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Published Quarterly – February, May, August and November

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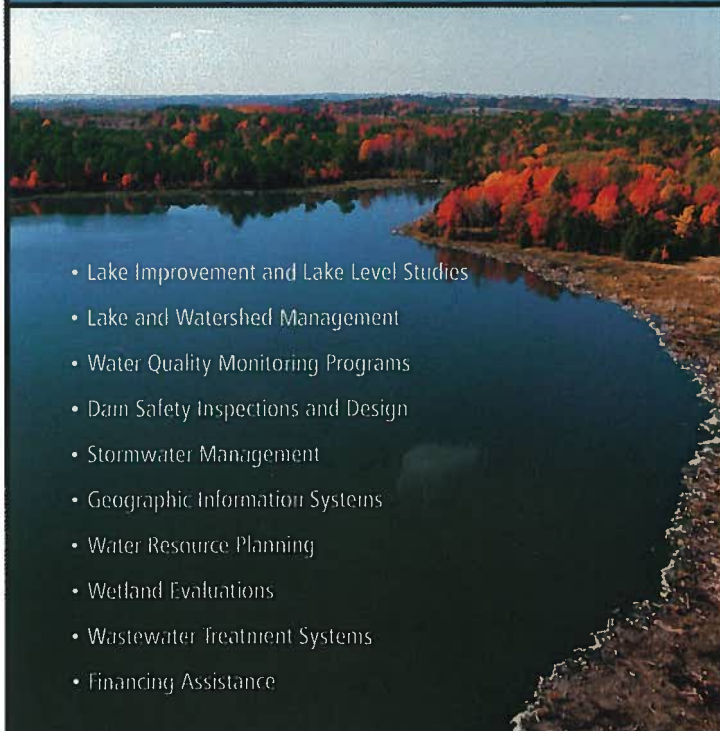
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A second edition was released to announce attorney David Fry as the successor to the late Stuart J. Hollander's cottage law practice. Available at bookstores, and on the web at [www.cottagelaw.com](http://www.cottagelaw.com). Arrangements can be made to have Mr. Fry speak to your association about cottage succession planning by calling (616) 866-9593.

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## Advantages and disadvantages of aquatic plant management techniques: PART THREE

### PART THREE

NOTE: Part One of this three-part series appeared in the May 2008 issue of *The Michigan Riparian*. This series is a revision of a previously printed article.

One neglected aspect of harvesting operations is disposal of plant material. The plant material is generally more than 90% water and not suitable as a feed and cannot be sold or made into anything truly useful. The common response is to use it as mulch. Due to the disposal problem, some recent machine designs have included a shredder, chopper, or grinder to dispose of the plant material back into the lake. Although some concern has been expressed to the release of nutrients, the actual amount of nutrients released is small relative to other sources. A more realistic concern, at least in southern water bodies, is the attraction of large carnivores (e.g., alligators) to the "chum" resulting from chopped fish and other organisms that are a "by-catch."

Several studies have indicated that one harvest per year provides only brief control, whereas two to three harvests of the same plot in a given year are required to provide adequate annual control. However, cutting three times in a year may also reduce growth the following year (Madsen et al. 1988, Nichols and Cottam 1972). Most researchers directly ascribed successful control to reductions in total stored carbohydrates (Kimbel and Carpenter 1981). Although many claim that harvesting is environmentally superior to herbicide use, most neglect to consider that harvesting removes large numbers of macroinvertebrates, semi-aquatic vertebrates, forage fishes, young-of-the-year fishes, and even adult gamefishes (Engel 1990). The harvester acts as a large, nonselective predator "grazing" in the littoral zone. In addition, harvesting can resuspend bottom sediments into the water column, releasing nutrients and other accumulated compounds.

However, not all secondary effects of harvesting are negative. Removal of large amounts of plants can improve the diel oxygen balance of littoral zones and rivers, particularly in shallower water (Carpenter and Gasith 1978, Madsen et al. 1988). At this

point, no studies have indicated whether native communities respond preferentially to harvesting.

In the past, harvesting was widely touted as a mechanism to remove nutrients from lake systems. However, ecosystem studies indicated that harvesting was not likely to significantly improve the trophic status of a lake. For instance, harvesting all available plants in Lake Wingra, Wisconsin, removed only 16% of the nitrogen and 37% of the phosphorus net influxes into the lake; these removals were insignificant compared to the lake's internal pools of those nutrients (Carpenter and Adams 1976, 1978). Plant harvesting in Southern Chemung Lake, Ontario, removed 20% of the annual net phosphorus input (Wile 1975). In a more eutrophic system (Sallie Lake, Minnesota), continuous harvesting of aquatic plants in the littoral zone during summer removed only 1.4% of the total phosphorus input (Peterson et al. 1974). In a less eutrophic system (East Twin Lake, Ohio), harvesting the entire littoral zone would have removed from 26% to 44% of the phosphorus and from 92% to 100% of the nitrogen net loadings to the lake over a 5-year study period (Conyers and Cooke 1983).

Harvesting aquatic plants is not an effective tool for reducing nutrient loads in a lake; in none of the above scenarios was the internal nutrient pool reduced. In the best-case scenario, removing all the plants in the lake only kept pace with the amount of external nitrogen loading and with not quite half of the external phosphorus loading. Because no operational control program is going to remove all plants in the littoral zone, it is unlikely that any operational harvesting program will significantly impact the internal nutrient balance of the system.

The use of diver-operated suction harvesting (or dredging, as it is often called) is a fairly recent technique. Called "harvesting" rather than "dredging" because, although a specialized small-scale dredge is used, sediments are not removed from the system. Sediments are re-suspended during the operation, but using a sediment curtain mitigates these effects. Divers use this device to remove plants from the sediment (NYS-

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DEC and FOLA 1990). The technique can be very selective; divers can literally choose the plants to be removed. Removal is efficient and regrowth is limited. The system is very slow (100 m<sup>2</sup> per person-day; Eichler et al. 1993), and disposal of plant material must also be resolved. However, it is an excellent method for small beds of plants or areas of scattered clumps of plants too large for hand harvesting.

The last major mechanical management technique is rotovating, which is widely used in the Pacific Northwest and, formerly, in British Columbia for management of Eurasian watermilfoil. This method uses rotovator heads on submersible arms to till up the bottom sediments and to destroy the root crowns. Rotovating is relatively rapid and can effectively control dense beds of Eurasian watermilfoil for up to 2 years (Gibbons and Gibbons 1988). However, it spreads Eurasian watermilfoil fragments, resuspends large amounts of sediments and nutrients, causes high levels of turbidity, disrupts benthic communities, and is nonselective.

Physical management methods may or may not utilize large equipment but are distinguished from mechanical techniques in the following manner: in mechanical techniques the machines act directly upon the

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plants, in physical techniques the environment of the plants is manipulated, which in turn acts upon the plants. Several physical techniques are commonly used: dredging, drawdown, benthic barriers, shading or light attenuation, and nutrient inactivation (Table 7).

Dredging is usually not performed solely for aquatic plant management but to restore lakes that have been filled in with sediments, have excess nutrients, and have inadequate pelagic and hypolimnetic zones, need deepening, or require removal of toxic substances (Peterson 1982). However, lakes that are very shallow due to sedimentation typically have excess plant growth. This method is effective in that dredging typically forms an area of the lake too deep for plants to grow, thus opening an area for riparian use (Nichols 1984). By opening more diverse habitats and creating depth gradients, dredging may also create more diversity in the plant community (Nichols 1984). Results of dredging can be very long term. Biomass of *Potamogeton crispus* in Collins Lake, New York, remained significantly lower than pre-dredging levels 10 years after dredging (Tobiessen et al. 1992). Due to the cost, environmental impacts, and the problem of disposal, dredging should not be performed for aquatic plant management alone. It is best used as a multi-purpose lake remediation technique.

