



The Current

Issue 4, Fall 2010



Great Lakes Birds and Gulf Oil

By Ted Gostomski, Network Science Writer

Four people move slowly down the face of a dune toward the shoreline, their eyes focused on two light-colored specks just ahead that are moving slowly along the brightly glaring sand. When the two specks—an adult Piping Plover and its newly-hatched chick—spot the group, they do what comes naturally: they run for the water's edge. But when the group presses closer, the adult takes the next natural step and flies out over the water and down the shoreline to safety. The chick, however, is still too young to fly and so is trapped as the group forms a U around it, pinning the three-inch-high bird between themselves and the water. The chick skitters back and forth, looking for an opening. It sees a gap between someone's legs and tries to escape, but a hat dropped down in front of it gently scoops the small bird off the ground. Another young plover will be banded here today.

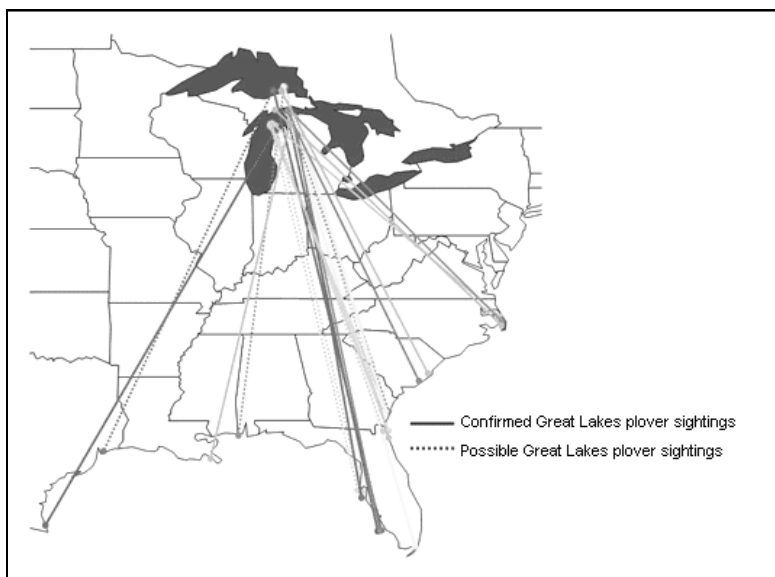
This scene plays out each summer at three national lakeshores in the Great Lakes Network: Apostle Islands, Pictured Rocks, and Sleeping Bear Dunes. It could also happen some day at Indiana Dunes National Lakeshore, where migrant plovers often show up in Spring and Fall but none have been seen during the breeding season since the 1950s. The three northern park units are important to the breeding Great Lakes Piping Plover population because they contain undeveloped beaches that are wide enough and relatively undisturbed enough to provide appropriate nesting habitat. But now the plovers that use our parks' beaches may be in trouble.

In the wake of the tragic Deepwater Horizon oil rig explosion and the ensuing environmental disaster that it spawned in the Gulf of Mexico, there is a small but growing voice asking what we might see here in the Great Lakes next spring when "our" Piping Plovers

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Piping Plover chicks are banded each summer at Apostle Islands and Sleeping Bear Dunes national lakeshores. What will they find when they reach their wintering grounds in the Gulf of Mexico? And what will we see (or not see) when it's time for plovers to return north next spring?



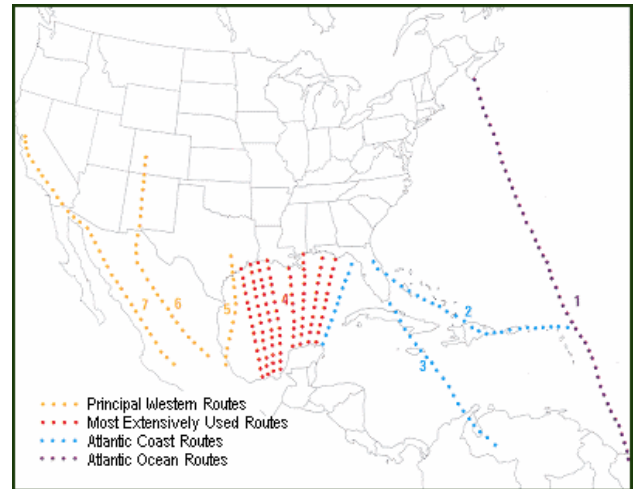
Winter locations of Great Lakes Piping Plovers based on reported observations of banded birds. Graphic courtesy of Great Lakes Waterbird Research Program, www.waterbirds.umn.edu/Piping_Plovers/

