

The Arctic Angle

Newsletter for the Arctic Network of Parks (ARCN)

Bering Land Bridge & Noatak National Preserves,
Cape Krusenstern National Monument, Kobuk Valley National Park,
and Gates of the Arctic National Park & Preserve

National Park Service
U.S. Department of the Interior

Arctic Network Inventory and Monitoring Program
Spring 2016 Newsletter



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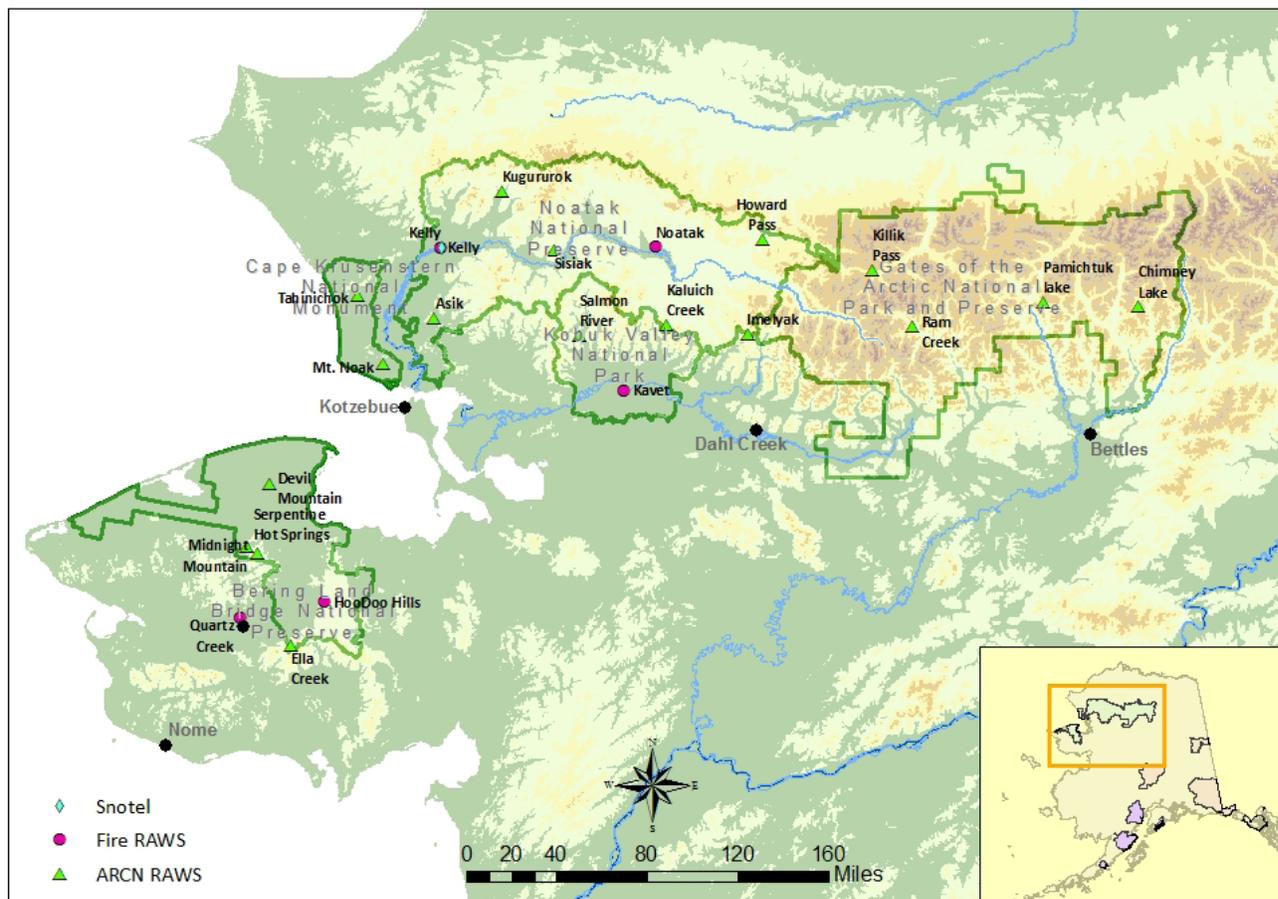


Warmer than normal in Alaska's northern parks: above and below.

