

Mission Lakes Association

Strategic Lake Management Plan

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Introduction/History of our Lake Association

History of development/impacts on our lake

The Mission Lakes were named by a German Lutheran Minister, Rev. Ottomar Cloeter, of Saginaw Valley, Michigan. His Synod decided to establish in 1857 a mission station near what is now Lower Mission Lake. The Mission was located on the Mississippi River, about a mile north of where the Mission Creek flows into the Mississippi River. He ministered to a small band of Chippewa Indians in a nearby village. His letters to his Synod reveal what extraordinary hardships he faced. He and his family (four children were born at the Mission) lived in constant fear that the Indians would kill them. In 1862 they were forced to flee for their lives because of an Indian uprising started by Chief Hole-in-the-Day. The Mission was destroyed in this uprising. Thirty-five years later, in 1897, Dr. J.L. Camp (who had a farm near the old Mission site) and J.V. Brower, erected wooden markers at the Mission and platted the Indian burial mounds. Brower also explored and platted the Indian burial mounds located on the northwest shoreline of Upper Mission Lake on what is now the Ridgewood Estates addition.

In the early 1890's logging was the principal industry in the area. The Bert Sabins operated a saw mill and logging company on the property that is now owned by the Nerbys. The logs were cut in the winter so that they could be easily skidded to the lake. In the spring, the logs were floated to the lower lake, through the channel, and down Mission Creek and the Mississippi River to the paper mill in Brainerd, Minnesota. The Sabins also began the Pine Shores Resort. Their home was the local post office. Other early homesteaders who had an impact in the area were the Fridays, Harrisons, Grand Pres, Roaches, and Rostes.

All the present resorts were started in the late 1920's. The resorts that have ceased operations are Pine Shores, the Last Resort, Elm Bay, Fridays and Tates. The Pine Shores Resort was one of the first to sell its cabins to private owners in 1946.

Prior to 1950 there were very few privately-owned cabins. In the late 1940's to 1950's lake frontage sold for \$2.50 to \$3.50 per foot. IN the 1920's there was a bridge that crossed over the channel and a road followed the Upper Mission Lake shoreline to the Elm Bay Resort.

The DNR maintained a walleye rearing pond on the Lower Mission Lake from 1948 until the mid-1960's. This area is just west of the County Road 19 and is now a wildlife game refuge. The Mission Creek dam was built by the WPA in 1938.

In 1950 the Mississippi River flooded, primarily because of inadequate flood control and ice jams. This caused the Mississippi River to flow up mission Creek and into the lakes, increasing the lake level by about four feet and causing damage to cabins and homes.

The lakes most recent real estate development begin in 1975 and is known as the Ridgewood Estates addition located on the northwest shoreline of Upper Mission Lake.

In 1986 the lakeshore property owners were alarmed to learn that a proposed 150 site trailer park was to be developed at a resort known as Elm Bay. This resort had been an operable for several years and was comprised five cabins. The proposed campground was exceptionally environmentally sensitive. Nearly 100% of the lakeshore property owners joined in an effort to

defeat this project. In the course of fighting the campground it was found that there was a fairly large dump located on the property, and members were concerned that it could be leaching into the lake. Tom Hitchcock hired an attorney to represent us before the Planning and Zoning board and we had a turnout of almost 100 people. The result was that the county commissioners required that the developer obtained an EIS (environmental impact study) before proceeding with the campground. The developer refused to undertake the study and subsequently dropped the project. This made the residents realize that a show of solidarity was important to keep the lakes safe for the future.

NOTE: In the remaining history portion of this report we have tried to identify the many activities that have taken place as a result of the formation of the Mission Lakes Association. We have undoubtedly missed some important events and the names of many of the people that have made the association as successful as it is. If you have anything to add, please contact Ron Hedlund, 218-765-3258 or by e-mail at rhedlund@brainerd.net.

In 1986 the lakeshore property owners successfully defeated a potential 150 site mobile home trailer park and campground development that was to be located on the old Elm Bay Resort property. It was with this effort that the Mission Lakes Association was formed in 1987.

The objectives of the Mission Lakes Association are:

- A. To protect and improve the lakes' ecology.*
- B. To control and enhance the lakes' watershed.*
- C. To educate, environmentally, those using the lake and property owners within the lakes' watershed.*
- D. To provide social fellowship among members and guests.*
- E. To support the needs of the community*

After the defeat of the Elm Bay campground, the task of developing Articles of Corporation began under our first president, George Wilson, with the guidance of John Baker. John was also involved in getting CR 19 designated as a part of the Great River Road, and later in the formation of our Constitution and Bylaws.

1989 saw the first of our annual Boat and Pontoon Parade and 1990 the first of our annual membership meeting and picnic. The meeting/picnic was attended by 90-100 members. At this meeting a proposal was made to start a pull-tab operation in order to build up a reserve to be used for other possible development threats as well as finance the stocking of walleyes and any water quality testing expenses. Through the efforts of Chuck Thompson, as well as Betty and Jim Kelly, we were licensed to sell pull-tabs on December 1, 1990.

At the same meeting the association voted to hire A.W. Research to do an aerial survey, analysis and subsequent follow-up on both Upper and Lower Mission Lakes. Not knowing at that time whether the pull-tab operation would happen, it was decided that the \$6,000 cost of the survey could be paid through donations. The aerial survey was completed in 1991 and the follow-up

groundtruthing began. The groundtruthing process, never fully completed, continued through about 1994.

John Baker became our second president, followed by Tim Anderson from mid 1990 through 1991, Ron Hedlund from 1992 through 1995, Roger Funk from 1996 through 1997, Roy Delgahausen from 1998 to 1999 and Warren Herold since August of 1999.

Tom Hitchcock was our first Water Quality Chairman, and it was through his efforts that we were approved by the MPCA for their 1991 Lake Assessment Program (LAP study). Only ten of these studies are done each year. Other Water Quality Chairmen over the years were Ron Hess, George Wilson, Carol Sersland, Ron Hedlund, Ed Lherke and Nick Bernier. In the early 90's the lake association purchased channel marker buoys that were installed and removed annually first by Gary Rau, then by Dave Foote and Ron Hedlund, then by Merle Anderson and Mark Germain, and now by Nick Bernier and Ron Hedlund.

In 1992, as a result of our venture into charitable gambling, the association was required to have monthly meetings, and another change in our constitution and bylaws was necessary. That year we experimented with a professionally prepared newsletter, but because of the cost we decided to continue to do the newsletter ourselves. Chuck Thompson made dozens of wood-duck houses and placed them around the old hatchery area, Ron Hess cleared out the beaver house in the channel and George Wilson took over the gambling committee, followed by Warren Herold in 1997.

Beginning 1993 Barb and Del Woese did an extraordinary job of producing the newsletter as well as chairing the social committee. That year Steve Sather checked into repairing the old hatchery pump with our hopes that the DNR would allow us to flood the hatchery for use as a duck habitat. Unfortunately the DNR decided against allowing us to proceed because of the cost to run the pump. Ted Mohnkern became our LARA representative and represented us at their meetings for many years. In 93 we also began what would turn out to be a lengthily process of becoming a 501C3 Corporation.

In 1994 Barb Woese, George Wilson and Ron Hedlund attended training to become Lake Advocates. That year the association worked to influence the Township and County in the paving of Mission Cutoff, became involved in reviewing the planned expansion of Sunset Bay Resort, and began working towards updating non-conforming septic systems around the lakes.

At the August 27, 1994 Annual Membership Meeting of the Mission Lakes Association, our membership unanimously approved a resolution that all non-conforming on-site septic systems be upgraded by December 31, 1996. As a result of this resolution, an alliance was formed between Crow Wing County (CWC) and the Mission Lakes Association. From this alliance and the work of Ron Hedlund and Ted Mohnkern, the Mission Lakes Septic Update Pilot Project was developed. Although we did not meet the target date, at the end of 1999 the last of the 43 non-conforming septic systems that were identified was finally upgraded. Since then, many lake associations in Crow Wing County have followed our pilot plan to update their non-conforming septic systems.

In 1997 the association discovered that a very sensitive piece of property that included 626 feet of lakeshore on Upper Mission Lake was for sale. Although the property was identified by CWC

Planning and Zoning as developable, any improvements on the property would have, without question, had a negative impact on the lake. The lake association was able to purchase the property, split the cost with the DNR, and turn it over to the DNR to be protected as an Aquatic Management Area. Our portion of the purchase cost was \$22K.

In 2000, another sensitive piece of property bordering the creek that flows into Upper Mission was purchased by the Mission Lakes Association to protect the waters flowing into our lakes. The price for this property was also \$22K. This property remains in our possession.

Through our newsletter we have presented articles on septic system maintenance, use of zero phosphorus fertilizer, regulations regarding removal of aquatic vegetation and many other subjects. Our newsletter is now mailed to all property owners, not just our members.

For many years our association has worked through the DNR and a licensed trapper to maintain an ongoing effort to control the beaver population in Mission Creek. This is necessary in order to insure an uninterrupted flow of water to carry excess nutrients out of our lakes.

Mission Lakes Association had a very successful charitable gambling organization that funded many lake and neighborhood projects over the years. However, charitable gambling proceeds slowly dwindled to the point where it was barely a break-even proposition and was discontinued in 2008. That left us with a need to find considerable funding for projects noted by the association as desirable and necessary.

Healthy Lakes and Rivers Partnership Program

In July 2004 the Mission Lakes Association was invited to participate in the Initiative Foundation's Healthy Lakes and Rivers Partnership program along with eight other Lake Associations in Cass and Crow Wing Counties. Under the coordination of Bonnie Finnerty (Crow Wing County Local Water Planner and County Planning Administrator) and John Sumption (Crow Wing County Water Planner and Deputy 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 Mission Lakes Association was represented at the Healthy Lakes & Rivers training sessions by: Lyle Anderson, Myrle Anderson, Kevin Hall, Ron Hedlund, Warren Herold, Helge Johnson, Ron Neal, Donn Peterson and Gary Williams.

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 Mission Lakes Association held this planning session on October 16, 2005, facilitated by Jack Heule and Kathy Bussard. Approximately 31 people were in attendance, with about 68 percent of the participants describing themselves as year round residents.

The document you are now reading is a result of this training. This document is intended to create a record of historic and existing conditions and influences on Mission Lakes, and to identify the goals of the Mission Lakes 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 Strategic Lake Management Plan is also intended to be a “living document;” as new or better information becomes available, as we accomplish our goals or discover that alternative strategies are needed, *it is our intent to continually update this plan so that it will 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.

We would like to thank the funders of the Healthy Lakes & Rivers Partnership program for Crow Wing and Cass Counties, including The McKnight Foundation, Laura Jane Musser Trust, U.S. Environmental Protection Agency, McDowall Company, Minnesota Environment and Natural Resources Trust Fund, Crow Wing County Water Plan, Crow Wing County Water Plan, Minnesota Board of Water and Soil Resources, Lake Hubert Association, Portage-Crooked Lakes Association, Linda Kaufmann, and Don Hickman & Sandra Kaplan.

Physical Characteristics and location of Mission Lakes Watershed

The Mission Lakes are located nine miles north of Merrifield in central Crow Wing County. Upper Mission Lake (#18-0242) has a surface area of 817 acres, of which 256 acres (31 percent) in the littoral zone. The maximum depth of Upper Mission is 36 feet, and the average water clarity is 9.1 feet. The majority of the shallow water soil type is sand. The lake has numerous bulrush beds which maintain water quality and are utilized for fish spawning and home for many aquatic insects. Curly-leaf pondweed, which is an invasive exotic (not native to this area) form of aquatic vegetation, has been observed throughout the lake with high concentrations in Elm Bay and Hoot-Owl Bay. Upper Mission and Lower Mission Lakes are connected by a navigable channel. A public access exists on the north side or access is available through the channel from Lower Mission where a public access is on the west shore.

Lower Mission Lake (#18-0243) has a surface area of 698 acres, of which 452 is in the littoral zone (meaning that it has a depth of 15 feet or less). The maximum depth is 27 feet, and the average water clarity is 8.1 feet. Shoal waters (water less than 4 ft) soil type is mainly sand with muck making up 25% of the bottom type. There is a diverse and very abundant aquatic plant community. Bulrush and wild rice beds are very common. Curly-leaf pondweed has been present for the last few years, with very high concentrations in some areas, and hinders navigation and recreational activities. The outlet for both lakes is Mission Creek, which drains Lower Mission directly to the Mississippi River.



Lake and Watershed Description

According to the 1991 MPCA LAP study, The two lakes combined are approximately 1,512 acres in size with Upper Mission having approximately 820 acres of surface area and Lower Mission having approximately 692 acres of surface water. In terms of surface area Upper Mission and Lower Mission rank in the upper ten percent of Minnesota's lakes.

The two lakes, while connected, act as separate basins. Upper Mission is the deepest lake with a maximum depth of 36 feet, followed by Lower Mission with a maximum depth of 27. Mission Creek is a direct tributary to the Mississippi River. The Mission Creek watershed is located in central Crow Wing County, Minnesota. The watershed is in Center and Mission Townships approximately 12 miles north-northeast of the city of Brainerd. It is approximately 117 air miles north-northwest of Minneapolis. The major lakes of the watershed are Upper Mission Lake and Lower Mission Lake.

The watershed also includes a number of smaller lakes.

