BRIGGS LAKE CHAIN ASSOCIATION

HEALTHY LAKES PARTNERSHIP

Lake Management Plan:

SAVING OUR LAKES FOR THE FUTURE

2012-2015

MARCH, 2012

TABLE OF CONTENTS

Prepared by the BLCA Healthy Lakes Committee
Kenzie Phelps and Walt Munsterman Co-Chairs

HEALTHY LAKES PARTNERSHIP
BRIGGS LAKE CHAIN ASSOCIATION

INTRODUCTION

In the summer of 2002 eight people from the Briggs Lake Chain Association participated in the Healthy Lakes Program sponsored by the Initiative Foundation, the Elk River Watershed Board, the Sherburne Soil and Water Conservation District and others. The goal of the program was to train participants in the continuing development of our Lake Management Plan designed is to maintain and improve the quality of our lakes so they will remain usable in the future.

On June 15, 2002, the Briggs Lake Chain Association held a visioning session attended by twenty- five persons. The focus was to discover how association members and other community persons viewed our lakes, which ultimately led to the 2003 Healthy Lakes Plan.

The Briggs Lake Association adopted the 2003 Healthy Lakes Plan as part of the association's planning process, and has been implementing the plan each year since. The BLCA board updates it's vision annually and sets goals for the following calendar year. The Healthy Lakes Committee has taken the responsibility to manage and update the Healthy Lakes Plan for 2007 and beyond. Within the association the plan is referred to as our "lake management plan".

EXECUTIVE SUMMARY

The overall purpose is to improve and maintain the water quality of the Briggs Lake Chain and connecting waterways. There are three primary goal areas addressing the water quality improvement strategy in the lake management plan.

Shoreline and In-water Vegetation
Land Use and Zoning
Water Quality Monitoring

Each goal area has one or more specific goals as stated in the BLCA yearly goals.(See appendix 1 for present goals.)

SUMMARY OF LAKE CHARACTERISTICS

The Briggs Lake Chain Association is made up of members from four lakes and the surrounding area. Briggs, Rush, Julia are lakes connected by channels and Big Elk Lake is located a short distance away and has water running into it from the Elk River and Lily Creek which is the out source from the other three lakes.

The sizes of the lakes are as follows: Big Elk Lake-352 acres with a watershed area of 154,381 acres, Briggs-406 acres, Julia-137 acres and Rush 161 acres with a watershed of 9,588 for all three. All four lakes are located in Sherburne County.

All of the lakes are considered shallow lakes with Briggs ranging from 25 feet to the others at about 15 feet or less.

Shoreland zoning for Big Elk is General Development and Briggs, Julia and Rush Recreational Development.

At present there are over 500 seasonal and permanent homes directly on the four lakes. In addition there are many homes near the lakes and in the watershed area.

DESCRIPTION OF THE WATERSHED

The Watershed and Hydrology of the Lakes

The Briggs Lake Chain and Big Elk Lake watersheds are sub-watersheds of the Elk River Watershed, which is part of the Upper Mississippi River Basin (Map 1). All of the lakes would be considered “drainage” or “flow through” lakes in that streams flow into and out of the lakes. Briggs Creek flows into Briggs Lake from the northeast and a small creek enters Lake Julia from the northeast. As stated, Lily Creek is the outflow for these three lakes. The Elk River flows through Big Elk Lake entering the lake at the northwest and exiting to the southeast. During periods of high water following spring runoff and heavy rains the Elk River often overflows its banks flowing into Briggs Lake through the “bayou”, a channel located at the southwest end of Briggs Lake.

Drainage lakes typically have relatively large watersheds. For comparison, seepage lakes, which receive most of their water from ground water and lack stream inlets and outlets have relatively small watersheds. The ratio of watershed size to lake area size is one predictor of expected water quality. Lakes with large watershed to lake area ratios are predicted to have higher levels of nutrients and productivity as compared to lakes with small watershed to lake area ratios that are otherwise similar in depth and land use.

Precipitation

Precipitation is well distributed throughout the growing season. In Sherburne County, National Weather Service monitoring sites are located at the St. Cloud Airport, near Santiago and in Elk River. The 30-year average annual precipitation is 27.43 inches for St. Cloud, 30.63 inches for Santiago and 29.58 inches for Elk River. An average of 19.47 inches (for Santiago) falls during the growing season (May-Sept).

Soils and Topography of the Briggs Lake Chain and Big Elk Lake Watershed

Deposits left by retreating glaciers formed the topography and soils of the watershed. The topography and soils of the watershed can be divided into two general areas. Glacial tills

associated with moraines and drumlin fields comprise the upper portion of the watershed. Soils are predominantly loamy in this area. On this landscape, soil infiltration rates are low and runoff tends to rapidly concentrate in low areas where intermittent streams carry runoff to main channels. These soils are susceptible to water erosion. The lower part of the watershed, which includes all four lakes, consists of sandy out wash and sand and gravel deposits associated with river terrace. Upland soils in this portion of the watershed are predominantly coarse textured and have a high infiltration rate. Because of the gently sloping topography and well-drained sandy soils, this part of the watershed is not as susceptible to erosion from water. Wind erosion, however, is a common problem. Because of the rapid movement of water through these soils the shallow ground water is susceptible to pollution from surface sources. Wetlands and lakes occupy low areas throughout the watershed. Approximately 9% of the total area of the watershed consists of wetlands and lakes. Wetlands are characterized by soils with high organic content.

Land Use

The approximate land use for the watersheds is:

	Forest	Water and Marsh	Pasture and Open	Cultivated	Urban Residential
Briggs Chain	23%	12%	25%	27%	13%
Big Elk Lake	13%	9%	34%	42%	2%
North Central Hardwoods Forest	6 – 25%	14 – 30%	11 – 25%	22 – 50%	2 – 9%

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.

