



The Current

Issue 21, Fall 2021



Diversity, Biological and Otherwise

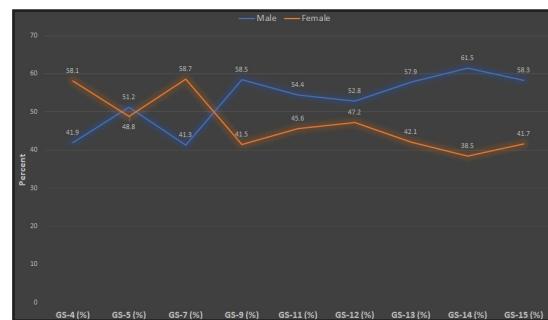
By Ted Gostomski, Network Science Writer

Inclusive science communication (ISC) is a rising field of study and practice among academics and those of us tasked with making science accessible and relevant to broad audiences. One of the three key traits of ISC is *Intentionality*—“paying due regard to the audience, how ‘science’ is defined, and how marginalized identities are, and have been represented and supported.”¹ There are many layers to this onion, but one of the underrepresented and undersupported identities is women. National Park Service data support this.

Between 1975 and 2020, the number of male NPS employees consistently exceeded that of women. In 1975, there were almost four times as many men as women. In 2020, women comprised 37.8% of the workforce but 50.8% of the American population. Digging deeper into who is promoted to the higher grade levels is another level of disparity. In 2019, women composed more than

50% of employees at the GS-4, 5, and 7 levels. But women do not even rise to 50% of the people in positions at the level of GS-9 through GS-15.

The problem is not unique to the NPS. However, it has implications for unconscious biases in research



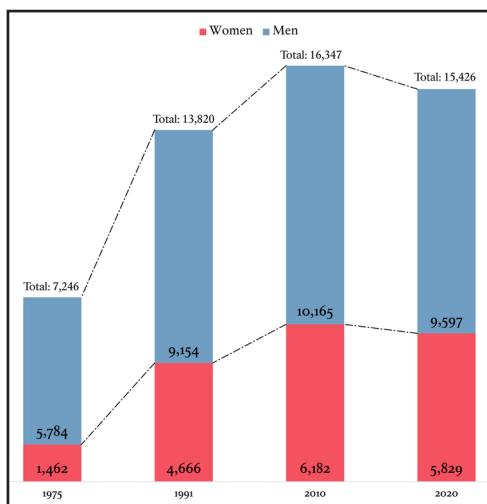
Proportion of NPS employees, by gender, in select GS-grades, 2019. Source: NPS Office of Equal Opportunity Programs.

and singular perspectives on what is “known” from that research.

Singing has long been considered a strictly male endeavor in the bird-world, used to attract mates and to declare and protect the boundaries of a nest and territory. Generations of student ornithologists have been told females sing only rarely, an exception to the rule. But a recent study of 1,141 songbird species worldwide found female bird-song to be “both widespread” (occurring in 71% of the species studied) “and ancestral,” meaning that female singing was common in an ancestor of modern songbirds³. Much of the female singing occurs in the tropics, where “many

continued on page 9

Total permanent NPS employees by gender, 1975 to 2020. Source: NPS Office of Equal Opportunity Program, March 2021².



Moving On

Leonard C. Ferrington, Jr.

Esteemed University of Minnesota Professor of Entomology Dr. Leonard Ferrington, Jr., 73, passed away unexpectedly on September 11, 2021, while bicycling on the Root River Trail near Lanesboro, Minnesota.

Len was the graduate advisor for GLKN aquatic ecologist Alex Egan

and so was involved in a number of projects in the Great Lakes parks, most notably the Chironomidae (midge) sampling from shoreline rock pools at Isle Royale, Pictured Rocks, and the Apostle Islands. Len was also co-author of a 2015 report, “Landbird population trends for seven Great Lakes Network national parks.” Recently, Len and Alex have been working on a longitudinal study of midges of the St. Croix River. “Len was more than an advisor and professor to his graduate students, he encouraged our individual interests and became a close mentor and friend,” said Alex.



