Arctic Network Newsletter

Alaska Region Inventory & Monitoring Program

National Park Service

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Our Network is Alaska's 5 northern National Parks

2012 Winter and Spring Activities

March

Muskox Population Survey, BELA/CAKR 1-16 (*B. Shults*)

Muskox Capture, BELA/CAKR 17-31 (*B. Shults*)

April

Muskox Group Composition, BELA/CAKR 1-10 (*J. Lawler*)

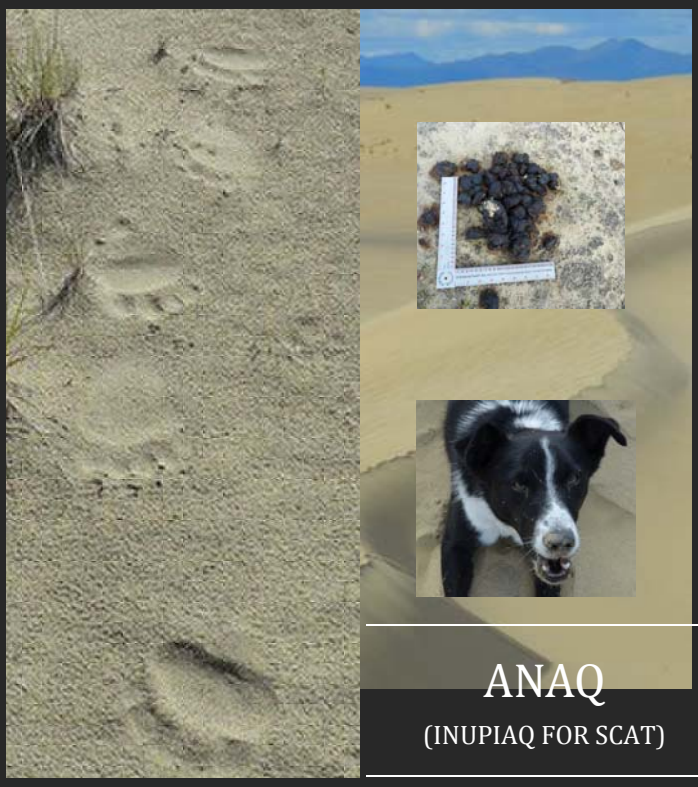
Moose Survey KOVA 1-10 (*B. Shults*)

Caribou fecal sampling, ARCN–wide 8-15 (*K. Joly*)

Dall's sheep fecal sampling, GAAR 16-22 (*K. Rattenbury*)

Arctic Network Inventory and Monitoring Program

Our mission is to collect scientifically sound information through natural resource monitoring to contribute to park management and facilitate park preservation for future generations. We work in Bering Land Bridge National Preserve (BELA), Cape Krusenstern National Monument (CAKR), Gates of the Arctic National Park and Preserve (GAAR), Kobuk Valley National Park (KOVA), and Noatak National Preserve (NOAT).



ANAQ

(INUPIAQ FOR SCAT)

Last August Western Arctic Parklands wildlife biologist, Marci Johnson teamed up with Working Dogs for Conservation to find bear anaq in the Great Kobuk Sand Dunes of Kobuk Valley National Park for genetic and diet analyses . This was the first study of black bears in northwest Alaska using a new, non-invasive technique to assess brown and black bear densities. This information will be used to manage bears and in Park planning, and will inform ARCN bear monitoring efforts.

In addition to Johnson, the diverse crew included director of Bear Smart Durango Bryan Peterson, Artist-in-Residence Constance Baltuck, Kristin DeGroot (ARCN), and three mixed-breed dogs. Covering over 55km of transects around and in between the dunes, the crew collected 150 samples for analysis in 2012. Peterson, from Colorado , was stunned and humbled by the size of brown bear tracks.