Based on data from 21 climate monitoring stations (Snotel and Remote Automated Weather Stations) across Alaska's five northern parks—the Arctic Network (ARCN)— air and soil mean annual temperatures increased 3° to 4° C from 2011 to 2015. The warmest year on record for Alaska was 2014, with the warmest temperatures and greatest departures from normal in the northwest region of the state. The average annual air temperature was 1.3° C warmer than normal for land north of 60° between October 2014 and September 2015; the warmest period in recorded history (NOAA 2015). For Kotzebue, near Cape Krusenstern National Monument, mean annual air temperatures in 2014-2015 were on average 2.5° C above the long-term normal, the highest over

the entire 80-year period of record; the winter of 2013-2014 was the second warmest and 2014-2015 the third. Near Bering Land Bridge National Preserve at Nome, 2014 was also the warmest year on record, 2.4° C above normal. For Gates of the Arctic National Park and Preserve at Bettles it was the fifth warmest year on record at 1.8° C above normal. Pictures from phenology cameras revealed snow-free ground near Serpentine Hot Springs in Bering Land Bridge National Preserve in January and February of 2014, while to the east at higher elevations in the Brooks Range maximum daily temperatures rose above freezing. The seasonal snowfall totals for the region were below normal on the western coast, just above normal in the Interior, and well above normal on the northern coast.

Climate Stations in the Arctic Network



Warmer than normal in Alaska's northern parks (cont.)

The Pacific Decadal Oscillation (PDO), an index of sea surface temperatures in the North Pacific, has been positive since the beginning of 2014—meaning warmer temperatures over Alaska. A strong El Niño event also developed in the fall of 2015 and the Pacific Ocean temperatures off the coast of Alaska continue to be well above normal. This warming trend is less alarming if viewed from the perspective of Bettles (near the southeastern corner of ARCN), where the current warm spell resembles several others observed in the past 40 years. Nonetheless, if these warm temperatures were to persist, they would fulfill the predicted increase in the mean annual temperature for 2046-2065, based on global circulation models (IPCC 2013). The next few years will be crucial to determining if the present warm spell is just a temporary cyclical phenomenon or a significant warming trend. For more information contact: pam_sousanes@nps.gov

What does this mean for permafrost?

The regional climate is cold enough over most of ARCN to keep permafrost frozen in spite of the recent warming. Both the regional climate and the local soil conditions control permafrost stability. Soil-site conditions result in local permafrost temperatures that range from about 0° C to 5° C above mean annual air temperatures (MAAT). However, if current warm conditions persist, permafrost will start to degrade in the portions of ARCN with the warmest MAATs combined with the warmest local soil conditions; in places like the low-elevation southern portions of Kobuk Valley National Park and Gates of the Arctic National Park and



Yedoma exposure on the Itkillik River. Photo: Misha Kanevskiy (UAF).

Preserve that have relatively deep snow and tall shrub or forest vegetation. It would require a significant cold period involving a drop in MAAT of 3° C to 5° C to bring ground temperatures back to long-term normals and prevent initiation of permafrost thaw in these areas.

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What does this mean for the fate of carbon stored in permafrost?

According to a recent study co-authored by Jon O'Donnell (ARCN ecologist), "the fate of carbon stored in permafrost upon thaw will contribute to climate warming". Permafrost stores about half of all soil organic carbon on Earth. When permafrost warms and thaws, this carbon can be released from soils to the atmosphere as carbon dioxide or methane – potent greenhouse gases. Permafrost scientists are currently working to determine the timing and magnitude of this carbon release, as it could impact the global climate. In

this study, the team collected cores from deep (> 20 meters) ice-rich permafrost deposits (i.e. yedoma; see picture above). They found that most of the permafrost carbon was in dissolved forms that are easy for soil bacteria to break down and convert to greenhouse gases upon thaw. This finding suggests that permafrost thaw may result in the rapid release of carbon to the atmosphere, due in part to the chemistry of carbon in ancient ice.

