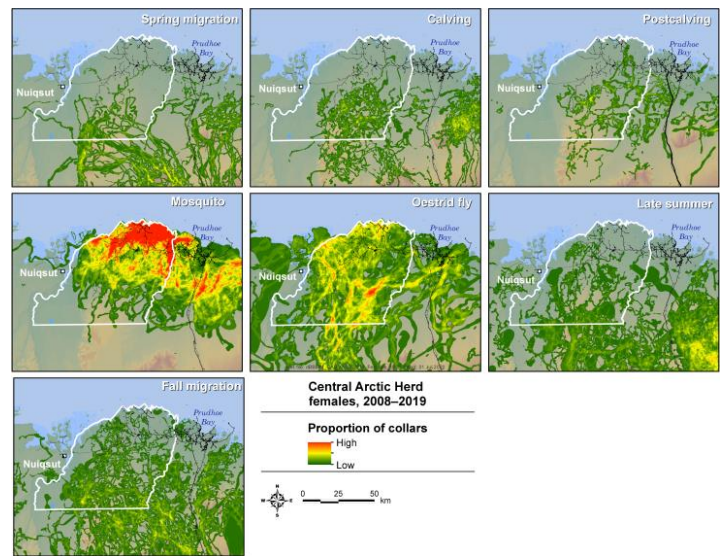


Figure 1. Movements of female caribou outfitted with GPS radio collars near the Kuparuk Oilfield by season, 2008–2019.



Female and calf moving under a pipeline.



Caribou and pipeline.



Caribou crossing a road.

COLVILLE RIVER AREA SUMMER FISHERY HARVEST MONITORING

What did you do?

During winter and early spring 2020, the ABR fish and aquatics team and ConocoPhillips Alaska collaborated with the North Slope Borough Department of Wildlife (NSB-DWM) personnel to develop a process for assessing the harvest number of fish caught for subsistence in the Colville River and other nearby waterbodies. The plan includes:

- Development of an HTML app that works on any electronic device with an internet browser.
- Distribution of that app to interested fishers.
- On-site monitoring of the fishery during July and August 2020.
- Local hire of a boat operator to assist ABR biologists in monitoring the 2020 fishery.
- Collaboration with the Career Quest program to include students in the monitoring process.

ABR, Inc.—Environmental Research & Services has provided biological and ecological consulting services in Alaska for more than 40 years, including detailed fishery monitoring services for the village of Nuiqsut since 2006.



General location of subsistence fishing in the Colville River delta.

Where did you go?

Due to COVID-19, the field portion of the 2020 field season was cancelled. Instead of traveling to the field to begin harvest monitoring on the river, we distributed the app to several fishers for testing. We anticipate deploying to the field to resume fishery monitoring in and near Nuiqsut in summer 2021.

Why were you working in the area?

This project is permit-driven and related to rezoning efforts for GMT2. ConocoPhillips Alaska, in collaboration with NSB-DWM, agreed to monitor fishery harvests in the Colville River and nearby waterbodies during the ice-free season in 2020 and 2021.

What are your preliminary findings?

- ABR developed a simple, user-friendly data-entry app which could be used by monitors, Career Quest participants, or fishers themselves.
- The app includes entry fields for date, location of net, net type, and harvest totals by species. The app also allows for photos to be attached to each specific harvest event.
- Fishers can enter their data offline (once registered) and upload their data to ABR servers once they return to a Wi-Fi or cellular network, with the touch of a button.
- We are developing the reporting function to provide each fisher with a summary of their harvest effort and results.
- At this time, there are no data uploaded to our database from local fishers.
- On July 26, 2020 a fisher reported harvest of a Saprolegnia mold-infected Broad Whitefish.
- We will continue to develop the app with feedback from fishers in 2020.
- We will send ABR employees to the field in 2021 to monitor harvest results and to work with fishers to improve the data-entry app for successful self-reporting of harvests.

Colville River Fishery Data Entry Form

Fisher: Christopher Swingley

Net: fourty footer

Net Length (ft): 40

Mesh Size (inches): 3

Gear Type: Gillnet

Harvest Record #1

Date: Friday, September 4, 2020

Time: 11:06 AM

Days Fished: 2

River Section: Upper Nigla

Lat: 61.10248962

Lon: -149.91687580

Species	Count
Gadus (Arctic Charr)	25
Saprolegnia (Least Charr)	10

Example of a page from the app.