Drawdown is another effective aquatic plant management technique that alters the plant's environment. Essentially, the water body has all of the water removed to a given depth. It is best if this depth includes the entire depth range of the target species. Drawdown, to be effective, needs to be at least one month long to ensure thorough drying (Cooke 1980). In northern areas, a drawdown in the winter that will ensure freezing of sediments is also effective. Although drawdown may be effective for control of hydrilla for 1 to 2 years (Ludlow 1995), it is most commonly applied to Eurasian watermilfoil (Siver et al. 1986) and other milfoils or submersed evergreen perennials (Tarver 1980). Drawdown requires that there be a mechanism to lower water levels. Although it is inexpensive and has long-term effects (2 or more years), it also has significant environmental effects and may interfere with use and intended function (e.g., power generation or drinking water supply) of the water body during the drawdown period. Lastly, species respond in very different manners to drawdown and often not in a consistent fashion (Cooke 1980). Drawdown may provide an opportunity for the spread of highly weedy or ad-

ventive species, particularly annuals.

Benthic barriers or other bottom-covering approaches are another physical management technique that has been in use for a substantial period of time. The basic idea is that the plants are covered over with a layer of a growth-inhibiting substance. Many materials have been used, including sheets or screens of organic, inorganic and synthetic materials, sediments such as dredge sediment, sand, silt or clay, fly ash, and combinations of the above (Cooke 1980). The problem with using sediments is that new plants establish on top of the added layer (Engel and Nichols 1984). The problem with synthetic sheeting is that the gases evolved from decomposition of plants and normal decomposition activities of the sediments underneath the barrier collect under the barrier, lifting it (Gunnison and Barko 1992). Benthic barriers will typically kill plants under them within 1 to 2 months, after which they may be removed (Engel 1984). Sheet color is relatively unimportant; opaque (particularly black) barriers work best, but even clear plastic barriers will work effectively (Carter et al. 1994). Sites from which barriers are removed will be rapidly recolonized (Eichler et al. 1995). In addition, synthetic barriers may be left in place for multi-year control but will eventually become sediment-covered and will allow colonization by plants. Benthic barriers, effective and fairly low-cost control techniques for limited areas (e.g., <1 acre), may be best suited to high-intensity use areas such as docks, boat launch areas, and swimming areas. However, they are too expensive to use over widespread areas, and heavily affect benthic communities.

A basic environmental manipulation for plant control is light reduction or attenuation. This, in fact, may have been the first physical control technique. Shading has been achieved by fertilization to produce algal growth, application of natural or synthetic dyes, shading fabric, or covers, and establishing shade trees (Dawson 1986, Dawson and Hallows 1983, Dawson and Kern-Hansen 1978, Madsen et al. 1999). During natural or cultural eutrophication, phytoplankton growth alone can shade macrophytes (Jones et al. 1983). Although light manipulation techniques may be useful for narrow streams or small ponds, in general these techniques are of only limited applicability.

The final physical management method often discussed is nutrient inactivation. Nutrient inactivation is commonly done for algal or phytoplankton control by adding alum to the water column, which binds

phosphorus and thus limits the growth of algae (McComas 1993). However, larger vascular aquatic plants are typically limited by nitrogen rather than phosphorus and derive most of their nutrients from the sediment rather than from the water column. No chemical is available that binds nitrogen as readily as alum binds phosphorus. Additionally, the difficulties of adding a binding agent to the sediment rather than to the water column are obvious. Despite these limitations, nutrient inactivation has been attempted, but with limited success (Mesner and Narf 1987). At this point, nutrient inactivation for control of aquatic vascular plants is still in the research and development phase.

While doing nothing is not, on the face of it, a management technique; the "no-action" alternative is one often used as the "baseline condition" for permits or environmental impact comparisons. "No action" is also the default choice of regulators and managers everywhere. Who can blame them? The direst of bureaucratic punishments is reserved for those who try and fail, while those who do nothing are rarely even reprimanded, much less punished.

When evaluating the various management techniques, the assumption is erroneously made that doing nothing is environmentally neutral. In dealing with nonnative species like hydrilla, giant salvinia and Eurasian watermilfoil, the environmental consequences of doing nothing may be high, possibly even higher than any of the effects of management techniques. Unmanaged, these species can have severe negative effects on water quality, native plant distribution, abundance and diversity, and the abundance and diversity of aquatic insects and fish (Madsen 1997). Nonindigenous aquatic plants are the problem, and the management techniques are the collective solution. Nonnative plants are a biological pollutant that increases geometrically, a pollutant with a very long residence time and the potential to "biomagnify" in lakes, rivers, and wetlands.

Despite the views of some, there is no single cure-all solution to aquatic plant problems. For that matter, several of these techniques can be made to work to work for most aquatic plant problems, given enough time and money. None of these techniques are evil or inherently unacceptable; likewise, none of these techniques are without flaws or potential environmental impacts. It is up to each management group to select the most appropriate techniques for their situation given a set of social, political, economic and environmental conditions.



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## FROM THE PUBLISHER

### My point of view on House Bills #4463 and #4464



Don Winne

It is my opinion that House Bills 4463 and 4464 are based on illegal premises and should be defeated and committed to the trash barrel.

#4463 would place power in the hands of the local unit of government to issue permits for marinas and other activities.

#4464 provides for the seasonal mooring of boats, sunbathing, and lounging at the end of the road, street or alley. These two bills provide for non-riparians to seize public road-ends for their own private use.

Act #451 provides for the creation of a Department of Natural Resources charged with the duty to protect and conserve the natural resources of the state, and charged with adoption of rules to protect the public lands from molestation, spoilation, destruction and any other improper use or occupancy.

The title to the beds of navigable waters in Michigan is impressed with a public trust that the state may not surrender.

The Attorney General's opinion #7211, January 30, 2008, provided:

"While the Legislature has the authority to modify the law, any legislative modification of the judicially established rules of property law that have shaped the rights and expectations of property owners regarding the meaning of public use in the context of platted roads ending at the shore of a lake has the potential to impact existing property rights would be subject to the constitutional protections against the taking of property without due process and just compensation."

#### AQUATIC PLANT SURVEYS: A CRITICAL ELEMENT IN LAKE MANAGEMENT

Has it been one of those really "good" years for weeds in your lake? There are reports from a number of areas where folks have noted a surge in nuisance vegetation this year. Whether you are just beginning to formulate a plan for dealing with nuisance species or you've been at it for years, don't neglect a critical element of your management program – a detailed and independent aquatic vegetation survey. A vegetation survey is a very important first step that, surprisingly, some lake associations skip. Instead, some associations go right to an herbicide applicator, have them come out and look over the situation, and then let the applicator tell them what needs doing and how much it will cost. It's a little like opening up your checkbook and letting the contractor write the check. Because nuisance aquatic plants can be treated a number of different ways, it's really important to know exactly which plants are present, and the relative quantity and distribution of each type. For example, certain plants are amenable to treatment with certain herbicides; some aren't. Some nuisance plant species should never be managed using mechanical harvesting, but harvesting may be a great option for others.

