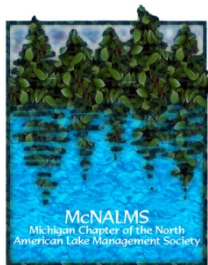




# **LAKE MANAGEMENT IN MICHIGAN WITH A LAKE IMPROVEMENT BOARD**

**September 2012**

**MICHIGAN CHAPTER NORTH AMERICAN LAKE  
MANAGEMENT SOCIETY**



## **PREFACE**

Michigan has 11,000 lakes over 5 acres in size. It is impossible to effectively manage this resource without the involvement of the local government and community. Michigan has several mechanisms for collaborative lake management, one of which is the Inland Lake Improvement Board (Part 309 of the Michigan Natural Resources and Environmental Protection Act – Public Act 451 of the Public Acts of 1994, as amended). The Inland Lake Improvement Board (Lake Board) brings together the local citizens with the township and county governments to manage the lake. This partnership of concerned agencies and stakeholders can take significant action to protect the valuable local lake resource.

Very often the individuals who represent the citizens and local governments on Lake Boards have limited knowledge or experience in lake ecology or management or how lake improvement boards operate. This manual has been drafted to help citizens and local government representatives have a better understanding of lake ecology, the lake management options available and when best to apply them and the administrative procedures for implementing a Lake Board. Hopefully, the manual will also serve to promote a network for Lake Board representatives and encourage greater communication between lake management groups.

The manual is not a comprehensive document addressing every possible issue a Lake Board representative may encounter. Such a manual would be very large and quickly would be obsolete. Instead this manual will address the basics of lake management and Lake Board operations and refer the user to other available documents, websites and training opportunities which offer greater details.

## ACKNOWLEDGMENTS

We would like to acknowledge Oakland County and the Oakland County Drain Commissioner's Office for providing a copy of their *Lake Improvement Board Manual*, which was very thoughtfully produced and provided an excellent foundation for the Lake Improvement Board Administration section of this manual. Oakland County's *Lake Improvement Board Manual* was produced by Ms. Gayle Murphy with assistance from Mr. Terry Dohany and Mr. Sid Lockhart. It was originally produced in May 2003 and revised in October 2007. The *Lake Improvement Board Manual* is available on the internet in its entirety at the Oakland County Drain commissioner's web page.

We acknowledge the significant work of Mr. Howard Wandell, with Mr. Mike Solomon, Mr. Dave Foley, and Mr. John Beck who wrote many sections of the Manual. Mr. Larry Copley provided valuable comments regarding the responsibilities of Lake Board members. The manual was reviewed and edited by Dr. Lois Wolfson and Mr. Ralph Bednarz. We appreciate their time and excellent comments.

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**WE REQUEST THAT ANYONE USING OR REPRODUCING ANY PART  
OF THIS DOCUMENT ACKNOWLEDGE MICHIGAN CHAPTER  
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## TABLE OF CONTENT

### PART I: INTRODUCTION

<b><u>Section 1 – Michigan’s Inland Lakes</u></b> .....	1
<b><u>Section 2 – Barriers to Management</u></b> .....	2
<b><u>Section 3 – Management Institutional Options</u></b> .....	4
The Lake Association .....	5
Partnerships .....	5
Township Public Works .....	6
County Public Works .....	6
Water Resource Improvement Tax Increment Finance Authority .....	7
Lake Improvement Boards .....	7
Watershed Councils .....	8

### PART II: LAKE ECOLOGY AND MANAGEMENT ISSUES

<b><u>Section 1 – Eutrophication</u></b> .....	9
Measuring Lake Eutrophication .....	10
<b><u>Section 2 – Lake Ecology</u></b> .....	11
Lake Types .....	12
Seepage Lakes	
Groundwater Drainage Lakes	
Drainage Lakes	
Impoundments	
Light Zones of the Lake .....	14
Temperature Zones of the Lake .....	15
<b><u>Section 3 – Water and Nutrient Budgets</u></b> .....	17
The Water Budget .....	18
The Nutrient (Phosphorus) Budget .....	18
Mathematical Lake Models .....	19
<b><u>Section 4 – Holistic Management: Managing the Land and Water</u></b> .....	19
<b><u>Section 5 – Shoreline Habitats and Management</u></b> .....	23
<b><u>Section 6 – Management of Aquatic Plants and Algae</u></b> .....	24
<b><u>Section 7 – Aquatic Exotic Invasive Species</u></b> .....	25
<b><u>Section 8 – Swimmers’ Itch</u></b> .....	26
<b><u>Section 9 – Fish and Wildlife</u></b> .....	28

### PART III: LAKE IMPROVEMENT BOARD ADMINISTRATION

<b><u>Section 1 – General Overview of the Lake Improvement Board</u></b> .....	30
Summary of How a Lake Board Works .....	30
<b><u>Section 2 – Chronological Steps to be followed by a Lake Improvement Board</u></b> .....	31
<b><u>Section 3 – Establishing Petition and Township Resolutions</u></b> .....	33

<b><u>Section 4 – Election of Lake Board Officers and Duties</u></b> .....	37
<b><u>Section 5 – Lake Improvement Board Meetings Documents</u></b> .....	38
<b><u>Section 6 – Hearing of Practicability and Hearing of Assessment</u></b> .....	44
<b><u>Section 7 – Financing Projects</u></b> .....	50
<b><u>Section 8 – Deactivate a Lake Improvement Board</u></b> .....	56

## **PART IV: ADDITIONAL SUPPORT**

<b><u>Section 1 – State Laws and Programs</u></b> .....	57
<b>Grants</b> .....	57
<u>Nonpoint Source Program</u>	
<u>Michigan Natural Resources Trust Fund</u>	
<u>Clean Water Revolving Fund/Strategic Water Quality Fund</u>	
<u>Inland Fisheries Grants</u>	
<u>Marine Safety Grants to Counties</u>	
<b>Monitoring</b> .....	59
<u>Cooperative Lakes Monitoring Program</u>	
<u>Stream Monitoring</u>	
<b>Laws and Permits</b> .....	61
<u>National Pollution Discharge Elimination System</u>	
<u>Inland Lakes and Streams</u>	
<u>Wetlands</u>	
<u>Aquatic Nuisance Control</u>	
<u>Endangered Species</u>	
<u>Exotic Species</u>	
<u>Dam Safety</u>	
<u>Local Watercraft Control Ordinances</u>	
<u>Legal Lake Levels</u>	
<b>Partnerships</b> .....	67
<u>Michigan Inland Lakes Partnership</u>	
<u>Michigan Natural Shoreline Partnership</u>	
<b><u>Section 2 – Local Government and Lake Protection</u></b> .....	69
<b>County and Township Planning and Zoning</b> .....	69
<b>Drain Commissioner Responsibilities</b> .....	69
<b>Township Boards under Public Act 188</b> .....	70
<b>Soil Erosion and Sedimentation Enforcement</b> .....	70
<b>Conservation Districts and Health Departments</b> .....	70
<b><u>Section 3 – Leadership Skills</u></b> .....	71
<b>The Local Community</b> .....	71
<b>The Community’s History</b> .....	72
<b>The Lake Environment</b> .....	72
<b>The Local Government</b> .....	73
<b>Leadership Styles</b> .....	74
<b>Diversity/Personality Differences</b> .....	74
<b>Decision Making</b> .....	75
<b>Meeting Dynamics</b> .....	76

<b><u>Section 4 – Working with Professional Providers</u></b>	<b>77</b>
Working with Consultants	77
Where to Find a Consultant	
Working with Contractors	78
Where to Find a Contractor	
<b><u>Section 5 – Board Member Responsibilities</u></b>	<b>79</b>
Open Meetings Act	79
Natural Resources and Environmental Protection Act	79
Robert’s Rules of Order	79
Other Presidential Responsibilities	79
What a Lake Board Member Should Know	80
<b><u>Section 6 – Products that a Board can Produce</u></b>	<b>80</b>
Website	80
Newsletter	81
Email List	81
Working with the Local News Media	82
Annual Report	82
Lake Manual	82
<b><u>Section 7 – Publications, Websites, and Training Opportunities</u></b>	<b>82</b>
Publications	83
Web Sites	85
Training Opportunities	87
<b><u>Section 8 – Organizations that may be Helpful</u></b>	<b>89</b>
North American Lake Management Society	89
Michigan Chapter North American Lake Management Society	89
Michigan Lake and Stream Associations, Inc	90
Michigan Department of Natural Resources	90
Michigan Department of Environmental Quality	90
Michigan State University Extension	91
Watershed Councils	91

## **PART V: INDEX**

## **PART I: INTRODUCTION**

### **Section 1 – Michigan's Inland Lakes**

A little over 10,000 years ago Michigan was covered by a sheet of ice, in some places over a mile thick. The land under the ice had been scraped to bare rock by the glaciers. Then the earth began to warm and the glaciers started to melt and retreat north. As the ice sheet wasted away, it left blocks of ice, some small, and some very large scattered about the landscape.

The glacier was not just ice. Imbedded in the ice were boulders, rocks, and soil particles that the glacier had pick up as it scrapped along the land. So much material was imbedded in the ice that the glacier probably appeared a dark brown or gray cooler. As the glacier melted, rivers of water carried the rocks and soil particles away from the glacier and deposited them upon the land. There was so much material that the blocks of ice the glacier had spawned were surrounded or even covered with the rocks and soil.

Eventually the blocks of ice that had been covered by the glacial deposits melted, leaving depressions in the land. Depending upon the block of ice that had been there, some of these depressions were small, some shallow, some large, and some deep. Surface water from the melting glaciers as well as ground water that had migrated into the space between the soil particles and rain filled these depressions.

As rain fell on the land, some of the water moved over the soil and some migrated into the ground to become groundwater which also flowed downhill but below the ground surface. This flowing surface and groundwater eventually formed streams and rivers. Some of these streams flowed into and out of lakes. However, some lakes remained isolated from the rivers and were only filled by rain water and groundwater from the surrounding land.

Lakes can be formed by means other than glaciers. Lakes may be formed by volcanoes, earthquakes, sinkholes, or rivers. However, the great continental glaciers were by far the primary creators of the world's lakes. Approximately 80 percent or more of the world's lakes were created by the glaciers during the last ice age. Since the North American continental glacier only moved as far south as the state of Indiana, the Upper Midwest and New England are the lake rich areas of the United States. In fact the three states of Minnesota, Wisconsin, and Michigan have almost 50 percent of the lakes over 100 acres in the continental United States.

Michigan has 11,000 lakes over five acres in size and many thousand more small lakes and ponds. Given the way they were created by the glacier with differences in size, depth and hydrology, each lake is unique. Thus, lakes will respond differently to events such as pollution or nutrient inputs from the land. A small shallow lake with no stream outlet can be dramatically altered by even minor nutrient inputs. Alternatively a large, deep lake with a major river passing through it has a significant capacity for nutrient inputs. Consequently, each lake has its own unique conditions.

Some Michigan lakes are naturally shallow and filled with aquatic plants while others are deep, clear, with cold water and few aquatic plants. Water quality sampling of Michigan's lakes has found that most of them are still of reasonably good quality. About 20 - 30 percent have low nutrient levels with low biological productivity and are classified as *oligotrophic* or subjectively "high quality" trout lakes capable of supporting a cold-water fishery. Another 45 - 60 percent have moderate nutrient levels with moderate plant production and are called *mesotrophic* or again subjectively "good quality" lakes. Lakes with high nutrient levels and abundant plant production are classified as *eutrophic* (15 - 22 percent) and lakes with very high nutrient levels and abundant plants are *hypertrophic* (4 - 5 percent). More about the quality of Michigan's lakes can be found in Part II, Sections 1, 2 and 3 of this manual.

In the wild landscape of North America before the arrival of Europeans lakes changed very little since Native Americans made only minor changes to the land with their lifestyle. Today our culture makes massive alterations of the land every day. These land modifications often result in the movement of soils, nutrients and other pollutants from the land to the rivers and streams and eventually the lakes. Consequently, if Michigan inland lakes are going to remain magnificent recreational resources, management efforts will be required to protect these water bodies from unnecessary pollution loads.

## **Section 2 – Barriers to Management**

Given the number of inland lakes in Michigan and the limited resources of State natural resource agencies, it is imperative that local communities and governments become involved in the management of their local lake resources. Since the early 1970s many publications and educational efforts have been produced to encourage and facilitate the involvement of local communities in lake management. These efforts have produced limited success. To this date very few of Michigan's inland lakes have a written management plan or a community that is organized to implement measures to protect the lake.

One question that might be asked is what barriers limit community involvement in lake/watershed management? Knowing the barriers to participation would enable the State agencies and others to adjust, or develop programs and products to increase local community initiated lake/watershed management projects. In 2005 an unpublished study by Mr. Howard Wandell, Dr. Geoffrey Habron and Ms. Lisa Campion of Michigan State University (MSU), Department of Fisheries and Wildlife attempted to identify these barriers. Two written surveys were developed and mailed to lake communities in July, 2005. One survey targeted residents, lake associations and local communities who were knowledgeable about the Cooperative Lakes Monitoring Program (CLMP), Michigan's volunteer inland lakes monitoring program, but had never participated or had not participated for several years. The second written survey targeted residents, lake associations and local communities presently participating in the CLMP.

In addition to the mail survey, MSU, the Michigan Department of Environmental Quality (MDEQ) and CLMP staff conducted four focus groups at lake communities actively involved in lake/watershed management. The focus group(s) format sought to identify motivational forces and strategies used to commit local residents and resources to lake/watershed management.



Surveys yielded the following suggestions:

- Most local lake communities lack adequate organization, community resources, and networks with other lake community associations and management agencies.
- Even most organized lake communities probably have limited community resources to devote to lake management despite the significant economic value of the lake.
- Many lake communities need help to understand lake data and initiate a lake management project.
- Some lake communities are confused about when management is needed.
- The lack of local leaders is likely an important barrier in many communities.
- The lack of money to fund efforts is a significant barrier.

For these lake communities the lack of resources particularly funds for management projects and leadership were significant barriers.

The focus groups yielded the following suggestions as to why their communities were successful in their lake management efforts:

- Lake management is as much social as environmental.
- Major events or issues often triggered the need for management activities.
- Local leaders serve as a significant asset for community engagement in lake management and directing community response to events and issues.
- Local money was more important in funding management projects than state or federal grants.
- Partnerships are important.
- Citizen involvement.
- Successful projects increase the community's willingness to initiate additional management projects.

The report made the following conclusions:

- “Of the identified barriers to lake management, a lack of leaders with a vision for management may be the most significant. Funding resources are available to any lake community in the State in the form of Lake Boards and township public works projects. Educational resources also exist. Sometimes these educational resources lack wide distribution or advertisement, but an individual who makes the effort can usually acquire this information or training. Additionally, information from the focus groups suggests that effective local leaders enable communities to overcome the other barriers to implement effective lake/watershed management programs.
- The lake communities most engaged in protective lake/watershed management identified local leaders as the most significant factor facilitating their movement into protective lake management. These communities not only acquired lake management information and training, but they brought this knowledge back to the local community in the form of local training opportunities, publication distribution, watershed tours, newsletters, and

owner manuals. They acquired funds for management efforts mostly through local funding mechanisms. In addition, they implemented strategies to overcome other barriers. They established working relationships with others with an interest or responsibility for water resource management. Some of these relationships evolved into informal or formal partnerships to sustain management efforts.

- Participants in the focus groups identified “success as contributing to success”. Starting with small successfully implemented projects can provide a good way for communities to initiate their involvement in protective lake management.
- Protective lake management involves the lake and its watershed. Management issues are complex and management responsibilities reside in multiple state and local agencies. Beside agencies, individual citizens, recreational users, conservation groups and business interest all have a stake in the lake and its watershed. The four focus group lake communities used partnerships and collaborative efforts to increase communication among responsible governmental agencies and stakeholders, reduce conflict, promote win/win conditions for partners and extend limited financial and staff resources.
- State resource managers should increase and improve lake monitoring and management programs by promoting local lake social/political associations, expanding local leadership training, developing and distributing targeted lake management educational and training opportunities and supporting partnerships for lake protection management.”

### **Section 3 – Management Institutional Options**

A community has several management institutional options for organizing a lake management program. Each of these options has advantages and disadvantages, which must be considered before selecting the best option for any given lake community. What works for one lake community may not be the best option for another community only a few miles away.

When selecting an institutional option the community must evaluate its available resources and limitations. To successfully implement a lake program the management institution must provide what is needed to complete the project on time. The major elements needed to undertake a lake management project include: the authority to implement the project, funding for the project, leaders to guide the project, and the time necessary to complete the project on schedule.

The scope, impacted area and complexity of the project will also influence which institutional option is most appropriate. More comprehensive projects or projects involving the entire watershed will engage more stakeholders and interest groups requiring greater collaboration.

Some of the management institutional options a community may use to implement a lake management program include:

- The Lake Association
- Partnerships

- Township Public Works
- County Public Works
- Water Resource Improvement Tax Increment Finance Authority
- Lake Improvement Boards
- Watershed Councils

Below is a brief description for each of these options along with some of the “pros” and “cons” for each option.

### **The Lake Association**

The lake association is usually a nonprofit organization made up of riparian property owners and sometimes others with a property or recreational interest in the lake. It serves the important role of being the foundation level of citizen interest and should be the primary advocate for protection and management of the lake. It would be difficult but not impossible to implement a lake management program without a local association.

#### **Pro(s):**

- the association is the base level of citizen involvement,
- as the local community advocate the association is critical to the success of a project,
- the association represents the base for local funding of projects,
- with newsletters, websites, meeting and reports the association provides important communication capacity,
- lake associations with large memberships, engaged members and available funds can undertake significant management projects.

#### **Con(s):**

- some associations have limited membership and financial resources,
- leadership is sometimes limiting for many associations,
- local apathy for lake management is often difficult to overcome,
- most lake associations have no public works authority to implement lake management projects.

### **Partnerships**

Partnerships with other stakeholder groups, such as fishing clubs and organizations, nonprofit environmental groups and local agencies such as the County Conservation District, can increase lake management program support, provide additional resources and increase the program's influence. Partnerships with groups and agencies that have the resources for and history of watershed management can increase the potential for grant funding from governmental agencies or private foundations.

#### **Pro(s):**

- partnerships broaden the support for a project,

- with more organizations and agencies involved in the project there is a greater work force and finances,
- broader support often increases the possibility of acquiring grants.

Con(s):

- more partners requires more communication and coordination,
- each partner represents a competing interest group whose concerns must be addressed.

## **Township Public Works**

Township lake management projects are authorized by PA 188 of 1954. The township may set up a special assessment district for the lake project and citizen committees to provide input. A project may be initiated by the township board by resolution or in response to a petition from residents. The township passes a resolution initiating the project and has prepared a project plan with cost estimates. The board schedules a public hearing to receive comments on the proposed project and special assessment district. If the community supports the project the board solicits bids and awards a contract for completion of the project. The project may be terminated by a vote of people in the district.

Pro(s):

- the local lake community works with local government to develop and implement a lake management project,
- the township has public works and taxing authority to complete the project,
- working with the township provides local control for the project.

Con(s):

- many townships have limited resources and expertise to undertake lake management,
- many townships have many other commitments competing for limited township resources.

## **County Public Works**

The County Board of Public Works can assist local lake communities initiate lake management projects under the authority of Public Act 185 of 1957. The Board can undertake many types of projects including those that improve fishing and fishing habitat, protect water quality with sewer systems, provide erosion control and enhance recreational opportunities all of which can increase property values. Projects are normally initiated by the property owners who petition their township for assistance. The township approves a resolution requesting a project through the Board of Public Works. After the project details are developed the Board holds two public hearings, one for the project and another for the assessment roll. If the community supports the project at the hearings, bids are developed and contracts signed.

Pro(s):

- the board of public works authority is created by state law,

- the law allows the board of public works to take on a broad range of projects, including projects on the watershed,
- the board has public works authority to initiate and implement projects,
- the board has taxing authority to raise project funding every year,
- the bonding authority of the board of public works is well tested.

Con(s):

- the law requires a detailed planning phase, before funds are available for a project,
- without a local lake association to provide input the board may have difficulty determining the will of the community,
- some individuals mistrust government to represent their interest.

### **Water Resource Improvement Tax Increment Finance Authority**

This Authority is a relatively new lake management institution. The law creating finance authorities was passed in 2008. The purpose of the Authority is the creation and implementation of development plans and development areas to promote water resource improvement and access to water resources. At this time the authors know of no communities using a tax increment finance authority to develop and implement lake management plans. With no examples for work done by an authority no “pros” and “cons” are offered.

### **Lake Improvement Boards**

Improvement Boards are formal local government boards authorized by PA 451 of 1994, Part 308. The board's membership includes: a county commissioner, two township representatives, the county drain commissioner, and a citizen property owner. A board's project authority is fairly broad, and it has the authority to fund a project through creation of a special assessment tax. A project may be initiated by the local governmental board by resolution or in response to a petition from 2/3 of the freeholders owning land abutting the lake. Once formed the lake improvement board must retain a registered professional engineer to provide a feasibility report with project recommendations, an estimate of cost and a proposed assessment district to pay for the project. The Lake Board holds two public hearings, one to determine if the community supports the project and a second to determine the appropriateness of the special assessment district. If approved by the community the Lake Board must advertise for bids and sign contracts to complete the project. If certain conditions are met the local governmental board may hold a hearing to dissolve the Lake Board.

Pro(s):

- the board's authority is created by state law,
- the board has broad representation including local citizens, township government and county government,
- every governmental unit important to lake management is represented, except the state,

- the law allows the Lake Board to take on a broad range of projects, including projects on the watershed,
- the Lake Board has public works authority to initiate and implement projects,
- the lake board has taxing authority to raise project funding every year.

Con(s):

- the law requires a detailed planning phase, which can go for one to two years before funds are available for a project,
- without a local lake association to provide input the board may have difficulty determining the will of the community,
- some individuals mistrust government to represent their interest,
- the board no longer has state representation,
- bonding authority has never been tested in court

### **Watershed Councils**

Watershed councils may be informal nonprofit corporations or established by local governments under authority of PA 451 of 1994, Part 311. They have limited authority to undertake a project but do bring together important local governmental and nonprofit organizations in a partnership to manage the watershed using available resources, legal tools and funding sources.

Pro(s):

- the councils area of interest would include the entire watershed,
- all stakeholders within the watershed would be the target audience,
- effective education and monitoring projects within the watershed can significantly positively impact the lake ecosystem,
- the large project scope may create greater grant funding possibilities,

Con(s):

- the larger area of interest will contain more competing interests and stakeholders,
- it can be difficult to bring all competing interest groups together to initiate and administer a project,
- raising local funding for large complex projects may be difficult,
- the council has no public works authority to implement projects,
- the greater project scope will require greater communication and coordination needs.

## PART II: LAKE ECOLOGY AND MANAGEMENT ISSUES

Part II describes how lakes and their watersheds are an ecosystem. To effectively manage a lake ecosystem a manager must have an understanding of how a lake and its watershed interact to produce the conditions observed in the lake. The processes at work in the lake ecosystem are complex and to understand them completely requires a trained professional. However, a local community manager should have a basic understanding of the conditions in order to communicate with the hired professional and the local community they serve.

### Section 1 – Eutrophication

Each lake is a reflection of the land around the lake known as its watershed. Some lakes have clear water, sandy bottoms and few aquatic plants, while others are green with algae have muck bottoms and abundant aquatic plants. Whether a lake is clear or green depends upon many factors regarding the lake and its watershed. Some of these factors include shoreline development, watershed size, land use in the watershed, stream and stormwater flows, and lake characteristics such as size and depth.

It is generally understood that the more sediments and nutrients that wash off the watershed and into the lake the greener the lake becomes. The nutrients act as fertilizers to produce more plants and algae and ultimately more fish. The dying plants and animals produce more muck on the bottom of the lake. A lake that has more nutrients and therefore more plants and animals and resulting muck is said to be more *biologically productive*. In other words capable of producing more aquatic life.

Even without human involvement it is natural for lakes to become more biologically productive over time. Leaves fall onto the lake and decompose releasing nutrients into the water. Natural erosion of the land carries sediments with nutrients attached to the lake. However, these natural processes are very minor and take many thousands of years to increase the lake's productivity even slightly. This slow natural "aging" of lakes caused by nutrient loading is called *eutrophication*.

Scientists have given names to different stages of increased biological productivity or *trophic states* in the eutrophication of lakes. Low productive clear lakes are known as *oligotrophic*. Lakes that are slightly more biological productive, having moderate

#### **Cold-Water (Trout) Lakes**

Low productive *oligotrophic* lakes are generally deep and clear with little aquatic plant growth. These lakes maintain sufficient *dissolved oxygen* in the cool, deep-bottom waters during late summer to support cold water fish, such as trout and whitefish. *Mesotrophic* and other more productive lakes produce more plant and animal life. Upon death these plants and animals sink to the bottom and bacteria decompose them and in the process use up the dissolved oxygen. With minimal to no dissolved oxygen in the deep colder water trout are not able to survive and disappear. Consequently trout and other cold water fish are usually only found in oligotrophic lakes and a few mesotrophic lakes.

populations of plants and algae are called *mesotrophic*. Highly, productive lakes with abundant plants and algae are *eutrophic*. Finally, lakes that are extremely productive with excessive amounts of plants and/or algae are *hypereutrophic*.

Plant nutrients are a major factor that cause increased biological productivity in lakes. In Michigan, *phosphorus* is the nutrient most responsible for increasing lake biological productivity. As more phosphorus gets into the lake the lake becomes more eutrophic.

Human activities on a lake's watershed can greatly speed up natural eutrophication by dramatically increasing nutrient, soil, or organic matter input to the lake. This human influenced, accelerated lake aging process is known as *cultural eutrophication*. What generally takes thousands of years to occur naturally can be done by cultural eutrophication in just a few years.

Increasing lake productivity resulting from cultural eutrophication can result in problems such as excessive weed growth, algal blooms, mucky bottom sediments and loss of dissolved oxygen in the deep water. A primary objective of most lake management plans is to slow down cultural eutrophication by reducing the input of nutrients and sediments to the lake from the watershed.

### Measuring Lake Eutrophication

The four lake trophic states explained above are a convenient way of describing lakes, but somewhat misleading in that it places all lakes into a few distinct trophic categories. In reality, eutrophication is a continuum from clear to green conditions. A more precise method of describing eutrophication is to use numbers which can be calculated directly from water quality data. Several numbering systems are available with Carlson's (1977) Trophic State Index (TSI), being the most widely used.

