Alaska Park Science

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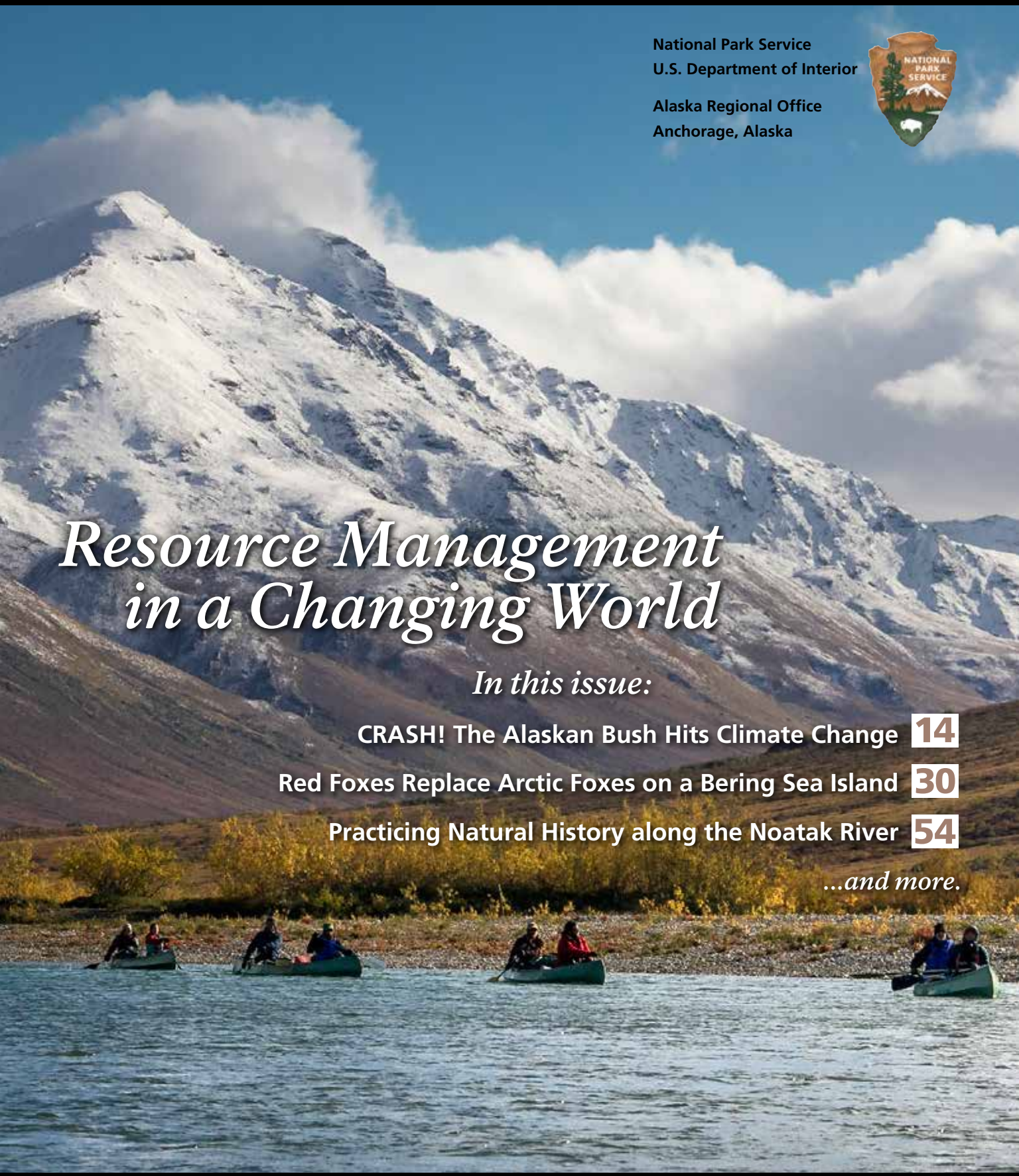

Resource Management in a Changing World

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...and more.