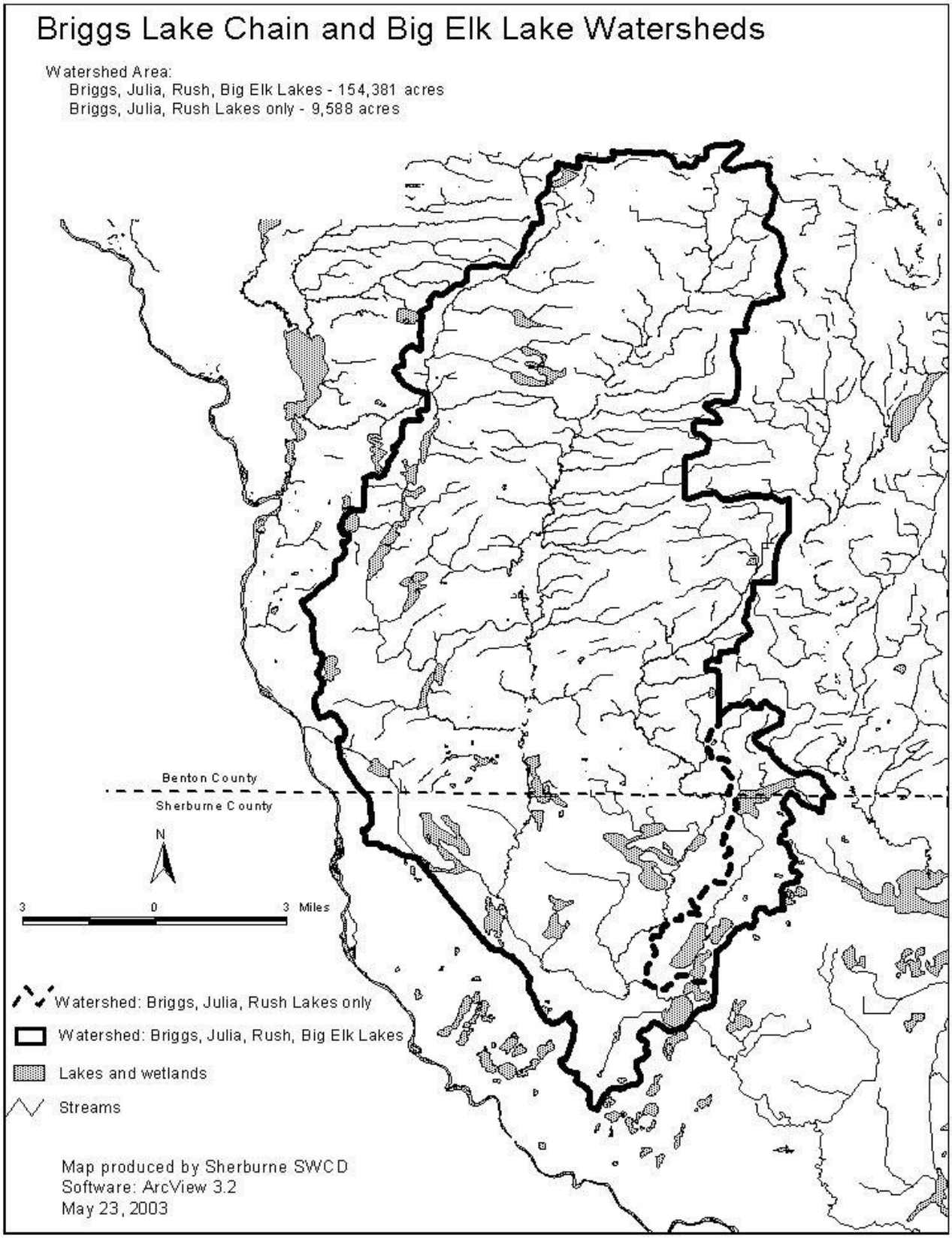
Big Elk Lake is a GD lake, and Briggs, Julia and Rush are RD. In Sherburne County the zoning standards associated with each water body class are:

Class	Min. Lot Size	Min. Lot Width (feet)	Structure Setback (feet)	Setback from Sewage Treatment
NE	* see note below	200	150	150
RD	* see note below	150	100	100
GD	* see note below	150	75	75

* For new development, Sherburne County requires that lot sizes adhere to the underlying zoning requirement for the district. The Briggs Chain and Big Elk Lake are in the Agricultural District. The minimum lot size in the Agricultural District is 5 acres although lots may be smaller for Planned Unit Developments.

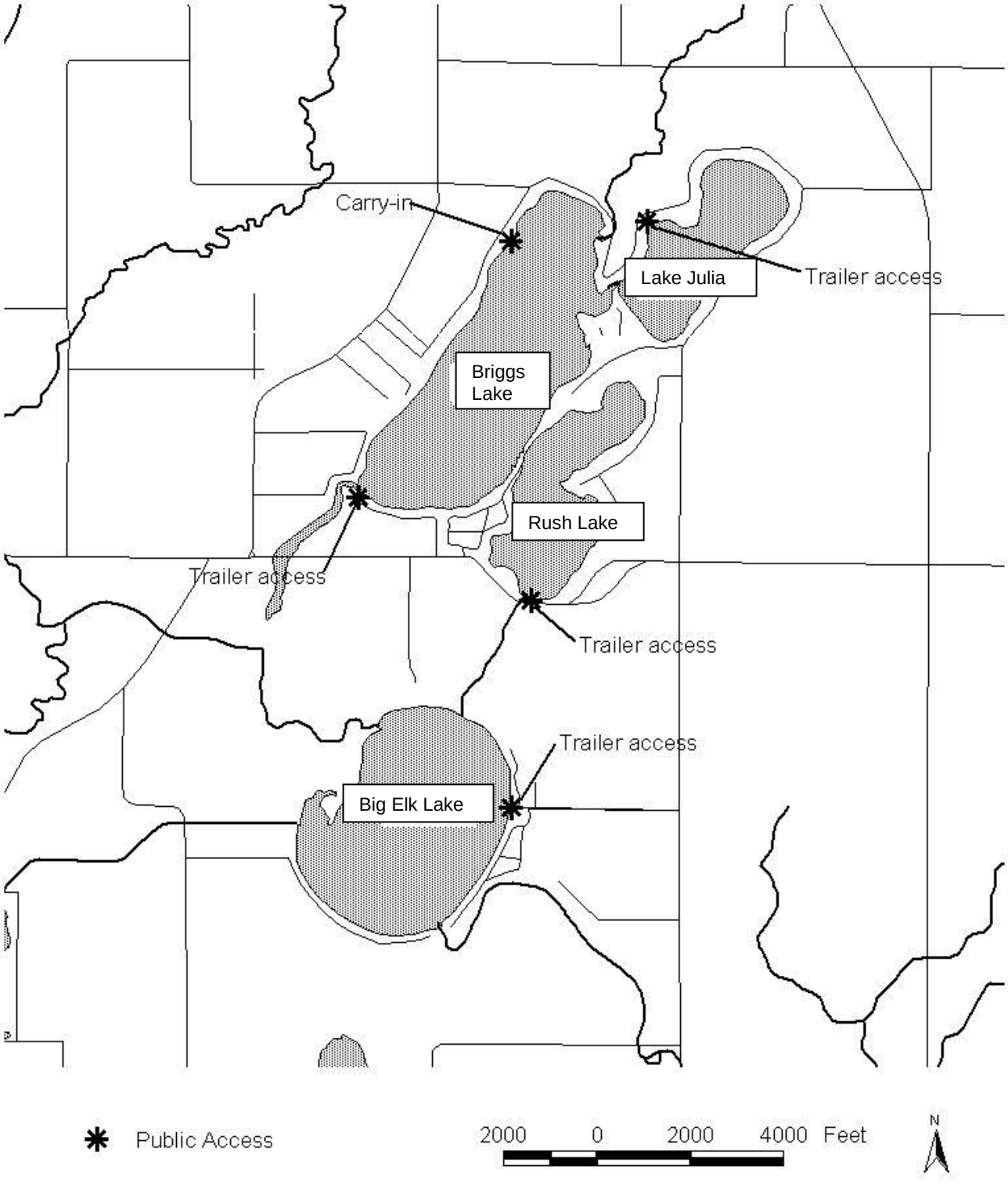
Most lakes have numerous properties that are “grand fathered,” or developed prior to the establishment of these restrictions. In general, these pre-existing uses are allowed to remain unless they are identified as a threat to human health or environment.