Carlson's TSI was developed to compare lake data on water clarity, as measured by a Secchi disk, chlorophyll *a*, and total phosphorus. These parameters are good measures of a lake's productivity. The TSI expresses lake productivity on a continuous numerical scale from 0 to 100, with

#### Transparency/Chlorophyll *a*/Total Phosphorus

Measuring a lake's transparency, chlorophyll *a* concentration and total phosphorus concentration can provide an estimate of a lake's productivity.

**Transparency** or the clarity of water is measured using a device known as a *Secchi disk*. The disk is attached to a line, and lowered into the lake. The distance into the water column the disk can be seen is the transparency, measured in feet. A short distance of visibility means that there are many algae cells in the water, an indication of higher productivity.

**Chlorophyll *a*** is a component of the cells of plants, and can be used to measure the concentration of algae in the water. Chlorophyll *a* is measured from samples of water and reported in units of ug/l (micrograms per liter) or ppb (parts per billion).

**Phosphorus** stimulates plant growth. It is measured from samples of water and reported in units of ug/l.

The Secchi disk





higher numbers indicating more productive conditions.

Carlson developed mathematical equations for calculating the TSI from measurements of Secchi depth transparency, chlorophyll a, and total phosphorus in lakes during the summer season. The computed TSI values for an individual lake can be used to compare with other lakes, and to evaluate changes within a lake over time. Generally, oligotrophic lakes have TSI values below 38. Mesotrophic lakes have TSI values between 38 and 48. Eutrophic lakes have TSI values between 48 and 58 and hypereutrophic lakes have TSI values over 58.

It is very important to know that a lake's water quality conditions can naturally vary from week to week and year to year. This variability is the result of numerous factors, such as changes in temperature, rainfall, snowfall, snowmelt and runoff. Given these annual changing conditions, observers of lake quality must train themselves to recognize the difference between short-term, normal fluctuations and long-term changes in lake productivity

(eutrophication). Many years of reliable data collected on a consistent and regular basis are required to separate true long-term changes from seasonal and annual fluctuations. Participation in a long-term monitoring program such as the State's CLMP is important to identify long-term changes in a lake's quality. For more information about the CLMP see Part IV, Section 1 – State Laws and Programs.

Phosphorus and Lake Water Quality		
Trophic State	Carlson TSI	Phos. Conc. (ug/l)
Hypereutrophic	100	768
	90	384
	80	192
	70	96
Eutrophic	60	48
	50	24
	40	12
Mesotrophic	30	6
	20	3
	10	1.5
	1	0.5

*For more information on this topic the following resources are helpful (see Part IV, Section 7)*

- *Cooperative Lakes Monitoring Program – Annual Summary Report*
- *Protecting Inland Lakes – You Can Make A Difference*

## **Section 2 – Lake Ecology**

Lakes are not made from the same mold. Each lake is unique and different. When developing management plans the community should know and take into consideration the lake's characteristics. A management strategy that works well for one lake may be unsuited for another lake.

A lake's unique characteristics may be called its ecology. It is how the lake's chemical, physical and biological components come together to create a living world. A complete discussion of lake ecology would fill a college text book. Therefore the discussion on lake ecology in this manual is informative only. No major costly management decisions should be made using this

manual. Professional consultation should be acquired before making any major management decisions. This manual will introduce the reader to just three important lake characteristics:

- 1) lake type,
- 2) light zones of the lake, and
- 3) temperature zones of the lake.

## Lake Type

Lakes work very differently depending upon how water moves in and out of them. This water movement is known as the lake's hydrology. A lake's hydrology can greatly influence how the lake responds to sediment and nutrient (phosphorus) inputs from the watershed. Some lakes may be very sensitive to nutrient loading, drastically changing with even minor inputs, while others may experience only minor changes with moderate to even large nutrient inputs. Additionally, some lakes once impacted by a pollution load may be very difficult to impossible to restore, while others may be restored relatively easily to a previous quality once the nutrient source is removed.

Below are four examples of lake hydrology types. The discussion for each lake type should be considered as a generalization and not specific for every lake. Many other factors such as lake depth, volume, watershed soil types, topography and others can modify phosphorus loading and impacts upon a lake.

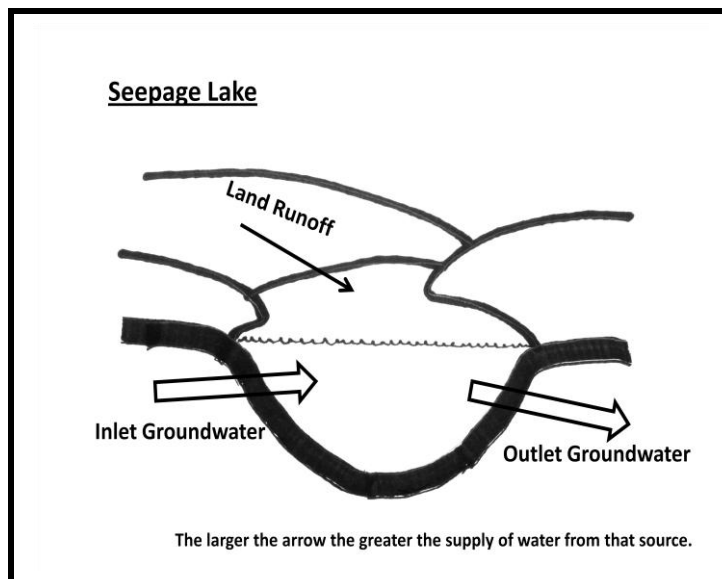
### Seepage Lakes

Seepage lakes have the following characteristics:

- No inlet stream,
- No outlet stream,
- Small watershed, and
- Groundwater is the lake's major source of water.

With a small watershed and no inlet stream, the supply of sediments and nutrients (phosphorus) from the lake's watershed tends to be low in seepage lakes. The major source of water to a seepage lake is groundwater.

Groundwater generally has low levels of phosphorus. Since the phosphorus supply to seepage lakes is normally low the lakes typically have good water quality and are mostly oligotrophic to mesotrophic in character (cold-water trout lakes).



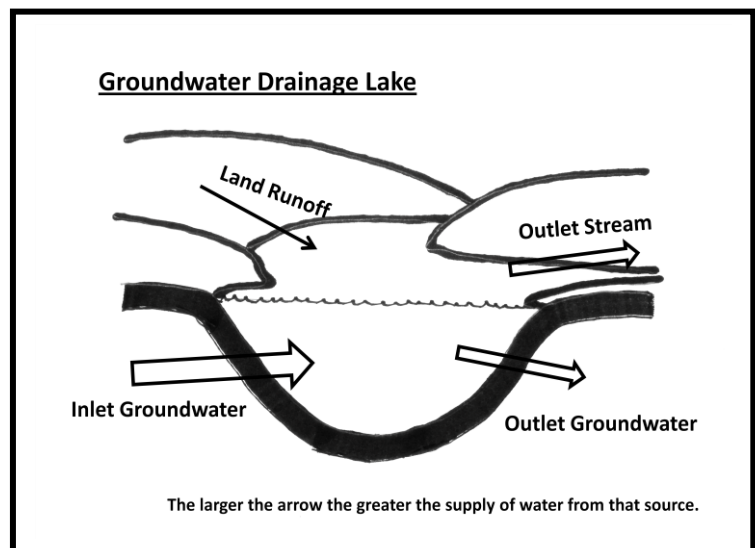
Because seepage lakes have no outlet they are very susceptible to degradation. Sediments and nutrients that come into the lake are there forever or for a very long time. If a major source of phosphorus were added to the lake, such as a wastewater treatment plant discharge or large stormwater runoff drainage, the lake would very quickly decline in quality. If the source of phosphorus was removed the lake would be very difficult if not impossible to restore to its prior quality. Even if possible the significant financial commitment needed to make the restoration would preclude returning the lake to its former state. For most seepage lakes once degraded their high quality state is likely lost forever.

### Groundwater Drainage Lakes

Groundwater drainage lakes have the following characteristics:

- No inlet stream,
- An outlet stream,
- Small watershed, and
- Groundwater is the lake's major source of water.

Groundwater drainage lakes are very similar to seepage lakes. They usually have a low phosphorus supply from the watershed and groundwater so normally are oligotrophic and mesotrophic lakes (cold-water trout lakes). However, an increase in phosphorus supply can quickly degrade the lake. Once degraded, the lake may be difficult to restore, but not as difficult as a seepage lake. The groundwater drainage lake's outlet does somewhat increase the potential for restoration by allowing some sediments and nutrients to be flushed out of the lake.

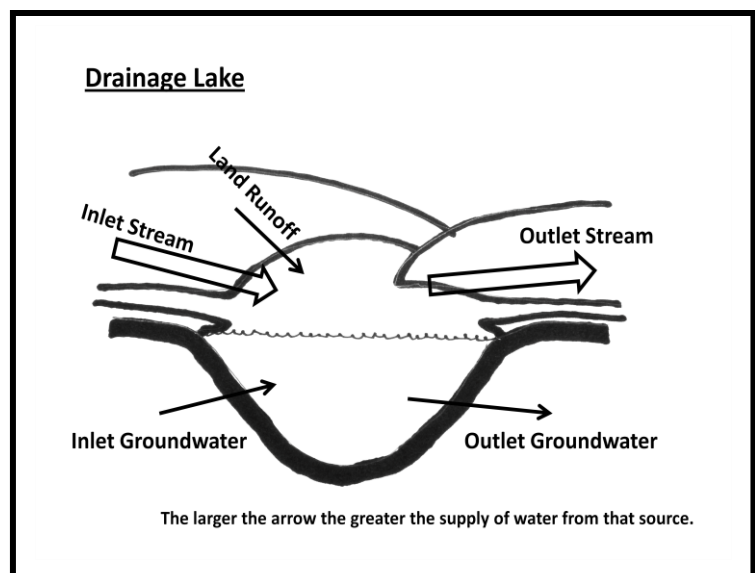


### Drainage Lakes

Drainage lakes have the following characteristics:

- Inlet stream(s),
- An outlet stream,
- A moderate to large watershed,
- Surface water is the lake's major source of water, and
- Groundwater is a minor source of water for the lake.

Most of the water coming into a



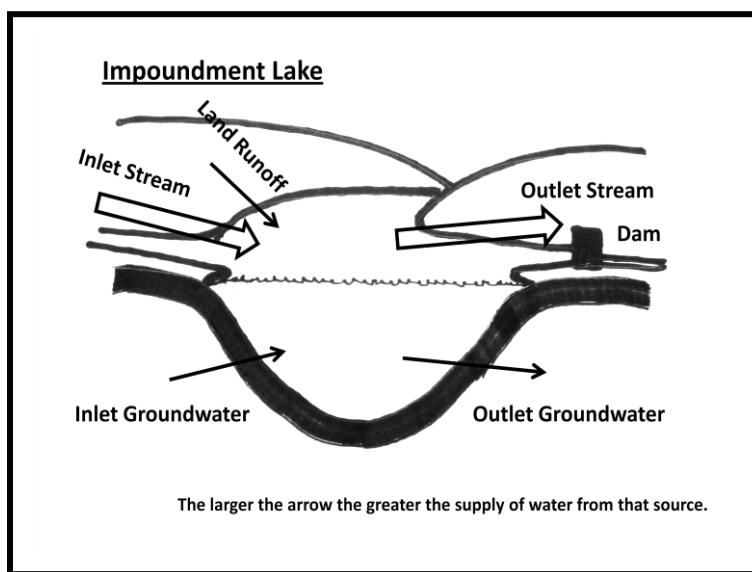
drainage lake comes over land from the watershed and only a minor amount comes from groundwater. Water draining across the land carries more sediments and phosphorus than groundwater. Because of this different water source it is common for more phosphorus to enter a drainage lake than seepage or groundwater drainage lakes. Therefore drainage lakes are usually more biologically productive, typically mesotrophic to eutrophic.

If a major source of phosphorus, such as a wastewater treatment plant discharge or a large storm drain were added to the drainage lake it would decline in quality. If the source of phosphorus was removed it would be possible to restore the lake to its prior quality, because of the large supply of water continually moving through the lake. However, the lake could not be restored to oligotrophic conditions because more than likely the lake never was oligotrophic.

### Impoundment

Impoundment lakes are artificial lakes created by damming a stream or river which have the following characteristics:

- A large inlet stream(s),
- A large outlet stream,
- A large to extensive watershed,
- Surface water is the lake's major source of water, and
- Groundwater is a very minor source of water for the lake.



Almost all of the water coming into an impoundment comes from the watershed through the stream or river and only a minor amount comes from groundwater. Water draining across the large watershed carries major amounts of sediments and phosphorus to the lake. Because of significantly greater amounts of phosphorus entering an impoundment than seepage, groundwater drainage or drainage lakes, impoundments in Michigan generally are more biologically productive usually eutrophic to hypereutrophic.

### **Light Zones of the Lake**

Standing at the shore and looking across the lake surface it may appear as if the lake is just one large bowl of water with plants and animals spread throughout the lake. This is not the case, however. The lake is actually divided into zones by several physical and chemical factors. One of the lake's zonal patterns is due to light.

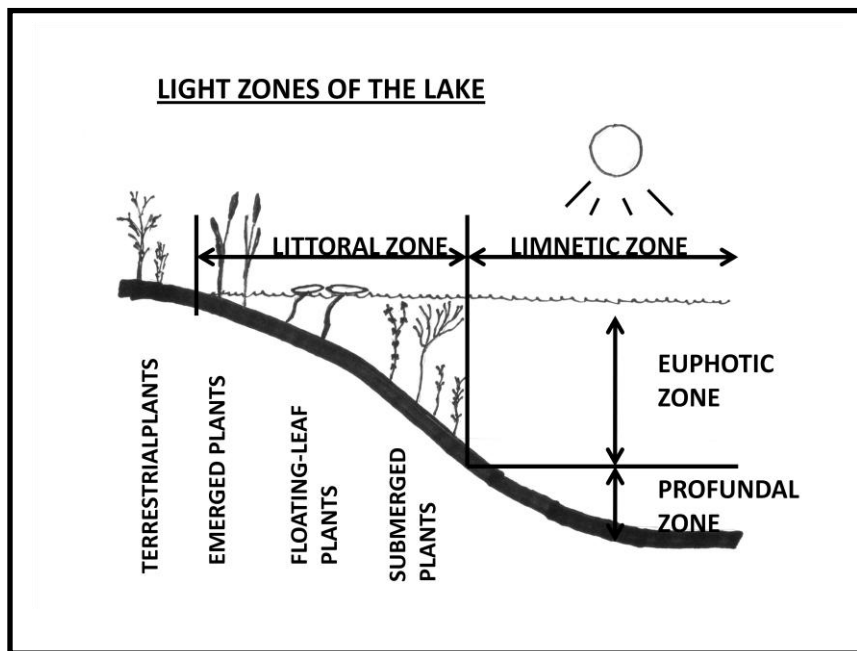
Light will only penetrate so far into a lake based upon the amount of particulate matter dissolved and suspended in the water. The greater the amount of particulate matter in the water the less light will penetrate into the lake. Consequently, in a very clear lake with very little particulate

matter in the water light may penetrate 30 to 40 feet deep or more into the lake. Conversely, in a lake with high amounts of particular matter in the water light may penetrate only 3 to 5 feet deep or less into the lake.

Since plants need light for photosynthesis, the depth to which light can penetrate into the lake will dictate where plants can grow and consequently where animals will congregate. This zone where light is present is known as the *euphotic* zone. If the lake is deeper than light penetrates there is a dark, lightless zone below the *euphotic* zone known as the *profundal* zone. No plants will grow in the *profundal* zone and animals living here are adapted to low light conditions or complete darkness in very deep lakes.

Free floating plants known as algae may grow anywhere in the *euphotic* zone. Large rooted plants, however, must have sediments to place their roots in and germinate from. Consequently, the *euphotic* zone may be divided into two zones if the lake is deep enough. Near shore is the littoral zone, where light

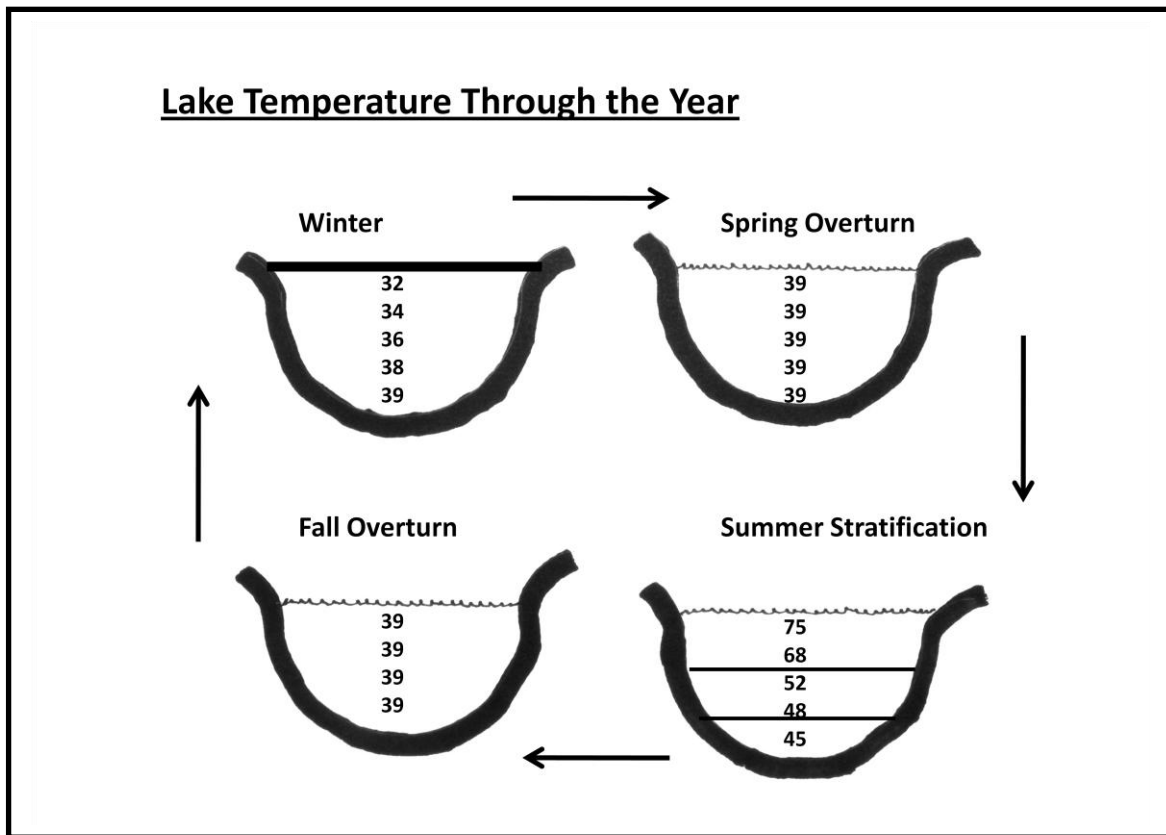
penetrates all the way to the sediments and where rooted plants can grow. Away from shore is the limnetic zone, or the open water area of the lake. If the lake is shallow and light can penetrate to the bottom everywhere, then the entire lake is littoral zone and rooted plants can grow everywhere in the lake.



### Temperature Zones of the Lake

Not only do lakes have light zones, they also have temperature zones. Because the maximum density of water is at 39 degrees Fahrenheit (39°F), water that is colder or warmer than 39°F will float on top of the more dense 39°F water. Consequently in the four season state of Michigan lakes will have different temperature zones as the year progresses.

In the spring and fall as the lake warms or cools respectively the lake's temperature eventually reaches 39°F. At this temperature the lake's water is the same density from top to bottom and the lake can completely mix. These time periods of mixing are known as *spring overturn* and *fall overturn*. In winter colder less dense water will float over the more dense water of 39°F and ice will form at the lake surface when the water temperature reaches 0°F.



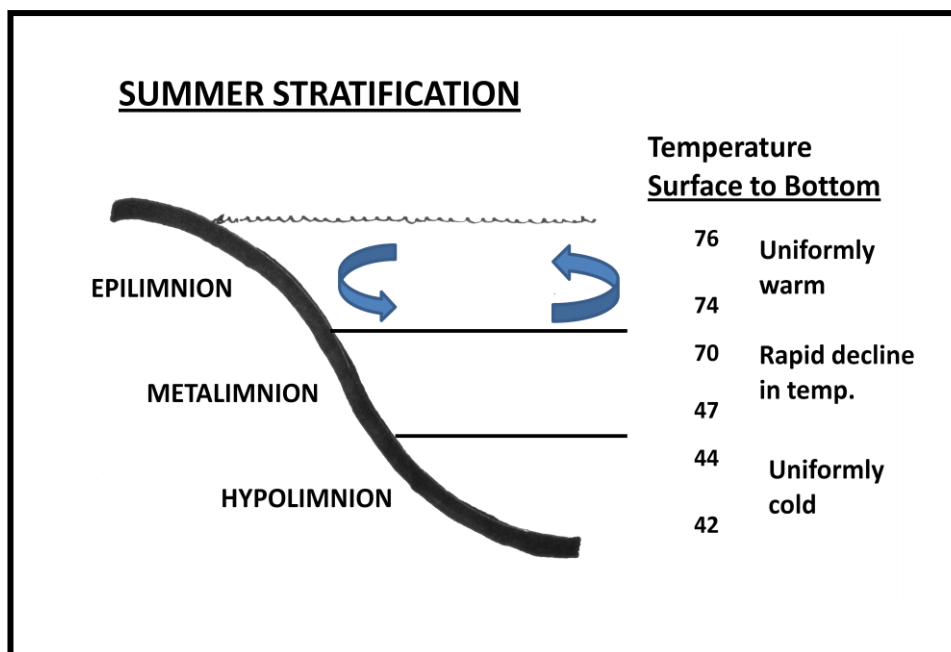
In the summer the temperature difference between the warm water on the surface and the cold water in the deep basin of the lake is great. Therefore the lake will be divided into three very distinct temperature zones, like a three layer cake. This temperature regime is known as *summer stratification*.

In *summer stratification* the upper zone is known as the *epilimnion*. The water in this zone will be uniformly warm and mixed by the wind to a depth of about 20 feet. Below 20 foot depth the wind is no longer capable of mixing the water and temperatures will begin to drop rapidly as one descends deeper into the lake. This zone of rapidly decreasing temperature is known as the *metalimnion*. The *metalimnion* will extend down into the lake from 20 feet to about 30 to 40 feet depending upon the size and depth of the lake. As the declining temperatures near 39°F the density of the water will be uniform and temperature will be consistent all the way down to the bottom of the lake's deep basin. This zone of uniformly cold, deep water is known as the *hypolimnion*.

In a lake with water depths greater than 30 feet the major effect of *summer stratification* is that the deep water is isolated from the atmosphere by the upper layers of water for several months. No oxygen can be added to this zone by the atmosphere during this time. Also since this zone is dark with little to no light penetrating from the surface, there is no plant photosynthesis to

produce oxygen in this zone. Consequently, the only oxygen available to this zone is the oxygen that was entrained there during *spring overturn*.

Oxygen in the *hypolimnion* will be depleted as the summer progresses by bacterial decomposition of organic matter that falls into the *hypolimnion* from the upper zones. In low productive lakes like *oligotrophic* lakes with large deep basins, the supply of oxygen will not be completely used up by bacterial decomposition before *fall overturn*. Consequently, the *hypolimnion* will have oxygen all summer long. However, in more productive lakes bacterial decomposition will deplete the oxygen to zero in the *hypolimnion* and in highly productive lakes deplete the oxygen in the *metalimnion* as well. Consequently, fish and other animal life are unable to inhabit the *hypolimnion* during *summer stratification*.



For more information on this topic the following resources are helpful (see Part IV, Section 7)

- *Understanding Lake Data*
- *A Procedure to Estimate the Response of Aquatic Systems to Changes in Phosphorus and Nitrogen Inputs*
- *The website – [waterontheweb.org](http://waterontheweb.org)*

### **Section 3 – Water and Nutrient Budgets**

Water and nutrient budgets can be used in mathematical lake models to address many questions that the community may have regarding the lake. A *budget* is the summing of all the sources of water or nutrients coming into and leaving a lake. A water budget would account for the amount of water coming from rain falling on the lake, streams and rivers entering and leaving the lake, runoff from shoreline areas, and ground water entering and leaving the lake. A nutrient budget would account for the levels of nutrients, usually phosphorus in these water sources and other sources of nutrients such as dry fallout from atmospheric dust particles.

## Water Budget

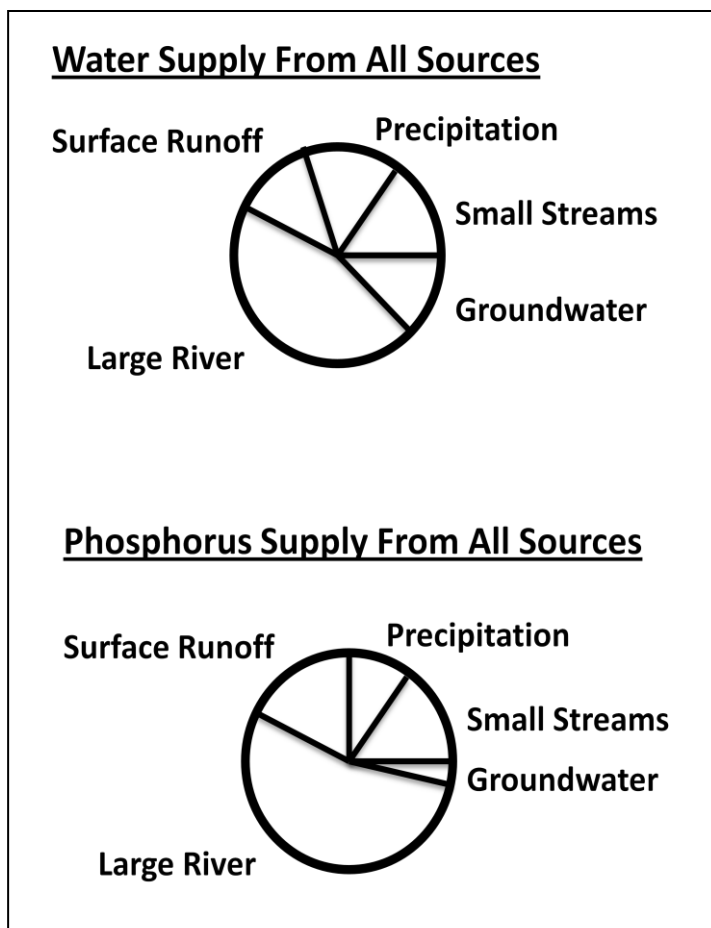
Water moving into a lake carries molecules of phosphorus. Where this water comes from and the land it flows over will determine how much phosphorus is in the water. Groundwater usually contains low levels of phosphorus because the soil adsorbs many of the phosphorus molecules. Water leaving a confined animal feed lot or an urban street can contain very high levels of phosphorus.

