Water Column

Spring 2012
Vol. 24, No. 1

Let the Sampling Begin!

~ *Melissa Clark*

As you are aware, Bill Jones has retired and has passed the torch to me to direct the Indiana Clean Lakes Program! I've been working closely with Bill and overseeing the laboratory and field sampling for 12 years. I hope to carry the torch high and deliver many more years of enlightening lake information. Not only will we be sampling our usual 80 lakes this summer for the Indiana Clean Lakes Program (CLP), but our crew will also be participating in the U.S. EPA's National Lakes Assessment (NLA). This assessment is part of the National Aquatic Resources Survey (NARS), which surveys all water resources including lakes, rivers, streams, wetlands, and coastal waters.

Goals of the National Lakes Assessments are to:

- Determine regional and national ecological integrity, trophic status, and recreational value of lakes.
- Promote collaboration across jurisdictional boundaries.
- Build state and tribal capacity for monitoring and analyses.
- Achieve a robust, statistically valid set of lake data for better management.
- Develop baseline information to evaluate progress.

How is the NLA different from the CLP? While both our lake programs have statistically valid designs, allowing us to say "the lakes of Indiana are…," the NLA includes many additional parameters. Table 1 lists the selected indicators for the NLA. You'll notice that the programs are very similar, but the NLA dedicates a significant portion of the survey to physical lakeshore habitat and human disturbance.

We joined the first NARS assessment with 50 Indiana lakes in 2007. A total of 1,028 lakes were sampled for the NLA in the lower 48 states, representing the condition of about 50,000 lakes nationwide. On the five-year rotation, we are gearing up to sample the second round this summer. The U.S. EPA again randomly selected lakes throughout the state. We will sample 52 lakes this summer, with 17 of them revisited lakes from 2007 (Figure 1, Table 2).

Table 1. National Lakes Assessment Indicators (CLP indicators are marked with *).

Biological	*Recreational*	*Chemical*	*Physical*
• Sediment diatoms • Phytoplankton (algae)* • Zooplankton* • Benthic macro-invertebrates • Algal density* (chlorophyll-*a*) • Macrophyte survey • Invasive species	• Algal toxin* (microcystins) • Algal cell counts* (Cyanobacteria) • Algal density* (chlorophyll-*a*)	• Nutrients (phosphorus & nitrogen)* • Water column profile (dissolved oxygen, temperature, pH, conductivity)* • Sediment mercury • Dissolved carbon	• Lakeshore habitat cover and structure • Shallow water habitat cover and structure • Lakeshore human disturbance