Watersheds


Briggs Lake Chain and Big Elk Lake Watersheds
Watershed Area:
Briggs, Julia, Rush, Big Elk Lakes - 154,381 acres
Briggs, Julia, Rush Lakes only - 9,588 acres
Benton County
Sherburne County
N
3
0
3 Miles
Watershed: Briggs, Julia, Rush Lakes only
Watershed: Briggs, Julia, Rush, Big Elk Lakes
Lakes and wetlands
Streams
Map produced by Sherburne SWCD
Software: ArcView 3.2
May 23, 2003

Public Access Locations

There are trailer accesses on Briggs, Julia, Rush and Big Elk and a canoe carry in access on Briggs.



Water Quality

The lakes are located in the part of Minnesota known as the North Central Hardwoods Forest Ecoregion [NCHF]. This is significant for evaluating water quality data and expectations since typical ranges and predicted water quality are based on ecoregion data sets.

Secchi Disc monitoring provides information on a lake's water quality by gauging the transparency of the water. Secchi transparency data can be used to convey information on the quality of lakes and is directly related to the amount of algae (chlorophyll *a*) growth in the lake. The relative abundance of algae in a lake is dependent on the availability of plant nutrients. Generally phosphorus is the "limiting" or most important nutrient for algae growth in the NCHF Ecoregion.

Water quality data for the Briggs Lake Chain and Big Elk Lake is available from several sources. Sherburne County has contracted with St. Cloud State University to monitor water quality every 3 to 4 years starting in 1982. Secchi Disc data is also available from participation in the MPCA's Citizen Lake Monitoring Program (CLMP).

This information is available at the following sites:
MPCA—HTTP://www.pca.state.mn.us/data/edaWater/index.cfm
DNR-----HTTP://www.dnr.state.mn.us/lakefind/results.html

Lake ID Numbers:
Big Elk ----------71-0141
Briggs----------71-0146
Rush----------71-0147
Julia----------71-0145

.
The typical range of Secchi Disc transparency for the NCHF ecoregion is 4.9 to 10.5 feet (the 25 to 75 percentile range).

The term "trophic status" refers to the level of productivity in a lake (the relative amount of algae growth) as measured by phosphorus content, algae abundance, and depth of light penetration measured with a Secchi Disc. Lakes are often classified according to four levels of trophic status:

OLIGOTROPHIC LAKE: A relatively nutrient-poor lake, it is clear and deep with bottom waters high in dissolved oxygen.

MESOTROPHIC LAKE: Midway in nutrient levels between the Eutrophic and Oligotrophic lakes.

EUTROPHIC LAKE: A nutrient-rich lake--usually shallow, "green", and with limited oxygen in the bottom layer of water.

HYPEREUTROPHIC LAKE: Has the highest nutrient concentrations and algae, and are often characterized as "green" with strong odors.

Carlson's Trophic State Index (TSI) is a common scale used for characterizing a lake's trophic status or productivity. The TSI can be calculated from the Secchi Disc transparency, chlorophyll-a, and total phosphorus measurements. All three parameters are available for the Briggs Chain of lakes and for Big Elk Lake.

The following table provides an indication of the expected Trophic Status of lakes given one or more of three water quality parameters. The Trophic State Index can be calculated for a lake given any three of the indicators.

Relationship between trophic status and water quality parameters

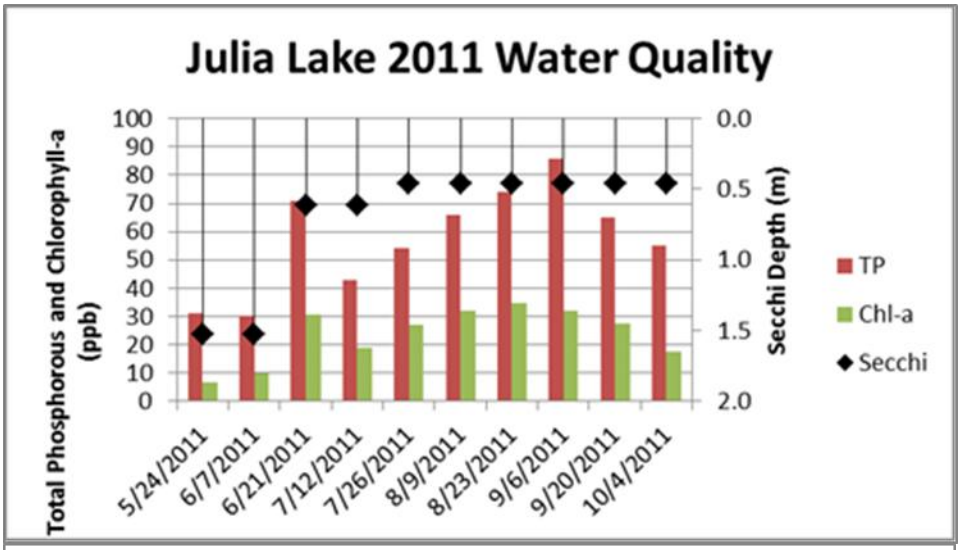
Parameter	**Oligotrophic**	**Mesotrophic**	**Eutrophic**	**Hypereutrophic**
Trophic State Index	<40	41-50	51-65	>65
Total Phosphorous (ug/L)	<12	13-25	26-66	>66
Chlorophyll-A (ug/L)	<3	3-7	8-33	>34
Secchi Transparency (ft)	>12.1	12.1 - 5.9	5.9 – 2.6	<2.6