The amount of water moving to the lake can be measured directly, such as with the use of flow meters in streams, or it can be estimated when no data existed by assembling data from similar situations where it has been collected. Obviously the more data that exists for the lake of interest the better the estimate of the water budget. If little or no data exists for the lake and the streams entering the lake the water budget is said to be theoretical and only an approximation of the real situation.

## Nutrient (Phosphorus) Budget

The lake's phosphorus budget can be calculated by multiplying the concentration of phosphorus from a water source by the volume of water for that source to arrive at the number of pounds of phosphorus in that source. The resulting number is the pounds of phosphorus entering the lake each year from that source. When all the sources (e.g., groundwater, precipitation, surface runoff) are added together, the sum is the total pounds of phosphorus entering the lake in one year. Besides these water sources, measurements or estimates must also be made for phosphorus entering the lake from atmospheric fallout and from sources internal to the lake such as deep water sediments. As with the water budget the more data that exists for the lake and water sources the better the estimate of the phosphorus budget. If little or no data exists for the lake and streams, the phosphorus budget is said to be theoretical and only an approximation of the real situation.

Lakes are not equal in their ability to handle the phosphorus load. Some lakes receiving only a few pounds of phosphorus will have serious algae and





aquatic plant problems. Other lakes can receive hundreds of pounds of phosphorus without any noticeable increase in algae and plants. The reason for the difference is a lake's characteristics. A large, deep lake with a rapid flushing and sediment rate can absorb large amounts of phosphorus with minimal impacts. Conversely, a small, shallow lake with no outlet can be significantly impacted by even minor amounts of phosphorus.

## **Mathematical Lake Models**

There are mathematical models for lakes that use the information about a lake, its size, depth and flushing rate along with the lake's water and nutrient budgets to estimate what the lake may look like under different phosphorus loading scenarios. For example these mathematical models may estimate:

- What the lake looked like before any development occurred in its watershed,
- How will proposed watershed developments impact the lake,
- What are the most important sources of phosphorus for the lake,
- How much phosphorus can the lake take before serious algae problems develop,
- How much phosphorus must be removed from the nutrient budget before nuisance algal blooms are stopped,
- How successful will restoration efforts be, and
- Are proposed restoration efforts realistic?

These mathematical models are technical and a professional lake manager's assistant is desirable when using them.

*For more information on this topic the following resource is helpful (see Part IV, Section 7)*

- *Managing Lakes and Reservoirs*

## **Section 4 – Holistic Management: Managing the Land and Water**

Since most of the phosphorus that stimulates algae and aquatic plant problems comes from the watershed, a community's lake management plan must consider both in-lake and land management practices. In some cases focusing only on in-lake techniques and ignoring land management in the watershed, may produce short-term benefits at the expense of long-term negative consequences.

Lake management should start with a plan. The plan should identify the problems that are impacting the community's use of the lake. Data should document the sources or causes of these problems. With the problems and causes identified the community and their consultant can consider management strategies best suited to address their unique problems. There are many management strategies, none of which is a silver bullet that will solve all problems. Each is a tool that has advantages and disadvantages. It is essential to understand and match the strategies with the lake's issues and the community's needs and financial resources.

It is likely that the plan will not employ just one management strategy, but multiple strategies. As an example the in-lake alum treatment strategy of phosphorus inactivation and precipitation is effective only if external (watershed) sources are reduced. Additionally some strategies, particularly watershed management strategies are usually long-term commitments. The lake community will need to make a commitment to working on implementing the strategy over a long time period.

Some of the in-lake management strategies are listed and very briefly discussed in Box II.4.1. and some watershed strategies are identified in Box II. 4.2. A more complete discussion of these strategies is presented in the publications such as *Managing Lakes and Reservoirs* (copies available from North American Lake Management Society) and *Diet for a Small Lake* (copies available from Federation of Lake Associations, Inc.)

*For more information on this topic the following resources are helpful (see Part IV, Section 7)*

- *Diet for a Small Lake – A New Yorker’s Guide to Lake Management*
- *Developing a Watershed Management Plan for Water Quality: An Introductory Guide*
- *Handbook for Developing Watershed Plans to Restore and Protect Our Waters*
- *A Model Lake Plan for a Local Community*

### Box II.4.1 Example in-lake management strategies.

Biological Control		Notes
Grass carp	The grass carp is an exotic fish from Asia. It is used in southern states to control serious aquatic plant problems, but is illegal in Michigan. It can cause significant damage to fish habitat in Michigan lakes by removing too much vegetation.	
Milfoil weevil	This beetle is native to North America. It lives most of its life cycle on native milfoil, feeding on the tips and stems. Research has shown that it will also feed upon Eurasian milfoil if hatched from eggs deposited on Eurasian milfoil.	
Chemical Control		Notes
Herbicides	There are many products available in various formulations, with various efficacy rates and toxicities to non-target organisms. They can be used individually or in combinations and applied to large or small areas. The product's label is a legal document. To use a herbicide contrary to its label is a violation of federal and state laws. See the Michigan State University Extension publication <i>A Citizen's Guide for the Identification, Mapping and Management of the Common Rooted Aquatic Plants of Michigan Lakes</i> (WQ-55) for more information.	
Phosphorus precipitation	This technique involves adding a chemical, usually alum, to the lake water to bind with phosphorus and precipitate it from the water column and seal it in the sediments. This alum bound phosphorus is less likely to return to the water under low oxygen conditions in the bottom of the lakes thus potentially reducing algal blooms. This effect may last from one to several years. Applications of alum must be made carefully to avoid toxic/pH effects from aluminum salts.	
Physical Control		Notes
Aeration	Aeration involves pumping water from the lake bottom to the surface where it will come in contact with the atmosphere and is then returned to the lake bottom. This process increases the dissolved oxygen content of the deep water reducing phosphorus release from the sediments. Aeration can cause destratification of the lake.	
Bottom barriers	Bottom barriers are placed on the lake bottom in small areas to block light required for aquatic plant growth. After several weeks the barrier can be removed to allow the area to be used for swimming.	
Dilution/Flushing	Dilution/Flushing uses water with low phosphorus levels to flush lake water with high phosphorus level out of the lake basin. Obviously a large source of low phosphorus water must be available. Phosphorus coming out of the lake sediments may prolong the time required to significantly reduce lake water phosphorus levels.	
Hypolimnetic withdrawal	Hypolimnetic withdrawal takes water from the lake's deep hypolimnion zone, which has no oxygen and is high in nutrients and discharges it out of the lake. The discharge may need to be treated to limit any impact upon receiving waters.	
Mechanical harvesting	Mechanical harvesting uses a device to cut and remove aquatic rooted plants. The device may be small and hand held to very large pontoon harvesting boats that can cut eight foot wide paths five feet deep through the vegetation beds. Some devices till the bottom sediments dislodging the plants.	
Dredging	Dredging removes bottom sediments from the lake to reduce areas where aquatic plants may grow, take out phosphorus rich sediments and/or remove sediment with toxic materials. Dredging has many secondary environmental issues and is very expensive greatly limiting its application.	
Shading	Shading uses a blue chemical dye to inhibit light penetration in the lake. Less light may reduce the algae and rooted plants ability to photosynthesize. The employment of this strategy is usually limited to ponds and small lakes.	
Drawdown	Drawdown involves the lowering of a lake's water level to expose sediments. The drying and freezing conditions can damage rooted plants and affect next summer's growth. Some plants actually favor drawdown and can expand their populations.	

## Box II. 4. 2. Example Practices to Reduce Nutrient and Sediment Pollution from the Watershed

Riparian Lands		Notes
Septic system inspection/repair		The county health code requires that septic systems be inspected at the time of property sale and be upgraded with best available technology and meet all code requirements.
Septic system maintenance		Educational materials such as MSU Extension bulletin WQ-39 are available to all property owners. A volunteer inspection and pumping program is coordinated with property owners and a local sludge hauler.
Fertilizer use		A township ordinance can prohibit fertilizer containing phosphorus from being used in the riparian zone, a set distance from the shore. A new State law now limits the use of phosphorus fertilizers.
Natural lake riparian buffers		Native shoreline vegetation traps sediments and nutrients, intercept nutrient rich groundwater, minimize shoreline erosion and provide habitat for wildlife.
Water conservation		This practice reduces hydrologic load to the soil or septic system. Conservation techniques may include: installation of low flow plumbing, flow-control devices, insulation of hot water pipes, only washing full loads, mulching shrubs and plants, landscaping with plants that require less watering and watering turf less frequently but with heavier amounts.
Agriculture		Notes
Livestock exclusion		Excluding livestock from riparian zones prevents destruction of banks, preventing erosion and reducing nutrient and organic matter loading.
Animal waste management		Controlling the time and amount of manure applications to fields reduces nutrient and organic matter loading.
Conservation tillage		Maintaining crop residue on the soil surface helps reduce wind and water erosion.
Fertilizer Management		Fertilizer management helps reduce nutrient loading by controlling the timing, amount, and type of fertilizer used on crops.
Urban		Notes
Sedimentation basins		Sedimentation basins help reduce the runoff of sediments and attached nutrients by settling the particles in detention or retention basins.
Porous pavement		Rainfall soaking through porous pavement reducing runoff. This practice may be applied to streets, driveways, walkways, patios and other paved areas.
Regular street cleaning		Removing accumulated sediments, nutrients and other pollutants from paved areas before they can be washed into surface waters protects water quality.
Construction		Notes
Limit disturbed areas		During construction limiting disturbed areas as much as possible reduces vegetation loss and minimizes erosion.
Stabilize non-vegetated soil		Mulch, matting and other ground cover devices can be used to reduce the erosion of exposed soils.
Multicategory		Notes
Grassed waterways		On farm lands or in urban drainways, grassed waterways or ditches reduce erosion, trap nutrients and other pollutants and promote infiltration.
Streamside riparian buffers		Vegetation buffers reduce erosion and trap nutrients. They may extend 20 to 300 feet from the water's edge depending upon soils, slope, land use and other factors.
Conservation easements		Conservation easements are legal agreements between a landowner and an agency or organization that permanently limits a property's uses, and remain even if the land is sold.
Zoning		Notes
Wetland ordinances		Local wetland regulations can protect wetlands as open space, wildlife habitat, and nutrient and sediment filters and ground water recharge sites.
Development regulations		Development regulations can manage shoreline development by lot sizes, set back distances, septic system placement, amount of impervious surface, vegetation removal and other activities which protect the public interest in water resources.

## **Section 5 – Shoreline Habitats and Management**

Just as lake shorelines are important to Michigan waterfront (riparian) owners, they are also important to the fish and wildlife of the lake. A lake's shoreline and shallow water areas provides habitat for fish and wildlife species. A shoreline that has had its native vegetation replaced with turf cannot effectively support the fish and wildlife native to this shoreline habitat. Consequently many animals that need this native shoreline like frogs, turtles, ducks and other waterfowl, muskrats, mink and many unique songbirds can become locally extinct. Healthy shorelines also protect the quality of the lake by retaining eroded sediments on the land and filtering the water to remove phosphorus and other pollutants. Therefore native shorelines help keep a lake's water cleaner by reducing algal blooms and sediment runoff.

A lawn at the water's edge creates problems for the lake by allowing lawn fertilizer, pet waste, leaves, grass clippings and oil and grease from roadways to enter the lake. Shallow-rooted lawn grasses allow waves and ice push along the shoreline to easily erode the land into the lake. These shallow rooted lawn plants do not have roots deep enough to intercept nutrient rich septic system groundwater. Additionally the perfectly manicured lawn can attract geese, which can become a nuisance in the area.

There are other options for a riparian property owner to use instead of having a lawn all the way to the water's edge. These options include bioengineered erosion control and naturalized landscaping design. These landscape technologies allow the property owner to put in place a landscape that mimics the wild shoreline of an undeveloped lake. Research shows that these green landscaping techniques benefit the lake by improving fish and wildlife habitat and by reducing pollution runoff and promoting cleaner water.

The State established the Michigan Natural Shoreline Partnership in 2008 with the mission of promoting natural shorelines through the use of green landscaping technologies. The Partnership consisting of governmental agencies, industry associations, industry representatives, academic institutions and environmental and nonprofit organizations actively engaged in promoting natural shoreline management. The partners bring statewide technical expertise and organizational support necessary to address the need for information, education and policy related to shoreline protection.

Partnership objectives are to:

- Train contractors and landscape professionals about green shoreline technologies,
- Educate property owners about natural shorelines and technologies that benefit lakes,
- Research, demonstrate, and develop natural shoreline technologies, and
- Encourage local and state policies that promote natural shoreline management.

More information about the Michigan Natural Shoreline Partnership, green landscape technologies, and shoreline management can be found on the Partnership's website [www.mishorelinepartnership.org](http://www.mishorelinepartnership.org).

*For more information on this topic the following resources are helpful (see Part IV, Section 7)*

- *Natural Shoreline Landscapes on Michigan's Inland Lakes*

- *Lakescaping for Wildlife and Water Quality*
- *The website – [www.water.epa.gov/type/lakes/shoreland.cfm](http://www.water.epa.gov/type/lakes/shoreland.cfm)*

## **Section 6 – Management of Aquatic Plants and Algae**

Aquatic plant and algae are a natural and essential part of the lake, just as trees and flowers are a natural part of the land environment. Algae are the base of the food chain for all animals living in the lake. Rooted plants are habitat for fish and provide structure for smaller organisms. Waterfowl, shorebirds and aquatic mammals use aquatic plants for cover, nesting material and food. The roots of rooted plants hold sediments in place, reducing erosion and suspension of sediments.

Rooted aquatic plants may grow from the shoreline's wet soils to a water depth of 12 to 20 feet. Beyond this depth light and pressure limit the growth of rooted plants. This area of the lake, from shore to a depth of rooted plant growth is known as the *littoral zone*.

Within the littoral zone plant communities may be divided into three zones, with unique plants growing in each zone. The *shore zone* extends from the shore to a depth of 2 to 4 feet. In this zone the dominant plants, such as cattail, bulrush, and arrowhead, have emergent leaves extending above the water surface. Beyond the shore zone is the *shallow littoral zone*. This zone is populated with plants growing below the water surface, but many have floating leaves. Examples of these plants are water lilies, water shield and pondweed species of the *Potamogeton* genus. This zone extends from about 2 feet to a water depth of about 6 to 8 feet. Beyond this zone is the *deep littoral zone*. In this zone the plants grow entirely submerged or with only a small flower tip breaking the water surface. The leaves on these plants tend to be small, thin or finely divided. Some examples are wild celery, bushy pondweed, and muskgrass.

These zones result in a condition where most lakes have a wide range of species. Most lakes have 12 to 16 relatively common species of aquatic plants. A lake with many plant species is said to have high diversity. High diversity provides stability to the environment. If one plant species is lost there is little impact upon the environment. Conversely in some lakes plant species have been reduced to 2 or 3 common species. These lakes are said to have low diversity. The loss of a plant species in these lakes can be critical to the fish and animal communities in the lake. These lakes are also more susceptible to being overtaken by aggressive exotic invader species.

Aquatic plant management programs should consider the natural conditions for the lake of interest. Eliminating too many aquatic plants from the lake may have cascading negative impacts upon fish and animal communities. Before beginning a plant control program it is critical to have a management plan. The plan would use data on the lake and its plant and animal communities to establish a goal for the plant community. The goal outlines what the plant community will look like once the plan's control strategies are implemented. There should be public input on the plan and a monitoring program to evaluate the plan's success.

There are several management options and control tools that a community can use to manage the aquatic plants in their lake. Control tools available include: dredging, herbicides, harvesting,

drawdown and others. There is no one best management option or control tool. What works best for one lake may not be the best for another lake. Each community needs to work out its own plan.

*For more information on this topic the following resources are helpful (see Part IV, Section 7)*

- *A Citizen's Guide for the Identification, Mapping and Management of the Common Rooted Aquatic Plants of Michigan Lakes*
- *Management of Aquatic Plants*

## **Section 7 – Aquatic Exotic Invasive Species**

Every plant and animal has predators, parasites, and bacteria that feed upon or cause disease in the plant or animal thus controlling its population. Even humans have disease agents that control our population size. Aquatic plants also have these controlling agents. In a “wild” lake no one native plant dominates the plant community for very long. As its population expands, so do the control agents that impact its population. Eventually, the control agents reduce the plant’s population to a base level in balance with other plants in the lake.

Sometimes a plant community is impacted by an action that favors one plant species over others in the lake. This most frequently occurs with the introduction of an exotic species not native to the area. The new plant is often able to outcompete the native plants and expand to high levels taking over large areas of the lake. The population explosion of this exotic species results from the fact that control agents that controlled the exotic species in its home range are not present in the new environment. Without control agents to curb its population, the exotic species has a competitive advantage over native species. The native species trying to compete with the new exotic plant are often greatly reduced or even eliminated.

A population explosion of an exotic plant sometimes results in an inappropriate human response. As an example, when Eurasian milfoil takes over a lake, citizens may notice the change not as a change in plant species, but as a case of all the plants “going wild”. In reality, the number of individual plants is about the same, but now one aggressive species has replaced a community of many species to a community dominated by one species. Without recognizing that a shift in the plant community has occurred, control actions are sometimes directed at all the plants rather than targeting the nuisance exotic species that has invaded the lake. Indiscriminate controls on all the plants including the native plants further encourage the exotic by reducing competition from the remaining native plants, thus prolonging the dominance of the exotic invader.

Given a period of time, the environment evolves to restrain the exotic species that has invaded the lake. Diseases, parasites and predators of native species similar to the exotic species shift to take advantage of the large population of exotic plants. Eventually, the exotic species becomes just another member of the plant community. The time required for this naturalization process varies greatly, depending on the species involved and environmental condition, but usually takes many years to decades.

To accelerate the naturalization process, environmental agencies often return to the home range of an exotic plant to find controlling agents such as insects that feed on the plant or diseases that

will infect the plant. After years of quarantine and research to ensure that the new control agent itself will not create additional problems, it is released to provide long-term control of the nuisance exotic plant.

*For more information on this topic the following resources are helpful (see Part IV, Section 7)*

- *Integrated Pest Management for Nuisance Exotics in Michigan Inland Lakes (WQ-56)*

## **Section 8 – Swimmer’s Itch**

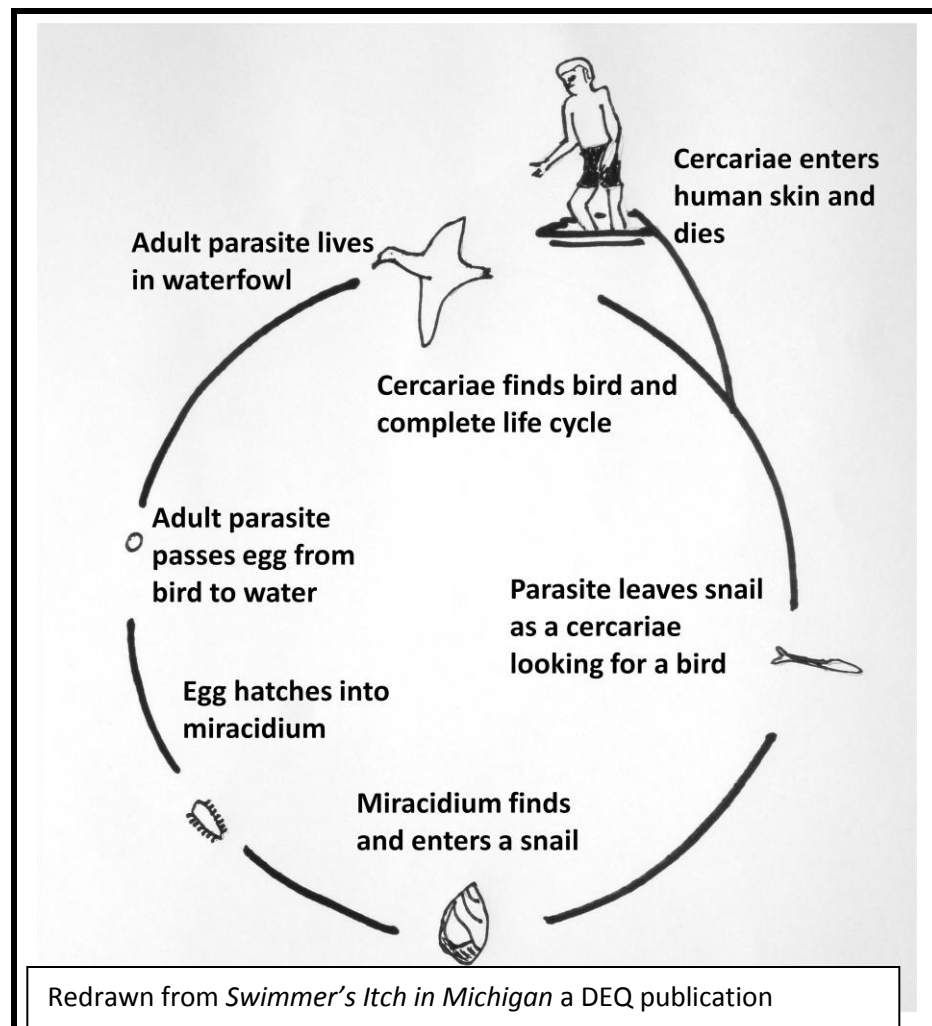
Swimmer’s itch is a disease of humans that is found worldwide. It is caused by *cercariae*, which are a free-swimming larval stage of parasitic blood flukes. The adult of these parasites live in certain waterfowl, shore birds and some aquatic mammals, such as muskrats. The adult parasite passes *eggs* out of the waterfowl and into the water. There they hatch and become mobile *miracidium*, which swim about. If they come into contact with a snail they penetrate into the snail and reside in the liver or pancreas. After some time the snail sheds cercariae of the parasite into the water. These cercariae drift in the water until they encounter a host animal (waterfowl, shore bird or water mammal). They then penetrate the host’s skin and migrate to the veins. If these cercariae encounter a human instead of the proper host they penetrate the skin, however, since humans are not the proper host the cercariae dies in the skin layer. About 30 to 40 percent of humans develop a reaction to the foreign protein matter in the skin. This reaction is usually manifested as a rash with itching.

Some lakes have incidences of swimmer’s itch every year, while other lakes only have the problem every ten or twenty years. The difference in these patterns appears to be the presence of substantial populations of host animals, waterfowl, shore birds, or aquatic mammals. Lakes with large populations of host animals often experience swimmer’s itch outbreaks every year. Lakes with sporadic outbreaks appear to be infected by migratory waterfowl. Most years the migrating waterfowl landing on the lake are not infected. However, in certain years infected waterfowl land on the lake, infect the snails and move on. Since there are no final host (waterfowl) for the parasite to infect after it has been in the snail the life cycle is broken. In these cases the incidence of the disease usually subsides by mid-summer and does not occur again for several years when once more infected migrating waterfowl land on the lake.



There are some precautions that individuals can take to minimize contacting swimmer's itch when it is known to be in the lake. The parasite's cercariae are very small and basically drift in the lake currents and wind driven waves. Therefore it would be good to avoid swimming in a beach when there are strong onshore winds. Since the highest concentrations of cercariae will be in near shore shallow water, it would be best to swim in deeper water and avoid wading or setting in wave washed beaches. Additionally, after swimming immediately shower or towel off. This action will remove any cercariae that are on the body but have not penetrated the skin yet.

Treatment for swimmer's itch infections is similar to the treatment for other rashes such as poison ivy. Avoid scratching the rash since this can lead to bacterial infections, which would be more serious than the swimmer's itch. Warm baths and lotions with an antihistamine may relieve itching symptoms. Antihistamines are also available in pill form without prescription. Obtaining advice from a physician is recommended if the individual is having problems controlling the itching.



Swimmer's itch control usually focuses on managing the parasite's life cycle. This management could be applied by reducing the number of snails in the lake or bird hosts that use the lake. For managing snail populations physical and biological controls have been researched, but at this time none have been found to be cost effective. Chemical control of snail populations to reduce swimmer's itch incidence has been used for about 60 years. There are a few molluscicides that will control snails, but copper sulfate is the only one available for use in Michigan.

Copper sulfate is toxic to snails, but it is also toxic to other invertebrates and some fish, particularly trout. Care must be taken when doing a swimmer's itch copper sulfate treatment to

get the copper to where the snails are while reducing the copper contact with non-target organisms. To minimize undesirable impacts to the environment a permit is required from the MDEQ. For information about swimmer's itch, its control and permit requirements visit the MDEQ website and review the publication *Swimmer's Itch in Michigan*.

Breaking the swimmer's itch life cycle at the bird or mammal host has been researched, but no practical application has been developed. General recommendations are to not encourage waterfowl populations by artificially feeding the birds. This action can concentrate birds and cercariae in the area. The practice is also not beneficial to the birds in the long term. Some communities have tried capturing and moving waterfowl populations that have been identified as contributing to serious swimmer's itch problems. However, this strategy is difficult, often ineffective and requires approval of the U.S. Fish and Wildlife Service.

For more information on this topic the following resources are helpful (see Part IV, Section 7)

- *Swimmer's Itch in Michigan*
- *Occurrence, Distribution and Control of the Parasites That Cause Swimmer's Itch in Michigan*.

## **Section 9 – Fish and Wildlife**

The fish and wildlife resources associated with Michigan inland lakes is a significant benefit to the people of Michigan. Fishing and waterfowl hunting alone generate hundreds of millions of dollars each year for the State's economy. Other activities include bird watching, animal viewing, trapping, photography and others.

While fish and wildlife may be a focal point for recreational interest on lakes, these animal populations are dependent upon algae, rooted plants, small animals such as crayfish and frogs and microscopic animals known as zooplankton. Fish and wildlife populations are also dependent upon physical features in the lake such as rock outcrops and large woody debris, such as tree that have fallen into the lake for habitat and structure. All of these plant, animal and physical elements combine and interact to create an ecosystem or complex web of life within the lake.

