

(Draft) Lake Management Plan  
for  
Thunder Lake

Cass County, Minnesota

Revised: July 2006

Healthy Lakes & Rivers Partnership Committee  
Thunder Lake Association

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## Introduction

In July 2006 the Thunder Lake Association was invited to participate in the Initiative Foundation's Healthy Lakes and Rivers Partnership program along with eight other Lake Associations in Crow Wing and Cass Counties. Under the coordination of Keith Pohl (Crow Wing County Local Water Planner and Crow Wing County Soil & Water Conservation District) and John Sumption (Cass County Water Planner and Director of Environmental Services), representatives attended two days of training on strategic planning, communication, and nonprofit group leadership.

Representatives of many state and local agencies, as well as nonprofit organizations also attended the training sessions in order to offer their assistance to each group in developing a strategic Lake Management Plan. The Thunder Lake Association was represented at the Healthy Lakes & Rivers training sessions by: **insert names here**.

Following the training sessions, each Lake Association held an inclusive community planning/visioning session designed to identify key community concerns, assets, opportunities, and priorities. The Thunder Lake Association held this planning session on **insert date here**, facilitated by **insert name here**. Approximately **xx** people were in attendance, with about **xx percent** of the participants describing themselves as year round residents. Details of the public input received at this session are provided within this plan.

This document is intended to create a record of historic and existing conditions and influences on Thunder Lake, and to identify the goals of the Thunder Lake community. Ultimately it is meant to also help prioritize goals, and guide citizen action and engagement in the priority action areas. Clearly state agencies and local units of government also have a vital role and responsibility in managing surface waters and other natural resources, but above all else this Lake Management Plan is intended to be an assessment of what we as citizens can influence, what our desired outcomes are, and how we will participate in shaping our own destiny.

This Lake Management Plan is also intended to be a "living document;" as new or better information becomes available, as we accomplish our goals or discovered that alternative strategies are needed, it is our intent to update this plan so that it continues to serve as a useful guide to future leaders.

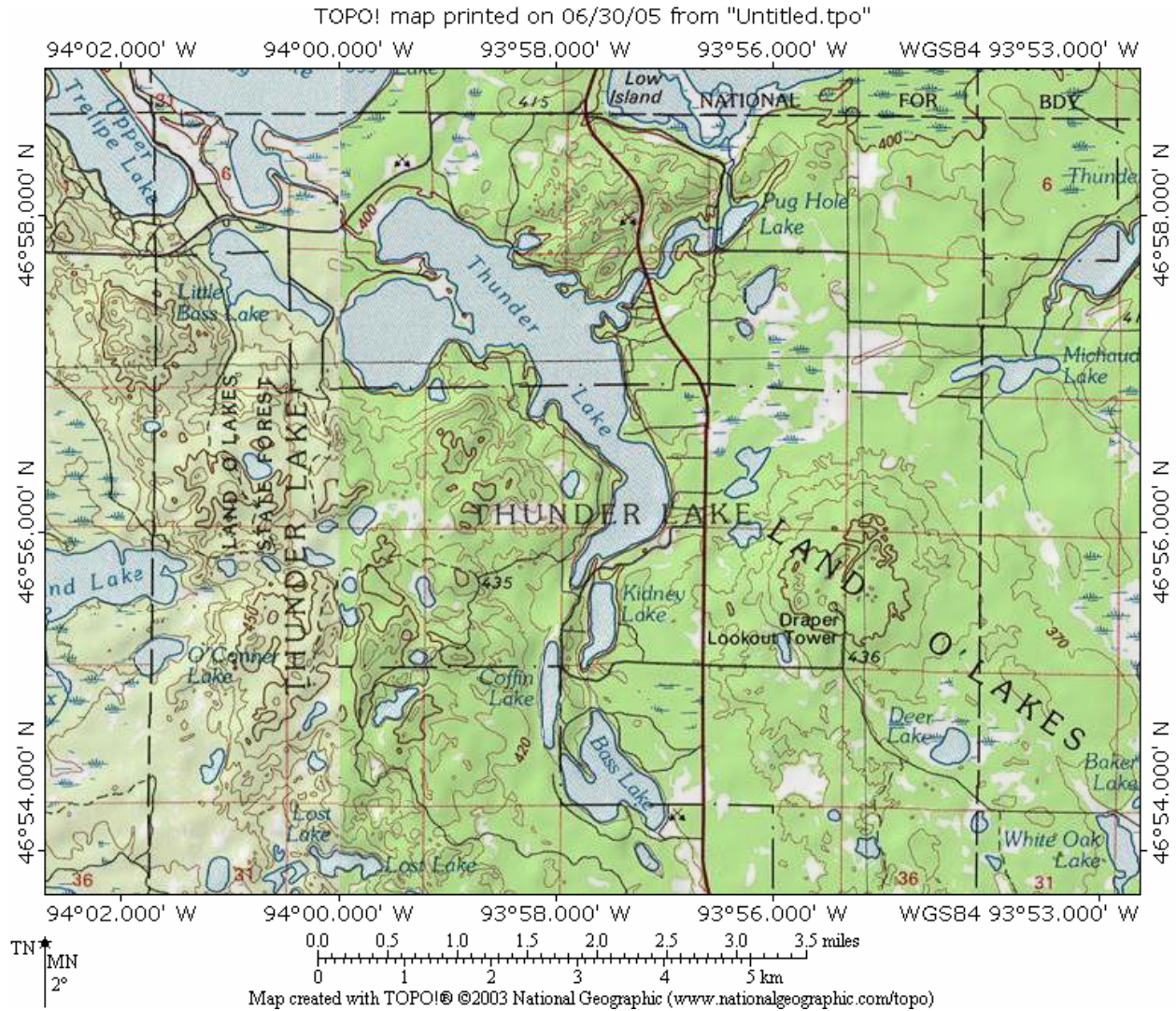
In discussing lake management issues, it is impossible to avoid all scientific or technical terms. We have tried to express our goals, measures of success, and other themes as simply and clearly as possible, but have included a glossary of common limnological terms at the end of the plan to assist the reader. Limnology is the state of lake conditions and behavior.

Finally, we would like to thank the funders of the Healthy Lakes & Rivers Partnership program for Cass and Cass Counties, including The McKnight Foundation, Laura Jane Musser Trust, U.S. Environmental Protection Agency, McDowall Company, Cass County Water Plan, Cass County Water Plan, Lake Hubert Conservation Association, Portage-Crooked Lakes Association and Sibley Lake Association of Crow Wing County, Linda Kaufmann, and Don Hickman & Sandra Kaplan. Additional support has been provided by the Minnesota Environment and Natural Resources Trust Fund as recommended by the Legislative Commission on Natural Resources (LCMR).

### Physical Characteristics and location of Thunder Lake

Thunder Lake (#11-0062) is located in Cass County, about seven miles south of the City of Remer.

