



# Clearing the waters

20 years of Lake and River Enhancement

By Michael Ellis & the LARE Section of the Division of Fish & Wildlife

Richard Fields photo

In “The Strange Case of Dr. Jekyll and Mr. Hyde,” Robert Louis Stevenson portrayed a man plagued by a split personality.

In a similar way, lakes, streams and ponds can exhibit a dual nature, depending on your point of view. The surface water can look beautiful while the depths tell a different tale.

One example is Lake Manitou near Rochester, whose story might put a twist on Stevenson’s novella title, as in “Jekyll and Hydrilla.” The latter word refers to a destructive aquatic invasive plant: *Hydrilla verticillata*. More on Mr. Hydrilla later.

What causes this curious schizophrenia in some of our waters? One deceptively positive sounding word: “nutrients.” Just as problems result when one overfeeds an animal, child or self, an overabundance of this generally good stuff can toss a lake’s ecosystem awry. Combined with sediment buildup, a lake can fill in, interfering with recreation, scenic enjoyment and overall health of the resource.

Indiana isn’t home to more than 10,000 lakes like our neighboring states to the north, but we have more than 500 natural lakes that Ice Age glaciers left here as they receded. Together with reservoirs and ponds, these irreplaceable gems provide Indiana homes for many species of plants, insects, mussels, reptiles, amphibians, fish and other aquatic creatures. These still-water resources are vital for humans, in terms of providing drinking water, flood control and recreation. About 90,000 miles of the state’s streams, rivers and ditches flow into and around these lakes, serving many of the same purposes.

So far, so good. A bunch of Dr. Jekylls, one might say.

Here’s where the story starts to, ahem, “Hyde.” Rainfall and wind erode millions of tons of soil from the state’s landscape each year. Unfortunately, much of that mess flows downstream. Huge deposits of sediment may end up in lakes, streams, reservoirs and rivers. The land’s crop-growing potential plummets due to loss of much of the topsoil.

“Sediment, by volume, pollutes Indiana’s waters more than anything else, industry included,” said Jim Ray, chief of the Lake and River Enhancement (LARE) section of DNR’s Division of Fish and Wildlife. “In addition, it’s a conduit for nutrients like nitrogen and phosphorus, as well as pesticide pollution.”

An overabundance of sediment also robs lakes, streams and reservoirs of depth and storage capacity, which in turn reduces water available for public use. Floodwater retention declines after heavy rains. Silt clogs fish gills, reduces water clarity for swimmers and decreases water depth for boaters.

(Previous page) A sediment plume spreads across Winona Lake near Warsaw (in the late 1980s), after uncontrolled erosion from a construction site upstream emptied into a ditch that feeds the lake. LARE helps prevent incidents like this by working with landowners, businesses and communities.

## Water clarity, home prices

In research conducted by the Ohio Sea Grant organization, Drs. Elena Irwin and Tim Haab of Ohio State University found that cleaner shoreline water can bring higher returns when selling a waterfront property.

Their research was conducted along the shoreline of Lake Erie, and they found that as water clarity and quality increased, so did property values.

Water quality was defined through two variables: (1) fecal coliform bacteria and (2) secchi disk depth readings—but the most important factor seemed to be water clarity (how far you can see into the water), as measured by the secchi disk.

The researchers concluded that increasing the depth of “seeing” into the water to as little as 2 meters caused the price of a home to be higher by 4 to 5 percent.

Homeowners and real estate agents realize that, when looking for a lakeside home, clear water is important to the extent that buyers will pay a premium for the house on clearer water. ■

Source: Jill Jentes Banicki, Ohio Sea Grant communications, *Twineline*, 2006 Summer/Fall Edition.

Elevated nutrient levels foster aquatic plant and algae growth. This hastens “lake aging,” a phenomenon experts call eutrophication.

“An example of what happens with lake aging can be found in the downtown canal (an artificial waterway in Indianapolis),” Ray said. “The canal went from bare concrete with water in it to having sediment and excess nutrients causing plants to grow, essentially filling in the canal and reducing the visual appeal of the area.”