A lake ecosystem is dependent upon all its interacting parts. If plant populations are reduced, fish species altered or an exotic species introduced to the lake, the effects can ripple through the entire ecosystem. It is not possible to significantly alter one element of the ecosystem without impacting all the others.

A recent study conducted by the U.S. Environmental Protection Agency on the nation's lakes (National Lake Assessment) documents this interaction. The intent of the study was to estimate the condition of the Nation's lakes using a study design which would produce results reflecting the general conditions present in all lakes. The study was large and comprehensive. The survey found that 56% of the Nation's lakes have good healthy biological communities. Another 21% are in fair condition and 22% are in poor biological condition. The researchers also looked at stressors that could cause poor conditions just as a medical doctor would examine the relationship between cholesterol and heart health.

The researchers concluded that poor or degraded biological lake conditions could be related to two significant stressors:

- High levels of nutrients such as phosphorus entering the lakes, and
- Poor native lakeshore conditions, resulting from the replacement of native vegetation with lawns and seawalls.

This study found it was possible to impact a lake's fish and wildlife communities not only by altering plants and animals within the lake, but also by altering the land around the lake. For more information about the National Lake Assessment visit the website [www.epa.gov/lakessurvey](http://www.epa.gov/lakessurvey).

It is also important to note that sometimes change is not sudden and dramatic as might be seen with the introduction of an exotic species, but the change is slow and not often noticed such as the cumulative effects of small modifications to the lake's habitat. For example, one riparian owner removes the woody debris from his beach area. There is small but unnoticed impact. Then another owner removes the woody debris followed by another. If the practice of removing woody debris continues until there is little to no woody debris left in the lake, the impact upon fish populations, particularly perch can be dramatic.

*For more information on this topic the following resources are helpful (see Part IV, Section 7)*

- *Fisheries Division Special Report 38 – Conservation Guidelines for Michigan Lakes and Associated Natural Resources*
- *Fish and Fisheries Management in Lakes and Reservoirs*

## **PART III: LAKE IMPROVEMENT BOARD ADMINISTRATION**

Part III covers the administration of Lake Boards. Lake Board members should be able to use Part III to work through each step of the administrative process. In many cases examples are provided which the board can modify and use.

### **Section 1 – General Overview of the Lake Improvement Board**

A Lake Improvement Board (Lake Board) is a board established by a local unit of government to manage an inland lake. The Lake Board is charged with the responsibility of carrying out desired lake improvements and is governed by Public Act 451 of 1994, Part 309, as amended. The Lake Board may undertake projects related to the elimination of pollution and flood damage, elimination of water conditions that jeopardize the public health or safety, the improvement of a lake for conservation of fish and wildlife, and the improvement of a lake for fishing, wildlife, boating, swimming, or any other recreational, agricultural, or conservation use.

### **Summary of How a Lake Board Works**

On public inland lakes, a Lake Board may be established by the governing body of a local unit of government (city, village, township or county) upon its own motion or by petition of 2/3 of the freeholders owning lands abutting the lake. Such action can be taken by the governing body of any local unit in which all or any part of the lake is located. On private inland lakes, a Lake Board can be established by petition only. Upon receipt of a petition(s), or on its own motion, the governing body of a local unit shall within 60 days establish a Lake Board. The Lake Board shall consist of the following:

1. A member of the county board of commissioners appointed by the chairperson of the board of commissioners of each county affected by the lake improvement project.
2. Two representatives from each local unit of government appointed by the legislative body of the local unit, if a lake with a Lake Board is totally within a particular Township; OR, if a lake with a Lake Board is located in more than one Township, then each Township appoints one (1) representative.
3. The county drain commissioner, or his or her designee, or a member of the county road commission in counties not having a drain commissioner.
4. A property owner, appointed by the Lake Board, who owns land abutting the lake. The homeowners' association may nominate three people for Lake Board membership. The government-appointed members elect the property owner member from the nominees to serve a four-year term.

Lake Boards established under Part 309 must do the following:

1. Retain a registered professional engineer to prepare an engineering feasibility report, an economic study report and an estimate of project costs. The report must include a

proposed special assessment district and a recommendation for the apportionment of benefits. The assessment district may include all parcels of land and local units benefited by the improvement project.

2. Hold a Public Hearing of Practicability to review the feasibility report, the proposed special assessment district, and apportionment of benefits and to determine the practicability of the project. The Lake Board must publish Notice of Hearing of Practicability twice in a newspaper of local circulation.
3. Once a project is determined to be practical and approved by the Lake Board and the special assessment district and an apportionment of benefits are determined, the Lake Board may then proceed to finalize the plans for the approved lake improvement project and prepare an assessment roll.
4. Before confirming the assessment roll, the Lake Board must hold a Hearing of Assessment to review and hear any objections to the assessment roll. Notice of the hearing must be published twice in a newspaper of local circulation as well as mailed to homeowners in the special assessment district.
5. After the hearing, the Lake Board may confirm the assessment roll and proceed with carrying out the approved lake improvement project.

## **Section 2 – Chronological Steps to be followed by a Lake Improvement Board**

- 1) Formation of a Lake Board, Public and Private Lakes, Sections 30902 and 30904.
  - a) On public inland lakes, a Lake Board may be formed either by petition of 2/3 of the freeholders owning land abutting the lake or upon a motion of a local governing body.
  - b) On private inland lakes, a Lake Board may be formed only by petition of 2/3 of the freeholders owning land abutting the lake.
- 2) Resolution by Local Governing Body, Sections 30906 and 30908. In creating a Lake Board, the local governing body shall direct the Lake Board to do the following:
  - a) Institute proceedings as prescribed in the Part 309 to bring about the desired lake improvement.
  - b) Determine the scope of the project.
  - c) Establish a special assessment district including all parcels of land and local units which will benefit by the improvement of the lake.
- 3) Lake Board Membership, Section 30903(1). The Lake Board shall consist of the following:
  - a) A member of the county board of commissioners appointed by the chairperson of the board of commissioners of each county in which the lake is located.
  - b) Two representatives from each local unit of government (City, Village or Township) in which the lake is located, OR, if a lake is located in more than one local unit of government than each governmental unit appoints one representative.
  - c) The drain commissioner, or his/her designee, or a member of the county road commission in counties not having a drain commissioner.
  - d) A property owner, appointed by the Lake Board, who owns land abutting the lake. The homeowners' association will nominate three people. From these nominees, one person will be appointed by the Lake Board to serve a four-year term.
- 4) Election of Officers, Section 30903(2). The first duty of the Lake Board is to elect a chairperson, treasurer, and secretary. A majority of the members shall constitute a quorum.

- 5) Selection of Engineer, Section 30903(1). The Lake Board shall retain a registered professional engineer to provide an engineering feasibility report, an economic study report and an estimate of cost. The report shall include, when applicable, recommendations for normal lake levels and the methods for maintaining such lake levels.
- 6) Engineering Feasibility Study, Section 30909(2) and (3). The engineering feasibility study, which is to be prepared by the selected engineering consultant, includes the following:
  - a) The methods proposed to implement the recommended improvements.
  - b) An investigation of the groundwater conditions and possible effects on lake levels from removal of bottom materials (if applicable).
  - c) A study of existing nutrients in the lake and a projection of future lake conditions which may result from a reduction in nutrient levels.
  - d) An estimate of project costs.
  - e) Probable assessments to individual property owners for the project.
  - f) An economic report which analyzes the existing local tax structure and the effects of the proposed assessment on the local unit(s) of government involved.
- 7) Funding by County Board of Commissioners, Sections 30905 and 30911. The county board of commissioners may provide for a revolving fund to pay for preliminary costs of improvement projects. Such funds must be repaid on collection of funds from the assessment district. The county board may also provide up to 25% of the cost of a lake improvement project on any public inland lake.
- 8) (Note: *Bond Counsel. If bonding is anticipated as a means of financing the lake improvement project, bond counsel should be retained as early in the project as possible. Whether bonding is needed depends on the cost of the project. Normally, only dredging projects require bonding because of the high cost of such projects. Bond counsel, if needed, can provide valuable assistance to a Lake Board to ensure that the necessary legal steps are taken so that bonds can be sold without problems or defaults.*)
- 9) Hearing of Practicability, Section 30910. Within 60 days following receipt and final acceptance of the engineering feasibility study, the Lake Board shall hold a public hearing to review the report and to determine the practicability of the project. Notice of the hearing must be published twice in a newspaper of general circulation in each local unit of government affected. The first publication shall not be less than 20 days prior to the time of the hearing. (Note: *Part 309 does not require notice of the hearing of practicability to be sent by first class mail to all residents within the proposed special assessment district. However, it is recommended that Lake Boards do so.*) The Lake Board shall, by resolution, determine the practicability within 10 days after the hearing. The resolution shall be published once in a newspaper of general circulation in each local unit to be affected.
- 10) Preparation of Assessment Roll, Section 30912. After finally accepting the special assessment district, the Lake Board shall prepare an assessment roll based upon benefits to be derived from the proposed lake improvement and shall direct the assessing official of each local unit of government to be affected to join in making the assessing roll.
- 11) Public Hearing and Confirmation of Assessment Roll, Section 30913. After the assessment roll is reported to the Lake Board by the local assessing officials, the Lake Board shall hold a public hearing on the assessment roll. Notice of the hearing must be published twice in a newspaper of general circulation in each local unit of government affected. The first publication shall not be less than 10 days prior to the time of the hearing. Notice of the public hearing must also be mailed first class to all property owners in the special assessment

district in accordance with Act 162, Public Acts of 1962. After the hearing, the Lake Board may confirm the assessment roll as reported, or as amended or corrected by it, or may refer it back to the assessing officials for revision, or may annul it and direct a new roll to be made. When an assessment roll has been confirmed, the Lake Board shall direct the assessments therein to be collected, and the clerk of each local unit shall endorse therein the date of confirmation. Notice of confirmation of the special assessment roll must be published in the same manner as the notice of the public hearing on the roll.

- 12) Project Financing, Section 30922. Lake Boards have three methods to finance lake improvement projects in anticipation of the collection of special assessment. They are:
  - a) Borrow money from a local lending institution.
  - b) Issue lake level orders. These are promissory notes issued to the contractor that promises payment upon collection of funds from the special assessment district. In cases where the contractor does not wish to hold such a note, a purchaser for the lake level orders would have to be found. In some cases, local units of government have purchased lake level orders.
  - c) Bonding. (Note: *Bond counsel may not render a favorable opinion on the salability of bonds issued under Part 309 of Act 451. Therefore, it is recommended bonds be sold under a different statute, but may be paid for via the special assessment district established by the Lake Board.*)
- 13) Advertising for and Letting of Contract, Section 30926(1) and (2). Except as provided below, the chairperson of the Lake Board shall advertise for bids. The contract shall be let to the lowest bidder giving adequate security for the performance of the contract, but the Lake Board shall reserve the right to reject any and all bids. The Lake Board may contract with a local homeowner association without advertising for public bids provided the homeowner association can provide adequate security for the performance of the contract. There should be a contract between the homeowner association and the Lake Board.
- 14) Computation of Project Costs, Section 30927. Within 10 days after the letting of contracts, or after appeals have been decided, the Lake Board shall make a computation of the entire cost of a project.
- 15) Further Lake Board Meetings. After letting of the contract(s), the Lake Board will need to meet periodically to review the progress of the project and to take action on the payment of bills. As part of the property tax bill, unpaid assessments are forwarded by the township to the County treasurer for collection. The County Treasurer pays the assessment to the Lake Board and adds it to the lien placed against the property.

### **Section 3 – Establishing Petition and Township Resolutions**

Upon receipt of a petition, or on its own motion, the governing body of a local unit will within 60 days, by resolution, establish a Lake Board. Below is a sample petition (Box III.3.1) to collect freeholder signatures and a sample township resolution (Box III.3.2) to establish the Lake Board.

Sometimes in the resolution the township will not give the Lake Board the unlimited authority to determine the scope of the project. Instead the resolution will indicate that the Lake Board will do a specific project to address a specific issue. This limits the authority of the Lake Board,

which is sometimes desired in some communities. However, if at a later date the community wishes to change the scope of the lake management project to include elements not identified in the establishing township resolution, it is necessary to have the resolution modified by the township and new proceedings initiated. This requires the Lake Board to initiate new proceedings at the very beginning.



### Box III.3.1. Sample Petition

WHEREAS, the undersigned are two-thirds (2/3) of the freeholders owning land abutting (*name of lake*) Lake, located in the (*city/village/township*) of (*county*) and by their signature on this Petition attest that they desire to conserve the natural resources of the State of Michigan and to preserve property values around (*name of lake*) Lake, and further they believe that the creation of a Lake Improvement Board for (*name of lake*) Lake will protect the public health, welfare, and safety of the residents on (*name of lake*) Lake.

NOW, THEREFORE, the undersigned do respectfully petition the (*city/village/township*) Board of the (*city/village/township*) of (*county*) to set up a Lake Improvement Board for (*name of lake*) Lake under the provisions of Part 309 of Act No. 451 of Public Act of 1994, as amended, within sixty (60) days of their receipt of this Petition.

"Signature" Name	"Print" Name	Address	Description of Property Owned	Date

STATE OF MICHIGAN

COUNTY OF \_\_\_\_\_

\_\_\_\_\_ being duly sworn, deposes and says that he/she circulated the foregoing petition and that each signature thereto is the genuine signature of the person whom it purports to be.

Subscribed and sworn before me this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_ .

\_\_\_\_\_  
Notary Public, \_\_\_\_\_ County, Michigan  
My Commission Expires: \_\_\_\_\_

### Box III.3.2. Sample Resolution

The Charter Township of \_\_\_\_\_ ordains:

WHEREAS, \_\_\_\_\_ Lake is located within the territorial boundaries of the Charter Township of \_\_\_\_\_, and

WHEREAS, a petition to establish a lake improvement board has been submitted to the Township Board of the Charter Township of \_\_\_\_\_ bearing the signatures of two-thirds (2/3) of the freeholders owning land abutting the lake, and

WHEREAS, the Township Board determines that the establishment of a lake improvement board under Part 309 is necessary to conserve the water quality of the lake and to preserve the property values around the lake,

NOW, THEREFORE, BE IT RESOLVED, that the \_\_\_\_\_ Lake Board of the Charter Township of \_\_\_\_\_ be hereby established. The Township Board shall hereafter appoint the board members pursuant to Sec. 4 of Part 309. The lake improvement board shall thereafter institute proceedings as prescribed in Part 309 to bring about the desired lake improvement, determine the scope of the project, and establish a special assessment district including all parcels of land and local units which will be benefited by the improvement of the lake.

YEAS: \_\_\_\_\_

NAYS: \_\_\_\_\_

ABSENT: \_\_\_\_\_

Motion carried.

STATE OF MICHIGAN

COUNTY OF \_\_\_\_\_

I, THE UNDERSIGNED, the duly elected and qualified Clerk of the Charter Township of \_\_\_\_\_, do hereby certify that the above \_\_\_\_\_ Township resolution is a true and accurate copy of the resolution adopted by the \_\_\_\_\_ Township Board at a regular meeting held \_\_\_\_\_.  
(date)

IN WITNESS WHEREOF, I hereto affix my official signature the \_\_\_\_\_ day of \_\_\_\_\_.

\_\_\_\_\_, Clerk  
(name)

## **Section 4 – Election of Lake Board Officers and Duties**

The first duty of the Lake Board is to elect officers as follows:

- Chairperson
- Secretary
- Treasurer

Often the Lake Board will elect a temporary Chairperson until the citizen representative has been elected. After the citizen representative has been appointed, then all the elected positions are filled. This allows the citizen representative to be available to fill any of the Lake Board officer positions.

Further responsibilities of the Lake Board members:

### **Chairperson:**

- Shall advertise for bids for lake projects
- Prepare agendas for the Lake Board meetings
- Run the Lake Board Meetings

### **Secretary:**

- Record and distribute Lake Board minutes
- Prepare information for Lake Board meetings
- Prepare information for legal advertisements
- Prepare individual notices for the feasibility hearing and mail (not required but almost always done)
- Request assessment roll from local governing body assessor
- Prepare individual assessment notices to be mailed 1st Class to homeowners in assessment district. Mail or direct assessor's office to mail notices.
- Maintain all Lake Board records
- Maintain a permanent "legal" file

### **Treasurer:**

- Pay all Lake Board bills. If the township is acting as the fiduciary, follow-up to verify the township treasurer has paid invoices and the preapproved bills/invoices submitted by the Lake Board
- Maintain all Lake Board financial records
- Create financial reports and oversee annual budgets. Annual budget must be adopted before any money can be expended by the Lake Board.

**Lake Board:**

- Contracts with licensed professional engineer for feasibility study
- Professional engineer identifies the possible boundaries of the special assessment district
- Local assessor(s) verifies which properties within the district have lake access
- Lake Board and professional engineer will develop units of benefit rates
- Advertise for public hearings and meetings
- Determine practicability of project at public hearings
- Award contracts with contractor or homeowner's association for projects
- Hold assessment hearing
- Confirm special assessment
- Direct clerk of local governing body(s) to collect assessments
- Take action to approve payment of the Lake Board's expenses as submitted by Lake Board members
- Act annually on delinquent assessments, as reported

**Local Assessor(s):**

- Shall prepare assessment roll for Lake Board assessment district
- Provide assessment roll to Lake Board Secretary to assist in the preparation of 1st Class individual homeowner mailings
- If directed by Lake Board, mail 1st Class individual homeowner notices.
- Report assessment roll to Lake Board
- Certify assessment roll
- File assessment roll with Clerk to collect assessments

**Section 5 – Lake Improvement Board Meeting Documents**

Lake Boards will have many documents that they use in their proceedings. Examples of these documents are provided below and include: meeting notice (Box III.5.1.), agenda (Box III.5.2.), meeting sign in sheet (Box III.5.3.) meeting minutes (Box III.5.4.), letters requesting proposals for professional service (Box III.5.5.), and proposal request document (Box III.5.6.).

These documents are important and should become part of the legal file for the Lake Board. Notices of Lake Board meetings must be posted 18 hours prior to the time of the meeting in accordance with the Michigan Open Meetings Act (P.A. 267 of 1976). To find consultants to receive the letter for professional service, check with the internet, professional society newsletters, such as the Michigan Association of County Drain Commissioner's publication *Pipeline* or Michigan Lake and Stream Associations' publication *The Riparian Magazine* and contact other Lake Boards for a list of consultants they have interviewed or used.

**Box III.5.1. Sample Meeting Notice**

**NOTICE OF MEETING OF THE  
LAKE IMPROVEMENT BOARD  
FOR  
\_\_\_\_\_ LAKE**

A meeting of the Lake Board for \_\_\_\_\_  
will be held on \_\_\_\_\_ at \_\_\_\_\_  
(date) (time)  
at the \_\_\_\_\_  
(location)

Posted: \_\_\_\_\_ (date posted)  
\_\_\_\_\_ (time posted)

NOTE: Notices of Lake Improvement Board meetings must be posted 18 hours prior to the time of the meeting in accordance with the Michigan Open Meetings Act, Act 267 of 1976.

**Box III.5.2. Sample Meeting Agenda**

**AGENDA  
\_\_\_\_\_ LAKE  
LAKE IMPROVEMENT BOARD MEETING  
(date)**

- I. Call meeting to order
- II. Introduction of Members and Guests
- III. Presentation of Meeting Notice as posted
- IV. Brief Explanation of Procedures
- V. Receive Resolution(s) from Local Governing Unit(s) creating Lake Board
- VI. Discuss Proposal for Engineering Feasibility Study
- VII. Discussion/development of Special Assessment Roll(s) by Local Governing Unit(s)
- VIII. Public Comment
- IX. Other Business
- X. Adjournment

### Box III.5.3. Sample Lake Board Meeting Sign in Sheet

**PLEASE SIGN IN**  
**\_\_\_\_\_ LAKE**  
**LAKE IMPROVEMENT BOARD MEETING**  
**DATE: \_\_\_\_\_ TIME: \_\_\_\_\_**

☐ **REGULAR MEETING**

☐ PUBLIC HEARING

[illegible]

### Box III.5.4. Sample Lake Board Meeting Minutes

#### LAKE IMPROVEMENT BOARD MEETING MINUTES

\_\_\_\_\_  
(DATE)

The meeting of the Lake Improvement Board for \_\_\_\_\_ Lake was held at \_\_\_\_\_, on the \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_. The meeting was called to order by \_\_\_\_\_, (Chairperson, Secretary, etc.), at \_\_\_\_\_ (time)

Present: (Board Members Present)

Absent: (Board Members Absent)

Also Present: (Guests)

#### APPROVAL OF MINUTES:

It was moved by \_\_\_\_\_, supported by \_\_\_\_\_, to approve the minutes of the Lake Improvement Board meeting held \_\_\_\_\_.

Adopted: Yeas: \_\_\_\_ OR *Motion Carried Unanimously*  
Nays: \_\_\_\_

#### PRESENTATION OF LAKE BOARD TREASURER'S REPORT AND INVOICES:

It was moved by \_\_\_\_\_, supported by \_\_\_\_\_, to approve invoice number \_\_\_\_\_, for payment in the amount of \$\_\_\_\_\_ to\_\_\_\_\_.

Adopted: Yeas: \_\_\_\_ OR *Motion Carried Unanimously*  
Nays: \_\_\_\_

#### OLD BUSINESS:

#### NEW BUSINESS:

#### PUBLIC COMMENT: (IF ANY)

#### ADJOURNMENT:

There being no additional business, it was moved by \_\_\_\_\_, supported by \_\_\_\_\_, that the \_\_\_\_\_, \_\_\_\_\_ meeting of the Lake Improvement Board for \_\_\_\_\_ Lake be adjourned at \_\_\_\_\_ (time)

Adopted: Yeas: \_\_\_\_ OR *Motion Carried Unanimously*  
Nays: \_\_\_\_

#### STATE OF MICHIGAN

COUNTY OF \_\_\_\_\_

I hereby certify that the foregoing is a true and complete copy of the minutes of the Lake Improvement Board for \_\_\_\_\_ Lake, \_\_\_\_\_ County, Michigan held on the \_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_ and that the said minutes are on file at the Office of the \_\_\_\_\_ County Drain Commissioner and are available to the public. I further certify that notice of the meeting was posted at least 18 hours before the meeting at the Office of the \_\_\_\_\_ County Drain Commissioner, which is the principal office of the Lake Improvement Board for \_\_\_\_\_ Lake.

\_\_\_\_\_  
(Name)

Lake Improvement Board Secretary

Dated: \_\_\_\_\_

**Box III.5.5. Sample Letter Requesting Professional Services**

LETTER SENT TO ATTACHED LIST

Interoffice Copies:

\_\_\_\_\_ Lake Board File

Reference: \_\_\_\_\_ Lake Board, \_\_\_\_\_ Township  
\_\_\_\_\_ County, Michigan

Gentlemen/Ladies:

The \_\_\_\_\_ Lake Improvement Board wishes to receive proposals for professional engineering services to undertake a study and to prepare a report for improvement of \_\_\_\_\_ Lake.

Attached is a copy of the "Request for Professional Services" which provides the necessary details. Please submit your proposals no later than 5:00 p.m. on \_\_\_\_\_ (date) to the following:

\_\_\_\_\_ Lake Improvement Board  
c/o \_\_\_\_\_ County  
Drain Commissioner's Office  
\_\_\_\_\_ (address)  
\_\_\_\_\_ (address)  
Attention: \_\_\_\_\_

At the Lake Board's option, low bidders may be requested to make a presentation at a meeting of the \_\_\_\_\_ Lake Improvement Board to explain their proposal.

Very truly yours,

\_\_\_\_\_ LAKE IMPROVEMENT BOARD

\_\_\_\_\_  
\_\_\_\_\_  
Attachments

cc: w/attachments: Lake Improvement Board Members



### Box III.5.6. Sample Proposal Requesting Professional Services

The \_\_\_\_\_ Lake Board is seeking the services of a licensed, professional engineer to evaluate the lake and its berms, and to present recommendations for its improvement. \_\_\_\_\_ Lake is a \_\_\_\_\_ acre lake and is located in portions of \_\_\_\_\_ Township in \_\_\_\_\_ County, Michigan.

As required by Public Act No. 451 of 1994, Part 309, Inland Lake Improvements, as amended, the services will involve preparation of an engineering feasibility report, an economic study report, and estimates of cost. The following items, while not all inclusive, will each be considered for study and report:

1. Evaluation of all lake berms for structural integrity and stability at the legal lake level of \_\_\_\_\_ feet above sea level, including recommendations for repair and future maintenance.
2. Analyze aquatic plant growth and make recommendations for removal and control. Prepare a map which shows the locations and types of aquatic vegetation, and approximate lake bottom contours.
3. Determine the lake water quality with respect to oxygen content and its relationship to fish population; determine possible adverse effects of stratification, and recommend whether aeration and/or other water conditioning are required.
4. Determine the lake water quality using the following listed parameters and recommend appropriate action to improve water quality:
  - a. pH
  - b. Oxygen concentration
  - c. Phosphorous concentration
  - d. Nitrogen concentration
  - e. Chlorophyll a concentration
  - f. Secchi disk transparency
  - g. Theoretical nutrient budget
5. Prepare estimates of costs for each of the above items, individually, with an analysis of effects of proposed assessments on interested landowners and residents.
6. Estimate how long it will take to complete the study report. State when you will be available to work on the study.
7. Please provide references of similar projects you have completed in the past.

Interested registered professional engineering firms possessing expertise in lake improvement projects are invited to submit a proposal including fees for services. Fees are to be quoted as Lump Sum not to exceed a Maximum Amount of \_\_\_\_\_.

Please submit two copies of proposals in a sealed envelope to:

(Lake Improvement Board Secretary)  
\_\_\_\_\_  
\_\_\_\_\_ Lake Improvement Board  
\_\_\_\_\_  
\_\_\_\_\_ (address)  
\_\_\_\_\_ (address)  
\_\_\_\_\_, Michigan 4\_\_\_\_\_

It is anticipated that the contract for services will be awarded to a firm qualified to perform this type of work for the most appropriate fee. The award of contract will also be contingent upon the approval of a special assessment roll to finance the cost of the engineering feasibility study. The \_\_\_\_\_ Lake Improvement Board reserves the right to reject any and all proposals received. Selection of the professional engineering firm will be made by the \_\_\_\_\_ Lake Improvement Board and its decision will be final.