Lake	Id No.	Acres	Maximum Depth	Percent Littoral ¹
Bass	18-256	309	24	59.9
Duck	18-244	16		
Faupel	18-237	26		
Flanders	18-247	60	16	100
Little Bass	18-254	92	49	52.2
Lower Mission	18-243	698	27	64.7
Mud	18-253	24		
Silver	18-239	214	23	90.2
Taylor	18-236	36	32	61.1
Unnamed	18-255	29		
Unnamed	18-249	28		
Upper Mission	18-242	817	36	31.3

	Upper Mission	Lower Mission
Surface Area (acres)	817	698
Maximum Depth (feet)	36	27
Mean Depth (feet)	20	11.9
Littoral ² Area (acres)	256	452
Percent Littoral Acres	31.3	64.8
Shoreline Length (miles)	5.8	6.4
Lake Class	27	29

¹ percent of lake with 15 feet or less water depth

² area with water depth of 15 feet or less

The Mission Creek watershed is 11369 acres in size or 17.8 square miles. Prior to settlement by Europeans, the Mission Creek watershed was dominated by forests (7376 acres). This was approximately equally divided among aspen-birch forest (2134 acres), jack pine barrens (2759 acres) and white pine or mixed red and white pine forest (2297 acres).

Several species of plants and animals, protected by state and federal endangered species laws, are found in the Mission Creek watershed or within one mile of its borders. Three species are listed by the state as being of special concern: bald eagle (*Haliaeetus leucocephalus*) (federal status is threatened), least darter (*Etheostoma microperca*) and pugnose shiner (*Notropis anogenus*). One species, Blanding's turtle, (*Emydoidea blandingii*) has a state status of threatened.

A tract of land near Lower Mission Lake was originally purchased and developed for use as a walleye fingerling rearing pond by the DNR's Section of Fisheries. This did not turn out to be a very successful endeavor. The site has been managed by the DNR's Section of Wildlife as a Wildlife Management Area for many years.

Lower Mission Lake is primarily managed for northern pike, largemouth bass and panfish. There has also been management for walleye with considerable stocking occurring prior to 1974 and in the 1990s. Upper Mission Lake is similarly managed. Walleye stocking has occurred in alternate years since 1991. Special regulations on both lakes call for the immediate release of all northern pike measuring 24-36" and only one over 36" is allowed in possession.

Precipitation

The average annual precipitation in the Mission Lakes area watershed ranges between 24 and 26 inches. The evaporation rate ranges of between 30 and 34 inches. The summer (May to September) precipitation averages about 17 inches. Precipitation in 1991 was about 4 to 6 inches above normal in this part of the state (approximately 32 inches for 1991).

Soils

The 1991 MPCA LAP notes:

Soils in the watershed are Menahga and Nisswa-Merrifield Associations. Soils in the Menahga Associations are characterized by well to excessively drained soils formed in sandy sediments and loamy sediments over sands. In certain cases these soils are intermixed with organic soils such as peat and supporting wetland vegetation.

The Nisswa-Merrifield Associations are composed of loamy fine sand. The Nisswa soils are well drained and the Merrifield soils are poorly drained, resulting in compact bands of greater water retention and increased agricultural productivity.

Land use

The development on Upper Mission Lake is scattered around the shoreline. The most significant development occurs on the northeast, east, northwest, west and southeast portions. During a 1994 DNR Fisheries survey done in 1994, 99 homes/cabins and 2 resorts were counted on the lake. The development on Lower Mission Lake is not as scattered. The most significant development is on the northwest and northeast shorelines. A significant portion (approximately 1.7 miles) of the southeast and east shorelines of Lower Mission Lake is in public (DNR) ownership. During the 1994 survey, 61 homes/cabins and 1 resort were counted.

Current (1990s) land use in the Mission Creek watershed is still dominated by forest cover (6707 acres). Little row crop agriculture is practiced (511 acres).

Water Based Recreational Use

The water-based recreational activities with the greatest level of use, in descending order, on Upper Mission Lake are fishing, recreational boating, swimming and wildlife observation (in particular loon observation). Activities on Lower Mission Lake are similar but not identical. Other water-based recreational activities on the lakes include tubing, waterskiing, jet skiing, hunting and appreciation of the intrinsic esthetic values of the lakes.

Water levels

Water levels were recorded sporadically between May of 1938 and April of 1992. Since then, lake levels have been recorded throughout the seasons of open water by Ron Hedlund, a resident of Upper Mission. Water level readings are the same for both lakes.

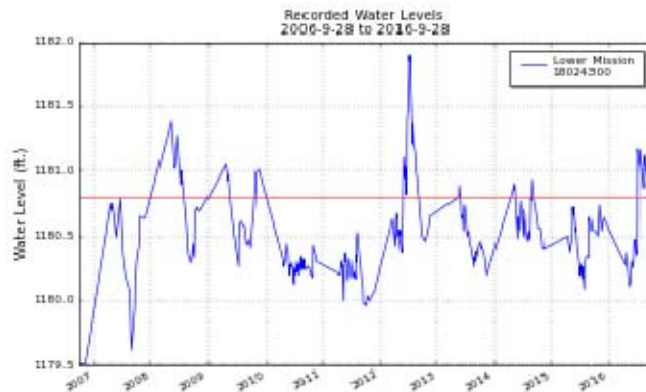
The following readings are official. However, an unofficial reading of interest was recorded in the Spring of 1950 when the Mississippi was blocked by ice and backed up Mission Creek, bringing the lake level to 1185.5 ft.!

A history of Mission Lake level readings going back to 1938 is available at:
www.dnr.state.mn.us/lakefind/showlevel.html?id=18024300

Water Level Data Lower Mission

(Lower and Upper Lakes are the same)

Period of record: 05/19/1938 to
09/21/2016
of readings: 1299
Highest recorded: 1181.89 ft
(07/06/2012)*
Lowest recorded: 1179.13 ft (07/01/1948)
Recorded range: 2.76 ft
Last reading: 1180.95 ft (09/21/2016)



Ordinary High Water Level

(OHW) elevation: 1180.8 ft
Datum: NGVD 29 (ft)

Last 10 years of data, click to enlarge.

*The unofficial high was in the spring of 1950 when the Mississippi was blocked by ice and backed up Mission Creek

Download lake level data as: [[dBase](#)] [[ASCII](#)] (If you have trouble try right clicking on the appropriate link and choosing the "Save ... As" option.)

Water Quality

Our objective is to create or maintain conditions that will minimize, halt or reverse the degradation of water quality in Mission Lake. Water quality is a term used to describe the condition of a water body in relation to human needs or values. Quality is not an absolute; the terms “good” or “poor” water quality only have meaning relative to the use of the water and the attitude of the user. A lake might have good water quality for swimming but be considered poor water quality for bass fishing. To most of us, water quality is synonymous with water clarity.

Secchi readings

For many years now, members of your lake association have been measuring water clarity by recording secchi disk transparency. This is done by lowering a white disk into the water and measuring and recording the depth at which the disk is no longer visible. This is done several times throughout the summer. Secchi data from 1981 to the present can be found on the DNR Lake Finder website at www.dnr.state.mn.us/lakefind/index.html. Enter our lake and click on go, under water clarity.

Water sampling

In 1991 our lake association teamed with the MPCA to enter into their lake assessment program (LAP). The LAP program consisted of a detailed study of our water by taking monthly water samples throughout the summer to gather water chemistry data. This data is then analyzed and converted 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 compare historic/future data as a measure of degradation or improvement.

Trophic state is defined as the total weight of living biological material (*biomass*) in a waterbody at a specific location and time. Time and location-specific measurements can be aggregated to produce waterbody-level estimations of trophic state. Trophic state is understood to be the biological response to forcing factors such as nutrient additions, but the effect of nutrients can be modified by factors such as season, grazing, mixing depth, etc.

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.

A considerable amount of data has been collected through water sampling done throughout the years. In 2003, 2005 and 2006 the Lake Association began taking part in a water sampling program provided by the Crow Wing County Outdoor Corps. The program is managed by the University of Minnesota Extension Service and is designed to train local high school students in limnology and sampling protocol. Additional sampling was done by your lake association in 2008, 2009 and 2010. The results for 2009 & 2010 can be found on the RMB Environmental Laboratories website at www.rmbel.info/Reports/ReportsQuery.aspx.

The downside to water sampling is that the results are hard for most of us to understand, it takes a considerable amount of a volunteers time, it can be costly and over the years the data has become scattered and as a result has not been compared on a long term basis.

Late in 2009 all of our scattered historic water sampling data was given to the MPCA to be included in their new water quality data management system. The implementation of the new system should take place in the spring of 2011.

Water quality...what we have done

Some of the things your lake association has done to protect your lake:

- Provide educational materials to our property owners through distribution of BMP's (best management practices) handouts, Landowners Guides to Lake Stewardship, Newsletters.
- In 1990-91 we hired AW Research Labs to record and analyze, through infrared and visual photography, the entire shoreline of our lakes. This was followed by a closer investigation of the areas of concern and individual contact with landowners to recommend preventative and corrective action in areas of concern.
- Developed, through the Crow Wing County Water Planner, a plan to upgrade all non-complying septic systems on Mission Lake. This became a pilot project that was later adopted and used by several other lake associations in our county. (see summary following)
- Worked closely with the Crow Wing County Lakes and Rivers Alliance to establish a ban on fertilizers containing phosphorus in Crow Wing County.
- Hired a trapper to trap beaver that were damming Mission Creek and worked with the DNR to keep the creek clear and flowing.
- Protected the creek flowing into Upper Mission from possible contamination by purchasing the property adjoining the creek to protect it from development.
- Protected a sensitive piece of lakeshore on Upper Mission by purchasing it in conjunction with the DNR and protecting it from development
- Purchased and placed buoys to mark the channel between the lakes to minimize disturbance of the lake bottom and destruction of the natural aquatic vegetation.
- Review all requests for variances and building projects within the shoreland area.

Water quality...what we plan for the future

Our plans are to continue our attempts to inform, evaluate, measure and take any steps necessary to protect the quality and health of our lakes.

The MPCA has established a monitoring schedule where they sample large lakes (greater than 500 acres) in a watershed for two years in a ten year cycle. Our lakes will be sampled in 2016 and 2017. The MPCA has recommended continued secchi monitoring and skipping the water chemistry monitoring unless a decline is seen in the secchi readings. We will continue water testing only if required by the DNR for the Lower Mission Curlyleaf Pilot Project. Regardless, we will continue with the CLMP secchi monitoring on both lakes.

Summary of the Mission Lakes Septic Update Project

For several years the Mission Lakes Association pursued activities such as lake water testing, analysis of aerial photographs, site visits and articles in their newsletter promoting the use of best management practices. Their goal was the long term protection of the lake's ecology.

Realizing that the two major threats to the water quality of their lake were lawn fertilizer runoff and non-conforming septic systems, they decided that they should take a more direct approach to eliminating these threats. The lawn fertilization problem was already being addressed by the Crow Wing County Lakes and Rivers Alliance (LARA) through their efforts to find sources for zero phosphorus fertilizer. The septic problem however had never been systematically addressed in the county.

At the August 27, 1994, Annual Membership Meeting of the Mission Lakes Association, their membership unanimously approved a resolution that all non-conforming on-site septic systems be upgraded by December 31, 1996. This was to be done by (a) identifying all non-conforming septic systems, and (b) assisting local government to enforce local septic ordinances.

As a result of this resolution, an alliance was formed between Crow Wing County and the Mission Lakes Association. From this alliance, the **Mission Lakes Pilot Project** was born.

The project started with county review of existing records to identify the property owners that did not have record of a conforming septic in file. Those not having record of a conforming system were sent a letter requested any information they may have about their septic. Those who either could not show evidence that their system was conforming or indicated they did not know what type of system they had, or those who did not respond, were then put on a list for on-site inspection by a county authorized inspector.

Of the 173 dwellings on the lake, records were eventually found indicating that 100 of the systems were of conforming design. Finally, at a County Board Meeting in the spring of 97, a sum of money was allocated to contract with a certified inspector to do the on-site inspections of the 73 remaining systems.

The inspections took place throughout the summer and fall of 97. Of the 73 systems inspected, 43 were eventually found to be non-conforming.

The next step in the upgrade project was for the county to send official notification to property owners having non-complying systems, informing them that they have ten months to bring their systems into compliance. The ten month period ended with the end of the 1998 construction season.

Upon completion, the pilot project was reviewed, evaluated, refined and then adopted by other lake associations throughout the county. The end result was probably the single largest step ever taken in Crow Wing County to protect and improve the water quality of our lakes and safeguard our ground water.

Fisheries Management

Upper Mission Lake Fisheries Report

Status of the Upper Mission Lake Fishery (as of 06/16/2014)

Walleye fingerlings have been stocked on a regular basis into **Upper Mission** since 1999. The current rate is 512 pounds in odd numbered years. The 2014 gill net catch was low for this type of lake (2.6/net), but on par with past catches. Average length was 16.4" and 93% of the fish were 12" or larger. The 2011 year class accounted for 73% of the catch. A fair number of these fish also showed up in our spring bass electrofishing catch (33.3/hr). Walleyes sampled by electrofishing had an average length of 14.7".

The northern pike catch was the highest to date at 14.7/net, although our goal is to maintain this below 5/net. Average length was decent at 24.1" and 41% of the fish were 24" or larger. The largest fish measured 37.9".

Panfish size was small, with average lengths for black crappie at 8.2" and bluegill at 5.3". Numbers were also low in our nets for crappies at 0.8/trap net. Bluegill numbers were a little better at 24.5/trap net.

Lake Characteristics

Lake Area (acres): 874.45

[Dominant Bottom Substrate](#): N/A

[Littoral Area](#) (acres): 256

[Abundance of Aquatic Plants](#): N/A

Maximum Depth (ft): 36

Maximum Depth of Plant Growth (ft): N/A

[Water Clarity](#) (ft): 12.0 (10-14)

For a full report that includes data regarding the fish survey results as well as the fish stocking history, go to <http://www.dnr.state.mn.us/lakefind/index.html>

Fishing Regulations:

A special regulation on Upper and Lower Mission requires all northern pike from 24-36" to be immediately released. One over 36" is allowed in possession.