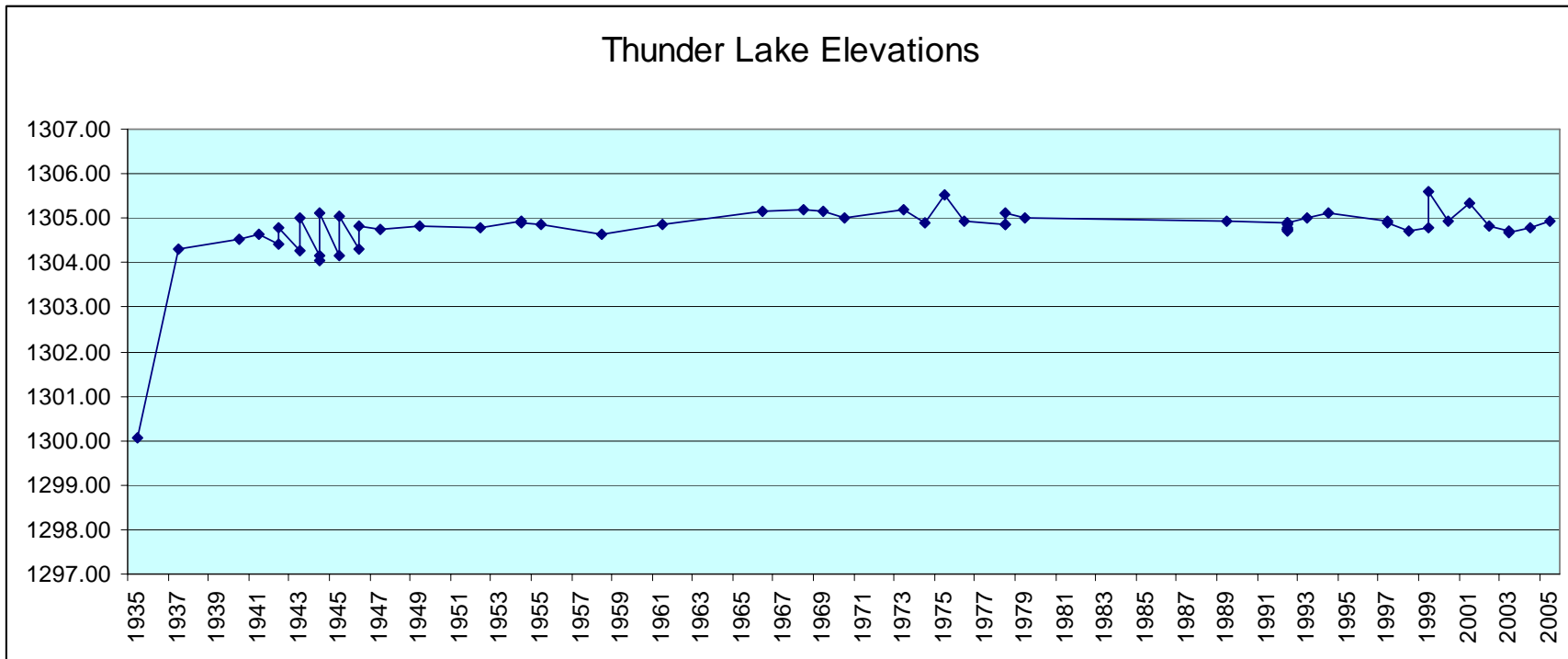
Thunder Lake has a surface area of 1,330 acres and a maximum depth of 95 feet. Approximately 226 acres (17 percent) of lake is within the littoral zone (having a depth of less than 15 feet). Water clarity averages 20 feet.



**Water Level:**

The DNR Division of Waters has historic water level data for Thunder Lake from 1935 to 2005. During the period of record the lake level has varied 5.52 feet based on 60 readings (through May 1995).

	Elevation <sup>1</sup>	Date
Highest Recorded Water Level	1305.6	May 18, 1999
Lowest Recorded Water Level	1300.08	March 14, 1935
Recorded range		5.52 feet
Average Water Level	1304.94	
Ordinary High Water Level	1305.4	



<sup>1</sup> Mean Sea Level in feet

## Watershed Description

Insert description here...

## Precipitation

In 1989 the Minnesota Pollution Control Agency (MPCA) conducted a Lake Assessment Program (LAP) study of Woman, Child and Girl Lakes near Longville. This study noted that average annual precipitation for the area ranges between 26-28 inches, and evaporation ranges between 30-32 inches. Annual average runoff is approximately 6 inches. One-in-ten year low and high runoff is approximately 2 inches and 8 inches respectively.

Springtime ice-out on Thunder Lake has usually occurred by (insert average date).

## Soils

According to the 1988 MPCA Lake Assessment Report on nearby Woman, Girl and Child Lakes, the lakes in this area are ice block basins formed in the outwash deposits of the late Wisconsin glaciation. The topography northwest of the lakes is characterized as pitted to hilly moraine in contrast to the flatter sandy outwash where (Woman, Girl and Child) lakes were formed. Soils in the watershed are classified as Nebish-Rockwood. The light colored well-drained soils have developed from loam (Nebish) and sandy loam (Rockwood) soil types. Some organic and poorly drained mineral soils occur in the depressions.

### **Introduction/History of your Lake/River Association**

The introduction section should cover your association history, accomplishments, goals and mission. It is literally an introduction to yourselves, one you could hand a new member or neighbor, and they would quickly understand the intent and value of your organization. This Organizational Review/Introduction chapter may be particularly important if fundamental questions of mission, structure, participation or other “capacity” issues become your focus.

Who do you represent, what percentage of shoreland (or watershed) residents are members? What services does membership provide? What role does the organization recognize with respect to other stakeholders, organizations, agencies, or institutions?

This review of the history of the Lake or River Association is also very helpful in creating a recorded “institutional memory” of the goals and accomplishments of the group, it can credit those that have invested time and talent, and reminds new members of “lessons learned” so that you can ever more “work wiser.” If you have a mission or vision statement you might consider incorporating it into this section. Many groups also include their by-laws or articles of incorporation in appendices of their Lake Management Plan.

## 1. Water Quality

Since 1973, citizen volunteers from Thunder Lake have participated in the Minnesota Pollution Control Agency's (MPCA) Citizen Lake Monitoring Program (CLMP), recording secchi disc transparency – a measure of water clarity. Joan M. Edlund has been the primary volunteer recording these data for Thunder Lake for many years.

On the MPCA's web-site link, "Lake Water Quality Database," additional water chemistry data is reported. The MPCA's "Environmental Database Access" system also provides additional water chemistry data which includes total phosphorus concentrations, as well as other data.

One application of secchi disc transparency data is to convert the clarity measurements into a Carlson Trophic Status Index (TSI) score. The Carlson Trophic Status Index (TSI) is a tool used to summarize several measurements of water quality into one index value, which can be used to compare a lake to other lakes, or to historic/future data as a measure of degradation or improvement. In many ways, the index can be viewed as a measure of the potential for algal productivity. Since most people value lakes with low algae productivity, the lower the TSI value the healthier the lake. Specifically:

<u>TSI Range</u>	<u>Trophic Status</u>	<u>Characteristics</u>
0-40	Oligotrophic	Clean Lake
41-50	Mesotrophic	Temporary algae & aquatic plant problems
50-70	Eutrophic	Persistent algae & aquatic plant problems
Greater than 70	Hypereutrophic	Extreme algae & aquatic plant problems

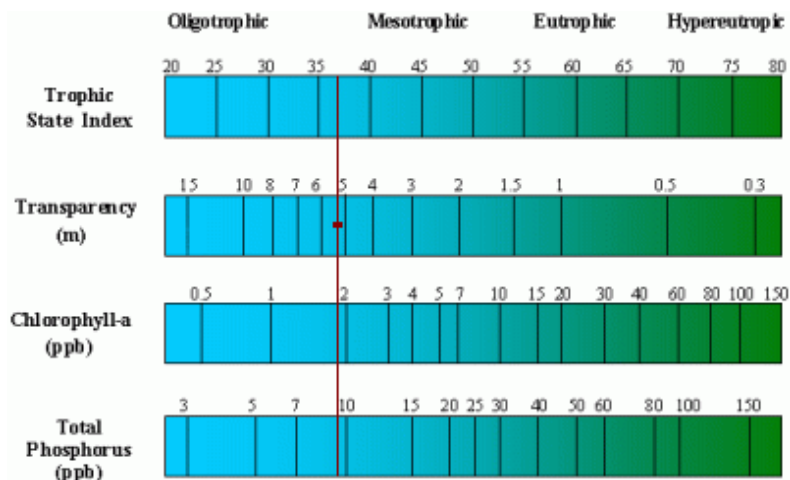
Based on the data provided on the MPCA website, an average concentration (or depth) for the key TSI parameters can be determined, and the associated TSI score calculated.