A detailed vegetation survey will identify the plants present and map them using GPS equipment and geographic information (GIS) or CAD software. These maps will serve as a baseline for future management efforts. A detailed and independent aquatic plant survey can save an association money and minimize environmental impacts by ensuring that only those areas requiring treatment are actually treated. The vegetation survey report can also serve as the basis for a bid package for aquatic plant management services. By making sure that potential contractors are all on the same page, you help ensure the best possible service for the dollars spent. Additionally, accurate cost estimates at the start are critical if your association plans to assess residents a set amount over a period of years. Late summer and early fall is the best time of year for performing these surveys. EnviroScience, a company that works with many MLSA lake associations, is one option for this type of service. You can visit [www.enviroscienceinc.com](http://www.enviroscienceinc.com) for more information.



# Zebra mussels and blue-green algae: a toxic link?

Zebra mussels (*Dreissena polymorpha*) are small mussels native to the Caspian Sea region of Asia. They are believed to have been transported to the Great Lakes via ballast water from a transoceanic vessel. The ballast water, taken on in a freshwater European port, was subsequently discharged into Lake St. Clair, near Detroit, where the first mussels were discovered in 1988. Since that time, they have spread to all of the Great Lakes and a growing number of U. S. and Canadian inland waterways. They have spread south down the Mississippi River and eastward to the Hudson River.

Most zebra mussels are thumbnail-sized, but they can reach up to 2 inches long in their two-year life span. The adult mussels form colonies of hundreds of thousands per square meter on hard underwater surfaces such as docks, boat hulls, commercial fishing nets, buoys, water intake pipes, native mollusks and other zebra mussels.

The mussels' ability to populate a body of water quickly is due to a high reproductive rate and a limited number of natural enemies. Diving ducks and freshwater drum eat zebra mussels but have not significantly controlled them.

Zebra mussels have disrupted water withdrawal operations by clogging water intake pipes. This has caused serious problems in the Great Lakes region, where about 655 billion gallons of Great Lakes water are withdrawn each day for use by more than 25 million people, thousands of crop and livestock farms, hundreds of lakeshore industries, and dozens of nuclear and fossil fuel power plants. The U. S. Fish and Wildlife Service forecasts \$5 billion in losses over the next decade to manufacturing, power and municipal water intake facilities that use Great Lakes water because of zebra mussel infestations.

Zebra mussels also affect the quality of the water. One zebra mussel can filter 1 liter of water per day. Dense colonies of mussels filtering tiny floating plants and animals (plankton) from the water are believed to cause increased water clarity in some areas. In the western basin of Lake Erie, water clarity has increased by 77 percent, or to 20 feet.

In addition to all the other problems that zebra mussels cause, MAES scientists are concerned about a possible link between zebra mussel infestation and subsequent blooms of toxic blue-green algae.

"If cyanobacterial [blue-green algae] blooms are a common side effect of zebra mussel in-



PHOTO BY CARRIE SCHEELE

After the research project at Gull Lake was completed, the plastic boards were thoroughly cleaned of zebra mussels. The experiment will be repeated and data will be taken in the same year, instead of over two years, for more accurate analysis.

vasion, then hard-fought gains in the restoration of water quality may be undone," said Orlando "Ace" Sarnelle, fisheries and wildlife scientist, who is studying the relationship between blue-green algae blooms and zebra mussels.

"The numbers of cyanobacterial blooms in Michigan have been increasing and appear to be correlated with the spread of zebra mussels," said Joan Rose, MAES-affiliated fisheries and wildlife scientist, and holder of the Homer Nowlin Chair in Water Research. She and Sarnelle are working together and with other researchers around the state to investigate this link.

## BLUE-GREEN ALGAE: BACTERIA

Correctly known as cyanobacteria, blue-green algae are quite small, one-celled creatures with the potential to form colonies large enough for humans to see. They live in the water, where they manufacture their own food through photosynthesis. Cyanobacteria have been on the Earth for billions of years — they have the distinction of being the oldest known fossil at more than 3.5 billion years old. Several species of cyanobacteria — including *Anabaena*, *Aphanizomenon*, *Microcystis* and *Oscillatoria* — produce toxins that are harmful to people and animals that drink water with cyanobacteria in it.

"Several cases of blue-green algae toxicosis in domestic animals have been recorded," Rose said. "A number of cattle died in a herd of 175 Hereford-Angus cattle in Burlington, Colo., after ingesting water containing an algal bloom. In February 1996, 52 patients at a dialysis center in Caruaru, Brazil, died

from a syndrome now known as Caruaru Syndrome. High concentrations of microcystin toxins were detected in the water used for treatment."

In a healthy cyanobacterium cell, the toxin is typically contained in the cell. But when the cell is damaged or killed, such as when the water is treated with chlorine to ensure it is safe to drink, the toxin is released into the water. This makes increased numbers of blue-green algae blooms an issue for those who regulate the safety of drinking water supplies. Blue-green algae also have the ability to form large, scummy blobs on the water's surface.

"Blue-green algae are famous for their scum-forming ability," Sarnelle said. "If the wind blows it to the edge of the lake and a big collection of scum forms, that is often a problem for animals that drink from the lake. If a dog took a drink from the spot where the scum was, it would soon keel over dead. It's very toxic."

According to Sarnelle, research has long demonstrated that summer blooms of harmful cyanobacteria typically occur in lakes with an excess of nutrients in them, particularly phosphorus. To reduce the cyanobacterial blooms, lake managers have spent much money and effort to reduce the amount of nutrients flowing into lakes. But new data suggest that phosphorus may not be the only trigger for cyanobacterial blooms.

"For example, Lake Erie, which at one time was highly impaired, has undergone a major reduction in point-source phosphorus loading," Sarnelle explained. "Recent data from

*continued on page 19*



## Lake Missaukee in Missaukee County

Lake Missaukee is approximately 1,880 acres (2.94 sq miles) in size, and is located in glacial terrain which is characterized by several kettle lakes, low to rolling topography, abundant wetlands, and numerous state forests. The lake developed from a relatively large block of glacial ice about 14,000 years ago. Glacial outwash from the Late Wisconsin Glacier provided the sandy-gravelly sediments which characterize the low bluff and sandy shorelines of the southern and eastern portions of the lake. Elsewhere, the soils consist largely of gravelly silts and clays, which are more conducive to wetlands and land remaining in woodlands.

About half of the water depths in Lake Missaukee are less than 10 feet, and the deeper parts of the lake occur in the eastern and southeastern areas of the lake. The maximum water depth is only 27 feet. Very shallow water along with soft, silty organic sediments characterize the western portion of the lake bottom, and about the western shorelines there are extensive wetlands and woodlands. In comparison, Lake City (the county seat) on the eastern shoreline, as well as most of the northern and southern shorelines, has numerous summer homes with sandy beaches and boat docks.

As a result of the low-lying and wetland nature of the land and shorelines about the western and northwestern portions of the lake, there is little residential or commercial development in those riparian areas of Lake Missaukee. No public sanitary system serves that western area, and few improved roads are present. Hence, the western portion of the lake and its surrounding riparian properties are more amenable to recreation uses and open space than to residential and other more intensive development.

The level of this freshwater and somewhat shallow lake is controlled. A water outlet (weir) structure was placed on the east shore of the lake in 1974 to address very high lake levels at the time and to comply with a 1947 ruling setting the legal lake level at 1,238.5 feet above sea level.

