

DRAFT Long Lake Executive Summary and Implementation Plan

Polk County, Wisconsin
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Harmony Environmental

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Long Lake is a 272 acre seepage lake located between the Villages of Balsam Lake and Centuria. The lake receives water from precipitation and snowmelt through ditches located on the north and south side of the lake. Long Lake responds greatly to rainfall events, with the lake level dropping over one foot during 2012 drought conditions.

One hundred six lake residents completed a survey regarding Long Lake. Algae growth, water clarity, invasive aquatic plant growth, algae toxins, and plants making it difficult to swim caused the greatest degree of negative impact on lake use. Three-fourths of respondents expressed interest in free information and site visits to address waterfront property runoff.

Citizen Lake Monitoring Data has been collected intermittently since 1992 and indicated that Long Lake is eutrophic (productive with frequent algae blooms). Data for 2012 indicated that Long Lake was hypereutrophic and characterized by heavy algae blooms and dense plant growth.

Blue green algae were the most abundant form of algae from 2010-2012. Blue green algae are of specific concern because they produce toxins at elevated concentrations.

In 2009 high algae toxin levels were likely the cause of a human skin rash and a large dog becoming violently ill and were confirmed as the cause of the death of a small dog. These unfortunate events prompted the Long Lake Board to work with the Polk County Land and Water Resources Department to monitor algae toxins on Long Lake from 2010-2012. Toxin samples were only taken when algae scums were present. Nearly 75% of the samples indicated a high probability of adverse health effects from the toxin microcystin LR, 17% had confirmed anatoxin-a present, and 75% of the 2012 samples tested positive for the toxin cylindrospermopsin.

From 1959 - 1981 chemical treatment for algae in Long Lake included literally tons of sodium arsenate and copper sulfate. As a result, copper in the sediments of Long Lake have built up to levels where harmful effects to the lake are likely to be observed.

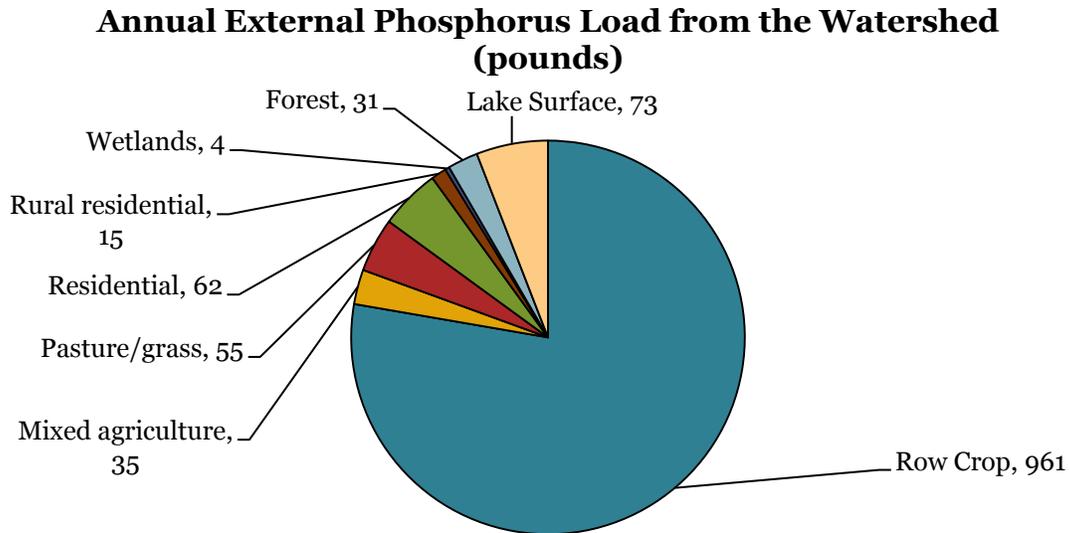
Most of the shoreline area on the lake is in a natural state (55%) or sand and rock (37%). The shoreline buffer area (35 feet upland from the water's edge) is equally split between a natural state (47%) and lawn (46%). An average lot on the Lake was estimated as mostly lawn (65%), followed by natural (21%), and impervious surface (15%).

The majority of lawns sampled on the lake (90%) tested over 25 ppm for phosphorus, indicating that phosphorus fertilizer is not needed.

The watershed area of Long Lake is approximately 2,343 acres. The lake itself is 272 acres and represents 6% of the total land use in the Long Lake Watershed. The largest land uses in the Long Lake Watershed are row crop (46%) followed by forest (17%). The majority of the shoreline of Long Lake is residential.