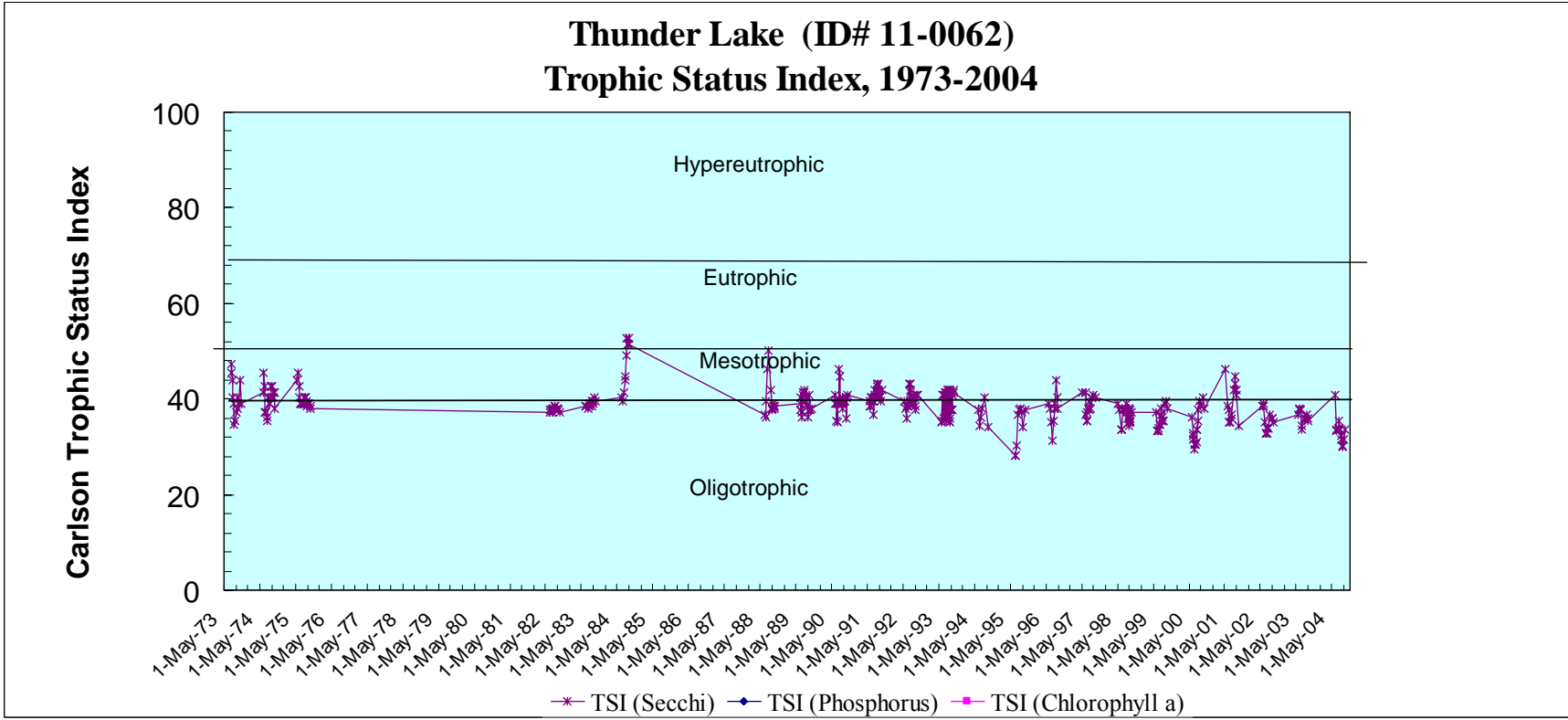
### Average TSI Measurements for Thunder Lake

Year	Chlorophyll <i>a</i> ( $\mu\text{g/L}$ )	Total Phosphorus ( $\mu\text{g/L}$ )	Secchi Depth (feet)	Average TSI
1973	---	---	13.3	40.3
1974	---	---	13.3	40.0
1975	---	---	13.3	40.0
1982	---	---	15.3	37.8
1983	---	---	14.0	39.1
1984	---	---	8.8	46.7
1988	---	---	13.6	39.9
1989	---	---	14.1	39.1
1990	---	---	13.7	39.6
1991	---	---	12.8	40.5
1992	---	---	13.5	39.8
1993	---	---	14.4	38.9
1994	---	---	16.7	36.8
1995	---	---	20.5	34.2
1996	---	---	15.7	37.9
1997	---	---	14.6	38.6
1998	---	---	16.6	36.7
1999	---	---	17.6	35.9
2000	---	---	19.9	34.5
2001	---	---	14.2	39.4
2002	---	---	18.2	35.5
2003	---	---	17.2	36.3
2004	---	---	21.2	33.3

These data suggest that water quality in Thunder Lake has recently exhibited “oligotrophic” conditions (a TSI score below 40) during the period of record. The graphic below (from the MPCA’s website:

<http://www.pca.state.mn.us/water/clmp/lkwqReadFull.cfm?lakeid=11-0062> also shows a long-term average in the lower mesotrophic range.





The table above shows the long-term trend in Trophic Status Index values the years for which data are available for **Thunder Lake**. The variation observed within a single year reflects naturally occurring impacts of temperature, precipitation and water level; the important ‘take home message’ of these graphs is that the data suggests a fairly stable range within the lower mesotrophic/upper oligotrophic conditions since data were first collected in 1973 .

A second method of assessing water quality and determining whether your water body is the “best that it can be” is to compare it to other lakes of similar morphology, geology, and land uses. Listed below are ranges of common measures of water quality based on many years and locations of water quality. The tables below are adapted from the MN Pollution Control Agency “Environmental Data Access” database, and compare observe results in Thunder Lake to common water quality ranges for lakes within the Northern Lakes and Forests Eco-region.

### Average Summer Water Quality and Trophic Status Indicators

Parameter	Typical Range: Northern Lakes & Forest Eco-region	Thunder Lake Average $\pm$ St. Dev.
Total Phosphorus ( $\mu\text{g/L}$ )	14 – 27	No data
Chlorophyll <i>a</i> ( $\mu\text{g/L}$ ) mean	4 – 10	No data
Chlorophyll <i>a</i> ( $\mu\text{g/L}$ ) maximum	<15	No data
Secchi disc (feet)	8 – 15	15.1 $\pm$ 3.7
Total Kjeldahl Nitrogen (mg/L)	0.4 – 0.75	No data
Nitrite + Nitrate Nitrogen (mg/L)	<0.01	No data
Alkalinity (mg/L)	40-140	No data
Color (Pt-Color units)	10 – 35	No data
pH	7.2 – 8.3	No data
Chloride (mg/L)	0.6 – 1.2	No data
Total Suspended Solids (mg/L)	<1 – 2	No data
Total Suspended Inorganic Solids (mg/L)	<2	No data
Conductivity ( $\mu\text{mhos/cm}$ )	50 – 250	No data
Total Nitrogen/Total Phosphorus ratio	25:1 – 35:1	No data

A third application of these data is to compare phosphorus concentrations to the Minnesota Pollution Control Agency water quality criterion for swimming and other recreational contact. The Northern Lakes and Forests Ecoregion phosphorus criteria level of 30 micrograms per liter ( $\mu\text{g/L}$ ) serves as the upper threshold for full-support for swimmable use. This concentration corresponds to Carlson's TSI values of 54 or lower.

For the Northern Lakes and Forests ecoregion, summer-mean total phosphorus concentrations above 35  $\mu\text{g/L}$  were associated with nonsupport of aquatic recreational use. At concentrations above about 35  $\mu\text{g/L}$  mild blooms occur over 50 percent of the summer, nuisance blooms (> 20  $\mu\text{g/L}$  of chlorophyll *a*) about 15 percent of the summer.

Phosphorus concentrations above criteria levels would result in greater frequencies of nuisance algal blooms and increased frequencies of "impaired swimming."

Name	Mean Total Phosphorus ( $\mu\text{g/l}$ )	Carlson’s Trophic Stratus Index (secchi)	MPCA Swimming Criterion <sup>1</sup>
Thunder Lake	No data	37.0	Full Support

Based on the phosphorus concentration (estimated using secchi depth) presented above, Thunder Lake “fully supports” recreational use and contact.

The MN Pollution Control Agency web-site provides additional guidance on how to chart and interpret Lake Water Quality, including providing a spreadsheet which can be used to generate interpretive graphs: <http://www.pca.state.mn.us/water/charting.html>, as well as a simple model which allows you to compare what your water quality “should be” based on local influences.

Ultimately all water chemistry (or physical) data is only a measure or reflection of whether the lake or river meets criteria or goals for the water body. Is the lake or river able to support recreational uses without risk to public health? Does it support the best possible fishery? Are the waters as aesthetically attractive as possible?

