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WALLOON LAKE, CHARLEVOIX AND EMMET COUNTIES

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## BACKLITTERS WOULD REPLACE COURT DECISIONS WITH ORDINANCES BY LOCAL GOVERNMENT

The Attorney General, Frank J. Kelley, in a letter (1988) to Robert Lindahl, a riparian property owner on Hutchins Lake in Allegan County, describes riparian rights, stating, "The owner of lands riparian or littoral to a body of water is by virtue of such ownership vested with riparian or littoral rights. Those rights include (1) The use of the water for general purposes, as bathing, domestic use, etc., (2) [The right] To wharf out to navigability; (3) Access to navigable waters; (4) The right to accretions. *Hilt v Weber* 252, Mich 198, 225 (1930)

Numerous decisions by Appeals Courts and the Michigan Supreme Court have confirmed these riparian property rights as stated by the Attorney General. These riparian property rights are subservient to the use of the entire surface of all navigable inland lakes in Michigan by the public. (*Hilt v Weber*, 1930; *Burt v Monger*, 1946, etc.)

Spokesmen representing non-riparians at the public hearing on House Bill 4576 at the House Office Building in Lansing on June 15, 2005 would set aside these decisions by the Courts, and replace it with township ordinances. If this were to happen, it would shake the very foundations of American constitutional government. The backlitters would use local units of government to do their bidding to give them property rights—to install docks, moor boats, and place hoists on bottomland of inland lakes.

The American constitutional government has identified the courts as the final arbiter in conflicts between individuals, organizations and corporations. To give supremacy to township ordinances over State Appeals Court and State Supreme Court decisions would be foolish and irresponsible. We need the courts to guarantee our constitutional rights, to redress wrongs, and prevent unconstitutional laws. Without the supremacy of the courts, government would become capricious and anarchistic. We need the courts to promote a stable and progressive society.

Written by Don Winne  
Editor and Publisher of *THE MICHIGAN RIPARIAN*.  
June 17, 2005

*The Michigan Riparian* magazine adds Contributing Editors to its staff. The new editors and their areas of expertise are listed below:

Dr. Lois Wolfson, Institute of Water Research, Michigan State University.  
Area of expertise – Aquatic Plants.

Anthony Groves, Progressive AE of Grand Rapids.  
Tony's area of expertise is Land Use and Water Quality.

Dr. Don Garling, Department of Fisheries & Wildlife, Michigan State University.  
Area of expertise is Fisheries Management.

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# HYDROGEOLOGY OF TWIN LAKES, CASS COUNTY, MICHIGAN

TOPOGRAPHY OF AREA

GROUND WATER FLOW

ANNUAL PRECIPITATION

LAKE ELEVATIONS

INSTALLING A DRAIN

AQUIFERS BENEATH THE LAKES

INSTALLING A PUMPING WELL

## GEOGRAPHIC LOCATION

The lakes are located in Sections 15 and 16, Wayne Township, Cass County. The lakes are about 7 miles southwest of Decatur and about one fifth of a mile East of the Amtrack railroad. Wayne Township is about 30 miles East of Lake Michigan and lies within that area where the climate is moderated by the “lake effect” of this large body of water.

The average annual precipitation at Dowagiac is 36.88 inches (1940-69) with winter snowfall accounting for 6 to 10 inches of water (10 inches of average snow are approximately equal to one inch of rain). Since 1900 annual precipitation in southwestern Michigan has ranged from about 25 inches to just over 40 inches. The past 20 years have generally been wetter than the long-term average.

Annual evapotranspiration is about equal to the average precipitation. During dry years evaporation from free water surfaces such as lakes and streams is slightly more than during wet years. This combination of decreased rainfall and increased evaporation increases the likelihood that lake levels will go down during dry years.

## GEOLOGIC DATA

The Twin Lakes basin is situated on a step-like terrace on the Northwest flank of the Kalamazoo Moraine. The lakes lie more than 100 feet below the upland surface to the East and stand 50 feet above the swampy Dowagiac River lowlands to the northwest. The Kalamazoo Moraine is the dominant topographic feature in this area. It is composed of unconsolidated glacial deposits that well logs in the area reveal to be layered sand, sand and gravel, clay, clayey sand, and clayey sand and gravel.

The Dowagiac lowland to the west is a broad swampy valley with very low slopes that grade to the Dowagiac River. The River is located along the southeastern margin of the broad valley between the Valparaiso Moraine to the northwest and the Kalamazoo Moraine to the southeast.

## SURFACE WATER

The surface water features in the Twin Lakes area are generally the result of the intersection of the land surface

with the water table. The Dowagiac River and its major tributaries, for example Osborn Drain and Woods Drain, are the only streams that flow all year. Most of the small streams are intermittent, and flow only when the water table is high during the late winter and spring.

The general lack of surface drainage in the upland area and the broad terrace indicate that most of the precipitation that falls in this area does not run off overland, but rather percolates through the soil to become soil water and ground water. The fact that the many closed depressions in the upland are generally dry is a clear indication that the soils and surface materials in this area are very permeable, and that most of the precipitation soaks into the ground.

The Twin Lakes drainage basin is small (about 420 acres) and it is unlikely that the lakes are sustained by runoff from the land surface. The lakes are sustained by direct precipitation of the lake surface (North Lake, 62 acres, and South Lake, 44 acres) and by ground water.

## GROUND WATER—Aquifers and Water Table

Well logs from the Twin Lakes area reveals that there is a water table aquifer and a deeper aquifer that is generally separated from the surface aquifer by layers of clay. In the immediate vicinity of Twin Lakes the clay is over 100 feet deep and more than 25 feet thick. Although it is likely these aquifers communicate regionally, this thick clay probably precludes flow between them around Twin Lakes. The depth to the base of the clay places it well below the bottom of the lakes and indicates that the lakes are sustained by flow from the water table aquifer.

In the area of Twin Lakes, the water table slopes from the upland formed on the Kalamazoo Moraine east of Twin Lakes to the Dowagiac River. Near the junction of Marcellus Highway and Glenwood Road, the water table is about 810 feet. At Gage and Twin Lakes road, the elevation is 785 feet. At the area of Twin Lakes, the water table elevation is 780 feet, and drops to 745 feet at the junction of Atwood and Morton roads, about one mile west of North Twin. The Dowagiac River northwest of Twin Lakes is 730 feet above sea level.



## TWIN LAKES—LAKE LEVELS

The relationship of the Twin Lakes basin to the ground water system is unusual, and much of the problem with maintaining lake levels in Twin Lakes is caused by the fact that these lakes are situated on a sloping water table rather than being simply a “discharge area” for ground water. This sloping water table can be clearly seen by noting the following elevations; Wetland east of south Twin Lake at 785 feet above sea level; North Twin at 780 feet above sea level, and the wetland west of North Twin at 770 feet above sea level.