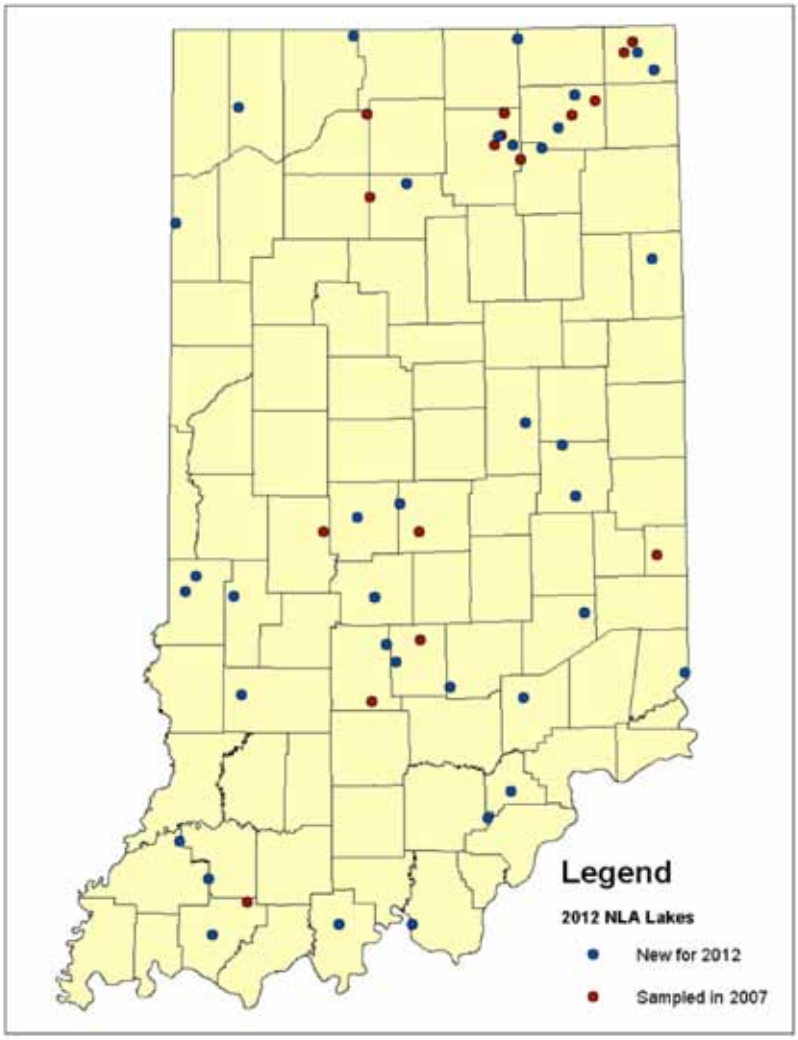

Figure 1. The 52 randomly selected lakes to be sampled (tentatively based on access) for the 2012 NLA. The pool includes 17 lakes from the 2007 survey for revisit sampling.

Based on the 2007 survey, habitat alteration is the most important measured stressor in lakes across the lower 48 states. Man-made impoundments (reservoirs) were more often stressed than natural lakes, especially when looking at lakeshore disturbance. The lakeshore disturbance habitat indicator reflects direct human alteration of the lakeshore itself. These can range from minor changes (such as the removal of trees to develop a picnic area) to major alterations (such as construction of a large lakeshore residential complex complete with concrete retaining walls and artificial beaches). The effects of lakeshore development on the quality of lakes include excess sedimentation, loss of native plant growth, alteration of native plant communities, loss of habitat structure, and modifications to substrate types. These impacts, in turn, can negatively affect fish, wildlife, and other aquatic communities.

As expected, nutrients are also major stressors in U.S. lakes. These results of habitat and nutrient stressors have significant policy implications. The results show support for Low Impact Development, the need to address mitigation of lakeshore habitat, and support initiatives to protect these lakeshores. They also support nutrient management efforts. Figure 2 shows the overall results for all the stressors of the 2007 lakes survey. Figure 3 shows the overall results for trophic status for U.S. lakes.

Since the NLA provides a national baseline against which lake managers can

Table 2. The 52 Randomly Selected Lakes to be Sampled for the 2012 NLA, Listed Alphabetically (tentatively based on access).

Lake	*County*	*Lake*	*County*	*Lake*	*County*
Bartley Lake	Noble	Loon Lake	Whitley	Yellow Banks Lake	Warrick
Big Chapman Lake	Kosciusko	Monroe Lake	Monroe	Yellowwood Lake	Brown
Bruce Lake	Fulton	Mud Lake	Kosciusko	- no name -	Vigo
Center Lake	Steuben	O'Blennis Lake	Fulton	- no name -	Decatur
Cheeseboro Lake	Steuben	Overflow Pond	Harrison	- no name -	Laporte
Daredevil Pit	Clay	Robinson Lake	Whitley	- no name -	Pike
Eagle Creek Reservoir	Marion	Round Lake	Steuben	- no name -	Gibson
East Lake	LaGrange	Round Lake	Noble	- no name -	Henry
Echo Lake	Bartholomew	Skinner Lake	Noble	- no name -	Scott
Heritage Lake	Putnam	Snow Lake	Steuben	- no name -	Madison
Izaak Walton Lake	Vigo	Stanton Lake	Kosciusko	- no name -	Adams
JC Murphy Lake	Newton	Stout Lake	Hendricks	- no name -	Greene
Koontz Lake	Starke	Strakis Lake	Marion	- no name -	Henry
Kuhn Lake	Starke	Sylvan Lake	Noble	- no name -	Warrick
Lake Edgewood	Morgan	Tippecanoe Lake	Kosciusko	- no name -	Washington
Lake Hollister	Porter	Tipsaw Lake	Perry	- no name -	Dearborn
Lake Lemon	Monroe	Whitewater Lake	Union		
Lake Wildwood	Jennings	Woodland Lake	Brown		