Lower Mission Lake Fisheries Report

Status of the Lower Mission Lake Fishery (as of 06/09/2014)

Northern pike was one of the most abundant species caught in **Lower Mission** at 17.0/gill net. They had an average length of 22.5" and 28% of the fish were 24" or larger. The largest fish measured 35". Largemouth bass numbers were down in our electrofishing count (26/hr), but size was good, with an average length of 14.9" and 83% measuring 13" or larger. Panfish numbers

were average, with black crappie offering the better size at an average length of 10.9". Bluegill sizes were smaller with an average length of 5" and only 18% measured 7" or larger.

Walleyes are not stocked directly into Lower Mission, but are stocked as fingerlings in Upper Mission in odd numbered years. The catch rate was average for this type of lake, although the population is dominated by older fish. All of the fish were over 17", with an average length of 22.2".

Lake Characteristics

Lake Area (acres): 724.66

Littoral Area (acres): 452

Maximum Depth (ft): 27

Water Clarity (ft): 11.5

Dominant Bottom Substrate: N/A

Abundance of Aquatic Plants: N/A

Maximum Depth of Plant Growth (ft): N/A

For a full report that includes data regarding the fish survey results as well as the fish stocking history, go to <http://www.dnr.state.mn.us/lakefind/index.html>

Fishing Regulations:

A special regulation on Upper and Lower Mission requires all northern pike from 24-36" to be immediately released. One over 36" is allowed in possession.

Aquatic Vegetation/Exotic Species

The good plants

Some of the aquatic plants in the Mission Creek watershed have unique values. Bulrush (*Scripus* species) should be protected and encouraged to expand since it has excellent qualities for fish and wildlife habitat, erosion control and water quality improvement. Arrowhead (*Sagittaria spp.*) has important value to waterfowl as a food source. Wild celery (*Vallisneria americana*) similarly has value to wildlife. Yellow and white water lilies (*Nymphaea spp* and *Nuphar spp.*) have both esthetic and habitat values. Wild rice (*Zizania aquatica*) has value as waterfowl food and for both recreational and commercial harvest as a human food source. It should be maintained at levels providing adequate wildlife habitat and harvest but not excessively interfering with recreation by watercraft.

The bad plants

Two exotic aquatic invasive species have been found in our lakes. Curlyleaf pondweed (*Potamogeton crispus*) and Eurasian-watermilfoil (*Myriophyllum spicatum*) exist in both Upper and Lower Mission. Both have reached nuisance levels in our lakes.

Issues/Causes Related to Aquatic Plants and Riparian Owner Use

During our 2004 Healthy Lakes and Rivers Partnership Program sessions, our planning committee was asked to list the aquatic plant related issues for the Mission Lakes and suggest causes for the problems identified. The following lists are not in priority order.

Issues

1. Large areas of curly-leaf pondweed in Lower Mission Lake.
2. Increasing late season plankton algae blooms.
3. Filamentous algae.
4. “Stringy” weeds interfere with waterskiing on Lower Mission Lake.
5. Snail and swimmer’s itch problems.

Suggested Potential Causes

1. The launching of boats that have come from infested waters is the primary cause of the transfer of exotic plant species to our lakes.
2. Weather (the lack of snow cover on the ice, early ice-off, etc.) can create nuisance levels of curly-leaf pondweed.
3. Careless fertilization of lawns increases nutrient levels.
4. In-lake cycling of nutrients following decomposition of Curlyleaf pondweed spurs growth of other plants and algae.
5. Erosion contributes to nutrient input to the lakes.
6. The littoral (shallow water area) is different between the two lakes. Different types and abundances of aquatic plants occur because of this.
7. The volumes of the lakes and the retention times of the two lakes are different. This means the nutrient regimes, and therefore, the plant communities, will be different.

Aquatic Plant Management Plan-Our activities to control the bad plants

In early 2004, because of the growing concern over to the rapid increase in the amount of Curlyleaf pondweed in our lakes, an Aquatic Plant Management Committee was established. Our Lake Association members were: Merle Anderson, Nick Bernier, Rodger Bubendorf, Mark Germain, Ron Hedlund, Warren Herold and Paula West. Our newly formed Aquatic Vegetation Committee recognized the need to accurately identify the amount and location of the infestation. The last recorded survey was done in 1994, so the Mission Lakes Association authorized a retired DNR professional to conduct an aquatic plant survey of both lakes. The survey disclosed that Curlyleaf pondweed had infected about 300 acres on Lower Mission and 150 acres on Upper Mission. As a result of these findings, and the growing relationship between our lake association, the DNR, and the applicator Professional Lake Management, the DNR decided to conduct their own extensive survey in 2005.

The Committee then collaborated with staff from the DNR Fisheries Section to develop a Vegetation Management Plan covering the issues of both Upper and Lower Mission Lakes. . It has become necessary to make minor adjustments to this plan when deemed necessary. This is done by mutual agreement. The plan was in effect through January 1, 2010, at which time both parties agree to review the plan and its effectiveness in reaching its goals. Adjustments to the plan based on this review have recently been made and the plan renewed by mutual agreement.

Another result of our growing relationship was the development of a five year pilot program to assess the results of whole-lake treatment of the Curlyleaf pondweed in Lower Mission. The pilot program brought us professional management from the DNR and the University of Minnesota, as well as substantial grants and yearly vegetation surveys by the DNR.

It was on June 2&3, 2008, when Dan Swanson, DNR Aquatic Invasive Species Specialist, was performing a plant survey on Upper Mission. Although he found a healthy native plant population, along with some Curlyleaf, he was surprised to find rooted **Eurasian Water-milfoil** in two locations. During a follow-up native plant survey in mid-June, Eurasian watermilfoil was found in 26 different locations in Upper Mission. The largest concentration was in the south eastern portion of the lake, with smaller (one or two plants) infestations found in other areas, indicating fragments were probably spreading the milfoil from a central source. (see the Eurasian watermilfoil section of this report).

General Methods for Control of Nuisance and/or Exotic Plants

The Department of Natural Resources does not encourage the destruction of aquatic vegetation. However, the Department recognizes that aquatic plants may interfere with a property owner's right to reasonable access to open water. Several control methods may be used for submerged, floating leaf and emergent vegetation, swimmer's itch (snails), leeches and algae when they occur in such numbers that they interfere with boating, swimming and other traditional aquatic recreation. Mechanical control, herbicide control, and biological control (currently being researched for purple loosestrife and Eurasian watermilfoil) are among the control methods available so that lakeshore homeowners have reasonable access and use of the lake while still protecting and enhancing Minnesota's aquatic resources. Most of these control methods provide temporary relief since aquatic plants grow from root crowns, seeds, and other plant parts. Specific control varies by plant species and site conditions.

Aquatic plant removal by property owners may require permits

Lakeshore property owners are reminded that removal of aquatic plants from Minnesota lakes may require a permit from the Minnesota Department of Natural Resources (DNR).

The DNR staff members who issue permits for aquatic plant removal can help property owners avoid harming the lake. Aquatic plants serve many important functions in lakes. They prevent shoreline erosion, stabilize bottom sediments, provide habitat for fish and wildlife, and tie up nutrients that might otherwise spur the growth of algae. We encourage shoreline property owners to limit the disturbance of near-shore vegetation so that plants can still perform these important functions.

Lakeshore property owners can control a modest area of aquatic plants for swimming or boat docking without a permit from the DNR. Cutting, pulling, raking, or harvesting submersed vegetation, like pondweeds, watermilfoil, or coontail, in an area for recreation is allowed under the following conditions:

- the cleared area may not exceed 2,500 square feet

- the cleared area may not extend more than 50 feet along shore or more than one-half of frontage width, whichever is less
- if the cleared area does not reach open water, a 15-foot wide channel to open water may be added
- the cut or pulled vegetation must be removed from the water.

If floating leaf vegetation such as white or yellow water-lilies interferes with boat access, a lake shore property owner can mechanically maintain (by cutting or pulling) a channel extending to open water without a permit. However the channel must be no more than 15 feet wide and comply with the following conditions:

- the cleared channel must remain in the same place from year to year
- the vegetation that is cut or pulled must be removed from the water.

A DNR aquatic plant management permit (permit fee is \$35) is required if plans include the following:

- using herbicides or algicides
- removing emergent vegetation, like bulrush, cattails or wild rice
- installing or operating an automated plant control device (such as the Crary WeedRoller, Beachgroomer or Lake Sweeper)
- removing floating leaf vegetation in an area larger than a 15-foot wide channel (see above)
- controlling submerged vegetation in an area larger than 2,500 square feet or wider than 50 feet (see above)
- removing or relocating a bog of any size. Bog that has broken free and has become a navigational hazard may be returned to the site from which it broke free and staked down to keep it in place. The Mission Lakes Association will provide assistance in recruiting volunteers to assist in the relocation.

The DNR aquatic plant management regulations do not allow the following activities:

- excavating the lake bottom for aquatic plant control
- use of hydraulic jets
- using lake-bottom barriers to destroy or prevent the growth of aquatic plants
- removing aquatic vegetation within posted fish-spawning areas
- removing aquatic plants from undeveloped shoreline.

MORE INFORMATION

For more information on the Aquatic Plant Management Program, contact the Brainerd regional fisheries office at 218-203-4343 or check out the DNR [website](#).

Association Goals for Aquatic Plant Management

- Maintain a healthy ecosystem for the Mission Lakes.
- Utilizing a combination of methods, manage the exotic plant species to enhance the native plant species and recreational use.
- Create and maintain an accurate, up to date map utilizing GPS technology to identify locations of nuisance level Curlyleaf pondweed and Eurasian-watermilfoil beds and remaining beds of emergent species, in particular bulrush.
- Maintain vigilance by continuing periodic inspections to detect Eurasian watermilfoil infestations and increased Curlyleaf pondweed growth.
- Prevent the introduction of other exotic invasive species.

What is Curlyleaf pondweed?

Curlyleaf pondweed (*Potamogeton crispus*) is a growing exotic aquatic plant problem in Minnesota. Though it has been in southern Minnesota since the early 1900s, in recent years it has spread to at least 560 lakes in 80 percent of Minnesota's counties. It is an exotic rooted, submersed aquatic plant that grows aggressively in four to 10 feet of water. Because it can tolerate low light, Curlyleaf pondweed grows well in disturbed sites and can grow under algae blooms or ice. Its strong root system anchors the plants into sediment allowing it to grow well even in areas with strong wave action or streams with moderate velocity.

Curlyleaf impacts lakes in several ways that make it Minnesota's most noxious aquatic exotic plant. The plant reaches its peak in early summer crowding out native plants. Its dense floating mats interfere with swimming, fishing, boating and recreational enjoyment of the lake. As it decays in early July, it releases nutrients that can fuel excessive algae blooms to further degrade water quality. It also produces difficult dead plant disposal as wind and waves deposit the plants on shorelines.



Several characteristics are commonly used to distinguish Curlyleaf pondweed from other native pondweeds commonly found in Minnesota lakes. Curlyleaf has a serrated leaf margin and the leaf tip is blunt, whereas the common varieties have a smooth leaf margin and the leaf tip comes to a point. The leaf base of Curlyleaf does not clasp the stem; the leaf base of common pondweeds curl, or clasp, around the stem.

Curlyleaf's unique life cycle gives it the competitive advantage over many other aquatic plants. Minimal snow cover over the ice can trigger growth. When the ice melts and water temperature warms in the spring, Curlyleaf begins a period of rapid growth out-competing native plants. Later in the spring, flower spikes are produced that emerge above the water surface. By June, the fruits are mature on the stalks and drop to the sediment. The seeds in these fruits have very low germination rates. Prior to dying back in mid-summer, Curlyleaf produces large numbers of small buds, called turions, in leaf axes along its stem. It is primarily through these turions that the plant reproduces. The living turions disperse by water movement, sink to the lake bottom, and lie dormant during the summer when other aquatic plants are actively growing. As the water cools in the fall, the turions sprout to new plants, which remain alive under the ice and snow waiting to proliferate again immediately when the ice melts.

It is this unique life cycle that makes Curlyleaf particularly difficult to manage. Strategies must include stopping turion production, reducing plant biomass, and depleting the seed banks. For long-term success, management efforts must be aimed primarily at reducing turion production and plant biomass. This is most effectively accomplished with a herbicide treatment in the early

spring when the water temperature is between 50-60 degrees and before the turions have been produced. Treatment will be necessary for several years to control turions that may remain and sprout. Managing Curlyleaf is very costly—around \$300 an acre for herbicide applications. A number of lake associations have developed Curlyleaf management plans with the DNR, but the treatment cost, in the tens of thousands for a lake, is shouldered by their lake association, often collected through landowner contributions.

Curlyleaf pondweed on Mission Lake and what we have done so far

Year 2000

- Curlyleaf Pondweed discovered by Lower Mission resident
- Solicited competitive bids from DNR approved commercial applicators
- Received permit from DNR (cost \$120.)
- Contracted selected bidder to treat 15 acres, mostly in the area of the Lower Mission access and Fishin' Mission Resort, for \$6,750.

Year 2001

- On advice from the DNR we did not treat because turion seeds not reaching maturity due to weather and lake levels

Year 2002

- Received permit from DNR, delayed by need for St. Paul headquarters approval because treatment area requested exceeded 15% of lower lake littoral area. (cost \$120.)
- Competitive bids plus negotiations to lower cost resulted in a contract to treat 77 acres at a cost of \$20,000.

Year 2003

- Same Board actions as previous years
- DNR permit \$78.
- Treatment, limited to most critical areas on the West side of Lower Mission, \$8,100.

Year 2004

- Established the Aquatic Vegetation Committee (AKA Weed Committee) to address all concerns regarding aquatic vegetation in our lakes
- Thanks to the hard work and dedication of the committee members and the DNR we developed an Aquatic Plant Management Plan that was accepted by the DNR in March of 2004. The 25-page plan will be in effect through 2010, subject to adjustments by mutual agreement.
- Following the plan, our Board authorized the treatment of 34.2 acres in the most critical areas of Lower Mission, with costs of \$35 for the DNR permit and \$9,234 for professional application.
- The Board authorized engaging professionals to conduct an aquatic plant survey on both lakes. Cost for the survey was \$2,100.