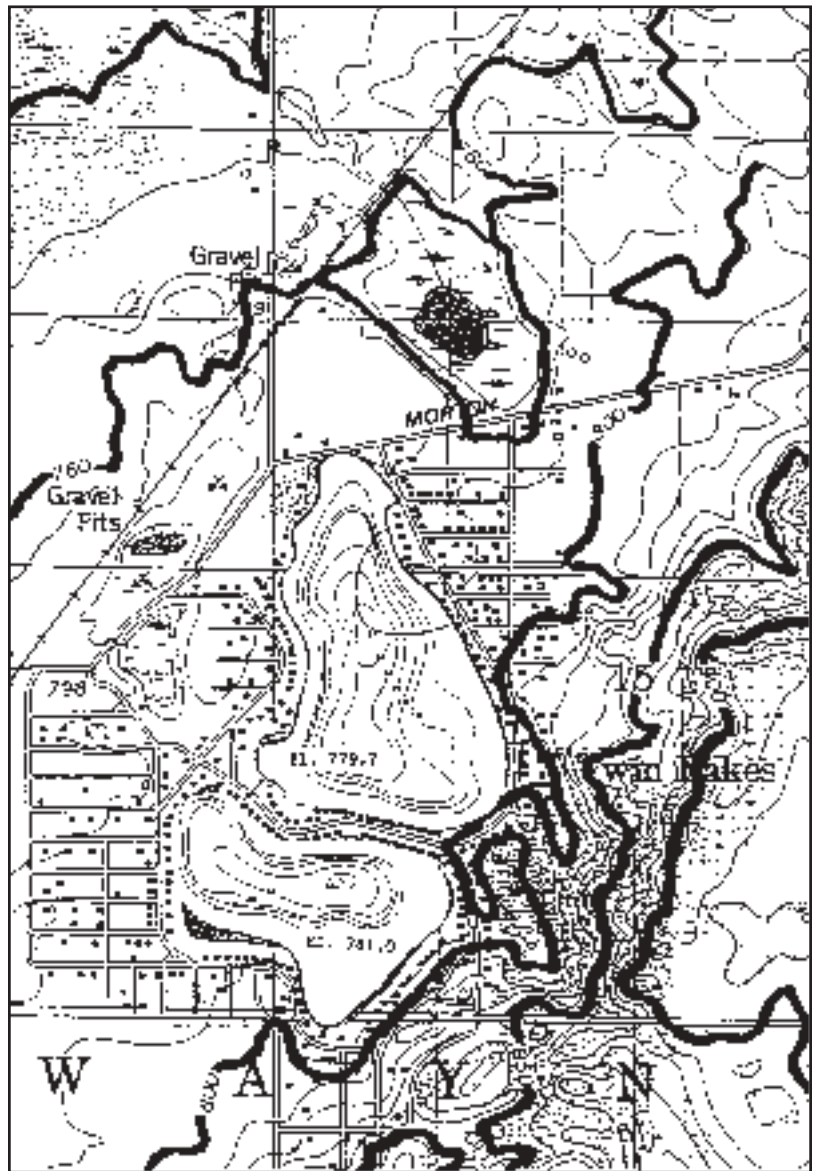
## NORTH TWIN LAKE AND NEARBY WETLANDS

The wetland and pond north of Morton Street and 2/10 of a mile north of the lakes, stands 10 feet below the level of North Twin (780) showing that the water table slopes away from North Twin on both the north and west directions. This small wetland and pond feed an intermittent stream that flows northwest to the Dowagiac River, clearly showing that these features located only two tenths of a mile north of the lakes form a ground-water discharge area. This wetland area and the one to the west of North Twin Lake probably receive some seepage from the Twin Lakes system. Lakes that lose water to the groundwater may have sharply declining lake levels during dry seasons. Although the Twin Lakes basin receives water from ground water, its position on a sloping water table causes it to lose water to the ground water system. In short, the lakes leak. As a consequence Twin Lakes can be expected to experience declining lake levels during the late summer and fall, and during extended dry periods.

## STABILIZING TWIN LAKES LEVELS

Stabilizing lake levels may be accomplished by installing a dam, diverting the flow of a stream, expanding the drainage area or installing a pump to pump water into a lake. The question that always arises when installing a pump is considered is, “Will we just recirculate the water from the ground water to the lake and back to the ground water as we continue to pump?” To successfully use ground water to augment the lake level, the lake and the aquifer from which the water is to be drawn must not be connected. Otherwise, pumping the well will lower the water table in the area of the well, and will cause the water to flow from the lake into the groundwater or aquifer.

Analysis of water well logs in the Twin Lakes area indicates that a lower aquifer is separated from the upper aquifer and the lakes by an aquitard (a bed or beds of material that greatly retards the flow of ground water). This aquitard is as much as 60 feet thick and should



preclude movement of water from the lake and back into the aquifer.

The second question that should be asked is, “Will the aquifer below the aquitard supply enough water to support such a well?” According to B.J. Lewis & Sons, Cassopolis, Michigan, the Twin Lakes Well yielded 900 gallons per minute when tested in 1966. This pump test is a very strong indication that the aquifer below the aquitard will supply enough water to maintain North Twin Lake at its court let level of 779.7 feet above sea level.

In addition to the questions posed above, at least three additional questions should be asked. (1) How much water will be required to maintain the lake levels at their legally fixed altitude? (2) How much will it cost to drill a well and install and maintain a pump to maintain the desired lake level? and (3) What will the electric cost be to maintain the desired lake level? Answers to these questions can be secured locally from certified well drillers and utility companies in the area.

# Financing Your Lake Project: Lake Boards vs. Township Boards

By Tony Groves, Water Resources Director, Progressive AE

*This is the second part of a two-part article about financing alternatives for lake projects. The first article, which appeared in the February 2005 issue of the Michigan Riparian, examined recent amendments to the Lake Board Act. This article discusses the pros and cons of organizing a lake project by establishing a lake board versus using an existing township board.*

Part 309 (Inland Lake Improvements) of the Natural Resources and Environmental Protection Act, PA 451 of 1994, as amended, provides for the establishment of lake boards and special assessment districts to finance lake improvement projects. Since 1966, this act has been used extensively to finance a variety of lake projects. Currently, there are over 100 active lake boards in Michigan.

The Township Special Assessment Act, PA 188 of 1954 was amended in 1994 to provide a mechanism to finance lake improvement projects. However, with Act 188, projects are organized under an existing township board.

With respect to process, both Part 309 and Act 188 are similar (Table 1). Both statutes provide for the establishment of a special assessment district to finance lake improvements, and both statutes require a public hearing on 1) the necessity (or practicability) of the project, and 2) a public hearing on the special assessment roll.

Some practical things that should be considered in establishing a special assessment district include:

**The Petition:** If a project is proposed to be initiated via petition, the petition should clearly state that “a special assessment district will be established and that special assessments will be levied to finance the desired lake improvements.” Space should be provided on the petition for property owners to both sign and print their names. If property is owned jointly, all freeholders should sign the petition. Prior to circulation, the local unit(s) of government involved with the project should review the petition to ensure petition language is acceptable.

**Developing the “Plan”:** An independent study should be conducted to evaluate the feasibility of lake improvement alternatives and to determine the proposed scope and cost of the project. The preparation of a lake improvement plan is important. You want to make sure that the thousands of dollars that may be invested in a lake project are being spent on improvements that are both environmentally sound and cost effective.

**Special Assessments:** When establishing a special assessment district for a lake project, care should be taken to ensure the district only includes those properties that directly benefit from the proposed improvement. Typically, this will include all lake front properties and back lots with deeded or dedicated lake access. To avoid legal challenges, assessment should be levied in a fair, consistent, and equitable manner. All similarly situated properties should be assessed the same. Often, a simple assessment apportionment scheme (where, for example, lakefront parcels are assessed one unit of benefit and back lots with access one-half unit of benefit) is easier to defend (and explain) than a more complex assessment methodology.

With respect to procedure, neither statute is superior over the other. However, there are some instances where one act may be preferred over the other. For example, if a lake is located entirely within one township and the township is willing to undertake the project, then Act 188 may be a more expedient way to proceed. If, on the other hand, a lake is located in several townships or political jurisdictions, then Part 309 may be more desirable. (In a situation

where a lake is in several townships, each township involved would need to undertake separate assessment proceedings which could be both time-consuming and cumbersome. In addition, no single entity would be administering the project). Another practical consideration with Act 188 is that township boards often have full agendas and address a myriad of issues at their meetings. (If you have ever sat through a township board meeting, you can attest to this fact.). Often, they have precious little time available to discuss and address lake issues and concerns. By contrast, a lake board is formed to address only the lake in question and thus, focuses only on lake issues.

