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THE MICHIGAN RIPARIAN

www.mi-riparian.org

PROMOTING WATER QUALITY 50 PROTECTING RIPARIAN RIGHTS

Riparian (ri-'pair-ee-en) adj. Relating to or living or located on the bank of a natural watercourse, such as a river, or of a lake or a tidewater.

DEVOTED TO THE MANAGEMENT AND WISE USE OF MICHIGAN'S LAKES AND STREAMS Published Quarterly

the Great Blue Heron *and* Michigan Wetlands

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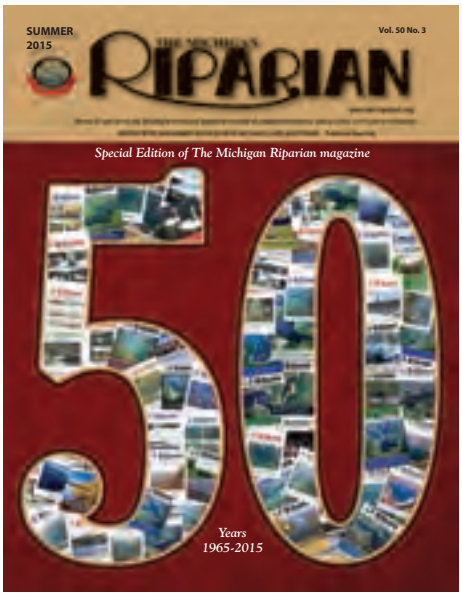
FROM THE PUBLISHER

Year 2015 Marked Our 50th!

Well, this is the final issue commemorating our 50-year anniversary. If you missed the special spring 2015 edition, it's not too late. You can still order your copy. See page 16.

Maybe you saw a picture of your lake on the front cover or recalled a favorite article or need to complete your collection—just remember that you can order past issues any time. Many of you took advantage of our archive presentations and have ordered copies.

In the spring 2015 issue of *The Michigan Riparian*, we asked for pictures of your lake's annual boat parade. Sherman Lake was our choice to run in the Love My Lake feature or this issue of the magazine. See page 13 for the pictures.



From cover to cover, you will find a variety of topics exploring the real number of inland lakes in Michigan, pipelines running under our waters, septic issues and boating regulations and the status of quagga mussels in our lakes. The front cover feature of our fall issue is the great blue heron. Blue herons are iconic sites on many of our inland lakes and wetlands. I hope that wherever you live, you too, are blessed by their visits and beauty.

The focus of our magazine is to provide you with useful information through a wide range of topics and entertain you along the way as you thumb through *The Michigan Riparian.*

There's still a lot of great weather left to enjoy this fall. Keep those boats in the water and enjoy a beautiful color tour! Be sure to take along the camera and send us your photos. We would love to show them off in the next issue of *The Michigan Riparian*. Send them to: swagner@mlswa.org.

Thanks again for 50 amazing years! Here's to the next 50!

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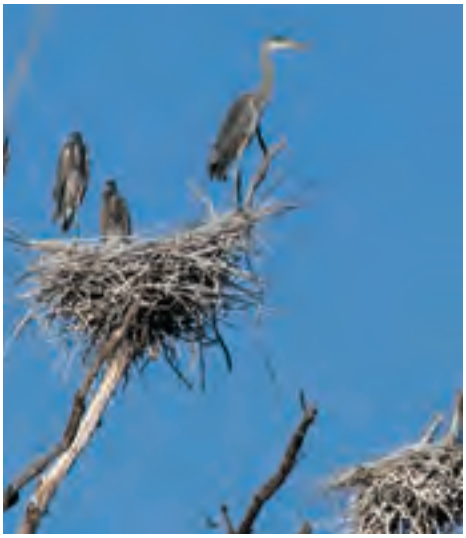
the Great Blue Heron and Michigan Wetlands

In Michigan, the great blue heron is classified as a common permanent resident and can be found scattered throughout most of Michigan but are much more likely to be encountered in the southern half of the state or in the Upper Peninsula.

Have you ever driven by a wetland and been taken by surprise by the site of a great blue heron? Their tall, graceful stature pleases the eye and may cause us to catch our breath, just a little. In Michigan, the great blue heron is classified as a common permanent resident and can be found scattered throughout most of Michigan but are much more likely to be encountered in the southern half of the state or in the Upper Peninsula. The familiar, large grayish blue heron are seen wading in shallow water in marshes, ponds and along lakeshores and stream edges. They are sometimes confused with the sandhill crane: the difference is that the heron is smaller and flies with its neck folded back, while cranes fly with their neck extended. Great blue herons are commonly seen in small suburban wetlands (cranes are generally less tolerant of close presence).

The great blue heron is mostly a colonial nester, although occasionally they nest in single pairs. Colonies are typically found in lowland swamps, islands, upland hardwoods and forests adjacent to lakes, ponds and rivers. Nests are usually in trees and may be as high as 98 ft. or more from the ground. The platform-like nests are constructed out of medium-sized sticks and materials may be added throughout the nesting cycle. Nests are usually lined with finer twigs, leaves, grass, pine needles, moss, reeds, or dry grass (Cottrille and Cottrille 1958, Palmer 1962, Mock 1976, and Baicich and Harrison 1997). The same nests are refurbished and used year after year. Nest size varies; newer nests may be 1.5 ft. in diameter with older nests reaching up to 4 ft. in diameter (Andrle 1988). Nests can also be used by Canada geese.

Both sexes are involved in the nest building process with males primarily gathering sticks from the ground, nearby trees, or unguarded nearby nests. Males pass sticks to females who then place them on the nests (Cottrille and Cottrille 1958, Palmer 1962, Mock 1976). Between 3 and 7 (usually 4) greenish blue eggs are laid in April and May in Michigan. Both sexes take a turn at incubation with females incubating mostly at night and males during the day (Butler 1992). The incubation period lasts from 25-29 days (Baicich and Harrison 1997).



Nests are usually in trees and may be as high as 98 ft. or more from the ground.

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the Great Blue Heron *and* Michigan Wetlands

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In Michigan hatching occurs in the first week of May in the south while parents are still incubating nests in the far northern part of the state (Scharf 1989). For the first 3-4 weeks post hatching, one parent remains on the nest with the young (Baicich and Harrison 1997). The young are semialtricial and downy, and for the first month eat regurgitated food dropped by parents into the nest (Mock 1987). Adults feed the older chicks by standing on the edge of the nest and place food items directly into the open bill of chicks (Cottrille and Cottrille 1958). At about two months old, young great blue herons begin to fly and leave the nest between 64-90 days (Baicich and Harrison 1997).

Wetland foraging areas in close proximity to nests are an important habitat component. Main food items include fish, crayfish, and frogs but many other animals are taken including snakes, salamanders, insects, small mammals, and birds (Barrows 1912, Butler 1992). Great blue herons hunt individually or in groups. They hunt mostly by standing in wait of prey in shallow water, or by slowly wading in search of food (Kushlan 1976, 1978, Hom 1983). They will occasionally hunt from floating objects (Godin 1977). Prey are located visually and caught by rapid forward thrust of head and neck, and then held between the mandibles (Butler 1992).

The great blue heron as described by Butler (1992) is the largest North American heron standing 2 ft. tall and 3 - 4.5 ft. long, weighing up to 5.5 pounds. It has a 6 ft. wingspan and, while in flight, tucks its neck in a characteristic S-shape, with its long legs trailing. It has a slow deep wing beat and frequently calls a deep croaking 'fraaahnk'. Distinctive field marks include a large, grayish body and white face and crown with wide black bands terminating in usually two plumes. Its yellowish bill is long and tapered. Juveniles are brownish, with gray crowns and no body plumes.

The great blue herons in Michigan are largely migratory, with almost all of them leaving the state during the winter months. Most leave by the end of October and return in early to mid-March. No data exists where Michigan birds over-winter but large numbers of great blue herons are recorded each year during Christmas bird surveys in the Gulf Coast states. In Michigan nest building and courtship begins in early April in the south and not until mid-May at heronries off Isle Royale (Scharf 1991).

In recent years many heron rookeries have been displaced by shoreline development or timber cutting. Every attempt must be made to preserve known nesting sites if these beautiful birds are to remain common in Michigan's wetlands.

History of Wetlands

Twelve thousand years ago the last great ice age was coming to an end in Michigan. As the glaciers melted, they left behind a changed landscape. Water was everywhere. New river channels cut through the sands and gravels and drained into broad lowlands, flowing finally into lake basins carved by the glaciers. Massive chunks of ice became kettle lakes, while winds sculpted coastal dunes of shifting sand.

Slowly, drainage patterns stabilized, and lake levels fell. Forests returned on the higher ground, while vast grassy marshes spread across the former lakebeds and coastal lowlands. Over time, the shallower kettle lakes filled with plant debris, becoming bogs. Perhaps a third or more of the state was covered by wetland habitats. These new habitats filled with wildlife in great abundance, including mastodons, caribou, and bear sized giant beavers. These species soon disappeared, to be replaced by more familiar creatures.

A succession of American Indian cultures in Michigan made efficient use of wetlands.

The blue heron breeds in colonies, in trees close to lakes or other wetlands. Michigan is home to many wild blue herons. This one was seen hiding at the edge of a marsh in Michigan.

Open waters of lakes and rivers served as transportation corridors, while swamps and marshes produced wild game and food plants. The Native Americans understood the value of wet places. Then, about 200 years ago, an invasion of Europeans arrived, bringing with them the view that the wilderness was an enemy, to be subdued and conquered. Wetlands, in particular, were considered mysterious and forbidding places–wastelands to be drained or filled at the earliest opportunity. The prevailing attitude, reinforced by acts of Congress and state government, led to the destruction of millions of acres of wetlands.

This "reclaim the wetlands" attitude continued to the middle of this century, when nearly three-quarters of the original wetland area in our state (estimated at over 11 million acres) had been destroyed. Michigan's abundant freshwater resources, a gift of our glacial past, have too often been squandered and wasted. Only in recent years have we begun to realize the essential role that wetlands play in nature, and the human economy. But despite new laws and the efforts of government and private conservation groups, the destruction of wetlands continues, though on a reduced scale.

Why Are Wetlands Important?

Because they occur where the dry land meets the water, wetlands play a critical role in the management of our water based resources.