- Survey results presented at Annual Meeting in August, 2004. This included disclosure that Curlyleaf pondweed has infected about 300 acres on Lower Mission plus 150 acres on Upper Mission.

Year 2005

- Our Board authorized the treatment of the most critical 66 acres.
- We then went through the bidding and negotiation process to determine who would provide the treatment.
- Permits were then obtained and treatment took place in early spring. Cost for treatment: \$15,875.
- Approximately 14 days following the treatment, the applicator performed surveys to determine the effectiveness of the treatment. Of the areas surveyed, 80-90% of the Curlyleaf had been controlled.
- Our “Weed Committee” drafted proposed changes for the Aquatic Plant Management Plan, which we discussed with DNR representatives. These changes reflected the results of the survey done following the spring treatment.

Year 2006

- Early in 2006 our Aquatic Vegetation Committee pursued the possibility of using Fluridone, an alternate method to treat Curlyleaf pondweed, on Lower Mission, with application on a whole lake basis.
- On February 22, 2006, our President, Warren Herold, mailed in a grant application to the DNR requesting approval and partial funding for the lake-wide application of Fluridone on Lower Mission.
- At our regular monthly meeting in March, Wendy Crowell and Dan Swanson from DNR Ecological Services in both St.Paul and Brainerd, Tim Brastrup from DNR Fisheries in Brainerd, and Patrick Selter from Professional Lake Management met with us to discuss our grant application and review possible options. After thorough consideration, the DNR biologists had determined that the use of Fluridone could possibly do harm to the native aquatic vegetation, and approval for its use was denied.
- The DNR did, however, present a plan to work with us on a new approach to treating Curlyleaf. Although we would be required to use the same herbicide that was used in the past, we would now be allowed to treat *all* of the Curlyleaf pondweed in Lower Mission and *any* dense Curlyleaf populations identified in Upper Mission. The result was a DNR pilot program to assess the success of whole lake treatment with the chemical Aquathol K. **Best of all, our project was awarded a \$25,000 grant from the DNR, plus we received additional grants totaling \$7,650.**
- As part of the DNR grant award, we accepted the obligation to continue treatment of the Curlyleaf pondweed for three years, 2006-2008, regardless of the availability of future DNR funding.
- We then went through the bidding and negotiation process to determine who would provide the treatment.
- We arranged for a DNR coordinated survey to be conducted after ice-out to identify areas for treatment. The survey was followed by bidding and negotiations that resulted in the

- Results were very positive. The areas with the heaviest concentrations of Curlyleaf in the past now appeared totally free of the plant. Because of the nature of the plant, we know it will probably return, but we are hoping it will be greatly decreased in quantity.

Year 2007

- Our president submitted a grant application to the DNR for 2007 funding support and we were again awarded \$25,000.
- A DNR coordinated survey was conducted after ice-out this spring to identify areas for treatment.
- We then went through the bidding and negotiation process to determine who would provide the treatment.
- We selected Professional Lake Management to do the treatment
- Permits were then obtained and treatment took place in early spring. (Although the majority of the treatment takes place on the lower lake, the project is viewed as if the two lakes were one because of the ease with which Curlyleaf pondweed can be spread by boat traffic)
- On May 1, 2007 we treated 240 acres on Lower Mission and on May 21, 2007 we treated 30 acres on Upper Mission for a total cost of \$68,500.
- Approximately 14 days following the treatments, Professional Lake Management performed surveys to determine the success of the treatments. No Curlyleaf was found within the treated areas.

Year 2008

- Our president submitted a grant application to the DNR for 2008 funding support and we were again awarded \$25,000.
- The Mission Lakes Association follows the Best Management Practices (BMP's) for treatment of Curlyleaf pondweed that include a cycle of **Assessment, Prescription and Implementation**. This allows for quick response to changing conditions within a lake.
- A DNR coordinated survey was conducted after ice-out this spring to identify areas for treatment.
- After negotiation we selected Professional Lake Management to do the treatment
- Permits were then obtained and on May 20, 2008 we treated 211 acres on Lower Mission and on May 29, 2008 we treated 15 acres in the channel area on Upper Mission for a total cost of \$61,998.58. The 211 acres treated on Lower Mission represents the third year of a three year commitment to participate in a DNR pilot program to assess the success of whole lake treatment with the chemical Aquathol-K.
- *Based on what has been learned in the course of the pilot project, the DNR has recommended and we have agreed to the continuation and financing of the project for an additional two years.*

Year 2009

- Our president, Warren Herold and Paula West, Aquatic Plant Committee Chair, submitted a grant application to the DNR for continued funding support for the Curlyleaf Pilot Project. We were awarded \$25,000 plus an additional \$5,424 that was remaining of the DNR grant monies for 2009!
- On June 3, Dan Swanson, DNR Aquatic Invasive Species Specialist, surveyed Upper and Lower Mission for Eurasian watermilfoil and on Upper Mission they found increased growth from last year, when the plant was first discovered. The good news is: no milfoil was found in the channel between the lakes **or in Lower Mission.**
- On April 29&30 the DNR did a delineation of the Curlyleaf on lower mission and determined that an area of 148A would require treatment.
- After negotiation we selected Professional Lake Management to do the treatment
- Permits for treatment were obtained
- 147A in Lower Mission were treated in early May for Curlyleaf pondweed at a cost of \$40,620.25.
- Dan was out again on July 23rd and was really pleased with the condition of Lower Mission--11 foot secchi disk, lots of recreational activity, abundant native plants. The weather of course contributes to some of this, but all in all, the lake is responding well to the Curlyleaf treatments.

Year 2010

- Our president, Warren Herold and Paula West, Aquatic Plant Committee Chair, submitted a grant application to the DNR for continued funding support for the Curlyleaf Pilot Project. We were awarded up to \$25,000 for the final year of the pilot project.
- On April 14&15, the DNR did a delineation of the Curlyleaf on lower mission and determined that an area of 48A would require treatment, a considerable decrease from 09
- On April 27th Professional Lake Management treated the Curlyleaf pondweed at a cost of \$13,072, which was completely covered by the DNR grant.
- Follow up inspection found healthy native plants and no sign of Curlyleaf pondweed!

Year 2011

- Our original plan was to have PLM do the initial survey to locate areas needing treatment
- The DNR agreed to do the survey instead and were on the lake on 5/16
- The DNR found 109 acres of CLP
- A meeting of the Aquatic Vegetation Committee was held on Thursday 5/19 to determine what we could afford and what areas were most important to treat. Members present were committee chair Paula West, Ron Hedlund and Warren Herold. A limit of \$15,000 was set and communicated via speakerphone to Patrick Selter from PLM along with our ideas and concerns, and a request for a plan that would meet our needs.
- The next day, Friday, 5/20, Paula sent an email to the DNR requesting a permit. A recommendation was also received from Patrick, reviewed by the committee and given approval.

- A call was then received from Patrick, who introduced the possibility of using Clearcast, a herbicide that has been used successfully in other states, is less likely to damage native vegetation and is safer to use. The manufacturer was planning on testing it on Lake Benton but conditions weren't right. Over the weekend the Committee spent several hours discussing, evaluating and asking questions regarding its use. The answers to our questions were all reassuring and in increased our comfort level. In addition we learned that the manufacturer, SePRO, would provide their research technicians to accompany Patrick during application and would do continuous water sampling for two days following treatment, as well as return to do evaluation studies throughout the summer.
- On Monday, 5/23, we had discussion with the DNR AIS Specialists who were in favor of the treatment. We then approved the new proposal .
- The treatment of CLP with Clearcast in the lower end of Lower Mission and Aquathol K in other areas took place on Wednesday, 5/25 for a total cost of \$15,000.

Year 2012

- On January 4th Paula West and Ron Hedlund met with the DNR to discuss plans for 2012 treatment, the new DNR permitting changes and combining MLA volunteer locator data with DNR and PLM data to determine treatment areas. Also discussed last year's treatment of CLP in Lower Mission with Clearcast, its high cost, the research done on the project throughout the summer and the need for more research to determine its effectiveness. It was decided that without an additional grant or financial assistance from the manufacturer of Clearcast or other source we could not afford to continue its use in 2012
- In February we learned about the new grant program with the DNR contributing \$175/acre towards approved treatment. (Later reduced to \$150/acre)
- March 19 &20 Paula attended a Symposium in St Paul regarding the latest AIS research and policy. They covered reasoning for treatment, chemicals used, chemical approval process, risk/benefit, extensive research & need for more, etc.
- On March 28th a Board Meeting was held specifically to discuss what we could afford and which areas were most important to treat. Information was presented summarizing possible treatment options for CLP and the newly discovered Eurasian Watermilfoil (EWM), the treatment costs and an estimate of our finances after dues and contributions are received this year. With only about \$18,000 available in our treasury and not knowing what the 2012 contributions will be, a motion was passed to limit treatment costs to about \$18K by treating about 30 acres in each lake.
- On April 19th Dan Swanson with the DNR did a CLP and EWM delineation on Lower Mission that revealed 127 acres of CLP and 2.5 acres of EWM. About 80 acres of the CLP was in the far south end of Lower Mission in a low use area.
- With a 30 acre treatment limit already established by the Board, the most critical acres were selected for treatment.
- Paula did all the paperwork necessary for permitting and grant requests and we received approval from the DNR to treat 30 acres of CLP as well as the 2.5 acres of Eurasian Watermilfoil found last year in Lower Mission.

- On May 9th CLP treatment with granular Aquathol Super K was completed under very good weather conditions.
- On May 16th one week after treatment, Ron Hedlund and Paula West were out on Lower Mission to check on the effectiveness of the treatment. What they found was indication that the treatment, for the most part, was successful. Unfortunately, an area that was identified by Dan's delineations but was not treated, (by our choice due to financial restraints), is now a huge mat of floating CLP at least 100x300 ft. There is also an area of concern, near the channel, that was identified and treated, but still look very healthy. We were very discouraged by the amount of CLP growing in both upper and lower mission this year and as a result Ron gathered some information regarding ice cover and weather conditions to determine their effect on CLP and came up with two recommendations that will strongly influence our future decision making. Although we have always known that the winter conditions have an impact on CLP growth, this winter's conditions made it very clear that this factor deserves much more weight in the decision making process.
- On May 21, Ron Hedlund and Walt Pangburn did a post-application CLP delineation on Lower Mission to help determine the effectiveness of the treatment and identify areas of heavy growth. This information will be used next year to help us determine areas for treatment. The GPS waypoints identified were downloaded and emailed to the DNR for mapping.

Year 2013 CLP activities

The short winter of 2011-2012, with only 114 days of ice cover and little snow cover over the ice, followed by record March temperatures, allowed unusually heavy growth of CLP last year. The winter of 2012-2013 however, was a different story. There were 52 more days of ice cover, a snow cover over the ice and cool spring temperatures. Based on previous summers following similar winters we assumed, correctly, that the CLP growth would be reduced.

The following activities took place throughout the year:

- **On January 9th 2013** Ron Hedlund, Paula West and Nick Bernier met with Dan Swanson and others from the DNR and Patrick Selter from Professional Lake Management to discuss our plans for 2013 treatment. The CLP in Lower Mission has been a problem for almost 15 years, and more than a third of a million dollars have been spent on its treatment. With today's methods of treatment it cannot be eradicated. This has resulted in a lot of frustration on the part of all of us who are involved in its treatment as well as those of us that must put up with navigating our boats through the vegetation and cleaning up our shoreline. Because of our frustration we were looking for a more effective and longer lasting means of treatment.
- At the meeting we brought up the fact that in 2011 we were part of a study where the manufacturers of Clearcast, an herbicide successfully used in other states and less likely to damage native vegetation, was used and extensively evaluated in a part of Lower

Mission for its effectiveness on CLP. Although we have had a relatively short time to evaluate the Clearcast, we have observed that it seems to have a more lasting effect on the control of the CLP. We, and Patrick, suggested that part of our treatment plan this year for Lower Mission include treating an area with Clearcast and compare its long term effect with areas we have previously treated with Aquathol-K. Our goal is to find the most effective, affordable treatment available to treat the areas where the CLP affects our property owners the most.

- On 3/28 Nick, Paula and Ron met with Patrick at the PLM office to discuss possible 2013 treatment options for both CLP and EWM based upon the funding that we determined would be available, using Clearcast in a test area to further determine its effectiveness.
- On 4/11 we received a preliminary proposal from PLM.
- On 4/20 at our Board meeting Paula West, Aquatic Vegetation Committee Chair, presented an activity report and PLM proposal. The plan was to continue to revise the plan as more information became available. A motion was made and approved to proceed with the CLP treatment of the areas outlined, plus the latitude to treat additional areas as deemed necessary.
- On 5/3 Paula submitted our grant applications.
- On 5/10 the ice finally went out on Lower Mission, the latest ever in our records that go back to 1980.
- On 5/15 and 5/20 the DNR did their delineation with rake samples and, as usual, found CLP in many areas. The growth however was not as advanced as in previous years, probably due to the very late winter and ice-out.
- On 5/24 Ron did his first search and found almost no visible CLP.
- On 5/27 we received the final recommendation from PLM, to treat 6.01 acres with Clearcast and 1.126 acres with Aquathol K.
- On 5/30 PLM treated the Clearcast area.
- On 6/3 PLM treated the Aquathol K area
- After the Clearcast treatment Ron collected water samples for PLM to use in evaluating the coverage of the chemical.
- From 6/1 on, searches of the treated areas indicated that the treatment was effective, there was no CLP growth found! Searches of the rest of the lake indicated the CLP growth was reduced from the previous year, most likely due to the late ice cover and cooler weather.
- On 6/22 at our Board Meeting the treatment results were discussed. We also discussed the need for significant follow-up evaluation of the area treated with Clearcast in order to determine our treatment plan for 2014.