This article provided an overview of the procedures that must be followed in organizing a project under Part 309 or Act 188. In organizing a lake improvement project, it is important that statutory hearing and notice procedures be followed closely. Lake projects can be time-consuming enough without having a project challenged and prolonged due to a procedural flaw. To help ensure proper steps and procedures are followed, lake residents who are considering pursuing the establishment of a special assessment district for their lake should seek professional assistance or legal counsel before embarking on the process.

## Table 1 - An Overview of Part 309 and Act 188 Procedures

### Part 309 (Inland Lake Improvements) of the Natural Resources and Environmental Protection Act, P.A. 451 of 1994

- Projects are administered by a lake board that is comprised of a lakefront property owner, a representative of each local governmental unit (if there is only one local unit of government involved, 2 representatives of that local unit are appointed to the lake board), a county commissioner, and the county drain commissioner or his or her designee. (Note that local units of government can appoint lake residents as their representative(s) if they so choose.)
- Projects are initiated by motion of the local unit(s) of government or by petition of 2/3 of freeholders abutting the lake.
- Pursuant to the Act, projects can be implemented that provide the following benefit(s): The elimination of pollution and elimination of flood damage, elimination of water conditions which jeopardize the public health or safety; increase of the value or use of lands and property arising from improving a lake or lakes as a result of the lake project, and the improvement or development of a lake for conservation of fish and wildlife and the use, improvement or development of a lake for fishing, wildlife, boating, swimming or any other recreational, agricultural, or conservation uses.
- Lake board retains an engineer to conduct lake improvement feasibility study, and to determine the scope and estimated cost of project and probable assessments.
- Public hearings are required on the practicability of the project and special assessment roll.

### Township Special Assessment Act, P.A. 188 of 1954, as amended

- Projects are administered by the township board.
- For lake improvements, projects can be initiated by motion of the township board or by petition of land owners constituting more than 50% of the land area in the special assessment district.
- Under this Act, assessments can be levied for the eradication or control of aquatic weeds and plants, the construction, improvement, and maintenance of a lake including, but not limited to, dredging, and the construction, improvement, and maintenance of dams and other structures which retain the waters of the state for recreational purposes. (Note that under Act 188, a lake, pond, river, or stream under the jurisdiction of the county drain commissioner cannot be improved without written permission of the drain commissioner.)
- Plans are prepared describing the improvement and estimated costs.
- Public hearings required on the necessity of the project and the special assessment roll.



# Attorney Writes

By Clifford H. Bloom

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## NO MORE EXCUSES FOR MUNICIPALITIES!

In the August 2001 issue of *The Riparian*, I wrote a column entitled “The Top Ten Excuses—Are You Kidding?” While some townships, cities, and villages with lakes have been very progressive when it comes to protecting their lakes by adopting reasonable lake access regulations, other municipalities continue to make excuses for doing nothing.

Municipal zoning regulations which limit and regulate the ability of developers to give lake access to new lots and parcels located away from a lake have long been upheld by the courts in Michigan. These zoning regulations are sometimes referred to as “anti-funneling” or “anti-keyhole” regulations. No less an authority than the Michigan Supreme Court in *Hess v West Bloomfield Township*, 439 Mich 550 (1992), upheld anti-funneling regulations so long as they are reasonable. Since then, anti-funneling regulations have been upheld against attack from developers by numerous trial courts and on several occasions by the Michigan Court of Appeals.

Recently, the Michigan Court of Appeals issued another landmark case in this area in *Yankee Springs Township v Fox*, 264 Mich App 604 (2004). In that case, the Court of Appeals upheld an anti-funneling regulation which required at least 70 feet of frontage on a lake for each new off-lake lot or dwelling unit. The court also obliterated several longstanding myths which are often perpetuated by backlot owners and even some municipalities. Those myths are as follows:

1. Myth—A municipality cannot adopt a valid anti-funneling regulation if the lake being governed is located in more than one municipality.

The Court of Appeals flatly indicated that this is false. Of course, a municipality can only regulate lake frontage located within the municipality involved, but that is often still very helpful. This has always been a particularly silly myth, since if it were true, a municipality could never adopt a zoning ordinance unless all adjoining municipalities also have zoning regulations identical to the first municipality. For example, suppose a main highway traverses two adjoining townships. One township has zoning regulations and the other does not. Just because one of the townships does not have any regulations limiting commercial development on its portion of the highway does not mean that the other township cannot sensibly regulate commercial development along its portion of the same highway.

2. Myth—Anti-funneling regulations cannot or should not be adopted where a lake has a public access site.

This myth was also shattered by the Court of Appeals in *Yankee Springs Township*. Just because a lake might have some existing recreational conflicts or overcrowding problems due to a public access site or existing funnel developments does not mean that the municipality involved cannot or should not adopt anti-funneling regulations to prevent the creation of future keyhole developments which will make the existing problems worse. To believe in this myth is akin to arguing that zoning regulations should never be adopted (or ever be made more strict) where existing development problems already exist in a community—it is like one throwing up their hands and declaring that since there is already a problem or potential problem with development on the horizon, the horse is already out of the barn and the municipality should just give up.

3. Myth—Anti-funneling regulations constitute a “taking” or violate substantive due process.

In *Yankee Springs Township*, the Court of Appeals held that the ordinance (which required at least 70 feet of frontage for each new dwelling which will access the lake) was reasonable and did not constitute a taking. The court pointed out that protection of natural resources such as lakes is a reasonable governmental interest. Furthermore, the court noted that by limiting the number of dwelling units that have lake access, anti-funneling ordinances curtail lake congestion, pollution and the risk of boating accidents by cutting down on overuse.

4. Myth—Anti-funneling regulations which do not regulate all types of lake access sites and properties are invalid.

The court also rejected this falsehood. Even if only certain types of lake access devices or situations are covered, such regulations are still reasonable and rationally-related to the goals of the ordinance of reducing lake congestion, lowering the risk of accidents on the lake and preserving the lake.

\* \* \*

Anti-funneling zoning regulations were also upheld by the Michigan Court of Appeals in the unpublished case of *Jones v Genoa Township* (decided on October 25, 2004 – Case No. 231537). In *Jones*, the Court of Appeals easily affirmed and applied the anti-keyhole regulations contained in the Genoa Township Zoning Ordinance.

In addition to anti-funneling or lake access regulations in municipal zoning ordinances being consistently upheld by

(Continued on page 14)





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# ML&SA NEWS

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Donald E. Winne, Executive Director

## CONTRIBUTIONS TO MICHIGAN LAKES AND STREAMS FOUNDATION ARE DEDUCTIBLE ON FEDERAL TAX RETURNS

The Corporation was formed exclusively for the benefit of and to help carry out the purposes of Michigan Lake & Stream Associations.

The Corporation was given a 501 (c) (3) status by the Internal Revenue Service on January 12, 2004. Bequests, legacies, devises, transfers or gifts to Michigan Lakes and Streams Foundation are deductible for federal estate and gift tax purposes if they meet the applicable provisions of Code sections 2055, 2106, and 2522. You should consult with your attorney for the most appropriate way to make your bequest.

Contributions may be made in any amount and may be made by check, credit card or other method you may choose. Checks should be made out to: **Michigan Lakes and Streams Foundation** and mailed to P.O. Box 303, Long Lake, MI 48743.

### FALL REGIONAL SEMINARS SCHEDULED

**Regions 1, 2, 5, & 6** will be held at the Potter Center at Jackson Community College on October 8, 2005. The meeting will run from 9:30 a.m. to 3:00 p.m.

**Region 3** will be held at the Van Buren County Center at Lawrence on October 12, 2005, Wednesday from 5:00 to 9:00 p.m.

**Region 7** will be held at Sage Township Hall, 1831 Pratt Lake Road, on Sunday, October 2, 2005. The meeting will start at 9:30 a.m.

**Regions 9, 10, & 11** will be held at BJ's Restaurant at Gaylord on Saturday, September 10, 2005. Time: 9:30 a.m. to 3:00 p.m.