Acre for acre, wetlands produce more wildlife and plants than any other Michigan habitat type. Wetland species also comprise a critically important segment of these species. For example, Michigan boasts about 2300 native plant species; 50 percent of these are wetland species and over 25 percent of the wetland species are threatened or endangered. More than 40 percent of the 575 vertebrate (with a backbone) wildlife species in Michigan live in or utilize wetlands. This includes 10 to 15 of the 66 mammals, 180 of the 370 birds, 22 of the 28 reptiles, and all of the 23 amphibians.

What Are the Threats to Wetlands?

The extent of wetland habitat was once controlled by natural processes. Marshes along the Great Lakes and drowned river mouth lakes vary in size, depending on rainfall trends and Great Lakes water levels. The natural filling of old glacial lakes with plant remains and sediment will create bog habitat. Eventually through continued succession, open water may be eliminated, replaced with a continuous sphagnum bog or a wet meadow. Floodplain swamps may shrink or increase with the normal changes in a river's channel over time. Over the long term, such natural change is inevitable. Wetland areas in Michigan have been growing, shrinking and re-forming according to natural cycles since the last Ice Age and before, and these cycles continue today.

The last century has seen a greatly increased rate of wetland loss due to filling and drainage by man. Prior to World War II, drainage to expand agricultural lands accounted for most of this loss. Recently, much wetland destruction has been caused by commercial, industrial, and residential expansion. The estimated 11 million acres of Michigan wetlands existing in pre-settlement times has now been reduced to less than three million acres. Recent legislation has slowed the loss rate somewhat but threats to these habitats, particularly the smaller wetlands, continue in many areas.

Wetlands are home to the great blue heron, bitterns and egrets, other fowl, reptiles, amphibians, plant life, bugs and insects, fur bearing creatures...all of which are interdependent. The first step toward heron conservation is continued monitoring of population size (Scharf 1991). Used and abandoned colony sites should be surveyed regularly, mapped by local and state agencies, and reproductive success should be monitored (Quinn and Milner 2004). Quinn and Milner (2004) suggest that the most effective way to conserve great blue herons is through comprehensive land-use planning that considers the needs of all species. Colony site-specific management plans would be the best alternative in lieu of comprehensive land use planning (Quinn and Milner 2004). If sites have to be prioritized, larger colonies should receive priority over small colonies, since there is some evidence suggesting the former have more stability and higher productivity (number of fledglings/nesting herons) (Butler 1995). Disturbances to the nesting colony (i.e. human visits, road building, logging activity) can cause abandonment. It's up to us to be good stewards.

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Here are a few other things that wetlands do:

- reduce flooding by absorbing runoff from rain and melting snow and slowly releasing excess water into rivers and lakes - a one acre swamp when flooded to a depth of one foot contains 330,000 gallons of water
- filter pollutants from surface runoff, trapping fertilizers, pesticides, sediments, and other contaminants and helping to break some of them down into less harmful substances, improving water clarity and quality
- help recharge groundwater supplies when connected to underground aquifers
- contribute to natural nutrient and water cycles, and produce vital atmospheric gases, including oxygen
- provide commercial or recreational value to our human economy, by producing plants, game birds (ducks, geese) and fur bearing mammals - many fish are directly connected to wetlands, requiring shallow water areas for breeding, feeding and escaping from predators
- when wetlands occur adjacent to the Great Lakes, inland lakes or streams, they serve as nutrient traps that then enrich the larger body of water of which they are a part

The Michigan Department of Resources and the Michigan Natural Features Inventory websites provided much of the information used in this article.

Two Books Written by Clifford H. Bloom and Published by ML&SA to Benefit Lakefront Property Owners In Michigan!

Are you and your lakefront neighbors pondering the creation of a lake association? Would you like to improve an existing lake association? Are you wondering about the legal ramifications of forming a lake association in Michigan? If so, this book will provide you with every detail and answer every question you may have regarding lake associations!

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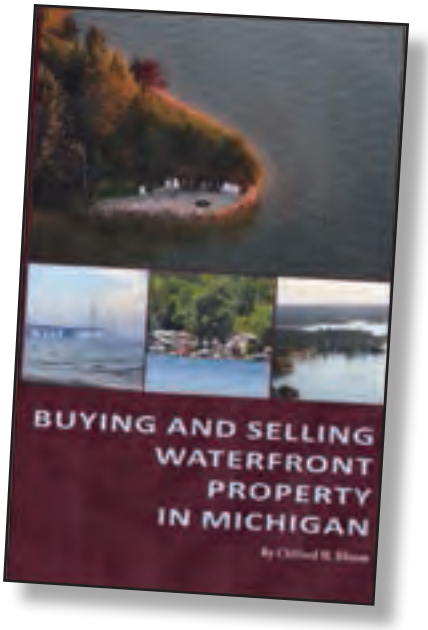

Considering the sale of an existing lakefront property? Are you looking to buy lakefront property in Michigan? Do you understand the legal ramifications and common pitfalls that you may confront? The purchase of this book could save you tens of thousands of dollars and/or the grief and headache of regretting your lakefront property transaction decisions.

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the Great Blue Heron and Michigan Wetlands

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Related Abstracts:

Wooded Dune and Swale Complex, Great Lakes Marsh, Mesic Northern Forest, Mesic Southern Forest, black-crowned night-heron.

Selected References:

Andrle, R.F. (Ed.) 1988. The atlas of breeding birds in New York State. Cornell Univ. Press, Ithaca, New York.

Baicich, P.J. and C.J.O. Harrison. 1997. A guide to the nests, eggs, and nestlings of North American birds (second edition).

Academic Press, San Diego, CA. 347 pp.

Barrows, W.B. 1912. Michigan bird life. Michigan Agricultural Experiment Station Bulletin No. 94. East Lansing, MI.

Brewer, R., G. A. McPeek, and R.J. Adams, Jr. 1991.

Atlas of breeding birds in Michigan. Michigan

State University Press, East Lansing, 590 pp.

Butler, R.W. 1992. A review of the biology and conservation of the great blue heron (Ardea herodias) in British Columbia. Can. Wildl. Serv. Tech. Rep. No. 154, Delta, B.C.

Butler, R.W. 1995. The patient predator: foraging and population ecology of the great blue heron

(Ardea herodias) in British Columbia.

Occasional Paper Number 86. Canadian Wildlife Service, Ottawa, Ontario, Canada.

Cottrille, W.P. and B.C. Cottrille. 1958. Great blue heron: behavior at the nest. Misc. Publ. Mus. Zool., Univ. Mich. No. 102.

Godin, J.G. 1977. A great blue heron preying on shiner perch in deep water. Can. Field. Nat. 91: 88-90.

Hom, C.W. 1983. Foraging ecology of herons in a southern San Francisco Bay saltmarsh. Colonial Waterbirds 6:37-44.

Hoover, R.L. and Willis, editors. 1987. Managing forested land for wildlife. Colorado Division of Wildlife, Denver, Colorado.

Kushlan, J.A. 1976. Feeding behavior of North American herons. Auk 93:86-94.

Kushlan, J.A. 1978. Feeding ecology of wading birds, pp. 249-298 in Wading birds (A. Sprunt IV, J.C.Ogden, and S. Winkler, Eds.). Natl. Audubon Soc. Res. Rep. No. 7, New York

Mock, D.W. 1976. Pair formation displays of the Great Blue Heron. Wilson Bull. 88: 185-230.

Mock, D.W. 1987. Sibilicide, parent-offspring conflict, and unequal parental investment by egrets and herons. Behav. Ecol. Sociobiol. 20: 247-256.

Palmer, R. S. 1962. Handbook of North American birds, Vol. 1. Yale Univ. Press, New Haven, CT.

Quinn, T., and R. Milner. 2004. Great blue heron (Ardea herodias). In E. M. Larsen, J. M.Azerrad, and N. Nordstrom, editors. Management Recommendations for Washington's Priority Species, Volume IV: Birds [Online].

Available http://wdfw.wa.gov/hab/phs/vol4/gbheron.htm

Scharf, W.C. 1989. Coastal great blue heron and great egret colonies of the Michigan Great Lakes.

Scharf, W.C. 1991. Species account for great blue heron. Pages 108-109

The Atlas of Breeding Birds in Michigan. Brewer, R., G. A. McPeek, and R.J. Adams, Jr. (eds). Michigan State University Press, East Lansing, MI.

Vermeer, K. 1969. Great blue heron colonies in Alberta. Can. Field Nat.83: 237-242.

Vos, D.K., D.A. Ryder, and W.D. Graul. 1985. Response of breeding Great Blue Herons to human disturbances in north central Colorado.

Colonial Waterbirds 8: 13-22. Abstract Citation: Cuthrell, D.L. 2004. Michigan Natural Features Inventory. Special animal abstract for Ardea Herodias (great blue heron rookery). Lansing, MI. 4 pp.

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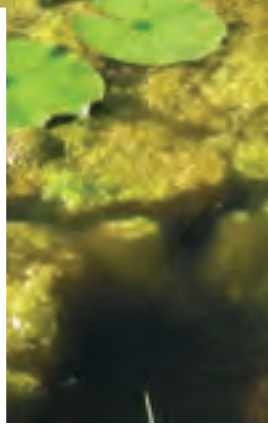

Send us your lake association newsletter or special announcements electronically. We love hearing from your lake. We will continue to use and spread the interesting and informative things happening on your lake in The Michigan Riparian. Please send your lake association newsletter to: swagner@mlswa.org.

Higgins Lake Foundation Receives Lighthouse Award from MBIA

The Higgins Lake Foundation, a 501(c)(3) non-profit Michigan Corporation, is a grant provider for funding of environmental and/or educational projects that support its mission to protect the ecology of Higgins Lake and the surrounding watershed. (Higgins Lake Foundation is located in Roscommon, Michigan).

Higgins Lake Foundation Summer 2015 Newsletter and Website

Among many honors conferred on the Higgins Lake Foundation last year was the Lighthouse Award from the Michigan Boating Industries Association (MBIA). Vicki Springstead, HLF Chair, accepted the award on behalf of the HLF at the Recreational Boating Educational Conference in Lansing.

The award recognized the Foundation's work to establish and fund the boat wash at the Higgins Lake South State Park, the first of its kind in Michigan. "We are very proud to honor the HLF as a Lighthouse Award recipient," said Chris Lisowicz, MBIA Awards Chairman.