Great Lakes Birds and Gulf Oil

(Continued from page 1)

and other birds return to their northern breeding grounds. Will there be noticeably fewer birds? If they nest, will they be successful?

The Gulf of Mexico is a long way from the Great Lakes, but look through the distribution maps in a bird guide and you will find at least 40 species that nest in the Great Lakes region during the summer and spend their winters along the Gulf Coast. Waterbirds such as Common Loons, grebes, herons, pelicans, mergansers, ducks, and rails all go to the wetlands, mud flats, and even the ocean waters of the Gulf and southern Atlantic coasts. That list of 40 does not include the dozens of songbirds that migrate to Central and South America but stop in the Gulf region to rest and feed before continuing on their thousands-of-miles journey. How important are the stop-over sites in the Gulf? At least one author has noted that "during the height of migration some of the islands off the coast of Louisiana are rewarding observation points for the student of birds, since the feathered travelers literally swarm over them."²



Principal migration routes used by birds passing from North America to winter quarters in the West Indies, Central America, and South America. Route 4 is the one used most extensively, especially by Great Lakes birds (Lincoln et al. 1998).

The news was looking up in late July and early August, as the leaking well was capped and the oil began to dissipate faster than expected. Gulf Islands National Seashore (Florida/Mississippi) reported successful nesting among colonial waterbirds despite some signs of contamination earlier in the season.⁴ Additionally, it was reported that "southern Florida, the Florida Keys, and the east coast of the Florida peninsula are not likely to experience any effects from oil remaining on the surface of the gulf, as it continues to degrade and remains hundreds of miles away from the loop current."⁵

Only time and good long-term monitoring data will tell if Great Lakes birds avoid the ill effects of the oil spill disaster. Whether it is the Network's songbird monitoring or the Piping Plover monitoring conducted by the parks, the information we have collected gives us a baseline for comparing future data. Beyond the data, though, is the joy of actually seeing a young Piping Plover run along the beach, and we can only hope for that in the years to come. ●

References

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2. Lincoln, F.C., S.R. Peterson, and J. L. Zimmerman. 1998. Migration of birds. U.S. Department of the Interior, U.S. Fish and Wildlife Service, Washington, D.C. Circular 16. Jamestown, ND: Northern Prairie Wildlife Research Center. Online. www.npwrc.usgs.gov/resource/birds/migratio/index.htm (Version 02APR2002).
3. Stucker, J.H., F.J. Cuthbert, W. Winn, B.L. Noel, S.B. Maddock, P.R. Leary, J. Cordes, and L.C. Wemmer. 2010. Distribution of non-breeding Great Lakes Piping Plovers (*Charadrius melodus*) along Atlantic and Gulf of Mexico coastlines: Ten years of band sightings. *Waterbirds* 33(1): 22-32.
4. "Island Nesting Birds Have Successful Season." *InsideNPS Incident Reports*, 3 August 2010. <http://inside.nps.gov/index.cfm?handler=viewprintheadline&type=Incidents&id=5275>.
5. "Cultural Resources Remain Unaffected By Spill." *InsideNPS Incident Reports*, 4 August 2010. <http://inside.nps.gov/index.cfm?handler=viewprintheadline&type=Incidents&id=5280>.

Vegetation Mapping Complete for Three Network Parks

Vegetation maps for three Network parks are now complete. Final reports and data products were presented to resource management staff at Pictured Rocks, Apostle Islands, and Grand Portage during small gatherings in July. Kevin Hop with the U.S. Geological Survey and lead author of the reports also demonstrated how to access and use the various data products during these sessions.