Year 2014 CLP activities:

- On March 11th, 2014, Paula West, Nick Bernier and Ron Hedlund met with Dan Swanson, DNR AIS Specialist and Patrick Selter from Professional Lake Management to establish a preliminary treatment plan for 2014. Our discussion included: a review of our 2013 treatment and results; treatment successes and failures on other lakes; treatment options available to us; grant opportunities; permit requirements; timing for necessary paperwork; possible areas for treatment; timing of treatment; plans for early and ongoing vegetation surveys by the DNR, PLM and our own volunteers; etc.

- At the June 14th Board Meeting, Ron Hedlund and Nick Bernier reported that they and Paula West did a pre CLP treatment search on Lower Mission on May 26th and under very good visibility conditions they found almost no CLP, probably because of the long period of ice/snow cover. With May 28th being the last day approved for treatment they decided we would be better off skipping the treatment this year, do a thorough mapping of any CLP growth at its peak, and use the data for future treatment planning. (This turned out to be a good decision as very little CLP growth was found throughout the year)

Year 2015 CLP activities:

- On March 10th, 2015, Nick Bernier and Ron Hedlund met with Dan Swanson, DNR AIS Specialist and Patrick Selter and David Hillstrom from Professional Lake Management to establish a preliminary treatment plan for 2015. Our discussion included: a review of our 2014 EWM treatment and results; treatment successes and failures on other lakes; treatment options available to us; grant opportunities; permit requirements; timing for necessary paperwork; possible areas for treatment; timing of treatment; plans for early and ongoing vegetation surveys by the DNR and our own volunteers; etc. We also discussed our decision not to treat CLP last year because of its minimal growth due to the heavy snow cover over the ice. This turned out to be a good decision because there was almost no CLP in Lower Mission last year.#
- This year the volume of aquatic invasive species (AIS), both Eurasian watermilfoil (EWM) and Curlyleaf pondweed (CLP), seems to have exploded in our lake as well as in lakes throughout the state. Soon after ice-out we observed that the CLP was rapidly growing and already close to the surface in both lakes. This rapid growth was the result of the lack of snow cover over the ice, allowing the sunshine to reach the plants and start their growth beneath the ice. .
- In April, shortly after ice-out the DNR identified areas for possible treatment and In May a survey by our volunteer locators identified the priority areas for treatment based upon the expected amount of boat traffic in the area, the problems it may cause for property owners and the treatment cost and finances available. It was decided to treat almost 18 acres of CLP in Lower Mission only.
- The treatment was completed on May 14th
- By June there were several large patches of floating CLP in the untreated areas of both Upper and Lower Mission. On the good side, by mid June the CLP started to die off and sink to the bottom.
- Throughout this process it was necessary to handle the chores of applying for grants, permits and requests for reimbursement.#This year we expect that our grant will bring us \$3,000 to help us cover the \$7,536 we have spent for the treatment of CLP.

Year 2016 CLP activities:

Spring meeting with DNR and PLM- Nick Bernier and Ron Hedlund attended a meeting on March 15 with Dan Swanson from the DNR and David Hillstrom from PLM. At that meeting they discussed the possible negative effects of the record late ice-over and early ice-out on

our lakes. The short time of ice cover tends to stimulate the growth of EWM and especially CLP. Dan Swanson will be out shortly after ice out to record the CLP growth. Our goal will be to treat the areas with highest impact to our property owners and greatest risk of spread. All of this will be based upon what we can afford. We already have the treatment permits which will be modified as necessary at the time of treatment.

- On 5/2 the DNR did a search on Lower Mission and found a considerable amount of CLP. This data was transmitted to the Mission Lakes Association and to the applicator, PLM.
- The data was reviewed by Ron Hedlund and Nick Bernier and the decision was made to treat almost 20 acres.
- On 5/11 PLM treated 19.7 acres of CLP, all in Lower Mission, covering the areas determined to create the highest risk of spread and have the most impact on property owners. The areas were treated with Aquathol K at a total cost of \$9,798.18.
- Observations in June indicated that our fears of heavy CLP growth because of the short ice-over and little snow on the ice were well founded. In the untreated areas we observed the heaviest CLP growth we have ever experienced, both on Upper and Lower Mission.
- By the end of June most of the CLP had died off and was no longer a serious problem.
- Very high winds and heavy rain in early July resulted in a considerable amount of CLP turions (seeds) floating upon the lake surface.#

Year 2017 CLP activities:

Spring meeting with DNR and PLM- Nick Bernier and Ron Hedlund attended a meeting on April 5th with Tim Plude and Wayne Mueller from the DNR and David Hillstrom from PLM. At that meeting they discussed the possible negative effects of the record late ice-over and early ice-out again this year on our lakes. The short time of ice cover tends to stimulate the growth of EWM and especially CLP. Our goal will be to treat the areas with highest impact to our property owners and greatest risk of spread. We will be responsible for CLP searches on both lakes, and transmission of our findings to PLM for their development of treatment maps that will be sent to us and Tim Plude for approval. All of this will be based upon what we can afford. We already have the treatment permits which will be modified as necessary at the time of treatment.

- Early searches by Nick Bernier and Ron Hedlund revealed little sign of CLP other than the channel areas.
- With input from the DNR, PLM and the information collected by Ron and Nick a plan was developed that would result in treatment of the most critical areas.
- The planned area of CLP to be treated, on both Lower and Upper Mission, was reviewed. We had all previously agreed that we could provide up to \$25K for AIS treatment (our expense). Gary Rohde made a motion at the 5/1/2017 Board Meeting

that we treat up to 25A of CLP this year at a cost of just over \$500.00 per acre. Barb Woese seconded the motion, all in favor.

- The request for treatment was passed on to PLM.
- Grants- No money will be available from the DNR or the County for CLP treatment
- On 5/24/2017 PLM treated 8.5 acres on Lower Mission with Aquathol K at a cost of \$4,358.80 and 16.4 acres on Upper Mission with Aquathol K at a cost of \$8,409.92.
- Weather conditions delayed treatment. Later discussions resulted in the feeling that an earlier treatment might have been more effective.
- Future treatment was discussed regarding the effect of a short winter on CLP development and basing future treatments accordingly. Under these conditions we can expect CLP to grow almost anywhere that the water depth is in the 6-9 foot range.
- We also feel that the DNR is no longer treating CLP as an Invasive Species and is accepting it as another weed.

Year 2018 CLP activities:

Spring meeting with DNR and PLM- Nick Bernier attended a meeting on March 15th with Tim Plude and Wayne Mueller from the DNR and David Hillstrom from Professional Lake Management (PLM). At that meeting they discussed Last year's mapping and treatments, this year's anticipated needs for mapping and treatment (PLM once again volunteered to map CLP for us at no charge!)

Lack of funding from DNR and the disappointing position they have taken that CLP is no longer considered invasive

Our goal will be to treat the areas with highest impact to our property owners and greatest risk of spread. All of this will be based upon what we can afford

- PLM was able to do a preliminary survey as a starting point on both Upper and Lower Mission Lakes, identifying the more dense areas.
- Early searches by Nick Bernier revealed little sign of CLP other than the channel areas.
- With input from the DNR, PLM and the information collected by Nick a plan was developed that would result in treatment of the most critical areas.
- The planned area of CLP to be treated, on both Lower and Upper Mission, was reviewed. The request for treatment was passed on to PLM.
- Grants- No money will be available from the DNR or the County for CLP treatment
- On 5/30/2018 PLM treated 6 acres on Lower Mission and 11.6 acres on Upper Mission at a cost of \$11,640.56.
- The DNR is no longer treating CLP as an Invasive Species and is accepting it as another weed.

History and cost of Curlyleaf Pondweed Treatment on Mission Lake, 2000-2018			
	Lower Mission #acres/treatment date	Upper Mission #acres/treat. date	Total Cost to Lake Association
2000	15 acres		\$6,750
2001	No treatment advised by DNR		
2002	77 acres(DNRvariance granted)		\$20,000
2003	West side of lower mission		\$8,100
2004	<ul style="list-style-type: none"> • 34 acres – critical areas only • Aquatic plant survey 		\$9,234 \$2,100 (not treat. cost)
2005	<ul style="list-style-type: none"> • 66 acres treated (critical areas) (5/31/05)### 		\$15,875
2006	<ul style="list-style-type: none"> • Participant DNR Pilot Program 240 acres treated (5-3-06)	35 acres (5/3?/07)	\$69,468 (less \$25K DNR; \$7.65K other grants) Our cost \$36,818
2007	<ul style="list-style-type: none"> • Participant DNR Pilot 240 acres (5/1/07)	30 acres (5/21/07)	\$68,500 (less \$25K DNR grant) Our cost \$43,500
2008	<ul style="list-style-type: none"> • Third year of DNR Pilot • 211 acres (5/20/08) 	15 acres (5/29/08) in channel area of UM	\$61,999 (less \$25K DNR grant) our cost \$36,999
2009	<ul style="list-style-type: none"> • 147 acres treated in early May 	No treatment in Upper Mission	\$40,620 (less \$30,424 DNR grant) Our cost \$10,196
2010	<ul style="list-style-type: none"> • 48 acres treated on 4/27/10 	No treatment in Upper Mission	\$13,072 (all paid by DNR grant) Our cost \$0
2011	<ul style="list-style-type: none"> • ? acres treated on 5/25/2011 	No treatment in Upper Mission	\$15,000 All paid by Mission Lakes Ass'n
2012	<ul style="list-style-type: none"> • 30 acres treated on 5/9/2012 	No treatment on Upper Mission	\$10,680(less \$4,500 DNR grant) Our cost \$6,180
2013	<ul style="list-style-type: none"> • 6.01 acres treated with Clearcast on 5/30/2013 • 1.126 acres treated with Aquathol K on 6/3/2013 	No treatment on Upper Mission	\$5,938 (less \$1,500 DNR grant) Our cost \$4,438
2014	No treatment	No treatment	
2015	17.84 acres treated on 5/14/2015	No treatment on Upper Mission	\$7,536 (less \$3,000 DNR grant) our cost \$4,536
2016	19.7A treated on 5/11/2016	No treatment on Upper Mission	\$9,798.19 (no grant assistance received)
2017	8.5A treated on 5/24/2017	16.4A on 5/24/17	\$12,768.72 (no grant assistance received)
2018	6.0A treated on 5/30/18	11.6A treated on 5/30	\$11,640.56 (no grant assistance received)

CLP Costs so far			\$251,831.47 MLA cost \$135,146 Grants received \$386,977.47 Total treatment costs
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What is Aquathol K?

Aquathol K, active ingredient Endotholl, is a Chemical toxic to not only Curlyleaf pondweed but other plants as well. **However**, by doing the treatment early in the spring, *before* the water warms up beyond 60 degrees, it will minimize the affect on the later growing native plants. Studies conducted by Army Corp of Engineer researchers have shown this to be the most effective way to treat CLP with minimal harm to native plants. CLP spouts in the fall, grows under the ice in the winter, and is actively growing by spring thaw; native plants are not growing actively at the time of treatment.

Here are some additional things you should know about Aquathol K:

- There are no swimming restrictions
- There is no restriction on the consumption of fish
- It is not toxic to dogs or cats at the rates used
- It is not toxic to waterfowl and wildlife
- With a half-life of 3-7 days it generally dissipates and degrades within a few days
- It degrades into Carbon, Hydrogen, Oxygen and Organic Acids normally found in the environment

An adult would have to drink more than 350 gallons of water every day for a lifetime to experience adverse effects (from the Endotholl)

Future Aquatic Plant Management Activities for Curlyleaf pondweed

Best Management Practices or BMP's include a cycle of **Assessment, Prescription and Implementation**. This allows for quick response to the changing conditions within a lake.

- **Assessment:** Sediment sampling can be conducted to predict the levels of Curlyleaf pondweed within an area of the lake. This can not only indicate the number of turions present, but also the frequency of sprouting. This information, along with visual observations and surveys by the DNR, the applicator and volunteer locators can be used to determine the need of future treatments. If depleted, these areas should be monitored every year to ensure that populations of Curlyleaf pondweed stay at low levels. Management of Curlyleaf pondweed could be shifted to other areas in the lake that may be impacted. Assessments of Native vegetation should continue through the management program. This will ensure efforts are not negatively impacting the balance of the ecosystem. A complete vegetation assessment should at a minimum be performed every other year.
- **Prescription:** Results from the sediment samples can be reviewed to determine the seed bank left in the area. This information can be used to determine the locations of future treatments. If populations are high, it is recommended that treatment shall be required. Information from vegetation assessments can indicate areas where other "nuisance" plants may be encountered. Any sites showing significant decreases in native diversity should be reviewed to determine if the area will recover or another method of control can be used.
- **Implementation:** Treatments of Curlyleaf pondweed should be conducted in areas where high densities of turions have been collected as well as new areas that have been identified.

Some areas in Lower Mission Lake have been treated for several consecutive years, yet the Curlyleaf continues to return. As time goes by, new chemicals and better treatment methods will surely be developed. We must remain alert to opportunities to try new options such as we did in 2011 with the use of Clearcast in the South end of Lower Mission. As more effective treatments become available and affordable we hope to greatly improve our control of CLP. Throughout the treatment efforts the protection of native plants will be stressed, especially the vast beds of bulrush found throughout the lakes.

Specific Plan Conditions for Curlyleaf pondweed management

Continued support from the DNR through grants, technical expertise and manpower will depend on the continued commitment on the part of the Mission Lakes Association and the property owners it represents. We must continue to work closely with the DNR specialists as we have in the past, meeting their requirements in a timely manner and following their recommendations. As conditions and requirements may change from year to year we must maintain close communications with them in order to succeed in meeting our goals.