The boating industry recognizes the need to control invasive species and wanted to acknowledge the impact of a boat wash at one of the most heavily used boat launch locations in the state.

Background on the boat wash:

The boat wash at the South State Park opened in 2014. The boat wash is positioned just before the boat launch area and is the first of its kind in a Michigan State Park. It was funded by more than $70,000 in donations from the Higgins Lake Foundation and the EnTrust fund.

With the addition of the new boat wash at the South State Park, area boaters now have three convenient boat wash locations on the lake, including a portable wash station funded by the HLF at the Gerrish Township Community Marina on Higgins Lake. All three boat washes are free and open to the public seasonally.

The boat wash at the South State Park.

By: Clifford H. Bloom, Esq.
Bloom Sluggett Morgan, PC
Grand Rapids, Michigan
www.bsmlawpc.com

On-Lake Regulations

Riparians frequently ask me whether a local municipality can regulate problematic boating behavior on inland lakes in Michigan. More specifically, the issue is whether a local government (i.e., a city, village or township) can, by ordinance, impose water skiing and high-speed boating hours limitations, create no wake zones, designate certain times of the week as "quiet times" (i.e., no high-speed boating) or impose similar regulations.

A portion of the Michigan Marine Safety Act (MCL 324.80109 *et seq.*) (the "Act") does contain a procedure for enacting "special watercraft rules". Pursuant to that statute, a group of riparian property owners or the local government requests that the Michigan Department of Natural Resources ("DNR") consider a special watercraft rule for a particular inland lake or a portion of the lake. The DNR then holds a public hearing regarding the special watercraft rule request. If the DNR decides not to impose such a rule or regulation, the matter ends. If the DNR approves the special watercraft rule, it cannot be effective until and unless the local municipality also enacts the special watercraft rule without any changes. Once a special watercraft rule is adopted for an inland lake, it has the force of law. Any qualified police officer can issue tickets or citations for the violation of a special watercraft rule.

There are two major problems with the special watercraft rule process. First, the DNR will normally only approve such a rule if there is a demonstrated existing safety problem on the lake involved (or a portion of the lake) which can be remedied by the proposed special watercraft rule. It is the DNR's position that no factor apart from an existing safety problem can be considered by it when deciding whether to adopt the special watercraft rule. Even if almost every property owner on a lake were to indicate their support for a special watercraft rule, the DNR would still deny the rule if the DNR does not find an existing substantial safety problem.

A second problem with the state's special watercraft rule process is the limited types of rules available. Typically, the DNR will only consider several different types of special watercraft rules as follows:

1. A no-wake lake.
2. No wake areas.
3. More strict waterskiing and high-speed boating hours than are normally allowed by state statute.
4. Greater setback distances for high-speed boating.
5. Electric motors only.
6. Towing limits.
7. Special speed limits.

In light of the limited utility of the special watercraft rule process under the Act, can a local municipality adopt and enforce its own ordinance provisions for an inland lake located within its jurisdiction? Unfortunately, the law is not clear.

In general, Michigan municipalities have broad authority to enact and enforce police power ordinances (i.e., ordinances other than zoning regulations). See MCL 41.181 *et seq.*, MCL 117.1 *et seq.* and MCL 61.1 *et seq.* Also, in general, the Michigan courts have held that local governments in Michigan can regulate at least some lake uses and activities. See *Square Lake Hills Condominium Association v. Bloomfield Township*, 437 Mich 310 (1991).

Accordingly, in the abstract, it is highly likely that the Michigan courts would uphold the validity and enforceability of a local government ordinance that regulates on-water uses and activities. However, that cannot be the end of the inquiry.

A Michigan municipality may not enforce an ordinance, however, that conflicts with or is preempted by a state statute that governs the same subject matter or topic. The issue is whether an ordinance adopted by a local governmental unit regulating boat speeds, waterskiing or high-speed boating activities by hours, designating a lake as a no-wake lake and similar restrictions would either be precluded or preempted by the Act (and the DNR special watercraft rule proceedings contained therein).

Unfortunately, determining whether a particular state statute preempts or precludes a local government ordinance is not always easy. There are generally two types of state preemption. The first type is an express preemption, where the state statute specifically indicates that no local government ordinance governing the same subject matter can be enforced. The second type of preemption is more subtle. Nothing in the state statute involved expressly declares that it should have preemptory effect. Instead, a court must carefully review the statute to determine whether the statute seemingly "occupies the field" and evidences a general intent that the Michigan Legislature intended the state statute to be exclusive (i.e., to the preclusion of a local government ordinance provision governing the same subject matter).

Whether or not the Act preempts local ordinances governing on-water uses and activities is likely a 50/50 proposition. However, a 1962 decision by the Michigan Supreme Court could give

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ASK THE EXPERTS

If you have a question about water related issues, riparian rights, and/or lakes and streams, etc., let us know by email or snail mail.

Email: swagner@mlswa.org
Mail: The Michigan Riparian 300 N. State St., Suite A, Stanton, MI 48888

* * * * * *

Our experts include our riparian attorney, a biologist, a limnologist, an engineer, a college professor and a state agency official. They look forward to responding to your question.

Question What are the streaks I sometimes see on lakes during windy days?

Answer: These streaks, formed due to the effects of Langmuir circulation, consist of floating debris or foam *(Figure 1)*. When the wind blows steadily in one direction at a moderate speed, the water begins to form rotating tubes that run parallel, in the same direction as the wind *(Figure 2)*. The physics of the formation of these tubes is quite complicated and still a focus of research, but likely involves differences in shear stress due to the wind, as well as surface waves. These tubes rotate in opposite directions, so that the foam and other materials come together to form the often-parallel white streaks you see on the surface. The typical depth of these tubes (also known as cells) is 4-6 meters, though in large water bodies they can reach 200 meters below the surface. These streaks can range from a few meters in small water bodies such as lakes and rivers, to many kilometers in the ocean. This phenomenon was named after Irving Langmuir who described the formation of these streaks in the 1930s.

In the ocean, Langmuir circulation can affect how plankton is distributed and may also play a role in how oil droplets move after an oil spill. For riparians, Langmuir circulation can result in increased mixing of water which may decrease the water temperature at the lake or river surface.

Alisha Davidson, Ph.D.
ML&SA Research and Development Coordinator

Figure 1. Photo of streaks formed by Langmuir circulation. Photo courtesy of Mmelugin, Creative Commons.

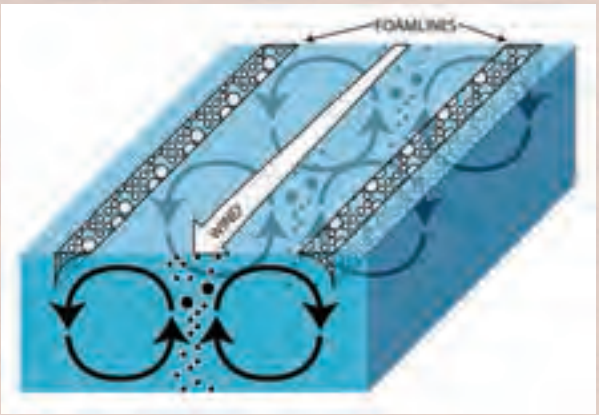

Figure 2. Diagram of Langmuir circulation. The black arrows represent the direction of the rotating water. Photo courtesy of Hydrated.

On-Lake Regulations

(Continued from page 11)

riparians hope that local lake uses and activities ordinances could be determined not to be preempted by the Act and thus, be valid and enforceable. In *Miller v Fabius Township Board*, 366 Mich 250 (1962), Fabius Township enacted special limited high-speed boating and waterskiing hours on Pleasant Lake. Several riparian property owners challenged the validity of the ordinance, based on whether the township had the authority to enact the ordinance in the first place and whether the ordinance was preempted by two state statutes. First, the Supreme Court held that Fabius Township had ample authority under the general law township ordinance statute, being MCL 41.181 *et seq.*, to enact the ordinance. That statute is still in effect today. Second, and with regard to the preemption argument, the Supreme Court held that the local ordinance was not preempted or precluded by two then-applicable state statutes (MCL 752.401, which was a penal statute regulating motor boat mufflers and reckless or excessive boat speeds, or Public Act 310 of 1957 which regulated waterskiing, including hours). The Supreme Court did not expressly address the statute that allows the DNR to set special watercraft rules for particular lakes, but such a statute was in effect in 1962 (MCL 281.1014 *et seq.*). Nevertheless, *Miller v. Fabius Township Board* presents a pretty fair argument as to why local ordinances regulating on-lake use on inland lakes should not be preempted by the Marine Safety Act (and specifically, MCL 324.80109 *et seq.* regarding DNR special watercraft rules).

One of these days, an ordinance enacted by a local municipality governing on-water uses or activities that was not adopted under the Act will likely be challenged in a trial court, with a decision on appeal following thereafter. It is only then that riparians will have a clear picture of whether a local municipality can not only enact, but also enforce, an ordinance regulation regarding on-water activities or uses on an inland lake in Michigan.

Love My Lake

Wouldn't you love to see your lake featured here?
In word and picture, send us your story to swagner@mlswa.org.
(Send pictures in jpeg or 300 dpi.)

Sherman Lake — Boat Parade

By: Mark Rodgers

I live on Sherman Lake in Ross Township which holds an annual July 4th boat parade. I have a group of talented and enthusiastic friends (Mandy Redebaugh, Bill Ecklund, Gerard Mouatt, Jon Walter, John Russell and several others) who have rallied around decorating my boat for several years now. My boat entry was a Fire Truck in 2013, the Sherman Tank in 2014, and an Ice Cream Truck this year. The parade, in combination with the water fight that follows, has been a lot of fun.

PUBLISHERS NOTE - The spring 2015 issue of The Michigan Riparian invited everyone to send in their boat parade pictures. Thank you to all who participated. We chose to showcase Sherman Lake Residents Association.

2013 - Fire Truck

2015 - Ice Cream Truck

2014 - Sherman Tank

Michigan Waterfront Alliance

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

Members Receive: Protection of their Riparian Rights by professional lobbyist in Lansing * MWA Newsletters sent by 1st class mail * Lobbyist Reports * Testimony at important legislative hearings on behalf of Riparians * Email Action Alerts * Amicus Briefs and much much more.

Waterfront owners are the final defense of their lakes and streams.

