



# The Current

Issue 22, Spring 2022



## The DMP: Monitoring Mercury on the Wing

By Ted Gostomski, Network Science Writer

The Great Lakes Network began monitoring contaminants in water, dragonflies, and fish at six parks, and bald eagle nestlings at three parks, in the mid- to late 2000s. By 2015, we found that time and money were best spent on one omnipresent chemical—mercury—and one omnipresent insect—dragonfly larvae. There was a scientific basis for this decision in addition to the financial and time management aspects—concentrations of mercury in dragonflies are directly correlated with concentrations in lake water as well as that in in prey and predator fish (Yellow Perch and Northern Pike, respectively). ([See our resource brief here.](#))

Why is this remarkable? Because it takes a lot of time and money to climb trees and capture nestling bald eagles or to collect fish using a variety of labor-intensive methods, then analyze all those samples for six different contaminants. Why not use one common insect and study the one contaminant that arguably poses the highest risk to wildlife and human health? Especially because that insect's contaminant load can tell us what we will find proportionally in the next two levels of the food web, namely fish and bald eagles.

Dragonfly larvae are found in every natural waterbody. They are fun to collect and cool to look at and learn about. It's a monitoring program tailor-made for citizen involvement. Enter the Dragonfly Mercury Project, or DMP. Even though it's called the Dragonfly Mercury Project, we are really using the dragonfly larvae. So, in truth, we're monitoring mercury before it takes flight.

The DMP is coordinated nation-wide by the NPS Air Resources Division and the U.S. Geological Survey.



Dusky Clubtail (*Gomphus spicatus*)  
PHOTO © ROGER HARO

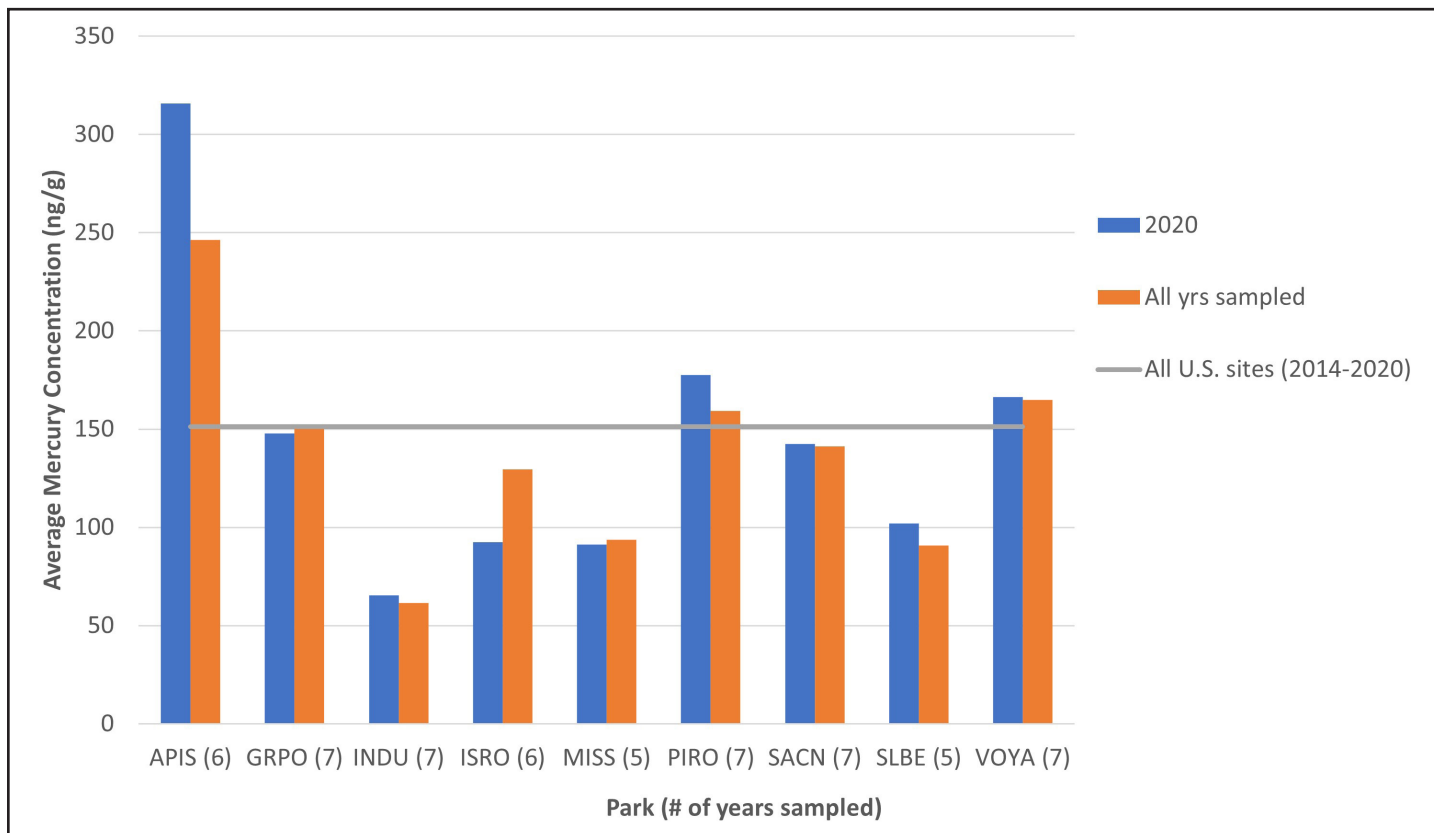
They report that the 2021 field season was the “biggest year yet” in terms of numbers: 3,622 dragonfly larvae samples submitted for analysis from 235 unique sites across 75 NPS units, 11 national wildlife refuges, one national forest, and three Bureau of Land Management field offices.