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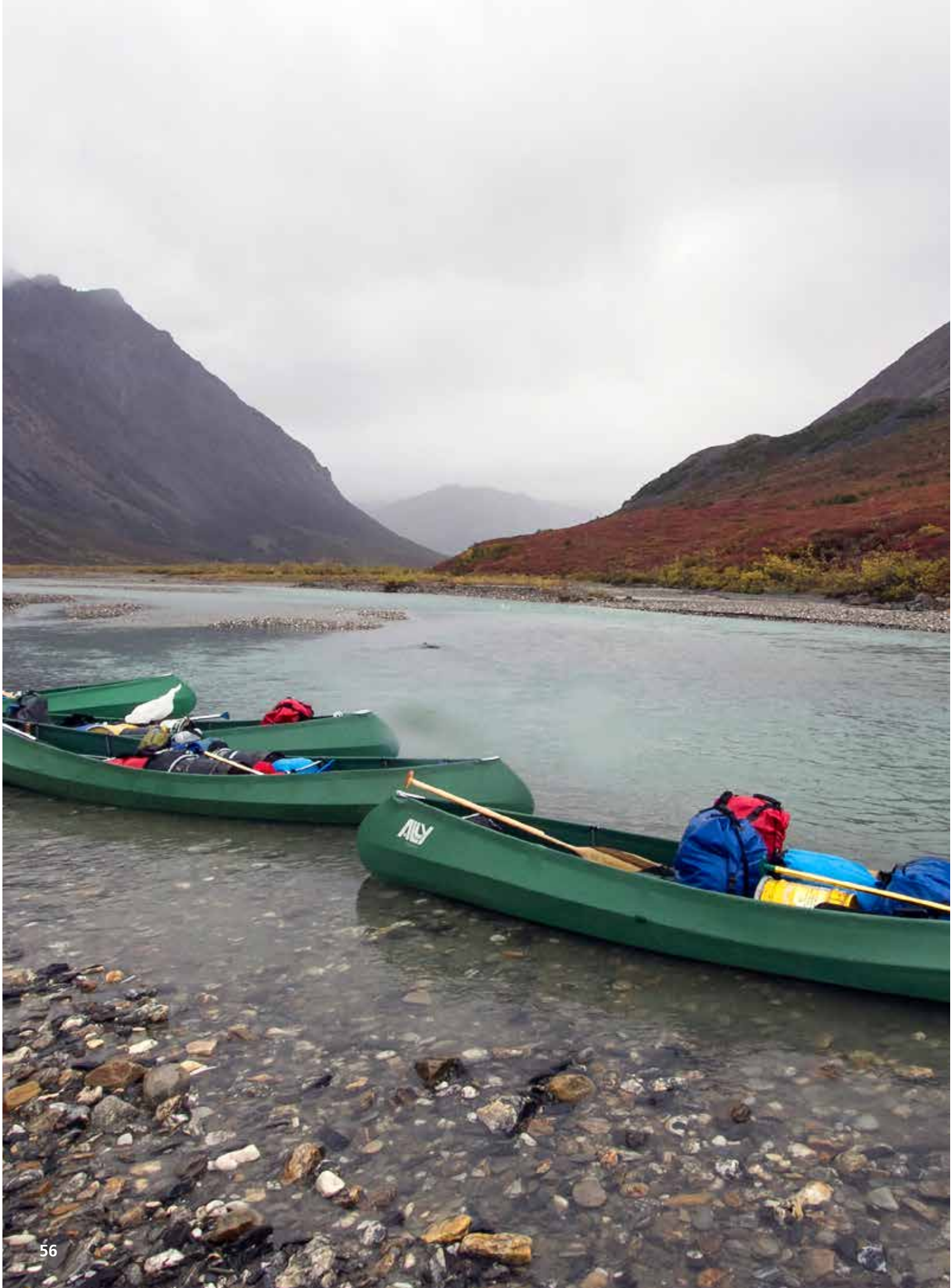
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At the Roots of Alaska Science: Practicing Natural History along the Noatak River

By Michael Gaige and Lee James

Introduction

"Look, a fox!" a student announces. Instantly, ten pairs of binoculars rise, scanning the ground below. We are standing on a pingo, a 15-minute walk through scattered willows from the Noatak River. The animal is approximately 100 yards (91.4 meters) away and has not yet noticed us. "It's not a fox. It's a wolf pup!" another student concludes. Our lesson on permafrost features has been pleasantly interrupted.