## 2. Fisheries:

Status of the Thunder Lake fishery (as of June 12, 2000) according to the MN Dept. of Natural Resources fisheries summary:

Big Thunder Lake is a 1330 acre lake in Cass County located seven miles south of Remer. The lake is becoming highly developed with 259 cottages/homes and 4 resorts observed during the survey of 2000. The shoreline has a mixed forest with scattered white pine, red pine and a few nice stands of cedar existing along a gradually sloping shoreline. Hardstem bulrush beds exist scattered along the shoreline and submerged vegetation is present in moderate amounts. The bottom soil types in water less than 4 feet is predominately sand, but large areas of boulder, rubble, and gravel exist. These areas provide excellent spawning habitat for walleye and smallmouth bass.

The 2000 lake survey found northern pike in low numbers, with sizes ranging from 19.3 to 35.7 inches and 71% were at least 24.0 inches. Growth rate was above average. Walleye catch rate of 6.2/gillnet is very good for this lake type. Size ranged from 6.8 to 27.2 inches, and averaged 15.4 inches. A total of 16 different age classes were observed, with fish as old as 20 years. Smallmouth bass were quite abundant in gillnets and ranged in size from 12.3 to 17.6 inches. Largemouth bass were found in moderate numbers while spring electroshocking and sizes ranged from 3.2 to 15.7 inches. Bluegill numbers were very high and size was small. Black crappie were observed in moderate numbers and various sizes.

Some lakes may be stocked on a planned basis. In some instances the stocking has a limited and short-term benefit. DNR fisheries specialist (or private fish biologists) can provide information about the limiting factors for specific fish species on a lake-by-lake basis. These factors may include spawning habitat, nursery areas or protective cover.

In previous years the DNR has had numerous grants to enhance fisheries habitat, most of which require a local cash or "in-kind" (volunteer hours or materials) match. If these grants survive the current state budget crisis the Initiative Foundation funds can be applied to provide some of this cash match.

Virtually all lake associations "support strong fisheries," but the key to a successful and fulfilling role is to define a citizen role that compliments or helps shape DNR programs and strategies.

For Thunder Lake the DNR Area Fisheries Manager is Tim Brastrup, Area Fisheries Manager 1601 Minnesota Drive, Brainerd MN 56401 Phone: (218) 833-8636, email: [tim.brastrup@dnr.state.mn.us](mailto:tim.brastrup@dnr.state.mn.us). In 2002, Mr. Brastrup and his colleagues prepared a fisheries management plan for Thunder Lake which is attached as an appendix to this citizen-based Lake Management Plan. This fisheries goal of the DNR plan is to:

- \* Maintain the walleye abundance at 6.0/gill net with a mean weight of 2.0 lbs., and
- \* Maintain northern pike abundance at 3.0/gill net with a mean weight of 3.0 lbs.

The DNR Fisheries Management Plan also notes the following limiting factors:

"...a low littoral area at 17 percent or 226 acres. Northern pike spawning habitat is very limited, especially since the Laura Lake channel has been closed off. A general scarcity of macrophytes may be limiting to some centrarchid species. Angling success, especially for walleye, may be adversely affected by the lake's high water clarity and large forage base."

### 3. Aquatic Vegetation

In all your discussions, distinguish between beneficial vegetation (wildlife or fish habitat, vegetative buffer zones, native species) and nuisance (impediments to recreation) or exotic/invasive (biological “threats” such as Eurasian milfoil, purple loosestrife, curlyleaf pondweed). It is also important to remember that control of the nuisance kind of vegetation may have adverse impacts on the fishery/wildlife end of things; it is very hard to please everyone. By Minnesota Rule, aesthetics *are not* part of the definition of nuisances. Recreational impairment is the standard used to define nuisance conditions related to aquatic plants.

Another good resource is Ed Feiler at the MN Department of Natural Resources, Regional Fisheries Office, 1601 Minnesota Drive, Brainerd, MN 56401, (218) 825-3001, [ed.feiler@dnr.state.mn.us](mailto:ed.feiler@dnr.state.mn.us). Ed has been helping several HLRP graduates work on Aquatic Vegetation Management Plans, and is an excellent source of critical review. Wayne Mueller is the DNR’s Aquatic plant management specialist for Cass County, and can be contacted at 1601 Minnesota Drive, Brainerd, MN 56401, Phone: (218) 828-2535, Email: [wayne.mueller@dnr.state.mn.us](mailto:wayne.mueller@dnr.state.mn.us).

What surveys, maps, or other assessments have been completed which identify or quantify the location and vitality of remaining aquatic vegetation communities? What values (wildlife, fisheries habitat, etc.) are these areas managed for?

Is your lake association aware of any site-specific assets (such as Lake Demonstration sites) on the lake, or “human resources” (master gardeners, graduates of Extension, DNR, or Community Education classes in lakescaping)?

What institutions have you/could you partner with to encourage “lake friendly” buffer zones or landscaping?

#### 4. Wildlife

The “Blue Book,” *Developing a Lake Management Plan* notes that:

“Minnesota’s lakes are home to many species of wildlife. From our famous loons and bald eagles to muskrats, otters, and frogs, wildlife is an important part of our relationship with lakes. In fact, Minnesota’s abundant wildlife can be attributed largely to our wealth of surface water. From small marshes to large lakes, these waters are essential to the survival of wildlife.

The most important wildlife habitat begins at the shoreline. The more natural the shoreline, with trees, shrubs and herbaceous vegetation, the more likely that wildlife will be there. Just as important is the shallow water zone close to shore. Cattail, bulrush, and wild rice along the shoreline provide both feeding and nesting areas for wildlife. Loons, black terns and red-necked grebes are important Minnesota birds that are particularly affected by destruction of this vegetation. Underwater vegetation is also important to wildlife for many portions of their life cycle, including breeding and rearing of their young.

The primary agency charged with the management of Minnesota’s wildlife is the Department of Natural Resources, Division of Fish and Wildlife, Wildlife Section. For Thunder Lake, the DNR Area Wildlife Manager is Gary Drotts, 1601 Minnesota Drive, Brainerd MN 56401. His phone number is 218-828-2314. His e-mail is [gary.drotts@dnr.state.mn.us](mailto:gary.drotts@dnr.state.mn.us). Pam Perry is the Non-Game Wildlife Specialist, and can be reached at (218) 828-2228, [pam.perry@dnr.state.mn.us](mailto:pam.perry@dnr.state.mn.us).

The Minnesota County Biological Survey has completed the survey for Cass County.

Are there any species of special interest or concern on Thunder Lake? Are there trends that residents find desirable (successful nesting by loons or eagles) or undesirable (Canada goose infestations, “excessively successful beaver”)?

## 5. Exotic Species

This section should review whether surveys have been previously conducted, and whether neighboring lakes have had positive confirmation of the presence of exotic species. If exotic presence is confirmed, has a DNR vegetation management plan been developed?

What is the role of citizens in implementing this plan, or how could you collaborate or otherwise mobilize your local assets? If chemical, biological, or mechanical treatment is prescribed is this viewed as a one-time or short-term treatment, or will long-term support be required?

Could any control/treatment programs be supplemented with programs to reintroduce native species in order to further enhance chances of success?

### Background

"Exotic" species -- organisms introduced into habitats where they are not native -- are severe world-wide agents of habitat alteration and degradation. A major cause of biological diversity loss throughout the world, they are considered "biological pollutants."

Introducing species accidentally or intentionally, from one habitat into another, is risky business. Freed from the predators, parasites, pathogens, and competitors that have kept their numbers in check, species introduced into new habitats often overrun their new home and crowd out native species. In the presence of enough food and favorable environment, their numbers will explode. Once established, exotics rarely can be eliminated.

Most species introductions are the work of humans. Some introductions, such as carp and purple loosestrife, are intentional and do unexpected damage. But many exotic introductions are accidental. The species are carried in on animals, vehicles, ships, commercial goods, produce, and even clothing. Some exotic introductions are ecologically harmless and some are beneficial. But other exotic introductions are harmful to recreation and ecosystems. They have been caused the extinction of native species -- especially those of confined habitats such as islands and aquatic ecosystems.

