Great Lakes Network
Resource Brief

U.S. Department of the Interior
National Park Service
Inventory and Monitoring Division

Amphibian Monitoring in the Great Lakes Network Parks

The high-pitched *peep*ing of Spring Peepers is one of the earliest signs of spring. And it can be loud. Drive by a roadside pond and the calls can penetrate the closed windows of your vehicle. Stand next to a pond full of calling peepers, and you will hear nothing else.

Toads and frogs produce calls that are uniquely identifiable, making it possible to monitor their populations using remote recorders, or "frog loggers." Such monitoring was important to the network parks for many reasons, the top one being that declines of amphibian populations are one of the most prominent conservation issues in the world. Most amphibians need both land and water during their lifetimes, so they are sensitive to environmental changes including temperature, precipitation, and humidity, making them an indicator of climate and habitat change.

Occupancy vs. Abundance

Recording frog and toad calls allows us to determine occupancy and abundance. *Occupancy* is a measure of whether or not a site is occupied by a species. *Abundance* is tracked by assessing how the maximum call intensity changes on sites across years, and by how many times we hear that species across years. In 2018, we also began tracking *phenology*, or the trends in annual first-calling dates for each species over time. For now, we are only tracking phenology for three species common to all parks in the network: Eastern American Toads, Green Frogs, and treefrogs. The Gray Treefrog and Cope's Gray Treefrog have very similar calls that are difficult to distinguish, even with recordings, so for phenology purposes, we combine data for both species.



Gray treefrogs can be gray or green or both. They are able to change colors to match their surroundings. Gray treefrogs are found in all of the Great Lakes Network parks. PHOTO: T. GOSTOMSKI



An automated recorder, or "frog logger." Microphones come out of the top left and right of the box. A temperature logger is attached to the bottom of the box. NPS PHOTO

The Where and the How

Recorders are located in seven of the nine network parks. (St. Croix Riverway and Voyageurs participate in a separate monitoring program that uses a different protocol.) Recorders are programmed to turn on in the spring (typically in mid-April) and recordings are collected for five minutes at the top of each hour between 5:00 p.m. and 3:00 a.m. each day. Three additional samples are collected on the half-hour during the prime evening calling period.

A sub-sample of recordings from each park are used to assign a Call Index Value (CIV)—a measure of calling intensity—for each species. Over time, we can use CIV values to determine if a species is increasing or decreasing in abundance.

Occupancy of frog and toad species at Great Lakes Network parks. A = Absent, E = Extirpated, P = Present, U = Unconfirmed. APIS=Apostle Islands, GRPO=Grand Portage, INDU=Indiana Dunes, ISRO=Isle Royale, MISS=Mississippi River, PIRO=Pictured Rocks, SLBE=Sleeping Bear Dunes. St. Croix Riverway and Voyageurs participate in a different monitoring program, so their data are not shown here.

Common Name	Scientific Name	Status						
		APIS	*GRPO*	*INDU*	*ISRO*	*MISS*	*PIRO*	*SLBE*
American Bullfrog	*Lithobates catesbeianus*	U	A	P	A	P	U	U
Blanchard's Cricket Frog	*Acris blanchardi*	A	A	E	A	P	A	A
Boreal Chorus Frog	*Pseudacris maculata*	P	P	P	P	P	U	A
Cope's Gray Treefrog	*Hyla chrysoscelis*	P	A	P	A	P	U	U
Eastern American Toad	*Anaxyrus americanus americanus*	P	P	P	P	P	P	P
Fowler's Toad	*Anaxyrus fowleri*	A	A	E	A	A	A	U
Gray Treefrog	*Hyla versicolor*	P	P	P	P	P	P	P
Green Frog	*Lithobates clamitans*	P	P	P	P	P	P	P
Mink Frog	*Lithobates septentrionalis*	P	P	A	P	A	P	A
Northern Leopard Frog	*Lithobates pipiens*	P	P	P	U	P	U	P
Pickerel Frog	*Lithobates palustris*	A	A	A	A	A	A	U
Spring Peeper	*Psudacris crucifer*	P	P	P	P	E	P	P
Wood Frog	*Lithobates sylvaticus*	P	P	P	P	P	P	P
Western Chorus Frog	*Pseudacris triseriata*	A	A	A	A	A	A	U

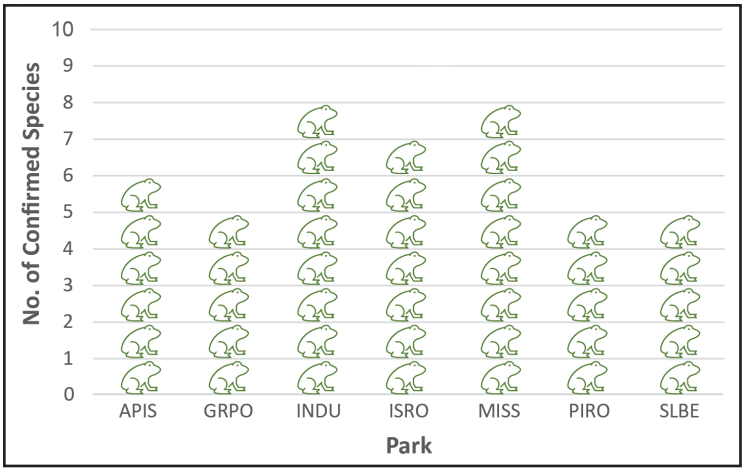
2019 Results

APIS—Six of eight species recorded, with Green Frog and Spring Peeper occurring at every site.

GRPO—Five of eight species recorded, with Green Frog and Spring Peeper occurring at every site.

INDU—Eight of nine species recorded, with Eastern American Toad, Gray Treefrog, Green Frog, and Spring Peeper occurring at every site.

ISRO—All seven species recorded, with Eastern American Toad, Green Frog, and Spring Peeper occurring at almost every site.



Number of frog and toad species present in each park as confirmed by audio recordings, 2019. APIS=Apostle Islands, GRPO=Grand Portage, INDU=Indiana Dunes, ISRO=Isle Royale, MISS=Mississippi River, PIRO=Pictured Rocks, SLBE=Sleeping Bear Dunes. St. Croix Riverway and Voyageurs participate in a different monitoring program, so their data are not shown here.

MISS—Eight of nine species recorded, the most well distributed being Eastern American Toad, Gray Treefrog, Green Frog, and Northern Leopard Frog.

PIRO—Five of six species recorded, with Eastern American Toad, Gray Treefrog, Green Frog, and Spring Peeper occurring at almost every site.

SLBE—Five of six species recorded, with Eastern American Toad, Gray Treefrog, Green Frog, and Spring Peeper occurring at almost every site.

See individual park briefs for more detailed information.

Challenges

Our methods are sufficient for monitoring all species found in the parks, but there are some challenges. The most difficult species to confirm are American Bullfrog, Cope's Gray Treefrog, Mink Frog, and Northern Leopard Frog. The bullfrog, Mink Frog, and leopard frog calls can be obscured by ambient noise, while Cope's Gray Treefrog sound similar to Gray Treefrogs. Mink Frogs tend to call in the morning, so collecting early morning samples has improved their detection rates, but, leopard frog calls are low frequency, low volume, and sporadic. They also tend to call from a few small areas within larger wetlands, making it more likely to miss them by random chance.