"It takes a long time to compile information at this level of detail," said Ulf Gafvert, Network GIS Specialist. Gafvert is overseeing the project, working with Hop and his colleagues at U.S. Geological Survey (USGS) and with botanists at NatureServe, a non-profit conservation organization.

"It takes about four or five years to complete the data collection and analysis for one park," explains Gafvert. "We start by acquiring aerial photos for each park. NatureServe developed the plant community classification, and USGS created the maps by applying the classification categories to the plant communities they could identify in the air photos. When they were done, Kevin and NatureServe botanists went out into the parks to see if their interpretation of the aerial photos matched what is actually on the ground." Among the three parks, Hop and his colleagues enjoyed an average accuracy rate of 85.5% in their interpretation of the air photos and application of the community classification, which means they had to make few adjustments to their mapping delineations after visiting the parks.

The National Park Service Vegetation Inventory Program provided most of the funding for these projects, which involved six of the nine Network parks. Voyageurs and Isle Royale were completed earlier under different programs, while work at Mississippi National River and Recreation Area is pending.

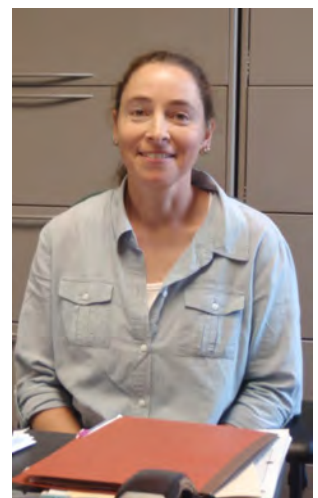
"A lot of time, money, and effort are necessary to produce the suite of products we did for each park unit. We hope the individual park units, the network, and the NPS as a whole will benefit from these classification and map products in the coming years," said Hop. "It has been an honor and pleasure to be a part of developing these fine resource tools that park managers and researchers may use for decision making and science."

More information and downloads of the maps can be found on the USGS website — <http://biology.usgs.gov/npsveg/products/parkname.html>

Staff Insider

Liz Peltekian, Administrative Support Clerk

Liz arrived at the Network office in 2008 by way of a long and winding path. Born and raised in Washington, D.C., Liz moved to Wisconsin to attend Beloit College, where she earned a Bachelor's Degree in Anthropology with an Archaeology emphasis. She did extensive field work in the American Southwest and at revolutionary war sites in up-state New York before taking a job with the Wisconsin State Historical Society's Burial Sites Preservation Program. A growing family and other interests took Liz into social work—she was co-director of the Family Resource Center in Ladysmith, Wisconsin. She earned an Associate Degree in Administration and now processes payroll and travel vouchers and enters data for the bioaccumulative contaminants and vegetation monitoring programs. ●

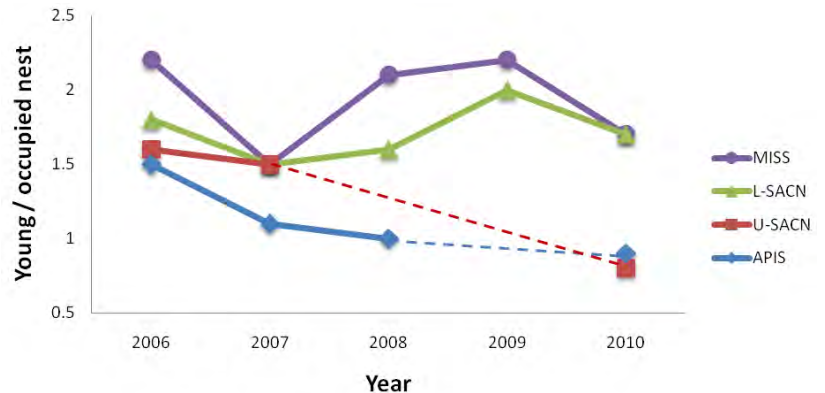


2010 Field Season Summary

Bioaccumulative Contaminants—Bald Eagles

This was our fifth year of sampling bald eagle nestlings for environmental contaminants at APIS, MISS, and SACN. We visited 70 occupied nests in the three parks during May and June. Plasma and feather samples were collected from 104 nestlings, of which 57 were sent for immediate laboratory analysis and 47 were archived for later use. Six additional nests were sampled outside NPS boundaries for partners.