## **Section 6 – Hearing of Practicability and Hearing of Assessment**

After the engineering consultant hired by the Lake Board has completed the feasibility study report, the Lake Board will need to hold two public hearings. The first hearing addresses the project being proposed by the consultant's report, and is called the "Hearing of Practicability". The consultant's report will include the recommended activities, their costs and how the costs will be spread within the assessment district to pay for the project. The hearing will allow citizens to learn about the recommendations for action and to comment on them. If the proposed project is accepted the Lake Board will hold a second hearing to determine if the cost of the project to be paid by each property owner in the special assessment district has been properly calculated. This hearing is called the "Hearing of Assessment".

For the Hearing of Assessment the special assessment roll must be mailed first class to each property owner in the special assessment district in accordance with Act 162, Public Act of 1962. The mailing must include the individual's name, address, the property number of the property, the time and place of the hearing and the type of project the assessment is supporting. An owner of or party to interest in real property to be assessed may appear in person to protest the special assessment or may protest the special assessment by a letter filed with the Lake Board, at or prior to the time of review, in which case personal appearance is not required. If the special assessment is protested as provided above, the owner or any party having interest in the real property may file a written appeal of the special assessment with the Michigan Tax Tribunal within 30 days of confirmation of the Special Assessment Roll being published in a newspaper of general circulation.

The Lake Board has the option of holding the two hearings on the same evening or conducting them separately. The hearings are usually held on separate evenings for the initial funding cycle. This allows adjustments to be made to the recommended actions and costs from comments received in the Hearing of Practicability before holding the Hearing of Assessment. In subsequent funding cycles, if the community has accepted and approves of the project and its costs, it is more efficient to hold the hearings on the same evening.

For the Hearing of Practicability within 60 days of receiving and accepting the Feasibility Study the Lake Board will take the following actions:

1. Hold a public hearing to review the consultant's report and "determine the practicability" of the project.
2. Publish a hearing notice twice in a newspaper of general circulation in each local unit of government affected. The first publication shall not be less than 20 days prior to the time of the hearing. Sample letters to the local newspaper and hearing of practicability notice are provided in Box III.6.1. and Box III.6. 2., respectively.
3. Note: The law does not require Notice of Hearing of Practicability to be sent by first class mail to all residents within the proposed special assessment district. However, the Lake Board can determine this. Sending first class mail notices can greatly reduce confusion and conflict among citizens who will be included in the special assessment district.

4. By resolution, determine the practicability of the project and costs within 10 days after the hearing, or at the time of the hearing. The resolution must be published once in a newspaper of general circulation in each local unit to be affected.

For the Hearing of Assessment the Lake Board will undertake the following actions:

1. Obtain from the local assessor a copy of the proposed assessment roll with the amounts of the individual assessments, property description and names of the owners.
2. Keep one copy of the assessment roll at the county drain commissioner's office and another at the township(s) office for the residents to examine.
3. Obtain a set of mailing labels for the assessment district for the first class mailing.
4. Note: Do not schedule the hearing until the proposed assessment roll and mailing labels have been received. The assessment hearing legal notice states that a copy of the assessment roll will be available for public examination, so the roll needs to be available before the ad is placed.
5. Publish twice in a newspaper of general circulation in each local unit of government affected. The first publication shall not be less than 10 days prior to the time of the hearing. Sample letters to the local newspaper and hearing of assessment notice are provided in Box III.6.1. and Box III.6. 3., respectively.
6. Provide a notice of the public hearing to all property owners in the special assessment district by first class mail (see Box III.6.4. for a sample letter).
7. After the hearing, the Lake Board may confirm the assessment roll as reported, as amended, as corrected by it, or may annul it and direct a new roll be made.
8. When an assessment roll has been confirmed, the Secretary of the Lake Board shall send a letter to the local assessing official(s) directing the assessments therein be collected, and the Clerk of each local unit shall endorse therein the date of confirmation.
9. Notice of Confirmation of the special assessment roll must be published twice in the same manner as the Notice of the Public Hearing in a newspaper of general circulation.

The following items will be needed or helpful at the hearings of Practicability or Assessment

1. Documents for the scheduled meeting: sign-in sheet, hearing agenda, extra copies of agenda.
2. Meeting supplies: pens or pencils, tape recorder and blank tapes, extension cord, audio/visual equipment if needed, index cards (for those who wish to speak).
3. Supporting documents: map(s) of lake community, map of special assessment district, minutes from the last board meeting, legal and correspondence files, copy of legal advertisement, copy of assessment roll for the assessment hearing, copy of notice of hearing copy of feasibility study, copy of first class mailing.

**Box III.6.1. Sample Letter to Local Newspaper for Publication of Hearing Notice**

January 20\_\_\_\_

Ms. \_\_\_\_\_  
\_\_\_\_\_ Column Newsweekly  
Legal Ad Department  
P.O. Box \_\_\_\_\_  
\_\_\_\_\_, Michigan \_\_\_\_\_

Reference: **Notice of Hearing for the Lake Improvement Board for \_\_\_\_\_ Lake**

Dear Ms. \_\_\_\_\_:

Please publish the enclosed Legal Notice in the following editions of your newspaper:

Wednesday, July 24, 20\_\_\_\_  
Wednesday, July 31, 20\_\_\_\_

Please provide this office with one (1) Affidavit of each publication and bill the Lake Improvement Board for \_\_\_\_\_ Lake for the cost. The Affidavit and bill should be sent to:

(Lake Board Secretary)  
Lake Improvement Board for \_\_\_\_\_ Lake

\_\_\_\_\_  
\_\_\_\_\_

Very truly yours;

\_\_\_\_\_  
\_\_\_\_\_, Secretary

Enclosure  
cc: Lake Improvement Board Members  
Lake Improvement Board File  
Treasurer (municipality)

**Box III.6.2. Sample Hearing of Practicability Notice Sent to Local Newspaper**

**CHARTER TOWNSHIP OF \_\_\_\_\_  
\_\_\_\_\_  
COUNTY, MICHIGAN  
NOTICE OF PUBLIC HEARING  
\_\_\_\_\_  
LAKE – LAKE IMPROVEMENT BOARD  
SPECIAL ASSESSMENT DISTRICT NO. \_\_\_\_\_  
HEARING OF PRACTICABILITY  
OCTOBER 10, 20\_\_\_\_\_  
TO THE OWNERS OF THE FOLLOWING DESCRIBED PROPERTIES:**

T2N, R10E, Section 7, all properties abutting and/or with \_\_\_\_\_ Lake,  
\_\_\_\_\_ Township, Michigan, \_\_\_\_\_ County, Michigan.

Notice is hereby given that the Lake Board for \_\_\_\_\_ Lake, Charter Township of \_\_\_\_\_,  
County of \_\_\_\_\_, will meet on **Tuesday, October 10, 20\_\_**, \_\_\_\_\_ **Township Hall,**  
\_\_\_\_\_ **Road,** \_\_\_\_\_ **p.m.**, to hear and consider the practicability of (*proposed activity*) for  
the \_\_\_\_\_ **Lake**. All interested persons are welcome to attend and comments will be heard.  
Residents can review the engineering evaluation and assessment district by accessing the following  
website:

http://www.\_\_\_\_\_

The engineering evaluation may also be viewed at the following locations:

\_\_\_\_\_  
\_\_\_\_\_

This Hearing is called pursuant to the provisions of Part 309, P.A. 451 of 1994, as amended March 1, 2005.

\_\_\_\_\_  
Ms. \_\_\_\_\_  
\_\_\_\_\_ TOWNSHIP CLERK

**Box III.6.3. Sample Hearing of Assessment Notice Sent to Local Newspaper**

**CHARTER TOWNSHIP OF \_\_\_\_\_**  
**\_\_\_\_\_ COUNTY, MICHIGAN**  
**NOTICE OF ASSESSMENT HEARING**  
**\_\_\_\_\_ LAKE – LAKE IMPROVEMENT BOARD**  
**SPECIAL ASSESSMENT DISTRICT (S.A.D.) NO. \_\_\_\_\_**  
**FEBRUARY 5, 20\_\_\_\_**

**TO THE OWNERS OF THE FOLLOWING DESCRIBED PROPERTIES:**

**T2N, R10E, Sections 17 and 18**, all properties abutting and/or with access to \_\_\_\_\_ Lake,  
\_\_\_\_\_ Township, \_\_\_\_\_ County, Michigan.

Notice is hereby given that the Lake Board for \_\_\_\_\_ Lake, Charter Township of \_\_\_\_\_,  
County of \_\_\_\_\_, will meet on **Monday, February 5, 20\_\_\_\_**, \_\_\_\_\_ **Township Hall**,  
\_\_\_\_\_ **Road**, \_\_\_\_ **p.m.**, to review, hear any objections to, and confirm a Special Assessment  
Roll. Riparian parcels are assessed \$\_\_\_\_\_ and lake access parcels are assessed \$\_\_\_\_\_ per  
year.

Any person may appeal and be heard at the said Hearing, which is called pursuant to the  
provisions of Part 309 of Public Acts No. 451 of 1994, as amended, provides that the special  
assessment must be protested at the Hearing held for the purpose of confirming the special assessment  
roll before the Michigan Tax Tribunal may acquire jurisdiction of any special assessment dispute.  
Appearance and protest of the special assessment the time and place of review is required in order to  
appeal the amount of the special assessment to the Michigan Tax Tribunal. An owner of or party in  
interest in property to be assessed, or his or her agent, may appear in person to protest the special  
assessment or may protest the special assessment by letter filed with **Ms. \_\_\_\_\_, Clerk**,  
\_\_\_\_\_ **Township**, \_\_\_\_\_ **Road**, \_\_\_\_\_, **MI \_\_\_\_\_**, prior to the time of review, in  
which case personal appearance is not required. If the special assessment is protested as provided  
above, the owner or any party having an interest in the real property may file a written appeal of the  
special assessment with the Michigan Tax Tribunal within 30 days after the confirmation of the special  
assessment roll has been published in a newspaper of general circulation.

Ms. \_\_\_\_\_  
\_\_\_\_\_ Township Clerk

**Box III.6.4. Sample Letter to Property Owners for the Assessment Hearing**

NOTICE OF ASSESSMENT HEARING  
LAKE IMPROVEMENT BOARD FOR \_\_\_\_\_ LAKE  
TOWNSHIP OF \_\_\_\_\_, \_\_\_\_\_ COUNTY, MICHIGAN

February 13, 20\_\_\_\_

(Individual Homeowner)

SIDWELL NUMBER: \_\_\_\_\_ UNITS(S) OF BENEFIT: 1.0

PROPOSED ANNUAL ASSESSMENT: \$\_\_\_\_\_

NOTICE IS HEREBY GIVEN that the Lake Improvement Board for \_\_\_\_\_ Lake, Township of \_\_\_\_\_, County of \_\_\_\_\_, will meet at \_\_\_\_\_, \_\_\_\_\_ Conference Room, \_\_\_\_\_, \_\_\_\_\_, Michigan, at \_\_\_\_\_ P.M. on \_\_\_\_\_, \_\_\_\_\_, 20\_\_\_\_. The meeting will be to review, to hear any objections to, and to confirm a Special Assessment Roll for the purpose of the continuation of a Lake Improvement Program for 20\_\_\_\_, 20\_\_\_\_ and 20\_\_\_\_. Any person may appeal and be heard at the said Hearing, which is called pursuant to the provisions of Section 30913 of Act 451 of the Public Acts of 1994, as amended.

The total proposed Special Assessment Roll, to be collected annually is estimated at \$\_\_\_\_\_.00 that will be assessed approximately \$\_\_\_\_\_ per lot. The Special Assessment Roll is on file at the \_\_\_\_\_ Township Offices for public examination.

An owner of or party in interest in property to be assessed, or his or her agent, may appear in person to protest the Special Assessment, or may protest the Special Assessment by letter filed with the Township of Waterford at or prior to the time of review, in which case personal appearance is not required. Appearance and protest of the Special Assessment at the time and place of review is required in order to appeal the amount of the Special Assessment to the Michigan Tax Tribunal.

LAKE IMPROVEMENT BOARD FOR \_\_\_\_\_ LAKE  
\_\_\_\_\_, CHAIRMAN

## **Section 7 – Financing Projects**

Lake Boards have three methods available to finance lake improvement projects in anticipation of the collection of special assessment. They are:

1. Borrow money from a local lending institution. Sometimes a local unit of government will create a revolving fund from which the Lake Board may borrow money and then repay the revolving fund when the special assessments are collected.
2. Issue lake level orders. These are promissory notes issued to the contractor that promises payment upon collection of funds from the special assessment district. In cases when the contractor does not wish to hold such a note, a purchaser for the lake level orders would have to be found. In some cases, local units of government have purchased lake level orders.
3. Bonding is permitted by the statute, but most Lake Boards have been advised to use other statutory authority if bonding a project is necessary.

Most Lake Boards will borrow money only to pay for the feasibility study and other initial costs, such as public notices. The actual project is not initiated until the first special assessment is collected and available for expenditure. This could be 12 to 18 months or longer after the first meeting of the Lake Board.

Once funds are available to begin the project the chairperson of the Lake Board will advertise for bids. The contract must be awarded to the lowest bidder giving adequate security for the performance of the contract, but the Lake Board may reserve the right to reject any and all bids. The Lake Board may contract with a local, incorporated, nonprofit homeowner association, the membership of which is open on a nondiscriminatory basis to all residents within the geographic area to be assessed or serviced, without advertising for public bids provided the homeowner's association can provide security for the performance of the contract.

Box III.7.1. provides an example bid document that would go to possible contractors who would conduct the work the Lake Board and local community is proposing to undertake. Once a contractor is selected a contract would be entered into between the Lake Board and the selected contractor. Box III.7.2. gives an example contract. Example specifications for the contract are presented in Box III.7.3.



### Box III.7.1. Sample Bid Document

**BID DATE:** \_\_\_\_\_  
**BID TO:** \_\_\_\_\_ Lake Board  
\_\_\_\_\_  
\_\_\_\_\_, Michigan \_\_\_\_\_  
**BID FROM:** \_\_\_\_\_ (Company Name of Bidder)  
\_\_\_\_\_, (Company Address)  
\_\_\_\_\_, (Company Address)  
\_\_\_\_\_, (Telephone Number)

In compliance with your invitation for bids, bidder hereby proposes to perform all work related to aquatic plant control of:  
\_\_\_\_\_, (Township)  
\_\_\_\_\_, (County), Michigan

In strict accordance with the contract documents, within the time set forth therein, and at the prices stated below.

- By submission of this bid, the bidder certifies that this bid has been arrived at independently without consultation, communication or agreement as to any matter relating to this bid with any other bidder or with any competitor.
- Further, the bidder also certifies that he/she has examined the contract documents and the location of the work described herein and is fully informed as to the nature of the work and the conditions relating to its performance.
- The bidder understands that the acreage listed is approximate only and subject to either increase or decrease. The bidder agrees that the unit prices named will be used if additions or deductions are made to the quantity of work.
- The bidder shall include and be deemed to have included in his bid all Michigan sales and use taxes currently imposed by legislative enactment and as administered by the Michigan Department of Revenue on the bid date.
- All work described in the contract documents and required for completion of the project shall be considered as incidental work unless designated as a pay item on the Bid Form.

The undersigned, having familiarized himself/herself with the instructions to bidders and the specifications, hereby proposes to perform everything required and to provide and furnish all of the labor, materials, equipment, and all utility and transportation services necessary to perform and complete all the work required for aquatic plant control and removal on Lake \_\_\_\_\_ in a workmanlike manner, all in accordance with the specifications at and for the following named price to wit:

ITEM DESCRIPTION	BASIS OF BID	BID PRICE
Aquatic Plant Control	_____ Cost Per Acre	\$ _____ Per Acre

Statement of equipment materials proposed to be utilized on \_\_\_\_\_ Lake: Trucks (model, year, and date of purchase); Harvesters (state manufacturer, model, year, depth of cut, width of cut and date of purchase); Herbicides (if any are to be used); and personnel to be used. Also include estimated time to complete the treatment.

**Contract extensions beyond calendar year 20\_\_ at the amount bid, plus three percent of the base bid per year, are contingent upon the discretion of the Board.**

In the interest of expediting the award of this contract, the undersigned may be required to show that he/she has performed work similar to that included under the proposed contract for which this bid is offered.

In submitting this bid, it is understood that the right is reserved by the Board to reject any and all bids and to waive defects in the bids.

Signed this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_

**SIGNATURE:** \_\_\_\_\_ **NAME AND TITLE:** \_\_\_\_\_  
(Printed)

**Box III.7.2. Sample Contract for Work to be Completed**

**CONTRACT**

THIS AGREEMENT, made and entered into this day \_\_\_\_\_ of \_\_\_\_\_, 20\_\_\_\_, by and between the \_\_\_\_\_ Lake Improvement Board hereinafter called the "Board" and \_\_\_\_\_ hereinafter called the "Contractor", to wit:

1. That the bid form, instructions to bidders, insurance requirements, specifications and addenda hereto attached or herein referred to, shall be and are hereby made a part of this agreement and contract.
2. That the Contractor shall furnish all labor, materials and equipment necessary and do all the work as set forth in the bid according to the specifications and contract documents, which have hereinbefore been made a part of this contract in a manner, time and place as herein set forth.

IN CONSIDERATION WHEREOF, said Board promises and agrees to pay to said Contractor the sum provided in the attached bid, dated \_\_\_\_\_, 20\_\_\_\_, \$ \_\_\_\_\_ per acre (\_\_\_\_\_ dollars/acre).

Payment shall be made upon satisfactory completion of the \_\_\_\_\_ work based on a review of the daily log records and a visual inspection by the Board's Consultant.

For the faithful performance of all of the stipulations, terms and conditions of this agreement, said parties respectfully bind themselves and their successors, heirs, executors, administrators and assign.

IN WITNESS WHEREOF, the parties have hereunto set their hands, in duplicate, the day and year first above written.

\_\_\_\_\_  
**LAKE  
LAKE IMPROVEMENT BOARD**

By: (Name) \_\_\_\_\_ Title: \_\_\_\_\_  
(Signature) (Printed)

WITNESS: (Name) \_\_\_\_\_  
(Signature) (Printed)

**Contractor**

By: (Name) \_\_\_\_\_ Title: \_\_\_\_\_  
(Signature) (Printed)

WITNESS: (Name) \_\_\_\_\_  
(Signature) (Printed)

### **Box III.7.3. Sample Contract Specifications**

#### **1. DESCRIPTION OF WORK**

The work shall consist of ...

#### **2. SPECIFICATIONS FOR THE \_\_\_\_\_ LAKE BOARD CONTRACT**

The scope of work shall be limited to that provided for in this agreement and specifically these Specifications. In no event shall the work conducted by Contractor exceed the scope of work authorized by section 30902 of the Natural Resources and Environmental Protection Act being MCL 324.309902.

a. Aquatic plant control shall consist of ...

b. Contractor shall keep records in a format to be provided by the Lake Improvement Board and available for review as basis for all work completed.

c. Contractor, at its sole expense, shall comply with all federal, state and local statutes or ordinances and obtain any permits necessary to accomplish the work under this agreement.

#### **3. TIME OF COMPLETION**

Work under this contract shall consist of a regular schedule ... and begin on or after May 1 of each year, and to conclude on or before October 31 of each year.

#### **4. TERM OF CONTRACT**

The work will be performed each year for five (5) years, beginning in December of 20\_\_\_\_ and continuing through December 20\_\_\_\_, unless terminated.

#### **5. TERMINATION AND OPTION TO RENEW**

a. This contract shall terminate at the conclusion of the term of the contract as provided herein. In addition, during the term of the contract, the Board has sole right to terminate this contract prior to the expiration of the term if for any reason the Board is dissatisfied with the services provided by the Contractor. Should the Lake Improvement Board exercise its option and terminate this contract, a 30-day written notice must be provided to Contractor.

b. The Board shall have the right to renew or extend this Agreement.

c. As a condition to entering into this Agreement and any subsequent extension, the Contractor shall provide upon request of the Board, copies of the Contractor's federal tax returns and statement of revenue and interest earned by Contractor.

#### **6. SUBCONTRACTORS**

a. Contractor shall not transfer, sublet, or subcontract any portion of the work required under this Agreement without the prior written consent of the Board.

b. In the event that the Contractor desires to request the Board's approval to subcontract any portion of this contract, the name(s) and qualifications of any subcontractor shall be submitted to the Board. If the Board agrees to permit Contractor to subcontract any portion of this contract, Contractor shall accept full responsibility for the performance of any subcontractor. All provisions of this contract shall apply equally to any subcontractor. Contractor indemnifies the Board as to subcontractor and will ensure that the Board is protected from any liability that may occur as a result of any subcontractor's performance under this Agreement. The Board shall in no way be obligated to approve any request for consent to subcontract merely by virtue of Contractor's submission of such a request.

#### **7. PAYMENT**

The Board promises and agrees to pay the Contractor in a timely manner for the cost to complete the work. It is understood that services under this agreement are contingent upon Board's appropriation of the necessary funds on an annual basis to utilize these services, and therefore the total amount shall not exceed the approved budget unless approved by the Board.

On or before May of each year, the Contractor shall submit an invoice to the Board's Contract Administrator or other designee for partial payment on account for contracted work. Within 30 days of the end of the calendar year, the Contractor shall submit a final invoice with its year-end report to the Board's Contract Administrator or other designee for all expenses for work performed less the partial payment on account with and any other payments made, with the difference settled between the parties within thirty (30) days after approval by the Board.

The Board reserves the right to make partial payments on account of the amount due Contractor as the services progress. The Board shall have no obligation to make payment until a proper invoice of service is submitted.

The Board, the Board's consultant or at its direction, the Lake Property Owners Association, may inspect and certify the amount of work satisfactorily performed.

(continued on next page)

### **Box III.7.3. Sample Contract Specifications (continued)**

#### **8. INSURANCE REQUIREMENTS**

a. Contractor shall not commence work, nor allow any subcontractor to commence work, under this contract until all insurance requirements stated in this section have been complied with.

b. Contractor shall procure and maintain during the life of this contract, except where otherwise indicated, the following insurance coverage:

1. **WORKER'S COMPENSATION** – Insurance affording coverage in accordance with the Worker's Compensation Laws of the State of Michigan. In addition, coverage included for Employer's Liability shall provide a limit of liability of not less than \$100,000.00.

2. **COMPREHENSIVE GENERAL LIABILITY** – Providing not less than \$1,000,000.00 Combined Single Limit Comprehensive policy (bodily injury, property damage and contractor's protective liability).

3. **COMPREHENSIVE AUTO** – Insurance affording fleet automatic coverage on all owned, non-owned or hired vehicles with limits of liability of not less than \$250,000.00 per person and \$500,000.00 per occurrence for Bodily Injury Liability and \$100,000.00 Property Damage Liability per occurrence.

c. **NOTICE OF REDUCTION OR CANCELLATION** – All policies affording the various coverage required by this section shall be endorsed to provide for a 10-day prior written notice to be delivered to the Lake Improvement Board for \_\_\_\_\_ Lake before any of the coverage afforded by these policies are either reduced or canceled.

d. **ADDITIONAL NAMED INSURED** – In the policies to be issued as required herein, the named insured shall include the County of \_\_\_\_\_, the Lake Improvement Board for \_\_\_\_\_ Lake and the individual members of the Lake Improvement Board for \_\_\_\_\_ Lake.

e. **OWNERS PROTECTIVE ENDORSEMENT** – The policies shall include an Owners Protective Endorsement for the Board for \_\_\_\_\_ Lake.

#### **9. CERTIFICATE OF INSURANCE**

Certificates of Insurance for the coverage shall be delivered to the Board for \_\_\_\_\_ Lake. These certificates shall clearly indicate that the provisions of the applicable policy are in compliance with all requirements of this section. If coverage confirmed by these certificates will expire prior to the termination date of this contract, certificates for renewals must be delivered to the Board prior to the expiration date.

#### **10. HOLD HARMLESS AGREEMENT**

Contractor shall indemnify and save harmless \_\_\_\_\_ County, its elected officers and employees, the Board for \_\_\_\_\_ Lake and the individual members of the Board for \_\_\_\_\_ Lake from any and all claims, demands, payments, attorney fees, suits, actions, recoveries, and judgments, or every name and description brought or recovered against them or either / or any of them for or on account of any injuries to or death of any person or any other loss or damages to persons or property received or sustained by any person or persons whosoever by reason of the performance of the work of this contract, and on account of liability or obligation imposed directly or indirectly upon the County, the Association, and all additional named insured, by reasons of any law of the State of Michigan or of the United States, now existing or which shall hereafter be enacted, imposing any liability or obligation or providing for compensation to any person or persons on account of, or arising from the death of, or injuries to employees. The Contractor shall pay, settle, compromise and procure the discharge of any and all such claims and all such losses, damages, expenses, liabilities, and obligations, and shall defend at its own cost and expense, and any and all claims, demands, suits and actions made or brought against \_\_\_\_\_ County, the Board for \_\_\_\_\_ Lake and all additional named insured, for or upon any such claim.

In case the said Contractor shall fail, neglect, or refuse to comply with any of the provisions of this paragraph, \_\_\_\_\_ County, the Board for \_\_\_\_\_ Lake or any additional named insured may at its option but without obligation to do so, in order to protect itself and all additional named insured, from liability, defend any such claim, demand, suits, or action and pay, settle, compromise and procure the discharge thereof, in which case the said Contractor shall repay \_\_\_\_\_ County, the Board for \_\_\_\_\_ Lake, and all additional named insured, any and all such loss, damage, and expense, including attorney's fees paid, suffered or incurred by the same. So much of the monies due, or to become due, to Contractor under this agreement as shall be deemed necessary by the Board for \_\_\_\_\_ Lake shall or may be retained by the Board until every and all such claims, demands, suits, actions, recoveries, judgments, liabilities and obligations have been settled and discharged and evidence to that effect furnished the Board, or the Board may collect the same in whole or in part in any lawful manner from said Contractor.

Nothing in this section shall be construed to apply whenever the damages arising out of bodily injury to persons or damage to property are caused by or result from the sole negligence of any indemnity hereunder, its agents or employees.