Over the course of the next hour, eight students and two instructors observe a pack of wolves with dedicated attention. The wolves do the teaching. Our students all capture the moment that evening in their field journals. As one student describes it:

> We froze, to hear the sounding of the wolves, who were obviously watching us, from who knows where. Normally, one only hears about the howl of the wolf. But we were hearing much different words. The wolves were barking and then would let a howl off. But it was amazing to me to hear the barking! It made me wonder: what other types of communication do wolves have? Also it made me wonder: how many wolves have surrounded us at this moment? (*S. Lewis, unpublished field journal, 2012*).

We counted seven wolves in the end, some of which we saw, and others we only heard. During that hour everyone was keenly observant of the moment. And the intensity with which we observed the wolves was reciprocal:

> Finally we saw an adult wolf making its way toward us from the direction of the calls. I was expecting it to go toward the pups, but it kept trotting toward us. Then, all of the sudden, way to our left it stood in an opening and slowly made its way closer yet, totally focused on us, and maybe within 50 yards. Even without binoculars it was easy to see the curiosity with which it moved forth. (*S. Lewis, unpublished field journal, 2012*)

Natural History

People have been practicing natural history in the Noatak region for at least 11,000 years. As described by Fleischner (*2011*), natural history is "a practice of intentional, focused attentiveness to the more-than-human world, guided by honesty and accuracy." Barry Lopez (*1989*) described natural history as being "as old as the interaction of people with landscape" and a "patient interrogation of the landscape" (*Lopez 1986*). Though today natural history often takes the form of an objective inquiry and description of the natural world, over the preceding millennia, the people of the Noatak region and throughout the world depended—and still depend—on a practice of natural history for their survival, as well as their culture. Through direct observation, they understood the ways of the animals, the weather, and the seasons.

The first European to practice natural history in what is now Alaska was Georg Wilhelm Steller in 1741. As the naturalist (and physician) on Vitus Bering's voyage, Steller observed and documented a variety of animals and plants unknown to western science at the time. Because of his careful attention, we have descriptions of Alaska fauna, such as the Steller's sea cow, that have since gone extinct.

In time, other explorer-naturalists arrived and continued the inquiry into Alaska's unique landscape. John Muir plied the coast of Alaska beginning in 1879 making observations of glaciers and contributing significantly to the emerging science of glaciology. William Dall, active in Alaska soon after its purchase from Russia, was commissioned to survey the territory's interior and coastal regions. He had a passion for natural history and reported detailed descriptions of Alaska's flora, fauna, and people. After dedicated observation (and hunting) of sheep in the Alaska Range, Charles Sheldon (*1930*) described his observations and later advocated successfully for the establishment of Mount McKinley National Park. And Adolph Murie, like us, observed and described wolves. His efforts resulted in a new understanding of predator-prey relationships (*Murie 1944*) and in the establishment of additional conservation lands.

The first western naturalist-explorer to venture into the Noatak region was Samuel McLenegan of the Corwin expedition in 1885. McLenegan was commissioned to explore the river in a geographical sense, as this part of the territory remained unexplored. In his report (*Healy et al. 1887*), McLenegan describes the country and speculates on natural processes such as the limits to tree growth and the causes of folds in geologic strata. The list of observed birds he generates is particularly impressive considering the purpose of his expedition and the harrowing conditions he met.

Our Noatak expedition follows this great tradition of exploration and direct observation to describe and understand an unknown landscape. We encourage students to engage deeply, enter with broad open-mindedness, and be willing to speculate and generate questions. *This landscape rewards attention*, we tell them. Similarly, through

Figure 1. We use Ally folding canoes for the 26-day expedition.

Photo by M. Gaige.

description, comparison, and questioning, contemporary researchers in disciplines such as geology, biology, atmospheric science, and ethnography use the foundation of natural history to further our collective understanding. Natural history forms the root of all Alaskan science.

