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NPS Science and Indigenous Knowledge

By Ted Gostomski, Network Science Writer

One of my favorite examples of indigenous knowledge is a story Barry Lopez tells in the introduction to the book *Home Ground: Language for an American Landscape*.

> *Some years ago I walked into the office of a man named Jim Kari, at the time the director of the Native Language Center at the University of Alaska, and was brought up short by a striking contrast posted on his wall. Arranged side by side above his desk were a pair of identical United States Geological Survey maps showing the topography of a section of south-central Alaska's Susitna Valley. The map on the left bristled with more than a hundred colored pushpins, each bearing a tiny paper flag with a Deni'ina place-name on it, the Athabaskan language spoken by the indigenous people still living there. Fewer than a dozen names appeared in English on the right, neatly printed on the quadrangle as an official part of the map.*

There are two points to be taken from this display, Lopez writes: (1) "that a region hardly known to its relatively new landlords is, in fact, minutely and extensively known to its long-term residents," and (2) "that the English words on [the maps] were arbitrarily chosen, little more than points of orientation. The Deni'ina words ... had grown up over many centuries, out of the natural convergence of human culture with a particular place."

This story distills the essential importance of Indigenous Knowledge (IK), also known as Traditional Ecological Knowledge (TEK), especially when you consider that indigenous words and names often describe the people's relationship with the named thing: there is an abundance of knowledge based on years (decades, centuries, millenia) of observation and interaction that western science often discounts as anecdotal and untested.

NPS Director Sams, the Department of the Interior, and the Office of the President have emphasized increased tribal engagement, consultation, co-stewardship, and co-production of knowledge. Here in the Great Lakes Network, Grand Portage (Gichi Onigaming) National Monument was the first NPS unit to enter into a co-management agreement with the tribe on whose land the monument sits. That happened in 1999. Isle Royale (Minong) was designated a Traditional Cultural Property in 2019 and now flies the flag of the Grand Portage Anishinaabe. Apostle Islands (Wenabozho Ominisan) has taken many steps towards embracing the long-standing relationship the Anishinaabe have with the islands, including the introduction of prescribed fire to enhance blueberry production in a storied gathering place. There has been limited

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Ojibwemowin names often refer to the people's relationship with the named thing. What relationships are behind these place names?

Gichi Onigaming "Great Carrying Place"

Minong "Good Place"

Wenabozho Ominisan "Wenabozho's Islands"

NPS Science and Indigenous Knowledge

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discussion of IK or knowledge co-production within IMD circles to date. However, there are some examples of successful co-monitoring and management from other parks and regions:

- Camas Lily Monitoring (Upper Columbia Basin Network)
- Gathering Sweetgrass and Renewing the Past: How Science at Acadia Is Making a Course Correction (Acadia National Park)
- How a Navajo Scientist Is Helping to Restore Traditional Peach Horticulture (Canyon de Chelly National Monument)

In September 2024, an interagency work group hosted a series of three webinars entitled "Co-Production of Knowledge Rooted in Equity: Bringing Together Indigenous Knowledge and Western Science to Inform Research, Monitoring, Decision-making, and Policy." The webinars were grounded in a framework for knowledge co-production developed by some of the organizers, and they featured geographically diverse indigenous speakers who shared their perspectives on how federal agencies can build relationships with tribal entities for the purposes of co-creation of knowledge and co-management of natural resources. Some of the take-aways from the series:

- IK is used; it is applied knowledge.
- If conclusions derived from Western knowledge and those derived from IK do not arrive at the same answers, it's usually a result of assumptions and not any sort of inherent "betterness" of one way over the other.
- However you engage with indigenous peoples, there has to be a mutual benefit. Ask yourself why are you seeking co-production? "The mere inclusion of Indigenous writers and obtaining and 'integrating' their ideas to enrich settler education can be a form of colonialism."
- If we are serious about incorporating IK, it cannot be business as usual. Federal agencies must meet tribes more than halfway in order to build trust.