The MWA is the waterfront voice in Michigan politics

Annual dues for individual membership in Michigan Waterfront Alliance are $50.00 per year. Dues for lake or stream associations are $100 per year. Commercial and individual donations are needed and appreciated.

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☐ Individual Membership $50

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☐ Check here if you would like to donate to the legal defense fund.

Make checks Payable to Michigan Waterfront Alliance

Send Dues and Contributions to: Michigan Waterfront Alliance, PO Box 369, Fenton MI 48430

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

Dear Riparians,

The Lake Avalon Property Owners Association has passed a motion to request that their local township pass the following ordinance. Dr. Ed Mahoney, Professor Emeritus MSU, was instrumental in putting it together along with other lake associations. The Michigan Waterfront Alliance will review this and hopefully engineer a model ordinance for state-wide use. Our thanks to Dr. Mahoney and the Lake Avalon Property Owners Association.

Sincerely,
Bob Frye, President
Michigan Waterfront Alliance

MICHIGAN WATERFRONT ALLIANCE
P.O. Box 369
Fenton, Michigan 48430-0369
www.mwai.org

DRAFT PROPOSED ORDINANCE WORDING

Hillman Township ORDINANCE XXXXXXXXXXX

INTRODUCTION OF NON-NATIVE INVASIVE AQUATIC SPECIES ORDINANCE

An ordinance to deter the introduction of non-native aquatic invasive species into Lake Avalon by requiring the washing of watercraft, motors, trailers or other gear before the launching or the use of the same into or on the waters; and to provide a municipal civil sanction for the violation thereof.

Hillman Township Hereby Ordains:

Section 1. Findings.

Lake Avalon, recognized by the National Geographic Society as one of the most beautiful lakes in the world, is located about five miles, by road, northwest of the town of Hillman. It is a 330-acre natural moderately hard water kettle lake of glacial origin with no inlets. It is supplied primarily by seepage from springs and by limited surface runoff from its 1103 acre watershed. A small, permanent outlet, approximately two feet in width, located at the southwest end of the lake drains it. The lake level is controlled by the county drain commissioner who establishes a legal lake level as directed by the local circuit court (Cwalinski et al. 2006). Sand, marl, and some gravel are the dominant substrate with some pulpy peat in the deeper sections of the lake. The deepest part of the lake is over 75 feet deep with a large percentage of the lake deeper than 40 feet. Ongoing limnology studies show that it is one of the highest quality lakes in the state. Water clarity is typically very good. A single DNR managed public boat launch exists on the east end that provides parking for approximately 25 boat trailers. Protecting Lake Avalon's ecosystem is important to the recreational diversity and economic well-being of the township and also its fiscal fitness. Up until now,

except for zebra mussels, Lake Avalon has remained relatively free of most aquatic invasive non-native species. The potential introductions of additional non-native invasive species, however, present a significant and growing threat to Lake Avalon. Many Michigan lakes have seen an influx of invasive species, from the zebra and quagga mussels to plants like the Eurasian water milfoil and hydrilla, and even diseases that can wipe out entire fish populations. Invasive species can be defined as non-native (i.e. "non-indigenous") plants, animals, or other organisms (e.g., microbes) that have no natural predators, and if introduced to Lake Avalon can disrupt or replace native species and cause serious economic and environmental harm. Invasive species can alter the lake's ecosystem and threaten various human uses (e.g., swimming, boating). Damage to these resources can in turn result in lower property values. Once various invasive species are established it is often impossible to eradicate them and control is costly and must be continuous.

The introduction of Eurasian milfoil is of particular immediate concern. Eurasian milfoil is very difficult to control. And, control measures are very expensive and potentially harmful to certain non-target species. Control focuses on limiting any new/additional infestations, limiting the spread of the plants in lakes, and/or reducing their impact on human activities. Even controlling milfoil is difficult since only the invasive plant species that adversely impact lake ecology and inhibit recreational use should be removed, not native plants. If Eurasian milfoil is introduced and becomes established in Lake Avalon, the continuing high costs of efforts to control it will be borne by littoral property owners.

Since Avalon has no natural inlets, invasive aquatic species may be introduced to the lake by being physically attached to boats and trailers, from bait buckets emptied into the lake, and from live wells, bilge water and transom wells containing water contaminated with these damaging species. Most boats are launched on Lake Avalon at the DNR Public Access/Launch Site, the only public access and launch site. The Hillman Township Board of Supervisors has deemed it necessary, therefore, to prohibit the launching of boats and the use of equipment in Lake Avalon that may harbor and introduce into Lake Avalon such invasive non-native aquatic species.

Section 2. Definitions.

"Invasive Aquatic Species" means any invasive, non-native plant or animal organism that threatens the ecosystem, including native plant and animal species, and the recreational qualities of Lake Avalon. Non-native invasive species include zebra mussels, quagga mussels, plants such as the Eurasian watermilfoil, hydrilla, and curly leaf pondweed, non-native plankton such as the spinney water flea and the fishhook water flea, and non-native fish such as the round goby and the ruffe, and any other non-native plant or animal organism that may be determined to threaten the lake ecosystem as set forth above.

An "ecosystem" can be defined as a system of animals, plants and microorganisms that are linked with and interact with each other and with their physical and chemical environment.

"Boats" include both recreational and commercial boats. "Recreational boats" have been defined by the U.S. Coast Guard as watercraft that are operated on the water for pleasure and recreation. Recreational boats include: sailboats, outboard, inboard and stern-drive power boats, jet boats, pontoons, houseboats, row boats, canoes, kayaks, dragon boats, personal watercraft (e.g., jet skis), inflatable boats, kite boards, stand-up paddleboards and wind surfers. "Commercial boats" are watercraft of any type used for commercial, government agency or university purposes such as transporting materials, construction, dredging, netting or scientific studies.

"Lake Avalon Watershed" is that area of land that is drained by Lake Avalon.

Section 3. Prohibited Conduct.

It shall be unlawful for anyone to fail to follow the requirements set forth in Sections 4 and 5 in respect to the proper cleaning and use of boats, trailers, and other equipment associated with their use

Section 4. Launching boats.

It shall be unlawful for any person to launch any boats into Lake Avalon from the DNR Public Access Site unless it has first been washed at the boat wash station, and any live wells and bilges are cleaned, and water has been blown out of the engine, in such a manner to remove any invasive aquatic species.

Section 5. Trailers; Related Equipment.

It shall be unlawful for any person to place any watercraft trailer, motor or related equipment into Lake Avalon from the DNR Public Access Site unless such trailer, motor or related equipment has been washed at the boat wash station in such a manner as to remove any aquatic invasive species.

Section 6. Hours to Launch Boats at DNR Public Access Site

The (posted) hours at the DNR Lake Avalon Public Access Site are 4 AM to 11 PM. It shall be unlawful to launch a boat from the Lake Avalon Access Site between the hours of 11 PM and 4 AM.

Section 7. Enforcement.

A violation of this ordinance is a municipal civil infraction and shall be enforced in the manner authorized by Chapter 87 of the Revised Judicature Act [MCL 600.8701 et seq]. Violations of this ordinance shall be enforced by [MUST BE IDENTIFIED] who is authorized to issue municipal civil infraction notices and citations pursuant to the authority of and as provided in applicable state law.

Section 8. Sanctions.

A violation of this ordinance is a municipal civil infraction, and any person or firm found responsible for such violation shall be subject to a maximum civil fine of $500.00 plus costs. Commencing thirty (30) days after receiving notice of a violation, each day the violation continues unabated shall constitute a separate violation of this ordinance, and each person or firm responsible shall be liable for the maximum civil fine for each separate violation.

Section 9. Severability.

Each of the provisions of this ordinance is severable, and, if any provision is held invalid for any reason by a court of competent jurisdiction, the remaining provisions shall remain in full force and effect.

Section 10. Effective Date.

This ordinance shall take effect thirty (30) days after publication in the manner provided by law.

Adoption of the foregoing ordinance was moved: ----------

Voting for: ----------

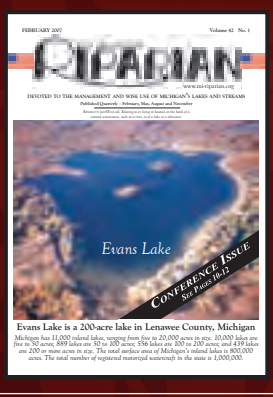
Voting against: ----------

The ordinance was declared adopted. ----------

CERTIFICATION ----------

CELEBRATING 50

THE MICHIGA
RIPA



Evans Lake is a 200-acre lake in Lenawee County, Michigan

50th Anniversary Issue

The feedback from the 50th Anniversary issue of The Michigan Riparian has been remarkable. If you are missing an issue for your collection we would be happy to send you a copy for your special archive collection.

***The Michigan Riparian Magazine* special anniversary edition is still available. Please email us at swagner@mlswa.org or call 989-831-5100 to place an order. Please specify which issue(s) you would like shipped.**

All copies are $3.00 per issue plus $2.00 for shipping. Order up to 5 copies for same $2.00 shipping.

Quaggas Drift Inland From the Freshwater Seas

Quagga mussel found in Crooked Lake in Emmet County

By Kevin Cronk,
Director of Monitoring & Research Tip of the Mitt Watershed Council

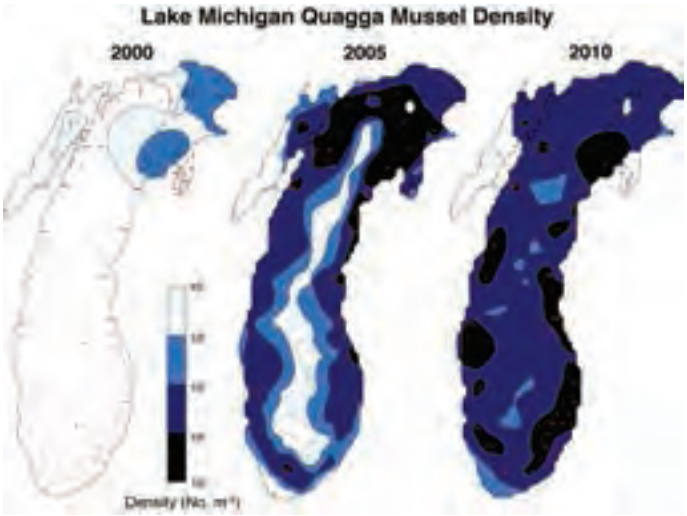
Adrift in the freshwater seas, an unfathomable number of microscopic veligers (less than 0.2 millimeters in length) move through the Great Lakes at the mercy of wind, waves and currents. Within a few days of inception, veligers develop new organs and a minute shell. Between 20 to 90 days, they begin to settle, secreting byssal threads that they use to attach to rocks, wood, or even to other mussels on the lake bottom. Their reproductive and colonization strategies, evolved through the ages, have given quagga (and zebra) mussels a competitive edge that has resulted in their spread to freshwater lakes and streams across the entire planet.