Modeling was used to estimate an annual phosphorus budget for Long Lake

External load from the watershed: 1245 lbs phosphorous/year

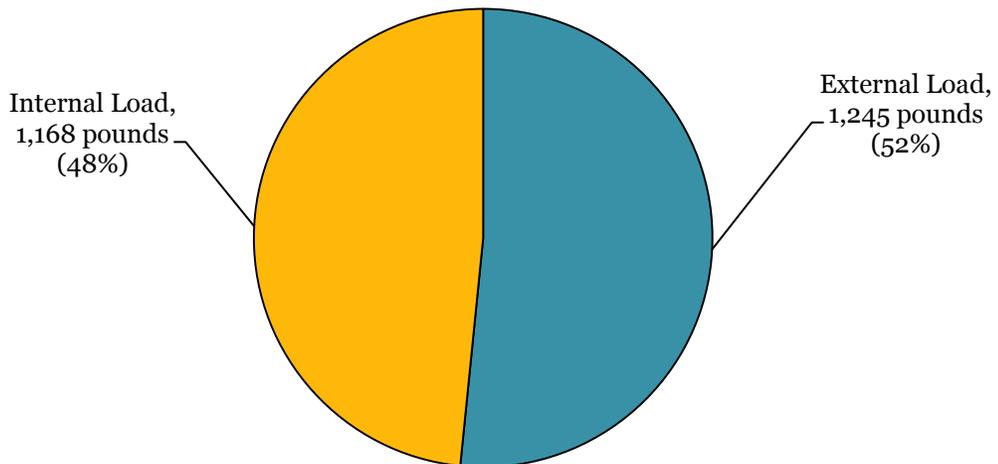


Internal load from the lake sediments: 1168 pounds phosphorus/year

Load from curly-leaf pondweed die off: 52 pounds of phosphorus/year

TOTAL LOAD TO LONG LAKE: 2,413 pounds of phosphorus/year

Annual Phosphorous Load to Long Lake (pounds)



**LONG LAKE
DRAFT PLAN VISION, GOALS, OBJECTIVES, AND ACTIONS
2014-2023**

Plan Long Term Vision

Long Lake is a healthy, recreational lake with clean water and diverse native fish, wildlife, and plants.

Guiding Principles for Plan Implementation

- 1. Understanding of lake and watershed processes drives lake management.*
- 2. Lake management activities are conducted in a manner that will limit unintended environmental impacts (Do good – Do no harm).*
- 3. Lake residents and users are provided information to understand the ever evolving nature of lake management, the complexity of issues, the status of projects and activities, the costs and benefits of remedial actions, and the opportunity and techniques to reduce or prevent any negative consequences of lake use and lakeside living.*
- 4. Communication regarding plan goals, objectives, and actions is clear, concise, and frequent.*
- 5. The agricultural community is engaged as a partner in reaching the Long Lake Plan vision.*
- 6. All major decisions that impact the lake or have a financial burden on Lake District residents are reviewed and voted on by Lake District members. Any budget item of \$5,000 or more must be reviewed and voted on by members.*

Plan Goals and Objectives

Water quality goal. Achieve and maintain a growing season mean total phosphorus concentration of .065 mg/L (65 ug/L.)

Phosphorus leads to algae blooms in Long Lake. Total phosphorus concentration at this level will mean that the lake will stay clear longer and there will be less risk from algae toxins. This goal is achievable only if both the internal load from lake sediments and the external load from the watershed are controlled. In 2012 the total phosphorus was .146 mg/L

Water clarity goal. Extend the number of weeks that secchi depths exceed 4 feet and 2 ½ feet by 2 weeks.

Secchi depth is a measure of water clarity. It records the depth at which a black and white disk is no longer visible as it is lowered into the lake. A secchi depth of 4 feet is the threshold where algae growth increases greatly. The Chla level (a measure of algae growth) increases above .03 mg/L at this point. This transition occurred early in July in 2012. A secchi depth of 2 ½ feet corresponds to a Chla level of about .05 – the threshold from moderate to high risk for algae toxin production. This transition occurred in early August in 2012.

Evaluation:

1. Participate in DNR Expanded Self-Help Monitoring measuring total phosphorus, chlorophyll a, temperature and oxygen profiles in addition to secchi depth.
2. Continue algal toxin measurements and algae assessment.
3. Consider conducting a sediment core study to establish a baseline of lake conditions, magnitude of changes, and progress with plan implementation.

Goal 1. Minimize nutrients, sediment, and other pollutants that flow to the lake from its watershed.

Objective A. Engage and support agricultural producers in reducing runoff to Long Lake.

Actions

1. Invite agricultural producers to special lake meetings and develop other means to reach out to farmers in a positive manner.
2. Inventory crop fields and other agricultural land uses to identify positive practices and where priority improvements could be made.

3. Share information about positive agricultural and residential practices with lake owners and agricultural producers.
4. Pay for soil tests to measure phosphorus levels in crop fields.
5. Consider financially supporting the installation of priority best management practices including sediment basins.
6. Consider purchasing land or easements to allow installation of priority best management practices including sediment basins.
7. Evaluate to track improvements made and determine next steps.

Objective B. At least 50 percent of Long Lake owners carry out best management practices to reduce runoff to the lake.