Read the study at <http://bit.ly/releaseofancientcarbon>

For more information contact: jonathan_a_o'donnell@nps.gov

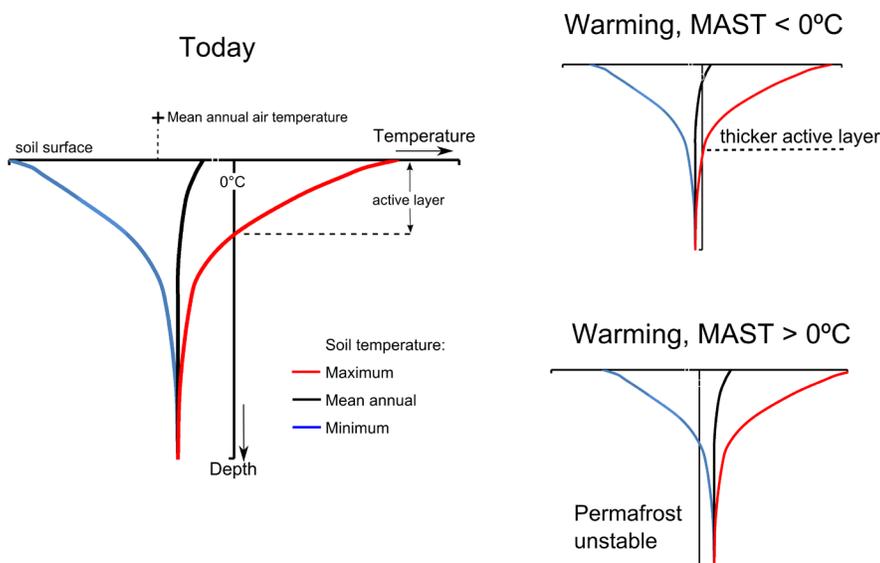


Figure: Diagram of annual maximum, minimum, and mean ground temperatures with depth in an area with permafrost. The active layer is the portion near the surface that thaws in the summer. The mean annual air temperature (MAAT) is usually lower than the mean annual soil temperature (MAST). Today the MAST is still well below freezing, but with warming it will get closer to freezing - resulting in a thicker active layer - or rise above freezing and destabilize the permafrost.

Feathered ambassadors

“At whatever moments you read these words, day or night, there are birds aloft in the skies of the Western Hemisphere, migrating.” - Scott Weidensaul

Last summer, we surveyed montane birds near Anaktuvuk Pass in Gates of the Arctic National Park and Preserve. We monitor these species because they comprise a significant portion of the park’s bird species and many of them are unique and represent conservation challenges throughout their geographic range— some are experiencing significant population declines. Also, these species are good indicators of the effects of local and regional changes in ecosystems, given their distribution along steep elevational gradients, high body temperature, rapid metabolism, and high ecological position in most food webs.

From May 23- June 29, 4-6 biologists conducted repeat surveys of bird assemblages along 14 routes, each 4-10 km in length, near Anaktuvuk Pass. The most abundant songbird species (in order and excluding redpolls, which were not breeding at the time) were Savannah Sparrow, White-crowned Sparrow, American Tree Sparrow, Lapland Longspur, and Northern Wheatear.



A Smith's Longspur sings after a June snow. Visit <https://youtu.be/hnSlwAB00jk> to see research on this species near Gates of the Arctic NP&P.

The field crew documented 80 species within the study area including several unexpected species including Barn Swallow, Blackpoll Warbler, Pine Siskin, and White-winged Crossbill—the latter three are generally associated with



All photos this page NPS/Jared Hughey



forests. Periodic snow from June 1-5 probably led to some nest failures as some birds were seen rebuilding after the storm. Judging by timing of nestlings fledging their nests, many nests did not fail the first time around.

The Northern Wheatear (left) migrates from Subsaharan Africa each year to the Arctic to breed. Alaska's N. Wheatears travel 30,000 km (18,640 miles) traveling 290 km/day, crossing the Arabian desert and Siberia to get here—the longest migration of any songbird in the world.

Migratory birds are the feathered ambassadors of our planet—they connect water, land, air and us to other people, cultures, and countries far away. Only a few birds live in Gates of the Arctic NP&P year-round such as Common Ravens, chickadees, American Dippers, and ptarmigan. This year marks the 100th anniversary of the Migratory Bird Treaty Act—an important protection for the conservation of many species that undertake extraordinary journeys to and from Alaska each year. To learn more about the act and events visit <http://www.fws.gov/birds/MBTreaty100/>.