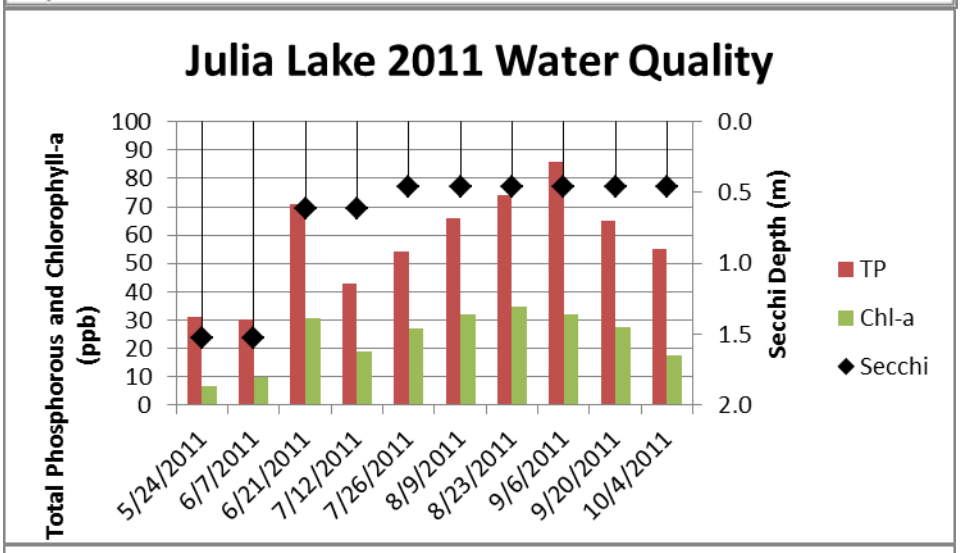
Using the available data for Secchi disc transparency, total phosphorus and chlorophyll-a and the above table, the long term average TSI and trophic status of the lakes would be determined as:

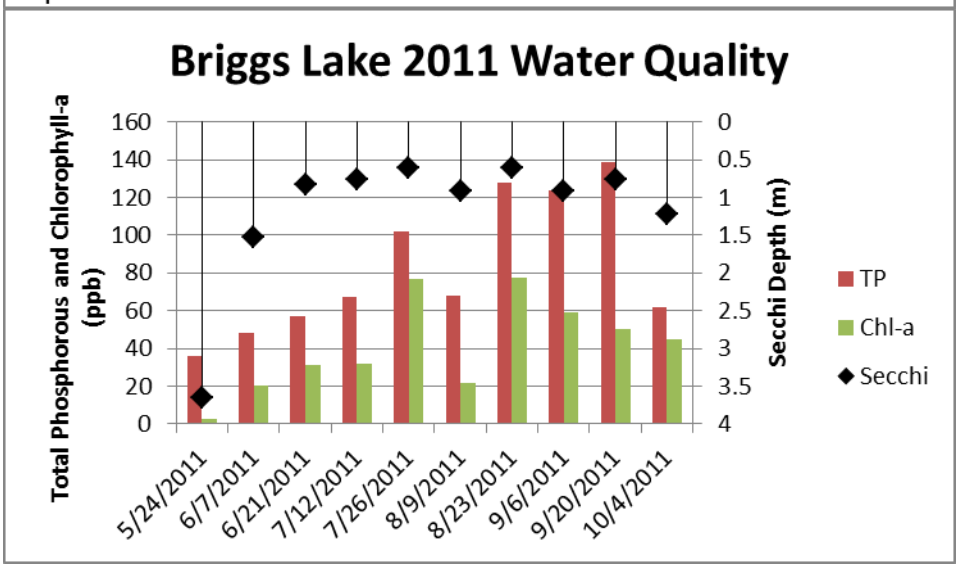
	Trophic State Index - Secchi Disc	Trophic State Index – Total Phosphorus	Trophic State Index – Chorophyll-a	Trophic Status
Briggs Lake	58	72	64	Eutrophic
Lake Julia	62	70	61	Eutrophic
Rush Lake	66	75	67	Hypereutrophic
Big Elk Lake	70	82	73	Hypereutrophic

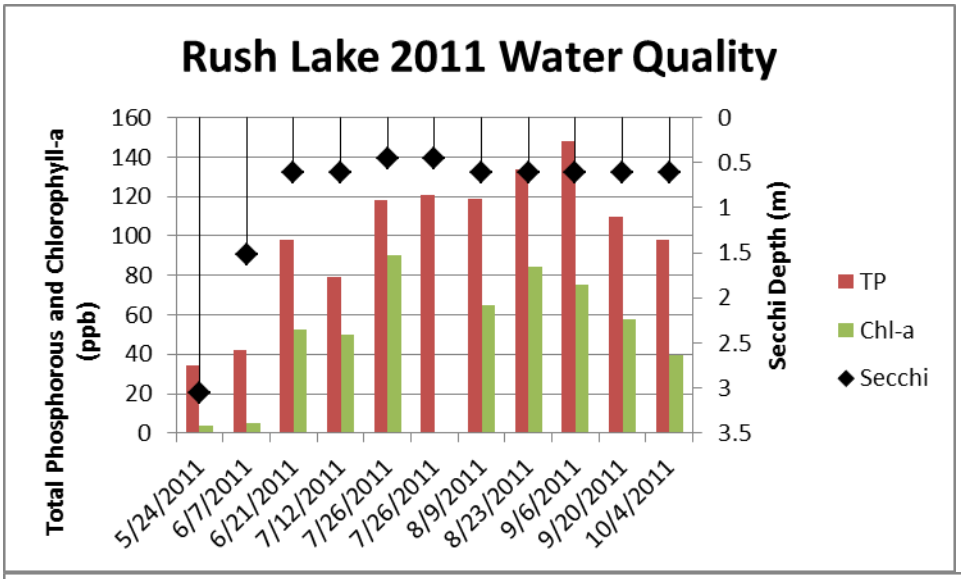
The above table shows the average TSI values based on long-term averages however the calculated TSI fluctuates from year to year with variations in rainfall and temperature patterns. Calculating the TSI using each of the three parameters results in somewhat different values. By evaluating the TSI calculated from each of the three parameters, the best estimate of the trophic status of the lakes can be determined.