**Regions 12, 13, 14, & 15** will be held on September 10, 2005 at Covenant Point on Hagerman Lake, Iron County. Registration 9:00 a.m. First session at 10:00 a.m.

# WALLOON LAKE AND ITS WATERSHED

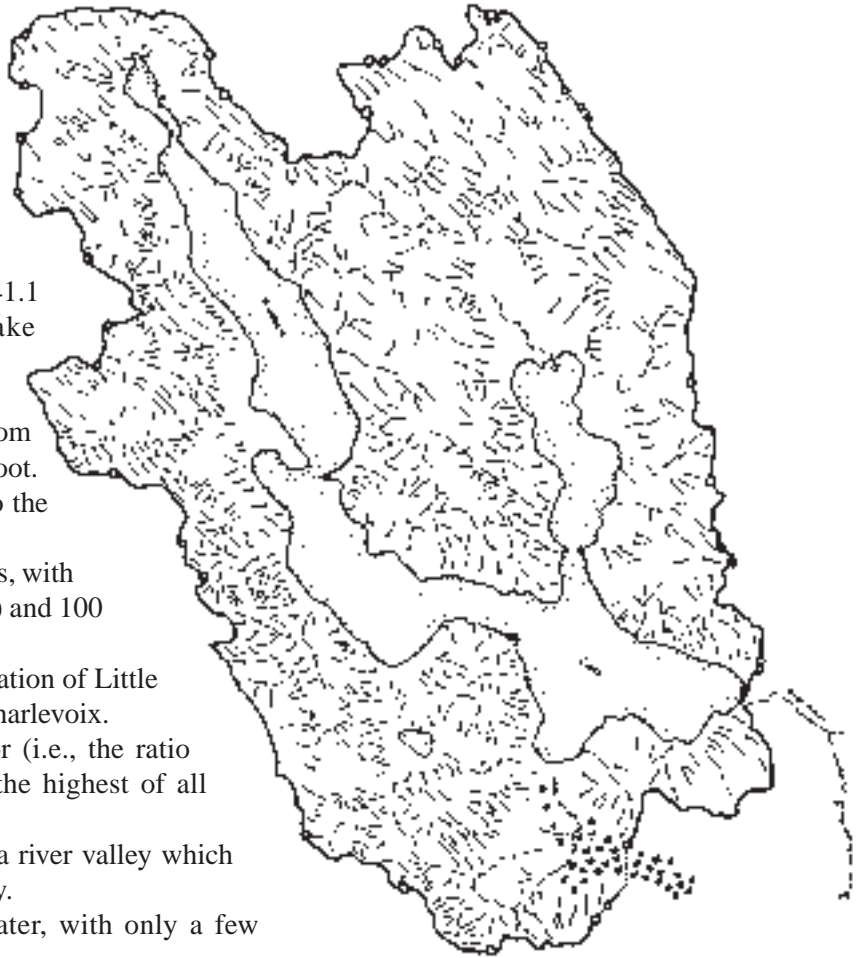
Walloon Lake is located in Charlevoix and Emmet Counties. Politically, the lake and its watershed are located in Bay, Evangeline, and Melrose Townships of Charlevoix County; and in Bear Creek and Resort Townships of Emmet County.

Walloon Lake is the 26th largest lake in Michigan, with a lake surface area of 6.9 square miles.

Walloon Lake has a relatively small watershed (41.1 square miles, including the lake), with the lake accounting for 16.8 percent of the total watershed.

- Walloon Lake's shoreline length is 30 miles.
- Walloon Lake is 9.2 miles at its longest point, from Mud Lake at the tip of the West Arm to the Foot. The distance from the tip of the North Arm to the bottom of the South Arm is four miles.
- Walloon Lake is one of the State's deepest lakes, with mean and maximum depths of 28.9 feet (8.8m) and 100 feet (30.5m) respectively.
- Walloon Lake is about 100 feet above the elevation of Little Traverse Bay (about a mile away) and Lake Charlevoix.
- Walloon Lake's shoreline development factor (i.e., the ratio of shoreline length to lake surface area) is the highest of all Emmet County lakes.
- Walloon Lake existed in pre-glacial times as a river valley which was re-shaped and deepened by glacier activity.
- Walloon Lake is fed primarily by groundwater, with only a few inlet creeks.

(Information Source: Walloon Lake Directory)



## OBJECTIVES OF MICHIGAN LAKE & STREAM ASSOCIATIONS

1. To inform riparian property owners and the public at large of **Riparian rights in Michigan**.
2. To disseminate information about pending legislation which will have an impact on riparian rights.
3. To inform Riparians of applications to dredge, fill or change the shoreline of lakes and streams in Michigan.
4. Sponsor conferences and workshops for riparians and the public to provide information regarding the protection of lakes or streams.
5. To assist Riparians to establish an Association to deal with problems which call for unity in action to prevent the degradation of the water quality of lakes or streams and to prevent their misuse.
6. To assist Associations in the presentation of their respective positions regarding riparian rights and water resource management before courts, municipalities and government agencies.
7. To review and submit proposals to administrative and legislative bodies considering statutes, ordinances and regulations impacting riparian property owners and water resources.
8. To develop a library of information including books, pamphlets, documents, research studies of Michigan's water resources and make the same available to riparians and the public at large.
9. To sponsor studies and research designed to expand the fund of knowledge about Michigan's water resources.
10. To instruct Lake & Stream Association members how to monitor land and water development within the watershed.
11. To assist local associations in obtaining help from local and state governing units in their efforts to protect their water resource.
12. To support all efforts of state and federal governments to maintain water quality standards established by state and federal law.



# The MSU Boat Noise Gun Project

Prof. Clark J. Radcliffe

Mechanical Engineering, Michigan State University

The Boat Noise Project is a long term commitment of the Michigan Lake and Streams Associations (ML&SA). During the 2003 year, the project was supported by ML&SA funding that allowed the construction of the first prototype of the Noise Gun. That project was documented in the ML&SA magazine, *The Riparian*.

For 2005, we received a second phase of funding from the Michigan Department of Natural Resources, ML&SA and Michigan State University. With those funds, we have constructed a more advanced second prototype and are testing it against current boat noise standards – specifically the 25 meter pass-by test standards used in the U.S. by a number of states and proposed in Europe by the ISO and ICOMIA.

Pass-by standards require a boat to run at a distance of 25 meters past a stationary sound measuring instrument. A maximum noise level is prescribed that the boat must not exceed. Maximum pass-by levels from 90 dBA to 70 dBA are in force at various localities.

These pass-by tests are a repeatable and accurate way of measuring boat noise. They require a course that is VERY difficult to set up and maintain.

Additionally, they require a law enforcement officer to bring the boat (and boater) to the course. They are an effective engineering specification for manufacturers to build boats to. Although effective for manufacturers, they are unsuited for law enforcement.

This summer we will demonstrate that our “Noise Gun” instrument will allow easy and portable pass-by measurement without the need for a course. We must demonstrate the instrument measurements are comparable to the pass-by measurements in a way that will stand up in court. To do that, we are constructing a course at Higgins Lake and conducting many pass-by measurements using the standard method alongside our simpler-to-use “Noise Gun” device.

Our law enforcement people believe that our “Noise Gun” concept is enforceable. We are in the process of making the validation measurements that will prove their belief. We will have results and a report late this Fall.

The final result will be a device that is proven to measure the “minimum possible pass-by measurement” that would have been measured if the boat had been operated over the standard course. If that minimum possible level exceeds the maximum allowable level, law enforcement can issue a citation that will hold up in court. A reasonable and enforceable standard will then exist for law enforcement.