Estimated productivity ranged from 0.8 to 1.7 young per occupied nest at the four study areas (graph). Productivity estimates on the Upper SACN and at APIS fell below the healthy population threshold of 1.0 young per occupied nest. A change in personnel on the Wisconsin DNR survey crew may have contributed to these low estimates, as there appeared to be a greater tendency for new observers to call nests 'occupied' when only slight activity was noted. Interestingly, all 7 nests that were successful at APIS had 2 young, which is quite high for Lake Superior. Productivity at MISS and Lower SACN also declined but was still relatively high (1.7 young per occupied nest).



A paper was published in the *Journal of Great Lakes Research* (see page 11 of this newsletter) presenting study results from the late 1980s through 2008 on levels of mercury, PCBs, and DDE (a metabolite of DDT) in bald eagle nestlings. All three of these contaminants have been declining in Lake Superior eaglets at rates of 2.5% to 4% per year. Long-term eagle data do not exist for MISS and SACN, but similar studies of fish, loons, and sediments from elsewhere in the region suggest similar trends.

A technical report will be published this fall, showing the levels and spatial patterns of all the contaminants being monitored under this program from 2006 through 2009. This year's blood and feather samples were sent to the Wisconsin State Laboratory of Hygiene for analysis, and the results will be available in late summer of 2011.

Bioaccumulative Contaminants—Fish

The University of Wisconsin-La Crosse is carrying out this part of the contaminants monitoring program, sampling other elements of aquatic food webs in six Network parks. This year's work was funded in part by the Great Lakes Restoration Initiative and builds on a pilot project conducted during 2008-2009.

Whole adult fish from each of the parks are being analyzed for selected legacy contaminants (lead, DDT and its derivatives, and PCBs) and emerging contaminants (polybrominated diphenyl ethers and perfluorinated compounds). Surficial sediment, water, free-floating particulate material (mostly algae), zooplankton, larval dragonflies, prey fish, and predatory fish are being analyzed for mercury. The utility of dragonfly larvae as indicators of methylmercury contamination in fishless aquatic and wetland environments or in situations where sampling fish is not logistically feasible is also being examined.

Sampling was carried out at GRPO, INDU, ISRO, PIRO, SLBE, and VOYA in April, May, and early June 2010. Field crews noted that mass emergences of adult dragonflies in 2010 were earlier than normal at several study sites, presumably because of the unusually warm, spring weather.

Grand Portage National Monument

Three stream sites spanning the park from east to west were sampled: Grand Portage Creek, lower Poplar Creek, and Snow Creek. Fishes collected were longnose dace, blacknose dace, creek chub, slimy sculpin, and central mudminnow.

Indiana Dunes National Lakeshore

Samples were obtained from Long Lake, Middle Lagoon, and multiple sites in Great Marsh. Adult fishes were black bullhead

and common carp from Long Lake; grass pickerel, gizzard shad, and largemouth bass from Middle Lagoon; and grass pickerel from Great Marsh. Prey fishes collected were central mudminnow (all sites), green sunfish (Long Lake and Middle Lagoon), and Iowa darter (Middle Lagoon).

Isle Royale National Park

Sampling was conducted at Angleworm, Harvey, Richie, and Sargent lakes. Adult predatory fishes were northern pike from Angleworm, Richie, and Sargent lakes and large yellow perch from Lake Harvey. Small yellow perch were the prey fish collected from all lakes.

Pictured Rocks National Lakeshore

Beaver, Chapel, Grand Sable, Legion, and Miners lakes were sampled. Adult predatory fishes collected were smallmouth bass, northern pike, walleye, yellow perch, and rock bass. Prey fish were Iowa darter, Johnny darter, yellow perch, mottled sculpin, rock bass, and central mudminnow.