Forming relationships, building trust, ensuring mutual benefit: this is the context in which we must approach the idea of co-creating knowledge with our neighbors, but as a network, we have to do this alongside our technical committee and board of directors. We do not want to go around the parks to initiate these relationships on our own. Besides, many already have these connections.

What Do We Have to Offer?

In light of changes underway relative to resource management activities at Grand Portage, we have already begun talking with tribal biologists about co-monitoring efforts for amphibians. We are considering a similar engagement with landbird monitoring.

What do we as the network office bring to the table?

- Capacity for data management and science communication.
- Monitoring insights and technical assistance.
- Access to project funds (e.g., NPS Inventories, Great Lakes Restoration Initiative).

What could we do together? We are interested in exploring possibilities to

- Develop tribal internship opportunities and career pathways.
- Sponsor a special session or IK theme at the next Great Lakes Science Symposium.
- Ensure any new species inventories or projects engage local tribal contacts on the front end.

Similar to the map of place names that Barry Lopez encountered, one thing the network has already done was to incorporate Ojibwe names into the species checklists created for Grand Portage in 2013

and Apostle Islands in 2015. Why only those two parks? Because there was a native Ojibwe speaker at each park who could check the work and be sure the included words were appropriate to that place. "Nothing about us without us" is a maxim we heard from many native speakers in the webinar series. It would be inconsiderate and presumptive to incorporate Ojibwemowin into a publication for the park without ensuring that the words are the correct ones—correct dialect, correct spelling, correct usage.

Is there a place for I&M science in co-management? Could network staff work with parks and their tribal neighbors to share information and widen the lens through which we view our work? We know we have a lot to learn, but we are excited to explore these opportunities with network parks and to perhaps create relationships with our tribal neighbors.

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"For the first time since the creation of the Apostle Islands National Lakeshore, the flag of the Red Cliff Band of Lake Superior Chippewa was permanently raised over the park on June 23rd, 2021 ... in recognition of the place and stories we share." (Friends of Apostle Islands National Lakeshore)

"**In-debendaagozimin Minong – We belong on Minong.** This journey across the lake to bring our flag to Minong is a homecoming for Gichi Onigaming Anishinaabeg." — April McCormick, Gichi Onigaming Anishinaabekwe, during flag-raising ceremony at Rock Harbor on Isle Royale. NPS PHOTO/B. BYRNE

2024 Field Season Summary

Amphibians

Thanks to everyone who sent in their SD cards and temperature loggers from the 2024 monitoring season! Despite a last-minute call for firmware updates by Wildlife Acoustics and a few instances of SD cards spontaneously ejecting, it seems like monitoring at most parks continued without major issue.

This year the program welcomed a new partner in the Grand Portage Band of Lake Superior Chippewa (Gichi-Onigaming) Trust Lands Agency. Their ecologists played a crucial role in the servicing and redeployment of song meters at Grand Portage National Monument. Miigwech (thanks) to the Tribe for their support this year, and may we continue to work together for years to come. On the other side of the coin, we said farewell to Keith and Bill, two of SLBE's steadfast volunteers that decided to hang up their data sheets and SM4 Troubleshooting Guide after many years of service. We wish them both well in their next venture!

This year we also rolled out a digital data form built in Survey123. I was happy to see that half the parks gave it a try and were able to collect their field data using this new tool. Please let me know if you have suggestions for improving the form or if you have questions about its use. Going forward, my hope is that we can continue to streamline the data collection and analysis pipeline to improve the timeliness and relevancy of these data to work in your parks.