Once validated, our instrument’s existence allows the start of the process of changing Michigan law to allow for the pass-by test of boat noise levels and our instrument’s use to enforce those standards. We will need the support of organizations across the state to encourage adoption of those changes in the laws to allow the Noise Gun to be used by law enforcement. ♦

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## ATTORNEY WRITES

### NO MORE EXCUSES FOR MUNICIPALITIES!

(Continued from page 11)

the courts in Michigan, the courts have also validated nonzoning or “police power” ordinances which regulate lake structures and activities such as docks, boat launching, the number of boats moored at a property, and similar matters. See *Square Lake Hills Condo Association v Bloomfield Township*, 437 Mich 310 (1991). It is not uncommon for a municipality to adopt both anti-funneling regulations in its zoning ordinance and to also enact a complementary police power ordinance regulating docks, boat launching, and similar activities. Michigan municipalities also have full legal authority to adopt ordinances which regulate the use of road ends at lakes, which can include the ability to ban dockage and permanent boat mooring, littering, boisterous activity, and similar matters at road ends. See *Jacobs v*

*Lyon Township*, 199 Mich App 667 (1993) and *Robinson Township v Ottawa County Board of Road Commissioners*, 114 Mich App 405 (1982). Finally, now that municipalities can adopt civil infraction procedures for enforcing zoning ordinances and other ordinances by means of simple tickets, it is easier and cheaper for a municipality to enforce these types of ordinances.

For a more in-depth discussion of municipal lakefront legal issues and other riparian matters, please also see the article entitled “An Overview of Lakefront Development Legal Issues” by this author which appeared in the October 2003 issue of Michigan Planning & Zoning News. That article is also reprinted on the ML&SA website at [www.mlswa.org](http://www.mlswa.org).

Based on the above, municipalities no longer have any legitimate excuses (not that they ever did!) for not adopting the necessary ordinance provisions to protect lakes within their jurisdiction. ♦

## DEBBIE STABENOW, SENATOR FROM MICHIGAN, REPORTS PROGRESS IN STOPPING DUMPING OF CANADIAN TRASH IN MICHIGAN

The following letter was sent to Bruce Bonnell on June 24, 2005 from Stabenow's Washington office:

"On June 8, the Subcommittee on Environment and Hazardous Waste Material of the U.S. House Committee on Energy and Commerce approved the International Solid Waste Importation and Management Act of 2005, which is based in part on legislation I introduced in the Senate earlier this year. Essentially, this bill gives authority to the State of Michigan to stop shipments of Canadian trash until the Environmental Protection Agency (EPA) begins enforcing our existing treaty with Canada. This treaty allows the EPA to object to the trash shipments.

So what does this mean? Now that the bill has been reported from the House Subcommittee it must be passed by the House Committee on Energy and Commerce, which is chaired by Joe Barton of Texas, and then the full House of Representatives. I will be introducing an identical bill in the Senate in order to help expedite the process. Although we have a long way to go before the bill becomes law, this action is significant since this is the first time that Congress has officially voted on this issue.

Michigan passed new laws last year that require tough standards and inspections for trash coming into the state. Now several State House members are working on bills that will eliminate the financial incentives that make trash dumping in Michigan profitable. Their bills would toughen enforcement, apply penalties for dangerous shipments and violations, and extend the ban on new landfills. Information on the state bills can be found at [www.housedems.com/trash.html](http://www.housedems.com/trash.html).

The federal legislation, which passed Committee this week, will give the additional authority needed to the State of Michigan to finally put an end to the outrageous dumping.

I am also continuing to pressure the President and the EPA to step up and take responsibility for enforcing our treaty with Canada, which would mean stopping the trash immediately. Since my last e-mail, a new EPA administrator, Steve Johnson, has been appointed. I will be meeting with him personally to present him with the 165,000 petitions signed by you and other Michigan citizens outraged over this dumping. You may recall that these petitions helped convince former EPA Administrator Leavitt to announce a pilot program to implement the existing treaty with Canada. Although the pilot project fell far short of our expectations, I will ask Administrator Johnson to strengthen this program by making it mandatory, penalizing those who break the rules, and fully enforcing the treaty.

## RIPARIAN RIGHTS RESIDE WITH OWNER OF LOT SEPARATED FROM THE LAKE BY COUNTY ROAD OR HIGHWAY

### CROUCHER v WOOSTER 271 Mich 337 (1935)

"Conveyance of the lot abutting a highway which touches a lake carries with it the same riparian rights on the opposite side of the highway as it would have had the lot itself been touching the lake, unless there is an express limitation in the deed. Had there been intervening land between the highway and the lake, the result would probably have been different. The deed gave to the grantees a common right with other riparians to exercise full riparian rights."

### MICHIGAN CENTRAL PARK ASSOCIATION v ROSCOMMON COUNTY ROAD COMMISSION 2 Mich App 192 (1966)

The Appeals Court "upheld the trial court findings that the boulevard is a public highway and under the county jurisdiction. They also upheld the finding that plaintiff association and other abutting property owners have riparian rights on Higgins Lake opposite their lots and across the highway. The Court also finds that the Lyon Township Board has no duty to assume policing of the boulevard because of lack of legislative authority in the record. The public beach is ENJOINED as an improper interference with the plaintiff's riparian rights."

### SHERIDAN DRIVE ASSOCIATION v WOODLAWN BACK PROPERTY OWNERS ASSOCIATION 29 Mich App 64 (1970)

The Court of Appeals "holds that the owner of the land separated from a lake only by a public road has riparian rights in the lake. The plaintiffs have a right to exclude defendant back lot owners from the lake across the road... One whose property is separated from a navigable lake solely by a public highway has riparian rights in the lake... Cross streets platted to the road abutting a lake shore do not give the public a right to access."



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# NEWS FROM LAKES AROUND THE STATE

## BALDWIN LAKE, CASS COUNTY

**Alice Ann Troy, President**

### Home Drinking Water Test

The EPA recommends testing your drinking water about every 2 or 3 years, especially when (1) Density of homes is high, with several drawing from the same aquifer, (2) Wells are less than 70" deep or (3) Soil-type allows quick passage of contaminants into wells. As an individual, you can contact a lab to do the tests for you, but the cost would be higher than what the lake association can offer. Our bulk rate is passed on to members. The cost for the test will be only \$55 for members and \$75 for non-members. Payment by check or cash is needed at time of pickup of the kit.

### What do we test for?

**Coliform Bacteria:** These bacteria are abundant in human and animal waste and generally are found in wells located too close to septic systems or livestock areas. Elevated counts can cause a variety of recurring illnesses with symptoms such as nausea and diarrhea. Particularly susceptible are young children and older adults.

**Nitrates:** Elevated nitrates can be caused by improperly operating septic systems. Additionally, fertilizers contain nitrogen compounds which may break down into nitrates. Of particular concern in our area are the homes bordering agricultural areas, since fertilizers are frequently applied. This may also be true in our own lawns and gardens and is dependent upon the types and rates of chemicals used, methods of application, soil type, topography, and seasonal precipitation. Consumption of nitrates contributes to a number of illnesses and disabilities, including gastrointestinal problems leading to liver or kidney damage.

**Lead:** Underlying rocks and soil may contain heavy metals but rarely are found at levels that present a problem. However, activities such as construction (i.e., increased excavation) can release larger amounts into nearby groundwater. Of primary concern is lead used in pipes, solder, or fixtures, especially in homes built prior to 1988. Only homes built or replumbed before a 1988 lead-solder ban are affected. Even copper pipes soldered with lead could be a problem due to a corrosive process caused by the acidity (PH), temperature, and mineral content of your water.

## BANKSON LAKE ASSOC., VAN BUREN COUNTY

**Joan Merriman, President**

### Weed Treatment

This year (2005) a winter and summer augmentation of Aqua Prep and Bacteria to reduce organic matter and future algae growth was implemented by Professional Lake Management at no charge to the Lake Association. Translated, this is the "muck" eating bacteria they have been waiting to apply. The initial treatment was done in February through

the ice cap. Samples of sediment were collected and sediment depths recorded. Samples and measurements were taken one month later and evaluated. Pending results of that evaluation, another treatment of Aqua Prep and Nutri Sorb were injected. Again, samples taken and tested the following month. A collective evaluation of all samplings and visual observations will continue during the summer of 2005. Future recommendations will be made based on findings.