Montane breeding birds in ARCN include: 1) songbirds (passerines, e.g. White-crowned Sparrow, pictured below) that comprise more than 50% of the bird species in ARCN, 2) near-passerines (e.g. woodpeckers), 3) birds of prey (raptors, e.g. golden-eagle), and 4) heavy-bodied, ground-feeding birds (galliformes, e.g. ptarmigan).

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Discovery at lagoons

New fish found

During the ice-free season of 2015, scientists from Wildlife Conservation Society (WCS) sampled fish communities and water quality at Aukulak, Krusenstern and Kotlik lagoons in Cape Krusenstern National Monument (CAKR) and at Kupik and Ikpek lagoons in Bering Land Bridge National Preserve (BELA). They documented 26 fish species total— five of which not yet recorded in any of these lagoons before— and 33 instances where species were new to specific lagoons. These discoveries demonstrate how little we know about these lagoons and that, even now, we are still capturing baseline fisheries information for these dynamic environments. As early as this April, WCS will head out to the lagoons again to gather more information about the ecology and seasonal dynamics of lagoons in CAKR.

Connectivity to the marine environment and the amount of freshwater input affects the lagoon’s fish community and water quality. The lagoons in CAKR can open and close to the ocean with seasonal storms and BELA lagoons have seen significant changes in the erosion and deposition of sediments along the exterior barrier islands and particularly within the lagoon inlets. The open or closed status relates to the composition of the fish community at any given time. Catches of migratory species (e.g. sheefish, humpback whitefish) generally decreased towards the end of the season as fish left the lagoons, likely in response to the potential loss of connectivity to overwintering habitat as freeze-up approached. Traditional knowledge and past research indicate that fish likely move back into river systems to overwinter.

New species caught in each lagoon in 2015

Aukulak	Krusenstern	Kotlik	Kupik	Ikpek
Arctic Flounder	Saffron Cod	Arctic Flounder	Arctic Flounder	Arctic Flounder
Pacific Herring	Dolly Varden	Least Cisco	Fourhorn Sculpin	Fourhorn Sculpin
Rainbow Smelt	Fourhorn Sculpin	Pink Salmon	Pond Smelt+	Pacific Herring
Saffron Cod	Pink Salmon	Rainbow Smelt	Rainbow Smelt	Ninespine Stickleback
	Pond Smelt+	Pacific Sand lance+	Starry Flounder	Pond Smelt+
	Sheefish	Saffron Cod		
	Tubenose poacher+			
	Unidentified Sculpin*+			

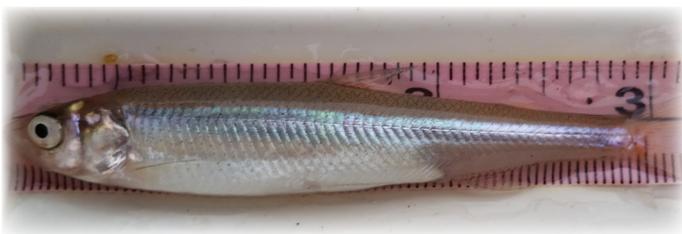
*We are currently confirming the identification of 3 sculpin species we captured in this lagoon.
 +Species that have not been recorded in any of the 5 lagoons in previous research.

Pictured right: gastric lavaging a sheefish at Krusenstern Lagoon to obtain a diet sample. Photo: Martin Robards/WCS



Fish diet

Preliminary observations of fish diets suggest that mysids and ninespine stickleback are critical for transferring energy up the food chain to top predators. Mysid densities in the lagoons were remarkable. They were present in the stomachs of almost every species we sampled for diet, and many species fed on mysids almost exclusively. However, ninespine stickleback, which were also highly abundant in the lagoons, were fed on heavily by piscivorous fish (e.g., sheefish) and birds (e.g., Arctic Terns).



Pond Smelt

Connectivity is key

Discovery at lagoons

Why we monitor lagoons

We monitor Arctic lagoons in BELA and CAKR because they are highly productive ecosystems that provide key habitats for Arctic fauna and sustain subsistence fisheries that are vital for Native Alaskan food security. These lagoons face potential threats to their health and stability such as oil and gas development in the northern Chukchi Sea, deep-water ports in the northern Bering Sea and increased international shipping along the Northern Sea Route above Siberia. This effort builds on traditional knowledge and prior research, provides ecological information vital for monitoring and managing Arctic lagoons of these parks, and will continue to inform a comprehensive understanding of the *Story of the Lagoons*—a key publication priority for the Native Village of Kotzebue, Wildlife Conservation Society, and the National Park Service. New information collected in 2016 will be paired with parallel efforts to understand subsistence fishing harvest and lagoon physical dynamics, such as coastline change, water quality, ice formation, and water balance.