The Course

Our Arctic river expedition is an upper division undergraduate course at Prescott College (Prescott, Arizona). The course began in 2004 driven by personal experiences of rivers in Alaska's Brooks Range. Transformational encounters with landscape and wildlife and the awe and wonder they inspire have been a consistent theme ever since. The structured study of natural history fosters an opening to detail, nuance, and inter-relationships that deepens that experience.

This is not a guided trip. Students are responsible for expeditionary planning; they generate an equipment list and plan their own food ration for the entire 26-day expedition.

Photo by M. Gaige.

Figure 2. An observant student unraveling ecological processes through his field journal.

Photo by L. James.

Figure 3. Looking closely at tundra lichens.

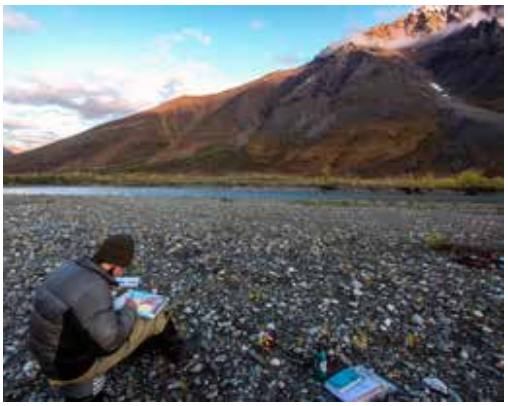

Photo by M. Gaige.

Figure 4. A student paints a scene from the Noatak headwaters. We strongly encourage students to engage with the landscape artistically, as this hones their observational detail.

Photo by M. Gaige.

Figure 5. A student presents a natural history lesson at the Cutler River confluence. Students are each responsible for presenting three lessons.

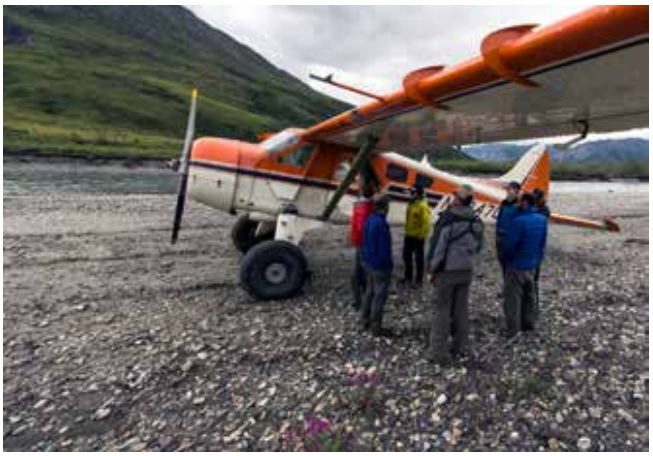

Photo by M. Gaige.

Figure 6. The flight to the headwaters in Coyote Air's Beaver aircraft allows students to get a broad overview of the landscape in which they will spend the next 26 days.

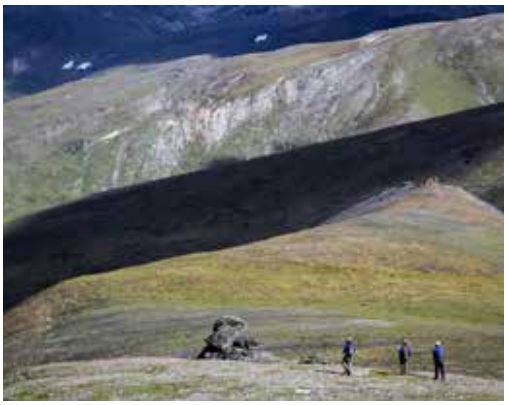

Photo by M. Gaige.

Figure 7. Exploring the landscape away from the river is equally important, such as here on the alpine ridges near 12-Mile Creek.

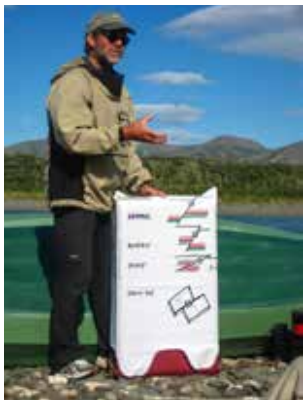

Photo by L. James.