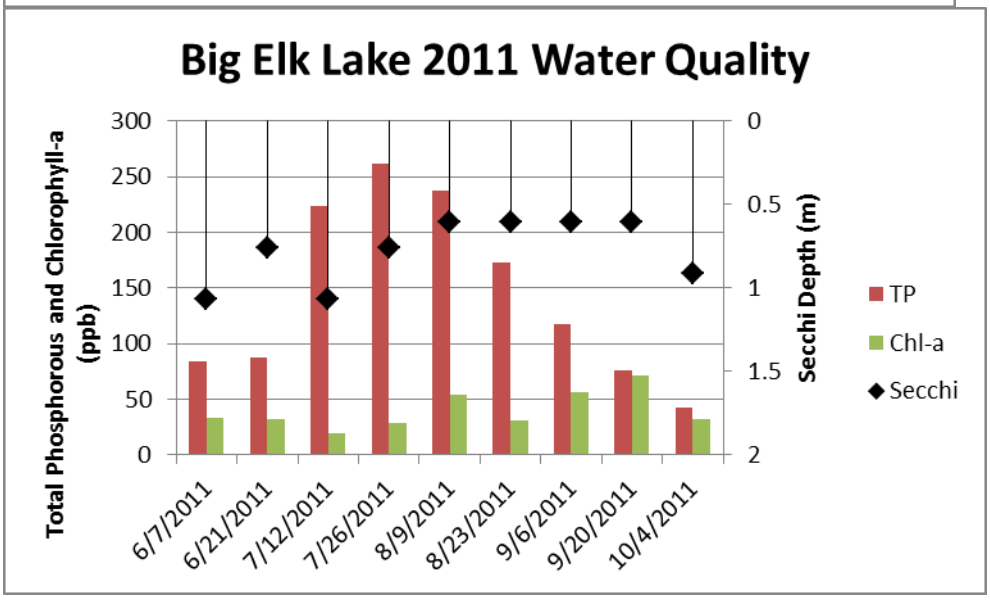
Following is the latest data from the ongoing water testing program monitored by the Healthy Lakes Committee:

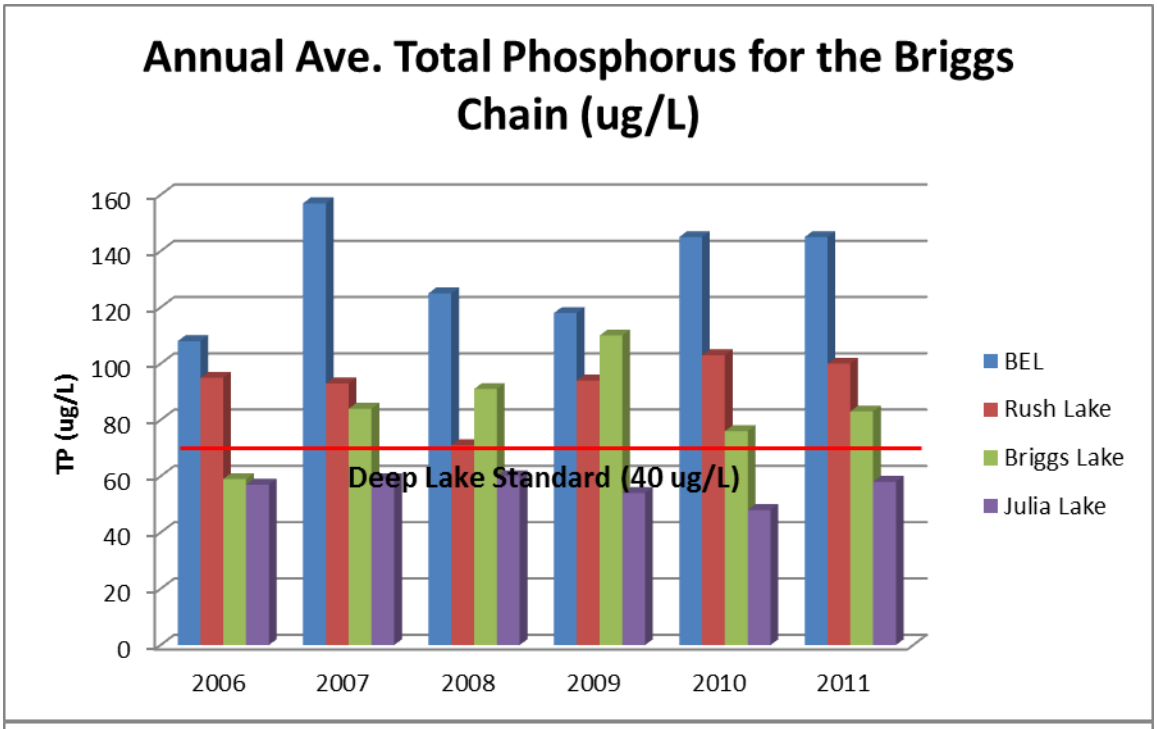

Julia Lake 2011 Water Quality
Total Phosphorous and Chlorophyll-a (ppb)
Secchi Depth (m)
TP
Chl-a
Secchi
5/24/2011
6/7/2011
6/21/2011
7/12/2011
7/26/2011
8/9/2011
8/23/2011
9/6/2011
9/20/2011
10/4/2011