Catch of the day is sheefish. Marguerite Tibbles, WCS biological technician and University of Alaska Fairbanks graduate student. Photo: T. Haynes

Global and local significance

All eleven lagoons in this region are found at the nexus of both the North American and Asian migratory bird flyways, and support seabird, shorebird, and waterfowl populations resident to northern and southern hemisphere Asian and American populations. They also support seasonal subsistence activities and are used as navigational pathways throughout the year by local village residents. These subsistence practices have continued for thousands of years, attested to by rich cultural and archaeological sites found in immediate proximity to the lagoons.

Youth Involvement

This summer, Alaska Native youth will set out to Cape Krusenstern National Monument, with video cameras in hand to document lagoons and the scientific investigations underway of the fish communities and physical dynamics. For some of the youth involved, lagoons in this park link closely to their culture and the subsistence traditions and food securities of their communities. For others from urban Alaska, the journey will be a lagoon odyssey— an opportunity to witness firsthand the beauty of these coastal environments and discover the significance of these special places.



Nicole Farnham, WCS biological technician, deploys a gill net. Note, gill nets were either set at shore (shown here) or away from shore. Photo credit – R. Sherman

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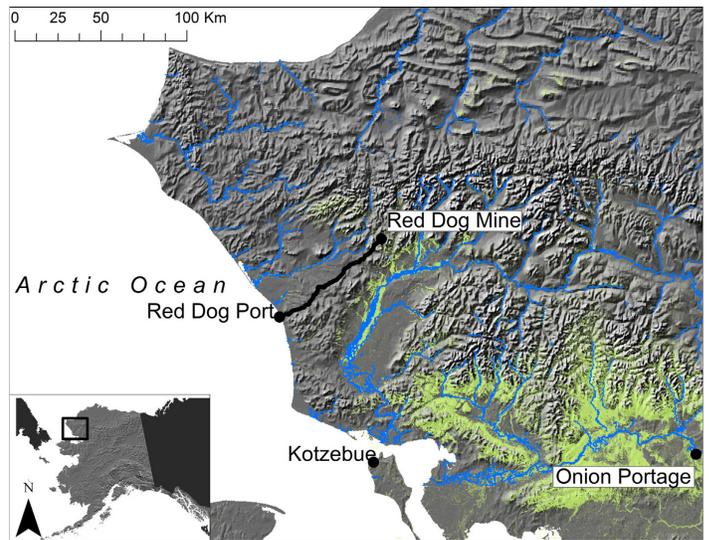
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'Expect delays': Roads affect movements of substantial numbers of caribou

Data from GPS collared caribou revealed that caribou from the Western Arctic Herd (WAH) and Teshekpuk Herds (TCH) were delayed during their autumn migrations on average 30 days by the Red Dog Mine Road. Individuals from both herds encounter the road primarily during autumn migration. NPS and Alaska Department of Fish & Game biologists captured and GPS collared adult female caribou from both herds (TCH: 2004–2012; WAH 2009–2012). Delayed caribou sped up after eventually crossing the road, perhaps to “make up” ground they lost while they were delayed. Results from this study published in *Biological Conservation* (doi:10.1016/j.biocon.2015.12.035) suggest, however, that even a single road can alter movement behavior for some individuals.

The Western Arctic Herd is currently the largest herd in the state ~235,000 individuals, whereas the Teshekpuk herd is considerably smaller, ~32,000.



The Red Dog Mine and its controlled access road in northwestern Alaska (black line); the concentrate storage and port facility is located at the western terminus of the road, whereas the mine is located at the eastern terminus.