Sleeping Bear Dunes National Lakeshore

Sampling was conducted at Bass Lake (Benzie County), Bass Lake (Leelanau County), Lake Manitou, and Round Lake. Adult predatory fishes were largemouth bass, smallmouth bass, black crappie, yellow perch, and northern pike. Prey fish were bluegill, green sunfish, Iowa darter, Johnny darter, yellow perch, central mudminnow, and mottled sculpin. While working at Round Lake, the UW-La Crosse crew explained the project and displayed aquatic organisms to several busloads of 6th grade students who were on a field trip to area lakes.

Voyageurs National Park

Samples were collected at Brown, Peary, Ryan, and Sand Point lakes. Adult northern pike (predator fish) and small yellow perch (prey fish) were obtained at each of the four lakes.

Landbirds

The Network's landbird monitoring protocol was published this spring, and eight parks conducted breeding bird surveys according to schedule. Pictured Rocks has drafted a landbird monitoring plan and is working to finalize that and place their survey points this fall in preparation for their first surveys next June. Highlights from some of this year's surveys include:

St. Croix National Scenic Riverway

Rarely recorded species that were observed during the 2010 surveys include the first American Bittern ever recorded on the bird surveys, and the first recorded within the Riverway boundaries; a Blackpoll Warbler recorded on the upper Namekagon (five previous recordings in 2004, 2006 and 2007); a Cerulean Warbler north of Highway 70; a Lincoln's Sparrow on the upper Namekagon near Phipps (only the second ever reported); a Magnolia Warbler on the upper Namekagon (the fourth recorded during these surveys); and three Trumpeter Swans on the upper Namekagon (only recorded twice previously).

Grand Portage National Monument

Thirty-eight points on three transects were surveyed between 15 and 17 June. Only a few observations of raptors have been noted while conducting the survey over the past four years, most notably an adult Northern Goshawk carrying prey in 2007, and a calling Broad-winged Hawk this year. A total of 659 individuals among 58 species were recorded.

Isle Royale National Park

Staff and volunteers surveyed 130 points on 8 transects. Two new species were detected: Wood Thrush and Common Nighthawk. The Wood Thrush's breeding range includes much of the Lake Superior shoreline, but Isle Royale is at the northwest edge of its range. Isle Royale is well within the breeding range of Common Nighthawk, so it is uncertain why this species does not appear more commonly.

PARK Codes

APIS

Apostle Islands National Lakeshore
(Wisconsin)

GRPO

Grand Portage National Monument
(Minnesota)

INDU

Indiana Dunes National Lakeshore
(Indiana)

ISRO

Isle Royale National Park (Michigan)

MISS

Mississippi National River and
Recreation Area (Minnesota)

PIRO

Pictured Rocks National Lakeshore
(Michigan)

SLBE

Sleeping Bear Dunes National
Lakeshore (Michigan)

SACN

St. Croix National Scenic Riverway
(Wisconsin)

VOYA

Voyageurs National Park
(Minnesota)

Thank YOU!

Seasonal employees, partner organizations, contractors assisting the Network with data collection – these individuals have been. Too often they come and go with little recognition to everyone pictured throughout this issue for working during the 2010 field season. (Photos by NPS staff unless noted.)

Bioaccumulative Contaminants (Fish/Aquatic Insects)



University of Wisconsin-La Crosse, River Studies Center: From left, (West Crew) – Sondra Buechel, Mark Sandheinrich, Alex Devonald, Kris Rolhus, Ryan Sadowski, Roger Haro (center); (East Crew) – Ryan Lepak, Lauren Savidusky, Reid Northwick, Katie Challis, Wyatt Puente, James Wiener, Sean Bailey. Center and East Crew photos by Sean Bailey.

Water



Sleeping Bear
Emily Tyner

Bioaccumulative Contaminants (Bald Eagles)



Landbirds



Eco-Ascension Research and Consulting: Jim Spickler, Giacomo Renzulo, Eli Nichols

Mark Martell
Audubon Minnesota

Alice Van Zoeren
Sandhill Nature Education
Photo by Erin Roche

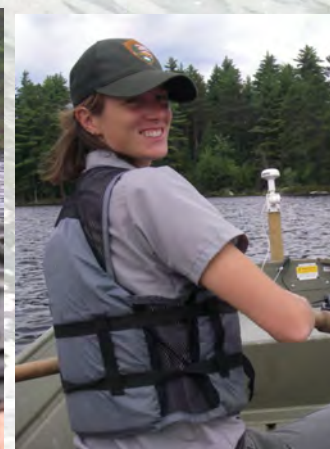
ors, graduate students, undergraduate interns, and park staff whose duties include
 individuals spell the difference between a successful field season and one that might
 recognition for their time and talent. So we extend a hearty and heart-felt THANK YOU
 ng so diligently on behalf of the Great Lakes Network and the National Park Service
 (less credited otherwise.)