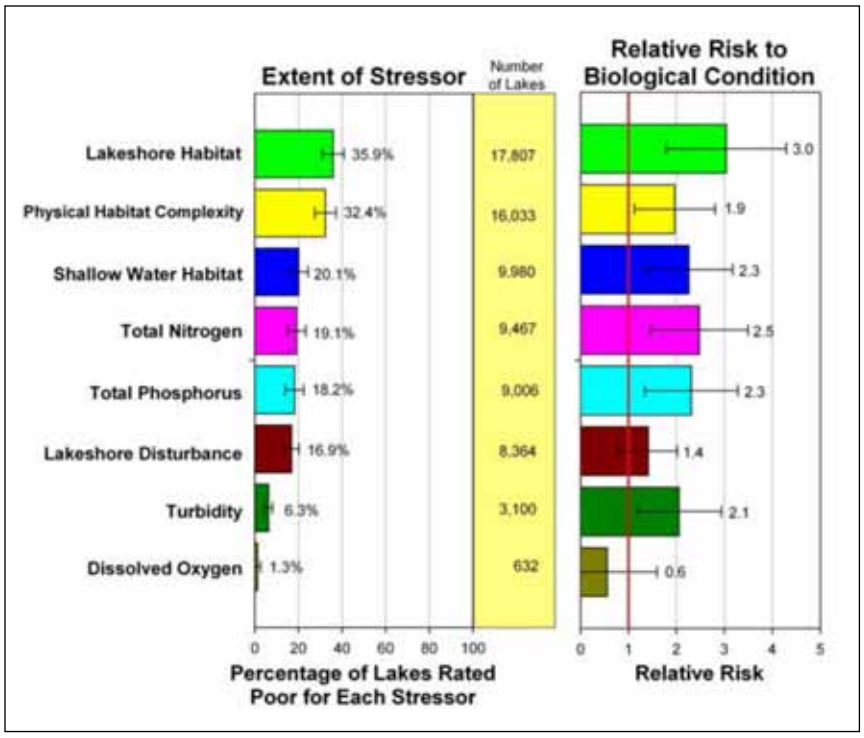

Figure 2. Relative extent of stressors and increased likelihood of degraded biology when stressor rated "Poor." "Relative Extent" answers "How widespread and common is this stressor?" "Relative Risk" answers "How severe is this impact?"

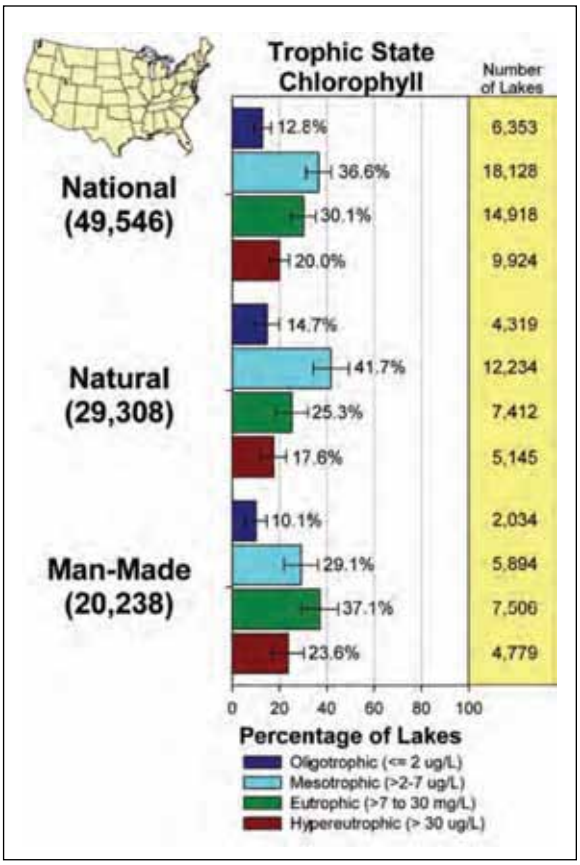

Figure 3. Trophic state of lakes in the lower continental U.S.