The recent development of fast ocean freighters has greatly increased the risk of new exotics in the Great Lakes region. Ships take on ballast water in Europe for stability during the ocean crossing. This water is pumped out when the ships pick up their loads in Great Lakes ports. Because the ships make the crossing so much faster now, and harbors are often less polluted, more exotic species are likely to survive the journey and thrive in the new waters.

Many of the plants and animals described in this guide arrived in the Great Lakes this way. But they are now being spread throughout the continent's interior in and on boats and other recreational watercraft and equipment. This guide is designed to help water recreationalists recognize these exotics and help stop their further spread.

### **Eurasian watermilfoil (*Myriophyllum spicatum*)**

Eurasian watermilfoil was accidentally introduced to North America from Europe. Spread westward into inland lakes primarily by boats and also by waterbirds, it reached Midwestern states between the 1950s and 1980s.

In nutrient-rich lakes it can form thick underwater stands of tangled stems and vast mats of vegetation at the water's surface. In shallow areas the plant can interfere with water recreation such as boating, fishing, and swimming. The plant's floating canopy can also crowd out important native water plants.

A key factor in the plant's success is its ability to reproduce through stem fragmentation and runners. A single segment of stem and leaves can take root and form a new colony. Fragments clinging to boats and trailers can spread the plant from lake to lake. The mechanical clearing of aquatic plants for beaches, docks, and landings creates thousands of new stem fragments. Removing native vegetation creates perfect habitat for invading Eurasian watermilfoil.

Eurasian watermilfoil has difficulty becoming established in lakes with well established populations of native plants. In some lakes the plant appears to coexist with native flora and has little impact on fish and other aquatic animals.

Likely means of spread: Milfoil may become entangled in boat propellers, or may attach to keels and rudders of sailboats. Stems can become lodged among any watercraft apparatus or sports equipment that moves through the water, especially boat trailers.

### **Purple loosestrife (*Lythrum salicaria*)**

Purple loosestrife is a wetland plant from Europe and Asia. It was introduced into the East Coast of North America in the 1800s. First spreading along roads, canals, and drainage ditches, then later distributed as an ornamental, this exotic plant is in 40 states and all Canadian border provinces.

Purple loosestrife invades marshes and lakeshores, replacing cattails and other wetland plants. The plant can form dense, impenetrable stands which are unsuitable as cover, food, or nesting sites for a wide range of native wetland animals including ducks, geese, rails, bitterns, muskrats, frogs, toads, and turtles. Many are rare and endangered wetland plants and animals and are also at risk.

Purple loosestrife thrives on disturbed, moist soils, often invading after some type of construction activity. Eradicating an established stand is difficult because of an enormous number of seeds in the soil. One adult plant can disperse 2 million seeds annually. The plant is able to re-sprout from roots and broken stems that fall to the ground or into the water.

A major reason for purple loosestrife's expansion is a lack of effective predators in North America. Several European insects that only attack purple loosestrife are being tested as a possible long-term biological control of purple loosestrife in North America.

Likely means of spread: Seeds escape from gardens and nurseries into wetlands, lakes, and rivers. Once in aquatic system, moving water and wetland animals easily spread the seeds.

## Other Midwestern Aquatic Exotics

**Curly-leaf pondweed** (*Potamogeton crispus*) is an exotic plant that forms surface mats that interfere with aquatic recreation. The plant usually drops to the lake bottom by early July. Curly-leaf pondweed was the most severe nuisance aquatic plant in the Midwest until Eurasian watermilfoil appeared. It was accidentally introduced along with the common carp.

**Flowering rush** (*Botumus umbellatus*) is a perennial plant from Europe and Asia that was introduced in the Midwest as an ornamental plant. It grows in shallow areas of lakes as an emergent, and as a submersed form in water up to 10 feet deep. Its dense stands crowd out native species like bulrush. The emergent form has pink, umbellate-shaped flowers, and is 3 feet tall with triangular-shaped stems.

**Round goby** (*Neogobius melanostomus*) is a bottom-dwelling fish, native to Eastern Europe that entered the eastern Great Lakes in ballast water. They can spawn several times per year, grow to about 10 inches, are aggressive, and compete with native bottom-dwellers like sculpins and log perch. They are expected to be harmful to Great Lakes and inland fisheries.

**Rusty crayfish** (*Orconectes rusticus*) are native to streams in the Ohio, Kentucky, and Tennessee region. Spread by anglers who use them as bait, rusty crayfish are prolific and can severely reduce lake and stream vegetation, depriving native fish and their prey of cover and food. They also reduce native crayfish populations.

**White perch** (*Morone americana*) are native to Atlantic coastal regions and invaded the Great Lakes through the Erie and Welland canals. Prolific competitors of native fish species, white perch have the potential to cause declines of Great Lakes walleye populations.

## 6. Land Use and zoning

The water quality of a lake or river is ultimately a reflection of the land uses within its watershed. While the specific impacts to a lake from various land uses vary as a function of local soils, topography, vegetation, precipitation, and other factors, it is ultimately the land uses which citizens have the most control over through prudent zoning

Many zoning regulations are based upon the Shoreland Management Act and/or the Minnesota Department of Natural Resources (DNR) classification of a given lake. The DNR has classified all lakes within Minnesota as General Development (GD), Recreational Development (RD), or Natural Environmental (NE) lakes, and assigned a unique identification number to the lake for ease of reference. Counties in turn have used these classifications as a tool to establish minimum lot area (width and setbacks) that is intended to protect and preserve the character reflected in the classification.

On any shoreland the permissible density and setbacks for virtually all new uses are determined by the lake or river classification standards established by the Department of Natural Resources. **Thunder Lake** (DNR Lake ID#11-0062) is classified by Cass County as a **General Development** (GD) Lake.

**Natural Environment** lakes are generally small, often shallow lakes with limited capacities for assimilating the impacts of development and recreational use. They often have adjacent lands with substantial constraints for development such as high water tables, exposed bedrock, and unsuitable soils. These lakes, particularly in rural areas, usually do not have much existing development or recreational use. In Cass County, an NE management district is “established to preserve and enhance high quality waters by protecting them from pollution and to protect shorelands of waters which are unsuitable for development; to maintain a low density of development; and to maintain high standards of quality for permitted development.”

**Recreational Development** lakes are generally medium-sized lakes of varying depths and shapes with a variety of landform, soil, and ground water situations on the lands around them. They often are characterized by moderate levels of recreational use and existing development. Development consists mainly of seasonal and year-round residences and recreationally-oriented commercial uses. Many of these lakes have capacities for accommodating additional development and use. In Cass County the RD management district is established to “managed proposed development treasonable consistent with existing development and use; to provide for the beneficial use of public waters by the general public, as well as the riparian owners; to provide for multiplicity of lake uses; and to protect areas unsuitable for residential and commercial uses from development.”

**General Development** lakes are generally large, deep lakes or lakes of varying sizes and depths with high levels and mixes of existing development. These lakes often are extensively used for recreation and, except for the very large lakes, are heavily developed around the shore. Second and third tiers of development are fairly common. The larger examples in this class can accommodate additional development and use. Cass County’s Shoreland Ordinance notes that “the GD management district is established to provide minimum regulations in areas presently developed as high density, multiple use areas; and to provide guidance for future growth of commercial and industrial establishments which require locations on protected waters.”

In Cass County the zoning standards associated with each water body class are:

Class	Min. Lot Size	Min. Lot Width (feet)	Structure Setback (feet)	Setback from Sewage Treatment
NE	80,000 sq ft	200	150	150
RD	40,000 sq ft	150	100	75
GD	30,000 sq ft	100	75	50

Most lakes have numerous properties that are “grand fathered,” or developed prior to the establishment of these restrictions. In general, these pre-existing uses are allowed to remain unless they are identified as a threat to human health or environment, or are destroyed by natural, accidental causes or in association with significant renovation.

Cass County has a web site which offers helpful contact information regarding planning and zoning matters: <http://www.co.cass.mn.us/index.html>. Details on shoreland standards and restrictions and answers to “frequently asked questions” regarding best management practices, resources of education or information, and additional assistance are provided through the Environmental Services Department and Planning and Zoning Department linkages. One may also download an excellent guide, “*Welcome to Cass County: An Environmental Resources and Services directory for residents and businesses*” from this site.