CONTRIBUTED PHOTO

Candy Peterson

Candy Peterson was doing songbird surveys at Isle Royale before the NPS was doing songbird surveys. Endlessly curious and having a talent for identifying bird song, Candy began keeping lists of songbirds she heard and saw in the 1980s. “[I was] working with Bob Janke to update a list of all the breeding birds on the island,” Candy recalls. That list became *The Birds of Isle Royale*, one of a series of species list booklets published by the Isle Royale Natural History Association. When the park began doing formal bird surveys in 1994, Candy volunteered to help. She spent the next 27 years completing surveys on two of the island’s eight transects every June, often with her husband Rolf serving as her data recorder. This year, after more than three decades of counting birds, Candy decided to pass the data sheets to someone else.

Thank you, Candy, for your dedication and expertise!



Dr. Len Ferrington (seated) and Alex Egan search for midge pupal cases in the shoreline rock pools on Isle Royale. NPS PHOTO/P. BROWN.



Candy Peterson and her husband Rolf have been doing bird surveys together on Isle Royale for more than 30 years. PHOTO © DAVE AND SARA FEHRINGER

New Reports and Publications

All of these reports 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.

Brigham, M.E., **D.D. VanderMeulen**, C.A. Eagles-Smith, D.P. Krabbenhoft, R.P. Maki, and J.F. DeWild. Long-term trends in regional wet mercury deposition and lacustrine mercury concentrations in four lakes in Voyageurs National Park. *Applied Sciences* 11:1879. Available at: <https://doi.org/10.3390/app11041879>.

Goodwin, K.R., and **A.A. Kirschbaum**. 2021. Acoustic monitoring for bats at Apostle Islands National Lakeshore: Data summary report, 2015–2019. Natural Resource Data Series Report.

Grand Portage National Monument: Data summary report for 2016–2019. Natural Resource Data Series Report.

Isle Royale National Park: Data summary report, 2015–2019. Natural Resource Data Series Report.

Mississippi National River and Recreation Area: Data summary report, 2016–2019. Natural Resource Data Series Report.

Saint Croix National Scenic Riverway: Data summary report for 2016–2018. Natural Resource Data Series Report.

Sleeping Bear Dunes National Lakeshore: Data summary report for 2015–2019. Natural Resource Data Series Report.

Kirschbaum A.A. 2021. Landsat-based monitoring of landscape dynamics at Isle Royale National Park: 1995–2017. Natural Resource Data Series Report.

LeDuc, J.F., and R.P. Maki. 2020. Annotated bibliography of Voyageurs National Park interior lakes documents and datasets. Natural Resource Report NPS/VOYA/NRR—2020/2209. National Park Service, Fort Collins, Colorado.

Larson, J.H., R.P. Maki, V.G. Christensen, E.J. Hlavacek, M.B. Sandheinrich, **J.F. LeDuc**, C. Kissane, and B.C. Knights. 2021. Mercury and water level management in lakes of northern Minnesota. *Ecosphere* 12(4). Available at: [e03465. https://doi.org/10.1002/ecs2.3465](https://doi.org/10.1002/ecs2.3465).

Christensen, V.G., E.A. Stelzer, B.C. Eikenberry, H.T. Olds, **J.F. LeDuc**, R.P. Maki, A.M. Saley, J. Norland, and E. Khan. 2021. Cyanotoxin mixture models: Relating environmental variables and toxin co-occurrence to human exposure risk. *Journal of Hazardous Materials* 415. Available at: <https://doi.org/10.1016/j.jhazmat.2021.125560>.

Roberts, S.G., Z.S. Ladin, E.L. Tymkiw, W.G. Shriver, and **T. Gostomski**. 2021. Songbird monitoring in the Great Lakes Network parks: 2014–2018. Natural Resource Report.

Route, W.T., C.R. Dykstra, S.M. Strom, M.W. Meyer, K.A. Williams. 2021. Patterns and trends of polybrominated diphenyl ethers in bald eagle nestlings in Minnesota and Wisconsin, USA. *Environmental Toxicology and Chemistry*. Available at: <https://doi.org/10.1002/etc.5006>.

Sanders, S., **J. Kirschbaum**, and S.E. Johnson. 2020. Response of 25 rare plant species on rocky shorelines of Isle Royale National Park in the face of extreme water levels in Lake Superior. *The Great Lakes Botanist* 59(3–4):159–177. Available at: <http://hdl.handle.net/2027/spo.0497763.0059.303>.