track the rate of change in trophic status at national and regional scales, and compare that to the rate of change in specific lakes they manage, we'll be adding to this knowledge this summer. We'll have two crews out sampling lakes to assess these indicators, specific to the Indiana Clean Lakes Program and the National Lakes Assessment. It will be a very busy season since we have 134 lakes to sample by the end of August! Hope you all have an adventuresome yet peaceful summer on the lake! Let the sampling begin!

For more information on the National Lakes Assessment, visit **http://www.epa.gov/lakessurvey.**

Have you checked out the Indiana Clean Lakes Program Web page lately? Take a look at http://www.indiana.edu/~clp/ and see what's new and happening with the program and with Indiana lakes!

A Warm Year in Fisheries Management

~ Matt Kerby

This article begins with a striking question. What happened to winter this year? Did we have one? The temperature dropped, we had minimal snow, and it was over. Spring is here! Let's go fishing!

This year, in order to begin preparation for the upcoming fishing season, Indiana fisheries managers had to respond early to natural fish reproduction cycles triggered by higher temperatures earlier in the season. For example, annual trapping of adult Muskellunge (*Esox masquinongy*), a.k.a. "muskies," in Lake Webster needed to begin two weeks earlier in mid-March due to water temperatures nearly 20 degrees warmer than usual. This year at Lake Webster, 143 muskies were collected and used to hatch a record corresponding 1.9 million eggs at the East Fork State Fish Hatchery in southwest Indiana before they will be released in the fall as fingerlings into 15 lakes and reservoirs. About 3,800 fingerlings are returned each fall to Lake Webster to aid in resupply of broodstock to hatch future muskie generations.

Management of Muskies: Use as a Bio-control for Bluegill

Muskies (Figure 4), members of the pike family (*Esocidae*), are among the largest predatory fish in North America. In Indiana, they originally occurred only in tributaries of the Ohio River. Many anglers will boast that Indiana muskie fishing is second to none. Historically, in response to popular demand, muskies were stocked by the Indiana Department of Natural Resources (DNR) Fish and Wildlife Division (DFW) in the 1970s and '80s as game fish. Fisheries biologist Jed Pearson played a key role in introducing muskies to northeast Indiana in the 1980s. Over the

Figure 4. Photograph of an adult muskellunge. Muskellunge body shape is typical of an ambush predator, with dorsal and anal fins situated near opposite each other and toward the back of the body, allowing quick thrust-like bursts of speed to capture prey.

years, muskie stocking programs have supplied good fishing, with a 2002 record catch of a 42.5-pounder at James Lake in Kosciusko County. Popular lakes for Indiana muskie fishing also include Lake Webster and the Barbee Chain lakes. Programs directed at stocking muskies in Indiana lakes have also had alternative goals to improved fishing, including use as a bio-control to improve bluegill fishing in specific lakes. Perhaps the best example involved a 32-year muskie stocking program at Loon Lake in Whitley County, where eventually minimal improvement in bluegill size and waning interest in muskie fishing did not justify the cost associated with continuing the program past 2011.

Lakes typically can provide stable environments where competition and predation are the driving forces controlling fish populations. So, in theory biologists thought that an increase in large predators would reduce numbers of bluegill and increase available resources such as food supply that would enable surviving bluegill to reach larger, more desirable sizes for anglers. Although bluegill fishing did not improve, Largemouth bass were notably larger in size over the study period, however fewer in number. No other fish species seemed to suffer in Lake Loon as a result of the stocking program.