Additional questions may be directed to: Environmental Services Department, County Courthouse, 1st Floor, 300 Minnesota Avenue. P.O. Box 3000, Walker, MN 56484-3000, Phone: 218-547-7241, Fax: 218-547-2440

Are there any additional local municipal jurisdictions that may have additional (and usually more restrictive) standards for land use or setbacks? Local controls can include:

- establishment of appropriate setbacks and vegetative buffers;
- requirement of adequate stormwater retention and treatment;
- limitation of the density of buildings and other impervious surfaces;
- restrictions on the development of sensitive lands like wetlands, those with steep slopes, or areas which cannot support on-site wastewater treatment;
- prohibition or establishment of conditions on higher risk activities like commercial fuel storage, extraction of gravel or other minerals, and storage or disposal of hazardous materials, and
- retention of ice berms.

Have there been trends (such as conversion from seasonal cabins to year round occupancy, or from productive agricultural lands to residential developments)?

What is the “future intended land use” as identified in the County’s Comprehensive Plan and associated ordinances?

What type of development exists on your water body? Is most of it new, and consistent with modern standards, or do you have clusters of older, sub-standard development?

What types of services are provided: on-site wastewater treatment (septics), cluster septics, small-scale “package” wastewater treatment facility, or centralized treatment? What non-residential land uses are present?

Are there any natural features that could make certain areas more prone to problem situations (erosive soils, poorly or excessively drained soils, and steep slopes near shorelands, stormwater discharges (either point or non-point)?

Have areas of open space, vegetative buffer, or other more “natural” features been preserved through zoning, creation of parks, wetland protection standards, land trusts, or other protection measures? What type of future development does the County Comprehensive Plan (or local municipality) indicate is likely (intended) for your drainage?

To a large degree the agencies where you can have the most impact are local planning and zoning and/or boards of adjustment, to help ensure that shoreland protections are upheld and enforced.

Planning and Zoning is clearly a potentially volatile issue, but is without question the one where you have the most “self-determination,” and is an area where state agencies tend to “fear to tread” in deference to local preferences. Do you currently recruit/encourage lake association leaders to volunteer for these bodies? Do you routinely comment or review requests for plat or variance? Do you routinely review the notices of pending local decisions? Do you have a process to make sure this information is routinely shared with affected parties?

You certainly don’t have to engage on any of these levels, but it is strongly advised that you have a policy prior to being asked to engage; this helps you avoid having to re-visit the issue, or make “exceptions” to your policy, so that your participation is viewed as based more on personalities rather than principles. In addition to the Planning Board and Zoning Board of Adjustment, you might also consider formal participation in the County Water Plan Task Force.

You can also contact appropriate local units of government, and request that they formally notify the Lake Association when any regulatory decision is pending within your service area. These would include Cass County Environmental Services Department for the Planning Commission and the Board of Adjustment, and the Cass SWCD for Water Management Planning efforts and Wetland Conservation Act issues. I would suggest that you formally identify your local contact (and perhaps an alternative) and request that these names be added to the mailing list for any public notices, change of land ownership or management policy, etc. (as appropriate for that contact). This will allow you to assess whether the agency/regulatory body is taking your “relationship” as seriously as you do! I would also note that it can’t hurt to re-submit this “contact list” annually, to help the regulators maintain current and accurate information. This sounds formal, but regulatory bodies (and your peer lake associations as well!) have constant turnover, and better safe than sorry.

## **7. Managing water surface use conflicts**

The goal of lake management is to ensure that the lake can continue to provide the benefits that attract homeowners and users. However, conflicts among uses arise almost invariably.

Successful resolution of conflicts lies in the ability of the users to work collaboratively to arrive at acceptable compromises.

The primary agency responsible for managing surface water use conflicts is the Minnesota Department of Natural Resources, Bureau of Information and Education. The Boat and Water Safety Section within the Bureau oversees surface water use and is in charge of administering the Water Surface Use Management (WSUM) program. The goal of this program is to enhance the recreation use, safety and enjoyment of the water surfaces in Minnesota and to preserve these water resources in a way that reflects the state's concern for the protection of its natural resources.

Within this context, any governmental unit may formulate, amend or delete controls for water surface use by adopting an ordinance. Submit the ordinance for approval by the MDNR Boat and Water Safety Coordinator by calling 1 (800) 766-6000 or (651) 296-3336. To gain approval the ordinance must:

- Where practical and feasible accommodate all compatible recreational uses;
- Minimize adverse impacts on natural resources
- Minimize conflicts between users in a way that provides for maximum use, safety and enjoyment, and
- Conform to the standards set in WSUM Rules.

From a practical standpoint, any community considering this action should also consult with their local law enforcement agency (that will largely enforce the local ordinance) to ensure that any restrictions can be effectively enforced.

An alternative or complementary approach is to encourage education and a "community standard" of acceptable behavior. Annual distribution of state standards for hours of operation, setbacks from shorelands, loon nests, swimming areas, and other hazards or sensitive areas helps create "peer pressure" to minimize the types of behavior that tend to lead to the most conflicts.

**Insert comment on the level of concern or conflict regarding this issue here. Any survey results, records of enforcement or property damage, or absence thereof can also help guide/inform your choices.**

## 8. Public water access

Research has shown that Minnesotans rely heavily upon public access sites to access lakes and rivers. A 1988 boater survey conducted by the University of Minnesota showed that three-fourths of the state's boat owners launch a boat at a public water access site at least once a year. In addition, over 80 percent of boat owners report using public water access sites for recreation activities other than boating.

The primary agency responsible for public water accesses in Minnesota is the Minnesota Department of Natural Resources, Trails and Waterways Unit. They are responsible for the acquisition, development and management of public water access sites. The DNR either manages them as individual units or enters into cooperative agreements with county, state, and federal agencies, as well as local units of government such as townships and municipalities. The DNR's efforts to establish and manage public water access sites are guided by Minnesota Statutes and established written DNR policy. The goal of the public water access program is free and adequate public access to all of Minnesota's lake and river resources consistent with recreational demand and resource capabilities to provide recreation opportunities.

According to the 2000 Minnesota Department of Natural Resources Fisheries Survey, there is one public access on Thunder Lake.

<b>Ownership</b>	<b>Type</b>	<b>Description</b>
Minnesota DNR	Concrete	Located on the small bay on the west shore of the southeast arm.

Some lake associations have used this section to outline a plan to encourage DNR to remove or close public access (to make their lakes "more private") until reminded that any lake, which receives fisheries stocking, must also have a public access. The more constructive focus has been to identify management issues such as traffic control, waste management, or provision of restroom facilities, and/or the recognition of "educational opportunities" such as volunteer prop inspections for exotic species, signage to help with exotic identification, etc. Virtually any of the ideas mentioned in the previous sentence represent service opportunities for community clubs or organizations.

## 9. Organizational Development and Communication

In this section detail the information that you would like to accomplish as a lake association. Some items may include communication plans, history, mission statement, membership data, etc. A great resource (which can be provided to you electronically if you wish) is the Institute for Conservation Leadership's publication, *Benchmarking Your Organization's Development*.

“Benchmarking” is a process of measuring how the way that you do things compares to standard and best practices in the field. It involves:

- Identifying “indicators,” measures which tell you whether you’re really effective;
- Setting a standard you wish to reach—a “benchmark”—for those indicators;
- Tracking them;
- Analyzing the results and modifying your practices to meet your “benchmark.”

Many nonprofits already do a form of benchmarking when they set goals for their projects or campaigns, and choose indicators to tell them whether they’ve been successful. For example, a watershed group might set goals for water quality. They might work to limit runoff, and monitor the water quality to see what impact they’re having. But how do we measure an organization’s internal capacity, its ability to be effective and to sustain itself over the long haul?

Done individually, benchmarking can help you manage your own work better, as you reflect on your organization’s development and set directions. Done as a team, it can transform your organization. Together, you can identify areas you want to work on, set goals and develop a systematic way to monitor your progress as you work to reach your goals. Of course, this takes more time and is more complicated than benchmarking alone. But the basic steps are the same.

To begin, have each participant go through the workbook. Then gather together.

### **As a group, assess your organization’s development.**

1. Section by section, list the answer each person has given to each question. Beside the number of the question, write down everybody’s answers.
2. Then look to see whether there are large differences in the answers. If there are, ask the participants to explain them. Do the differences come from:
  - Understanding the question differently?
  - Believing different things about the organization?
  - Having different information?