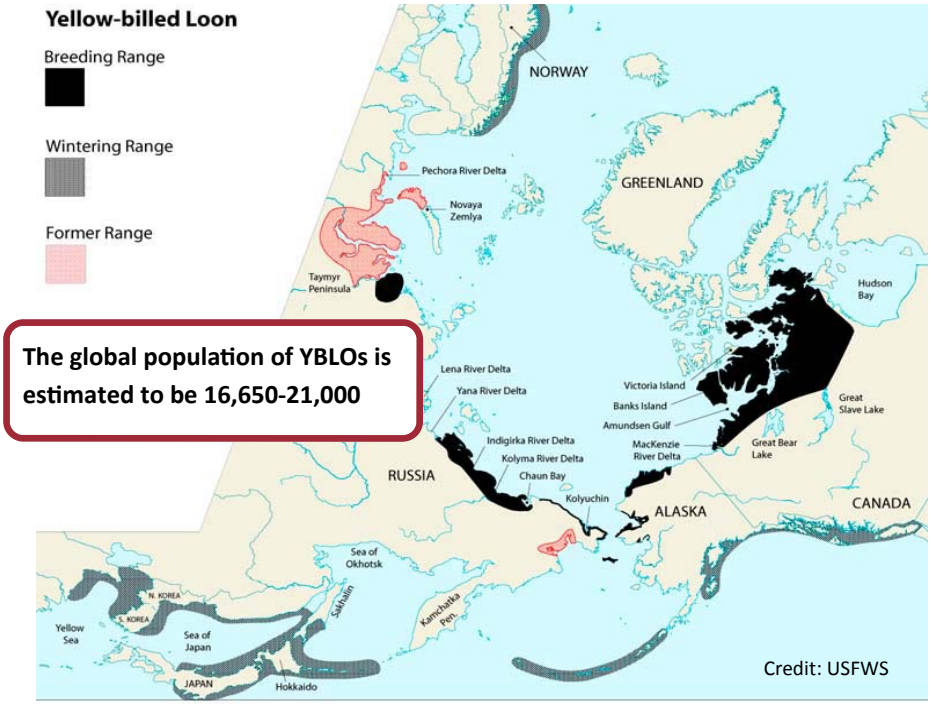
For more information contact Marci_Johnson@nps.gov

Yellow-billed Loon Vital Sign

Vital signs monitoring programs track a subset of physical, chemical, and biological elements and processes of park ecosystems that are selected to represent the overall health or condition of park resources, known or hypothesized effects of stressors, or elements that have important human values.

Why are we monitoring yellow-billed loons?

Yellow-billed loons (YBLO) are ideal for long-term monitoring because they are long-lived and return to where they were born (*natal philopatry*) and the same breeding sites each year. Also, as fish eaters (*piscivores*), they are top predators in lake ecosystems and therefore may be indicators of water quality and condition of coastal marine waters and rivers. Additionally, YBLO physiology reveals information about environmental contaminants (i.e., mercury, PCB) because they absorb contaminants faster than they can process them (*bioaccumulation*). People that harvest YBLOs and their eggs may be exposed to the same contaminants.



The global population of YBLOs is estimated to be 16,650-21,000

How are we monitoring yellow-billed loons?

In 2009, ARCN conducted two aerial surveys for YBLOs in CAKR and BELA. The survey area included 13,572 km^2 of potential YBLO habitat in western Alaska. In June, we counted adult loons and nests (*occupancy*) in the same units surveyed by the U.S. Fish and Wildlife Service (USFWS) in 2007. In August , we counted family groups (*adults and juveniles*) in these units to estimate how many adults raised young and the number of young they produced (*productivity*).

The entire U. S. population of yellow-billed loons* come to Alaska each summer to breed. Roughly 20% of these individuals are located in western Alaska including Bering Land Bridge National Preserve (BELA) and Cape Krusenstern National Monument (CAKR).

*between 3,700-4,900 birds, 25% of the world's population

Protecting Yellow-billed Loons

Because these populations are small, occupy a restricted range, and may be negatively affected by human activities, yellow-billed loons are being considered for listing as threatened or endangered under the Endangered Species Act.

Threats to Loon Survival:

oil and gas activities, habitat loss, contaminants, harvest pressure

YELLOW-BILLED LOONS

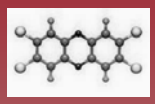
Type of Plane Matters

In 2009 we changed from a Cessna 206 (used in 2005 and 2007) to an Aviat Husky tandem (pictured here) to improve our ability to see loons. The Husky can fly low and slow and its tandem seating provides an optimal view for the crew.

Yellow-billed Loons in ARCN-2009 Survey Results

We found more loons in BELA than CAKR and higher loon densities overall compared to previous surveys. Possibly, our ability to see birds improved after we changed survey planes. We also surveyed slightly different areas and at earlier times than in 2005. As part of our future efforts to monitor yellow-billed loon populations in and around CAKR and BELA, we will survey the same plots in order to improve our ability to detect significant differences in population size. We will also begin assessing contaminants in YBLOs.