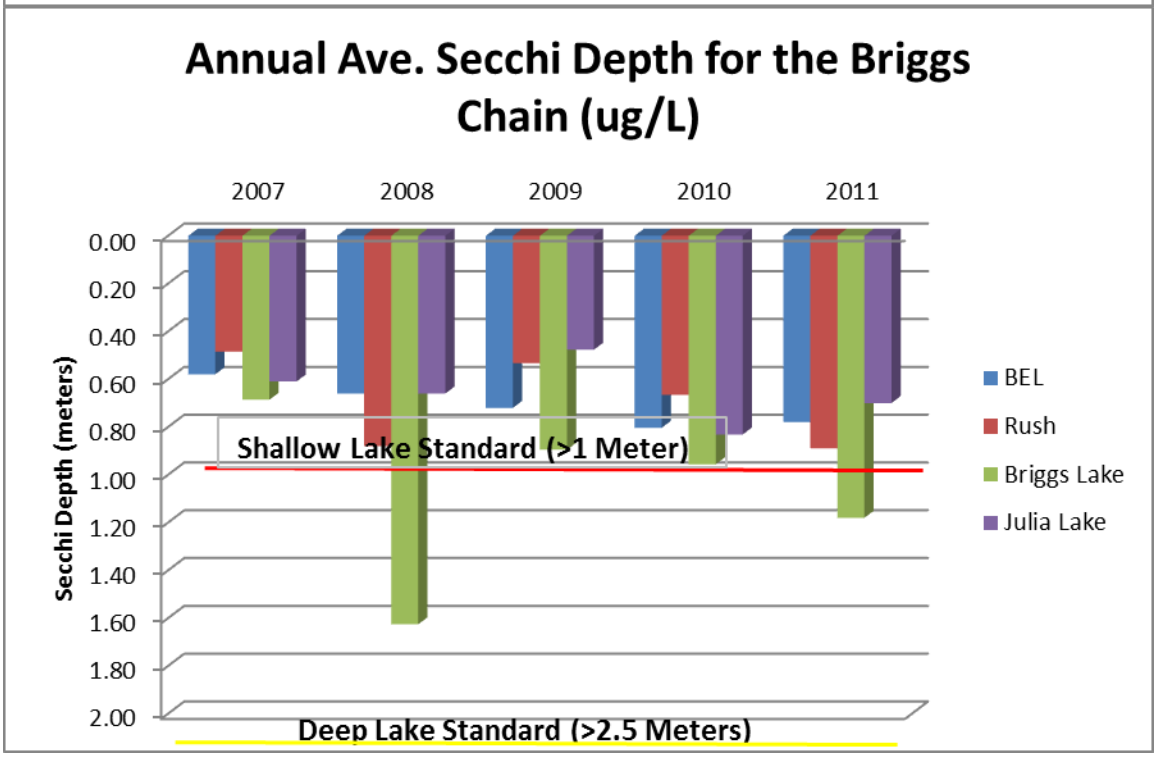

Julia Lake 2011 Water Quality
Total Phosphorous and Chlorophyll-a (ppb)
Secchi Depth (m)
TP
Chl-a
Secchi
5/24/2011
6/7/2011
6/21/2011
7/12/2011
7/26/2011
8/9/2011
8/23/2011
9/6/2011
9/20/2011
10/4/2011

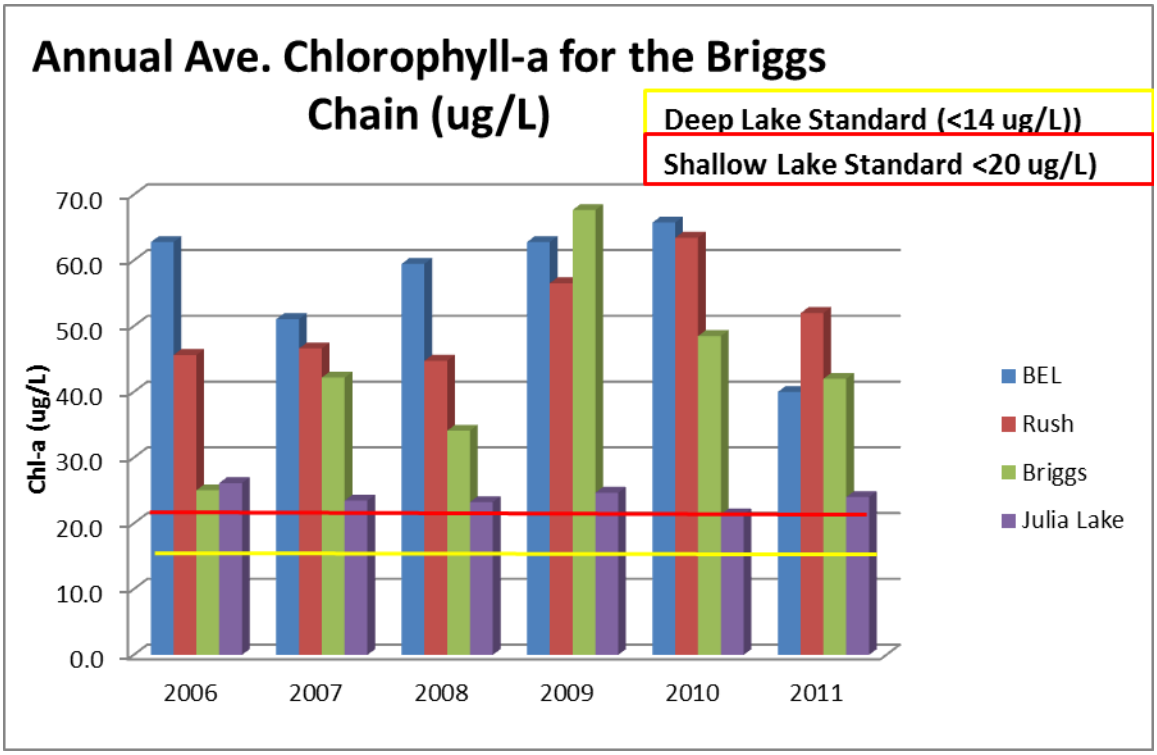

Briggs Lake 2011 Water Quality
Total Phosphorous and Chlorophyll-a (ppb)
Secchi Depth (m)
TP
Chl-a
Secchi
5/24/2011
6/7/2011
6/21/2011
7/12/2011
7/26/2011
8/9/2011
8/23/2011
9/6/2011
9/20/2011
10/4/2011