2021 Field Season Summary

Amphibians

It was an exceptionally dry year for most parks in the Great Lakes region. Lake Superior's water level returned to its long-term average for the first time in about 7 years. However, small and medium-sized wetlands were dry at many parks. Wetlands at APIS that we waded through the year before were dry and cracked. It will be interesting to see what the data show this year and next. Was the breeding season shorter this year? Will call activity be lower next year as a result?

The amphibian acoustics we record are not just a valuable archive of amphibian calls, but of all acoustics at a site. Our recorders are capturing data on questions we have not yet thought to ask, but we are constantly wondering what else we can get out of these recordings? Over the next year, using our existing data, we will be exploring the potential for using amphibian recorders to supplement breeding bird surveys at parks. Just another way we are looking to extract more information from the work we are all investing in this program. We will schedule a meeting in the next few months for the amphibians team (GLKN and park collaborators) to discuss and review current methods and future directions. We look forward to your ideas and feedback.

Bats

All nine network parks participated in the bat acoustic monitoring program this year. We sampled at 242 sites and collected data on more than 2,300 detector-nights. In addition to regular monitoring, four parks sampled at historic structures and along trails to gather information for NEPA (National Environmental Policy Act) compliance and potential mitigation.

We are working on a side project investigating differences between two models of Wildlife Acoustics ultrasonic microphones: the SMM-U1 we have used since 2015 and the recently released

SMM-U2. This summer each park conducted at least one deployment with the new and old microphones recording side by side. We will measure the differences between the two microphones in terms of the number and quality of recordings obtained. For future analyses, this information may help us separate the effects of data collection methods from true changes in bat activity.

Finally, in collaboration with the NABat Midwest Bat Hub, we are working on a manuscript examining trends in occupancy and the relationship between occupancy and environmental variables for three bat species affected by white-nose syndrome.