CONTAMINANTS



To assess contaminants YBLOs accumulate on:

winter grounds

We will collect 20 eggs (one/nest)

summer grounds

We will trap minnows and collect sediment samples on breeding grounds

Types of contaminants we will assess:

polycylic aromatic hydrocarbons (PAHs, petroleum contamination)

metals

persistant organic pollutants (POPs)

organochlorine pesticides

perfluorinated hydrocarbons

polychlorinated biphenyl (PCB) congeners

polybrominated diphenyl ethers (PBDEs) and PAHs

	June Occupancy	August Productivity
		
BELA	**174 adults** **14 nests** 	**83 adults** **15 juveniles** **49 individuals in 6 mixed-age flocks**
CAKR	**8 adults** **1 nest**	**5 adults** **0 juveniles**

Photo of eggs : C. Margolin

YBLO in winter plumage
Credit: R. Hocken

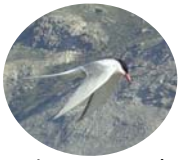
Credit: J. McCarter

YBLO breed in tundra landscapes where there are deep, fish-bearing lakes with low-profile shore-lines. When we survey for YBLOs and their nests we repeatedly circle these large lakes.

For more information contact Melanie_Flamme@nps.gov

Why are we monitoring birds in ARCN ?

Since the late 20th century, scientists have documented declining populations of many migratory birds. In northwest Alaska, migratory birds return every year from winter grounds via flyways of Asia and North America. Here, the boreal forest, coastal areas, and tundra overlap, providing many important habitats for these birds to nest and raise their young. Because multiple locations around the globe are important in the life cycle of a migratory bird, several international treaties, federal laws, and initiatives protect them. All ARCN park units are mandated to protect habitat for migratory birds. We chose terrestrial birds (landbirds) for long-term monitoring because they comprise more than 50% of bird species in ARCN. Landbirds spend the majority of their lives on land and include song birds (passerines; e.g., robins), near-passerines (e.g., woodpeckers), birds of prey (raptors; e.g., golden eagle,) and heavy-bodied, ground-feeding birds (e.g., ptarmigan).



Arctic Terns make a 15,000 mile journey from Antarctica, twice/year

ARCN GEOGRAPHY OF BIRDS

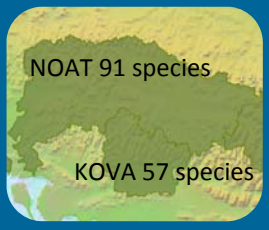
Bluethroat

Several Asian species have ranges that extend into North America along the Bering Land Bridge corridor, such as the Northern wheatear, yellow wagtail, bluethroat, and arctic warbler. The marine and estuarine habitat as well as the extensive freshwater ponds and lakes in BELA provide resting, nesting, feeding, and molting grounds for large populations of migrating geese, ducks, and shorebirds.

Bar-tailed Godwit

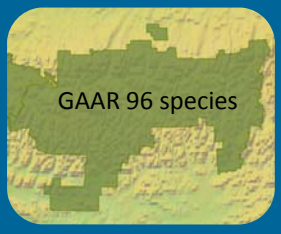
The lagoons between Cape Krusenstern and Sheshalik are heavily used by migrating geese, ducks, shorebirds, and gulls. The salty grasslands and marshes at the mouths of the Nugnugaluktuk, Pish, and Goodhope rivers and Cape Espenberg are especially important for waterfowl adapted to estuarine conditions.

Short-eared Owl



Thirteen species of raptors inhabit the Noatak drainage. Gyrfalcons and short-eared owls are species of conservation concern, and like golden eagles, rough-legged hawks, and peregrine falcons they are key predators in the ecosystem. The Kobuk river is the northern most limit of nesting ospreys, and the valley contains prime waterfowl nesting areas.

Smith's Longspur



Mountainous habitat (*montane*) in Gates of the Arctic is required by some species such as Smith's longspur and surfbirds. Montane breeding birds in Alaska are not well studied.

In ARCN there are between 150-200 bird species. Roughly 106 species breed in these parks. Over one third of ARCN bird species are of conservation concern.