Considerations for Curlyleaf pondweed treatment

Each year decisions regarding what areas to treat for Curlyleaf pondweed (CLP) have been based upon:

- DNR delineation of CLP in the spring
- Cost per acre of treatment
- Finances available that year, based on our current cash on hand and estimated contributions
- Grant funding available
- Anticipated impact of no treatment on lakeshore homeowners (swimming, lake access, water quality and beach cleanup)
- Impact on boaters (fishing, cruising, waterskiing, high boat traffic areas)
- Give consideration to the previous year's growth and problem areas

What also must be considered is the impact of the weather conditions on CLP growth between the previous fall and the time of decision-making regarding treatment. Under the right conditions CLP can show considerable growth over the winter. Late ice-over, light snow cover over the ice, early ice-out and a warm spring can lead to very rapid and heavy growth.

The following illustrates the ice-cover impact:

Winter of:	Ice cover days:	CLP observations on Upper Mission:
2015-2016	93 (plus little snow)	Extremely dense growth both lakes
2014-2015	151	Very dense CLP growth because of <u>no snow cover</u>
2013-2014	153	Almost no CLP due to heavy snow cover
2011/2012	110*	Very dense in Spring 2012
2010/2011	147	Minimal CLP growth
2009/2010	118	Dense in Spring 2010 due to short ice cover
2008/2009	147	Minimal CLP growth in Spring 2009

(The 20 year average ice cover on Upper Mission is 136 days)

* The 2011/2012 winter had almost no snow cover for most of the winter and was followed by record temperatures in March. This was the earliest ice-out in 20 years of data

Recommendations:

1. After treatment we must perform a post-application delineation at the peak of the CLP growth to determine both the effectiveness of the treatment and identify any areas of heavy growth that would merit special priority in the following year. All of this data should be shared with the DNR and the applicator.
2. Length of ice cover, snow cover over ice, spring temperatures, and previous years' post treatment delineations, all should become important factors in determining our CLP treatment areas for the coming year.

What is 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 water birds, 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.

The best way to control this species, or any aquatic invader, is to prevent it from being introduced in the first place. Anyone engaged in activities in Minnesota's waters should be aware of the potential for spreading invasive plants and take steps to prevent their introduction; your actions can make a difference.

Simple things to do include inspecting boats, motors, and trailers at the boat ramp before launching and again after hauling them out. Prevent plant material from getting into bait buckets and live wells, and from getting tangled up in anchor ropes or fishing gear. Plants cleaned from boats and gear should be disposed of in a trash receptacle or away from water on dry land. Once established, invasive aquatic plants are extremely difficult to eradicate. Control experiments have been attempted with water level manipulations, mechanical control and herbicides. In most cases these plants have survived attempts at control. Biological controls for invasive aquatics are still being researched and may help limit growth of some species in the future.

Until recently, there have been no realistic options to rid our lakes of milfoil. It was over 20 years ago that Eurasian watermilfoil was found in Lake Minnetonka, causing serious recreational, ecological and economic impacts. Over the years various methods of control were used by lakeshore owners to control milfoil adjacent to their property. In addition, an extensive harvesting program was initiated by the Lake Minnetonka Conservation District. Nothing proved successful. The search for an effective means of control is ongoing.



Eurasian watermilfoil typically has 12 to 21 pairs of leaflets. The native northern watermilfoil, with which it is often confused, usually has 5 to 9 pairs. Drawing courtesy Bell Museum of Natural History.



Eurasian Water-milfoil on Mission Lake

It would be hard to describe our disappointment when in June of 2008 Dan Swanson, DNR Aquatic Invasive Species Specialist, called to tell us he had found Eurasian-watermilfoil in Upper Mission Lake. Granted, with the growing number of infected lakes in Minnesota it was bound to happen eventually. With the high number of boats that are launched daily on our lakes, and the fact that almost none are subject to any official monitoring or inspection, it was only a matter of time before Eurasian-watermilfoil appeared.

Actually, in many ways we were lucky. Thanks to the close relationship that our lake association had developed between the DNR and Professional Lake Management during our Curlyleaf Pilot Program, a rapid response plan was quickly established. The plan followed the same basic elements as the Curlyleaf plan: assessment, prescription and implementation.

What we have done so far

Year 2008

- On June 2&3, Dan Swanson, DNR Aquatic Invasive Species Specialist, was performing a plant survey on Upper Mission. Although he found a healthy native plant population, along with some Curlyleaf, he was surprised to find rooted **Eurasian Water-milfoil** in two locations.
- During the native plant survey in mid-June, Eurasian watermilfoil was found in 26 different locations in Upper Mission by Dan Swanson, DNR Invasive Species specialist, and crew. The largest concentration was in the south eastern portion of the lake, with smaller (one or two plants) infestations found in other areas, indicating fragments are probably spreading milfoil from a central source.
- Treatment occurred as follows:
 - All of the milfoil was treated by Professional Lake Management with the herbicide Renovate on July 3 except for the near shore areas in the northwest corner of Upper Mission, which required property owner's signatures.
 - Dan Swanson returned to the lake in late July and found two new plant locations and determined that the milfoil growing in the SE part of the lake should be retreated for maximum results. Both times Dan was on the lake he found floating fragments of milfoil in the channel area of Lower Mission.
 - On July 30, the properties along the NW corner were treated after obtaining property owners signatures and a variance from the DNR for those signatures not obtained. The new locations were also treated along with re-treatment of the major patches in the SE part of the lake. Good results were found from the first treatment in all other locations.
 - Dan came back in early September for another survey and a final fall treatment of Eurasian watermilfoil was conducted.

--Treatment needs for next year will remain to be determined based on what is growing next spring

--Total treatment cost was \$575

Year 2009

- On June 3, Dan Swanson, DNR Aquatic Invasive Species Specialist, surveyed Upper and Lower Mission for Eurasian watermilfoil. On Upper Mission they found increased growth from last year, when the plant was first discovered. The good news is: no milfoil was found in the channel between the lakes **or in Lower Mission.**
- They produced a map indicating the locations that plants were found, ranging from a single plant to multiple plants at each GIS location. The Mission Lakes Association immediately proceeded with discussing treatment with the DNR. On Saturday June 13, the Board voted to spend \$13,800 to treat the milfoil, with \$5,000 of the cost coming from a control grant from a DNR grant.
- A grant request was submitted to the DNR and approved for \$5,000.
- Approximately 30 acres of Upper Mission were treated on June 21st with the chemical Renovate at a cost of \$13,650. This is the same chemical that was used last year and has no immediate restrictions for swimming or fishing after application and completely dissipates in the water column within five days.
- Dan Swanson was out on Mission Lakes July 23rd surveying for milfoil. Good news--still no milfoil in Lower Mission.
- On Upper Mission a majority of the treatment areas are not showing Milfoil, which shows us that the treatment has had a significant impact. We are, however, still showing some heavy patches of milfoil in the SE quadrant of the lake.
- Dan suggests treatment with a heavier dose of chemical with applications spread out over a 24 hour period to insure more dosage and longer contact with the plants.
- Patrick Selter, Professional Lake Management feels we must get control of those patches so we don't keep dragging milfoil around and re-infesting other parts of Upper Mission or infesting Lower Mission. Originally this spring Patrick had suggested proactively treating a larger area (10 acres) in the SE part of the lake; he feels if we had done that we would have had better control, though the DNR was reluctant to let us do that. We may still have to take this approach.
- In August, the areas that were treated in June and still retained milfoil were retreated at no cost to the Association. The areas in the SE quadrant were treated at a heavier dosage. The Association paid the difference in chemical costs between the June application and the later heavier dosage. Total cost, \$1,037.

Year 2010

- In mid May, Patrick Selter, Professional Lake Management, did a Eurasian watermilfoil search on Upper Mission and found approximately 30 acres with signs of milfoil.
- On May 26th, Dan Swanson and two other DNR Aquatic Invasive Species Specialists surveyed Upper Mission for Eurasian watermilfoil. They found about 29 acres.
- On June 14th Dan Swanson did a re-check of the area. Although the EWM was not as abundant as last year the recommendation was to treat all of the infected area (30 acres).
- On June 14th a grant request was submitted to the DNR and approved for \$4,900.
- On June 29th the 30 acres were treated, under very good conditions, by Professional Lake Management at a cost of \$13,100.
- On August 11th a survey indicated a few individual sites by the resorts, the channel, the point and Elm Bay

Year 2011

- Paula West, Aquatic Vegetation Committee chair, filed a grant application with the DNR on June 1st.
- Dan Swanson, DNR Aquatic Vegetation Specialist, did a survey of Upper Mission to identify EWM locations for treatment and found plants that should be treated within several polygons totaling 28 acres.
- Paula submitted the permit application for treatment which was approved.
- Set goal of treatment before July 4th, weather permitting.
- The 28 acres of EWM located earlier by the DNR was treated on June 28th at a cost of \$13,403.39.
- Volunteers were recruited to continue locating milfoil and mark its location by use of GPS. The GPS coordinates were then downloaded and transmitted to the DNR and PLM. This will aid in both the initial treatment and also help us evaluate the results and what might need additional treatment or be physically removed by trained volunteer divers.
- About 10 days later, some of our “milfoil locator volunteers” took advantage of ideal weather conditions to identify several EWM locations that fell outside of the treated areas.
- At the Saturday, July 16th meeting, APM committee members discussed their plan to meet with the applicator to determine our next steps.
- After the Saturday meeting two volunteer divers pulled a considerable amount of untreated EWM in a location where it was especially dense and reaching the surface. Much has been learned from this and subsequent diving experiences, giving us an increased perspective regarding the growth and abundance of EWM.

- From this locating and diving experience a plan is evolving that should greatly increase the effectiveness of the EWM control process. We hope to assist the DNR and the Applicator in this process by sharing EWM locations and observations before, during and after treatment.
- EWM locations identified as being outside of the originally treated area were treated on Friday, July 28th.
- On August 18th, during a follow-up evaluation of the Curlyleaf treatment on Lower Mission, *EWM was located on the lower lake in front of the old Fishin Mission Resort*. PLM recommended treating one acre surrounding the area of EWM at a cost of approximately \$400.
- The option of applying for a “Rapid Response” grant was discussed by the APM Committee, but eventually it was decided to have PLM treat the area at our expense. That treatment took place in late October.#

Year 2012

- On 6/5 the first search for EWM on Upper Mission was done early in the day by a MLA volunteer. The conditions were ideal and a disturbingly large amount of EWM was found and their waypoints marked by GPS. Some locations were quite thick and already near the surface. (It was later determined that the extremely high amount of EWM was probably a result of the very short winter and minimal snow cover over the ice). A search was then done that same day by Dan Swanson, DNR, to identify EWM for treatment. The waypoints of the two searches were combined and a map of the treatment areas was produced by Dan. Two new EWM sites were also found on Lower Mission by the DNR. Poor weather conditions caused a delay in treatment and it was finally scheduled for Monday, 6/25.
- On 6/23 (Saturday) Conditions were excellent and a MLA volunteer was able to do another EWM search on Upper Mission which revealed many new sites. These new sites were downloaded and emailed to the DNR and the applicator and included in Monday’s treatment plan.
- The applicator, Professional Lake Management, treated all locations in the treatment plan on 6/25/2012
- Excellent conditions on 7/3 again brought out a MLA volunteer, this time to search an area that in the past was referred to as a sunken island. The area was out of the normal search area and unfortunately was found to be covered with EWM. The waypoints were downloaded and sent to the DNR and the applicator.
- On 7/9 Good conditions resulted in further volunteer locating. Again, the waypoints were downloaded and sent to the DNR and the applicator and will be included in follow-up treatment scheduled for the week of July 9th.

- The second EWM treatment of Lower Mission was completed in AM under good conditions on 7/13/2012.
- Again, on 7/21, perfect conditions allowed additional locating to be done on the West side of Upper Mission and an additional 39 waypoints were collected and sent to the DNR and PLM.
- EWM activities to date were discussed at the 7/28/2012 Board Meeting. After reviewing our finances and an estimate from PLM of the cost to treat the additional area located 7/21, (as well as re-checking previously treated areas and re-treating as necessary), a motion was passed to treat the additional waypoints.
- The third treatment of EWM on Upper Mission took place on 8/10/12, to treat the additional sites located on 7/21.
- On 8/20 Patrick Selter from PLM and two of our volunteer locators did a follow-up search of Upper Mission treatment locations to collect information necessary to begin planning for next year.

Throughout this entire period MLA has also been performing the task of producing all of the necessary paperwork for permits, grants, etc..

Follow-up searches will continue on both lakes when weather permits to determine if further treatments are necessary and financially possible.

Year 2013 EWM activities

The short winter of 2011-2012, along with minimal snow cover over the ice, resulted in a large increase in EWM locations in 2012. In some of these locations large mats of EWM formed on the surface. Boat traffic over these areas resulted in a considerable amount of EWM fragments floating throughout the lake and eventually establishing the new colonies subsequently found in our extensive 2013 searches.

The following activities took place throughout the year:

- On January 9th 2013 Ron Hedlund, Paula West and Nick Bernier met with Dan Swanson and others from the DNR and Patrick Selter from Professional Lake Management to discuss our plans for 2013 treatment. With the considerable amount of data that was collected in 2012 via locating and observations by the Association, the DNR and PLM, a preliminary plan was developed that included treating all large patches, as well as narrow bands in the 6 to 8 foot depth around most of the lake. The treatment would be at a very high rate of application. A final plan, based on springtime observations and available finances, would be implemented in July.
- May 24th the ice finally went out on Upper Mission, 50 days later than last year and two weeks later than any spring in our records going back 20 years.
- On 6/3/13 Paula West issued the necessary permit and grant applications.
- On 6/19 a search of the point in front of Kelly's done by Ron Hedlund resulted in 38 waypoints of EWM plants.