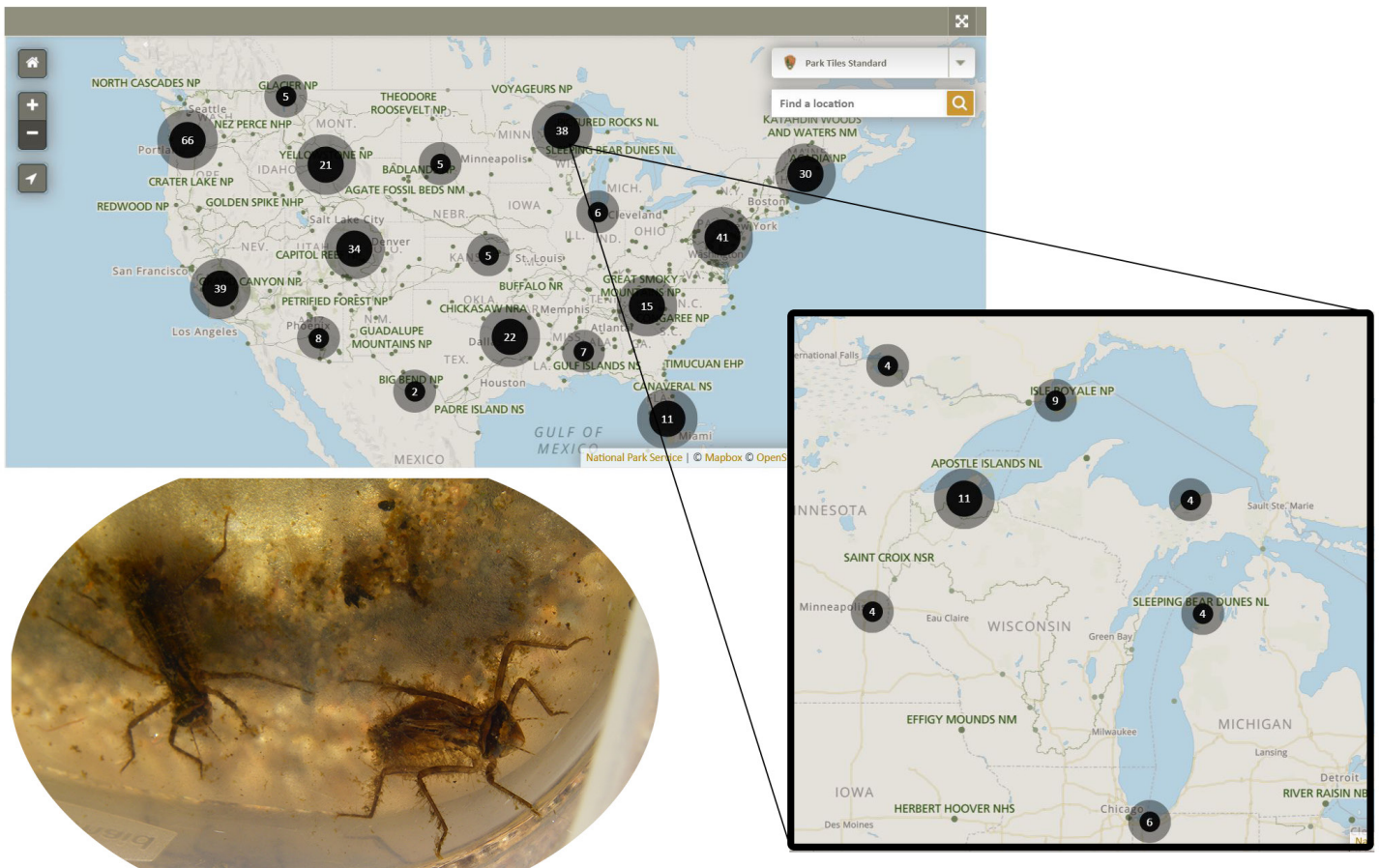
Contaminants—Dragonfly Larvae and Fish

Dragonfly larvae were collected from all nine network parks in 2021 in partnership with Northland College, park staff, and volunteers.

Dragonfly contaminants monitoring in the Great Lakes Network parks is part of the Service-wide Dragonfly Mercury Project (DMP). It is an interagency project now, as dragonfly larvae are also collected at national wildlife refuges, Bureau of Land Management (BLM) units, and national forests, and data analysis is done by the U.S. Geological Survey (USGS). You can explore park-specific data (up to 2018) on the DMP website (www.nps.gov/articles/dragonflymercury-map.htm). Summary data up to 2020 are available at <https://doi.org/10.5066/P9TK6NPT>.

Park staff and volunteers also sampled fish from MISS and INDU that, like the dragonfly larvae, will be analyzed for mercury. We have now sampled fish from all nine network parks over the past five years, mostly at the same sites where dragonfly larvae are sampled.

We worked with USGS and VOYA staff to assess long-term mercury trends in four VOYA lakes. We measured mercury levels in atmospheric deposition



Dragonfly sampling sites across the U.S. (above) and in the Great Lakes Network parks (right), as shown on the Dragonfly Mercury Project website (www.nps.gov/articles/dragonflymercury-map.htm).

(rain, snow), lake surface water, fish, and dragonfly larvae. Select measurements gathered through our standard water quality monitoring protocol were also incorporated to provide additional context for the mercury trends. This is novel work because relatively few long-term, multimedia data sets have been published that include atmospheric mercury deposition monitoring coupled with mercury in lake water and in lake biota.

Contaminants—Bald Eagles

Eagle nest occupancy surveys conducted by park partners every spring did not happen in 2020 due to the pandemic. In 2021, surveys were completed at MISS, but not at APIS or SACN due to pandemic limitations on fieldwork.

Former network program manager Bill Route, in collaboration with our partners, continues to

analyze bald eagle contaminants data collected from 2006 through 2015 and publish the findings. Most recently, he and others published a paper on the status of and trends in polybrominated diphenyl ether (PBDE) contamination at APIS, MISS, and SACN, as well as sites in northern and eastern Wisconsin sampled by the Wisconsin Department of Natural Resources. (See “New Reports and Publications” on page 3 for the full citation and a link to the paper.) Two other papers are in the works, one on bald eagle population dynamics and nestling morphological (form and structure) characteristics, and one on lead stable isotopes found in eagle nestling red blood cells.

Landbirds

Songbird monitoring continues to run smoothly in all nine network parks. Jared Wolfe, an assistant

professor at Michigan Technological University, took on the routes previously surveyed by long-time volunteer Candy Peterson. Jared and GLKN biologist Alex Egan completed all eight ISRO bird surveys and worked on planning and analysis of long-term bird data with Andrew Burchill, a PhD candidate from Arizona State University and Scientist-in-Parks intern at ISRO.