Bird images: USFWS Digital Library and T. Wild

LANDBIRDS

Monitoring Activities- ARCN parks are remote, and using methods developed for roaded areas makes monitoring birds here tricky. So far, all of our monitoring has happened along river corridors (Noatak and Kobuk rivers). For each survey, we transported crews via float plane to large lakes near the river. Crews travelled the river in inflatable canoes with gear and provisions for approximately 20 days. In the most complex scenario, we used three crews to repeat the same survey route —repetition reduces the likelihood of error. The first crew established the survey routes (approximately 8-12 stops/day, 100 meters from the river's edge, on either side of the river). The second crew followed two days later, located the survey route with a GPS and flagging left by the first crew, and repeated it. Two days later the third crew launched and repeated the same route. We will shift our monitoring efforts in 2013 to the montane regions of ARCN. Doing so will allow us to monitor a group of species that are unique to ARCN in the most abundant ecosystem in the network.

What do we know right now about landbirds along river corridors in ARCN?

MOST COMMON

White-crowned Sparrows (*Zonotrichia leucophrys*)

American Tree Sparrows (*Spizella arborea*)

FAIRLY COMMON

Redpolls (*Acanthis flammea* and *A. homemanni*)

Savannah Sparrow (*Passerculus sandwichensis*)

Orange-crowned Warbler (*Oreothlypis celata*)

Arctic Warbler (*Phylloscopus borealis*)

Gray-cheeked Thrush (*Catharus minimus*)

Most birds that we detect are heard in the first 3 minutes of the point count. We detect fewer birds toward the end of the 20 day survey period because the birds are engaged in nesting and singing less frequently.

LESS COMMON SPECIES

Northern Wheatear

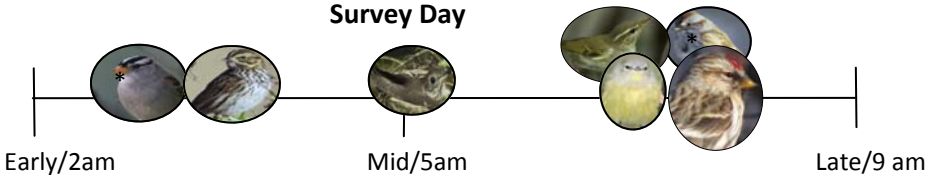
Northern Shrike

Eastern Yellow Wagtail

Short-eared Owl
Smith's Longspur
(Pictured on previous page)

Singing activity varies by species

From the Noatak river data, we learned that not all species are heard or seen at the same time of day. For example, American tree sparrows, redpolls, and orange-crowned warblers tend to be detected later in the survey day, whereas we detect gray-cheeked thrushes in the middle of the survey day.



Assessing bird numbers

Point Counts

Starting at 2:00 am (sunrise) we paddle down river, stopping at designated points on the river to listen and look for birds. Then for 10 minutes, we record all birds we hear and see in a 400 meter radius. For each individual bird we detect, we record the species (unknown for those we can't identify), time of detection, type of detection (singing, visual, etc.), and the distance and direction to each bird. We also assess background noise, which can influence our ability to hear birds. We end the survey day at 9:30am, set-up camp, and retire to bed by 4pm during the hottest part of the day.

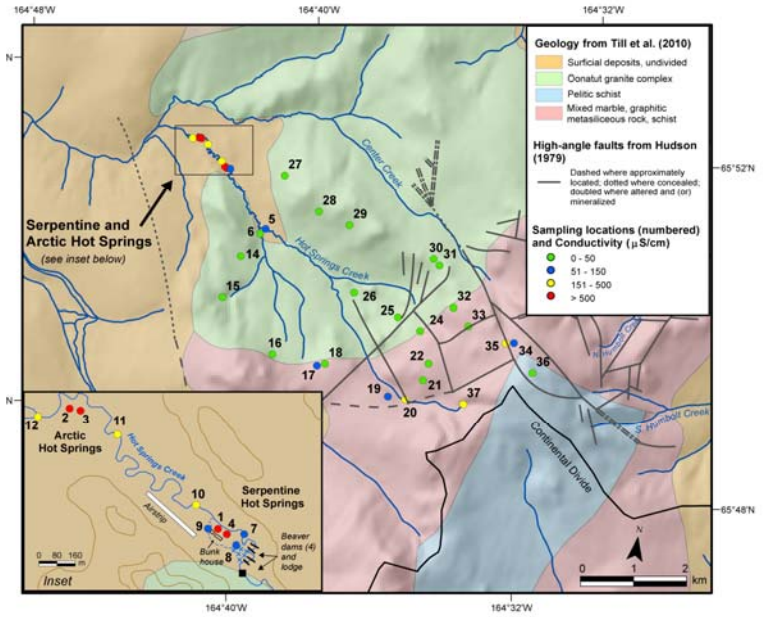
For more information contact Jim_Lawler@nps.gov

Bird images: USFWS Digital Library

Serpentine Hot Springs is the most visited site in Bering Land Bridge National Preserve. The hot springs have been used by the Native people of the Seward Peninsula for hundreds of years or more for religious, medicinal, and spiritual purposes, as well as for subsistence and recreational activities. The hot springs are also popular with a variety of other groups including non-Native users from Nome and other communities, recreational users, and visiting pilots.