As you may recall, our contract with Professional Lake Management (Weed Control), expires at the end of 2005. They have sent us a new contract for 2006-2010 for a continuation of their services. The *estimated* cost of treatment for the next five (5) years is \$80,170 to \$84,760. This is approximately what we paid for the previous five (5) years. Professional Lake Management also informed us that we could request a continuation of our Special Assessment Tax District, thus eliminating the cost and time of a petition drive.

## BARRON LAKE ASSOCIATION, CASS COUNTY

**Emery Hirschler, President**

### Barron Lake primed to be pumped up this summer

Increasing lake level will move lakefront residences closer to the water. Think of it as Barron Lake on steroids.

Actually, the 215-acre lake in Howard Township, east of Niles, won't be receiving any such injections but it is about to be pumped up. The pumping is expected to begin this summer, and it'll be at a relatively small cost to lakefront property owners.

The project was requested by the Barron Lake Association after years of unusually low lake levels left a number of lakefront residences far removed from the water. Delayed by litigation, the pump-and-fill project is just now nearing implementation.

At a public hearing, Cass County Drain Commissioner Jeffrey VanBelle said the \$298,000 project should cost the owner of each lakefront parcel no more than \$453 a year for each of three years.

"It probably won't come in above that... We didn't want this to be a burden," VanBelle said.

Also, he said recent tests have shown pumping water into the lake from a lower aquifer will indeed raise the lake level, rather than simply recirculate water already in the lake.

## BLACK LAKE ASSOCIATION, CHEBOYGAN & PRESQUE ISLE COUNTIES

**Bill Shull, President**

### Native Fishing Rights *by David Soule*

As many of you know, five Native American Tribes have taken the position that they have the right to hunt and fish on lands and waters open to the public for such activities. This includes State Forests and other public lands, such as trust lands and private conservancies. Also included would be the



right of the tribes to hunt and fish on any inland lake or stream without adhering to state rules and regulations.

The State of Michigan has taken the position that the tribes no longer have the right to hunt and fish on lands and waters that have at anytime been "required for settlement." In April 2004 the Federal government filed a claim on behalf of the tribes. The Michigan Fisheries Resource Conservation Coalition (MFRCC) is a group of nine organizations that have joined together to defend the rights of property owners, anglers and hunters.

MFRCC is seeking to be an intervener in this case. The request has been denied and is under appeal. At this time proceedings are being prepared. The case is scheduled to go to trial in late 2005 or early 2006.

**CEDAR LAKE RECREATION ASSOCIATION,  
VAN BUREN COUNTY  
Todd Mason, President**

**Water Level on Little Cedar**

On November 10th, 2004, Ed Hokanson wrote a letter to the Porter Township Board and Van Buren County Commissioners. In this letter it was clearly stated that the 160+ Cedar Lake property owners **do not** want to be included in Little Cedar's pumping plans. This letter is supported by the Cedar Lake Association Officers and, I would hope, all of its members. At the latest township meeting, it was made quite clear that we **do not** want to be assessed any cost in Little Cedar's plans. A big thank you to Ed for taking time to write the letter and for all of his ongoing hard work for the Big Cedar Lake members. In addition to the paragraph below, it is said that by adding groundwater the ecology of the lake can change. We do not want to take the chance of this happening. Here is an excerpt from an article published in the May 16, 2000 *Kalamazoo Gazette*, written by Alan E. Kehew, Chairman of the Geoscience Department at WMU.

*He considered lake augmentation by groundwater to be a wasteful use of ground water. In times of drought groundwater aquifers that feed the lakes drop, causing the lake levels to drop. The entire aquifer and surface water bodies are one interconnected system, despite the presence of clay layers some water does pass through. The average lake evaporation rate in this area is about 30" per year. Therefore, to raise the level of water in a lake by one foot over a one year period, a volume of 3-1/2' of groundwater would have to be added. Droughts are times when we should be pumping less groundwater than more.*

**The Key to Survival**

The key to the survival of your lake or pond is developing a long-term program for reducing nutrients entering the water. The following are suggestions that individual property owners can do at little or no cost to curb nutrients entering the lake.

- The use of a greenbelt of natural vegetation between your lawn or septic system and the lake to filter runoff. The greenbelt should consist of plant varieties of shrubs, flowers or trees that do not shed their foliage into the water.
- No lawn fertilization or a program which uses no phosphates and a slow release nitrogen. One pound of

phosphorus may produce over 10,000 pounds of wet weeds and algae!

- Apply nitrogen fertilizer when the grass is actively growing to minimize loss of nutrients to nearby waters. Begin fertilizing in the Spring when temperatures are warm and discontinue before the grass ceases to grow in the Fall. Avoid application of fertilizer prior to rainy days.
- Perforate lawn periodically and seed and mulch exposed soil (to prevent erosion).
- Remove aquatic weeds and other debris that washes up along the lake shore so it will not decay near the lake.
- Remove fallen leaves and branches near the lake shore.
- Remove dog droppings from lawns and deposit in trash containers. This also pertains to geese and duck droppings.
- Encourage the use of stone, brick and similar pervious materials when building surface covers to minimize urban water collection.
- Disconnect down spout from storm sewers.
- Do not pour oil or other material down storm sewers. Do not hook up washing machines to storm sewers.
- Check on all activities occurring around the lake that are either causing erosion to the lake or are filling in the lake below the high water mark.

**BIG BROWER LAKE ASSOC., KENT COUNTY  
Jerry Peterson, President**

**Donations for Annual Fish Stocking Program  
Still Being Accepted**

Please make a donation to support the Annual Fish Stocking Program if you, your kids, or your guests enjoy catching fish in Big Brower Lake. Every \$5 and \$10 donation helps! The only stocking of the lake that takes place is through this annual program. Send your donations to Phil Battershall, 3638 Cook Valley Blvd., S.E., Grand Rapids, MI 49546 or to Bill Bonney, 8329 Je Ne Be Dr. All money collected is used to purchase fish. Walleye, hybrid blue gill, perch and feeder minnows will be planted later this fall.

**CHEBOYGAN LONG LAKE AREA ASSOCIATION,  
CHEBOYGAN COUNTY  
Pat Malloy, President**

**Township News**

At the March 14th Township Board Meeting it was voted to change the trash pickup service provider to PAC, Inc. The trash pickup for residents in Aloha Township will be the last Thursday of the month. However, the first month that this will be effective is yet to be determined. Those who have Friday garbage pickup will need to check with their garbage pickup service provider to see how their service will be affected. The Township provides the monthly trash pickup as part of the taxes residents pay. That day has been designated as the last pickup day of the month. However, garbage and trash pickup day was changed to Fridays by the current service provider. In changing service providers, it also changes the day of the week that the once-a-month trash gets picked up and that will again be on the last Thursday of the month, whenever that date is determined.

*(Continued on page 18)*

**BURT LAKE PRESERVATION ASSOCIATION,  
CHEBOYGAN COUNTY**

**Frank Kestler, President**

**Lake Levels Update (Burt Lake)**

*By Jon Jontz, M.D., Co-Chair, Waterways Use and Safety Committee*

The level of Mullett Lake was mandated in the 1930's by a Cheboygan County resolution and must be maintained at 593.60 feet above sea level during the summer. The DNR measures the level electronically at the north end and controls the outflow through the Cheboygan dam and paper company hydroelectric plant to maintain this level. There is no corresponding legal requirement for Burt Lake, which typically stays 12-18 inches above Mullett, due to its geography. (It's higher and the Indian River constricts the outflow.)

The DNR measures the level of Burt Lake at the South end near Indian River periodically and has seen slight fluctuation over the years.