Ecological and Social Challenges in Indiana Fisheries Management

Introducing predators to control game fish size and number is just one example of challenges that Indiana fisheries biologists face when trying to manage aquatic species for sportfishing within the state.

I had a chance to speak with DNR's District 3 fisheries biologist Jed Pearson about his long 40-year career with the DNR and what he sees as the main priorities and responsibilities of his district both past and present. Pearson bestowed upon me his famous acronym "F.I.S.H.I.N.G." to describe his philosophy and role as a DNR fisheries manager and biologist.

F	Fishing Regulations
I	Information Education
S	Surveys and Studies
H	Habitat Type Projects
I	Invasive Species
N	Niches
G	Government

According to Pearson, F.I.S.H. represents the four cornerstones of fisheries management. This includes the design of fisheries regulations such as size and catch limits, which are based on scientific information obtained through surveys, studies, and monitoring. This information is then disseminated through various avenues to educate the public about the status of fisheries populations. It is best understood through application of various habitat type projects that assess all aspects of environments in which fish live. This "systems approach" to management can include issues that determine water quality and clarity, such as the amount of suspended sediments and algae in the lake, which can vary based on lake type, geomorphology, watershed features, inputs of nutrients and pollutants, and other ecological changes. In addition, management of aquatic plants is important to provide habitat for breeding and refuge in the shallow littoral zone area of the lake. These aquatic plants also play a key role in natural cycling of nutrients in lakes, which are necessary for all plant and animal life within the lake.

Fish, being visual predators feeding on other fish, insects, or plankton, are sensitive to habitat conditions such as those previously listed, which may inhibit their ability to effectively feed and reproduce. Fish are also sensitive to oxygen levels within the lake, so during periods of stratification (separation of upper and lower water column due to differences in temperature) fish are unable to live in the much less oxygen-rich lower part of the lake. Invasive plants (e.g., Brazilian elodea) and animal species (e.g., Asian carp) can also disturb natural interactions between both native fish and other aquatic life and nutrient cycles, which may exacerbate or create additional problems for managers. Pearson is very experienced with the challenges of managing fisheries in northeast Indiana and

explained that the stocking of fish for public use always should be scientifically evaluated using a systems or ecosystem approach.

Native species to Indiana that have interacted together over thousands of years develop specific roles and functions (niches) in the environment that allow them to survive as a community from generation to generation. The stocking of non-native fish for sportfishing or use as a bio-control can result in unintended consequences if not carefully planned.

Management programs utilizing fish with low reproductive potential and slow growth rates can require constant intervention by managers using significant resources, which may be inefficient, requiring regular re-evaluation of management goals. Species that are able to establish self-sustaining reproductive populations in resident waterbodies may be better suited as candidates for both stocking and bio-control purposes as they may better fill a particular niche. Once introduced, however, these same species may be so well-suited for the environment that managers may have a more difficult time later removing or controlling them.

A major challenge with fisheries management involves balancing angler/citizen satisfaction with ecosystem management and fisheries populations for future generations. So, here it is clear that government, in the form of politics and bureaucracy, can present budgetary challenges making prioritizing varied management activities difficult. Pearson reminded me that regulations need to focus on providing a diversity of interests and opportunity to accommodate full representation of citizen concerns.

Fisheries Past and Present and the Role of Technology

As Pearson reflected on his long career as a fisheries manager, he admits many of the same issues reoccur over decades. Communication and cooperation continue to be important ingredients in the recipe of any successful fisheries program.

Pearson's excitement continues about the future prospects that technology may offer to aid in management and information education. One example may be the recent ESRI Geographic Information System (GIS) "Where to Fish" application available on the DNR Fish and Wildlife Division website (**http://www.in.gov/dnr/fishwild/3591.htm**). This interactive map program allows you to find public fishing locations and access points in Indiana.

With a simple point-and-click on a selected waterbody you can find information on site name, GPS coordinates, boat access, shoreline fishing, motor restrictions, and fishable species. You can search by county, address, property type, and name. The use of a mouse-operated drawing tool allows you to trace distances, perimeters, and display measurement distances on the map. Users can then save these map edits and print these generated maps for later use (Figure 5). If you have ever used Google maps you have the technological ability to operate this powerful tool for planning your fishing trips.