I would like to end this year's report with some entertaining "observations" from the field (an admittedly odd sentence to write since I suspect that none of these events were actually seen). Earlier this year, ISRO staff asked if we had recorded ambient natural sounds characteristic of wetlands while also recording amphibians. Since our analyses to date had focused on amphibians, the people checking sound files only documented in the tabular data instances of calling amphibians. They rarely mentioned any ambient sounds that were recorded. This inspired a couple of us to explore the original sound files to see what we could find. Here are a few of the things we heard: many, many files with nearly deafening Spring Peeper choruses; the distant call of a lone loon on an otherwise quiet morning; the splash down of Canada Geese; the eruptive call of Sandhill Cranes right next to the song meter (this one nearly knocked me out of my chair); and a recording of lumbered sloshing followed by deep

C. Hester / NPS

Acronym Decoder

APIS
Apostle Islands National Lakeshore (Wisconsin)

GLKN
Great Lakes Inventory and Monitoring Network

bubbling that we can only guess was a moose feeding on submerged plants. It's a wild and wonderful soundscape out there!

—Cyrus Hester

Contaminants—Dragonfly Mercury Project

In partnership with Northland College, park staff, and volunteers, dragonfly larvae were collected from all nine network parks in 2024. Water samples were also collected at select sites for analysis of dissolved organic carbon, an important variable that aids in understanding how mercury accumulates in biota.

All larval dragonflies and water samples were sent to our USGS collaborators in Corvallis, Oregon. Special thanks go to GLKN's Alex Egan, who, with his assistant, was able to complete the sampling at ISRO this summer. ISRO is normally sampled by a Northland College field crew, but they were unable to do so this year due to staffing challenges.

You can explore the data for your or any park involved in the Dragonfly Mercury Project on the NPS website, www.nps.gov/articles/dragonfly-mercury-data.htm.

—David VanderMeulen

Landbirds

Landbird surveys were completed in all nine network parks this June. Thanks to Debbie Peterson, our long-time birder at Grand Portage, for her willingness to also take on Voyageurs this year as well.

A lot of the news in the landbird monitoring program has been behind the scenes. Network data manager Cyrus Hester has been hard at work streamlining how we do the quality checks of the bird data. We are still finding issues to resolve, but we completed all checks on 2022 data and are nearing completion of 2023 data. This new process will allow us to check 2024 data in short order and publish a complete data package over the winter.

The other big project is an analysis of landbird data trends in the context of landscape condition and change in and around network parks in the Great Lakes, Heartland, and Northern Great Plains I&M Networks. Working with USGS research biologist Ryan Burner, and with funding from the USGS Natural Resources Preservation Program (NRPP), we developed models using North American Breeding Bird Survey (NABBS) data collected on routes from across the central United States. These models were used to predict occupancy of bird species of concern in the 32 national park units that are part of one of the three I&M networks. We compared the predictions with data collected through NPS bird surveys at each park to determine if bird species of concern were more or less prevalent than expected.

In each park, we found most bird species are less frequently detected than the mean prediction. However, when range of uncertainty around the predictions was considered, only 22% of park-bird combinations showed strong evidence (95% confidence) of differing from what we expected. In other words, bird populations in the parks tend to reflect what is seen outside the parks.

This collaboration produced one journal article about the modeling (see page 9), the final report is in review.

—Ted Gostomski

Landscape Dynamics

During the past season we wished a farewell to our GIS intern, Katelynn Roberts, who worked with us from October 2023 through April 2024. She was a great asset to our office and assisted many other programs with her programming and cartography skills. She found a job in Bozeman, Montana, working for a private GIS company. Her work allowed me to write up the Sleeping Bear Dunes data summary report, which will be published in summer of 2025. I have also been busy requesting, downloading, and providing high-resolution satellite imagery for parks to use in compliance and park planning projects. If you would like to learn more about this imagery, please feel free to contact me.

Also this season, I spent a lot of time creating vegetation maps and doing some analyses of land cover in and around national park units in all three Midwest Region I&M networks. These maps will appear in a forthcoming report analyzing songbird population trends in the context of landscape condition and change in and around parks in Great Lakes, Heartland, and Northern Great Plains I&M Networks. The report is the final product to come out of a collaboration with the U.S. Geological Survey supported by funding from the USGS Natural Resources Preservation Program (NRPP).