- On 6/21, 24 waypoints were marked in front of the resorts and the point of bulrushes north of the resorts.
- On 6/24 Ron and Nick Bernier identified 38 waypoints around Hoot Owl Bay and the nearby sunken island.
- On 6/30 Ron identified 10 waypoints in the area in front of the Harrison's.
- On 7/1 Dale Gunderson identified many waypoints along the Ridgewood Drive area with his GPS.
- On 7/1 Dale and Ron marked 46 waypoints between Ron's house and the point of bulrushes north of the resorts.
- On 7/2 Dale and Ron marked 96 waypoints from Kelly's to Elm Bay.
- On 7/3 Ron and Paula West marked 22 points from Paula's to the bulrush point north of the resorts.
- On July 12th Nick Bernier, Paula West and Ron Hedlund met with Dan Swanson, DNR Invasive Species Specialist, and Patrick Selter, with Professional Lake Management to discuss the EWM treatment on Upper Mission Lake. Prior to the meeting, a map of areas for treatment had been produced using DNR and PLM data as well as almost 300 waypoints from our own volunteer locating program. With this map as a guide, along with our recent observations and data from previous years, we discussed areas for treatment, the product to be used, methods of application, the timing of the treatment and the cost of our various options.
- The end result was that on July 24th, under ideal conditions, almost all of the milfoil that had been identified was treated. The products used were Max G in the area from Elm Bay through the sunken island area and Renovate OTF in the remaining areas. A total of 15.2A at a cost of \$12,000.00.
- Additional volunteer monitoring took place throughout August to monitor progress.
- On 8/13 Dan Swanson and Ron made a follow-up search on Ron's pontoon and found that in most areas the EWM was dying off. They did discover, however, an area where the EWM and Northern watermilfoil were forming a hybrid plant. This has been reported recently on other lakes. Just what we need ☺.
- On 9/15 PLM did a follow-up evaluation and found that the treatment was effective in most areas. Unaffected or untreated areas found were marked for future treatment.
- On 9/17/13 Ron Hedlund and Nick Bernier met with Patrick Selter from PLM and Dan Swanson and others from the DNR to discuss the years results from both our CLP and EWM treatment and make preliminary plans for next year. It was decided that no more EWM treatment would be done this year. ***The preliminary plan for next year is to do locating and treatment of the EWM in the resort area as soon as practical, followed by extensive locating, assessment, and development of a treatment plan for the rest of Upper Mission.***

Year 2014 EWM activities:

- On March 11th, 2014, Paula West, Nick Bernier and Ron Hedlund met with Dan Swanson, DNR AIS Specialist and Patrick Selter from Professional Lake Management to establish a preliminary treatment plan for 2014. Our discussion included: a review of our 2013 treatment and results; treatment successes and failures on other lakes; treatment options available to us; grant opportunities; permit requirements; timing for necessary

- At our June 14th Board meeting we reviewed our plan. It was also stressed that anyone boating on Lower Mission should be on the lookout for EWM and if any is found it should be reported to Nick or Ron. Shortly after the meeting, Nick Bernier and Ron Hedlund did a thorough search of the large bay in front of the resorts on Upper Mission Lake. They marked 111 waypoints of EWM throughout the area. They were very disappointed to see such an abundance of EWM. This is an area that had minimal EWM in the past and has received very little treatment. Searches that had been done late last year only resulted in finding very few small patches, yet this year it seems to be everywhere, even in some very shallow (3-4 foot depth) areas where we have never found it in the past. Probably one of the causes for the spread is the heavy boat traffic from the resorts, however it is hard to explain the significant change from last year.
- The first EWM treatment, covering the area in front of the resorts and using liquid 2-4D, was applied to 14.85 acres on June 26th.
- The conditions were very poor for locating, due to wind and cloudy weather for an extended period. As a result, the next rounds of searches, performed by our volunteer locators, were limited to June 3, 7, 9, and 16. This resulted in our second treatment, using liquid 2-4D applied to 17.54 acres that included most of the East shore, the Hoot Owl Bay area, a large patch outside of Elm Bay and a patch on the North end.
- Follow-up assessment and searches on August 2nd and 13th resulted in one more patch that required treatment. This, our final treatment for 2014, was completed on August 14th and covered only 1.5 acres.
- Probably the most important factor in the success of our locate/treat strategy is our volunteer locators. Our thanks to Nick Bernier, Dale Gunderson, Belinda Hedlund, Ron Hedlund, Paula West and the various family members that helped to collect over 500 waypoints to guide the treatment process.

Year 2015 EWM activities:

- On March 10th, 2015, Nick Bernier and Ron Hedlund met with Dan Swanson, DNR AIS Specialist and Patrick Selter and David Hillstrom from Professional Lake Management to establish a preliminary treatment plan for 2015. Our discussion included: a review of our 2014 EWM treatment and results; treatment successes and failures on other lakes; treatment options available to us; grant opportunities; permit requirements; timing for necessary paperwork; possible areas for treatment; timing of treatment; plans for early and ongoing vegetation surveys by the DNR and our own volunteers; etc.
- In mid May, Shortly after the CLP treatment was completed the Eurasian watermilfoil (EWM) search began. Between May 22nd and June 26th our volunteer locators marked with GPS units almost 550 waypoints in Upper Mission, identifying the perimeter of large patches or marking individual plants. In addition, the DNR performed two surveys

in Lower Mission, revealing that after two years without finding EWM it had returned in several areas.

- This information was used to provide maps and the information necessary to allow the applicator to provide an accurate bid. After receiving a recommendation and after much consideration on our part it was decided to treat 35 acres in Upper Mission and 12 acres in Lower Mission.
- Treatment for EWM in both Upper and Lower Mission lakes took place on July 10th, under good weather conditions at a cost of \$40,000.
- Throughout this entire process it is necessary to handle the chores of applying for grants, permits and requests for reimbursement. This year we expect that our grants and County aid will bring us over \$14,500 to help us cover the \$40,000 we have committed to so far to the treatment of EWM.

Year 2016 EWM activities:

Spring meeting with DNR and PLM- Nick Bernier and Ron Hedlund attended a meeting on March 15 with Dan Swanson from the DNR and David Hillstrom from PLM. At that meeting they discussed the possible negative effects of the record late ice-over and early ice-out on our lakes. The short time of ice cover tends to stimulate the growth of EWM and especially CLP. Our goal will be to treat the areas with highest impact to our property owners and greatest risk of spread. We will be responsible for EWM searches on both lakes, and transmission of our findings to PLM for their development of treatment maps that will be sent to us and Dan Swanson for approval and treatment. All of this will be based upon what we can afford. We already have the treatment permits which will be modified as necessary at the time of treatment.

- On 6/8 Ron Hedlund did a search that covered about 75% of the possible EWM growth area and found little sign of EWM.
- On 6/29 Ron did another search and found that his enthusiasm a couple of weeks ago was a little premature. The EWM seems to be presenting itself a little later this year. He was out for a couple of hours collecting over 150 waypoints, some in places that we may have missed last year, but many in locations that we had treated. He was especially disappointed in what he found in the areas that had been treated.
- Our plan was to continue our searches and schedule treatment when the searches were completed. Unfortunately, before more searches could be completed, we experienced heavy winds and very heavy rains that raised the water level by almost 10 inches. The high water also resulted in a loss of water clarity from 24 feet on Upper Mission to only 7 feet. This, and other issues, delayed further searches until late July and early August.
- Searches in late July, all of August and into September resulted in very little additional data. Discussions in mid September with the applicator, PLM, and review of their treatment options and recommendations resulted in a decision to treat all EWM identified on both Upper and Lower Mission as soon as practical.

- On September 16th PLM treated 4.92A of EWM on Lower Mission with Sculpin G at a cost of \$4219.69. On September 16th PLM also treated 10A of EWM on Upper Mission with Sculpin G at a cost of \$9,488.31 (after a credit from 2015).

Year 2017 EWM (Eurasian Watermilfoil) activities:

- Spring meeting with DNR and PLM- Nick Bernier and Ron Hedlund attended a meeting on April 5th with Tim Plude and Wayne Mueller from the DNR and David Hillstrom from Professional Lake Management (PLM). At that meeting they discussed the possible negative effects of the record late ice-over and early ice-out again this year on our lakes. The short time of ice cover tends to stimulate the growth of both EWM and CLP. We will be responsible for EWM searches on both lakes, and transmission of our findings to PLM for their development of treatment maps that will be sent to us and Tim Plude for treatment approval and permitting. All of this will be based upon what we can afford as well as the availability of volunteer locators.
- On June 7th PLM was able to do a preliminary survey as a starting point on both Upper and Lower Mission Lakes, identifying the more dense areas.
- The preliminary survey was followed by the addition on July 6th of points gathered by Ron Hedlund on July 2nd, 3rd and 5th.
- On July 7th PLM provided an updated map of treatment areas on Upper Mission.
- By July 11th David Hillstrom had supplied the DNR with files of their recommendations.
- On July 14th Ron Hedlund did some additional searching and transmitted the results to PLM.
- On July 17th we received an adjusted permit from the DNR.
- On the morning of July 19th PLM proceeded with the treatment of Upper and Lower Mission. 16.5 acres on Upper Mission and 6.3 acres on Lower Mission.
- On the afternoon of July 20th Ron Hedlund went for a ride on Lower Mission and stumbled upon a large, thick patch of EWM near the lower end of Lower Mission. This patch had never before been recorded. Ron recorded and downloaded the waypoints and transmitted them to PLM.
- Further discussion with PLM resulted in the additional treatment of 2½ acres of EWM on Lower Mission.
- A total of 16.5 acres were treated on Upper Mission at a cost of \$14,510.46 and a total of 8.85 acres were treated on Lower Mission at a cost of \$7,689.68.
- Our next step is the submission of an invoice to Crow Wing County for reimbursement of \$5,000. per lake towards our treatment costs. This funding was allocated by the state legislature in 2014 as a part of program aid given to Minnesota Counties for treatment and prevention of invasive species in county waters.

Year 2018 EWM (Eurasian Watermilfoil) activities:

Spring meeting with DNR and PLM- Nick Bernier attended a meeting on March 15th with Tim Plude and Wayne Mueller from the DNR and David Hillstrom from

Professional Lake Management (PLM). At that meeting they discussed Last year's mapping and treatments, this year's anticipated needs for mapping and treatment (PLM once again volunteered to map CLP for us at no charge!)

Lack of funding from DNR and the disappointing position they have taken that CLP is no longer considered invasive

- We will be responsible for EWM searches on both lakes, and transmission of our findings to PLM for their development of treatment maps that will be sent to us and Tim Plude for treatment approval and permitting. All of this will be based upon what we can afford as well as the availability of volunteer locators.
- On June 22nd, Ron Hedlund did some extensive searching and transmitted the results to PLM for mapping.
- The MLA board met and decided to treat a total of about 19 acres
- David Hillstrom supplied the DNR with files of the recommendations.
- We received an adjusted permit from the DNR.
- On the morning of May 30th PLM proceeded with the treatment of Upper and Lower Mission.
- A total of 16.7 acres were treated on Upper Mission at a cost of \$19,442.61 and a total of 5.2 acres were treated on Lower Mission at a cost of \$5,895.14.
- Our next step was the submission of an invoice to Crow Wing County for reimbursement of \$4,000. per lake towards our treatment costs. This funding was allocated by the state legislature in 2014 as a part of program aid given to Minnesota Counties for treatment and prevention of invasive species in county waters.

History of Eurasian watermilfoil treatment cost on Mission Lake				
Year	Number acres treated/date	Cost of treatment	Less Grants received	= Cost to Mission Lakes Association
2008	Individual sites spot treated	\$575	none	\$575
2009	30 acres treated on 6/21/10 + ?	\$13,650+\$582 & \$455 = \$14,687	(\$5,000)	\$9,687
2010	30 acres treated on 6/29/10	\$13,100	(\$4,900)	\$8,200
2011	28 acres treated on 6/28+ add'l on 7/28	\$13,403.39 \$1,171.63	(\$4,900)	\$8,503.39 \$1,171.63

2012	UM 19.62A on 6/25 UM 2.5A on 7/13 UM 6.5A on 8/10 <i>LM 2.5A on 5/9</i> <i>LM 0.6A on 6/25</i>	\$14,310 (all Upper Mission) \$800 (all Lower)	(\$4,293)	\$10,017 \$800
2013	<i>UM 15.2A on 7/24</i>	\$12,000	(\$1,520)	\$10,480
2014	<i>UM 14.85A on 6/26</i> <i>UM 17.45A on 7/29</i> <i>UM 1.5A on 8/14</i>	\$4,870.80 \$7,086.10 \$609.12	(\$2,000DNR) (\$5,000CWC)	\$5,566.02
2015	<i>LM 12.44A on 7/10</i> <i>UM 34.98A on 7/10</i>	\$10,494.26 \$29,508.78	(\$4,500DNR) (10,000CWC)	\$25,503.04
2016	<i>LM 4.92A on 9/18</i> <i>UM 10A on 9/18</i>	\$4,219.69 \$9,448.31	(\$4,219.69CWC) (\$5,000.00CWC)	\$0 \$4,448.31
2017	<i>LM 8.85A 7/19&25</i> <i>UM 16.7A on 7/19</i>	\$7,689.68 \$14,510.46	(\$10,000 CWC)	\$12,200.14
2018	<i>LM 5.2A</i> <i>UM 16.7A</i>	\$5,895.14 \$19,442.61	(\$8,000 CWC)	\$17,337.75
Costs & grants so far		\$183,821.97	(\$69,332.69)	\$114,489.28

Future aquatic Plant Management Activities for Eurasian water-milfoil

The current process used for the treatment of EWM in Mission Lake consists of three basic steps:

1. The first step begins with an assessment of the extent of EWM presence in the lake. This is a thorough survey done by the DNR Aquatic Invasive Species Specialists. During this survey, the DNR Specialists cruise over all the areas where milfoil might grow, and mark, via GPS, all milfoil found. They then go back to the office to download their data and produce a map that reflects their findings. This first assessment by the DNR is a requirement in order for them to

issue a permit for treatment. Often this information is supplemented with additional data gathered by the applicator or the Lake Association.