Developments in the use of sampling methods such as electrofishing, catch and release tagging with remote transmitters, and fish ageing techniques are just a few examples of how technology has helped us learn more about the fish species we know and love. The better we are able to understand how a particular species reproduces, grows, and adapts throughout its different lifecycles, the better we will be able to continue to successfully manage fisheries for centuries to come. This understanding, coupled with knowledge about environmental conditions such as changing climate patterns, which affect a fish's habitat, will better inform managers on how to anticipate unexpected changes in fish reproduction patterns and behavior.

So, there you have it in a nutshell. If you plan to go muskie fishing from now till fall, take a moment to remember those that

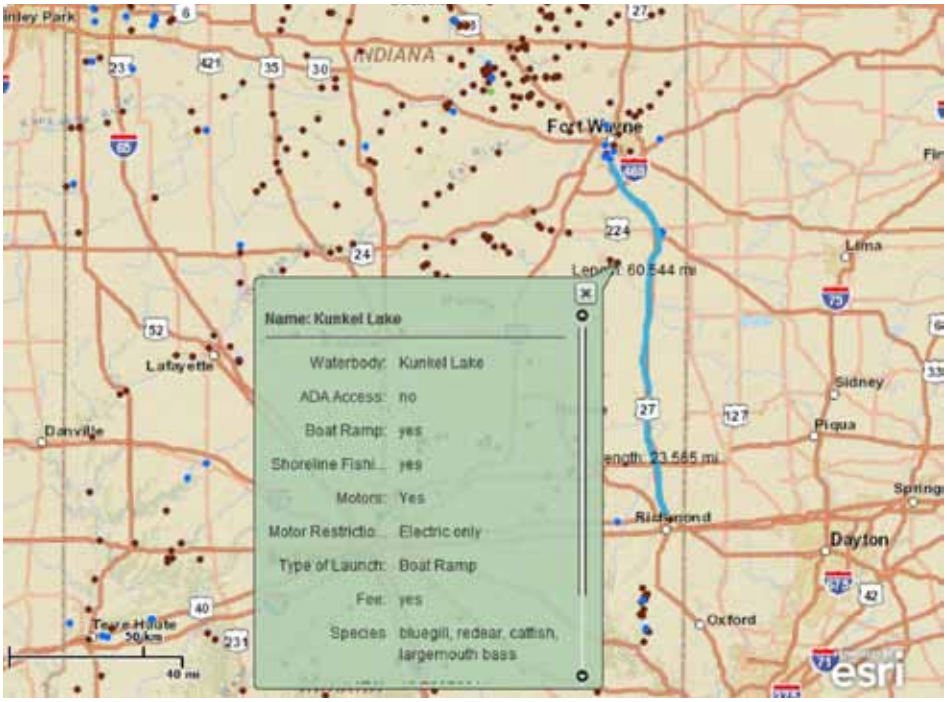

Figure 5. Screenshot of DNR Fish and Wildlife Division's "Where to Fish" GIS tool. The green box provides information on the selected lake and the blue line along highway 27 is an example of the trace tool feature used to determine distance on the map (60.544 miles).

helped supply those monster muskies and made possible that hook-up adrenaline rush you only get when you have a "muskie on the line!"

Have a great muskie fishing season, Indiana!

Indiana Lakes Management Conference Wrap-Up

~ Sara Peel

Nature is messy . . . but it sure makes for great networking! The Indiana Lakes Management Society (ILMS) hosted the 24th Annual Indiana Lakes Management Conference on March 23 and 24, 2012 at Indiana's largest state park – Brown County – and its historic Abe Martin Inn. More than 130 people attended the conference, being treated to great presentations about shoreline stabilization, outreach and education, lake project updates, and a special Saturday workshop highlighting shoreline stabilization work completed at nearby Yellowwood Lake.