Water Quality



Dunes NL: Chris Otto (GLKN Water Quality Technician), Emily Kobernik; and

Pictured Rocks NL: Leah Kainulainen and Lora Loope



Voyageurs NP: Jaime LeDuc (GLKN Water Quality Technician), Charles Eckman, Lisa Maas, and Lisa Chetney



Debbie Waters
Hawk Ridge Bird Observatory
 Submitted photo



Erin Lehnert, *Isle Royale NP*



Lark Weller, *Mississippi NRR*



Michelle Prosser, *St. Croix NSR*

2010 Field Season Summary

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Sleeping Bear Dunes National Lakeshore

Forty-one (41) points are distributed across five transects, but one point could not be completed due to inclement weather. A total of 648 birds among 85 species were recorded. Heavy tent forest caterpillar defoliation was noted at two points.

Land Cover/Land Use

Apostle Islands National Lakeshore aerial photography

The Network provided funding toward a statewide aerial photography program in Wisconsin, coordinated by the North Central Regional Planning Commission. Thus, APIS will soon receive 0.2 m (8") resolution, spring, leaf-off imagery, in both color infrared and true color. Last November, park and network staff placed 27 ground targets within the park to provide high accuracy ground control for geo-referencing the imagery. Targets were placed on the mainland unit, and all islands except Hermit, Gull, and Eagle. The flight occurred in mid-April.

Voyageurs National Park summary report

This past winter, Network staff wrote the technical report summarizing the analysis of land cover change at Voyageurs National Park over the past six years, using the recently completed landscape dynamics protocol. The protocol and technical report are both available on our website (<http://science.nature.nps.gov/im/units/GLKN/monitor/landuse/landuse.cfm>).

Isle Royale National Park land cover change monitoring – LandTrendr

We are in the process of completing the change analysis for Isle Royale National Park and adjacent areas in Canada. Next we will summarize the results for the technical report, to be available early in 2011. No field work was conducted at the park, but Network Remote Sensing Specialist Al Kirschbaum has created a "virtual tour" of the park and Thunder Bay, Ontario, using satellite imagery and high resolution air photos.

Vegetation

Fifty-two permanent plots were established at Isle Royale during the summer of 2010. Measured within these plots were 24 tree species, 48 shrub species, and 226 herbaceous species. This latter group included 22 sedge and 20 grass species, as well as 9 species that are listed in Michigan as threatened or special concern.

Highlights of the year included the documentation of hooked buttercup (*Ranunculus recurvatus*), which is common in Michigan, Wisconsin, and Minnesota but has not been documented on Isle Royale. Another highlight is that we established 14 plots within white cedar habitat. Cedar is one of the tree species expected to be impacted the greatest by a warmer and dryer climate. One unfortunate lowlight is that we noticed earthworms in a few plots, including one deep within the Feldtmann Lake loop, approximately 0.9 miles from the nearest trail and 1.2 miles from Washington Harbor, which is the potential point of introduction.

The large amount of data collected on each plot, with a strong emphasis on herbaceous plants and tree regeneration, will facilitate the detection of change in these forests. We are scheduled to revisit Isle Royale in the summer of 2016.

Water Quality—Inland Lakes

We sample 33 index lakes in six parks (VOYA, APIS, ISRO, PIRO, SLBE, and INDU) three times each between June and September. In 2010, we nearly met our goal at all six parks. The exception was Lake Desor (ISRO), without a doubt the most difficult to access of all 33 index lakes. As in past years, we sampled additional lakes at several parks—ten at VOYA, one each at INDU and PIRO, two at ISRO, and four at SLBE. We also continued our collaboration with the U.S. Geological Survey (USGS) to sample and analyze mercury levels in five index lakes at VOYA, and with the St. Croix Watershed Research Station (SCWRS) to analyze diatom communities in surface sediments. Lake chemistry can be inferred from diatom community composition, so we will compare these samples to those taken in 2006 to look for potential changes in water quality.