Is it important to have agreement about the question? It may not be, and in that case, you may want to move onto the next step. If it is, how can you reach agreement? Perhaps there’s more information to be gathered.

### **Identify the benchmarks you do well on, and those that need work.**

1. Calculate the average score for each answer. (Add up all the answers and divide them by the number of participants). Which are the topics that show the highest average scores? Those are probably your strengths. Congratulate yourselves for them.
2. Then identify those areas where the scores are lowest. Which of them are also the questions that participants felt were most urgent to address? Those are probably the areas you think are most important for your organization to work on—those which could really threaten the organization if you don’t deal with them.
3. Finally, consider which areas might offer you the greatest benefits if you worked on them, or which hold the greatest opportunity for you. Those may also be your top priorities.

4. As a group, choose your top priorities for the coming year. One way to do this is simply to take a nonbinding “straw Poll,” by giving each person three or more votes, and letting them cast a vote for each area of work. In this way, you’ll find out which areas are likely to have the most interest on the part of participants. See if you can reduce the number of areas for your work to three. This may be easy, or it may take some discussion. In any case, focusing your efforts will make it easier for you to achieve the goals you do set. Your success will build momentum for next year.

### **Set goals and decide how to measure your progress toward them.**

1. Consider the benchmarks you’ve identified as high priority. Discuss in the group:
  - Where do you want to be in a year or five years?
  - How would you know if you’d arrive there?
  - How would you measure your progress? (The ways you choose to measure your progress are called “indicators.”)
2. Individually, have participants write down what they think would be reasonable goals for the next year for each indicator.
3. Share the goals with one another, then discuss them.
4. Reach agreement, and set your goals.
5. Then decide how you’ll measure them and who’ll be responsible for collecting the data.

### **Plan your next steps.**

What are the individual steps on the way toward your goal? They may be obvious so that your group can plan them right now. Or you may need to do some research, or consult with mentors or sister organizations that have faced similar challenges. When you plan, make sure that the people who will carry out the actions are involved in deciding what they are. When you’ve decided the steps you’ll take to reach your goals, write them down. You may want to include them as a part of your strategic or annual plan.

Make sure that you also plan how you’re going to monitor your indicators for progress. Will you have updates at Board meetings? At staff meetings? On regularly scheduled conference calls? This ingredient is essential to turning your dreams into reality.

### **Monitor your progress regularly.**

At regular times throughout the year, reread your goals and see how you’re doing. Just looking through the list again will remind you of what you set out to accomplish, encourage you when you see your progress, and motivate you to include the organizational development in your ongoing activities. When you discuss your progress in a group, you may decide to modify your benchmarks, or to revise your action plan for reaching them. Hold yourselves to high standards, and you’re likely to attain them.

### **In a year, evaluate yourselves and plan again!**

If you’re like folks in many organizations we know, you’ll have made some real strides toward your goals. You’ll also have new ideas for the future that you’re creating together.

## Summary of Visioning/Planning Session

- Insert visioning notes here!
- When was the session held, and what kind of turnout did you have?
- What were the priority goals identified, and how did you define what success would look like?
- What organizational or community assets did you identify?
- Who wasn't present but needs to be invited to participate in the future?
- What issues/options require more research, and who is responsible for following up on this?

## **Prioritized Goals and Action Plan**

The final chapter of our lake management plan summarizes the conclusions and priority action we have chosen to work on at this time. Specifically, for each priority action we have down our best to answer (for each goal presented):

- What are the criteria for measuring success (measured as outcomes, not effort)?
- What is our schedule for implementation (What needs to happen in the next 30 days, 60 days, one-year out)?
- Who is responsible for implementation or measurement (name names!)?
- What is the budget for this action/goal?
- Is this an on going action/goal, or a one-time effort? If on-going will we require additional funds for full implementation?

Following this format, the remaining pages identify our top priorities, what our goals for each priority are, and how, who, and when we will implement action for each of these priorities.

You are not required to complete the next two pages (28-29), but you may find them helpful as a tool to answer the above questions. Not coincidentally, they also represent the “meat” of the Healthy Lakes & Rivers Partnership implementation grant application (for up to \$5,000 of matching funds), so if you are able to complete these pages for your top priorities the hard work of the application is virtually completed.

## Grantee Action Plan and Evaluation Form

<b>Grantee Organization:</b>	
<b>Project Coordinator:</b>	
<b>Phone/Email:</b>	
<b>Project Title:</b>	

**Summary of Project**  
(1 or 2 sentences)

**\*Note:** At least one objective should answer the question, "So What?" What difference will your project make in your community, in changed lives, in new skills, knowledge, behaviors, or attitudes? Can you measure that change?

**\*Objective #1**  
(must be measurable results, not just effort)

**Action Plan-**  
What steps need to be done to achieve this objective:

Action	By When	Person Responsible
<b>1.</b>		
<b>2.</b>		
<b>3.</b>		
<b>4.</b>		

**Expected Result:**

**Results:** \*Please note: the remaining questions are to be filled out at mid term (if grant exceeds \$5,000) and at end of grant period for evaluation purposes.

**Objective #1**  
**Mid-point Result** (fill out at mid-point ONLY if grant exceeds \$5,000)

**Objective #1**  
**Actual Result** (to be completed at end of grant period for final report)

	Initiative Foundation use only
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## Grantee Action Plan and Evaluation Form

**\* Objective**  
#\_\_\_ (must be measurable results, not just effort)

**Action Plan-**What steps need to be done to achieve this objective:

<b>Action</b>	<b>By When</b>	<b>Person Responsible</b>
<b>1.</b>		
<b>2.</b>		
<b>3.</b>		
<b>4.</b>		
<b>Expected Result:</b>		

**Results:** \*Please note: the remaining questions are to be filled out at mid term (if grant exceeds \$5,000) and at end of grant period for evaluation purposes.

**Objective #\_\_\_**  
**Mid-point Result**  
(fill out at mid-point ONLY if grant exceeds \$5,000)

--

**Objective #\_\_\_**  
**Actual Result** (to be completed at end of grant period for final report)

	Initiative Foundation Use Only
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**\*Please copy this page for any additional objectives you have that pertain to this project.**

**Appendix I**  
**DNR Fisheries Management Plan**

## Glossary

**Aerobic:** Aquatic life or chemical processes that require the presence of oxygen.

**Algal bloom:** An unusual or excessive abundance of algae.

**Alkalinity:** Capacity of a lake to neutralize acid.

**Anoxic:** The absence of oxygen in a water column or lake; can occur near the bottom of eutrophic lakes in the summer or under the ice in the winter.

**Benthic:** The bottom zone of a lake, or bottom-dwelling life forms.

**Best Management Practices:** A practice determined by a state agency or other authority as the most effective, practicable means of preventing or reducing pollution.

**Bioaccumulation:** Build-up of toxic substances in fish (or other living organism) flesh. Toxic effects may be passed on to humans eating the fish.

**Biological Oxygen Demand:** The amount of oxygen required by aerobic microorganisms to decompose the organic matter in sample of water. Used as a measure of the degree of water pollution.

**Buffer Zone:** Undisturbed vegetation that can serve as to slow down and/or retain surface water runoff, and assimilate nutrients.

**Chlorophyll *a*:** The green pigment in plants that is essential to photosynthesis.

**Clean Water Partnership (CWP) Program:** A program created by the legislature in 1990 to protect and improve ground water and surface water in Minnesota by providing financial and technical assistance to local units of government interested in controlling nonpoint source pollution.

**Conservation Easement:** A perpetual conservation easement is a legally binding condition placed on a deed to restrict the types of development that can occur on the subject property.

**Cultural eutrophication:** Accelerated “aging” of a lake as a result of human activities.

**Epilimnion:** Deeper lakes form three distinct layers of water during summertime weather. The epilimnion is the upper layer and is characterized by warmer and lighter water.

**Eutrophication:** The aging process by which lakes are fertilized with nutrients.

**Eutrophic Lake:** A nutrient-rich lake – usually shallow, “green” and with limited oxygen in the bottom layer of water.