Figure 8. A formal lesson on Brooks Range geology.

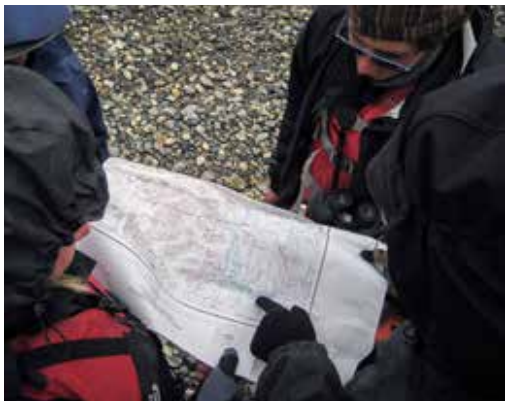

Photo by M. Gaige.

Figure 9. Students are responsible for navigation, and map reading is a frequent activity.

Some students arrive having never paddled a canoe. But by the time we reach Noatak Village, some 370 miles downstream, they are competent in expeditionary canoe travel in the challenging arctic environment (*Figure 1*).

In addition to expeditionary planning, students have other academic responsibilities. Each student maintains a natural history field journal to record his or her observations (*Figure 2*). This is the primary means by which they document their engagement with the landscape. Field journals can be used in many ways (*Farnsworth et al. 2014*) though we emphasize two points: (1) use the journal as an objective inquiry into the external landscape; and (2) vary the subject matter and scale—be attentive to mosses and lichens (*Figure 3*) as well as to landforms, wildlife, and the shape of the river as it winds through vast expanses of tundra. We strongly encourage students to draw that which they observe (*Figure 4*) as this engages additional modalities of learning (*Ainsworth et al. 2011*). Each student also presents three brief natural history lessons on a bird, mammal, and plant family (*Figure 5*). In addition to the required text—*Arctic Dreams*, by Barry Lopez (*1986*)—we carry an extensive library of field guides and maps.

On the River

The Noatak River begins in the western Brooks Range, its headwaters rising in Gates of the Arctic National Park and Preserve. The bulk of the river and its watershed occur above treeline in Noatak National Preserve. The entire region was affected by previous glaciations, evidenced by glacially carved landscapes in the mountains, and glacial lakebed sediments in the basin (*Hamilton 2010*). After a 90-minute flight—a natural history experience in its own right—pilot Dirk Nickisch sets us down on a gravel bar within sight of Mount Igikpak, in the Noatak River headwaters (*Figure 6*).

If a group paddled each day, the trip to Noatak village could be completed in less than 10 days. We allow 26 days to accommodate hikes (*Figure 7*), formal classes (*Figure 8*), rest days, and a pace that facilitates digging in and experiencing the country.

Once on the river, students are responsible for navigation (*Figure 9*). Standard topographic maps are a luxury early explorers did not have. We stop regularly throughout each paddling day to climb the bluffs and scan the landscape. One never knows what will emerge, but something always does: caribou, musk ox, bears, birds, or a rich patch of blueberries. As one student discovered:

> The whiny call of a Falcon—eee eee eee—sounds across the tundra. Looking over, my first thought is a Snowy Owl sporting the flat head and inexistent shoulders. As the wings shift and the bird banks, I can see a more defined head—stout with a large hooked bill, and dark lightning bolt streaks on the white chest and underwings. This is a Gyrfalcon! As I scan to the east another falcon enters the field of view. This one, smaller and darker all around, is also a Gyrfalcon. These two birds circle each other for the next fifteen minutes. They behave like opposed pendulums. One banks too close, the other repositions a few feathers and soars away using present energy. They fly like fish move underwater—masters of their third dimension—a simple wing flick can put a bird over on its back, backwards and upside-down, to flash a talon and send off the other pendulum. (*S. Williams, unpublished field journal, 2010*)

Photo by M. Gaige.

Figure 10a. Standing at a small refugia days after a July 2010 fire at Okak Bend.

Photo by M. Gaige.