GLKN Vegetation Monitoring

Crew: Cory Howes, Jake Davidson, Ken Hiser, Peter Widin, Ben Kamps.

Voyageurs National Park

Jaime LeDuc, a biological technician at Voyageurs in 2008 and 2009, was hired this year into a permanent position under the Student Career Experience Program (SCEP). Her duties are split between the park and the Network. Network ecologist Joan Elias made several trips to the park to train Jaime in our monitoring protocol and to help complete the sampling. Jaime's continued presence will provide much-needed consistency in sampling at this large park, which required a great deal of time and travel by Network staff in the past.

Apostle Islands National Lakeshore

Sampling was conducted in June, late July, and early September. The water at Little Sand Bay lagoon was more turbid and had higher phosphorus levels in June than at any previous sampling time, likely because it received run-off from recent rains. Being on the mainland, it receives inputs from a relatively large watershed, most of which is outside of park boundaries.

The Stockton Island lagoon at Julian Bay was connected to Lake Superior in June and September but not in July. Connection to the lake greatly influences the water level of the lagoon. This site has extremely high levels of dissolved organic carbon, as evidenced by the shallow Secchi disk measurement and the easily observed mixing of dark lagoon water with the clear water of Lake Superior.



Tannin-stained waters from the Stockton Island lagoon (APIS) pour through a temporary opening in the beach that separates the lagoon from Julian Bay (Lake Superior).

Isle Royale National Park

All nine index lakes were sampled in June and July, but only eight were visited in August/September when frequent gale force winds rendered Lake Desor unreachable. We are grateful for field assistance provided by park employees from Resource Management, Resource Protection, and Maintenance divisions, as well as researchers from the St. Croix Watershed Research Station and the University of Maine.

As it did in 2007, Lake Richie experienced a cyanobacteria (previously known as blue-green algae) bloom this year. The bloom resulted in reduced water clarity and unusually high pH readings, and the lake was closed to visitors for swimming and as a source of drinking water. Blooms reported by visitors at Chickenbone and Whittlesey Lakes were also investigated, but neither were as intense as in Lake Richie.

Early ice-off, warm temperatures, and frequent mixing of the water column are thought to contribute to the formation of cyanobacteria blooms. To help us understand the conditions that lead up to these events, a vertical array of temperature probes, stretching from lake bottom to the surface, was placed in Lake Richie in May and will remain there all winter. The data loggers record the water temperature hourly and will provide a lot of fascinating data for us to analyze in the future.

Pictured Rocks National Lakeshore

The water quality monitoring program is grateful for the reliable and consistent help of Lora Loope and Leah Kainulainen, who conducted sampling on schedule in June, July, and August/September. Abundant precipitation and hot temperatures marked the summer, and epilimnion temperatures were warmer than usual.

Sleeping Bear Dunes National Lakeshore

Nice weather made for easy sampling until the final round, when wind and 8-12 foot waves forced the cancellation of sampling on North Manitou Island three times. The unusually strong winds this summer may have caused additional mixing of near-surface waters on all the lakes, which might explain the very high dissolved oxygen levels (120-130% saturation) measured in several lakes. Normal average readings range from 100% to 110%.

Several lakes at SLBE (Loon, North Bar, Otter, and Round) and one lake at PIRO (Miners) have consistently high nitrite-nitrate levels — as much as 40-75 times greater than their respective ecoregion reference criteria. The two park units are collaborating on a proposal to determine the sources of these high nutrient levels.

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2010 Field Season Summary

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Indiana Dunes National Lakeshore

Routine water quality monitoring was conducted in early May, late June, and early September. Assistance was provided by

Charles Morris, environmental protection specialist, and Joshua Dickey, water quality biological technician, both of whom were recently hired at Indiana Dunes.