Why are we monitoring Sepentine Hot Springs?

Human use at Serpentine has the potential to adversely affect water quality. Concerns include grey water discharge (e.g., soap), heating and transportation fuels management, human waste disposal, infrastructure development, and increased visitation. In addition, surface hydrology and water quality at the site are strongly influenced by recent beaver activity. Other natural threats include flooding, geothermal variability, and climate change. Park managers lacked data to evaluate these concerns, so in 2010, we launched a study to characterize the geology, hydrology, geochemistry, and microbiology of the hot springs environment.



What's in the water?

Low levels of fecal coliform bacteria are found in all cold waters near the Serpentine Bunkhouse. The presence of any fecal coliform, regardless of the source, means the water must be properly boiled or treated prior to consuming. In 2009, extremely high bacteria levels in the open, cold water intake ditch were a primary concern; this has since been mitigated by piping. The hot water source pond (167°F) is too warm to support the growth of coliform bacteria.

Thermal waters at Serpentine host well-developed and conspicuous aquatic thermophilic ('heat-loving') algal communities. These communities are likely adapted to specific physical and chemical characteristics at this isolated, high latitude site. Recent DNA analyses confirmed the presence of several unusual microbial species at the site.

Water source, temperature, and thermal energy

Like most hot springs in central and northern Alaska, the Serpentine Hot Springs complex is associated with granitic plutons (igneous rock from magma slowly cooled beneath the earth's surface). Serpentine and adjacent Arctic Hot Springs have virtually identical chemical composition and similar maximum temperatures (~167°F), and are believed to share the same source: seawater. Researchers theorize that seawater is transported by a large convective hydrothermal system in which permeable fault zones are connected with sediments or metasediments containing modern or ancient seawater.

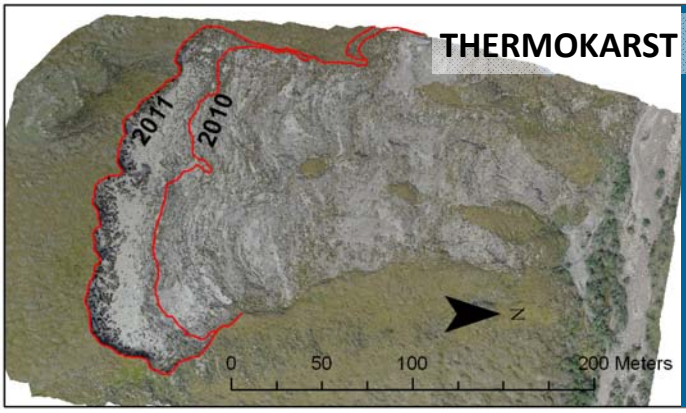
Chemical geothermometers estimate the temperature of the water-rock equilibrium at depth. Serpentine Hot Spring waters yield subsurface temperature estimates of ~212-365°F. Both surface discharge and geothermometer temperatures for Serpentine Hot Springs are the highest observed in central or western Alaska.

One megawatt of electricity can power approximately 750 homes.

The hydrothermal heat discharge of the Serpentine Hot Springs is ~5 megawatt (MW) based on the maximum observed discharge temperature of ~167°F or ~8 MW based on a geothermometer temperature of ~259°F .

Contact Linda_Hasselbach@nps.gov for more information

VITAL SIGN UPDATES

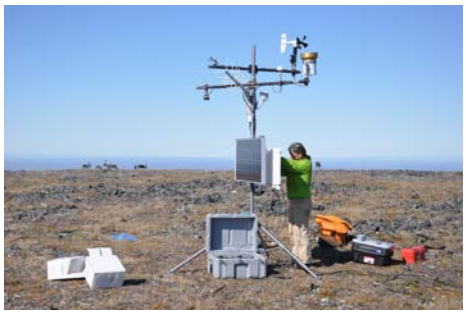


THERMOKARST SLUMPS GROW

Using these 3D generated models of permafrost thaw slumps, we discovered that the cut bank of some slumps migrated over 20m (66ft) in one year; one moved 65m (213ft) between 2010 and 2011. Dave Swanson's mapping in 2011 showed over 1000 small landslides and slumps caused by thaw of permafrost in NOAT. Further monitoring will determine if the number of slides is increasing due to climate change. For more information contact Dave_Swanson@nps.gov