Available data indicate that Lake Mis-

saukee is supplied with water originating from both groundwater springs as well as from runoff from the adjacent watershed. The springs largely occur about the low bluff shorelines, or along sandy shorelines. The porous sands and gravels readily transmit the groundwater to the lakeshore. Surface runoff is also most important. Since the watershed about Lake Missaukee, i.e., the area of the land that drains into the lake, is only 1,775 acres (2.77 sq miles), the lake (1,880 acres) is slightly larger than its watershed. As a result, large seasonal water-level fluctuations due to runoff from storms and snow melt do not occur as in lakes with larger watersheds or drainage areas. Furthermore, a noted limnologist calculated the flushing rate to be nine years for this lake. Hence, it would take nine years or so for the lake to completely exchange its normal water volume.

With regard to surface runoff into the lake, much of this runoff originates on the western and northwestern sides of the lake. Water in the two small lakes west of Lake Missaukee - Crooked Lake and Lake Sapphire - passes through wetlands as the water drains toward Lake Missaukee. As this runoff passes through the wetlands, the runoff picks up particulate and dissolved organic matter as well as nutrients derived from the decomposing plants.

Aquatic plants on the lake bottom, provide for a productive fishery along with diverse wildlife populations along the undeveloped shorelines. The fish populations include forage minnows, as well as abundant game fish such as walleye, largemouth bass, northern pike, and bluegill. A pair of common loons nests along the shorelines of western Lake Missaukee, and bald eagles are commonly observed in that area, as well.

The low flush rate of the lake, combined with the planned development of a previously wild area at the west end of the lake resulted in the formation, in 1997, of Missaukee Lakes Association (MLA). The association's first order of business

was to establish a consistent program of lake water testing, which did not exist at the time. After considering the option of handling this through volunteer efforts, it was decided to hire a professional company (Professional Lake management of Caledonia) to be assured of consistent sampling and analysis. Since 1997, the association has funded testing at three locations on the lake three times a year. Test data is available at the association web site, [www.missaukeelakes.org](http://www.missaukeelakes.org).



In the summer of 2001, Eurasian milfoil was discovered in the boat launch lagoon at Missaukee County Park. This was a relatively contained area with a channel into the main body of the lake. With the

cooperation of the park, MLA funded the treatment and control of the milfoil in the lagoon for several years.

We knew the milfoil would inevitably spread to the main body of the lake, and when it did, it was again discovered during the water sampling program. With the help of many local groups, as well as Professional Lake Management, MLA pushed for the quick formation of a lake board with the authority to start treatment and levee taxes to pay for it. Treatment started the same year, based on tax revenues yet to come to pay for it. This quick action kept a big problem from becoming an even bigger one.

Like many lake associations, MLA suffers to some degree from apathy. Many people seem not ready to become involved until a serious problem becomes evident. Our mission is to prevent problems from becoming serious, and as our membership slowly continues to grow, we are more committed than ever to the protection of this lake and its fragile ecosystem.



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## Jackson County Road Commission adopts policy regarding road-ends

In June of this year, the Board of Jackson County Road Commissioners implemented a policy regarding roads terminating at navigable waters.

The policy states that:

❑ Publicly dedicated streets and roads under the jurisdiction of the Jackson County Road Commission that terminate at the end of navigable waters are generally deemed to provide ingress and egress to said waters. Without a specific designation, the public does not have the right to erect structures or obstruct access to roads ending at navigable waters. The public, however, has the right to anchor boats, rafts and have a right to use the surface of the water in a reasonable manner of such activities as boating, fishing and swimming.

❑ Construction of docks is prohibited at public roads ending at navigable waters unless authorized by the Jackson County Road Commission.

❑ Overnight storage of boats, rafts, and watercraft is strictly prohibited at the public docks erected at the end of public roads, except for temporary storage of disabled boats.

❑ A person shall not moor a vessel overnight on bottomland directly offshore from the public access and/or a public dock.

❑ A public road terminating at the

water's edge of a lake or stream can not be altered, improved or maintained in any manner without first obtaining permission from the Jackson County Road Commission.

❑ Any person violating this policy will be notified in writing or by posting of said violation and given 10 days to remove such violation. After 10 days, the Jackson County Road Commission may remove any structural object, whether permanent or temporary, placed without a permit within the county road right-of-way. The road commission may recover from the property owner(s)/occupant(s) any costs that it incurred in the removal of the object.

For more information, visit [www.jcrrc-roads.org](http://www.jcrrc-roads.org).

## SAVE THE DATE

Plan now for Michigan Lake & Stream Associations, Inc.,'s 48th Annual Conference, scheduled for April 24-27, 2009, at Houghton Lake.



## Am I a lakefront property owner?

**By Clifford H. Bloom, Esq.**  
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Doesn't someone asking if they are a lakefront property owner seem like a bizarre inquiry? After all, shouldn't it be pretty obvious whether or not a person owns riparian property? No, not necessarily. There is, sometime, the matter of the "gap."

What might appear at first glance to be a lakefront property is, in some instances, a property actually separated from the waters of an inland lake in Michigan by a gap of land. That gap can be a strip of land owned by someone else, a road right-of-way which runs parallel to the shoreline, or a variety of dedicated properties that run parallel to the shoreline such as a walkway, alley, narrow park, beach, or outlot. So, if there is a lot or parcel located very close to a lake but it is separated from the lake by one of these "gaps," doesn't that prevent it from being a lakefront or riparian property? Not necessarily.

If a lot located near or immediately adjacent to a lake was truly separated from the waters of the lake when it was created by a strip of land owned by some other party, the nonwaterfront lot is not lakefront or riparian, and being close to the water does not make it riparian. In other words, ownership of a strip of land by someone else located between the waters of a lake and a lot prevents the lot from being a riparian property. Riparian property must physically touch the body of water involved, at least when the riparian parcel or lot was created.

However, there are some instances in which a lot appears to be separated from a body of water by a gap which is something other than a normal strip of land does not prevent the lot from being riparian. The Michigan appellate courts have held that in a platted subdivision

where a lot is shown on the original plat as being separated from the waters of an inland lake by a dedicated parallel road, walkway, park or beach, the lot is normally deemed to be lakefront or riparian. See *Croucher v Wooster*, 271 Mich 337 (1935) (parallel public road); *Dobie v Morrison*, 227 Mich App 536 (1998) (parallel narrow park); *Thies v Howland*, 424 Mich 282 (1985) (parallel walkway); *McCardle v Smolen*, 404 Mich 89 (1978) (parallel

**Ownership of a strip of land by someone else located between the waters of a lake and a lot prevents the lot from being a riparian property.**

road) and *Magician Lake Homeowners Assn v Keeler Twp* (unpublished decision of the Michigan Court of Appeals dated July 31, 2008; Case No. 278469) (parallel narrow beach). In most cases, the side lot lines of the lot are deemed to go "through" the platted road right-of-way, park, beach, or walkway and to the waterline which was applicable when the plat was created. Of course, the portion of the lot underlying the dedicated road, walkway, beach, park or other dedicated item is still subject to an easement for road, beach, park, etc., usage.