This year's highlights include more Purple Finches and Scarlet Tanagers than usual, a Great Crested Flycatcher and Sedge Wren, Red Crossbills on a few routes, and a Northern Goshawk trying to catch a red squirrel about 20 feet away from the survey point (the squirrel escaped).

At Pictured Rocks, observer Brian Johnson notes "bird numbers were good (so was the weather). I believe I have now seen 106 species during the PIRO counts." Highlights were an Orchard Oriole, Wilson's Snipe, and Dickcissel.



Kass Klein records bird survey data on Passage Island. In addition to being talented aquatic ecologists, Alex Egan and Kass Klein also assist with songbird surveys on Isle Royale. NPS PHOTO/A. EGAN

An updated landbird database went live in late July, complete with an online training module and updated user manual. Users can still view records from and run reports for any of the network parks, but park-specific data entry and edits can only be done by designated staff from that park.

Landscape Dynamics

Alex Olson was our summer intern who validated disturbances at MISS. Alex investigated just over 21,000 polygons from within the park, a 300-meter buffer around the park, and three watersheds flowing into the river (Crow River, Rice Creek, and Minnesota River), looking for any potential changes between 1990 and 2019. The results of this analysis will be summarized in a data summary report early next year.

We published a resource brief on the most recent analysis of Isle Royale disturbance data (<https://irma.nps.gov/DataStore/Reference/Profile/2286686>), and the APIS data summary report is in the final stages of publication.

We also assisted in acquiring and processing high resolution satellite imagery for a few parks that experienced storm or fire events during the summer. The imagery assisted park and network staff in their field operations. To learn more about this process, please contact Al Kirschbaum (al_kirschbaum@nps.gov).

Vegetation

Our team spent its summer at APIS resampling all 48 permanent forest monitoring plots and adding two plots.

The 2021 season marked a major transition for us, as we switched to data collection on tablets. Rebecca was "key" ([rim shot](#)) in getting these in order for us in the last couple of weeks before we needed them. We are all excited about the time this will save us in the fall.

This past summer was dry and we may be seeing the effects of this in the data, particularly with richness



The rare spreading woodfern (*Dryopteris expansa*) was found on the Mainland Unit at APIS. The recognizable trait for this species is the "missing" lower proximal pinnules on the lowest pinna.

and abundance of herbs. Besides precipitation, we also observed the effects of wind, specifically a strong wind event in July of 2020. This created large areas of blowdown on Oak Island, but impacted other islands, as well. We were unable to sample one of the three transects of a plot near the north tip of Manitou Island, due to safety concerns around the unstable nature of a recent blowdown.

One exciting thing for us this year is that our herb lead, Erin Blow, found a rare fern in one of the mainland plots. Spreading woodfern (*Dryopteris expansa*) is documented in the park only on Oak, Rocky, and Stockton Islands.

We hope to have a draft report of this year's work by late 2021. It will take an in-depth look at change between 2011 and this year. We are scheduled to resample at APIS in 2030.

Water Quality—Diatoms and Midges

Diatom monitoring, accomplished by collecting long sediment cores and surface sediment from lakes, has been done almost annually since 2005. After taking a year off in 2020, park staff at ISRO and VOYA collected diatoms at 18 inland lakes in 2021. Additional papers, one focusing on analysis of the long cores and another on the relationship between recent diatom community changes and water quality measurements, will be submitted for publication this winter.

We collected midge pupal cases (Family Chironomidae) from three inland lakes (Desor, Sargent, Richie) and four Lake Superior sites at ISRO. The cases can be identified to species, and the known habitat requirements for each species helps tie long-term water quality data to the biotic community, similar to diatom work but at a different level of the food web. A second project focused on 2007 chironomid collections at SACN continues. The passing of one of the SACN study co-authors, Dr. Len Ferrington of the University of Minnesota, will delay completion of this project.

Water Quality—Inland Lakes

In addition to safely completing all sampling work, staff helped deploy dissolved oxygen/temperature loggers in six lakes at VOYA and ISRO (part of a U.S. Fish and Wildlife Service project) and helped VOYA and the Minnesota DNR conduct a population assessment of Muskellunge in Little Shoepack Lake. The muskies in Little Shoepack are a genetically-distinct native strain found nowhere else.