Figure 10b. The same area of Okak Bend in September 2014. Students look for evidence of the fires.

Observing Landscape Change

"*You can't step in the same river twice.*" Heraclitus

Though the Noatak is new and foreign country for students each year, it has become a familiar landscape to us. We revisit areas that, in less than a decade, show clear signs of change. In 2010, for example, we observed the smoldering remains of many tundra fires that occurred in the preserve that year (*Higuera et al. 2011*). On subsequent years we have been able to revisit these sites to witness the tundra's recovery (*Figures 10a and 10b*). Rather than measure and quantify change, we encourage students to observe, describe, and question the processes taking place and their repercussions.

Near Akikuchiak Creek, in the Grand Canyon of the Noatak, we explore an active thermokarst slurry. We have

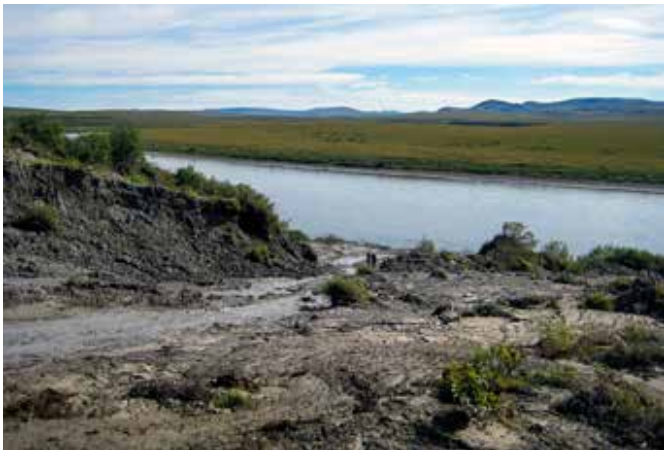

Photo by M. Gaige.

Figure 11a. Thermokarst slurry in 2008.

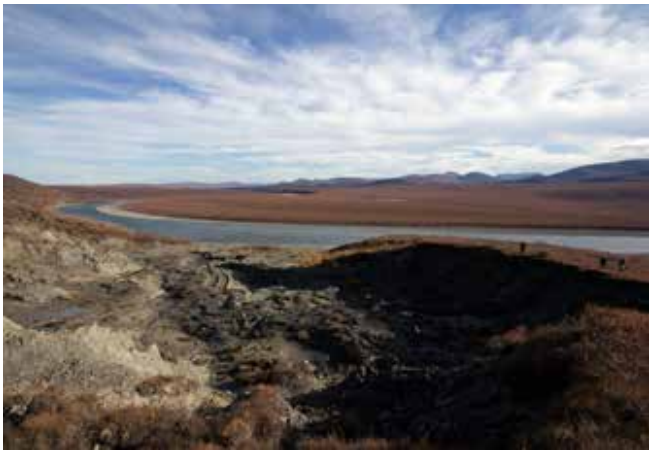

Photo by M. Gaige.

Figure 11b. The same thermoskarst slurry in 2014.

Photo by M. Gaige.

Figure 12. Drifting toward a small herd of migrating Western Arctic caribou.

Photo by M. Gaige.

Figure 13. Student Jeff Glessing with a remarkable find of a fully intact mammoth tooth.

Photo by M. Gaige.

Figure 14. Student Lauren Twohig inspects a caribou bone fragment fallen from a midden exposed by an eroding bank.

witnessed this rapidly melting and eroding slope expand from less than 2 acres (0.8 hectares) in 2008 to an estimated 10 acres (4 hectares) in 2014 (*Figures 11a and 11b*). Each year we stand at the retreating wall of frozen sediment and listen to melting ice, mud, and falling stones. Because of our own repeated observations we're able to pose questions to students regarding how such change occurs and what the ramifications may be.

Our encounters with wildlife are never the same from year to year (*Figure 12*). One year we observed over 50 rough-legged hawks. During the same month the following year we saw none. In 2014 we observed a congregation of 17 grizzly bears working the chum salmon run at the confluence with Kugrak River—the highest density of bears we've ever seen. We're as interested in raising questions and speculating about the factors behind this variation as we are in specific answers. The questions inspired by observation are at the heart of natural history and the field journal process. On our most recent trip, a student found a fully intact mammoth tooth (*Figure 13*); discussions of Pleistocene megafauna moved from the theoretical to the observable!