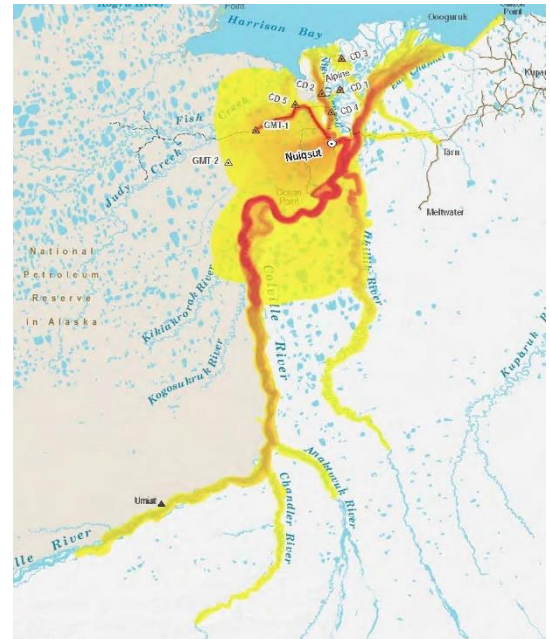
NUIQSUT CARIBOU SUBSISTENCE MONITORING PROJECT

What did you do?

In 2019, the study team continued the annual active harvester interviews with Nuiqsut caribou hunters to document harvest activities, and household harvest surveys to document community-level harvests in hunting year 2018. This represents Year 11 of the Nuiqsut Caribou Subsistence Monitoring Project. These interviews and surveys document baseline caribou subsistence harvesting data and harvester observations regarding development-related impacts on caribou harvesting activities. In 2020, the study team began conducting interviews for a one-time comprehensive (all resources) 10-year mapping study as well as continued the annual caribou subsistence harvester interviews and household surveys.

Where did you go?

In 2019, for the 2018 (Year 11) study year, researchers conducted active harvester interviews and household harvest surveys in the community of Nuiqsut at the KSOP office and at Nuiqsut residents' households. Interviews for the 2019 (Year 12) study year began in 2020; however, due to the COVID-19 pandemic, fieldwork in Nuiqsut was halted in March 2020 before interviews were complete. The study team subsequently conducted additional household surveys remotely via local liaisons, by telephone, and using an online survey form. The study area for the Nuiqsut Caribou Subsistence Monitoring Project is all areas used by Nuiqsut residents for caribou hunting activities.



Caribou Subsistence Use Areas, 2018

Why were you working in the area?

CPAI initiated the Nuiqsut Caribou Subsistence Monitoring Project in response to a stipulation in the NSB's permit to CPAI for the CD4 development. While the original stipulation required that the study occur for 10 years, both the NSB (2018 Rezone Ordinance) and BLM (GMT2 ROD) required that monitoring continue beyond the initial 10-year time period. The monitoring study, which began in 2009 for the 2008 study year, is now in its 12th year. The purpose of the subsistence monitoring project is to monitor caribou subsistence harvester activity, harvest experiences, and hunter observations of impacts related to CD4 and other Alpine satellite developments. The one-time comprehensive all resources study started in 2020 is required by the BLM (GMT2 ROD).

What are your preliminary findings?

Year 11 (2018) findings include the following:

- In 2018, the community of Nuiqsut harvested an estimated 608 caribou, within the range of all previous study years (between 258 and 774 caribou).
- Active harvester participants identified 177 caribou subsistence use areas and 150 caribou harvest locations for the 2018 study year, the majority of which were located along the Colville River, along the lower Itqiliq River, and north and west of the community along the Nuiqsut Spur Road, the CD5 Road and the GMT1 Road.
- In 2018, the area "West of Nuiqsut" accounted for the highest portion (45%) of the caribou harvested, higher than all previous study years.
- The overall extent of overland travel in 2018 was similar to many previous years, but with increased use along the road system.
- In 2018, a higher concentration of harvests were documented along the road system and on the Itqiliq River.
- In 2018, 68 percent of respondents indicated one or more perceived Alpine-related impacts on their caribou hunting. Helicopter traffic and man-made structures were the most commonly reported impact source.