“The canal was drained and the plants and sediment removed. A more natural body of water, left untreated over many years, reacts the same way. Over the long term, it turns into a wetland, and, eventually, dry land.”

Sedimentation and its related nutrient problems also depreciate the property values of land, homes and businesses around lakes. The cost to remedy these problems can be staggering. (See sidebar above on water clarity and property values in Ohio.)

LARE has worked on these issues for 20 years. During that time, the program has evolved into a multi-faceted source of funding and technical assistance for addressing ecological issues in publicly accessible lakes and streams.

LARE now provides nearly \$2.3 million annually to improve the state’s waters. All of the money comes from fees from the very boaters who typically reap the direct benefits of the program.

This concept originated in 1983 with then-Gov. Robert Orr’s effort to address erosion and sediment

## Lake care top 10

**10** Understand that our health and quality of life depend on clean water and diverse fish and wildlife resources.

**9** Work with your neighbors to plan a lakewide aquatic vegetation management strategy, rather than each homeowner doing his or her own thing.

**8** Pay your annual boat registration fees. All of the money is used to improve public waters for recreation, habitat and water quality.

**7** Use no-phosphorus fertilizer for your lakefront lot, and only when necessary. You want a green lawn, not a green lake.

**6** Plant a strip of native wildflowers, grasses or shrubs at your lakefront property along the water's edge to provide a filter for runoff, control erosion and to discourage unwanted numbers of Canada geese.

**5** Know the boundaries of your watershed and the effects of various land uses on water quality.

**4** Maintain natural shoreline and aquatic plants to provide habitat and guard against erosion, instead of a concrete seawall.

**3** Properly compost grass clippings and leaves away from the water.

**2** Never dump plants, fish or water from a bait bucket, live well, water garden or an aquarium into a lake or stream. Remove "hitchhiking" plants from boat trailers when leaving a lake.

**1** Protect our water resources by getting involved with your local lake association or watershed group. ■

🌐 **To watch a video on the problems hydrilla causes, see [dnr.IN.gov/mydnr/videos](http://dnr.IN.gov/mydnr/videos).**



Richard Fields photo



Jeremy Price photo

(Top) Sunlight casts playful highlights upon a school of redear sunfish at a State Fair display, a typical scene common in Hoosier waters for generations. (Left) Threats from exotic invasives, such as the hydrilla that was discovered in 2006 at Lake Manitou near Rochester, raise alarms among DNR professionals about the future of our waters.

problems. A comprehensive study of soil conservation issues in Indiana spawned the "T by 2000" program's creation in 1987. The goal was to provide technical, educational and financial resources to land users statewide to bring soil erosion to a "tolerable" (the "T" in the program name) level, meaning the amount that would allow soil to maintain its long-term productivity. A portion of the funding went to lake enhancement in the newly established DNR Division of Soil Conservation.

When that division moved to the recently created Indiana State Department of Agriculture in 2005,

LARE shifted to the DNR Division of Fish and Wildlife (DFW), its current home, in recognition of the way it had enhanced aquatic habitats for fish, primarily, but also for some wildlife species.

"LARE's goals and methods mesh so well with those of Fish and Wildlife, that this altogether natural shifting was a win-win for both DNR and Indiana's water and aquatic resources," said Glen Salmon, DFW director. "The close working relationship of LARE staff and the fisheries staff members has provided new insight and synergy that didn't exist when LARE was in another division."

### Who pays?

State legislation passed in 1989 required Hoosier boat owners to pay an annual \$5 fee to use public waters. The income was to be used by DNR to enhance lakes. This fee boosted funding for such projects from \$300,000 to \$1 million or more per year. The DNR, buoyed with the financial backing, targeted two strategies: taking upstream land conservation measures to prevent nutrients and eroded soil from entering streams and lakes, and remediating in-lake sediment and nutrient-related problems.