—Al Kirschbaum

Vegetation

The vegetation crew spent the summer of 2024 canoeing down the Namekagon and St. Croix Rivers and collecting data at the 49 permanent sampling sites at St. Croix National Scenic Riverway.

SACN is very rich in plant species, with an average of 92 unique species identified per site (a combination of trees, shrubs, herbaceous plants, and ferns). The winning site for the year had 145 unique species present, located downriver from the Head of the Rapids Landing in the Kettle River Slough.

Our previous sampling effort at the park was in 2013, shortly after a severe storm affected areas along parts of the riverway, which resulted in large losses of trees at some sites. Eleven years later, these sites are so thick with young tree saplings and shrubs, it was challenging to perform our sampling. We look forward to continued monitoring of these early successional forests.

While the presence of invasive species in forested sites at SACN is limited, we did encounter some, namely common buckthorn at 16 sites and exotic honeysuckles at six sites, often growing near each other. These invasive shrubs were found at sites south of Highway 70 and at two sites near Hayward. They are present at all the same sites we found them at in our 2013 sampling, indicating that they may not be expanding their range into new areas.

—Jessica Kirschbaum

Two time periods at the same photo point. The photo on the left was taken in 2013, shortly after a severe storm leveled many of the trees. The photo on the right was taken in 2024, showing the thick regrowth that has occurred since our last visit. NPS PHOTOS

Water Quality—Inland Lakes

No reports from Sleeping Bear Dunes or Voyageurs, but everyone else had a slightly unusual field season.

Indiana Dunes NP

Since the end of last season, there has been major rehabilitation occurring on the main access road to our monitoring site at Middle Lagoon. This complete rehabilitation of Lake Street and the bridge curbing that crosses over the lagoon not only made accessibility to the monitoring site challenging, but it also completely altered our longstanding reference point for measuring water level, which was the Lake Street bridge curbing itself. A new benchmark was established during our second sampling round in July.

In addition to road construction, last winter was very mild throughout the Chicago region, including northwest Indiana, with few days of very low temperatures and snow cover. We also had a very warm late winter and early spring, which resulted in very early primary productivity in Middle Lagoon. During my first sampling round in May, I observed algae accumulating on our submerged equipment and by the last sampling round in September, the macrophyte growth became so

Aquatic plants became abundant in Middle Lagoon at Indiana Dunes. Both photos are looking west. The photo on the left was taken in May, the one on the right was taken in September. J. Dickey/ NPS photo

pervasive it nearly covered the entirety of the lagoon from bank to bank.

—Josh Dickey

Isle Royale NP

Several events mixed up the scheduling for ISRO site visits, including a conference and invasive mussel dive work, but we got it all done. We supported additional projects that focused on inland lake fish communities and zooplankton transport between water bodies. Both of these projects will help the park understand water chemistry and biotic conditions in lakes that GLKN does not study.

This was the final year for field work to determine baseline communities of Chironomidae (midges) in our nine study lakes; now begins a lot of time staring through a microscope and occasionally remembering why so few people identify chironomids to species.

—Alex Egan

Pictured Rocks NL

PIRO had an interesting water quality season due to the aquatics lead, aquatics supervisor, and natural resources division chief all being new to their positions this year. As a longtime PIRO biologist, aquatics supervisor Leah Kainulainen provided a strong foundation for aquatics lead Tony Vitale and resource chief Andrew Bishop, who arrived from California partway through the season. The team's strong communication, enthusiasm for the work, and team-oriented outlook has already led to much growth and learning for the whole division, reinforcing the old adage "teamwork is team fun."

—Tony Vitale

Water Quality—Large Rivers

Sampling began on April 3rd with snow still on the ground. Early in the season, river discharge (flow) on the St. Croix River was low (mostly below 5,000 cubic feet per second), but then it more than doubled in April and doubled again in June to 20,000 cfs as a result of lots of rain in May and early June. This made boat access easy at many river sites, but it affected the success of our macroinvertebrate sampling.