What are the usage rights for the owners of a "first tier" lot, as well as members of the general public or other property owners within the plat, in which a dedicated road, park, beach or walkway runs parallel with the shoreline between the lake and the lot at issue? First, although a lot in that situation is normally deemed to be riparian, it is subject to what is in essence an easement for road, park, beach or walkway use. Accordingly, the owner of the riparian lot cannot do anything which would unreasonably interfere with such road, walkway, beach or park

use. Generally, that would still permit the riparian property owner to install a dock, moor boats, swim, sunbathe, etc. Second, the usage rights of the public or backlot owners as to the easement comprising the road, walkway, beach or park are normally quite limited. Courts have generally held that members of the public (or other property owners within the plat if the item was only dedicated to the use of lot owners within the plat) do not normally have the right to install docks, moor boats, or keep rafts. Depending upon what type of easement is involved, members of the public or other property owners within the plat might have the right to use the lake access device for sunbathing and lounging, but not in

all cases. In most cases, members of the public (and in some cases, just lot owners in the plat) have the right to walk, swim, fish, hand-launch small watercraft, and briefly moor a boat (for drop-off, pick-up, or similar brief excursions).

What is a lot owner to do if there truly is a strip of land (not just a right-of-way or easement) located between the lake and the owner's lot, which is owned by someone else? If the ownership clearly remains with another person or entity, then the lot owner is not a riparian or lakefront property owner. What if the ownership of the strip of land is unknown or its title has not formally passed down through the years to the heirs of the original owner of the intervening strip of land? Those are exceedingly difficult cases. Sometimes, the owner of a first-tier lot can claim ownership to the intervening strip of land (and hence, riparian status) by the doctrine of adverse possession. (That is, they and/or the predecessors have adversely possessed a strip of land and its bottomlands for 15 years or more.) But in many cases, the "first-tier" lot is simply not riparian.

# Important appellate case decision

On July 31, 2008, the Michigan Court of Appeals released a very important decision in *Magician Lake Homeowners Assn, Inc v Keeler Twp Bd of Trustees* (unpublished decision; Case No. 278469), which confirms that the usage rights for off-lake property owners with regard to dedicated parks and beaches are quite limited.

The Magician Lake Homeowners Assn – an association comprised of backlot property owners – challenged the Keeler Township ordinance which requires township approval for docks at common access sites and prohibits the overnight mooring of boats at such docks. The backlot owners asserted that the ordinance constituted an unconstitutional “taking” of their property rights, as they claimed they had the right to maintain docks (with permanent boat moorings) at the dedicated areas within the plat labeled as parks and beaches. The Court of Appeals held that the backlot owners had no right to maintain docks or boats at the dedicated parks or beaches or along the bottomlands thereof. The Court of Appeals

noted that the users of those beaches and parks are not riparian property owners, and as such, do not have the full range of riparian rights such as the right to maintain a dock and moor a boat. Since the backlot property owners did not have the right to install docks or moor boats overnight at the parks or beaches, the ordinance was valid because it did not take away any of their rights.

This case is particularly important since it confirms that the “temporary” mooring or anchoring of a boat does not include overnight mooring or docking, which would constitute permanent boat mooring.

The Court also discussed what evidence and testimony a court can consider for ascertaining the intent of the developer who created the plat when the easement or dedication at issue is ambiguous. If, in fact, a court finds easement language or a dedication to be unambiguous, no evidence of the original intent can be introduced, whether it be testimony, past practice, promotional materials, or other

“extrinsic” evidence. The Court of Appeals confirmed that the only evidence which is relevant (and hence, admissible) to show the original intent of the plat creator to prove the scope of usage rights for the easement or dedication at issue involves evidence which occurred at the time the plat was created or shortly thereafter. In other words, if a plat was created in 1950, photographs or testimony about dockage or boat mooring occurring in the 1980s or 1990s would normally be inadmissible, even if the easement language or dedication were ambiguous. In order to be admissible, the party attempting to introduce a photograph or testimony would have to demonstrate that it was from the era of 1950 (when the plat was created) or shortly thereafter. Unfortunately, a significant number of judges throughout the state improperly consider evidence of customs or uses which occurred many years after the plat or easement was created.

By Clifford H. Bloom  
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## Michigan Waterfront Alliance

### A unified voice to protect Michigan's Lakes and Streams.



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☐ I am not ready to join yet. Please send me more information.



# MICHIGAN LAKE & STREAM ASSOCIATIONS, INC.

## MLSA NEWSLETTER



### MLSA Newsletter Notes

Increasing costs for production and mailing have contributed to a big change for the Michigan Lake & Stream Associations Newsletter, which has been published quarterly for more than two decades. The newsletter now appears as a special section, which you see here, in The Michigan Riparian Magazine.

Many articles are taken from the newsletters of individual lake associations. If you would like articles from your newsletter to be considered for publication, please send a copy of your newsletter to the MLSA Editor, 5660 Woodland Ave., Watervliet, MI 49098. If possible, please e-mail it to [delavan1122@comcast.net](mailto:delavan1122@comcast.net).

– Delavan Sipes, Newsletter Editor

### Those Old Prescription Drugs

Once upon a time, we were told to flush unused or outdated prescription drugs down the toilet drain. Now we are learning that there are dangers to doing so.

Dozens of pharmaceuticals course through the nation's waters in unknown concentrations and scientists say it is unclear how they impact aquatic organisms. Some have been linked to adverse ecosystem changes, including mutations in fish, birds and amphibians. For most of these compounds, no health guidelines exist for the nation's waters, and little is known about the reactions that may occur in such complicated mixtures.

Wastewater treatment plants remove conventional pollutants such as feces, as well as other suspended solids and biodegradable organic material. They do not remove synthetic pollutants such as pharmaceuticals. Chemicals as common as caffeine and birth control hormones, and as powerful as cancer-fighting drugs, are routinely dumped into waterways. The human body typically does not absorb all of a drug that is taken or administered, but passes on the excess in urine, so it ends up in our water.

According to a 2002 United States Geological Survey, such contaminants were found in 80% of the streams sampled, with an average of seven different contaminants found in a given sample. Subsequent studies identified approximately 100 pharmaceuticals in waterways throughout the United States and Europe.

The two largest sources of pharmaceuticals entering the sewer systems are believed to be hospitals and households. Flushing drugs down the toilet is not environmentally safe. Similarly, disposing of non-hazardous waste in landfills should be avoided.

Some local household hazardous waste programs offer special collections for unused and expired drugs. Some pharmacies accept medications from the public. If you live in a community where these are available, they are the best way to dispose of the drugs from your home.

If you cannot find a local disposal program, follow the guidelines from the federal and state agencies. In general, the guidelines specify the following:

- Never flush prescription drugs down the toilet
- Destroy and make unusable the medication, then dispose of it in the trash.
- Place spoiled medications in an impermeable container, or double bag in sealable plastic bags to further ensure that the drugs are not accidentally spilled.
- Remove, or make unreadable, all personal information on the drug label.
- Dispose of the spoiled drugs in the trash.

For specific guidelines, go to [www.whitehousedrugpolicy.gov/publications/pdf/prescrip\\_disposal.pdf](http://www.whitehousedrugpolicy.gov/publications/pdf/prescrip_disposal.pdf)

Or go to [www.deq.state.mi.us/documents/deq-ess-cau-rxbrochure.pdf](http://www.deq.state.mi.us/documents/deq-ess-cau-rxbrochure.pdf).

*Source: Pentwater Lake Association Newsletter  
Karen Jona, Michigan Pharmacists Association  
Molly Polverento, Michigan Environmental Council  
Winter 2008 Michigan Environmental Report*

### Maston & Muskegon Lakes' Project Successful

In 1996, we became aware of a proposed development of a site condo project on Muskegon Lake; approximately 125 homes (77 homes in the first phase) Developers wanted to use a "funnel point" so lots could be sold with "lake access."