2. The second step is ***prescription***. In this step, usually in a meeting with the DNR, the applicator, and members of the Association's AIS Committee, a "prescription" is developed for the treatment of the areas identified in the assessment. The prescription, consisting of method, timing, extent, goals, etc, can change over the years for many reasons. Lessons learned from our previous year's results, findings from divers, successes or failures on other lakes, new chemicals and application methods, and the finances we have available for treatment, all can influence the prescription.

3. The third step, ***Implementation***, is the actual treatment that was decided upon in the joint meeting held in step 2

The completion of these three steps in no way means the process is over. Actually, about two weeks after its treatment, the area is again assessed to determine the effectiveness of the treatment and identify any new, untreated areas. The results are again reviewed and the prescription and implementation steps may be repeated.

Process weakness and possible solutions

Probably the most important step in this process is the initial identification of the areas to be treated. The DNR personnel that do the locating are very busy at the time we need them most and can't always do their locating under ideal conditions (little or no wind, clear skies, clear water and mid-day opportunity). As a result, due to limited visibility, some EWM locations may be missed in the survey. In order to improve the assessment process, the Mission Lake Association has gathered a growing list of volunteers, with the goal of having the flexibility of going out on that "ideal day" and marking, via GPS, all EWM locations they find. This data is then downloaded from their GPS and transmitted to the DNR and the applicator to supplement their findings. The volunteer locator team, as well as volunteer divers, will also do post treatment evaluation and searches for new sites in both lakes. The goal is to make the treatment as effective as possible and reduce our future costs.

Regardless of the efforts put into the process there will still be areas that we miss or that survive the treatment. Additional steps that have been used or considered are the removal of plants by divers and/or treatment of remaining individual plants by our volunteer locators.

Continued support from the DNR through grants, technical expertise and manpower will depend on the continued commitment on the part of the Mission Lakes Association and the property owners it represents. We must continue to work closely with the DNR specialists as we have in the past, meeting their requirements in a timely manner and following their recommendations.

Other exotic species

Zebra mussel (*Dreissena polymorpha*)

Species and Origin: Zebra mussels and a related species, the Quagga mussel, are small, fingernail-sized animals that attach to solid surfaces in water. Adults are 1/4 to 1 1/2 inches long and have D-shaped shells with alternating yellow and brownish colored stripes. Female zebra mussels can produce 100,000- 500,000 eggs per year. These develop into microscopic, free-living larvae (called veligers) that begin to form shells. After two-three weeks, the microscopic veligers start to settle and attach to any firm surface using "byssal threads". It is the only freshwater mussel that can attach to objects. They are native to Eastern Europe and Western Russia and were brought over to the Great Lakes in ballast water of freighters. Populations of zebra mussels were discovered in the Great Lakes about 1988.

Impacts: Zebra mussels can cause problems for lakeshore residents and recreationists. Homeowners that take lake water to water lawns can have their intakes clogged. Mussels may attach to motors and possibly clog cooling water areas. Shells can cause cuts and scrapes if they grow large enough on rocks, swim rafts and ladders. Anglers may lose tackle as the shells can cut fishing line. Zebra mussels can also attach to native mussels, killing them. Zebra mussels filter plankton from the surrounding water. This filtering can increase water clarity, which might cause more aquatic vegetation to grow at deeper depths and more dense stands. If a lake has high numbers of mussels over large areas, this filter feeding could impact the food chain, reducing food for larval fish.

Status: They have spread throughout the Great Lakes and the Mississippi River from Brainerd downstream, and are now in other rivers and inland lakes. They are established in Minnesota and were first found in the Duluth/Superior Harbor in 1989.

The [Infested Waters PDF](#) list provides details of current infestations. Diving ducks, freshwater drum (sheepshead), and other fish eat zebra mussels, but will not significantly control them.

Means of spread: Mussels attach to boats, nets, docks, swim platforms, boat lifts, and can be moved on any of these objects. They also can attach to aquatic plants, making it critical to remove all aquatic vegetation before leaving a lake. Microscopic larvae may be carried in water contained in bait buckets, bilges or any other water moved from an infested lake or river.

Where to look: Examine boat hulls, swimming platforms, docks, aquatic plants, wood and other objects along shorelines of lakes and rivers. Join in the [Volunteer Zebra Mussel Monitoring Program](#) and report your efforts each year.

Regulatory Classification: It is a [prohibited invasive species](#) (DNR), which means import, possession, transport, and introduction into the wild is prohibited.



Zebra mussels



Many zebra mussels attached to a native mussel.

A very important message to all regarding Aquatic Invasive Species

The invasion/infestation of Curlyleaf pondweed and Eurasian watermilfoil in Mission Lakes has been a very frustrating, as well as a very expensive experience for us. **Let's not share the experience with other lakes.** If you plan to take your boat to another lake, please follow these rules. **It is the law.**

- 1. CLEAN** all visible aquatic plants, zebra mussels, and other prohibited invasive species from watercraft, trailers, and water-related equipment before leaving any water access or shoreland.
- 2. DRAIN** water-related equipment (boat, ballast tanks, portable bait containers, motor) *and* drain bilge, livewell and baitwell by removing drain plugs before leaving a water access or shoreline property. **Keep drain plugs out** and water-draining devices open while transporting watercraft.
- 3. DISPOSE** of unwanted bait, including minnows, leeches, and worms, in the trash. It is illegal to release live bait into a waterbody or release aquatic animals from one waterbody to another. If you want to keep your live bait, you must refill the bait container with bottled or tap water.

KNOW THE LAW: You may not...

- Transport watercraft without removing the drain plug.
- Arrive at lake access with drain plug in place.
- Transport aquatic plants, zebra mussels, or other prohibited species on any roadway.
- Launch a watercraft with prohibited species attached.
- Transport water from Minnesota lakes or rivers.
- Release live bait into the water.

If you have used your boat on waters other than Mission Lakes, or if a guest is bringing their boat from another lake, make sure that the above rules have been followed. Many lakes are infested with zebra mussels, which are hard to detect and hard to remove. If you know the boat is coming from a lake with zebra mussels, we strongly recommend the following steps.

Spray, rinse, dry — Some invasive species are small and difficult to see at the access. To remove or kill them, take one or more of the following precautions before moving to another waterbody, especially after leaving zebra mussel and spiny waterflea infested waters:

- Spray with high-pressure water
- Rinse with very hot water*
- Dry for at least 5 days

Run motor and personal watercraft for a few seconds to discharge water before leaving a water access.

Transport fish on ice — be prepared, bring a cooler.

* These water temperatures will kill zebra mussels and some other AIS: 120°F for at least 2 minutes; or 140°F for at least 10 seconds.#

Veliger testing

Starting in 2015 Crow Wing county has arranged to pay for veliger testing in lakes that are not infested with zebra mussels. Veligers are the microscopic baby mussels. We had to purchase a special net that filters out microscopic organisms and follow a prescribed route and depth at specified areas on the two lakes. Subsequently the resulting specimens need to be preserved in a specific manner and taken in promptly to be sent out to a reference lab. This was graciously accomplished in both 2015 and 2016 by Alex Janochoski from the Upper lake. Fortunately both years we have tested negative for zebra mussels. The plan is to test again next year and years to come as long as the program is available.

Wildlife

A goal of the Mission Lakes Association is to develop the old hatchery area of the Lower Mission Wildlife Area into a duck habitat. Efforts to this extent had been pursued since the early 90's. Recently, Ducks Unlimited, the Mission Lakes Association and the DNR formed a 3 way partnership to restore the old hatchery area into a suitable duck habitat. We now have a new pump and refurbished pump house, burnt out the cat tails in 2008 and in 2009 have poisoned what's left. The next steps of this long term project are yet to be determined.

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 Mission Lakes, the DNR Area Wildlife Manager is Christine Reisz, 1601 Minnesota Drive, Brainerd MN 56401. Her phone number is 218-203-4323. Her e-mail is Christine.reisz@dnr.stste.mn.us. Kevin Woizeschke is the Non-Game Wildlife Specialist, and can be reached at (218) 203-4371. His email address is Kevin.woizeschke@dnr.state.mn.us .

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. Similar classifications exist for rivers; in Crow Wing County the Mississippi River is considered Class II. Clearly any local municipal jurisdiction may have additional (and usually more restrictive) standards as well.

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

Class	Minimum Lot Size (sq ft)	Minimum Lot Width (feet)	Structure Setback (feet)	Maximum impervious coverage
GD	20,000	100	75	25 percent
RD	40,000	150	100	25 percent
NE	80,000	200	150	25 percent
II	5 acres	330	150	---

Upper Mission Lake (DNR Lake ID#18-0242) is classified by Crow Wing County as a General Development Lake, while Lower Mission Lake (#18-0243) is Recreational Development.

Most lakes have numerous properties that are “grandfathered,” 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.

The development on Upper Mission Lake is scattered around the shoreline. The most significant development occurs on the northeast, east, northwest, west and southeast portions. The development on Lower Mission Lake is not as scattered. The most significant development is on the northwest and northeast shorelines. A significant portion (approximately 1.7 miles) of the southeast and east shorelines of Lower Mission Lake is in public (DNR) ownership.

Throughout 2004 our association was very involved in the County Planning Commission meetings in an attempt to influence their decisions in a way that would minimize the impact of the development of the Fishin' Mission property on our lakes.

We recognize the need to educate our property owners on the best management practices for their lakeshore and watershed properties. Our future plans are to develop a “welcome package” describing the rules and BMP’s for their property. We also plan to continue to educate our property owners through appropriate articles in our newsletters.

Changes made in 2008 in the management of the Crow Wing County Planning and Zoning office (now the Environmental Services office) have resulted in many positive changes in many areas, including the building permit process. These changes will surely eliminate almost all of the zoning mistakes and violations that we had to deal with in the past. We also will be notified by them whenever a property owner on our lakes seeks a variance, giving us the opportunity to do our own evaluation of the request and voice our opinion of the request.

Crow Wing County has a web site which offers helpful contact information regarding planning and zoning matters: <http://www.co.crow-wing.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 Land Services Department, 200 South 4th Street, Brainerd, MN 56401-3565, Phone: (218) 824-1125, Fax: (218) 824-1126.

Managing surface use conflicts

(this has not been a priority issue on Mission Lake)

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.

(this issue is not under current development)

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 1999 Minnesota Department of Natural Resources Fisheries Survey, there are two public accesses on Mission Lakes, as shown below:

Public Access Information

Ownership	Type	Description
Minnesota DNR	Concrete	Northwest side of Upper Mission lake
Minnesota DNR	Concrete	East side of Lower Mission lake

Organizational Development and Communication

This is an area that we intend to address in the near future.

Meeting Financial Needs

Beginning in 1992 the Mission Lakes Association operated a very successful charitable gambling organization that funded many lake and neighborhood projects over the years. However, charitable gambling proceeds slowly dwindled to the point where by 2008 it was only a break-even proposition. Because of the tremendous amount of work involved it was discontinued. That left us with a need to find considerable funding for projects noted by the association as desirable and necessary.

In 2007 the original agenda for the August 11th annual membership meeting was set to cover the usual review of what the Association had done in the past year, with a focus on the history of our fight against curlyleaf pondweed and the plans to continue the battle in the future. We then planned to continue the discussion that highlighted our July 21st meeting regarding the possible formation of a Lake Improvement District (LID) to provide continued funding of the Association's efforts for Curlyleaf control. We hoped that at the annual meeting we would be able to ask these three questions:

- Do you agree with our mission?
- Do you trust our judgment?
- Are you willing to help?

Unfortunately, just one week before the meeting a letter went out to all property owners from a newly formed group, the Mission Lake Concerned Property Owners (MLCPO). The letter referred to the July 21st meeting and accused the lake association of misrepresenting the facts given at the meeting. The letter went on to give 10 statements that were supposedly made at the meeting and "corrected" them with their own "facts". Most of the 10 statements they gave either were never made, were misrepresented, or their correcting "facts" didn't apply to the statements. The letter was clearly designed to build their support by exacerbating fears of never-ending high taxes and irreversible damage to our lakes.

As a result of this letter a great deal of our annual meeting was spent on defending our position and answering concerns brought up by the letter. It wasn't a fun meeting.

At this meeting we hoped to form a committee of concerned members and property owners to further the discussion and determine our next steps. Instead we ended up with a neighbor against neighbor situation where no one wins. We had regrets that anyone had been misled or confused by our comments or actions. It was definitely not our intent.

The decision to pursue the formation of a LID was a long and agonizing one made by the Board of Directors. We thought continuation of the curlyleaf fight was what everyone wanted and could think of no other way to fund it. Because of our fear of permanently dividing our association and knowing that this was only the first step in a very lengthily and complex process, we decided to abandon, for now, our pursuit of a Lake Improvement District.

Current Fundraising Strategy

The current financial needs of the Mission Lakes Association fall into two main areas:

- Association operating expenses (postage, printing, meetings, picnic, etc.).
- Management of Aquatic Invasive Species (AIS). Currently this is the treatment of Curlyleaf Pondweed and Eurasian Watermilfoil.

Even with only 50% of our property owners being association members, our membership dues over the last few years have been enough to cover the first area, our operating expenses.

Management of AIS has come at a great cost to the Mission Lakes Association. This money has come largely from our memberships' very generous private contributions. In addition, the Association has received a considerable amount in grants from the Minnesota Department of Natural Resources.

Each year, after carefully considering the areas that require treatment and weighing that with the cost of treatment and the amount of funds available, a treatment plan is established. Every year there will be areas that we would like to treat but cannot because of fiscal constraints. While we all feel strongly that the DNR should take a more active role in the financial management of these invasive plants in the public waters of Mission Lakes, the primary responsibility falls to the Mission Lakes Association. We all hope that in the near future there will be new, more effective treatments and means of application that will be safe and affordable. Even then, we will continue to rely on the sustained generous contributions from our membership.

It goes without saying that your associations' board members are not professional fundraisers, so if any of you who are reading this have any good fundraising ideas, please contact our President or any of our board members, or email Ron Hedlund, rhedlund@brainerd.net .