The drought brought low water levels to most lakes in 2021, but at PIRO, Chapel Lake's water level continued to rise, likely because of beaver activity. Also probably related to drought and climate, harmful algal blooms continued to be a problem, limiting visitor use of Lake Richie and Chickenbone Lake at ISRO and creating problems in North Bar Lake at SLBE and the bigger lakes at VOYA, particularly Kabetogama.



Hester-Dendy invertebrate samplers are placed at least 2 feet below the water surface where there is good streamflow. When removed, the plates are rinsed to collect aquatic insects, such as stoneflies (*right*), that have gathered on them. NPS PHOTO/R. DAMSTRA.

Water Quality—Large Rivers

After a series of high water years on the St. Croix, with floods in 2016 and 2018, flow conditions this year returned to levels not seen since 2015.

In addition to our regular monitoring, aquatic insects were collected at all water quality sites on the Namekagon and St. Croix rivers using Hester-Dendy samplers. Hester-Dendy samplers are stacks of particle board (MDF) plates placed in the river for six weeks to allow aquatic insects and other invertebrates to colonize the spaces between the plates. After the samplers are collected, the invertebrates captured are sent to the University of Wisconsin-Stevens Point Aquatic Biomonitoring Lab for identification. The known habitat requirements for aquatic invertebrates tells us something about the water quality where they were found. The high number of clean-water loving species such as stoneflies captured in past years indicated good water quality at most sites on both rivers.

We are grateful for the invaluable field and logistical help from Marian Shaffer, Jay Johnson, Jason Dowell, and Caitlin Nagorka at SACN and Katie Sickmann and Taylor Siddons from the Wild River Conservancy.

Weather and Climate

Due to COVID travel restrictions annual maintenance visits to the GLKN-owned RAWs stations in SLBE and PIRO were deferred in 2021. Maintenance on those stations will happen in June 2022 if travel is possible.

The Sand Island RAWs station (APIS) was visited in August of 2021. There have been multiple sensor outages in the last couple of years due to a sharp-toothed critter gnawing through connection cables. Improvements were made in 2021 to protect these cables and dissuade this type of behavior. The clearing size surrounding the station is smaller than desired to fully capture wind speed. Such compromises are not uncommon in station siting to protect the aesthetics of nearby historic sites or viewsheds. If you use data from a station, it might be prudent to investigate the site reports to see if there are any mitigating circumstances to understand for interpreting the data.

Both current and historical climate data for selected weather stations in or close to GLKN parks can be found on our Climate Analyzer site: www.climateanalyzer.us/glkn/. Contact Mark Hart if you have questions or suggestions about the site.

Diversity, Biological and Otherwise (continued from page 1)

bird species live and breed in the same area year-round, often keeping the same mate and territory for the whole year, or even multiple years⁴.” Prior to the 1990s, most bird-song research occurred in northern temperate breeding areas, where “more elaborate song and higher testosterone levels in males ... [suggests] that the evolution of migration might be an important driver of sex role divergence and sexual dimorphism in song.” Nevertheless, female singing was noted in northern species such as the Gray Jay, Northern and Loggerhead shrikes, and the Bell’s, White-eyed, and Warbling vireos.

Why are we just learning this now? The study’s authors wondered the same thing, so they reviewed “published ‘female song’ papers within the last 20 years, recording counts of author gender and authorship position (first, middle, last).” Papers on female bird-song were significantly more likely to be written by women—68% of first authors were women, while only 44% of the first authors were women on general birdsong papers⁵.

In part, this revelation underscores the importance of “full life-cycle” studies in which the entire spectrum of a migratory species’ natural history is considered. But also, what else might we know if different perspectives were given equal measure? The authors are careful to point out that gender is just one aspect of identity. Race, ethnicity, geographic location and socioeconomic standing likely also have important impacts on scientific research⁶.

As scientists, we have to widen the lens through which we view the world. Who are we collaborating

with? Are we actively reaching out to women, people of color, or Native Americans? If not, why not? Journalist Cara Giaimo notes “sexual harassment drives women out of academia, and ‘macho’ fieldwork culture alienates LGBTQ

people. Structural racism blocks people of color from enjoying the same funding and employment opportunities as their white colleagues⁷.” All of these things inhibit science, knowledge, and progress. All of these things make the world a smaller place.

“

The harder institutions work to welcome people from underrepresented groups into science, the more we’ll know about female birdsong—and everything else, too.

— Cara Giaimo

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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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