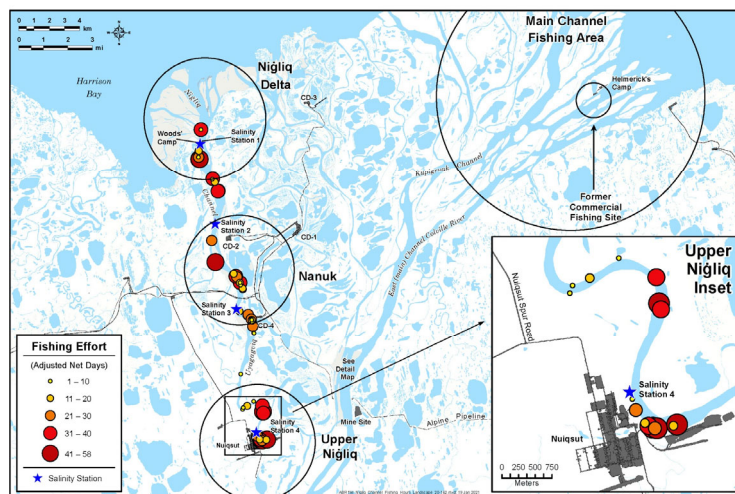
Data from the Year 12 Caribou Subsistence Monitoring study (2019 hunter year) are not yet available and are limited due to the impact of the COVID-19 and will be reported in 2021. Interviews for the 2020 all resources 10-year mapping study will be completed in 2021.

COLVILLE RIVER FALL UNDER-ICE FISHERY HARVEST MONITORING

What did you do?

During fall 2020, the fish and aquatics team at ABR, Inc.— Environmental Research & Services (ABR) conducted harvest monitoring surveys for the annual under-ice Nuiqsut Fall Fishery on the Nigliq Channel of the Colville River. ABR performed the following activities in 2020:

- Developed a COVID mitigation plan to assist in performing our survey program without compromising the health and safety of the community or our biologists
- Hired Sam Kunaknana of Nuiqsut to provide expertise on the fishery
- ABR conducted fishery monitoring in the field from 15 October to 30 November
- Monitored timing of deployment and removal of nets, total fishing effort and total harvest of Arctic Cisco and other subsistence fish
- Monitored salinity and other ambient water conditions at 4 stations on the Nigliq Channel throughout the fishing season



General location of subsistence fishing in the Colville River Delta.

ABR has provided biological consulting services for ConocoPhillips Alaska during the fall fishery in the village of Nuiqsut since 2007.

Where did you go?

Prior to the fall fishing season, we anticipated that the majority of subsistence fishing effort in the Colville River Delta would occur in the Nigliq Channel, but that at least some fishing effort would also take place in various other small channels in the eastern portion of the Delta. However, harvest numbers in the Nigliq Channel were very good and average fish size was above that of recent harvest years. Thus all subsistence harvest fishing took place on the Nigliq Channel during fall 2020.

Why were you working in the area?

This monitoring program has operated for 35 years under various permit requirements. Currently, ConocoPhillips Alaska has agreed to continue the project as requested by the North Slope Borough-Department of Wildlife Management (NSB-DWM) under rezoning efforts for GMT2.

What are your preliminary findings?

- The monitoring team conducted 328 harvest interviews
- Thirty different households fished a total of 47 nets
- Fishers made 56 different net-sets with those 47 nets (17 in the Upper Nigliq, 23 in the Nanuk, and 16 in the Nigliq Delta)
- Total fishing effort (adjusted to standard 60-foot net for 24 hours) was 1,131 days (413 days in Upper Nigliq, 375 days in Nanuk, and 343 days in Nigliq Delta)
- Harvest monitors counted 20,517 fish (representing 13 species), with Arctic Cisco (76%) and Least Cisco (9%) representing the majority of the harvest
- *Saprolegnia* (fish mold) was observed on a small number of fish, comprising three species: Broad Whitefish, Least Cisco, and Humpback Whitefish
- One Fisher continues to fish adjacent to the village as of 22 January 2021

2020 Fall Fishery Overview

- Most fishers agreed that fall under-ice fishing in 2020 was very good
- This likely explains the lack of effort in other channels within the Colville River Delta
- Fishers and monitors noted that early and mid-season fish appeared larger than average. By late season, larger fish were less common
- Analysis and reporting, particularly for laboratory studies, is ongoing; reports should be available by mid-February 2021