**Burt Lake Levels 2003 and 2004 feet above sea level.**

For some historical perspective, when we did a study in 1999, the five year high level was 595.00 in June 1997 and the five year low was 593.8 in August 1998, a difference of about 14 inches. **Monthly averages back in 1999 were: May – 594.4, June – 594.5, July – 594.4, August – 594.3, September – 594.3.**

There are no measurements of total inflow to the lake. But according to the DNR, the typical outflow in Cheboygan is 2200 cubic feet per second. (The maximum was 3850 cubic feet per second on April 20, 1960.) Most of this goes into Lake Huron through the hydroelectric plant near the dam. The consensus, and the evidence is that the level of Burt Lake is entirely a function of Mother Nature (Rain fall, snow melt, evaporation) and virtually unaffected by the dam and hydroplant in Cheboygan, where the outflow is relatively constant.

People in the North end of Burt Lake may see more fluctuation in these levels since most of the water flowing into the lake comes further South (Maple River, Crooked River, Sturgeon River). The only main tributary in the North is Carp Creek.

**DERBY LAKE ASSOCIATION, MONTCALM COUNTY**

**Ed Housler, President**

**Milfoil is Here to Stay**

This association is doing everything within our means to control the milfoil, and I feel that we are doing a good job. Compared to other lakes, Derby Lake is among the cleanest. We have been able to manage the milfoil effectively while controlling costs. The association board has received lots of input and suggestions from members this summer regarding the milfoil. We greatly appreciate your feedback and concern regarding this issue and encourage your continued support. The association board consists of seven members. We do not have all of the answers all of the time and do need and appreciate membership involvement and feedback – especially regarding this issue.

**ELK SHEGEMOG LAKES ASSOCIATION,  
ANTRIM COUNTY**

**Mary Ann Rivers, President**

**ESLA Objects to Excavation on Torch River**

Recently the ESLA Board met and reviewed the DEQ application made by John Peal to remove the existing docks, structures, and seawall along Torch River at Rose Mary's Dockage and to excavate, dredge, and construct a basin and a new marina on that site called Portside Marina. After considerable discussion and review, the ESLA Board unanimously recommended that ESLA go on record as objecting to the proposed Portside Marina. The reasons for this objection are multiple and include:

- The demolition, dredging, and construction present a threat to the sensitive ecology of the adjoining wetlands and natural areas.

- The demolition, dredging, and construction pose a risk to the water quality of Torch River and all downstream waters, including Skegemog and Elk Lakes.

- The proposed project has the potential of increased runoff of chemical and biological contaminants, both during construction and subsequently.

- The proposed marina can be expected to increase, not decrease, traffic congestion at the most narrow and fast flowing segment of Torch River. This area currently experiences a very high volume of summer boat traffic due to its proximity to the entrance to Torch Lake, Torch River Marina, and other retail outlets.

- There currently exists a large marina adjacent to the proposed site. There is no documented need for additional boat dockage in this area of Torch River.

- Replacing the existing dockage with more numerous and substantial metal and concrete structures does not represent an aesthetic improvement.

*ESLA is working with the Torch Lake Protection Alliance to articulate our concerns to the DEQ concerning this proposal.*

**EVANS LAKE LANDOWNERS ASSOCIATION,  
LENAWEE COUNTY**

**Lori Daudelin, President**

**Fall Fish Stocking**

The Fish and Conservation & Preservation Committee has been very busy doing all kinds of projects for Evans Lake. Our first goal was to raise funds for our Fall Fish Stocking. The support has been overwhelming! Donations in excess of dues \$2,626. We thank you! We'll be around one more time this spring! The Fish Committee's plan is to stock heavy on Walleye for three years, then skip a year, then restock the following year. This will be our third year for stocking. Some Walleye have been caught this past summer averaging about 10" long. Red Ear Sunfish have also been caught, they average approximately 8" long. The Channel Cats were very large last year, approximately 38" long and right around 10 lbs. plus. ❖

# Walleye Fingerling Culture in Undrainable, Natural Ponds

Jeffrey Gunderson, Minnesota Sea Grant Extension, University of Minnesota Duluth, Duluth, Minnesota 55812, Phil Goeden, Purewater Aquaculture Corporation, Garfield, MN 56332, Tom Hertz, Brandon Fisheries, Brandon, MN 56315

## Introduction

Commercial walleye fingerling producers in Minnesota were interviewed in November 1994 on cultural practices used to raise walleye fingerlings in undrainable, natural ponds. Although they gave information freely, to protect the proprietary nature of the information not all of the subtle variations of their techniques are presented. Because natural ponds are highly variable in size, depth, water quality, and fertility cultural practices are not standard and experienced growers encounter substantial variation in survival, yield (lbs/acre, kg/ha) and size at harvest. What follows is a description of the general practices used to produce walleye fingerlings in Minnesota.

## 1992 survey

A 1992 survey (Minnesota Aquaculture Report, 1993) of commercial aquaculture producers in Minnesota indicated that 53 of 79 (69%) producers used natural waters for some of their production. About 1,206 natural ponds, totaling 39,291 acres (15,900 ha) (mean was 33 acres, 13.4 ha) were used to raise bait fish, such as suckers and fathead minnows, and to produce walleye fingerlings for stocking. The survey reported that over 600,000 walleye fingerlings, valued at \$328,000 (\$0.54/fingerling), were sold by private growers in 1992. Data were not obtained from all producers in 1992, so actual production was probably higher. Minnesota producers are able to produce more fingerling walleyes than the existing market can bear in most years. Expanded markets in Minnesota and other states could significantly benefit producers.

## Natural pond selection

Ponds vary considerably in size, depth, fertility, and many other features. Finding an available pond that is appropriate for fish culture can be difficult. Typically in Minnesota, commercial producers lease ponds from a farmer or farmers with riparian lands. The most productive ponds for aquaculture purposes are in west-central Minnesota. Competition for water in this area of the state can be high.

As a rule, ponds used to raise walleye fingerlings must not have other fish present or at least nothing other than minnows. Other fish in the pond may be predators or competitors, and they may greatly reduce walleye production. The preferred depth is five to ten feet. Shallower ponds are at risk of summerkill and they often develop heavy growths of aquatic plants which hamper harvest efforts. Deeper ponds can be difficult to harvest and may allow overwinter survival of walleye or other fish. A carryover of walleye will severely limit the following year's production

because the carryover walleye will prey on newly stocked fry. Thus, the best fingerling culture ponds winterkill every year. The process which eliminates oxygen from the water and causes winterkill can vary from one year to the next, so a pond that has a complete kill one year may only have a partial kill another. Checking dissolved oxygen levels in late winter will help predict the extent of winterkill in a pond.

The size of the winterkill ponds that are used for walleye culture can range from 1–100 acres (0.4–40.5 ha), but the typical pond ranges from 5–30 acres (2–12 ha). Although ponds approaching 100 acre (40.5 ha), can be productive, it is often very difficult to harvest a high percentage of the fish from large ponds. Higher percentages of available walleyes can be harvested from small ponds.

Physical and chemical characteristics of ponds also varies. Bottom type may be sand, clay or muck, but harder bottoms are preferred because harvest is easier. Brush, logs, heavy vegetation and rocks make harvest more difficult. Total alkalinities of around 150–200 ppm are typical, but alkalinities may range from 50–300 ppm. The typical pH of the waters used ranges from 6.5–9.0; however, pH varies in a daily cycle, with highest values at mid-afternoon and lowest values before sunrise. Presunrise dissolved oxygen levels should not drop below 5 ppm. It is the opinion of producers that ponds in good farm country are often more productive than ponds in wooded areas, and ponds with embayments are usually more productive than circular ponds.