Our plenary speaker, Nicole Hawk, District Education for Mercer County Soil and Water Conservation District, highlighted partnership efforts hard at work to improve Grand Lake St. Mary, and our final speaker of the day, retired Indiana University professor and former Indiana Clean Lakes program director Bill Jones, treated us to highlights of what he learned over his professional career. Most attendees stayed for the highlight of the day – two tornado warnings and 120 people shuffled into a banquet access hallway! Nothing like sharing six square inches with your fellow attendee to generate great mixing, mingling, and networking!

Despite these lovely weather conditions, we were able to conclude our awards banquet. This year, we are honoring the Lake Lemon Conservancy District (LLCD) as the "Project of the Year." The LLCD has worked tirelessly since 2005 to improve and enhance conditions within the reservoir. These efforts include dredging more than 30,000 cubic yards of sediment, long-term aquatic plant controls, and stabilization of the reservoir's shoreline.

Hallway attendance and fun during one of two tornado warnings.

Bill Schmidt of the Clear Lake Association and Steuben County Lakes Council was honored as the "Volunteer of the Year" for his efforts focused on protection of Steuben County's lakes for today and tomorrow. In 2007, Bill initiated a water quality monitoring program throughout Steuben County. Since its inception, the program expanded to monitor 50 sites throughout all watersheds in Steuben County.

Finally, ILMS honored the Yellow Creek Watershed Association for its efforts to roll the Beaver Dam/Loon Lake Conservation Club, Diamond Lake Conservation Club, and Yellow Creek Lake Conservation Club into one group working on behalf of their six-lake watershed. This group successfully completed a watershed diagnostic study working to improve conditions within all six lakes.

Additionally, the three groups attend each other's meetings and events, building camaraderie and community among lake residents and waterbodies.

For all of their work on behalf of Indiana's lakes, ILMS salutes the efforts of these individuals and groups!

ILMS looks forward to our 25th annual Indiana Lakes Management Conference next March at Potawatomi Inn at Pokagon State Park.

Over the remainder of the spring, summer, and fall, ILMS will partner with lake associations and groups throughout the state to bring the conference to lake residents and enthusiasts through our workshop series. Scheduled workshops will highlight the new Indiana Clean Lakes Program plant monitoring program, dam maintenance and monitoring, lake association successes, county lakes council efforts and successes, and the Northern Indiana Lakes Festival.

Visit **www.indianalakes.org** for workshop dates and details!

The Volunteer Lake Monitoring Corner

~ Sarah Powers

I am happy to announce the addition of a volunteer corner. We hope to highlight the hard work of the Volunteer Lake Monitors, as well as share updates and information about the program.

New for this summer to the Volunteer Lake Monitoring Program, we will be offering an aquatic invasive plant monitoring program, "Aquatic Weed Watchers." The information gathered through this program will help maintain a record of aquatic vegetation (native and invasive) as well as provide an early warning for new invasive plants on our lakes.

The new program will require volunteers to go through additional training, which will include a training workshop that we will be hosting with the Indiana Lake Management Society (ILMS). These workshops will give volunteers classroom and field experience needed to conduct vegetation surveys. Please check our website for updates on the workshop schedule or contact us at **indianaclp@gmail.com**.

The workshop dates are tentatively set for June 30th and July 14th with locations and times still to be determined.

Perspectives

"The finest workers in stone are not copper or steel tools, but the gentle touches of air and water working at their leisure with a liberal allowance of time."

~ Henry David Thoreau

WATER COLUMN

Published quarterly by the Indiana Clean Lakes Program as a medium for open exchange of information regarding lake and watershed management in Indiana.

Address all correspondence to:
Melissa Clark, Editor
SPEA 460, 1315 E. Tenth Street
Indiana University
Bloomington, IN 47405-1701

E-mail: mlaney@indiana.edu
Phone: (812) 855-6905
FAX: (812) 855-7802

Editor's note: In Ryan Largura's article "Marl and Marl Lakes in Indiana" from the previous *Water Column* newsletter, the lake with eels was misidentified as Lake Gage, when in fact it was Lake George.