Macroinvertebrate sampling was accomplished in July through late August, but because water level was high at the time of deployment, some invertebrate samplers were left too shallow as water level dropped throughout the season. As a result, samplers were moved by people and were lost, or they failed to collect a suitable sample. We expect all data to be available in February 2025.

—Rick Damstra

Water grab accomplished despite cold feet! Scientist In Parks intern Abel Jordan brings a water sample back to shore as snow falls on the St. Croix River near Grantsburg, Wisconsin. R. Damstra / NPS photo

GLKN began pilot testing a new weather monitoring system this spring. While the football-sized unit would still be mounted on a tower to give it clear access for communication, the modern ClimaVue50-Aspen10 from Campbell Scientific (*left*) would consolidate all the sensors into that single unit, would eliminate a control panel box, and has a smaller solar panel than the weather stations placed in parks in the mid-2000s (*right*). NPS PHOTOS

Weather and Climate

A little over a decade ago, we installed three weather stations at parks whose remote locale meant it was unlikely that conditions there were being captured accurately by the existing network—which was then considerably denser in urban and agricultural areas. Since then, we have maintained these stations while other organizations have expanded their capacity to monitor climate phenomena in the vicinity of Great Lakes parks.

Earlier this year, we learned that the technology our stations rely on to transmit data via satellite will be retired by NOAA in 2026. Updating our stations to permit their continued operation will require us to also replace many of their interdependent components such as the sensors and the data logger. While we contemplate the resources needed to carry out such upgrades, we are also asking other questions relevant to climate science in parks. For instance, are these stations still filling important data gaps in the modern weather monitoring network? To what extent are climatologists in the NPS and other organizations already providing the climate-related products that the parks need? Are these data relevant at the scale that management decisions are made, or should we consider other monitoring approaches? What capacity does contemporary weather monitoring equipment afford us that was not available a decade or more ago? We hope to conduct a comprehensive survey of park needs with respect to climate science in the near future. In the meantime, if you have thoughts on these questions, please feel free to contact me.

—Cyrus Hester

This Just In!

After serving for more than two decades as the Midwest Region Aquatic Ecologist, **Brenda Lafrancois** has joined the Great Lakes Network as our new Program Manager. She begins on December 15.

Jessica Kirschbaum is the network's Vegetation Ecologist after 17 years as our Botanist. Jess began working for the GLKN in 2007, the inaugural year of the long-term vegetation monitoring program. She started her new position on December 1.

New Reports, Publications, and Data Packages!

The latest thing in outputs produced by network monitoring programs is the *data package*. It is not entirely new—we routinely post monitoring data in IRMA that has been quality checked and validated—but the data package is a new way of, well, packaging the data and making it publicly available.

A data package has two components: tabular data in one or more comma-separated (CSV) files and a single metadata file that describes the CSV files. All files must be machine-readable, non-proprietary, and based upon a published standard. Any reports, maps, or photographs associated with the data are published separately and linked to the data package in metadata and through cross-references in each item's IRMA/Data Store record. In this issue of *The Current*, we announce the publication of our first two data packages!

All of the reports listed here can be found on the Great Lakes Network website: www.nps.gov/im/glkn/reports-publications.htm. Those published in peer-reviewed journals can also be found using their DOI (digital object identifier). Great Lakes Network staff are indicated in **bold blue** text.

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The Current is published twice a year for Great Lakes Network park staff, our partners, and others interested in resource management at Great Lakes region national parks.

Apostle Islands National Lakeshore
Grand Portage National Monument
Indiana Dunes National Park
Isle Royale National Park
Mississippi National River and Recreation Area
Pictured Rocks National Lakeshore
Sleeping Bear Dunes National Lakeshore
St. Croix National Scenic Riverway
Voyageurs National Park

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