While conducting an aquatic vegetation survey on Crooked Lake in early July, a handful of tiny mussels on the stems of aquatic plants caught the attention of AmeriCorps volunteer Matt Claucherty. Watershed Council field staff are accustomed to finding oodles of zebra mussels clinging to aquatic plants (which is why we strongly encourage removing weeds from boats and trailers), but these were different. Matt noticed slightly different coloration and patterns, but the clincher was the hinge side of the shell – it was rounded, not flat like that of the zebra. Suspecting quagga mussels, specimens were sent to the National Oceanic and Atmospheric Administration's Great Lakes Environmental Research Laboratory (GLERL) in Ann Arbor where mussel researcher Ashley Baldridge, PhD, confirmed that there was a new invasive mussel in Crooked Lake.

Practicing due diligence, Matt immediately reported the infestation to the Midwest Invasive Species Information Network (MISIN), where he found that this was the first report of quagga mussels in an inland lake in Michigan. Upon learning this, the Watershed Council shared the discovery with partner organizations, agencies, and the media. This breaking news reverberated throughout the state, picked up by newspapers from Petoskey to Detroit, and at last bringing quaggas into the spotlight.

Quagga mussels were first discovered in Lake Erie in 1989, just three years after the discovery of zebra mussels, but for whatever reason, they did not spread and proliferate as quickly as the zebras. GLERL mussel studies in Lake Michigan showed an explosion in quagga mussel populations in the early 2000s, reaching an estimated 950 trillion by 2011 – that's well over 100,000 mussels for every human on earth, and just in Lake Michigan! Considering these statistics, it seemed inevitable that they would spread to our inland lakes, and now they have. Relative to the zebra mussel spread, it did take some time for the quaggas to move inland. We optimistically think the delay was due to a more widespread understanding of the problems caused by invasive species and actions that we can all take to prevent their spread.

Although Matt only found quaggas at three locations near the Little Traverse Boat Launch on US31, subsequent surveys by the Pickerel-Crooked Lake Association have established that they are present in other areas of the lake. In addition, we learned that quagga mussels were found in Mullett Lake in 2012, but never reported on MISIN. Therefore, these invasive mussels will invariably spread to other lakes and streams throughout the Inland Water Route, if they haven't done so already.



Source: Nalepa and NOAA GLERL

What are the implications to the lake and stream ecosystems of the Inland Water Route? The answer is that we are unsure. Little research has been conducted for quagga mussel infestations in inland waterways, chiefly because they have been found in few surface waters beyond the Great Lakes. However, if changes brought on by quagga mussels in the Great Lakes are any indication, there may be serious and perhaps dire ecosystem changes on the horizon. Quagga mussels are known to cluster more densely than zebra mussels (up to 35,000 per square meter in a reservoir in the western US), they more effectively colonize mucky and sandy areas, they survive in deeper waters (up to 500 feet in the Great Lakes), and can function and reproduce at temperatures lower than zebra mussels can. If they proliferate in inland lakes to the extent that they have in the Great Lakes, nutrient cycles and food webs will be further disrupted, which could lead to problems similar to those occurring in the Great Lakes, such as excessive periphytic algae growth and reductions in top predator (sports fish) populations.

In spite of this setback, we have not lost hope and are taking action steps. We recently submitted a proposal to the Michigan Invasive Species Grant Program that would involve working with a consulting company on a trial open-water application of Zequanox in Crooked Lake, which is an environmentally-safe quagga and zebra mussel control product. An aquatic vegetation survey scheduled next year will help determine if quaggas are present in Burt Lake. And perhaps most importantly, we may not be able to prevent quagga mussels from spreading through the Inland Water Route, but the Watershed Council is intent upon reducing the spread to other lakes and streams by redoubling invasive species outreach and education efforts to the boating community.

MICHIGAN LAKE & STREAM ASSOCIATIONS, INC.
ML&SA NEWSLETTER

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William Scott Brown, Executive Director

Michigan Lake and Stream Associations Partners with MSU Extension and State Agencies to Re-Vitalize the Michigan Clean Boats, Clean Waters Program

By Scott Brown
ML&SA Executive Director

Michigan Lake and Stream Associations is proud to announce that it has entered a formal partnership with Michigan State University Extension with funding support from the Departments of Natural Resources, Environmental Quality, and Agriculture and Rural Development-administered **Michigan Invasive Species Grant Program** to re-vitalize the Michigan Clean Boats, Clean Waters Program.

Formerly funded, managed and operated by the Ann Arbor based Michigan Sea Grant program, the primarily citizen volunteer Clean Boats, Clean Waters program is dedicated to protecting Michigan's water resources by educating boaters about aquatic invasive species that are often transported from one water body to another by recreational watercraft; by teaching operators and owners how to inspect their boats, trailers and associated gear for invasive species, and by demonstrating the proper technique for removing potentially harmful aquatic plant and animal species. Michigan joins several other Great Lakes region states including Indiana, Minnesota, New York and Wisconsin that currently administer pro-active Clean Boats, Clean Waters programs.

Michigan Lake and Stream Associations and Michigan State University Extension encourages inland lake communities and/or other interested groups to consider holding a Clean Boats, Clean Waters workshop in their area. It's a workshop that will serve to prepare and equip local volunteers how to teach recreational boaters using local public boat launches simple, yet effective techniques to help prevent the spread of aquatic invasive species.

For more information regarding the Michigan Clean Boats, Clean Waters Program, visit the program's new web resource at www.micbcw.org. To discuss the possibility of holding a Clean Boats, Clean Waters workshop in your community, contact Beth Clawson, MSU Extension Clean Boats, Clean Waters Program Educator at 269-330-5554 or via e-mail at clawsonb@anr.msu.edu.

MICHIGAN LAKE & STREAM ASSOCIATIONS, INC.
ML&SA NEWSLETTER

Michigan Lake and Stream Associations
Member Survey Member Feedback and ML&SA Response

Alisha Davidson, PhD
ML&SA Research and Development Coordinator

Michigan Lake and Stream Associations distributed a survey in January 2015 to better understand what programs our members valued and what programs they would like to see. We heard back from about 30% of members – and to those members, we give our sincere thanks for taking the time to provide feedback.

Survey respondents listed lake issue awareness and information (in particular, information related to aquatic invasive species and riparian rights) as the biggest benefit of ML&SA membership. ML&SA will continue to focus on these issues: in addition to new articles on these issues in *The Michigan Riparian* magazine, information on both aquatic invasive species and riparian rights can be found on the website.

Following interest in lake awareness and information, respondents noted the networking potential at the conference and other events, *The Michigan Riparian* magazine and the annual conference itself. In this vein, we'd like to let members know that *The Michigan Riparian* just celebrated its 50th anniversary and the annual conference this year was the best attended yet. There were 274 individuals from around the state discussing a variety of lake issues with a focus on aquatic invasive species.

The survey also asked questions regarding the ML&SA website. Most members visited the website 1-4 times per year with "An Attorney Writes", conference/events, and Cooperative Lakes Monitoring Program the most commonly visited pages. Based on some of the member feedback, we have modified the website to make highly-requested topics easier to find (see below for examples). Please check out the new look at www.mymlsa.org!

We also asked what programs members would like to see and received numerous ideas. In particular, many members were interested in aquatic invasive species (AIS) and their control and management. As such, ML&SA reviewed information related to the biological, physical and chemical control of AIS in order to provide a summary of treatment options. This guide also includes a list of businesses involved in AIS treatment and management in Michigan that members may want to consult when considering plant management. This guide can be found on the ML&SA website in the Aquatic Invasive Species section.

Many of the suggestions for new programs or requests for additional information were related to topics or activities in which ML&SA is already involved. For example, some members requested additional information on conservation and best management practices for their lake. We have redesigned the website to better identify the resources related to these issues. For example, there are now direct links to information on "Michigan's watersheds," "Michigan's inland lakes," and "Michigan's streams and rivers." You can also search for specific information (such as "legislation" or "boating laws") in the search bar in the upper right corner of the website.

We thank you for your continued membership in ML&SA – your membership provides the support for many of the projects ML&SA works on to improve inland lakes and streams around Michigan. Please contact ML&SA staff member Alisha Davidson at alishad@mlswa.org if you have any questions or comments.

Michigan Lake and Stream Associations
Recognizes Top Stewards of Michigan Lakes

Alisha Davidson, PhD
ML&SA Research and Development Coordinator

The splendor of Michigan's inland lakes is undeniable; their clean waters, diverse wildlife and serene beauty are natural treasures. Such treasures, however, require active and informed stewardship by the individuals who enjoy them. This stewardship can take many forms, from individuals who foster natural shorelines on their property, to watershed councils that act to reduce runoff. While these individual and collective efforts are essential in protecting Michigan's inland lakes, ML&SA would like to recognize the lake associations that complete the 'trifecta' of ML&SA-related stewardship activities.

The three activities are: membership in ML&SA, participation in the Cooperative Lakes Monitoring Program (CLMP) and attendance (by one or more association representatives) at the annual ML&SA conference. Each of these three activities is an important element of lake stewardship. Membership in ML&SA supports the variety of educational, stewardship and conservation initiatives undertaken by the association, such as workshops and

(Continued on page 22)

MLSA Recognizes Top Stewards of Michigan Lakes *(Continued from page 21)*

brochures on best management practices for lakes and streams, legal briefs related to water rights and obtaining grant money to expand the Clean Boats, Clean Waters Program. Participation in the CLMP provides an understanding of water quality at both the individual lake and statewide level. Finally, attendance at the ML&SA annual conference (or the joint Michigan Lakes Inland Lakes Convention) provides individuals who use lakes and streams with the latest resources and knowledge necessary to help protect our inland waters.