(continued on next page)

### **Box III.7.3. Sample Contract Specifications (continued)**

#### **11. NO WAIVER OF RIGHTS**

The Board's review, approval, acceptance of, or payment for any of the services required under the Agreement shall not be construed to operate as a waiver by Board of the rights under the Agreement or of any cause of action arising out of the performance of the Agreement by the Contractor. Contractor shall be liable to Board in accordance with applicable law for all damages to Board caused in whole or part by Contractor's negligent acts in the performance of any of the services furnished under the Agreement.

Notwithstanding any other provision in this Agreement, no provision in this Agreement is intended, nor shall any such provision be construed, as either waiving or constituting a waiver of any public or governmental immunity afforded to the Board, and/or Board's agents, employees, representatives as provided by applicable statutes and/or court decisions.

#### **12. OTHER TERMS AND CONDITIONS**

- a. That Contractor shall secure and solely employ the necessary personnel to perform the services described herein and all personnel shall be employees or shall be under the direct control and supervision of Contractor. Contractor shall accept responsibility for and make payments as required by law for worker's compensation insurance, social security, income tax reductions, unemployment compensation, and any other taxes or payroll deductions as required by law for its employees. All personnel or employees, working under this agreement on behalf of Contractor shall be professionally qualified to perform the duties required.
- b. That any and all employees employed by Contractor are employed at Contractor's own expense (including taxes and insurance) and Contractor remains solely responsible for and fully liable for the conduct and supervision of any of its employees. Contractor warrants that services performed by Contractor's assistants and/or subcontractors shall fully comply with the terms of this agreement.
- c. That Contractor's relationship to the Board is that of an independent contractor. This contract shall not cause the Board to be liable for, or Contractor to accrue benefits such as, but not limited to, worker's compensation, retirement, pension, vacation pay, sick pay, merit increases, annual leave days, promotion, disability pay, insurance of any kind, or any other rights or liabilities arising out of the contract to hire or employer-employee relationship.

#### **13. SECTION HEADINGS AND SEVERABILITY**

- a. All section headings contained herein are for convenience of reference only and are not intended to define or limit the scope of any provisions of this contract.
- b. If any provision of this contract is held invalid or unenforceable, such provision shall be deemed deleted from this contract and/or shall be replaced by a valid and enforceable provision which so far as possible achieves the same objectives as the severed provision was intended to achieve, and the remaining provisions of this contract shall continue in full force and effect.

#### **14. ENTIRE AGREEMENT**

The terms contained in this contract constitute the entire agreement between the parties with respect to the subject matter hereof, superseding all prior understandings, proposals and other communications, oral or written. This contract may only be modified by amendment signed by both parties.

#### **15. LAW**

This Agreement shall be interpreted in accordance with the laws of the State of Michigan.

#### **16. DISPUTES**

All disputes arising under this Agreement or in any the result of this Agreement shall be filed in the Circuit Court for the County of \_\_\_\_\_, State of Michigan; the District Court for \_\_\_\_nd-3<sup>rd</sup> Division for the State of Michigan; or the United States District Court for the \_\_\_\_\_ District of Michigan, \_\_\_\_\_ Division if the court otherwise has jurisdiction.

## **Section 8 – Deactivate a Lake Improvement Board**

A Lake Board for a public inland lake is dissolved if all of the following requirements are met:

1. The governing body of each local unit of government in which all or part of the lake is located holds a public hearing on the proposed dissolution, determines that the Lake Board is no longer necessary for the improvement of the lake because the reasons for the establishment of the Lake Board no longer exist, and approves the dissolution of the Lake Board. The governing body of each local unit of government in which all or part of the lake is located may hold the public hearing on the dissolution of the Lake Board upon petition of 2/3 of the freeholders owning land abutting the lake. Notice of the public hearing shall be published twice in a newspaper of general circulation in each local unit of government in which all or part of the lake is located. The first notice shall be published not less than 10 days before the date of the hearing.
2. All outstanding indebtedness and expenses of the Lake Board are paid in full.
3. Any excess funds of the Lake Board are refunded based on the last approved special assessment roll. However, if the amount of excess funds is small, the excess funds shall be distributed to the local units of government in which all or part of the lake is located, apportioned based on the amounts assessed against each local unit of government and lands in that local unit on the last approved special assessment roll.
4. The Lake Board determines that it is no longer necessary for the improvement of the lake, because the reasons for its establishment no longer exist, and adopts an order approving its dissolution.

## **PART IV: ADDITIONAL SUPPORT**

The responsibility for lake management is no simple task. It requires some knowledge of lake and land or watershed management principles and strategies. A Lake Board member doesn't have to be an expert on all the issues, but he/she needs to have some knowledge of many topics. The board member should know enough to ask fact finding questions of the experts and translate in an understandable way the meaning of ecological issues and administrative processes for the lake community citizens.

Part IV was written by a committee of lake association and Lake Board members who identified issues an understanding of which has been helpful to them with their lake management responsibilities. These issues include:

- State Laws and Programs
- Local Government and Lake Protection
- Leadership Skills
- Working with Professional Providers
- Responsibilities of a Board Member
- Products that a Board could Produce
- Publications, Websites, and Training Opportunities
- Organizations that may be Helpful

### **Section 1 – State Laws and Programs**

It is not possible in this document to list and discuss all State laws and programs that may impact upon a local lake management project, but more frequently cited laws and programs are identified. This section is divided into units with information on:

- Grants
- Monitoring
- Laws and Permits, and
- Partnerships.

#### **Grants**

##### **Nonpoint Source Program**

Nonpoint source pollution is caused when rain, snowmelt, or wind carry pollutants off the land and into lakes and streams. Michigan's Nonpoint Source Program has been established to assist local units of government, non-profit organizations, and others to reduce nonpoint source pollution. The basis of the program is watershed management and the program works with stakeholders to develop and implement plans to protect lake and stream watersheds. The Program consists of five parts:

- Technical assistance to help develop and implement watershed management plans,
- Information and education, including tools to educate people about nonpoint source pollution,
- Grants, to implement local watershed best management practices, land use planning tools and information/education activities,
- Compliance and enforcement, including investigation of complaints, and participating in enforcement actions,
- Monitoring and field investigations to determine the effectiveness of best management practices, and monitoring related to comprehensive watershed management programs.

*More information about the Nonpoint Source Program and the grants issued by the program may be found at the website [www.michigan.gov/nps](http://www.michigan.gov/nps).*

### Michigan Natural Resources Trust Fund

The objective of the Michigan Natural Resources Trust Fund's grant program is to provide funding to local units of government for the acquisition and development of lands and facilities for outdoor recreation or the protection of significant natural resources of environmental importance or scenic beauty. Any local government including school districts, or authorities constituted to provide recreation are eligible. Local units must have an approved plan to be eligible. A match on either acquisition or development projects is required from the local applicant. Grant priorities are set by the Michigan Natural Resource Trust Fund Board.

*Information about applications for project grants may be found on the website: [www.michigan.gov/dnr-grants](http://www.michigan.gov/dnr-grants).*

### Clean Water Revolving Fund and Strategic Water Quality Initiatives Fund

Michigan's Water Pollution Control Revolving Fund, is a low-interest loan (2.5%) financing program that assists qualified local municipalities with the construction of needed water pollution control facilities. The Strategic Water Quality Initiatives Fund provides low-interest loans for water pollution control projects involving the on-site upgrade or replacement of failing septic systems or the removal of groundwater or storm water from sanitary or combined sewer leads.

*Information about the programs are available on the website: [www.michigan.gov/deqcleanwaterrevolvingfund](http://www.michigan.gov/deqcleanwaterrevolvingfund).*

### Inland Fisheries Grants

The Inland Fisheries Grant Program's purpose is to provide funding and technical assistance to local units of government and non-profit groups to enhance inland fisheries and fishing opportunities in Michigan. Responsibilities of the grant applicant are outlined in a handbook



available on-line. Grant applicants should work with the MDNR's Fisheries Division Management Unit for the project area to ensure formulation of a high quality project and proper completion of the grant application.

Any individual, nonprofit organization or local unit of government (including school districts) may apply for an Inland Fisheries Grant. The minimum grant amount is \$5,000 and the maximum is \$200,000 per project. The grantee must provide at least 50 percent of the total project cost in the form of local match. The local match may be from cash or in-kind services.

The main objectives of the Inland Fisheries Grant Program are to:

- 1) Maintain and enhance aquatic environments;
- 2) Rehabilitate degraded fish communities;
- 3) Foster educational and interpretive communications on inland fisheries, and;
- 4) Provide additional fishing opportunities and public access.

The Michigan DNR determines a focus area for each year's grant projects. Only those applications that meet the focus area for that year will be eligible for funding.

*More information about the program is available at the website  
[www.michigan.gov/documents/dnr/IC1961\\_262124\\_7.pdf](http://www.michigan.gov/documents/dnr/IC1961_262124_7.pdf)*

### Marine Safety Grants to Counties

The purpose of this grant program is to promote safe recreational watercraft activities through enforcement and education. Grants are available to county sheriff departments. The amount available is determined by a need study done for each county by the MDNR.

*More information is available on the website [www.michigan.gov/documents/IC1929-2\\_159097\\_7.pdf](http://www.michigan.gov/documents/IC1929-2_159097_7.pdf).*

## **Monitoring**

### Cooperative Lakes Monitoring Program

With 11,000 lakes, it is impossible for the MDEQ to adequately monitor more than a small percentage of lakes annually. In order to collect important long-term data on more Michigan lakes the State joined with Michigan Lake and Stream Associations, Inc. (MLSA), to form the Cooperative Lakes Monitoring Program (CLMP), which is now also supported by the Great Lakes Commission (GLC), the Huron River Watershed Council and Michigan State University Extension (MSUE) under the Michigan Clean Water Corps (MiCorps) program.

The CLMP (formerly Self-Help) monitoring program began in 1974 as a trial project to collect data on Michigan lakes. The effort proved to be highly successful. The Program grew and now 250 to 300 lake communities are participating in the program each year.

Participants begin their involvement in the CLMP by taking water clarity readings of their lake with a simple device called a Secchi disk. Readings are taken either weekly or every other week throughout the summer season. At the end of the summer the readings are sent to the CLMP management team. The data is analyzed and a report is returned to the lake community. Participants may also collect water samples in the spring and late summer for total phosphorus analysis.

After the volunteer samplers have demonstrated that they can successfully collect good water quality data with the Secchi disk, they are eligible to register for more advanced sampling of other water quality parameters. Advanced sampling may include: chlorophyll samples, dissolved oxygen and temperature measurements from the lake surface to the lake bottom, and identifying and mapping the aquatic plants in the lake.

Training is critical to insure the data collected in the program is accurate and precise. Training is provided for each parameter at the MLSA annual conference each year. For some parameters the training is optional but recommended especially for new participants. For the advanced parameters participation in the training is required for the first year a lake community is involved in monitoring the parameter.

There is a small cost to the lake community for each program parameter in which they participate. These costs vary depending upon professional and staff time needed to analyze and report the data for that measurement. For most parameters costs are minor, ranging from \$15 to \$50. A few parameters have higher costs to cover more technical professional analysis. A report is provided to all participants. For those lake communities that have been in the program for several years, a lake water quality trend analysis is performed to see how the lake has changed over time.

*Those interested in learning more about the program or participating in the program should visit the website of MLSA, [www.mymlsa.org](http://www.mymlsa.org) or the MiCorps website [www.micorps.net](http://www.micorps.net).*

### Stream Monitoring

The MDEQ MiCorps program has two grant opportunities for volunteer stream monitoring: the Volunteer Stream Monitoring Grant Program and the Volunteer Stream Monitoring Start-Up Grant Program. The Volunteer Stream Monitoring Grant Program provides grants for monitoring in wadeable streams. The grants provide training and support for the volunteer groups to help them collect benthic macroinvertebrate and stream habitat data on the state's water resources. This information is used to support the DEQ's efforts to protect and manage the state's water resources. The grants may be used to fund a local monitoring coordinator and/or purchase monitoring supplies.

The Volunteer Stream Monitoring Start-Up Grant Program provides funding for newly formed volunteer monitoring groups to assist them in designing a monitoring strategy for their community and aid in the development of a full proposal for the Volunteer Stream Monitoring Grant Program. Start-up grant recipients will have access to resources and training and can use the start-up money to conduct research on a monitoring project and strategy.

Local units of government and nonprofit organizations are eligible to receive grant funding from both the Monitoring and Start-Up Programs.

*Grant application packages are available online at:  
<http://www.micorps.net/streamgrants.html>.*

## **Laws and Permits**

### National Pollution Discharge Elimination System

The National Pollution Discharge Elimination System (NPDES) permit process was initiated by The Federal Water Pollution Control Act amendments of 1972 to the Clean Water Act (CWA). The purpose of the program is to control the discharge of pollutants into surface waters by imposing effluent limitations to protect the environment. The Act had a goal to achieve "water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water." This is more commonly known as the "fishable, swimmable" goal.

The enactment of the 1972 amendments marked a distinct change in the philosophy of water pollution in the United States. The amendments maintained the water quality-based controls, but also included technology-based control strategies. The treatment technology-based discharge standards are promulgated by the U.S. Environmental Protection Agency (EPA). Dischargers are placed in categories based on industrial processes or on the type of wastewaters generated. As treatment technology improves, these federal standards are expected to become more restrictive in order to progress toward the goal of zero discharge. As permits expire they must be reissued with limits reflecting the most recent treatment technology standards.

The 1977 amendments to the CWA, shifted emphasis from controlling conventional pollutants to controlling toxic discharges. This era of toxic pollution control is referred to as the second round of permitting. The concept of best available technology (BAT) controls was clarified and expanded to include toxic pollutants.

In addition to treatment technology-based standards, the Clean Water Act also required that minimum water quality standards be achieved. Water quality standards are promulgated by the states. The Michigan standards are designed to not only protect for aquatic life ("fishable") and recreation ("swimmable"), but also for all other uses of the receiving waters, including agriculture, public and industrial water supply, and navigation.

On February 4, 1987, Congress amended the CWA with the Water Quality Act (WQA). The amendments outlined a strategy to accomplish the goal of meeting water quality standards set by the States. The WQA required all States to identify waters that were not expected to meet water quality standards after technology-based controls on point sources had been imposed. The States were required to prepare an individual control strategy to reduce toxics from point and nonpoint sources in order to meet the water quality standards. The WQA also established new schedules for storm water discharges to be regulated by NPDES permits.

If the MDEQ determines that a lake, stream or other water resource is significantly impacted by a certain parameter, it may declare the resource impaired and list it on the 303(d) list. The MDEQ must then prepare a report delineating how the resource will be brought into compliance with water quality standards. As part of the report the MDEQ will prepare an allocation for the resource call the Total Maximum Daily Load (TMDL) which will specify the amount of the parameter that can be discharged to the resource each day in order to restore the resource to compliance.

*For more information about the NPDES permit program visit the website  
[www.michigan.gov/deq/0,1607,7-135-3313\\_3682\\_3713-10197--,00.html](http://www.michigan.gov/deq/0,1607,7-135-3313_3682_3713-10197--,00.html)*

### Inland Lakes and Streams

The MDEQ is responsible for protecting the natural resources and the public trust waters of Michigan's inland lakes and streams under the authority of Part 301, of the Natural Resources and Environmental Protection Act, 1994 PA 451. The MDEQ also administers the federal permit program which regulates the dredging or filling of inland lakes and streams under Section 404 of the Federal Clean Water Act (except in coastal areas where the US Army Corps of Engineers retains this authority).

Part 301 covers inland lakes and streams, meaning any natural or artificial lake, pond, or impoundment; a river, stream, or creek, or any other body of water that has definite banks, a bed, and visible evidence of a continued flow or continued occurrence of water. Inland lake or stream does not include the Great Lakes, Lake St. Clair, or a very small lake or pond that has a surface area of less than five acres.

A permit is required under this act to:

- Dredge or fill bottomlands.
- Construct, enlarge, extend, remove, or place structures on bottomlands.
- Erect, operate, or maintain a marina.
- Create, enlarge, or diminish an inland lake or stream.
- Structurally interfere with the natural flow of an inland lake or stream.
- Construct or enlarge an artificial channel, pond, or similar waterway where the purpose is the connection with an existing inland lake or stream, or where any part of the artificial waterway is located within 500 feet of the ordinary high water mark of an existing inland lake or stream.

- Connect any natural or artificially constructed waterway, pond or lake with an existing inland lake or stream for any purpose.

Fee payment must be submitted with the permit application. Fees can range from \$50 to \$2,000.

*For more information about this permitting program see the website [onestophelp.state.mi.us/wiki/Inland\\_Lakes\\_and\\_Streams\\_Permit\\_\(Part\\_301\)](http://onestophelp.state.mi.us/wiki/Inland_Lakes_and_Streams_Permit_(Part_301))*

## Wetlands

Michigan's wetland program is defined by Part 303, Wetlands Protection, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. Wetlands are a significant factor in the health and existence of other natural resources of the state, such as inland lakes, ground-water, fisheries, wildlife, and the Great Lakes. Types of wetlands include deciduous swamps, wet meadows, emergent marshes, conifer swamps, wet prairies, shrub-scrub swamps, fens, and bogs.

The Wetland Program oversees activities proposed in regulated wetland areas and reviews permit applications for dredging; filling; draining surface water; or constructing, operating, or maintaining any use or development in a wetland. In accordance with Part 303, wetlands are regulated if they are any of the following:

- Connected to or located within 1,000 feet of the Great Lakes.
- Connected to or located within 500 feet of an inland lake, pond, river, or stream.
- Located within 500 feet of an inland lake, pond, river or stream.
- Greater than five acres in size.

The law requires that persons planning to conduct certain activities in regulated wetlands apply for and receive a permit from the state. A permit is required from the state for the following:

- Deposit or permit the placing of fill material in a wetland.
- Dredge, remove, or permit the removal of soil or minerals from a wetland.
- Construct, operate, or maintain any use or development in a wetland.
- Drain surface water from a wetland.

*More information about the Wetlands permitting program is available at the website [onestophelp.state.mi.us/wiki/Wetlands\\_Protection\\_Permits\\_%28Part\\_303%29](http://onestophelp.state.mi.us/wiki/Wetlands_Protection_Permits_%28Part_303%29).*

## Aquatic Nuisance Control

The MDEQ has the responsibility for issuing permits for the application of pesticides in waters of the state to control aquatic nuisances, such as aquatic plants, under the authority of Part 33 of the Natural Resources and Environmental Protection Act, 1994 PA 451. The purpose of the permit is to regulate aquatic nuisance control projects so that the work will be conducted during

certain times, under certain conditions, and with safeguards as are necessary to protect the public health, welfare, and the aquatic environment.

A State permit is required for any chemical treatment for the purpose of aquatic nuisance control located below the ordinary high water mark; in waters of the state, except ponds, which are defined as a small body of standing water without a permanent or intermittent outlet, which has a surface area of less than ten acres, no record of threatened or endangered species, and is owned by a single individual or corporation, or is owned by more than one person and written permission for the proposed chemical treatment has been obtained.

Treatment is restricted to the area which is described in the permit and which is either under the legal control of the applicant or under the legal control of parties who have granted the applicant permission to perform the treatment. A chemical employed for aquatic nuisance control must be registered with the U.S. Environmental Protection Agency and the Michigan Department of Agriculture and Rural Development (MDARD) for the nuisance control activity for which it is proposed.

Fees are due with the permit application and are based on the size of the proposed treatment area (these fees may change with time).

- For treatment of areas less than ½ acre, the required fee is \$75.00.
- For treatment of areas of ½ acre or more but less than 5 acres, the required fee is \$200.00.
- For treatment of areas of 5 acres or more but less than 20 acres, the required fee is \$400.00.
- For treatment of areas of 20 acres or more but less than 100 acres, the required fee is \$800.00.
- For treatment of areas of 100 acres or more, the required fee is \$1,500.00.
- Application fees for a Certificate of Coverage are \$75.00.

*Information about the program and permits may be obtained at the website [onestophelp.state.mi.us/wiki/Aquatic\\_Nuisance\\_Control\\_Permits](http://onestophelp.state.mi.us/wiki/Aquatic_Nuisance_Control_Permits)*

### Endangered Species

About 400 species are listed as threatened or endangered in Michigan. Each of these species can usually be found in only a few places. Many can only be seen or heard during a few weeks each year. A rare species in Michigan may be common elsewhere in the United States. That species would be state listed, but not federally listed. Sometimes a species is common in Michigan, but endangered throughout the rest of the United States. That species might be added to the federal list before state listing. Federally listed species automatically receive protection under state law.

Endangered species are in danger of extinction. Threatened species are in danger of becoming endangered. Threatened and endangered species are protected by law; they may not be killed, harassed, handled, or possessed without a permit. Species of special concern are rare or have declining populations, but do not yet meet the criteria for threatened status.

Habitat loss due to lawns, pavement, climate change, and invasive species are the greatest threats to endangered species in Michigan. To help combat this loss, individuals and communities can plant a native garden to make food and shelter for wildlife like butterflies or birds. People can also learn how to decrease their carbon footprint. A property owner can check his/her property for invasive exotic plants and remove them.

Finally, anyone can donate to the State-run Nongame Fund by purchasing a Loon License Plate. The Nongame Fund helps protect endangered species, such as lake sturgeon and the Kirtland's warbler, and species which are declining or rare in Michigan such as the spotted salamander or northern flying squirrel. Over the years the fund has supported efforts to reintroduce the peregrine falcon, trumpeter swan and pine marten, as well as the construction of nesting platforms for osprey, owls and bluebirds. Information about the Loon License Plate can be obtained from a Secretary of State office or web site [www.michigan.gov/sos](http://www.michigan.gov/sos)

### Exotic Species

Michigan's efforts in exotic species management are overseen by the Michigan Aquatic Nuisance Species Council. The Council was created by Executive Order of the Governor in 2002. The Order implements a primary recommendation of the multi-stakeholder group that developed Michigan's Aquatic Nuisance Species Management Plan Update, released in October, 2002.

The purpose of the Council is to advise the Office of the Great Lakes and the Departments of Natural Resources, Environment Quality, Agriculture and Transportation on implementation of the updated plan, including:

- the state's efforts to prevent and control aquatic nuisance species' introduction and spread,
- information/education activities about aquatic nuisance species,
- the coordination of research and monitoring activities pertaining to aquatic nuisance species, and
- revising and updating the Management Plan as necessary.

There are nine members on the Council representing the directors of the five state departments and five at large members appointed by the Governor. The Council is chaired by the Director of the Office of the Great Lakes. The Council meets twice per year in the spring and fall and meetings are open to the public.

*More information about the Council and Plan are available on the website [www.michigan.gov/deq/0,1607,7-135-3313\\_3677\\_8314-60394--,00.html](http://www.michigan.gov/deq/0,1607,7-135-3313_3677_8314-60394--,00.html).*

## Dam Safety

Dams in Michigan are regulated by Part 307, Inland Lake Levels, and Part 315, Dam Safety, of The Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. Dams are regulated by Part 315 when they are over 6 feet in height and over 5 acres are impounded during the design flood. Dams are regulated by Part 307 when a circuit court issues an order establishing the level at which the lake is to be maintained.

Permits are required for the construction, enlargement, repair, alternation, removal, abandonment and reconstruction of state regulated dams. Inspection reports are required every three to five years based on their hazard potential rating.

The Dam Safety Program with the MDNR is responsible for ensuring the safety of Michigan's regulated dams. The program focuses on ensuring that dams are properly constructed, inspected and maintained, and that the owners have adequately prepared for potential emergencies.

*For more information about this program visit the website [www.mi.gov/damsafety](http://www.mi.gov/damsafety).*

## Local Watercraft Control Ordinances

On certain lakes recreational conflicts can arise between high speed boaters, water skiers, swimmers, anglers and other water users. Sometimes these conflicts can result in serious safety issues. If these safety issues can't be addressed by the provisions of the Marine Safety Act Part 801 of Public Act 451 of 1994, then it is possible to establish a local ordinance to regulate recreational water uses. Issues that are not related to recreational safety such as trespass, disorderly conduct, environmental damage or shoreline erosion are not justification for establishing a local ordinance. The established local ordinance may regulate the time and place when high speed boating may take place.

A local unit of government that believes a local ordinance is necessary must contact the MDNR and request assistance by submitting an approved resolution. Upon receipt of the resolution the MDNR will initiate an investigation, draft a local ordinance, and hold a public hearing. Sixty days after the MDNR submits the proposed local ordinance to the local unit of government it must accept or reject the ordinance. If the local unit of government approves of the local ordinance it must enact the ordinance identical in all respects to the ordinance drafted by the MDNR.

## Legal Lake Levels

Lakes naturally go up and down in water level elevation. Some lakes are fairly stable having only minor changes in water level from year to year. Alternatively, other lakes can rise and fall dramatically between wet and dry years. These dramatic changes in water level can have significant impacts upon shoreline uses and recreational activities on the lake. It is possible for lake communities to take action to minimize the dramatic fluctuations in water level.



Lakes may have established a legal lake level through Part 307 (Inland Lake Levels) of the Natural Resources and Environmental Protection Act (1994 P.A. 451 as amended) which is administered by the MDNR. A legal lake level is determined in a circuit court proceeding. A study of the lake that evaluates environmental conditions and development patterns is conducted by an engineering firm. After evaluating many factors, the consultant will suggest a lake elevation that provides the most benefits to the public. The circuit court holds a hearing on this recommended lake elevation where members of the community may provide testimony for or against the recommended level. Following the hearing and considering all the testimony the court may set a legal lake level elevation and assign a county authority, usually the drain commissioner, to undertake the necessary actions to establish and maintain the legal level. The lake level may be controlled by some type of outlet structure that can be operated to raise or lower the lake level as needed or possibly a large capacity well may be installed to raise lake levels during low water periods.

The local authority may establish a special assessment district to raise funds to pay for the structures and maintenance activities necessary for the legal level. The special assessment district will include the homeowners around the lake benefitting from the new legal level.

The legal lake level is established by a court proceeding so any disputes over maintaining the level are resolved by filing suit in the circuit court. While the MDNR is involved in the initial proceedings to establish the legal level, the agency takes no part in the maintenance of the level or in resolving local disputes.

## **Partnerships**

### Michigan Inland Lakes Partnership

In Michigan the responsibility for management of lakes does not reside with any one agency or organization. Not only do federal, state, tribal and local agencies have management responsibilities, but the actions of citizens and environmental organizations (nongovernmental organizations, or NGOs) also can have significant positive or negative influences upon the lakes. To proactively protect and manage its inland lakes Michigan must focus the many interests and responsibilities to achieve a sustainable resource for present and future generations. One of the solutions to this dilemma is a collaborative partnership among all the agencies, organizations and citizens to focus management actions.