Monitoring mercury in dragonfly larvae is one of our network's vital signs, and sites across all nine of the Great Lakes Network parks are sampled annually. In 2020, (the most recent report on mercury levels), **samples from the Apostle Islands had the highest average contaminant load** (316 nanograms/gram, a.k.a.



Network ecologist David VanderMeulen collects dragonfly larvae in Julian Bay bog on Stockton Island, Apostle Islands NL. NPS PHOTO

## The DMP: Monitoring Mercury on the Wing (*continued*)



**Average mercury concentrations** (in nanograms/gram) in dragonfly larvae collected at Great Lakes Network parks in 2020 (*blue*) and for all years sampled (*orange*). Numbers next to park codes are the number of years sampled in that park. Gray line indicates study-wide average mercury concentration, 2014–2020. APIS = Apostle Islands, GRPO = Grand Portage, INDU = Indiana Dunes, ISRO = Isle Royale, MISS = Mississippi River, PIRO = Pictured Rocks, SACN = St. Croix Riverway, SLBE = Sleeping Bear Dunes, VOYA = Voyageurs.

parts per million) and **Indiana Dunes had the lowest** (63 ng/g). The 2020 data closely follow each park's overall average mercury concentrations (*see graph*), though changes of more than 10 ng/g occurred at Apostle Islands, Isle Royale, Pictured Rocks, and Sleeping Bear Dunes. The most recent mercury levels at Grand Portage, Isle Royale, and Mississippi River were below their long-term averages. Average concentrations at Apostle Islands, Pictured Rocks, and Voyageurs were above the long-term average for all sites nation-wide.

In addition to park staff and contractors, dragonfly larvae are collected by more than 4,500 volunteer citizen scientists. It offers a fun and meaningful way to get outside, to contribute to and learn about science in the parks, and perhaps to inspire future scientists.

There's a lot more to see and learn on the DMP website—[www.nps.gov/articles/dragonfly-mercury-project.htm](http://www.nps.gov/articles/dragonfly-mercury-project.htm). For more in-depth information about monitoring in the Great Lakes parks, including our sampling protocol and resource briefs, visit our website, [www.nps.gov/im/glkn/contaminants.htm](http://www.nps.gov/im/glkn/contaminants.htm).

## Explore the DMP data with the Data Visualization Dashboard!

[www.nps.gov/articles/dragonflymercury-map.htm](http://www.nps.gov/articles/dragonflymercury-map.htm)

Use the dynamic data map to see dragonfly mercury levels across space and time. Sort by park, year, and other variables, and see the changes reflected in three autogenerated graphs.

## Farewell, Jaime!

Aquatic biologist Jaime LeDuc, who was a shared employee between the Great Lakes Network and Voyageurs National Park, left the National Park Service in March to serve as water quality program specialist with the Concerned Citizens of Montauk, a non-profit environmental organization in New York.

Jaime spent 14 years at VOYA working on everything water-related in the park including sampling for the network's water quality and contaminants monitoring programs; participating in research and monitoring involving spiny water flea, zebra mussel, and rusty crayfish; working on collaborative cyanotoxin and fisheries research projects; and publishing journal articles including a paper on lake level management and fish mercury concentrations in VOYA lakes. Along the way, she completed her Master's Degree, served as instructor of the Motorboat Operator Certification



Course and Chair of the Safety, Health, and Wellness Committee, and was the park's Laboratory Manager.

Thank you for all your work, Jaime, and best of luck on this next chapter of your career!

## Park Codes and Other Acronyms

### APIS

Apostle Islands National Lakeshore (Wisconsin)

### DMP

Dragonfly Mercury Project

### GRPO

Grand Portage National Monument (Minnesota)

### INDU

Indiana Dunes National Park (Indiana)

### ISRO

Isle Royale National Park (Michigan)

### MISS

Mississippi National River and Recreation Area (Minnesota)

### PIRO

Pictured Rocks National Lakeshore (Michigan)

### SACN

St. Croix National Scenic Riverway (Wisconsin/Minnesota)

### SLBE

Sleeping Bear Dunes National Lakeshore (Michigan)

### VOYA

Voyageurs National Park (Minnesota)



## 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](http://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.

**Damstra, R.**, and **D. VanderMeulen**. 2022.

Standard operating procedure #14: Collection of macroinvertebrates in large rivers, Version 1.0. *In* Standard operating procedures for large rivers water quality monitoring: Great Lakes Network (version 1.1). Natural Resource Report. NPS/GLKN/NRR—2016/1262.1. National Park Service. Fort Collins, Colorado.