For more information contact kyle_joly@nps.gov

Bioblitz in northern parks

As part of the NPS Centennial, Alaska NPS is hosting Bioblitzes this summer. One will be in Gates of the Arctic National Park and Preserve at Anaktuvuk Pass and the other in Bering Land Bridge National Preserve at Serpentine Hot Springs. A BioBlitz is a quest to discover living organisms through public involvement. During these rapid biological surveys, scientists and volunteers of all ages and backgrounds work together to compile a “snapshot” of biodiversity, usually in 24 hours or less. This service-wide event is a significant contribution to celebrating the NPS Centennial goals of “inspiring the next generation of park stewards, visitors, and

bioblitz three days of discovery

May 20-22, 2016

We are encouraging area scientists, students, and volunteers to meet us in Anaktuvuk Pass to document as many species as possible in Gates of the Arctic National Park over the course of three days. This will be a hands-on, educational experience that will help the National Park Service gather important information on species diversity at an ecologically unique location in the Brooks Range.

Get involved! Help us identify and name as many species as we can in English, Latin, and Inupiaq!



Biology, fun, and discovery!

All events are free and open to everyone.

To learn more, go to nps.gov/GAAR
NationalGeographic.org/bioblitz

bioblitz four days of discovery

July 7-10, 2016

Mark your calendars! The Centennial BioBlitz is coming to Bering Land Bridge this summer. Scientists, youth, and park staff will gather for a multi-day science field trip to compile a “snapshot” of the park’s biodiversity and encourage citizen science around Serpentine Hot Springs. Activities will include an inventory of insects, birds, and bats, and an exploration of beaver ecology.

This event is part of a nationwide celebration of science in parks. Students will learn that science is fun, and their work will contribute to conservation of this special place.



Biology, fun, and discovery!

All events are free and open to everyone.

To learn more, call (907) 443-2500 or go to nps.gov/BELA
NationalGeographic.org/bioblitz

advocates,” and the “Find Your Park” campaign, as well as the NPS goal to “Go Digital” and the President’s initiative to get “Every Kid in a Park.”

Contact

andrew_baltensperger@nps.gov for Gates of the Arctic Blitz and marci_johnson@nps.gov for Bering Land Bridge Blitz.

Publications and Reports available on-line. Locate reports at Integration of Resource Management Applications (IRMA) <https://irma.nps.gov/>

Climate and Weather

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Rivers & Streams

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Wildlife

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Recently Released Short Films

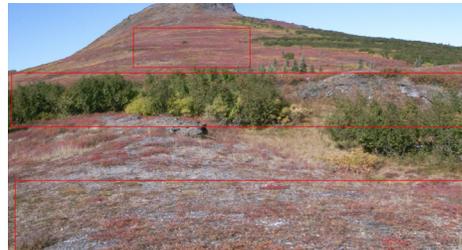
Counting Caribou produced by Farthest North Films (www.farthestnorthfilms.com) tells of the importance of caribou to rural residents of Northwest Alaska. Interviews with residents emphasize caribou as a critical subsistence resource and the ways climate change, industry and human activity affect caribou. Footage was collected as part of a study documenting traditional ecological knowledge of caribou and perspectives about caribou held by subsistence users in northwest Alaska. Watch the video at https://youtu.be/EX_JBoBo3Dw

Contact Kyle Joly (kyle_joly@nps.gov) if you have any questions.



Dev Dharm Khalsa

In Seasonal Changes in Alaska's National Parks
ARCN ecologist Dave Swanson explains the Arctic Network Inventory & Monitoring team's use of remote cameras to study seasonal changes across Alaska's northernmost national parks. Each camera is part of climate monitoring station that records weather conditions at locations across Bering Land Bridge NP, Cape Krusenstern NM, Gates of the Arctic NP&P, Kobuk Valley NP, and Noatak NP. In doing so, we can identify long and short-term trends, provide reliable climate data to other researchers, and participate in larger scale climate monitoring and modeling efforts beyond park boundaries. Watch the video at <https://youtu.be/b5aUk1Q9u9Q>



Welcome New ARC Program Manager- Eric Wald!

Eric comes to us from the US Fish and Wildlife Service, formerly a biologist with the Arctic Refuge. Before that, Eric was based with the Yukon Delta Refuge and based in Bethel. Eric examined moose habitat in the Snowy Range of Wyoming for his PhD research at the University of Wyoming. Please add Eric to your I&M contact lists. He can be reached at: eric_wald@nps.gov.

Photo: <http://voices.nationalgeographic.com>

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Science for the stewardship of Arctic Parklands

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