## Fingerling culture and pond management

### Controlling insects

Ponds should be checked before fry are stocked to assess the numbers of predatory invertebrates such as beetle larvae and backswimmers. One practice is to kill predatory air breathing aquatic insects by covering the pond with a thin film of oil. According to Dobie (1956) kerosene, fish oil, No. 2 fuel oil, and cod liver oil can be used for this purpose. Recommendations include using 3–5 gallons of fuel oil/acre (4.5–7.7 L/ha), 10–12 gallons of kerosene per acre (15.4–18.2 L/ha), or 4–5 gallons of fish oil per acre (6–7.7 L/ha). The oil is applied along the windward side of the pond when it is windy enough to spread the oil over the pond surface, but not so windy that it all blows to one shore. One producer used soybean oil mixed with kerosene, but he has since stopped the practice of oiling his ponds. Although the producer thinks an oil treatment improves survival, he has halted the practice because of costs for the oil and labor and to maintain landowner relations which could be

(Continued on page 20)



strained by perceived negative environmental impacts. Another producer uses vegetable oil without kerosene mixed in.

### **Monitoring zooplankton densities**

Many producers check zooplankton densities with a plankton net before walleye fry are stocked and one experienced grower stated that a plankton net is essential for walleye pond management. Zooplankton are sampled with a plankton net towed 50–100 ft (15–30 m) through the pond early in the morning or in the evening when zooplankton are higher in the water column. Experience is generally used to determine if fry should be stocked rather than specific zooplankton counts. If sufficient numbers of rotifers, daphnia, and copepods are not found, fry should not be stocked because survival will be low. If zooplankton numbers are low, then organic fertilizers can be added prior to stocking to stimulate a zooplankton production, however, results of pond fertilization are highly variable and are not immediate. Zooplankton populations must be surveyed far enough in advance of stocking to allow zooplankton time to respond to fertilization. Most producers do not fertilize large ponds. Many ponds in the row-crop area of west-central Minnesota receive sufficient fertilizers from runoff of adjacent farming operations. Fertilization may also be warranted after stocking if zooplankton numbers start to decline. The use of water clarity (Secchi disk–transparency) to determine when and how to fertilize (as recommended for southern U.S.) is not recommended by experienced growers in Minnesota. Better results are achieved by examining zooplankton numbers and composition than by looking at water clarity. Zooplankton can also be trapped from enriched ponds and stocked before fry are stocked or when zooplankton numbers decline (at least until the walleye reach 1.5–2 in [3.8–5.1 cm] when they become piscivorous).

### **Sources and stocking of fry**

In Minnesota, walleye fry are purchased from the Department of Natural Resources or from private producers. Although the number of commercial sources are limited, the number of fish farmers building facilities for holding brood fish is increasing. Producers pay around \$7 to \$9 per thousand for walleye fry. Prices vary from place to place and by the size of the order. Walleye fry are transported in plastic bags with a small amount of water and a large volume of oxygen. The bags are usually placed in a cooler to reduce temperature increases. When the fry reach the pond it is important that they be acclimated to both the temperature and chemistry of the water. The plastic bags are typically floated in the pond until the transport water temperature equilibrates to the pond water temperature, then the bags are opened and pond water allowed to slowly enter the bag. Once the pond and transport water have mixed, the fry are slowly released into the pond. If pH of the pond water differs substantially from the transport water, additional acclimation procedures may be warranted. Some producers allow fry to escape slowly into the pond on their own from an acclimation chamber; others spread the fry throughout the middle of the pond to reduce predation by any minnows and aquatic invertebrates that may be present.

### **Stocking density**

Most producers stock 2,500–10,000 walleye fry per surface acre (6,200–25,000/ha). Stocking rates of 20,000–30,000/acre (49,000–74,000/ha) or higher are used if the pond is known to be very productive, artificial aeration is used, and it is more intensively managed. Usually, when higher stocking densities are used, fingerlings are harvested or thinned in early July.

### **Pond aeration**

It is a general practice to aerate small fertile ponds if there is access to electrical power. The risk of catastrophic loss is greatly reduced, and some producers think that aeration increases production. Because many of the ponds are large, they are not fully aerated to the manufacturer's recommendations because the expense would be too great. The most common type of aeration is an air compressor with a bottom diffuser.

### **Feeding**

For production of advanced fingerlings, that is, fish larger than 2 in (5 cm), many producers feed fathead minnows to their walleyes once they reach 2–3 in (5–7.6 cm). Appropriate sized fathead minnows are less than 1.5 in (3.8 cm) and they pass through a 16 to 17 grader. Fatheads are added to the pond on a regular basis to maintain an adequate food resource. Without minnows, walleye can become quite cannibalistic. An indicator of cannibalism is a wide range of fingerling sizes; cannibalistic walleye grow faster than other walleyes. Some producers stock fathead minnow broodstock into ponds after stocking walleye fry. Fathead reproduction through the season is then a food source for the walleyes. Fatheads will, however, compete with or prey upon walleye fry, so care should be taken not to stock them before walleye fry are stocked.

### **Bird predation**

Bird predation is regarded by the fish farmer as a significant cause of mortality in natural ponds. Fish farmers have said that cormorants and pelicans can wipe out an entire pond very quickly. Flocks of 100–200 have been seen on some production ponds. The stomach of one cormorant contained 42 four-inch (10.2 cm) walleye. Retail value of that one meal was about \$42. While larger ponds seem to be at greater risk to bird predation, even smaller ponds are not safe. One experienced fish farmer claimed that if he had known how much of a problem birds can be, he never would have gotten into the walleye fingerling business. For more information about bird predation problems and solutions, the Southern Regional Aquaculture Center publications, numbers 400, 401, and 402 are useful. They can be obtained from your state aquaculture extension specialist or from the state USDA, APHIS, Animal Damage Control office, or the Regional Office of APHIS in Nashville, TN.

### **Harvest**

Some walleye fingerlings may be harvested in early July when they are 2–3 in (5–7.6 cm), but most are harvested during September and October when water temperatures cool to below 60°F (16°C). Fingerlings harvested from warmer water can be stressed and are difficult to hold and transport. High and even total mortality can occur when fingerlings are captured in trap nets when the water temperature exceeds 70°F (21°C). If catches

are small, walleye have been successfully trapped in warmer waters, but risk of loss is still high. The disadvantage of waiting for cooler water temperature is that there is less time to harvest the fingerlings before ice-up, resulting in reduced harvest rates. Walleye fingerlings can range in size from 3–10 in (7.6–25.4 cm) in September, although they are generally 4–8 inches (10.2–20.3 cm) long and 15–25/lb (7–11/kg).

Walleye fingerlings are usually captured in trap nets, but may be seined if pond conditions permit. Traps are set along the shoreline at intervals of 150–200 yd (137–183 m). Catch rates vary daily. It can be very frustrating to realize that the fish are in the pond but are simply not moving enough to encounter the nets. It is speculated that when food is abundant, fish move less. Therefore, feeding is usually discontinued prior to harvest. Various methods to induce fish movement have been tried with variable success. Development of more effective harvest methods would be very beneficial.

The yield of stocked fry varies considerably among ponds and years, but it generally ranges from 10–15%. In any given year there are ponds in which harvest may be zero, while other ponds may produce up to a 30–40% or greater return.

### **Summary**

Successful producers of walleye fingerlings in undrainable, natural ponds are experienced. Their advice is “get to know your ponds” and do not stock walleye fry in ponds if fish have survived

the winter or if zooplankton populations are not sufficient in density and composition. Another recommendation from experienced fish farmers is to clean boats and equipment thoroughly before moving to another pond. This will help prevent introducing unwanted aquatic vegetation (e.g. Eurasian water milfoil) from one pond to another.

Experienced producers are moving towards exerting more management control over the production of walleyes in undrainable, natural ponds, but it remains an extensive type of aquaculture with inherent risks. Bird predation and weather are important factors that are difficult to manage. Manuals and case studies like this one provide insights and guidelines on culture techniques for the beginning fish farmer, however, experience is required to appropriately apply the information to each specific set of environmental conditions.

### **References**

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