**Exotic Species:** Any non-native species that can cause displacement of or otherwise threaten native communities.

**Fall Turnover:** In the autumn as surface water loses temperature they are “turned under” (sink to lower depths) by winds and changes in water density until the lake has a relatively uniform distribution of temperature.

**Feedlot:** A lot or building or a group of lots or buildings used for the confined feeding, breeding or holding of animals. This definition includes areas specifically designed for confinement in which manure may accumulate or any area where the concentration of animals is such that a vegetative cover cannot be maintained. Lots used to feed and raise poultry are considered to be feedlots. Pastures are not animal feedlots.

**Groundwater:** water found beneath the soil surface (literally between the soil particles); groundwater is often a primary source of recharge to lakes.

**Hardwater:** Describes a lake with relatively high levels of dissolved minerals such as calcium and magnesium.

**Hypolimnion:** The bottom layer of lake water during the summer months. The water in the hypolimnion is denser and much colder than the water in the upper two layers.

**Impervious Surface:** Pavement, asphalt, roofing materials or other surfaces through which water cannot drain. The presence of impervious surfaces can increase the rates and speed of runoff from an area, and prevents groundwater recharge.

**Internal Loading:** Nutrients or pollutants entering a body of water from its sediments.

**Lake Management:** The process of study, assessment of problems, and decisions affecting the maintenance of lakes as thriving ecosystems.

**Littoral zone:** The shallow areas (less than 15 feet in depth) around a lake’s shoreline, usually dominated by aquatic plants. These plants produce oxygen and provide food, shelter and reproduction areas for fish & animal life.

**Local Unit of Government:** A unit of government at the township, city or county level.

**Mesotrophic Lake:** A lake that is midway in nutrient concentrations (between a eutrophic and oligotrophic lake). Characterized by periodic problems with algae blooms or problem aquatic vegetation.

**Native Species:** An animal or plant species that is naturally present and reproducing.

**Nonpoint source:** Polluted runoff – nutrients or pollution sources not discharged from a single point. Common examples include runoff from feedlots, fertilized lawns, and agricultural fields.

**Nutrient:** A substance that provides food or nourishment, such as usable proteins, vitamins, minerals or carbohydrates. Fertilizers, particularly phosphorus and nitrogen, are the most common nutrients that contribute to lake [eutrophication](#) and nonpoint source pollution.

**Oligotrophic Lake:** A relatively nutrient-poor lake, characterized by outstanding water clarity and high levels of oxygen in the deeper waters.

**Nutrient:** A substance that provides food or nourishment, such as usable proteins, vitamins, minerals or carbohydrates. Fertilizers, particularly phosphorus and nitrogen, are the most common nutrients that contribute to lake [eutrophication](#) and non-point source pollution.

**pH:** The scale by which the relative acidity or basic nature of waters are assessed,

**Photosynthesis:** The process by which green plants produce oxygen from sunlight, water and carbon dioxide.

**Phytoplankton:** Algae – the base of the lake’s food chain, it also produces oxygen.

**Point Sources:** Specific sources of nutrient or pollution discharge to a water body, i.e., a stormwater discharge pipe.

**Riparian:** The natural ecosystem or community associated with river or lake shoreline.

**Secchi Disc:** A device measuring the depth of light penetration in water.

**Sedimentation:** The addition of soils to lakes, which can accelerate the “aging” process by destroying fisheries habitat, introducing soil-bound nutrients, and filling in the lake.

**Spring turnover:** After ice melts in the spring, warming surface water sinks to mix with deeper, colder water. At this time of year all water is the same temperature.

**Thermocline:** During summertime deeper lakes stratify by temperature to form three discrete layers; the middle layer of lake water is known as the thermocline.

**Trophic Status:** The level of growth or productivity of a lake as measured by phosphorus, content, algae abundance, and depth of light penetration.

**Watershed:** The surrounding land area that drains into a lake, river, or river system.

**Zooplankton:** Microscopic animals.

## Common Biological or Chemical Abbreviations

BOD	Biological Oxygen Demand
°C	degree(s) Celsius
cfs	cubic feet per second (a common measure of rate of flow)
cfu	colony forming units (a common measure of bacterial concentrations)
chl <i>a</i>	Chlorophyll <i>a</i>
cm	centimeter
COD	Chemical Oxygen Demand
Cond	conductivity
DO	dissolved oxygen
FC	fecal coliform (bacteria)
ft	feet
IR	infrared
l	liter
m	meter
mg	milligram
ml	milliliter
NH <sub>3</sub> -N	nitrogen as ammonia
NO <sub>2</sub> -NO <sub>3</sub>	nitrate-nitrogen
NTU	Nephelometric Turbidity Units, standard measure of turbidity
OP	Ortho-phosphorus
ppb	parts per billion
ppm	parts per million
SD	Standard Deviation (statistical variance)
TDS	total dissolved solids
TN	total nitrogen
TP	total phosphorus
TSI	trophic status index
TSI (C)	trophic status index (based on chlorophyll <i>a</i> )
TSI (P)	trophic status index (based on total phosphorus)
TSI (S)	trophic status index (based on secchi disc transparency)
TSS	total suspended solids
µg/l	micrograms per liter
µmhos/cm	micromhos per centimeter, the standard measure of conductivity
UV	Ultraviolet

## **Guide to common acronyms**

### ***State and Federal Agencies***

BWSR	Board of Soil & Water
COE	U.S. Army Corps of Engineers
CRP	Conservation Reserve Program - A federal government conservation program
DNR	Department of Natural Resources
DOJ	United States Department of Justice
DOT	Department of Transportation
DTED	Department of Trade and Economic Development
EPA	U.S. Environmental Protection Agency
EQB	MN Environmental Quality Board
LCMR	Legislative Commission on Minnesota Resources
MDH	Minnesota Department of Health
MPCA	Minnesota Pollution Control Agency
OEA	MN Office of Environmental Assistance
OSHA	Occupational Safety and Health Administration
RIM	Reinvest In Minnesota - a State of Minnesota Conservation Program
SCS	Soil Conservation Service
SWCD	Soil & Water Conservation District
USDA	United States Department of Agriculture
USGS	United States Geological Survey
USFWS	United States Fish & Wildlife Service

### ***Regional, watershed, community development, trade and advocacy groups***

ACCL	Association of Cass County Lakes
AMC	Association of Minnesota Counties
APA	American Planning Association
COLA	Coalition of Lake Associations
IF	Initiative Foundation
LARA	Cass County Lakes & Rivers Alliance
LMC	League of Minnesota Cities
MAT	Minnesota Association of Townships
MLA	Minnesota Lakes Association
MSBA	Minnesota School Board Association
MCIT	Minnesota Counties Insurance Trust
Mid-MnMA	Mid-Minnesota Association of Builders
MLA	Minnesota Lakes Association
MnSCU	Minnesota State Colleges and Universities
RCM	Rivers Council of Minnesota
TIF	Tax Increment Financing

### ***Codes and Regulations***

110B	The Minnesota law that regulates non-metro county water plans
ADA	American Disabilities Act
B & B	Bed and Breakfast
BOA	Board of Adjustment
Chapter 70/80	Individual Sewage Treatment Standards
CIC Plat	Common Interest Community Plat
Class V	Class Five “Injection” well; any well which receives discharge
CSAH	County State Aid Highway
CUP	Conditional Use Permit
CWA	Clean Water Act
EAW	Environmental Assessment Worksheet
EIS	Environmental Impact Statement
EOA	Equal Opportunity Act
FOIA	Freedom of Information Act
GD	General Development (lake)
GLAR	Greater Lakes Area Association of Realtors
IAQ	Indoor Air Quality
ISTS	Individual Sewage Treatment System
LMP	Lake Management Plan
LQG	Large Quantity Generator (of hazardous waste)
MAP	Minnesota Assistance Program
OHW	Ordinary High Water
PUD	Planned Unit Development
RD	Recreational Development (lake)
ROD	Record of Decision
ROW	Right-of-Way
SBC	State Building Code
SDWA	Safe Drinking Water Act
SF	Square feet
SIZ	Shoreland Impact Zone
SQG	Small Quantity Generator (of hazardous waste)
SWMP	Stormwater Management Plan
UBC	Universal Building Code