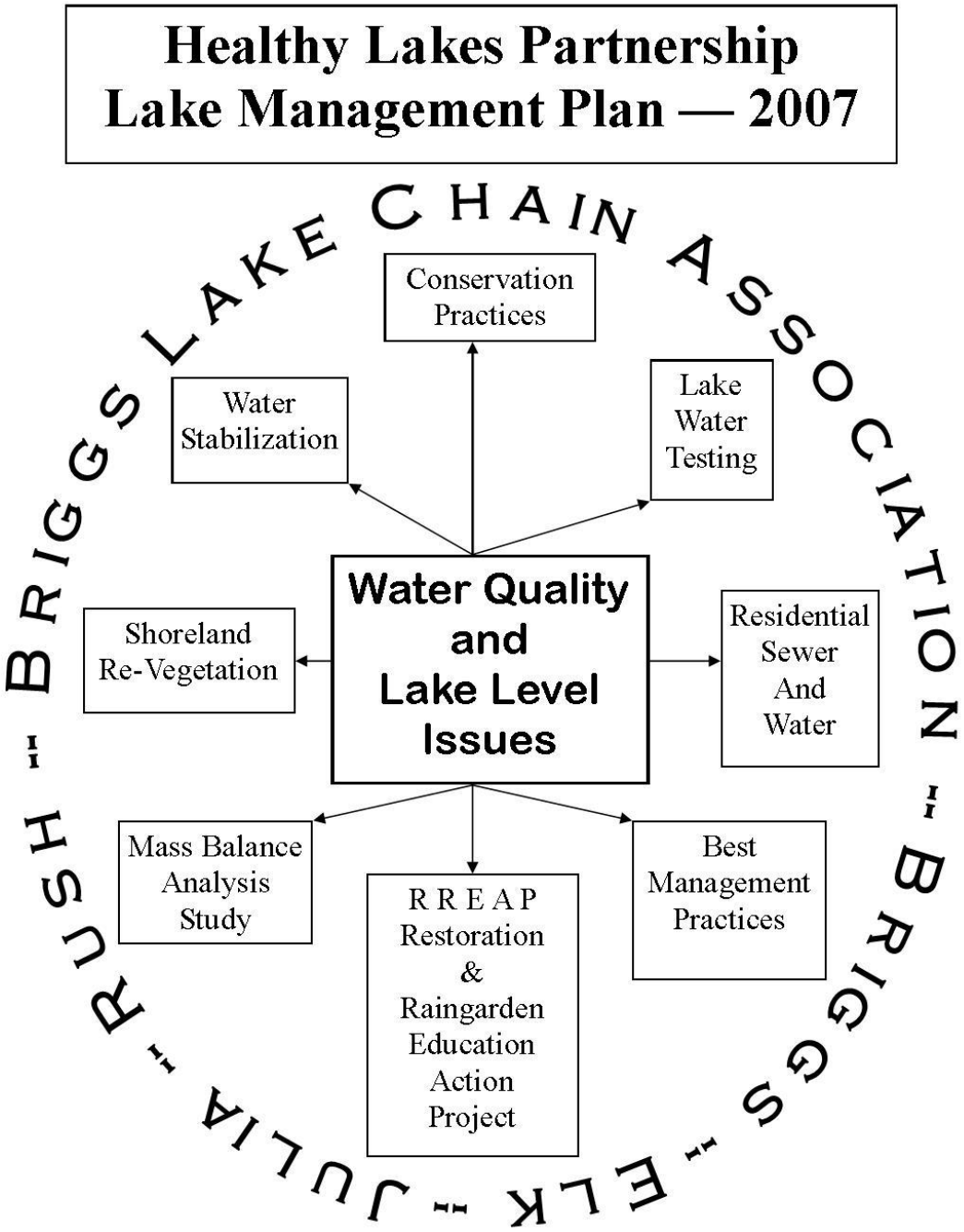

Rush Lake 2011 Water Quality
Total Phosphorous and Chlorophyll-a (ppb)
Secchi Depth (m)
160
140
120
100
80
60
40
20
0
0
0.5
1
1.5
2
2.5
3
3.5
5/24/2011
6/7/2011
6/21/2011
7/12/2011
7/26/2011
7/26/2011
8/9/2011
8/23/2011
9/6/2011
9/20/2011
10/4/2011
TP
Chl-a
Secchi


Big Elk Lake 2011 Water Quality
Total Phosphorous and Chlorophyll-a (ppb)
Secchi Depth (m)
300
250
200
150
100
50
0
0
0.5
1
1.5
2
6/7/2011
6/21/2011
7/12/2011
7/26/2011
8/9/2011
8/23/2011
9/6/2011
9/20/2011
10/4/2011
TP
Chl-a
Secchi


Annual Ave. Total Phosphorus for the Briggs Chain (ug/L)
TP (ug/L)
160
140
120
100
80
60
40
20
0
2006
2007
2008
2009
2010
2011
Deep Lake Standard (40 ug/L)
BEL
Rush Lake
Briggs Lake
Julia Lake


Annual Ave. Secchi Depth for the Briggs Chain (ug/L)
2007
2008
2009
2010
2011
Secchi Depth (meters)
0.00
0.20
0.40
0.60
0.80
1.00
1.20
1.40
1.60
1.80
2.00
Shallow Lake Standard (>1 Meter)
Deep Lake Standard (>2.5 Meters)
BEL
Rush
Briggs Lake
Julia Lake


Annual Ave. Chlorophyll-a for the Briggs Chain (ug/L)
Deep Lake Standard (<14 ug/L))
Shallow Lake Standard <20 ug/L)
Chl-a (ug/L)
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
2006
2007
2008
2009
2010
2011
BEL
Rush
Briggs
Julia Lake


Healthy Lakes Partnership
Lake Management Plan — 2007
BRIGGS LAKE CHAIN ASSOCIATION - BRIGGS - ELK - JULIA - RUSH -
Conservation Practices
Water Stabilization
Lake Water Testing
Water Quality and Lake Level Issues
Shoreland Re-Vegetation
Residential Sewer And Water
Mass Balance Analysis Study
R R E A P Restoration & Raingarden Education Action Project
Best Management Practices

THE HEALTHY LAKES PARTNERSHIP

"SAVING OUR LAKES NOW AND FOR THE FUTURE"

The Briggs Lake Chain Association entered into the Healthy Lakes Partnership with the Elk River Watershed Association and The Initiative Foundation for the purpose of improving the quality of our lakes and the surrounding property. These partnerships still exist and in addition others such as Palmer and Clear Lake Townships, Sherburne Soil and Water Conservation District, Minnesota Waters, Sherburne County Zoning and other local co-sponsors.

The Healthy Lakes Partnership Committee has set its initial goal of **Improving Our Water Quality,** and was incorporated into the Lake Management Plan. It remains a central focus of the Healthy Lakes Partnership, as well as the 2017 BLCA vision and annual goals.

There are three goal areas addressing water quality improvement:

Shoreline and in-water vegetation
Land Use and Zoning
Water Quality Monitoring

The BLCA Healthy Lakes Committee, which meets monthly, addresses each of these goal areas in their annual goals.

Shoreline and In-Water Vegetation:

All of the lakes in the Briggs Lake Chain are fed by mostly by water that comes from Agriculture lands, consequently providing an abundance of fertilizers in the run-off water. Although some of this problem is slowly being helped by better farming practices and legislation, which limits some use of commercial fertilizers, there still is a problem with the amount of fertilizers being deposited in the lakes from lakeshore properties.

The Healthy Lakes Committee will continue to work cooperatively with the Sherburne Soil and Water Conservation District, the Elk River Watershed Association and other interested entities to involve lakeshore owners and those living near the lakes and waterways to restore and improve vegetation to help catch and absorb some of the run-off before it gets into the lakes.