Maston and Muskegon lake association members acted by doing the following:

- Attended township meetings
  - Held discussions at meetings regarding property owners' concerns
  - Gathered information from other sources including: MDEQ, Kent County Road Commission, Kent County Health Department, West Michigan Environmental Action Council, and township clerks from surrounding townships.
  - Obtained copies of ordinances from across the state of Michigan.
  - Prepared draft of a proposed ordinance against funneling and submitted it to Spencer Township.
  - Spencer Township approved the redrafted anti-funneling ordinance.
  - After eight months of hard work by association members (especially Beth Ballard), access to Muskegon Lake was limited to the 15 lakefront lots.
- SUCCESS!!!**

*Source: M&M Environmental Association Newsletter*

*MLSA Newsletter continued on page 16*

# MICHIGAN LAKE & STREAM ASSOCIATIONS, INC.

## MLSA NEWSLETTER



### DNR Fishery Resource Report

Any remaining riparian wetlands adjacent to Lake Margrethe should be protected as they are critical to the continued health of the lake's fish community. Unwise riparian development and wetland loss in the future will result in deterioration of the water quality and fisheries habitat. Healthy biological communities in inland lakes require suitable natural habitat. Human development within the lake watershed, along the shoreline, and in the lake proper has a tendency to change and diminish natural habitat.

Appropriate watershed management is necessary to sustain healthy biological communities, including fish, invertebrates, amphibians, reptiles, birds and aquatic mammals. Generally for lakes this includes maintenance of water quality, especially for nutrients; preservation of natural shorelines, especially shore contours and vegetation; and preservation of bottom contours, vegetation, and wood debris within the lake. Guidelines for protecting fisheries habitat in inland lakes can be found in the Fisheries Division Special Report 38 (O'Neal and Soulliere 2006).

*Source: The Ripples; Lake Margrethe Newsletter*

### Want to be a Leader?

#### Lake & Stream Leader's Institute Helps

Michigan's water resources include more than 11,000 lakes and ponds and 36,000 miles of streams. Many of these lakes and streams have excellent quality and substantial economic and recreational value. However, most of these waters have no strategic plan to guide their development and use. As use demands grow, these waters will be increasingly susceptible to overuse and environmental degradation. The solution lies with collaborative management partnerships among the state agencies, local governments, natural resource organizations and citizen stakeholders.

Unfamiliarity with water resource science and management options and lack of experiences needed to be local leaders and managers hinders progress in preventing water degradation.

To meet this need, Michigan State University (MSU) Extension's Water Quality Area of Expertise (AoE) Team and MSU Fisheries and Wildlife Department partnered with the nonprofit organizations Michigan Lake & Stream Associations, Inc., and the Paul H. Young Chapter of Trout Unlimited to sponsor the Lake and Stream Leader's Institute.

The Institute's goal is to develop local land and water resource leaders who will promote lake, stream and

watershed management partnerships with state natural resource agencies and encourage and instruct other citizens in resource management.

Institute classes have been held annually since 2002. You can register now for the class in 2009! First is a one-day class on May 16 at the Ralph A. MacMullen Center on Higgins Lake. The second session will be a three-day session (July 30-Aug 1) at the Kellogg Biological Station (KBS) near Kalamazoo, studying local lakes and streams. The final session is scheduled for October and will be held at the Bengel Wildlife Center in Bath. Following graduation, there is an annual one-day symposium to offer alumni a chance to learn about current development in water resource science and management, to have new field experiences and to participate in informal discussions.

For more information about the institute, contact Dr. Jo Latimore at MSU at [latimore1@msu.edu](mailto:latimore1@msu.edu) or call 517.432.1491. Or contact Pearl Bonnell at MLSA at [pbonnell@mlswa.org](mailto:pbonnell@mlswa.org) or call 987.257.3582. For more information, visit [web1.msue.edu/waterqual/lakeleaders.html](http://web1.msue.edu/waterqual/lakeleaders.html).

## TOP 10

### Most Abundant Marine Debris

- Cigarettes & cigarette butts
- Plastic bags
- Caps and lids
- Food containers & wrappers
- Cups, plates, forks, knives
- Plastic bottles
- Straws and stirrers
- Aluminum cans
- Diapers
- Rope

Many of these items take hundreds of years to decompose; some cause fish and other wildlife to become sick and die. Do your part to keep all of the above out of our beautiful lakes!

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**– Calendar Alert –**  
**April 24-25, 2009**  
**MLSA Annual Conference**  
**Comfort Inn Lakeside**  
**Houghton Lake, MI**

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*MLSA Newsletter continued on page 17*



# MICHIGAN LAKE & STREAM ASSOCIATIONS, INC.

## MLSA NEWSLETTER



### Benefits of Land Protection

Do you own riparian property that can be subdivided ... or protected? Instead of selling your property for the appraiser's "highest and best use," a subjective phrase that always puts money before quality of life, consider the benefits to yourself and the public by protecting the land in some fashion.

In Michigan, there are significant potential tax savings that help owners of conservation-easement-protected properties. A bill passed in the Michigan legislature in December 2006 eliminates the pop-up reassessment of the land whenever it changes hands. Property taxes on most land in the state can increase only at the rate of inflation or 5% annually, whichever is less, but when property changes hands through a will or sale, the land is reassessed and taxes can increase dramatically. The 2006 state law eliminates this reassessment on conservation-easement-protected lands. This reassures families and successive landowners that property taxes won't increase at a rate greater than 5% or the rate of inflation. This law affects all conservation-easement-protected lands, regardless of when the easement was placed on the property. Buildings are not included and remain subject to the pop-up tax.

Properties adjacent to protected lands often increase in value. A survey by the National Association of Homebuilders revealed that new-home buyers' top priority, over any other amenity, is nature trails or natural areas. Your home may be more valuable if you decide to protect land around it. Perhaps protecting it with a conservation easement may be the best option for you.

If you help protect land in your neighborhood, it becomes a quieter area. There is less light pollution. Overall, the quality of life is better when natural areas are nearby. If you donate land or a conservation easement to a conservancy, you should qualify for tax deductions; estate income and property taxes are affected by such gifts as long as they meet IRS criteria.

Studies done throughout the United States show that there is a reduction of government spending when keeping working/open lands as they are. New housing areas call for infrastructure and services that cost more than the revenue they generate. A "Cost of Community Study" published by the America Farmland Trust in 2002 revealed that residential land use cost was \$1.55 for every \$1.00 collected. Tax increases subsidize the difference. So that means we help pay for new subdivisions indirectly. On working and open lands, the study showed that they cost \$0.36 for every \$1.00 collected. County and township services are in less demand on protected lands.

Consider the public and personal benefits of placing land in a Conservation Easement instead of selling for so called "highest and best use."

*Source: The Wallooner; Newsletter of the Walloon Lake Association & the Walloon Lake Trust and Conservancy*

### EDITORIAL:

#### "We Have Met the Enemy, And He is Us!" – Pogo

Walt Kelly first used the quote on a poster for Earth Day in 1970. Pogo was an opossum. Walt Kelly was a cartoonist who enlivened Pogo with succinct and acerbic political commentary.

How often, in our zeal to protect the environment, do we find that we are our own worst enemy? It is likely that the more common error is that we attempt to get the cooperation of other people who don't have the slightest idea what we are trying to do. The result is that cooperation is not forthcoming. Often, because of a lack of understanding, there is opposition. Where did we go wrong?

People, in general, prefer a comfortable, and quiet existence where they can pursue happiness in their daily living, whether it is work or recreation. Along comes some bloke who says, "We need to change this whole thing," and the immediate reaction is, "Why?"