The Michigan Inland Lakes Partnership (Partnership) was developed to engage state and local agencies, Native American Nations, outreach institutions (universities and other educational institutions), non-governmental organizations (NGOs), businesses, industries and citizens in a collaborative effort to ensure the quality, sustainability and ecological diversity of lakes, while considering society's needs. The Partnership promotes communication and cooperation between partners, communities and citizens interested in the management of Michigan's inland lakes, educates leaders, and strengthens stewardship efforts.

The Partnership supports efforts to research, monitor, evaluate and regulate ecosystem impact sources, such as nutrient enrichment, exotic species, soil erosion, consumptive uses, overcrowding and others, in order to develop and promote proactive, sustainable and science-based management practices. The Partnership encourages a system of voluntary and regulatory management approaches.

The partners have continued working on its four goals that was initially proposed:

- Manage invasive species
- Manage lakes as sustainable ecosystems
- Educate communities and citizens
- Manage watersheds to reduce pollutant inputs

*To learn more about the Partnership visit its website [www.michiganlakes.msue.msu.edu](http://www.michiganlakes.msue.msu.edu).*

### Michigan Natural Shoreline Partnership

Many inland lakes have had a significant loss of native shoreline habitat as development has replaced this habitat with turf and hard armored seawalls at the water edge. Many studies, including a recently completed large study of the nation's lakes by the U. S. Environmental Protection Agency have shown that this habitat loss has a significant negative impact upon a lake's water quality and upon plants and animals that depend on the native shoreline habitat for reproduction, protection and growth. Many states, including Michigan are now working to protect remaining native shoreline habitats and restoring them where they have been lost.

The Michigan Natural Shoreline Partnership was created with the goal of promoting natural shorelines of inland lakes through the use of "green" landscaping technologies and bioengineered erosion control practices. The Partnership is made up of public-private agencies and organizations including governmental agencies, industry associations, industry representatives, academic institutions and environmental and non-profit organizations.

The Partnership has four strategic goals:

1. Train contractors on natural shoreline protection to assist the landscape and construction industry in the transition to new technologies and create new opportunities for natural shoreline protection and restoration.
2. Provide education and outreach to lakefront property owners and the public on natural shoreline management.
3. Encourage development of demonstration sites and research on natural shoreline protection.
4. Encourage local and state policies that promote natural shoreline management.

*For more information about the Partnership and the work it is doing, visit their website ([www.mishorelinepartnership.org](http://www.mishorelinepartnership.org)).*

## **Section 2 – Local Government and Lake Protection**

### **County and Township Planning and Zoning**

Two documents set the tone for local planning efforts. These are the comprehensive plan and zoning ordinance. The comprehensive plan, also called a master plan or land use plan, is a guide that is intended to shape local land use decisions. It is the vision for the area being planned. Plans have recommendations about the placement of public services like schools and roads, as well as sewer and water lines. They also serve as the foundation for zoning ordinance regulations—which subsequently control the location, intensity, and design of a community’s land uses.

As a guide, the plan is not the law and cannot enforce where and how something is constructed. A community might adopt an excellent comprehensive plan, but it will only be effective if its goals are acted upon. Zoning, budget commitments, and partnerships with community agencies and organizations such as Lake Boards can help put the plan into practice.

Townships, cities, villages, counties and regions are all allowed to develop plans under the Michigan Planning Enabling Act, PA 33 of 2008. This act specifies what’s included in the plan, how it is approved and changed if necessary, and who has authority over the plan.

A zoning ordinance is a law or code that regulates how properties within a government may be used. By defining allowable uses of land, establishing standards for development, and offering incentives for different development types or patterns, zoning offers a number of opportunities to achieve a plan’s objectives.

According to the Michigan Zoning Enabling Act, PA 110 of 2006, the zoning ordinance shall be based on a plan. Because zoning affects the use and value of private property, the law is very specific about how zoning ordinances are structured, what is included, and where limitations can be imposed on zoning authority. There are many court decisions that affect zoning authority and form precedence for future decisions.

Zoning uses many techniques that can be applied to protect lakes. Some of these are zoning districts, set backs, permitted uses, special uses, shoreline protection and buffers, cluster development, anti-funneling, and overlay provisions. Getting involved at the local level allows riparian owners to have a significant say in the type of development around them and how well their lakes are protected.

*For more information on this topic the following resources are helpful (see Part IV, Section 7)*

- *Filling the Gaps: Environmental Protection Options for Local Governments*

### **Drain Commissioner Responsibilities**

Drain Commissioners have a variety of responsibilities that may have impacts on lakes. First, they are members by State law of any legal lake improvement board. They automatically sit on these boards and help to make decisions that directly impact lakes. Decisions may include the

level of assessment, contractors used for weed treatment and invasive weed control, as well as selection of a consultant or attorney. If a county does not have an elected drain commissioner, the responsibility lies with the County Road Commission.

If a lake has a legally established lake level, the drain commissioner is charged with operating and maintaining the water control structure within the guidelines established by the circuit court. This often includes record keeping to document lake levels and opening or closing the dam as determined by the court order. Most lay people are easily confused by apparent water levels and unless there is an established gage, they often feel the water is either too high or too low for their purposes.

Drain commissioners often develop stormwater ordinances. These are implemented at the township city, village or county level. They can be effective at substantially reducing the sediment and nutrient levels entering lakes or streams. Stormwater should receive some treatment before it is discharged into a lake. In-stream sediment basins or wetlands are often used to remove sediment and reduce nutrients.

### **Township Boards under Public Act 188**

A township by motion of the board or by petition of owners of 51% of the land area may initiate a special assessment district (SAD) for implementing lake projects. This allows funds to be collected by assessment for paying for improvements. The township board authorizes the preparation of a plan that describes the improvements and their location along with an estimate of the costs. The Township is required to have a hearing to obtain public opinion and a second one to establish the assessment roll for the special assessment district. A township also has the authority to pay management costs for lake improvements out of general funds.

### **Soil Erosion and Sedimentation Enforcement**

The Soil Erosion and Sedimentation Control Act (Part 91 of the Natural Resources and Environmental Protection Act 1994 as amended) requires a permit for any earth disturbing activity within 500 feet of a lake or stream or that exceeds more than one acre in size. Each county provides an enforcement officer to implement the Act. The application for a permit activates a review process that mandates the implementation of best management activities to reduce or control erosion and the movement of sediment. This is especially important on lake shore development. A permit often requires the use of silt fence, temporary seeding, water control structures such as rock dams and final revegetation. It also oversees the installation of shoreline protection such as rock riprap and sea walls.

### **Conservation Districts and Health Departments**

Conservation districts are located in many counties. They can be useful to riparian owners by providing advice for water quality protection and establishing vegetative cover. They also

frequently sell plants, shrubs and trees that can be used for establishing buffers. Cost sharing conservation practices may be available.

Health Departments issue permits for well drilling and septic tank installation. They generally can do testing to determine the ability of a soil to allow infiltration and percolation of water as well as effectively treat septage. They also determine proper setbacks for wells, septic tanks and lakes or streams.

### **Section 3 – Leadership Skills**

Sitting at the table in the front of the room and leading a lake community in its decision making process is a privilege and responsibility. Being prepared to lead can facilitate the community through a course of action that can sometimes be difficult and challenging. Being unprepared to lead could be painful for the individual and devastating for the community. A poorly facilitated process could result in years of division and mistrust. A good leader will prepare for her role by understanding the community circumstances and knowing the tools and skills needed to lead.

This discussion is not a comprehensive presentation of leadership but rather a discussion to identify some important leadership issues and refer individuals to more comprehensive resources. Before taking a seat at the head table, an individual should know and understand:

1. The local community
2. The community's history
3. The lake environment
4. The local government
5. Leadership styles
6. Diversity/personality differences
7. Decision making
8. Meeting dynamics

The publication *Developing Community Leadership – A Guide for MSU Extension* (2005) provided information for this section of the manual.

#### **The Local Community**

Every community is different. The differences can be economic, social, political, and environmental. Understanding the community will allow the leader to identify similarities and differences in the community's priorities and needs as well as relate to the community's social goals and local environmental conditions. A leader who knows the community will also know the community leaders, political and social, as well as the influential organizations within the community. A leader should be able to address the following. What (who) are the community's:

- Major priorities,
- Needs,

- Leaders,
- Environmental assets,
- Environmental liabilities,
- Economic conditions,
- Social programs,
- Governance,
- Resources, and
- Public participation.

*Resources such as Community Culture and the Environment – A Guide to Understanding a Sense of Place (2002) can help a leader have a better understanding of community values and processes that relate to environmental issues.*

## **The Community's History**

Past events and relationships have shaped the local community. Current situations and conditions can be better understood by knowing the history from which they evolved. Additionally, history may be seen as a continuum; future conditions are often built upon past and current events and actions. A leader who understands the community's history will have a good idea for where the community has been and where it is going. A leader should have knowledge of a community's:

- Pre-settlement conditions,
- Early settlement,
- Achievements,
- Failures,
- Leaders,
- Major events and crises, and
- Research/studies.

A short report addressing the above issues can help provide prospective and be informative for new members to the community.

## **The Lake Environment**

To guide a community through a lake management effort, a leader must have some understanding of lakes in general and the lake of concern in particular. It should not be assumed that all lakes are the same and what works for one lake will work for another. Just like humans, all lakes are unique. Given their size, volume, shape and water residence time they respond differently to sediments and nutrients coming from the watershed. For example some are capable of assimilating large

### **Environmental and Administrative Contacts**

- Project consultant,
- Township assessor and clerk,
- County commissioners
- County drain commissioner
- Project contractors,
- State agency staff issuing permits,
- Relevant professional organizations

amounts of phosphorus with few observable impacts, while others are dramatically altered by even minor increases in phosphorus.

Some lakes with high flushing rates can be easily restored once degraded and others are extremely difficult to restore once their high quality conditions are lost. For many lakes protection management may be the only feasible management option. Waiting for problems to develop before implementing management is acquiescing to irreversible change.

*The Natural Resources Conservation Service (NRCS) document, A Procedure to Estimate the Response of Aquatic Systems to Changes in Phosphorus and Nitrogen Inputs may help the leader have a basic understanding of lakes. The document has a good primer on eutrophication that is informative and easy to understand. The document also has a key that may help a leader identify his community's lake type. The document may be obtained at the website [www.sera17.ext.vt.edu/Documents/Procedure\\_Aquatic.pdf](http://www.sera17.ext.vt.edu/Documents/Procedure_Aquatic.pdf).*

## The Local Government

Local government can be traced back to the beginnings of human culture. In those early days a patriarch, tribal leader or spiritual priest gave the orders and meted out punishment. Most in the family or clan benefitted as the family was more effective at securing resources and competing with the families in the adjoining valleys. However, the primary beneficiaries of the government were the patriarch, tribal leader or spiritual priest. Over time government grew but didn't really evolve. The patriarch, tribal leader and spiritual priest were replaced by a pharaoh, Caesar, or king. If the leader was effective the nation prospered. However, again the primary beneficiaries were the pharaoh, Caesar or king.

Finally in the 13<sup>th</sup> century government began to evolve, with the early development of democracy. At last everyone in the community had a say in the decision making processes and could share in its

benefits. **The important point of this discussion is this: even in a democracy, just as in early governments, decision making and benefits go primarily to those that participate.** An effective lake community leader will be knowledgeable of and a participant in local government.

### Local Government Services which may be Important in a Lake Management Effort

- Land use regulations
- Sewer/drainage authority
- Building permits
- Soil erosion permits
- Road maintenance
- Parks
- Economic development
- Recreation programs
- Lake improvement boards
- Property tax assessment
- Libraries
- Public works projects

*For more information about how local government can benefit lake management efforts see the publication, Filling the Gaps: Environmental Protection Options for Local Governments.*

## Leadership Styles

Leadership is not only a position but a style. In the military, the sergeant gives an order and the platoon implements it, no questions asked. In the Peace Corps a volunteer works behind the scene to enable a community to reach its own decision on an issue and implement their plan. In the publication *Developing Community Leadership – A Guide for MSU Extension* (2005) Dr. Lela Vandenberg, identified six approaches to leadership (see box below).

There is no one best approach to leadership that is right in each and every situation. The community circumstances and personalities should guide the most appropriate leadership approach. Leadership in lake management is particularly challenging because in Michigan under riparian law doctrine, property owners have legal rights recognized by the courts. The community would probably be very suspicious and resistant to plans put forward by a leader that did not engage them in the development of management options and implementation of the program. They would probably see this as a usurpation of their rights.

Additionally, the lake community may have many, even hundreds of owners all with unique interest and priorities. It may be difficult, if not impossible, to have the community arrive at consensus on a course of action. The leader will have to have a decision making style that the community can appreciate and still be effectual.

### Leadership Approaches

Personal Influence – The leader uses his knowledge and skills to determine what actions the community should take.

Situational – The leader uses analytical skills to fit actions to needs.

Reciprocal – The leader and community through good communication use a mutual influence process to make decisions.

Transformational – The leader uses charismatic, visionary, and inspiring skills to transform and motivate the community.

Servant – The leader serves behind the scenes so others are able to identify and act upon their priority needs.

Shared – Everyone in the community is considered to be a co-leader committed to collective visioning and action.

*For more information on this topic the following resources are helpful (see Part IV, Section 7)*

- *Developing Community Leadership*

## Diversity/Personality Differences

As stated above, in the lake community there may be hundreds of citizens. Each of these individuals comes to a meeting of the community with their unique experiences, values and personalities, including the leaders. A person's personality affects how they view the world and



react to issues. A leader should understand how their personality influences his leadership skills as well as how the personalities of others influence the dynamics of the group/community.

Understanding one's own personality type and those of others can increase acceptance of differences that might otherwise be a source of conflict. This can result in a more thoughtful and respectful group leading to more effective and productive meetings and decisions.

**MBTI** is probably the most extensively used personality inventory. It utilizes data regarding how a person sees information, makes decisions, uses their resources and adjusts themselves to life's circumstances. From this information 16 different personality types are identified. It takes about three to four hours to complete the basic session.

**True Colors** is less rigorous than the MBTI and provides insight about four personality differences. This personality tools is good for groups and leadership teams just getting started. It takes about one to three hours to complete.

There are many resource tools used in leadership development curricula to develop an understanding and appreciation for personality types. Two of the more commonly used tools are the Myers-Briggs Type Indicator (MBTI) and True Colors. A leader should take advantage of the opportunity to participate in one of these training sessions, if available. Local resources, such as MSU Extension may be able to provide information about where and when these training sessions are held.

## Decision Making

Everyone is probably familiar with the decision making processes of authoritative decree and voting with simple majority rule. In authoritative decree the supervisor sends a memo indicating, "I want the report by Tuesday". Authoritative decree would certainly not work for making decisions in most lake communities, even for a lake improvement board with public works authority. It would undoubtedly result in concerted mistrust and opposition.

Voting with simple majority rule may also not be constructive in many lake communities. Such voting could divide the citizens into two "warring camps" each "pulling out all the stops" to secure their objective.

Other forms of decision making may include compromise, multi-voting, voting with super majority and consensus. Consensus decision-making constructs a solution that everyone can accept, even if it is not their chosen option. Consensus may have a significant place in lake management. A lake project will usually have many groups and stakeholders. Some of these groups may not have worked together in the past. Some of the players may have significantly diverging agendas. Developing trust so the groups can work together will be important. Arriving at consensus in the beginning of the project may take some time, but it may be time well spent and a money saver in the long-term. Arriving at a consensus in large groups may not be possible, but the concepts and process may still be useful in developing more acceptable alternatives.

*For more information on this topic the following resources are helpful (see Part IV, Section 7)*

- *Building Consensus: Conflict and Unity*

## Meeting Dynamics

Meetings may be the most significant dynamic in a lake management program. It is at the meeting that the community comes together to exchange ideas, receive and provide input, make decisions, evaluate success and build relationships. It is the leaders' responsibility to insure that the meetings work and produce results. Below are some meeting considerations:

- Set up the meeting for maximum participation – secure the place, date, and time,
- Plan the meeting – prepare an agenda that will work for the time allotted,
- Advertise the meeting place, date and time,
- Confirm the attendance of board members and presenters,
- Prepare the meeting room, audio/visual equipment and materials needed,
- Welcome participants,
- Begin on time,
- Have the agenda available as a handout,
- Have a sign-in sheet and name tags if necessary,
- Stay on the agenda, unless it becomes absolutely necessary to depart from it,
- Record the meeting minutes,
- Answer everyone's questions to the fullest extent possible,
- Don't let one person or group dominate the discussion,
- Encourage input from those that don't seem to be participating,
- End on time, and
- Evaluate the meeting.

### Potential Meeting Materials

- Pens and pencils
- Attendance sheet
- Agenda
- Easels
- Tape recorder/tape
- Extension cord
- Computer and Projector
- Masking tape
- Name tags
- Camera
- Handouts
- Participant directory
- Laser pointer
- Markers
- Evaluation forms
- Sticky notes

*For more information on this topic the following resources are helpful (see Part IV, Section 7)*

- *How to Make Meetings Work*

## **Section 4 – Working with Professional Providers**

The first decision a lake management board or team needs to make is to determine how to handle development and implementation of the management project. Three options are available. One Option one is the do-it-yourself method. This would work well if the lake community has the expertise required to produce and manage the plan. Individuals with expertise in science, management and education would be needed. If that expertise is lacking, options two and three probably make better sense. Option two is to hire a consultant and rely on the professional to provide expertise. This method has a higher cost, but would provide personnel with experience and knowledge specific to the community's needs. The consultant would also help the community develop bid documents and work with the contractors hired to implement the project. The consultant would oversee any treatments and make recommendations for succeeding years. The third option is to hire a full-service company. These companies produce the management plan, conduct the lake survey, and implement the treatment strategies.

There are pros and cons for each of the three options. What works best for any lake community will depend upon the distinctiveness of the community and the availability of expertise and funds. If the lake community uses a Lake Improvement Board to manage the lake, the Board by law is required to hire an engineering consultant to develop the project.

### **Working with Consultants**

When working with a consultant the management team should understand the options available and the time-lines for completion of studies, public hearings, and contract letting and the task of lake improvement. If using a Lake Improvement Board or doing a Township Public Works project the laws governing these management organizations identify many of the required time lines. Periodically the citizen management must follow up with the consultant to ensure that meeting dates, times and places are scheduled. Consultant can do pre- and post- lake surveys to determine the success of the project and provide recommendations for further action. If possible, the management team should accompany the consultant on surveys to observe and offer insight about the lake. This should improve the working relationship between the community and the consultant.

The consultant selected to oversee the lake management project should be knowledgeable about issues such as:

- Budget/Special assessment district development
- Notice and posting for meetings and hearings
- Lake management treatment strategies and options
- Required permits
- Obtaining contractor services
- Answering questions of a technical nature in such a way that the citizens understand.

### Where to Find a Consultant

To identify possible consultants to interview search the websites and publications of organizations like the Michigan Chapter North American Lake Management Association, ([www.mcnalms.org](http://www.mcnalms.org)) and Michigan Lake & Stream Associations, Inc. ([www.mymlsa.org](http://www.mymlsa.org)). Additionally consulting firms will also have exhibit tables at conferences sponsored by these organizations and others that promote water resource management in Michigan.

### **Working with Contractors**

It is very desirable to establish a good working relationship with the contractor working on the lake management project. Contractors can secure proper permits for the project. If the project involves aquatic plant herbicide treatments, permit information is available at the website [http://www.michigan.gov/deq/0,1607,7-135-3313\\_3681\\_3710-134667--,00.html](http://www.michigan.gov/deq/0,1607,7-135-3313_3681_3710-134667--,00.html). Permit costs range from \$75 to \$1500 depending upon the size of the treatment area. The Contractor should be able to provide sufficient liability insurance. They should also send out treatment notices, post treatment areas if required, and do follow-up treatments if necessary.

The full service contractor should help the lake community develop a complete and thorough management plan including how the lake will be surveyed, possible treatments that could be used, water clarity and quality, and impacts upon fish and other animal populations. The contractor should supply information with regard to technical and safety information of the products and/or procedures used in the project. Better communication and cooperation between the contractor and the management team prior to treatment implementation will lead to fewer complaints later. The contractor working with the management team should use meetings, email, a website, local newspapers, signs on crucial roads and access sites, phone calls, word of mouth, and any other means to inform the community of the project. The lake community should be given the opportunity to evaluate the success of the project and make recommendations for future efforts.

### Where to Find a Contractor

To identify possible contractors to interview search the websites and publications of organizations like the Michigan Chapter North American Lake Management Association, ([www.mcnalms.org](http://www.mcnalms.org)) and Michigan Lake & Stream Associations, Inc. ([www.mymlsa.org](http://www.mymlsa.org)). Additionally contractors will also have exhibit tables at conferences sponsored by these organizations and others that promote water resource management in Michigan. Additionally, information on contractors that conduct aquatic plant herbicide treatment can be found at the MDQRD and the website of the Michigan Aquatic Managers Association ([www.mamagroup.org/membership.html](http://www.mamagroup.org/membership.html)).

## **Section 5 – Board Member Responsibilities \***

### **Follow Provisions of Michigan law 1967 PA 267 – Open Meetings Act**

The Michigan legislature passed the open meetings act to provide statewide uniformity for the conducting of public meetings. Lake Improvement Boards are legally required to abide by the Open Meetings Act.

Key provisions include:

1. Guarantee that all meetings are open to the public.
2. The public may record the meeting with video or audio equipment.
3. The attending public are not required to give their name or other information.
4. The public will be given an opportunity to address the meeting.
5. A public notice is required of all meetings, giving date, time, and location.
6. The public notice for hearings must be published in a local newspaper at least two days before the meeting.
7. A public notice of the meeting must be posted at least 18 hours before the meeting.
8. Within ten days after the first meeting, a schedule for all meetings during the year must be posted.
9. Each public meeting must have minutes and the corrected minutes should be made available to the public.

### **Natural Resources and Environmental Protection Act (Act 451 of 1994) Part 309**

This act sets up the structure of the Improvement Board and is the blueprint for how business is conducted by the lake's Improvement Board.

### **Conduct Meetings by Using Robert's Rules of Order**

The president conducts meetings and carries on Improvement Board business by following the principles of the Open Meetings Act, and using Robert's Rule of Order. In addition the president needs to create an open atmosphere of give-and-take with the public to gain their support so the Improvement Board can move forward with its agenda.

### **Other Presidential Responsibilities**

1. Following guidelines spelled out in the Open Meetings Act, prior to a scheduled meeting, the president creates an agenda spelling out the business that is expected to be conducted in the meeting.
2. Having an understanding of the parameters of the Special Assessment District and insuring that assessments are correct within the district. The Improvement Board will work with the township or city assessors in developing and maintaining an accurate list of assessments within the lake assessment district.

3. If necessary, facilitate appeals in tax tribunal hearings.
4. In addition it is recommended that the president insure that the Board develops a Mission Statement and Goals.

### **What a Lake Board Member Should Know**

A Lake Improvement Board member doesn't need to be an expert on all the issues, but should be knowledgeable enough to ask good questions of the consultants and contractors and be able to address the public's concerns.

Lake Board members should be able to answer the following questions:

1. What is my assessment? (Requires understanding of the lake's assessment plan).
2. What are you spending the public's money for? (Be able to explain the budget and why the money is allocated in that way).
3. How are you going to solve a lake's aquatic vegetation problem?
4. What does the invasive plant look like?
5. What are the options for treating invasive plants? (contact or systemic herbicide, biological control, or harvesting) Be able to define terms like systemic, contact and biological control and clearly explain the pros and cons of using each method.
6. Why the Board chose the plant management plan they are using?
7. After the control methods have been applied what can be expected to happen in the weeks that follow?
8. What can be done about native plants that are a nuisance?
9. After using the best practices to control aquatic vegetation, will the problem be solved?
10. What can property owners do with their shoreline property to best help the lake ecology?
11. Why phosphorus-free products or no fertilizer, development of green belts, and environmentally friendly shoreline protection rather than seawalls are important and encouraged.

\* Larry Copley, president of the Lake Mitchell Improvement Board, was a source of information in the preparation of this section of the manual.

### **Section 6 – Products that a Board can Produce**

A major goal of the Board is keeping folks informed, reaching as many association members as possible and helping them to understand what the board is doing and why it is doing it.

#### **Website**

A website that is easy-to read and navigate will keep association members informed about the Board's work. The following should be a part of the website:

1. Minutes of meetings

2. Notice of all Lake Board and association meetings.
3. Explanation of what procedures (chemical treatment, harvesting) will be used and why they will benefit the lake.
4. Financial report detailing revenue and expenditures as well as annual budget and explanation of assessments.
5. An email address that will connect them with the Lake Board.
6. Listing of all officers and who they represent.
7. An appeal encouraging website users to join the Lake Board email list.
8. If there is one, the annual report from the contracted Lake Board consultant. The annual report identifies specific problems the consultant will deal with (milfoil, phragmites, loosestrife) and how it will address these problems. It also talks about other activities coordinated by consultant - lake surveys, water quality tests, and shoreline management.
9. The Goals and Mission Statement of the Lake Board.

Other recommended subjects for website content:

1. Shoreline ecology – Explaining best practices for lakeshore owners including use of phosphorus-free fertilizers, development of a greenbelt, seawall options, recognition and eradication of invasive plants such as purple loosestrife and Phragmites.
2. The problem with impervious surfaces.
3. Summary of key personal watercraft and boating regulations.
4. Help in treating swimmers' itch; the problem with feeding ducks.
5. Water quality report (if available).
6. Fishing report - fishing tips for the lake, record of fish plantings.
7. Photos of harvester, chemical treatment watercraft, examples of invasives in or near the lake, such as Eurasian water milfoil, purple loosestrife, phragmites, etc.

## **Newsletter**

A newsletter could be sent to all who are unable to use the Lake Board's website. The spring season is a good publication date to inform the public about phosphorus-free fertilizer and about fertilizing lawns. The newsletter may contain a summary of key information on the website (see list of issues above).

## **Updated Email List**

Important information can be distributed quickly by an email list composed of those who own lakeshore or lake access property or all in the assessment district as well as interested parties such as the news media, other interested associations and boards. To build the email list place an appeal on the website, plus reminders at all Lake Board functions, encouraging association members to share their email address. The email list is not shared or sold to others.