Water levels on Long Lake remain very low, despite above average precipitation this year. Researchers from the USGS have installed equipment that will monitor lake level on a continuous basis. Middle Lagoon continues to be impacted by high concentrations of chloride and sodium and is dominated by thick stands of rooted emergent aquatic vegetation.



Joshua Dickey, water quality biological technician, collects a water sample at Indiana Dunes National Lakeshore.

Water Quality—Large Rivers

Monthly sampling occurs at 18 sites in two parks during ice-free conditions. Five non-random sites are monitored at MISS. Six randomly-selected sites and seven non-random locations are monitored at SACN. Sampling is typically conducted every other year, alternating between parks.

Mississippi National River and Recreation Area

This was the third season of routine monthly monitoring between April and November. Water levels and flow were much higher this year compared to 2008 and 2009. Because many of the water quality variables we measure are positively correlated with higher flow, we expect to see increased levels of some measures such as nutrients and sediment.

St. Croix National Scenic Riverway

Limited water quality monitoring occurred (in what normally would have been an off-year for sampling), thanks to some additional funding from the park. Six sites—three on the upper St. Croix and Namekagon rivers, and three in Lake St. Croix—were visited on a quarterly basis to maintain continuity of data collection, which has occurred annually at these sites since 2007.

Probes were reinstalled in Lake St. Croix where the river enters the lake at Stillwater, Minnesota, and at Prescott, Wisconsin, where it leaves the lake. These probes were first installed in 2009 but then removed for the winter. They record water temperature, pH, specific conductivity, and dissolved oxygen every hour. The data collected over the past two years will help us to better understand the daily and seasonal patterns of these parameters.

We contributed logistical support, equipment, and/or staff time to: (1) the St. Croix Watershed Research Station's STARS program. STARS (Science Training and Research Skills) is a multi-tiered effort to engage young people directly in scientific research, including both field and laboratory settings, at a level appropriate for their age, experience, and personal goals; (2) a SCWRS research scientist who is studying the zooplankton assemblage in the St. Croix River; and (3) SACN staff and USGS researchers who installed temperature sensors in the sediment at several mussel beds in the St. Croix River. These will provide a better understanding of the temperature ranges tolerated by native mussels, which provides valuable information to resource managers in light of expected future changes in regional climate.

Weather and Climate

We are still evaluating locations for two RAWs (Remote Automated Weather Station) we purchased last year. A gap analysis of our current station coverage shows island locations at APIS and SLBE are the most desirable sites, but logistical and use-restriction concerns may not make that feasible. A draft 2009 climate summary for APIS is set to be released this fall. It will serve as a template for other park summaries to follow. As the picture has become clearer on exactly what data delivery resources are available from the Washington office and our partners, the Network has also started crafting a long-term climate monitoring protocol that should be finished this winter.

New and Notable

Newly Published Protocols, Reports, and Journal Articles

- Bowen, K. D., and E. A. Beever. 2010. Pilot amphibian monitoring at Apostle Islands, Pictured Rocks, and Sleeping Bear Dunes national lakeshores: Analysis and recommendations. Natural Resource Technical Report NPS/GLKN/NRTR—2010/360. National Park Service, Fort Collins, Colorado.
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George Wright Society Conference to Feature Science Communication, Other I&M Topics

The biennial George Wright Society Conference on Parks, Protected Areas and Cultural Sites is being held in New Orleans, Louisiana, March 14–18, 2011. The NPS Inventory and Monitoring Program is organizing a series of sessions, workshops, and side meetings to be held in conjunction with the regular conference. Steve Fancy, National I&M Program Coordinator, has asked Great Lakes Network Science Writer Ted Gostomski to organize one of the special sessions – a panel discussion on Effective Science

Communication – which he is doing in cooperation with Sara Melena of the Natural Resource Program Center's Office of Education and Outreach and Megan Nortrup, Science Communicator and Writer for the National Capital Region I&M Network. Additional sessions are being organized by other Network communicators for the main conference program.



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**Improving park management through
greater reliance on scientific knowledge**



Apostle Islands National Lakeshore
Grand Portage National Monument
Indiana Dunes National Lakeshore
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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