Michigan Lake and Stream Associations would like to recognize the lake associations that have engaged in each of these activities in 2015 (please contact alishad@mlswa.org if you think your lake should be added to the list):

1. Big Crooked Lake, Kent County (CLMP for 5 years)
2. Big Fish Lake, Leelanau County (CLMP for 9 years)
3. Big Star Lake, Lake County (CLMP for 38 years)
4. Birch Lake, Cass County (CLMP for 16 years)
5. Cedar Lake, Van Buren County (CLMP for 21 years)
6. Crockery Lake, Ottawa County (CLMP for 22 years)
7. Crystal Lake, Benzie County (CLMP for 41 years)
8. Crystal Lake, Montcalm County (CLMP for 15 years)
9. Devils and Round Lake, Lenawee County (CLMP for 19 years)
10. Eagle Lake, Cass County (CLMP for 41 years)
11. Farwell Lake, Jackson County (CLMP for 27 years)
12. Glen Lake, Leelanau County (CLMP for 36 years)
13. Greater Wall Lake, Barry County (CLMP for 1 year)
14. Gull Lake, Kalamazoo County (CLMP for 6 years)
15. Higgins Lake, Roscommon County (CLMP for 41 years)
16. Lake George, Clare County (CLMP for 23 years)
17. Lake Manitou, Shiawassee County (CLMP for 1 year)
18. Long Lake, Gogebic County (CLMP for 10 years)
19. Loon Lake, Iosco County (1st year in CLMP) not current MLSA
20. Magician Lake, Cass County (CLMP for 35 years)
21. Murray Lake, Kent County (CLMP for 23 years)
22. Muskellunge Lake, Montcalm County (CLMP for 21 years)
23. Portage, Base & Whitewood Lakes (CLMP for 39 years)
24. Pentwater Lake, Oceana County (CLMP for 20 years)
25. Perch Lake, Iron County (CLMP for 6 years)
26. Portage Lake, St Joseph County (1st year in CLMP)
27. Sanford Lake, Midland County (CLMP for 13 years)
28. Torch Lake, Antrim County (CLMP for 22 years)
29. East and West Twin Lakes, Montmorency County (CLMP for 22 years)
30. Van Etten Lake, Iosco County (CLMP for 29 years)
31. White Lake, Muskegon County (CLMP for 2 years)
32. Windover Lake, Clare County (CLMP for 22 years)

Enbridge Pipeline Kalamazoo River

Cleanup crews place absorbent pads to sop up oil at Talmadge Creek, near the source of the spill, on Aug 6, 2010. We also take into account the effect cleanup has on the environment. (Chuck Getter)

Michigan Pipelines

By Jennifer McKay
Policy Specialist TOMWC

Millions and millions of miles of pipelines crisscross the United States. These pipelines transport large quantities of light crude oil, synthetic crude oil and natural gas that serve a number of our everyday needs such as transportation, home heating, manufacturing and agriculture.

Pipelines are considered to be one of the safest and most efficient means of transporting these products used to power our homes and businesses. However, they come with risks. Pipeline accidents can and do happen. When they do, the results are often disastrous. The consequences of a pipeline spill can be catastrophic when they occur in our rivers, streams, lakes or oceans.

Michigan is at great risk from a pipeline spill. After all, water is Michigan's most significant resource. The Great Lakes contain one-fifth of the world's fresh water and provide drinking water to 40 million people. Michigan is home to more than 11,000 inland lakes, 36,000 miles of rivers and streams, 5.5 million acres of wetlands and 3,200 miles of shoreline.

Michigan is also home to over 123,000 miles of fuel pipeline.

Between 2004 and 2013, there were 116 reported incidents on pipelines in Michigan. This includes a July 26, 2010 pipeline rupture that released an estimated 843,000 gallons of crude oil into Talmadge Creek and the Kalamazoo River, a Lake Michigan tributary.

This served as a wake-up call for all of us; a reminder of the risk pipelines can pose. One particular pipeline has garnered significant attention: Line 5.

Line 5 is a 645 mile petroleum pipeline owned and operated by Enbridge Energy Partners. The line runs from Superior, Wisconsin, across Michigan's Upper Peninsula, through Northern Michigan, down to the thumb region, and over to Sarnia, Ontario. Along the way, the pipeline crosses under the Straits of Mackinac, multiple rivers and streams, goes through miles of wetlands, and runs right next to many of our sparkling inland lakes. The line became operational in 1953 and carries approximately 540,000 barrels or 22.7 million gallons of light crude oil, synthetic crude, and natural gas liquids per day.

Given Michigan's experience with the oil spill into the Kalamazoo River and the location of major petroleum pipelines near and in our precious water resources, the state of Michigan decided to convene a task force to take a closer look at Michigan's liquid petroleum pipelines.

After nearly a year of closed-door deliberations, the Michigan Petroleum Pipeline Task Force released its recommendations. The recommendations include statewide actions as well as actions specific to the portion of Line 5 that runs along the bottom of the Straits of Mackinac.

The Line 5-specific recommendations are:

- Prevent the transportation of heavy crude oil through the Straits pipelines.
- Require an independent risk analysis and adequate financial assurance for the Straits pipelines.
- Require an independent analysis of alternatives to the existing Straits pipelines.
- Obtain additional information from Enbridge relating to the Straits pipelines.

These pipeline safety recommendations will go a long way toward safeguarding the Great Lakes and Michigan's inland waters from oil spills, but only if they are implemented with a sense of urgency and accountability. In implementing these recommendations, it is important that state leaders set a clear and aggressive timeline, establish strong enforcement mechanisms to ensure Enbridge follows through with the required actions, and include the public in a transparent process.

In addition, the nine task force recommendations not specific to Line 5, if actually implemented, will give the public greater access to pipeline information, improve oversight of Michigan pipelines, and strengthen spill-response plans. For instance, they call for policies to guide the siting of pipelines, better coordination with federal pipeline regulators, and the creation of a pipeline safety advisory committee.

Taken together, these recommendations could move Michigan toward the comprehensive approach to the pipeline policy that we need to protect our Great Lakes, inland waters, and public health, but only if immediate steps are taken to actually implement these recommendations.

11,000 Lakes in Michigan: Fact or Fiction?

By: Tony Groves and Pam Tyning
Water Resources Group, Progressive AE

We often hear that Michigan has 11,000 inland lakes. But is that an accurate number? Breck (2004) described how that number of 11,000 lakes likely came to be:

There have been several attempts to count or compile a master list of lakes in Michigan. The Michigan Lakes and Streams Directory of 1941 reported that there were 6,454 water bodies "large enough to be lakes" (quoted in Brown 1943a). Brown (1943a) attempted to determine the total number of lakes in Michigan. Before counting the number of lakes one must decide on the definition of the term "lake." Brown (1943a, page 1) wrote that he used "the definition of Forel, the founder of modern limnology, who described a lake as 'a body of standing water occupying a basin and lacking continuity with the sea.' According to this definition all standing waters are lakes regardless of size, depth or origin. Ponds, bogs, swamps, reservoirs, etc. are just special kinds of lakes." Brown used the best available maps of the time: county master-plan maps from the Department of Conservation and the newly available polyconic projection maps from the State Highway Department. Brown (1943a) reported a count of 11,037 lakes, of which over half were less than 10 acres in surface area. This appears to be the source of the widely reported "fact" that Michigan has 11,000 lakes.

With the advent of geographic information system (GIS) and remote sensing technologies, it is now possible to get a much more accurate count of the number and size of lakes in Michigan (Figure 1).

The state of Michigan information database contains records for a total of 64,911 lakes and ponds statewide (Table 1). This number includes all lakes from the state's largest lakes to ponds only a fraction of an acre. Using the definition from Michigan's Inland Lakes and Streams Act, lakes are 5 acres and greater; therefore, Michigan contains 10,031 lakes. Of those 10,031 lakes, 89% are less than 100 acres and 1,128 (11%) are 100 acres or larger. With a surface area of 20,075 acres, Houghton Lake in Roscommon County is the largest lake in Michigan.