Appropriate occasions to send email:

1. Prior to all meetings and public hearings.
2. Just before chemical treatment or harvesting.
3. To send out meeting minutes and other official business.
4. Since many on email list may be part-time residents emails can inform these individuals of matters that may have caused property damage – such as major snowstorms, ice storms, flooding, sustained power outages, or a rash of break-ins.

### **Working with Local News Media**

A Lake Board should maintain regular contact with the local newspaper, and if possible, TV stations servicing the lake area. When working with the local news media, the Board might:

1. Include them on the email list.
2. Inform the local paper about the lake treatment program and the lake management plan as well as other noteworthy lake activities.
3. Make sure the news media is aware of the website.
4. Send a press release to the local media; however, a personal email or phone call is more effective.
5. Try to have Lake Board personnel be the first to contact the media rather than citizens who may not be informed.
6. Invite the news media to Lake Board and association meetings as well as public hearings.

### **Annual Report**

The annual report can identify specific problems the consultant will deal with and how the Lake Board will address these problems. It may also cover activities coordinated by the consultant such as lake surveys, water quality tests, and shoreline management. The report should be published on the website, in the newsletter, and shared with the local news media.

### **Publish a Lake Manual**

Though a lake manual can be an arduous task, it can have significant value for the lake community. When producing the local lake manual it would be helpful to obtain a copy of the MCNALMS Lake Management in Michigan manual as a resource. The lake manuals should be specific to local lake issues and helpful to the local citizens and community.

### **Section 7 – Publications, Websites, and Training Opportunities**

This section is not a comprehensive list of all publications, websites and training opportunities that may be helpful to a lake manager. Such a list would be massive and quickly be outdated. Instead the documents, sites and opportunities listed approach the topics of lake and watershed management more holistically, rather than focusing on one issue such as aquatic plants.



Additionally, these documents, sites and opportunities have often been cited and used by lake managers over the years giving them a degree of respected guidance.

## **Publications**

A Citizen's Guide for the Identification, Mapping and Management of the Common Rooted Aquatic Plants of Michigan Lakes – produced by Michigan State University Extension (bulletin WQ-55 - 2007) to help local communities develop an aquatic plant management plan unique for their lake.

A Model Lake Plan for a Local Community – produced by the University of Wisconsin Extension. The publication uses a fictitious Lake Hale in Phantom County as a model to help lake communities gather and summarize information, debate the alternatives and implement decisions.

A Procedure to Estimate the Response of Aquatic Systems to Changes in Phosphorus and Nitrogen Inputs – produced by the Natural Resources Conservation Service (1999). Lakes are not equal in their response to phosphorus loading and abatement. This publication allows a community to identify the type of lake it has and the lake's ability to assimilate phosphorus and its response to phosphorus abatement efforts.

Building Consensus: Conflict and Unit – draws heavily on the resources for decision-making in the Religious Society of Friends (Quakers). The book, introduced in 2001, is intended for use by people who are using or considering using consensus processes in the community or workplace setting to strengthen their understanding of relevant concern and potential consequences and solutions.

Clean Water in Your Watershed: A Citizens Guide to Watershed Protection – produced by the Terrene Institute (Washington, D.C.) and the U.S. Environmental Protection Agency (1993). The Guide is designed to help citizens work with local, state, and federal governmental agencies to design a watershed protection or restoration project.

Community Culture and the Environment: A Guide to Understanding a Sense of Place – produced by the U.S. Environmental Protection Agency (2002). This publication addresses the social and cultural aspects of community-based environmental protection. The publication gives a process and set of tools for defining and understanding the human dimension of an environmental issue.

Cooperative Lakes Monitoring Program: Annual Report – is produced annually by the Michigan Department of Environmental Quality for the citizens' lake monitoring program. The Report gives the annual results for the year's monitoring, but also provides a good basic overview of lake ecology.

Developing a Watershed Management Plan for Water Quality: An Introductory Guide – produced by Michigan State University and the Michigan Department of Environmental Quality

(2000). The Guide was written to help local units of government and nonprofit organizations develop watershed plans that could be supported by State funding and management programs.

Developing Community Leadership: A Guide for MSU Extension – was produced by Michigan State University Extension to increase the capacity of Extension professionals to promote sustainable communities and local leadership (2005).

Diet for a Small Lake: A New Yorker's Guide to Lake Management- produced by the New York State Department of Environmental Conservation and the Federation of Lake Associations, Inc. (1990). The Guide is designed to be a step-by-step manual for government and the lake communities to produce a lake management plan resulting in the protection of the lake and optimum use and enjoyment by the community.

Filling the Gaps: Environmental Protection Options for Local Governments – produced by the Michigan Department of Environmental Quality and the Planning and Zoning Center, Inc. (2003). The purpose of this publication is to provide local governmental officials with the information about the tools available to them to make good land use decisions that will provide a community with a quality environment now and in the years to come.

Fish and Fisheries Management in Lakes and Reservoirs – produced by the Environmental Protection Agency (1993). The manual was written to provide water quality managers with a better understanding of the concepts and techniques of fisheries management as well as the role of fish in the lake ecosystem and their relationship to water quality.

Fisheries Division Special Report 38 – Conservation Guidelines for Michigan Lakes and Associated Natural Resources. – produced by the Michigan Department of Natural Resources (2006) as guidelines for protecting the natural resources of Michigan inland lakes.

Handbook to Developing Watershed Plans to Restore and Protect Our Waters – produced by the U.S. Environmental Protection Agency (2008). This document provides guidance to states and local governments regarding technical tools and sources of information for developing watershed management plans.

How to Make Meetings Work – written by Doyle, M. and D. Straus (1993). New York, NY: Berkley Books. A good overview for conducting an effective meeting.

Integrated Pest Management for Nuisance Exotics in Michigan Inland Lakes – produced by Michigan State University Extension (Bulletin WQ-56) (2000). This document helps local communities develop a comprehensive plan to manage aquatic exotic nuisances in their lake.

Lakescaping for Wildlife and Water Quality – produced by the Minnesota Department of Natural Resources – Nongame Wildlife Program. This publication is a step-by-step manual regarding the protection and restoration of native shorelines on inland lakes, minimizing the loss of native plant and animal communities and protection lake quality from erosion and urban runoff.

Managing Lakes and Reservoirs – produced by the North American Lake Management Society, the Terrene Institute and the U.S. environmental Protection Agency (2001). The manual was written by professional lake managers for citizens and local communities to provide a comprehensive manual on lake ecology and management.

Natural Shoreline Landscapes on Michigan's Inland Lakes: Guidebook for Property Owners – produced by the Michigan Natural Shoreline Partnership and MSU Extension (2011). The goal of the publication is to assist riparian property owners manage their shorelines to protect native habitat and water quality.

Occurrence, Distribution and Control of the Parasites That Cause Swimmer's Itch in Michigan - produced by Michigan State University Extension (2003) to provide information about the life cycle of swimmer's itch and the management of this waterborne problem.

Protecting Inland Lakes: You Can Make A Difference – by the Michigan Department of Environment Quality (1990) is an older publication but a very good introduction to Michigan lakes and management of riparian property.

Restoration and Management of Lakes and Reservoirs, 3<sup>rd</sup> Edition – by Cooke, G. D. et al., Taylor & Francis Group (2005). This publication is a very comprehensive lake management book, but technical and targeted to professional lake managers. Each lake management strategy is given extensive technical and scientific review.

Understanding Lake Data – produced by the University of Wisconsin (2004) is a simple guide to help people understand information about lake water quality and to interpret lake data.

Your Lake and You – available from the North American Lake Management Society this small newspaper type publication provides simple concrete steps that a local citizen and community can take to protect their lake. A Michigan version is available from the MDEQ Water Resources Division.

The Watershed Project Management Guide – by Thomas Davenport/Lewis Publishers (2003). This publication is an excellent technical, comprehensive treatment of watershed management.

## **Websites**

waterontheweb.org This website has educational programs and water quality data that explain and demonstrate lake ecology.

www.epa.gov/owow/nps The U. S. EPA website for nonpoint source pollution has much information supporting watershed management including: federal laws and regulations, funding opportunities, available publications, educational resources, training opportunities and web links.

www.epa.gov/lakessurvey This U.S. EPA website has the recently completed study of the nation's lakes.

[www.water.epa.gov/type/lakes/shoreland.cfm](http://www.water.epa.gov/type/lakes/shoreland.cfm) This U.S. EPA website is a clearinghouse for information on lakeshore protection and restoration.

[www.epa.gov/watertrain](http://www.epa.gov/watertrain) This website provides online training in watershed management. Self-paced training modules varying in time from 1/2 hour to 2 hours are divided into six themes: watershed management overview, watershed ecology, watershed change, analysis and planning, management practices and community/social/water law.

[www.glsc.usgs.gov/files/research/InlandLakesManual.pdf](http://www.glsc.usgs.gov/files/research/InlandLakesManual.pdf) This U.S. Geological Survey website is a comprehensive lake sampling manual.

[www.michigan.gov/deq](http://www.michigan.gov/deq) The website of the State agency has information on law, rules, permits, funding sources and informational resources. The site can be somewhat difficult to navigate.

[www.micorps.net](http://www.micorps.net) The Michigan Clean Water Corps is a network of volunteer monitoring programs in Michigan. It was created through an executive order to assist the MDEQ in collecting and sharing water quality data for use in water resources management and protection programs.

[www.nalms.org](http://www.nalms.org) The website of the North American Lake Management Society provides information about lake management activities occurring across the country, including research, publications and conferences.

[www.mcnalms.org](http://www.mcnalms.org) The Michigan Chapter of the North American Lake Management Society website provides information about lake management in Michigan.

[www.mymlsa.org](http://www.mymlsa.org) The website of Michigan Lake and Stream Associations, Inc. has much information about lake management in Michigan including information about the Lake and Stream Leader's Institute, the Cooperative Lakes Monitoring Program, the Riparian magazine, and conferences and training opportunities.

[www.michiganlakes.msue.msu.edu](http://www.michiganlakes.msue.msu.edu) This is a website of the Michigan Inland Lakes Partnership. It is a reasonably comprehensive website with links to many other sites of organizations and agencies working on Michigan lakes.

[www.midwestglaciallakes.org](http://www.midwestglaciallakes.org) The mission of the Midwest Glacial Lakes Partnership is to protect, restore and enhance Midwestern glacial lakes fish and aquatic communities through partnerships that foster fish habitat conservation and improve the quality of life for the American people.

[www.uwsp.edu/cnr/uwexlakes](http://www.uwsp.edu/cnr/uwexlakes) This is the website for the University of Wisconsin and The Wisconsin Lakes Partnership. The website has a lot of information. The website is Wisconsin based but most of the issues are similar to those in Michigan.

[www.water.epa.gov/type/lakes/shoreland.cfm](http://www.water.epa.gov/type/lakes/shoreland.cfm) This site is a Federal Environmental Protection Site to help people find information regarding natural shoreline protection and restoration.

## **Training Opportunities**

### Lake and Stream Leaders Institute

Many lake community members are unfamiliar with water resource management options and do not have the educational experiences to assist them with the responsibilities of being a water resource leader. For stakeholders to be active participants in partnership resource management, they must have access to appropriate training and informational materials. To address this need the Michigan State University and MLSA with support from Trout Unlimited have initiated the Lake and Stream Leaders Institute.

The goal of the Institute is to develop a core of local water/land resource leaders who will promote lake, stream and watershed management partnerships with state natural resource agencies and encourage and instruct other citizens in resource management. The Institute employs a combination of classroom activities, field experiences, homework assignments and an applied project to prepare participants in lake, stream and watershed management planning and program implementation. After completing the Institute program, participants are engaged in an Alumni Program to promote communication, continued learning possibilities and opportunities for service.

Any citizen/resident interested in Michigan lakes, streams and watershed management, including high school and college students, may apply. Applicants must make a firm commitment to attend all sessions and prepare an applied project. Participants are selected from a cross-section of applicants from:

- environmental and conservation organizations
- local government
- private landowners and managers
- under-served communities
- tribal communities
- educational institutions
- agricultural interest
- elected officials
- community organizations
- concerned, active citizens and
- other water resource management interest

A brochure about the Institute is available from MLSA. Questions about the Institute may be addressed to Michigan State University Extension staff member Dr. Jo Latimore (latimor1@msu.edu).

### MSU Online Training – Soils Management

Michigan State University's Institute of Water Research, the Department of Community, Agriculture, and Recreation and Resource Studies and the MDEQ developed and placed online an educational course to address the issue of controlling sedimentation. The seven-week course provides training on:

- Construction site management of sedimentation,
- Identification of sedimentation control measures,
- Developing sedimentation control plans,
- Vegetative stabilization,
- Sediment basins and diversions, and
- Estimating runoff.

The course is beneficial for environmental organizations, watershed groups, drain commissioners, contractors, and developers. Registration for the course is available at [vu.msu.edu/preview/h2Osoil](http://vu.msu.edu/preview/h2Osoil).

### MSU Online Training – Watershed Management Profession Certification Program

MSU offers four courses on watershed management which provide certification in Watershed Management and/or three MSU credits for each course.

- Course 1: Watershed Concepts is an introduction to watershed hydrology and management.
- Course 2: Building and Implementing Watershed Management Plans works a watershed plan through data collection, public consultation and evaluation.
- Course 3: Watershed Assessments and Tools addresses water quality monitoring, bio-assessment protocols, and pollutant loading modeling.
- Course 4: Legal, Financial and Institutional Frameworks looks at federal, state and local laws for financing and organizing a watershed management program.

Information about these courses is available at “Online WS Courses” at the website [www.iwr.msu.edu](http://www.iwr.msu.edu).

### MSU Online Training – Watershed Management

MSU offers an eight-week non-credit, internet-based watershed management course. The course provides an understanding of watershed management, EPA's Phase II storm water regulations and other possible community initiatives to protect local water resources. Topics in the course include:

- The hydrologic cycle,
- Nutrient and pesticide movement,

- Stream flow,
- Water quality models,
- Point and non-point source pollution,
- Federal, state and local laws and rules,
- Best management practices.

A certification of completion is awarded based upon homework, final exam and participation in web discussions. For more information about the course visit “Outreach & Education” at “Virtual University” at [www.iwr.msu.edu](http://www.iwr.msu.edu).

## **Section 8 – Organizations that may be Helpful**

### **North American Lake Management Society**

The North American Lake Management Society (NALMS) is a national/international professional lake management society. The purpose of NALMS is to forge partnerships among citizens, scientists, and professionals to foster the management and protection of lakes. The interest of the Society is not just lake research but the application of that research to the effective management of lakes. To bring this management to reality there is the need to engage local citizens who are extensively involved in the implementation of lake protection strategies. The Society calls these citizen managers, practitioners and has structured the Society to ensure that these individuals’ interests and needs are identified and addressed. Therefore the Society is a distinctive collaboration of university scientist, professional lake managers and contractors, and citizen practitioners.

To promote lake science and technology transfer, the Society has several educational outlets. An annual conference is hosted each year where researchers can present their most recent projects. Additionally these conferences have training sessions for practitioners to give them the most recent information regarding important issues of lake management. Society publications include a scientific journal and a magazine for practitioners called LakeLine. The Society has a website ([www.nalms.org](http://www.nalms.org)) and a book store to share information regarding lake ecosystems and management.

While national/international in scope, NALMS also has state affiliates to better focus management on the distinctive conditions in each state or region of the country.

### **Michigan Chapter North American Lake Management Society**

In Michigan the Michigan Chapter of the North American Lake Management Society (McNALMS) is an affiliate of the national Society. McNALMS reflects the goals, membership and outreach objectives of the Society. McNALMS members include university researchers, professional lake managers and contractors and local Lake Board and association citizens. McNALMS publishes a newsletter, has a website ([www.mcnalms.org](http://www.mcnalms.org)) and hosts an annual conference.

Besides the traditional outreach venues, McNALMS goals include greater collaboration among lake management agencies and organizations and advocating for legislation and programs to support lake management in Michigan.

### **Michigan Lake and Stream Associations, Inc.**

Michigan Lake and Stream Associations, Inc. (MLSA) is a non-profit corporation, made up of organizations, corporations, associations and individuals who share an interest in the protection and management of Michigan's water resources. The corporation was organized in 1961 and now has hundreds of individual and association members. Membership is open to any individual, lake, stream, or watershed association/organization, or corporation who shares a concern and interest in Michigan's water resources.

The primary goal of MLSA is to assist lake, river and stream, and watershed associations and individual riparian property owners in the management of their waterfront property. Another goal is to prevent the degradation, contamination and pollution of the surface waters of the state of Michigan.

MLSA publishes the magazine *The Riparian*, holds regional and statewide conferences, supports the Cooperative Lakes Monitoring Program, the Lake and Stream Leader's Institute and many other projects. For more information about MLSA visit their website [www.mlswa.org](http://www.mlswa.org).

### **Michigan Department of Natural Resources**

The Department of Natural Resources (MDNR) is responsible for the stewardship of Michigan's natural resources and for the provision of outdoor recreational opportunities; a role it has relished since creation of the original Conservation Department in 1921. Its traditional responsibilities of fish, wildlife, parks and forest have been greatly expanded over the years. The MDNR web site can be accessed at [www.michigan.gov/dnr](http://www.michigan.gov/dnr).

### **Michigan Department of Environment Quality**

The Michigan Department of Environmental Quality (MDEQ) has responsibility for regulatory oversight for all public water supplies, issues permits to regulate the discharge of industrial and municipal wastewaters, and monitors and regulates water resources of the State for water quality, the quantity and quality of aquatic habitats, the health of aquatic communities, and compliance with state laws. It also has responsibility in a number of other issue areas including land management, waste and toxic materials management and many more. The best place to get information about the MDEQ is at their website [www.michigan.gov/deq](http://www.michigan.gov/deq). However the site is large and somewhat difficult to navigate.



## Michigan State University Extension

Michigan State University Extension (MSU Extension) is a statewide network of University and county offices that serve all Michigan counties. MSU Extension is charged with understanding the issues and opportunities of each county and its unique communities. MSU Extension works in partnership with other organizations and agencies to plan and implement research-based educational programs that address the issues and challenges of the local community.

With programs like *Introduction to Lakes*, the *Lake and Stream Leaders Institute* and *Citizen Planner* MSU Extension can help lake communities understand lake ecology, lake management and local government. MSU Extension county offices may also be able to organized specialized training on issues such as leadership, environmental monitoring, and working collaboratively. For more information about MSU Extension visit their website [www.msue.msu.edu](http://www.msue.msu.edu).

## Watershed Councils

Watershed councils are generally established to protect and manage the ecology of a river ecosystem. Most are nonprofit organizations made up of a community's residents, businesses, and local governments. A watershed council can bridge political boundaries within a river watershed by building partnerships between the local units of government. It can then use these collaborative networks and resources to address water pollution, wetland protection, citizen education, and land-use planning.

A watershed council can served as a place where local units of government and citizens discuss problems and seek solutions to critical issues affecting the river and the citizens that use and enjoy it. Even though a watershed council has no enforcement powers, it can accomplish its goals through the use of technical data, information and citizen stewardship to influence decisions made by local and state agencies.

Some watershed councils that have been significantly involved in lake management in the past include:

The Huron River Watershed Council – [www.hrwc.org](http://www.hrwc.org)  
The Clinton River Watershed Council – [www.crowc.org](http://www.crowc.org)  
The Muskegon River Watershed Assembly – [www.mrwa.org](http://www.mrwa.org)  
Tip of the Mitt Watershed Council – [www.watershedcouncil.org](http://www.watershedcouncil.org)

## PART V: INDEX

### A

advertising, 33, 50  
agenda, 38, 45, 76, 79  
algae, 9, 10, 15, 18, 19, 24, 28  
antihistamine, 27  
aquatic plants, 2, 9, 24, 25, 60, 63, 82  
assessment notices, 37  
assessment roll, 6, 31, 32, 37, 38, 44, 45, 56, 70  
assessor, 37, 38, 45  
atmospheric fallout, 18

### B

barriers, 2, 3, 4  
bid, 50, 77  
bidder, 33, 50  
bioengineered erosion control, 23, 68  
board of public works, 6, 7  
bonding, 7, 8, 32, 33, 50  
bonding authority, 7, 8

### C

cercariae, 26, 27, 28  
chairperson, 30, 31, 33, 37, 50  
chlorophyll, 10, 11, 60  
Clean Water Act, 61, 62  
clerk, 33, 38, 45  
community, i, 2, 3, 4, 5, 6, 7, 8, 9, 11, 17, 19, 20, 24, 25, 34, 44, 45, 50, 57, 60, 61, 67, 69, 71, 72, 73, 74, 76, 77, 78, 82, 83, 84, 85, 86, 87, 88, 91  
consensus, 74, 75, 83  
consultant, 19, 32, 44, 67, 70, 77, 78, 81, 82  
contract, 6, 33, 50, 77  
Cooperative Lakes Monitoring Program, 2, 11, 59, 83, 86, 90  
copper sulfate, 27  
county commissioner, 7

county drain commissioner, 7, 30, 45  
cultural eutrophication, 10

### D

deactivate, 56  
dissolution, 56  
dissolved oxygen, 10, 60  
diversity, 24, 67, 71, 74  
drainage lakes, 13, 14  
drawdown, 25  
dredging, 24, 32, 62, 63

### E

ecosystem, 8, 9, 28, 68, 84, 91  
email, 78, 81, 82  
endangered species, 64, 65  
epilimnion, 16  
euphotic, 15  
eutrophic, 2, 10, 11, 14  
eutrophication, 9, 10, 11, 73  
exotic species, 25, 28, 29, 65, 68

### F

fall overturn, 15, 17  
feasibility study, 32, 38, 44, 45, 50  
fertilizer, 23, 80, 81  
fiduciary, 37  
first class, 32, 44, 45  
fish, 9, 17, 23, 24, 27, 28, 29, 30, 59, 61, 78, 81, 84, 86, 90  
fishing clubs, 5  
flushing, 19, 73

### G

geese, 23  
Great Lakes Commission, 59  
groundwater, 1, 12, 13, 14, 18, 23, 32, 58

groundwater drainage lakes, 13, 14

## H

hearing of assessment, 45  
hearing of practicability, 32, 44  
herbicides, 24  
hypolimnion, 16, 17

## I

ice push, 23  
impoundment, 14, 62  
inlet stream, 12, 13, 14  
insurance, 78  
invasive species, 65, 68

## L

lake association, 2, 5, 7, 8, 57  
Lake Board, 3, 7, 8, 30, 31, 32, 33, 37, 38,  
44, 45, 50, 56, 57, 69, 80, 81, 82, 89  
lake level orders, 33, 50  
lake manual, 82  
lake type, 12, 73  
leadership, 3, 4, 5, 57, 71, 74, 75, 84, 91  
light zones, 12, 15  
limnetic, 15  
littoral, 15, 24

## M

majority rule, 75  
mesotrophic, 2, 10, 11, 12, 13, 14  
metalimnion, 16, 17  
Michigan Chapter North American Lake  
Management Society, v, 89  
McNALMS, 78, 86, 89, 90  
Michigan Department of Environmental  
Quality, v, 2, 83, 84, 90  
Michigan Department of Natural Resources,  
84, 90  
Michigan Inland Lakes Partnership, 67, 86

Michigan Lake and Stream Associations,  
38, 59, 86, 90  
Michigan Natural Shoreline Partnership, 23,  
68, 85  
minutes, 37, 38, 45, 76, 79, 80, 82  
miracidium, 26  
monitoring, 2, 4, 8, 11, 24, 57, 58, 59, 60,  
61, 65, 83, 86, 88, 90, 91  
motion, 30, 31, 33, 70  
muck, 9  
multi-voting, 75

## N

National Lake Assessment, 28, 29  
Natural Resources and Environmental  
Protection Act, 62, 63, 66, 67, 70, 79  
news media, 81, 82  
newsletter, 81, 82, 89  
newspaper, 31, 32, 44, 45, 56, 79, 82, 85  
North American Lake Management Society,  
20, 85, 86, 89  
nutrient budget, 17, 19  
nutrients, 2, 9, 10, 12, 13, 17, 29, 32, 70, 72

## O

oligotrophic, 2, 9, 11, 12, 13, 14, 17  
Open Meetings Act, 38, 79  
ordinances, 69, 70  
outlet stream, 12, 13, 14

## P

Part 309, 30, 31, 32, 33, 79  
payment, 33, 38, 50, 63  
personality differences, 71  
phosphorus, 10, 12, 13, 14, 17, 18, 19, 20,  
23, 29, 73, 80, 81, 83  
planning, 7, 8, 58, 63, 69, 84, 86, 87, 91  
precipitation, 18, 20  
productive, 9, 11, 14, 17, 75  
professional engineer, 7, 30, 32, 38

profundal zone, 15  
protective lake management, 3, 4

## **R**

resolution, 6, 7, 31, 32, 33, 45, 66  
revolving fund, 32, 50

## **S**

scope of the project, 31, 33  
Secchi disk, 10, 60  
secretary, 31, 37, 38, 45, 65  
sediments, 9, 10, 12, 13, 14, 15, 18, 23, 24, 72  
seepage lakes, 12, 13  
septic system, 23, 58  
shoreline development, 9  
sign in sheet, 38  
soil erosion, 68  
spring overturn, 15, 17  
stormwater, 9, 13, 70  
summer stratification, 16, 17  
super majority, 75

## **T**

temperature zones, 12, 15, 16

total phosphorus, 10, 11, 60  
township public works, 3  
transparency, 11  
treasurer, 31, 33, 37  
trophic state, 9, 10  
trout lakes, 2, 12, 13

## **W**

water budget, 17, 18  
water quality, 2, 6, 10, 11, 12, 60, 61, 62, 68, 70, 81, 82, 84, 85, 86, 88, 89, 90  
waterfowl, 23, 24, 26, 28  
watershed, 2, 3, 4, 5, 7, 8, 9, 10, 12, 13, 14, 19, 20, 57, 58, 59, 72, 82, 83, 84, 85, 86, 87, 88, 90, 91  
website, 17, 23, 24, 28, 29, 58, 59, 60, 62, 63, 64, 65, 66, 68, 73, 78, 80, 81, 82, 85, 86, 88, 89, 90, 91  
win/win, 4  
woody debris, 28, 29

## **Z**

zoning, 69, 84