If the response is, "Because it's important," the argument is lost. No one is going to exchange a comfortable, quiet existence pursuing their happiness to beat a drum for a cause "just because it is important." This is where we have "met the enemy and he is us," because we have not addressed the needs of the people whose cooperation we desire.

What have we done wrong? We have not provided our potential helper with the information which we already know. He, or she, needs to be given the information that convinced us for the need for our goal. Those we are soliciting need to be informed, educated.

The difference between a cooperative helper and an angry obstructionist is the difference between those who understand the problem and the potential resolutions and those who have no idea why you are trying to do what it is you are doing.

It is imperative, with any new project, that education precede efforts to obtain support; lengthy, detailed explanations of the problem and why you want to pursue a particular solution. On your next project, work for resolution, not opposition.

*--Delavan Sipes, Editor, MLSA Newsletter*



*MLSA Newsletter continued on page 18*

# MICHIGAN LAKE & STREAM ASSOCIATIONS, INC.

## MLSA NEWSLETTER



### GIFTS TO MLSA FOUNDATION ARE TAX DEDUCTIBLE

The Michigan Lakes & Streams Foundation is a non-profit 501 c 3 corporation. All gifts to the Foundation are deductible from your federal income tax. Please join us today to help our children, and their children, to enjoy the same, or better, water resources than we enjoy today.

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## MiCorps: Michigan Clean Water Corps

### ABOUT MICORPS

The Michigan Clean Water Corps (MiCorps) is a network of volunteer monitoring programs in Michigan. It was created through an executive order by Governor Jennifer M. Granholm to assist the Department of Environmental Quality (DEQ) in collecting and sharing water quality data for use in water resources management and protection programs.

### MICORPS MISSION

The MiCorps mission is to network and expand volunteer water quality monitoring organizations statewide for the purpose of collecting, sharing and using reliable data; educate and inform the public about water quality issues; and foster water resources stewardship to facilitate the preservation and protection of Michigan's water resources.

### STREAM MONITORING PROGRAM

MiCorps provides technical assistance and grants to local units of government and nonprofit entities for water quality monitoring in wadable streams and rivers through the Volunteer Stream Monitoring Program. Each year, up to \$50,000 is available for volunteer monitoring grant awards. The monitoring typically includes an evaluation of benthic invertebrate communities and stream habitat, but it also may include the collection and chemical analysis of water samples. MiCorps staff provides training, support, and assistance with developing quality assurance project plans to the grantees, helping them to

reach a professional level of monitoring. The resultant data will be used by the DEQ as a screening tool to identify sites requiring more detailed assessment and as supplemental data for DEQ water resources management programs.

### COOPERATIVE LAKES MONITORING PROGRAM (CLMP)

The CLMP, the second oldest volunteer lakes monitoring program in the country, has been an important component of Michigan's inland lakes monitoring program for more than 30 years. The primary purpose of the CLMP is to help citizen volunteers monitor the water quality of their lakes and document changes in lake quality over time. CLMP participants collect data on a variety of different parameters including: Secchi disk transparency; total phosphorous; chlorophyll a; dissolved oxygen; temperature; and aquatic plant identification and mapping. MiCorps staff provides training and support to volunteers. The MLSA administers this program under MiCorps.

### WEBSITE

The MiCorps website, [www.micorps.net](http://www.micorps.net), is the information center for volunteer monitoring programs in Michigan. This site contains information about MiCorps and its grants programs; a water quality data exchange platform; a directory of Michigan monitoring groups; resources for water quality monitoring; information on quality assurance; and more.

### LISTSERV

The MiCorps email listserv facilitates the exchange of information and ideas between volunteer monitoring program leaders, volunteers and resource professionals - all on volunteer monitoring issues specific to Michigan. Anyone who subscribes to our listserv can contribute information or pose questions to other subscribers on topics relevant to volunteer mentoring and water resource management and protection in Michigan.

### CONFERENCE

MiCorps hosts an annual conference to report on volunteer monitoring activity and progress in the state. Training is provided at the conference for interested volunteer coordinators. It provides excellent opportunities to stay up-to-date on methods and to meet and interact with other volunteer monitoring organizations.

### NEWSLETTER

MiCorps publishes a semiannual newsletter to report on volunteer monitoring activities in Michigan. Newsletters include technical information relating to monitoring, and also feature policy discussions and profiles of specific volunteer monitoring activities.

### CONTACT INFORMATION

For more information, contact Great Lakes Commission Project Manager Ric Lawson at 734-971-9135 or [rlawson@glc.org](mailto:rlawson@glc.org).



... continued from page 10

the western basin indicate that phosphorus levels are currently low enough that cyanobacteria should not be the main type of algae bloom occurring over the summer. However, intense cyanobacterial blooms have been reported since the establishment of zebra mussels. Similarly, data from the Bay of Quinte in Lake Ontario show a dramatic increase in the biomass of the cyanobacterium *Microcystis aeruginosa* after zebra mussel establishment.

"Toxic algal blooms in the Saginaw Bay and Lake Erie are disturbing because they come after many years of expensive reductions in nutrient loading to improve water quality," Sarnelle concluded.

"The EPA is concerned about blue-green algae toxins," Rose added. "The toxin has been on the contaminant candidate list for five years. The EPA is examining the toxin's effects on human health at various levels and will then decide if regulations are needed."

Rose pointed out that Canada already has regulations/guidelines on cyanobacterial toxins, as does the World Health Organization. "With more blue-green algae blooms, people are being exposed to higher levels than Canadian regulations permit," Rose said. "People thought that blue-green algae would be a problem in the South, not in northern states. We need research to study how and when the algae produce the toxin. Is there a way to stop the algae from producing the toxin?"

**UNTANGLING THE CAUSE AND EFFECT**  
Determining the relationship between zebra mussels and blue-green algae blooms is anything but straightforward. The number of variables is high and scientifically sound data are sometimes difficult to find.

"Data on blue-green algal blooms are hard to get — a lot of it is anecdotal," Sarnelle explained. "I hear things like, 'There wasn't any, now we see a lot.'"

So Sarnelle and his colleagues conducted a survey of inland lakes in Michigan and found the presence of zebra mussels cancelled the expected relationship between high phosphorus levels and increased blue-green algae blooms. They believe this influence is due to an interactive effect of the zebra mussels and the level of phosphorus in the lake on the blue-green algae.

"There was a dramatic positive influence of zebra mussels on the amount of blue-green algae in lakes with phosphorus levels between 10 and 25," Sarnelle explained. "Most of the shallow-water habitats in the Great Lakes have phosphorous levels in this range."

*M. aeruginosa* made up as much as 86 percent

of the algae in lakes with these phosphorus levels that had zebra mussels. In lakes that had phosphorus levels higher than 25, the zebra mussels had no effect on the amount of blue-green algae.

"Our hypothesis was that in lakes with low to medium phosphorus levels, zebra mussels had a high effect, meaning there would be more blooms. In lakes with high phosphorus levels, the zebra mussels would have a low effect, meaning fewer cyanobacteria blooms," Sarnelle explained. The scientists went to the Kellogg Biological Station on Gull Lake at Hickory Corners to test their theories experimentally. Gull Lake has low to medium phosphorus levels and has been infested with zebra mussels since 1994. The researchers anticipated finding a strong positive effect of zebra mussels on blue-green algae. What they found, however, was that there was less blue-green algae where there were more zebra mussels.