"River" was added to the program's name by 1991

legislation, but no specific program changes resulted at first. The broadened focus instead assured that "flowing waters" received attention to protect water quality from sediment and nutrient inflow.

Although LARE's early emphasis dealt primarily with lake watershed diagnosis and efforts to directly control erosion and sedimentation of Indiana lakes, residents and users of those lakes expressed interest in fixing two other problems—stemming the aggressive invasions of nuisance aquatic plants and animals and dredging sediment that accumulated over time.

In recognition of the expanded focus, additional legislation in 2003 was enacted to increase the annual LARE-designated boat fee to an amount ranging from \$5 to \$25 (based on boat value), and requiring that half of the additional funds be used by the DNR to pay for lake projects, including removal of sediment and control of exotic or invasive plants or animals. The other half expanded the capacity for water-related law enforcement and boater safety.

These program elements have proved extremely popular, particularly because, these days, many lakes in the state have been attacked by invasive non-native plants, including Eurasian watermilfoil, curly-leaf pondweed and others.

### LARE nuts and bolts

LARE helps Indiana fulfill a "public trust" doctrine that predates even Dr. Jekyll. Enacted by the Roman Emperor Justinian and later recognized in English common law, this doctrine provides that "public trust" lands, waters and living resources in a state are to be held in trust by the State for the benefit of all of its people.

The original LARE goal was to identify the sources of eroded soil and nutrients that sully surface waters, and to take measures to remediate their effects. Addressing the effects of exotic plant and animal species is also part of the plan.

LARE tackles lake and stream issues holistically, addressing the causes of problems and preventing them from occurring, rather than just treating symptoms.

The program is structured so that projects won't happen without local leadership. This approach engages local citizens to learn what causes each lake or stream's troubles, so that these individuals can become active participants in the solutions. Local sponsors and partners for LARE-funded projects typically include lake associations, conservancy districts, soil and water conservation districts, municipalities and parks departments.

The six-person LARE staff includes biologists and field specialists, but they are by no means the lone soldiers in the effort. Professional consultants and lake management practitioners are routinely contracted by the local sponsors of projects. These people typically come from natural-resource

management or engineering firms that employ engineers, biologists and other scientists; dredging contractors; earthmoving operators; and aquatic herbicide applicators.

LARE funds two types of projects, with the current annual budget equally divided between them. One type is the “traditional,” which includes diagnostic studies, watershed management plans, engineering feasibility studies, engineering designs, construction and watershed land treatment. The other type deals solely with lakes, either for sediment removal or exotic species control. LARE receives applications for projects that would cost three times its annual budget to fund.

“Trying to accommodate as many funding needs as possible is a perennial challenge that we address through prioritization and cost-effective project ranking,” Ray said.

Since 1988, LARE has provided funding and technical assistance for more than 100 lakes and 70 targeted stream segments and watersheds in more than half of Indiana’s counties.

## Success stories

Lake Wawasee, a natural lake of more than 3,400 acres near Syracuse, is a stunning attraction well known to many Hoosiers. Its watershed in Kosciusko and Noble counties (which includes Syracuse, Papakeechee, Knapp and Bonar lakes) is testament to LARE’s success.

The Wawasee Area Conservancy Foundation (WACF), in conjunction with the Wawasee Property Owners Association (WPOA), Syracuse Lake Association (SLA), Knapp Lake Association and area residents, has been active in LARE projects since 1996, starting with a diagnostic study of the 23,618-acre watershed. As the watershed’s conditions became better understood, several projects addressed pollution control in Enchanted Hills, South Shore, Bayshore and Leeland Addition, four specific areas around Wawasee.

The foundation involves residents along the lakeshore and watershed in all aspects of these projects, educating and encouraging them in ways to protect the lakes for this and future generations. (See “Top 10” on page 40).

Homeowners form just one group of participants. A watershed land treatment project sponsored by the Kosciusko and Noble Soil and Water Conservation districts also worked directly with farmers and other land users over an eight-year period to address nutrient and sediment inputs.