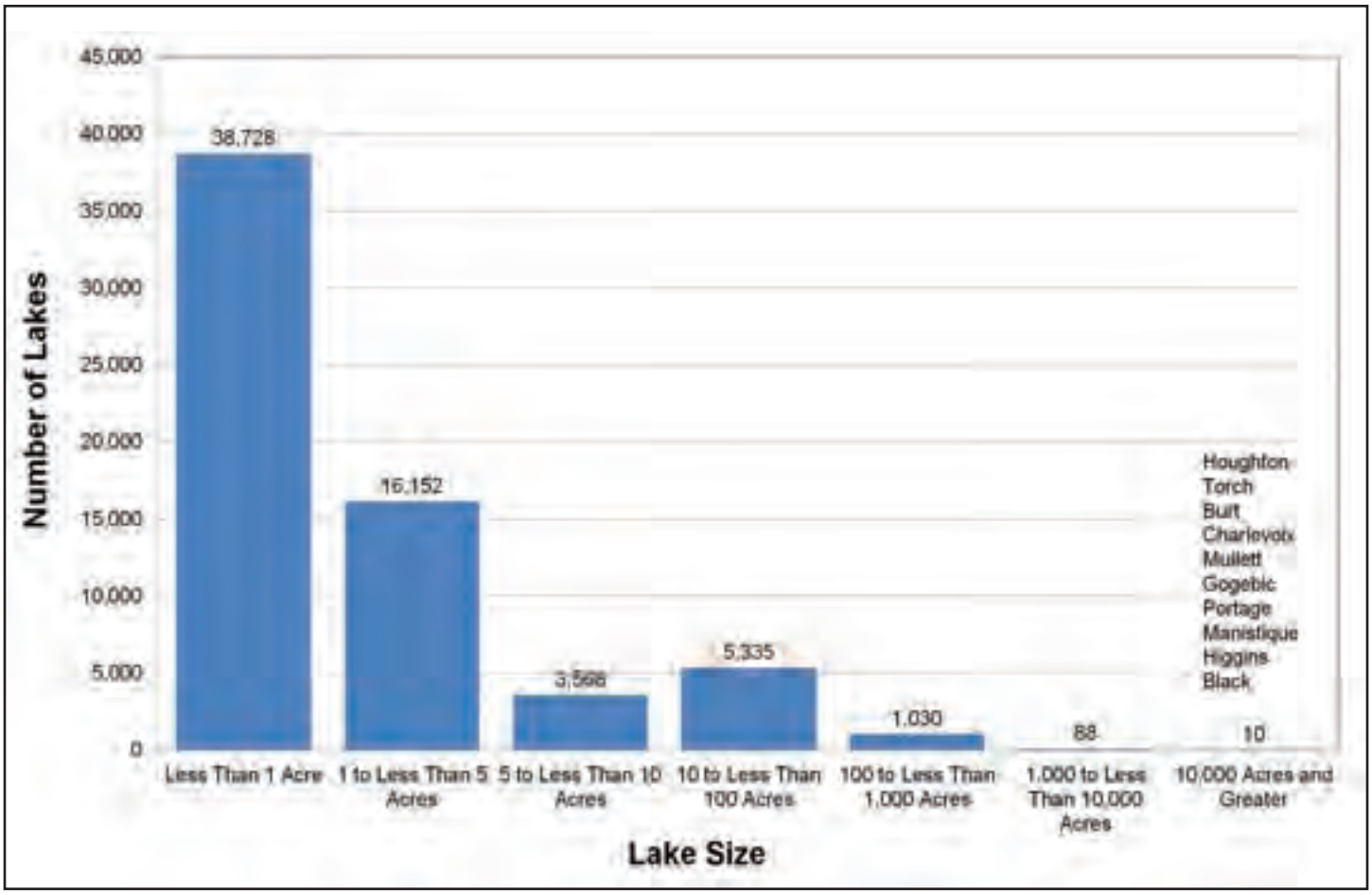

Figure 1. The number of Michigan inland lakes by size (in acres). Source: Michigan GIS Open Data.

Table 1

Number of Michigan Inland Lakes By Size

Size Category	Number	Cumulative Number of Lakes
10,000 Acres and Greater	10	10
1,000 to Less Than 10,000 Acres	88	98
100 to Less Than 1,000 Acres	1,030	1,128
10 to Less Than 100 Acres	5,335	6,463
5 to Less Than 10 Acres	3,568	10,031
1 to Less Than 5 Acres	16,152	26,183
Less Than 1 Acre	38,728	64,911

Figure 2 shows the distribution and size of lakes across Michigan. Most lakes in Michigan were formed as the result of glacial activity. The largest lakes in the state are located in the northern portion of the Lower Peninsula and the Upper Peninsula. Lakes are common throughout much of the state, but portions of the central Lower Peninsula and the thumb area are nearly devoid of lakes.

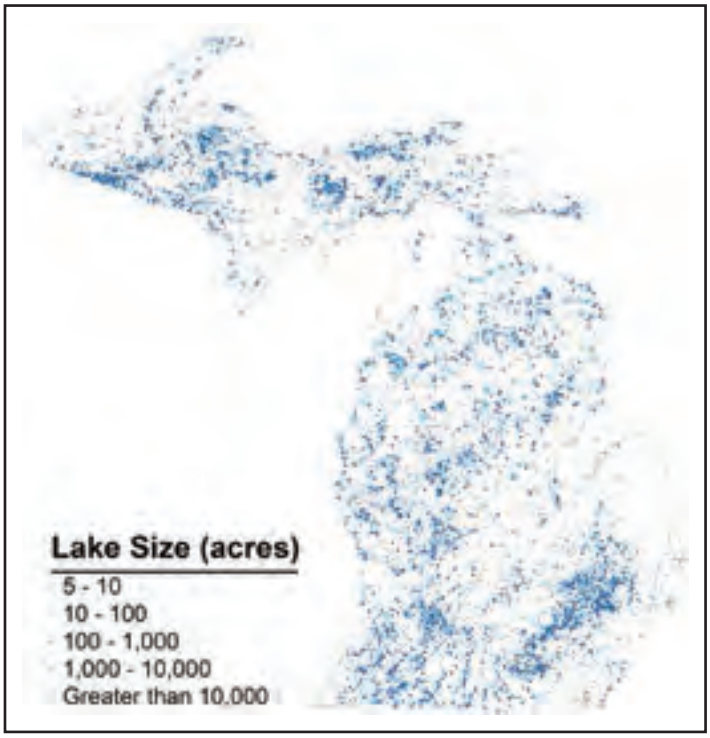

Figure 2. Statewide distribution of Michigan inland lakes greater than five acres. Source: Michigan GIS Open Data.

According to Breck (2004), depth contour maps are available for about 2,600 Michigan inland lakes. Many of the maps were created from data collected by Michigan's Institute for Fisheries Research. In addition to depth contours, these maps often show bottom types, aquatic plant distribution, and other features (Figure 3). Scanned images of the maps can be freely downloaded from the Michigan Department of Natural Resources website.

Reference:
Breck, J.E. 2004. Compilation of Databases on Michigan Lakes. Fisheries Technical Report 2004-2. Michigan Department of Natural Resources Fisheries Division.

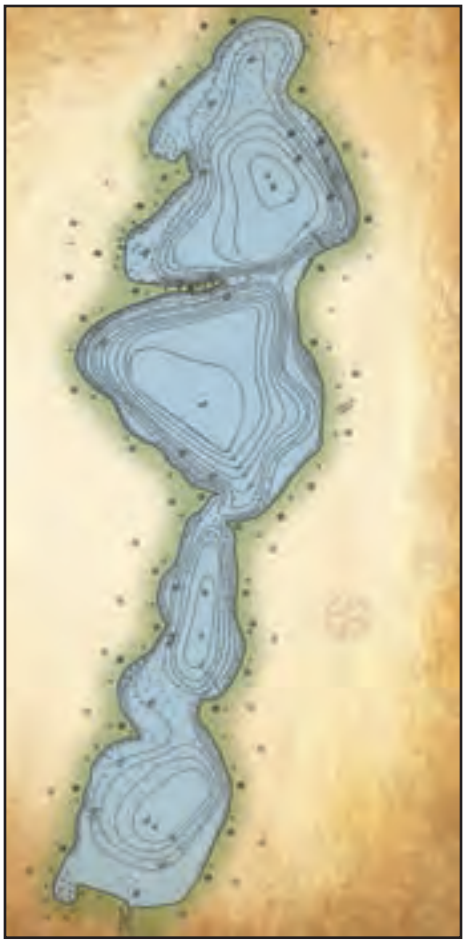

Figure 3. Barlow Lake, Barry County (1954). Modified from: Michigan Department of Natural Resources.

Our Inland Lakes and Septic Tanks:

Understanding the Contributions to Aquatic Vegetation and Algae Growth

By: Jennifer L. Jermalowicz-Jones, PhD Candidate
Restorative Lake Sciences

Figure 1: Toxic Microcystis blue-green algae in an inland Michigan lake. Photo: Restorative Lake Sciences, 2009.

Introduction:

Inland waters such as lakes provide multiple benefits to riparian communities and local municipalities through a variety of ecosystem services. Stynes (2002) estimated that Michigan's 11,000 inland lakes support a recreational industry that is valued at approximately 15 billion dollars per year. Inland lakes also provide economic and aesthetic values to riparian waterfront property owners with increased residential lot property values and scenic views. A survey of approximately 485 riparians that represented five lakes in Kalamazoo County, Michigan, USA, was conducted in 2002 by Lemberg et *al.* (2002) and revealed that the most important benefit of lakefront ownership was the vista. Thus, lakes clearly provide aesthetic as well as recreational benefits to riparians and those that use them.

For some time, lakes have been under continuous stress from surrounding development and land use activities. A major source of this stress includes the anthropogenic contributions of nutrients, sediments, and pathogens to the lake water from the surrounding landscape (Carpenter et *al.*, 1998). Nutrients have caused critical water quality issues such as the inundation of lakes with dense, filamentous green algae, or worse, toxic blue-green algae (Figure 1). Submersed aquatic vegetation also increases with high levels of phosphorus and leads to impedance of navigation and recreational activities, as well as decreases in water clarity and dissolved oxygen that lead to widespread fish kills (Figure 2). The existence of excess phosphorus in inland waterways has been well established by many scholars (Carpenter et *al.*, 1998; Millennium Ecosystem Assessment, 2005, among numerous others). Major sources of phosphorus for inland waterways include fertilizers from riparian lawns, septic drain fields, and non-point source transport from agricultural activities in the vicinity of a waterbody or upstream from the waterbody. Non-point source effluents such as phosphorus are difficult to intercept due to the diffuse geographical dispersion across a large area of land. Additionally, watersheds generally export more non-point source loads relative to point source loads as a result of the reductions of point source pollution required by the Clean Water Act of 1972 (Nizeyimana et *al.*, 1997; Morgan and Owens, 2001).

Figure 2: Nuisance aquatic plant growth in an inland Michigan lake. Photo: Roger Schweitzer, 2013

Regulation of Nutrient Pollution in Inland Lakes:

The Michigan Department of Environmental Quality (MDEQ) regulates some activities through the Inland Lakes and Streams Program, pursuant to Part 301 of the Natural Resources Environmental Protection Act, P.A. 451 of 1994, as amended. Currently regulated activities include permits for shoreline improvements and beach alterations, wetland mitigation, and dredging. Non-point source pollutants from adjacent lands are loosely regulated, generally through the derivation of Total Maximum Daily Loads (TMDL's) pursuant to the federal Clean Water Act of 1972 (CWA) for water bodies that do not meet state Water Quality Standards (WQS). An initial goal of the CWA was to reduce the discharge of all pollutants into navigable waters by 1985. This goal was clearly not achieved and thus the policy was not as effective as previously assumed. A TMDL is the maximum amount of a specific pollutant a water body can absorb and still maintain good water quality. In Michigan, waters that do not meet WQS must be studied to determine the TMDL's for specific pollutants which also includes nutrients and solids. Once the TMDL's are established for the water body by the MDEQ, they are submitted to the United States Environmental Protection Agency (EPA) for approval. Once approved, the TMDL's are implemented through the regulation of National Pollutant Discharge Elimination System (NPDES) permits for point source pollutants or through improvement programs for non-point source pollution. The WQS strive to maintain waters with acceptable dissolved oxygen concentrations for the fishery,

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Our Inland Lakes and Septic Tanks

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suitable conditions for recreation, and the protection of high quality waters. A primary problem with the current TMDL system is that sites need to be monitored frequently to determine what the TMDL should be and once determined, if the system is showing signs of improvement. Although the MDEQ maintains a current list of waters with TMDL's throughout the state, the impairments still exist on many water bodies (Jermalowicz-Jones, *unpublished data*). The monitoring frequency needed to obtain accurate information is often not executed and the runoff of phosphorus from farmland is often unmeasured and unknown. Furthermore, intense monitoring of agricultural non-point pollutant loads would be expensive and transaction costs associated with regulation policies would likely be high (Dosi and Zeitouni, 2001).