"That made us shake our heads," Sarnelle said. "But when we reviewed all the data, we noticed that the phosphorus levels in Gull Lake were extremely low compared to other Michigan lakes we had surveyed. Gull Lake had a phosphorus level of 6, and most lakes in Michigan are between 10 and 25."

So they decided to find out what would happen if the phosphorus levels were brought up to between 10 and 25. Would their original theory be supported?

"A year later, we brought the levels up and we saw the anticipated positive effect on cyanobacteria," Sarnelle said. The scientists now had experimental evidence to back up their survey results that phosphorus levels affect the zebra mussel-cyanobacteria relationship. This might explain why some lakes showed a strong correlation between the two and others did not.

But many questions remain. The scientists are looking at when a lake was invaded by zebra mussels and how long after that a blue-green algae bloom occurred. "We don't have enough data on that yet," Sarnelle said. "We don't see any patterns so far. The size of the system may affect that relationship. In Gull Lake, it took only two years for blue-green algae to bloom, while in Lake Erie, it took six."

Sarnelle is planning his next experiment, looking at the interactive effects of zebra mussels and phosphorus levels on *M. aeruginosa*, all in the same year, rather than a year apart as in his previous project.

"That will allow us to compare apples to apples," he said. "Our first project offered some interesting data, but because it was done in two different years, we can't be absolutely sure another variable didn't alter the results."

Another twist that may affect the zebra mussel-cyanobacteria relationship is the fact that zebra mussels eat *M. aeruginosa* at varying rates.

"Zebra mussels are herbivores, so they will eat blue-green algae," Sarnelle said. "But we don't know why they eat it in differing amounts. The zebra mussels in Lake Oneida in New York appear to like the blue-green algae and eat a lot of it. In Lake Erie, the zebra mussels don't eat the algae."

Sarnelle speculated that size may play a role. *M. aeruginosa* has small cells but forms large colonies. Because they are filter feeders, zebra mussels select their food by size. So in lakes with large blue-green algae colonies, the zebra mussels may simply not be able to eat them.

After zebra mussels eat the algae, they convert it to food, ammonia and phosphorus. The ammonia and phosphorus are excreted as waste into the water.

"But if the phosphorus levels in the water are very low, the zebra mussels don't excrete much phosphorus," Sarnelle explained. "They keep it because they need it to grow. *M. aeruginosa* really needs phosphorus. So this may also be a factor in the relationship. If the phosphorus levels are extremely low, it may decrease the growth rate of the blue-green algae, which may affect their potential to bloom."

#### PARTNERING AROUND THE STATE

The scientists are working with the Great Lakes Environmental Research Laboratory in Ann Arbor to study the zebra mussel-blue-green algae relationship in Lake Erie.

And Rose is just beginning to work with Tim Ervin, a researcher at the Water Studies Institute at Northwestern Michigan College, in Traverse City, and Meg Woller, stewardship director of the Leelanau Conservancy and coordinator of the Leelanau Watershed Council.

"Northwestern Michigan College's Water Studies Institute is collaborating with Joan and the Leelanau Watershed Council and Bowling Green University on a three-year study of the impact and public policy implications involving zebra mussel infestations in some high quality oligotrophic lakes, particularly in the Leelanau County area," Ervin said.

"Tim and Meg have trend data on blue-green algae in lakes before zebra mussels came," Rose said, "which is very important. There isn't a lot of that data. We want to see how we can work together on this project. I'm very interested in how a state university like MSU can help citizens at the local level."

— Jamie DePolo, originally published in the Spring 2004 issue of "Futures"

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## Ants sign of moisture problem

Carpenter ants coming into your home in the summer from a nest outdoors are a nuisance. Carpenter ants in your home year 'round are a sign of a bigger problem.

"Carpenter ants generally nest in wood that's already damaged by moisture," said Howard Russell, Michigan State University entomologist. "When that wood is in your home, you need to track it down and repair it."

A leaking roof or plumbing problems can set the stage for a carpenter ant infestation. Seeing carpenter ants indoors during the cold months is a pretty good indication that you have a nest in the home. And if you start seeing large (7/8 inch) winged ants, the colony has been under your roof for at least four years - long enough to have matured to the point that it produces the winged males and females capable of flying off and starting new colonies.

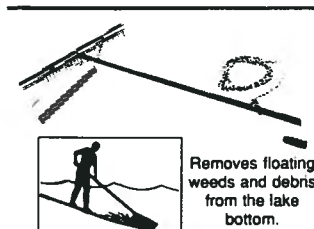
Tracking down the colony will lead you to the problem. Likewise, making repairs often exposes the nest. Treating the nest with an appropriately labeled insecticide and making the needed repairs eliminates the nuisance and preserves the value and structural soundness of your home.

To prevent carpenter ant infestations, prevent water damage to wood. Seal up openings to the outdoors through which ants might enter. Caulking, weather-stripping, and sealing cracks in masonry walls, foundations, and other openings where bugs could come in will help keep a host of casual invaders out, as well. It also reduces the flow of heated or cooled air outdoors and helps save energy.

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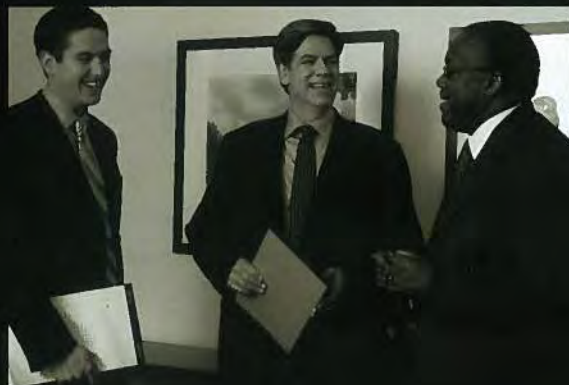
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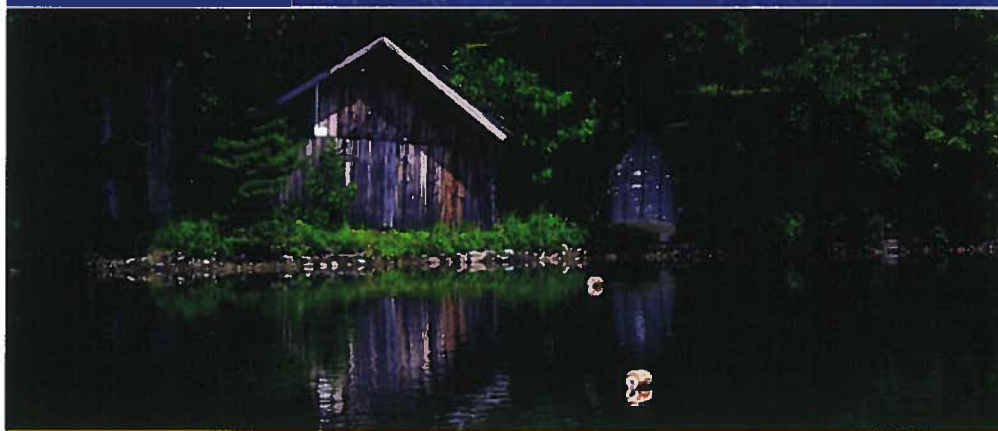
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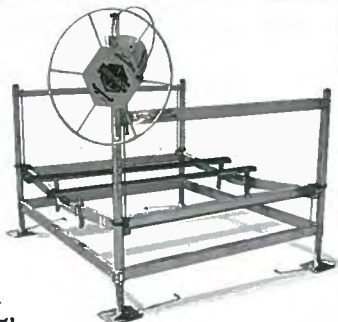
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