“The land treatment project involving erosion control and runoff in agricultural areas was a good example of how various on-the-ground projects that reduce the amount of erosion and sediment leaving the surrounding land in the first place is often more

efficient than removing that same sediment from the lake later,” said Heather Harwood, WACF executive director.

The 2006 discovery of hydrilla during a routine DNR aquatic plant survey in Fulton County’s Lake Manitou was noted at the beginning of this tale. The finding ignited a so-far successful battle that’s another example of LARE’s effectiveness in concert with other programs.

“This invasive aquatic plant is so aggressive that, if left unchecked, it can take over and destroy a lake,” said Doug Keller, the DNR aquatic invasive species coordinator.

No one knows that better than Keller’s peers in similar roles in Florida and California, where tens of millions of dollars a year goes toward battling this nemesis. So when Mr. Hydrilla sprouted here, establishing control efforts took high priority because this plant has no “Dr. Jekyll” upside.

The lake was locked down to prevent any movement of boats in or out, while aquatic herbicides were used as a counterattack to eradicate the invader.

“The cost of treatment is estimated at more than \$2 million, but the cost of doing nothing would be far steeper in the long run,” Keller said. “Early results after the first year of testing (2007) were encouraging, but hydrilla, like many invasive aquatic plants, can be a tough organism to totally eradicate without a thorough and complete plan. Total eradication may take three to five years.”

Lake Lemon has also reaped LARE benefits. This reservoir, which is owned by the City of Bloomington and managed by the Lake Lemon Conservancy District in Monroe and Brown counties, had fallen into disrepair in the late 1980s and early ‘90s. Water quality was deteriorating, shoreline erosion was rampant, and more than 60 percent of the aquatic vegetation consisted of exotic, nuisance species.

“The LARE program awarded the conservancy district its first grant in 1996 to develop a shoreline erosion-control design,” said Bob Madden, the district’s manager. “With the completion of that plan, the reclamation of Lake Lemon began. During the next eight years, grants from LARE, the City of Bloomington, and operating funds from the conservancy district’s budget restored the reservoir.”

Madden said that Lemon’s water quality has improved to the point that the conservancy district re-opened the public beach, and 95 percent of the shoreline is now protected from erosion. Proper vegetation management has controlled nuisance aquatic plants. Property values quadrupled during the past 10 years. Some anglers have touted the recovered fishery as one of the top five lakes in Indiana for bass fishing. In short, the reservoir has been restored.



Richard Fields photo

“The saving of this natural resource for all Indiana residents to enjoy would not have occurred without the support and assistance of LARE,” Madden said. “This is a model of state government partnering with local government and private property owners.”

Some work is still needed. In 2008, Lake Lemon efforts are focusing on removal of sediment from certain key areas.

## Epilogue

In addition to these and the myriad unmentioned LARE projects, the program’s overall education of lake residents and users about human impacts to water resources has resulted in greater public understanding.

“Part of the challenge is getting people to realize that so many people want to use Indiana’s lakes and streams that they run the risk of being ‘loved to death’ by those who don’t realize how the cumulative impact of their personal activities can adversely affect the very resources that attracted lake and riverside communities in the first place,” Ray said.

(Above) A wetland construction project along West Boggs Creek in the mid-‘90s used a semi-circular sheetpile structure to back up standing water into wetlands, preventing waterborne sediment and nutrients from entering West Boggs Lake, a popular fishery in Daviess County.

The next time you are on an Indiana lake, perhaps reading a classic book, pause to think about what LARE does to make it better ... and how you can help.

For tips, see [dnr.IN.gov/dnr/fishwild/lare/](http://dnr.IN.gov/dnr/fishwild/lare/), which also has a link to project reports from 20 years of LARE.

Help LARE keep the “Mr. Hyde” side of our waterways not only out of sight but under control while “Dr. Jekyll” flourishes, offering us all the benefits of healthy lakes, rivers and streams. ■

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