Local Sources of Nutrients to Inland Lakes:

Nutrient pollution of inland lakes from septic systems and other land use activities is not a modern realization and has been known for multiple decades. The problem is also not unique to Michigan Lakes and was earlier described in Montreal, Canada by Lesauteur (1968) who noticed that summer cottages were having negative impacts on many water bodies. He further noted that a broader policy was needed to garner control of these systems because they were becoming more common over time.

Many of our inland lakes are in rural areas and thus sewer systems or other centralized wastewater collection methods are not practical. Thus, septic systems have been common in those areas since development on inland lakes began. Septic systems have four main components consisting of a pipe from the residence, a septic tank or reservoir, a drainage field, and the surrounding soils Figures 3 and 4). On ideal soil types, microbes in the soil are able to decompose nutrients and reduce the probability of groundwater contamination. However, the land around many lakes in Michigan contain soils that are not suitable for septic systems. Soils that are not very permeable, prone to saturation or ponding and have mucks, exist around many lakes and residences with septic systems.

Figure 3: A concept drawing of a cottage and its associated drain field. Photo: Restorative Lake Sciences.

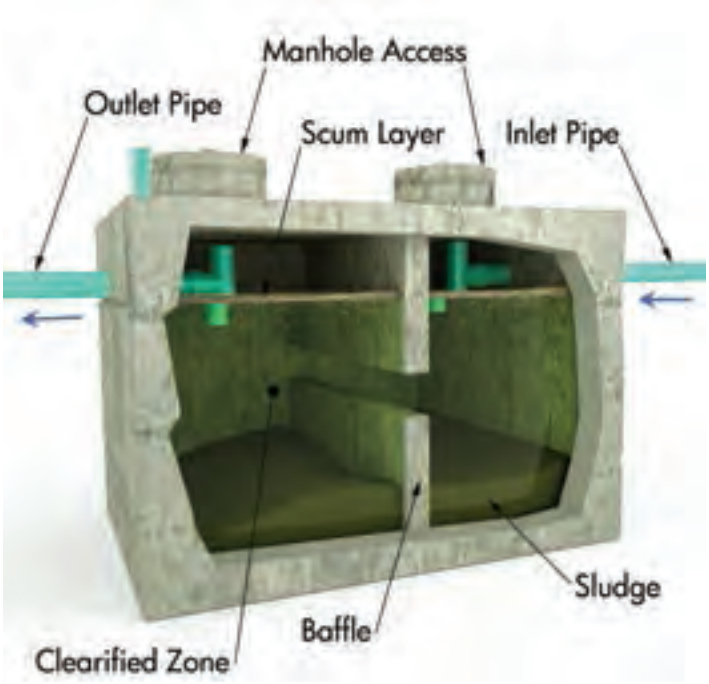

Figure 4: The components of a typical septic tank. Photo: Restorative Lake Sciences.

In fact, soils that are saturated may be associated with a marked reduction in phosphorus assimilation and adsorption (Gilliom and Patmont, 1983; Shawney and Starr, 1977) which leads to the discharge of phosphorus into the groundwater, especially in areas with a high water table. In the study by Gilliom and Patmont (1983) on Pine Lake in the Puget Sound of the western U.S., they found that it make take 20-30 years for the phosphorus to make its way to the lake and cause negative impacts on water quality. This may be why cottages built many decades ago are now having impacts on the water quality of those lakes.

Typical septic tank effluents are rich in nutrients such as phosphorus and nitrogen, chlorides, fecal coliform, sulfates, and carbon (Cantor and Knox, 1985). Phosphorus and nitrogen have long been identified as the key causes of nuisance aquatic plant and algae growth in inland lakes. Although phosphorus is often the limiting growth factor for aquatic plant growth, nitrogen is often more mobile in the groundwater and thus is found in abundance in the groundwater. A groundwater seepage study on submersed aquatic plant growth in White Lake, Muskegon County, Michigan, was conducted in 2005 by Jermalowicz-Jones (MS thesis, Grand Valley State University) and found that both phosphorus and nitrogen concentrations were higher in developed areas than in undeveloped areas. This helped to explain why the relatively undeveloped northern shore of White Lake contained significantly less submersed aquatic plant growth than the developed southern shoreline. The research also showed that more nutrients were entering the lake from groundwater than from some of the major tributaries.

Spence-Cheruvelil and Soranno (2008) studied 54 inland lakes in Michigan and found that total aquatic plant cover (including submersed plants) was most related to secchi depth and mean depth. However, they also determined that man-made land use activities were also predictors of aquatic plant cover since such variables can

also influence aquatic plant growth. Prior to changes in offshore aquatic plant communities, an additional indicator of land use impacts on lake water quality in oligotrophic lakes (lakes that are low in nutrients) included changes in periphytic algae associated with development nearshore. Such algae can determine impacts of septic leachate before other more noticeable changes offshore are found (Rosenberger et *al.*, 2008). Development in the watershed also may influence the relative species abundance of individual aquatic plant species. Sass et *al.*, (2010) found that lakes associated with rigorous development in surrounding watersheds had more invasive species and less native aquatic plant diversity than less developed lakes. Thus, **land use activities such as failing septic systems may not only affect aquatic plant biomass and algal biomass, but also the composition and species richness of aquatic plant communities.**

A groundwater investigation of nutrient contributions to Narrow Lake in Central Alberta, Canada by Shaw et *al.*, 1990, utilized minipiezometers and seepage meters to measure contributions of groundwater flow to the lake. They estimated that groundwater was a significant source of water to the lake by contributing approximately 30% of the annual load to the lake. Additionally, phosphorus concentrations in the sediment pore water were up to eight times higher than groundwater from nearby lake wells.

What You Can Do for Your Lake:

The U.S. Environmental Protection Agency (USEPA) offers excellent educational resources and reference materials that riparians can use to care for their septic systems. To learn more about septic systems and how to care for them, visit the website: http://water.epa.gov/infrastructure/septic/. Some lake associations have created "annual septic tank pump out" days where septic tank specialists visit individual properties and clean out the septic tanks as well as inspect the drain fields for any issues that may negatively affect water quality. Annual septic tank pump out days are a great way to interact with riparian neighbors and learn about the many different types and locations of individual septic systems. Additionally, riparians should always maintain an awareness of the aquatic vegetation and algae in their lake so they can report any significant deviations from the normal observations. An awareness of the ambient lake water quality is also useful since degradations in water quality often occur over a long period of time and can be subtle.

Scientific References:

Canter, L.W., and R.C. Knox. Septic tank system effluents on groundwater quality. Chelsea, Michigan, Lewis Publications, Inc. 336 p.

Carpenter, S.R., N.F. Caraco, D.L. Correll, R.W. Howarth, A.N. Sharpley, and V.H. Smith. 1998. Nonpoint pollution of surface waters with phosphors and nitrogen. *Ecological Applications* 8(3): 559-568.

Cheruvelil Spence, K., and P. Soranno. 2008. Relationships between lake macrtophyte cover and lake and landscape features. Aquatic Botany 88:219-227.

Dosi, C., and N. Zeitouni. 2001. "Controlling groundwater pollution from agricultural non-point sources: An overview of policy instruments" Chapter 6, In: Agricultural Use of Groundwater: Towards Integration between Agricultural Policy and Water Resources Management. Springer. 301 pp.

Gilliom, R.J., and Patmont, C.R. 1983. Lake phosphorus loading from septic systems by seasonally perched groundwater. Journal of the Water Pollution Control Federation. 55(10):1297-1305.

Jermalowicz-Jones, J.L. 2005-2007. Submersed aquatic macrophyte growth and groundwater nutrient contributions associated with development around White Lake, Muskegon County, Michigan. MS thesis. Grand Valley State University, Allendale, Michigan. 89 pp.

(Continued on page 30)

Our Inland Lakes and Septic Tanks (Continued from page 29)

Lemberg, D., R. Fraser, and J. Marsch. 2002. Implications for planning sustainable lake shores, Part I. In: The Michigan Riparian, publication of the Michigan Lake and Stream Associations. P.8-11.

Lesauteur, T. 1968. Water pollution in summer cottage areas. Canadian Journal of Public Health 59(7):276-277.

Millennium Ecosystem Assessment. 2005. Ecosystems and human well-being: Wetlands and water synthesis. World Resources Institute, Washington, DC.

Minnerick, R.J. 2004. Michigan Lakes: An assessment of water quality. USGS Fact Sheet, FS 2004-3048. 4 p.

Morgan, C., and N. Owens. 2001. Benefits of water quality policies: The Chesapeake Bay. *Ecological Economics* 39:271-284.

Nizeyimana, E., B. Evans, M. Anderson, G. Peterson., D. DeWalle, W. Sharpe, J. Hamlett, and B. Swistock. 1997. Quantification of NPS loads within Pennsylvania watershed. Final report to the Pennsylvania Department of Environmental Protection, Environmental Resources Research Institute, The Pennsylvania State University, University Park, Pennsylvania.

Rosenberger, E.E., Hampton, S.E., Fradkin, S.C., and Kennedy, B.P. 2008. Effects of shoreline development on the nearshore environment in large, deep, oligotrophic lakes. Freshwater Biology 53:1673-1691.

Sass. L.L., Bozek, M.A., Hauxwell, J.A., Wagner, K., and Knights, S. 2010. Response of aquatic macrophytes to human land use perturbations in the watersheds of Wisconsin lakes, USA. Aquatic Botany 93:1-8.

Shaw, R.D., Shaw, J., Fricker, H., and Prepas, E.E. 1990. An Integrated approach to quantify ground water transport of phosphorus to Narrow Lake, Alberta. Limnology and Oceanography. 35(4):870-886.

Stynes, D. J. 2002. Michigan statewide tourism spending and economic impact estimates: Accessed at URL http://www.prr.msu.edu/miteim

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