The Cultural Landscape

Though Gates of the Arctic National Park and Preserve and Noatak National Preserve together form one of the largest wilderness areas in the world, the region is not without people. Depending on the year we occasionally meet other paddlers, some from as far away as Australia and Norway. We also encounter outside sport hunters, often astute naturalists in their own right. And our interactions with the residents from Noatak Village, who we typically begin meeting 100 miles upriver from the village, are always welcome and memorable. They share with us their intimate knowledge and experience of the landscape and its animals. At the end of our most recent trip, a generous family in Noatak treated us to a caribou and salmon dinner in their home.

We have also found evidence of human habitation from long ago. On a small tributary stream we discovered house pits and a midden (*Figure 14*) in an eroding bluff that we subsequently learned was approximately 500 years old (*S. Shirar, personal communication*). This was a powerful experience for students. For three weeks they had been meeting the challenge of finding good tent sites to avoid wind and to have access to higher ground. Here, they were seeing someone else's interpretation of a good site. As one student wrote in her field journal:

> The location of the house pits was in a perfect spot next to a smaller river leading into the Noatak. They had the pits in a lower protected area and not in direct sight of the river. They were located at the base of a large bluff that had a perfect 360° view of

a large stretch of river and the area surrounding their camp. Perfect to look at who or what is surrounding them, where animals are, and who is coming down the river. (*L. Twohig, unpublished field journal, 2014*)

The Value of Natural History Field Expeditions

Perhaps one doesn't need an hour with a wolf pack to learn something about wolves. Maybe it doesn't take a month-long canoe trip down one of America's most remote rivers to learn about the Arctic. But we believe that in a world where people spend less and less time engaged with plants, animals, fresh air, and wildness, that intentional immersion and focused attention to the natural world can have strong positive outcomes.

Learning from the land forges a connection with it. The understanding of Alaska's wild landscape that comes from spending weeks with it develops informed, emotionally engaged citizen-advocates who can speak wisely on behalf of Alaska's parks and wildernesses. Place-based natural history education can foster abiding connection to, and concern for, the land.

Practicing natural history helps cement academic concepts in natural sciences. After a month on the Noatak River, matters such as salmon migration, the diet of grizzly bears, and the rapidly changing Arctic become real, observable phenomena. The hour we spent with wolves that year left students (and instructors) a lasting understanding of the species' behavior that cannot be replicated in a classroom. As the great Japanese poet Matsuo Bashō said, "Go to the pine if you want to learn about the pine."

Engaging learners with the natural world is important also because we still have things to learn that come from close observation of natural phenomena in the field. Though today much emphasis in natural sciences is on predictive models and statistical analyses, direct observation allows an unfiltered window into the natural world forming a foundation upon which quantitative studies can be built. Recently, Tewksbury and colleagues (*2014*) outlined the importance of natural history to science and society in the 21st century.

Finally, though we emphasize the importance of detached observation, sometimes the power of the landscape overwhelms one's ability to objectively describe it. These moments are likely more enduring than our formal classes. These moments are what we are hoping for. As one student wrote:

> Climbed the cliff upstream of camp. The colors here are stunning. Reds, greens, and grays of the mountains matched by red, green, and gray in leaves, needles, stems. You lose yourself in the shades of lichens and mosses, looking up to grey clouds turned pink with the setting sun. Pale orange glows in clear skies on the northern horizon.
>
> A few lines, a few words, a few sounds. Ultimately, nothing can do this land justice like spending a long stretch of time with it. Enough time to drift in and out of the present so many times that you realize there's nowhere else you'd rather be. Here. Now. No chance to record, just experience. (*C. Kulfan, unpublished field journal, 2014*)

Acknowledgments

We thank the many students who, over the years, have shared in the Noatak River with us. Special thanks also to the National Park Service, the people of Noatak Village, Scott Shirar at the UAF Museum of the North, and Tom Fleischner of Prescott College and one additional reviewer.

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