Climate and Air Quality Monitoring Update

Field trip to a weather station – Each year, Pam Sousanes (ARCN climate scientist) teaches middle school students about climate and weather patterns in Alaska by showing them various sensors on a remote automated weather station that collect and record weather data. Back in the classroom, students look at the live weather link for the weather station they visited to view real-time data. On one outing, German college students learned about climate change in Alaska and the role of the NPS Inventory and Monitoring program in science and park management.



Climate Stations – In the summer of 2011 we installed nine new climate stations. Three stations were deployed in BELA, two in CAKR, one in KOVA, and three in NOAT. The climate stations consist of research grade equipment that is fully automated and powered through a battery and solar panel system. They record temperature, wind speed and direction, precipitation, snow depth, relative humidity, soil temperature, and solar radiation. For more information contact Pam_Sousanes@nps.gov

Air Quality – We currently operate an air quality monitoring site in Bettles in collaboration with the National Atmospheric Deposition Program (NADP) to monitor the wet deposition of contaminants. Last summer, Zachary Richter (GAAR) and Dr. William Brumbaugh of Columbia Environmental Research Center (USGS) deployed four ion-exchange collectors (IECs, pictured right) at the station. The devices are designed to passively sample certain types of potentially harmful air contaminants from rain and snow. They are being developed in order to link nitrogen and sulfur levels in mosses to corresponding levels of harmful forms of nitrogen and sulfur deposited on the arctic and sub-arctic landscape. This year is the first test of these devices in arctic Alaska. For more information contact Zach_Richter@nps.gov

Short Communications

We produce short videos about our monitoring efforts and vital signs. Check out the latest videos about ice wedges, pingos, aufeis, black spruce, and Dall's sheep on the AlaskaNPS You Tube channel.
http://www.youtube.com/AlaskaNPS

Visit our website to find detailed information about all our vital signs
http://science.nature.nps.gov/im/units/arcn

You can follow ARCN and news for other Alaska NPS Inventory and Monitoring Programs on Twitter and Facebook @AlaskaNPS.

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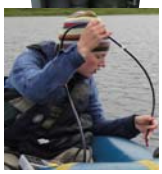
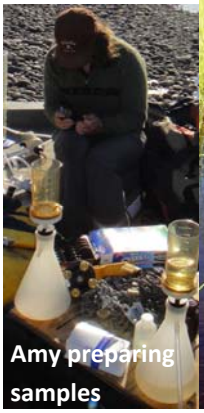
LADIES OF THE LAKES

ARCN monitors shallow lakes in BELA, NOAT, and KOVA. These lakes provide important habitat for birds and mammals. Last year, aquatic ecologist Amy Larsen and hydrological technician Heidi Kristenson sampled 71 lakes in KOVA, where as much as 20% of lake surface has declined over the last 30 years. With help from helicopters and float planes, they have sampled 115 lakes in ARCN so far.



J. Brice deploys a SONDE (shown above) to measure temperature, pH, conductivity, and dissolved oxygen.

Shallow lake sampling requires quite a bit of physical endurance. Generally, two teams of two sample seven lakes each day; nine if it's a superstar day. Doesn't sound like much, but travel between the lakes often requires marching across ankle-twisting tussocks in unsupportive wader shoes. On this hike, each crew member carries a 40-50 lb backpack full of sampling gear. After loading a small inflatable raft with instruments and empty sample bottles, one crew member paddles out to measure the lake's water quality, depth, and clarity and bottle up samples for further analysis. This part is quite fun, unless it's windy and cold. On shore, the vegetation-saavy member of the crew collects information about the plants in the littoral zone (where water and land meet) to assess the habitat change around the lake perimeter. The sampling work doesn't end there; back at camp water is filtered and prepared for lab analysis.



Amy preparing samples

Heidi veg'ing out

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Science for the stewardship of Arctic Parklands

Arctic Network Newsletter, February - May 2012

Check out the latest videos about permafrost, tussocks, aufeis, black spruce, and Dall's sheep on the AlaskaNPS channel. http://www.youtube.com/user/AlaskaNPS