Elias J., R. Axler, E. Ruzycki, and **D.D.**

**VanderMeulen**. 2022. Water quality monitoring protocol for inland lakes: Great Lakes Inventory and Monitoring Network, version 1.2. Natural Resource Report. NPS/GLKN/NRR—2022/2349. National Park Service. Fort Collins, Colorado.

**Goodwin, K.R.**, and **A.A. Kirschbaum**. 2022.

Acoustic monitoring for bats at Indiana Dunes National Park: Data summary report for 2016–2019. Natural Resource Data Series. NPS/GLKN/NRDS—2022/1345. National Park Service. Fort Collins, Colorado.

**Goodwin, K.R.**, and **A.A. Kirschbaum**. 2022.

Acoustic monitoring for bats at Voyageurs National Park: Data summary report for 2015–2019. Natural Resource Data Series. NPS/GLKN/NRDS—2022/1342. National Park Service. Fort Collins, Colorado.

**Kirschbaum, A.A.** 2022. Landsat-based monitoring of landscape dynamics at Apostle Islands National Lakeshore: 1990–2018. Natural Resource Data Series. NPS/GLKN/NRDS—2022/1346. National Park Service. Fort Collins, Colorado.

**LeDuc, J.F.**, R.P. Maki, T. Burri, J. Elias, J.

Glase, B. Moraska Lafrancois, K. Peterson, **D. VanderMeulen**, and B. Vondra. 2022.

Voyageurs National Park interior lakes status and impact assessment. Natural Resource Report. NPS/VOYA/NRR—2022/2351. National Park Service. Fort Collins, Colorado.

**Sanders, S.**, **J. Kirschbaum**, and S.E. Johnson.

2022. Arctic and alpine rare plant population dynamics at Isle Royale National Park: Response to changing lake levels. Natural Resource Report. NPS/GLKN/NRR—2022/2350. National Park Service. Fort Collins, Colorado.



Lake Kabetogama, Voyageurs National Park  
NPS PHOTO

## 2022 Field Season Schedule

	AMPH	BATS	BC- Dragonflies	LB	VEG	WQ
Apostle Islands (APIS)	Apr–Aug	June–Aug	May–Aug	June		June–Oct <sup>3</sup>
Grand Portage (GRPO)	Apr–Aug	June–Aug	May–Aug	June		
Indiana Dunes (INDU)	Mar–Aug	June–Aug	May–Aug	June		May, Jul, Sept
Isle Royale (ISRO)	Apr–Aug	June–Aug	May–Aug	June		May–Sept <sup>4</sup>
Mississippi River (MISS)	Mar–Aug	June–Aug	May–Aug	June	June–Aug	
Pictured Rocks (PIRO)	Apr–Aug	June–Aug <sup>2</sup>	May–Aug	June		June–Sept <sup>6</sup>
St. Croix River (SACN)	Apr–Aug <sup>1</sup>	June–Aug	May–Aug	June		Apr–Nov <sup>6</sup>
Sleeping Bear Dunes (SLBE)	Apr–Aug	June–Aug	May–Aug	June		June–Sept
Voyageurs (VOYA)	Apr–Aug <sup>1</sup>	June–Aug	May–Aug	June		June–Sept <sup>5</sup>

**AMPH** — *Amphibians*. Park and network staff along with volunteers will collect data recordings.

<sup>1</sup> Monitoring is being conducted using a U.S. Geological Survey protocol.

**BATS** — Collection of data recordings will be accomplished by park staff.

<sup>2</sup> Monitoring being conducted under a park protocol.

**BC-DRAGONFLIES** — *Bioaccumulative Contaminants*. Samples will be collected by a Northland College field crew at APIS, GRPO, ISRO, and SACN, and by park staff and volunteers at the other parks.

**LB** — *Landbirds*. Surveys are conducted by park staff, volunteers, and contractors.

**VEG** — *Vegetation*. Conducted with a team of three cooperators led by Suzy Sanders and Jessica Kirschbaum.

**WQ** — *Water Quality*. Conducted by Josh Dickey (INDU), Alex Egan (ISRO), Leah Kainulainen (PIRO), Rick Damstra (SACN), Chris Otto (SLBE), and TBD (VOYA).

<sup>3</sup> Includes assisting with nearshore water quality monitoring on Lake Superior.

<sup>4</sup> Includes sampling for freshwater midges from a subset of lakes.

<sup>5</sup> Includes sampling for mercury in water from a subset of lakes.

<sup>6</sup> Includes sampling for benthic macroinvertebrates from a subset of sites.



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

*The Current*, a publication of the Great Lakes Inventory and Monitoring Network, is produced twice a year for network park staff, our partners, and others interested in resource management at Great Lakes region national parks.



Find us online at [www.nps.gov/im/glkn](http://www.nps.gov/im/glkn) or on Facebook at [www.facebook.com/npsglkn](https://www.facebook.com/npsglkn)

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