Information and training sessions are held periodically to help involved property owners learn more about lakeshore restoration and other “best management practices,” such as rain gardens, healthy septic systems, non-phosphorous fertilizers and water runoff diversion.

Land Use and Zoning:

The focus of this goal area is the investigation of land use and zoning practices and related

issues. This will help determine what steps can and should be taken to improve the present conditions of our lakes, and to prepare for the inevitable future development of the Briggs Lake Chain and the surrounding watershed.

Goals include assisting new and existing lakeshore owners in proper shoreline maintenance through an educational newsletter delineating the most restrictive ordinances from the county, township, and DNR in a less confusing format.

Having this information in one place rather than in three different places makes it easier to improve and/or maintain our properties without fear of "missing something" in the regulations.

We will work cooperatively with the appropriate governmental organizations on watershed improvements and a water stabilization plan.

Water Quality Monitoring

The focus of this goal area is to monitor, collect and analyze lake and stream data and turn it into useable information necessary for addressing the sources of poor water quality. The Healthy Lakes Committee has developed a working partnership with Sherburne Soil and Water and the Elk River Watershed Association to implement water quality monitoring plans.

GOALS OBJECTIVES and ACTIONS

GOAL 1. Maintain and improve the water quality of all the Briggs Lake Chain Lakes

Objective 1: Research and study what the water quality is at the present time and determine what can be done to improve it.

Actions:

Secchi readings
Phosphorous testing
Chlorophyll testing

Continue cost sharing with Palmer Township.

GOAL 2: **Maintain ongoing education of Land Use and Zoning Ordinances for all lake property owners.**

Objective 1: Collect ordinances from all levels of governmental agencies and keep property owners aware of all ordinances and update them with any changes

Actions:

Collect data from State, County, Townships and DNR on all ordinances affecting our chain of lakes.

Educate lakeshore owners in proper shoreline maintenance through educational

publications delineating the most restrictive ordinances and best management practices.

Monitor land use and zoning by observation of what is occurring around the lakes and report concerns so persons do observe ordinances.

Maintain a Land Use and Zoning Committee.

Goal 3: **Maintain and improve water quality and shoreline stabilzation by use of Shoreline and In-Water Vegetation.**

Objective 1: Work in cooperation with the Sherburne Soil and Water Conservation District and other entities to involve lakeshore owners and those living near the lakes in methods to help restore and improve vegetation that will help catch and absorb some of the run-off water and fertilizers before it gets into the lakes and also stabilize the shore line.

Actions:

Maintain a Shoreline and In-Water Vegetation Committee.
Inform all property owners how and where to acquire plants.

Educate how plants should be used for restoring shorelines by having workshops for lakeshore owners who are interested. This would be done at a local site with the help of trained persons

.

Monitoring sites and using the gathered information to inform members of successful sites.

RREAP (Restoration and Raingarden Education Action Project)
(See details on page 17)

*__SEE APPENDIX 1 FOR 2012 BLCA Goals__

Lake Monitoring Program

In 2004 several individuals from the lake association spent several weekends learning about collecting water quality data from lakes and streams to help in assessing the quality of the water. They learned the procedure for getting samples that could be analyzed for total phosphorous and chlorophyll “a”.

This group developed a Briggs Lake Chain Monitoring program which allowed them to receive some grant money from the Minnesota Environment and Natural resources Trust Fund that was used to acquire some testing equipment and train some individuals to take samples which were analyzed at a certified laboratory. This program was started in 2005 with sampling the four lakes and continues each year. This is planned to continue as the funding is available.

Lake Association Vegetation Control:

In the 1960 and 1970’s timeframe an annual copper sulfate program was undertaken under MDNR licensing and monitoring. This activity was abandoned due to adverse sediment and lack of progress in results.

A weed-harvesting program was initiated in 1990 when the advent of curly pondweed invaded the Briggs Chain. In 1998 approximately 100 thousand pounds of weeds were removed. In 1999 the program was not successful.

In 2000 the association decided to undertake a chemical treatment program.

The curly leaf vegetation control program is the most costly undertaking the association is involved in, and will be an ongoing program.

In 2006 Lake Vegetation Management Plan was developed which allowed the BLCA to get some grant money which allowed the spraying of all areas of curly leaf in Julia and Rush Lakes. This grant money has now ended and the BLCA must continue the spraying as needed for three years.

A vegetation survey must be done for all the lakes prior to any spraying. The cost must be borne by the BLCA..

Appendix 1- Present Healthy Lakes Goals

HEALTHY LAKES BLCA GOALS
(Adopted March 2012)

1. **Extend and increase water quality monitoring data throughout 2012 as per Lake Management Plan.**

2. **Have a net increase of 10 residences establishing healthy lakeshore buffer areas or rain gardens by October 1, 2012, while utilizing RREAP training and funding.**

3. **Monitor all lakes related building permit requests and variances by December 31, 2012, and assist lake homeowners to follow existing laws and regulations.**

4. **Organize and fund curly leaf pondweed spraying of 100% of affected lake areas by May 31, 2012.**

5. **Publish a Best Management Practices (BMP) column in all Lake Report issues.**

6. **Update and distribute the Lake Management Plan by June 30, 2012**

7. **In partnership with public agencies and independent experts, develop and secure funding for a septic awareness project for implementation in 2012-13**

RREAP-RESTORATION AND RAINGARDEN EDUCATION ACTION PROJECT

The RREAP, Restoration and Raingarden Education Action Project, is a program initiated by the BLCA in 2007 to encourage conservation projects on our chain of lakes. The program is two-part: the first workshop where area service providers learned more about conservation projects and how to assist their customers. Experts from Minnesota DNR, Sherburne County Zoning, and Sherburne Soil and Water Conservation District provided up-to-date information on rules and regulations, Best Management Practices, and descriptions of various conservation projects (raingardens, shoreline restoration, and run-off control options.) The second part involves coupons that the workshop attendees can provide to lakeshore residents so they may apply for funding to assist in paying for conservation projects on their properties.

Funding for the RREAP program was provided from a major grant from Minnesota Waters and Anheuser/Busch Michelob Golden Light, and the National Wildlife Foundation. Additional funding was provided by contributions from 13 area providers

(Co-Sponsors). Project mini-grants of up to $400 per project will be awarded to successful applicants. The BLCA will also provide volunteer labor and technical assistance for some of these conservation projects.

We anticipate completing 10-12 projects in 2007.