Actions

1. Provide information about residential best management practices in meetings, personal visits, newsletters, and emails.
2. Teach residents about residential best management practices at workshops, demonstrations, and tours.
3. Provide free design assistance for water quality landscaping and habitat improvements to lake residents if funds are available from the LLPRD, grants, and other sources.
4. Assemble and train volunteers and provide volunteer support for project installation.
5. Share in the cost of project installation if funds are available from the LLPRD, grants, and other sources.
6. Provide recognition in the form of a sign or dock marker to raise interest, and/or consider a special listing in the homeowner's directory with permission from the landowner.
7. Evaluate to track best management practices implemented and determine next steps.

Goal 2. Encourage lake processes which minimize the release of nutrients from within the lake.

Objective A. Investigate/pursue in-lake management techniques including alum treatment and aeration.

Actions

1. Conduct an alum dosage study to determine appropriate alum application rates and cost.
2. Measure soluble and total iron in the hypolimnion (near lake bottom) to assess potential efficacy of an aeration system.

Objective B. Reduce internal loading from lake sediments by 90 percent.

Actions

1. Develop financing and install the recommended in- management technique(s).
2. Repeat selected treatment as needed.

Objective C. Reduce phosphorus loading from curly leaf pondweed by reducing beds to less than 20 acres and preventing CLP spread (from Aquatic Plant Management Plan).

Objective D. Increase native aquatic plant rooting depth (from Aquatic Plant Management Plan).

Actions for Objectives C and D are described in the Long Lake Aquatic Plant Management Plan.

Goal 3. Preserve and enhance lake and shoreline fish and wildlife habitat.

Objective A. Encourage installation of residential best management practices, such as native plantings and woody habitat, which improve habitat.

Actions are described under Goal 1, Objective B.

Goal 4. Lake residents and visitors understand the components of and the means to support a healthy lake.

Objective A. Lake residents understand the rationale behind the plan actions and have enough information to make sound decisions.

Objective B. Lake residents take action to improve lake water quality and habitat.

Messages to convey:

- Messages should be simple, and they should be repeated. Recipients can be directed to more in-depth information if interested.
- Celebrate the progress made with aquatic plant and lake management so far.
- Explain plan goals and actions.
- There is an urgency to lake water quality improvements. Algae toxins are a threat to the safety and well-being our families, visitors, and pets and wildlife.
- Describe conditions when algae toxins are a likely concern.

Educational methods:

- LLPRD and Long Lake Association newsletters
- Handouts/brochures (alum handout is one example)
- Presentations (annual meeting, seminars) – encourage new owners to attend, bring in credible experts such as Bill James, use testimonials from owners, include food
- Website: <http://longlakepolk.ning.com/>
- Email list
- Lake Association welcome packets for new lake residents – add water quality and plan information
- Articles for the Lake News edition of the Ledger Newspaper
- Letter from the LLPRD president, include on web site
- Additional educational methods are described under Plan Goal 1.

Goal. Implement the goals of the Long Lake Aquatic Plant Management Plan.

See the Long Lake Aquatic Plant Management Plan for Implementation Actions.

Long Lake Aquatic Plant Management Plan Goals

- 1) Improve water quality and clarity.
- 2) Protect and restore healthy rooted native aquatic plant communities.
- 3) Balance recreation and riparian needs with protection of native plants and the fishery.
- 4) Prevent the introduction of Eurasian water milfoil and other invasive, non-native aquatic species.
- 5) Rapidly respond to eliminate any newly introduced invasive, non-native aquatic plant species.

Plan Implementation

The implementation charts on following pages list potential funding sources for plan implementation. The implementation plan and funding sources will be reviewed each year prior to the LLPRD annual meeting.

While grants are available for most plan activities, the LLPRD may choose to move forward in some instances without DNR grant funding secured. DNR and other permits may be required for some activities, but activities do not need to be funded by grants.

Grant Sources

The main sources of implementation funds are LLPRD revenues and Department of Natural Resources grants. The DNR Lake Management Grant Program has two main types of lake management grants: planning and lake protection grants. Lake planning grants are available at two scales – large scale up to \$25,000 and small scale up to \$3,000. These applications are accepted twice each year on February 1 and August 1. DNR lake protection grants for plan implementation have a maximum grant amount of \$200,000. These grants are due each year by May 1. Plan activities will be eligible for lake protection grant funds following approval by the DNR.

The Department of Natural Resources also manages Targeted Runoff Management (TRM) grants for urban and agricultural practices as described in the state runoff rule: NR151. Cities, villages, towns, counties, regional planning commissions, tribal governments, and special purpose districts such as lake, sewerage, and sanitary districts are eligible to apply for TRM grants.

DNR Lake Planning Grants (up to 67% state share)

Large scale – up to \$25,000

Small scale – up to \$3,000

Applications due February 1 and August 1

These grant applications could proceed without final plan approval.

DNR Lake Protection Grants (up to 75% state share)

Up to \$200,000

Requires DNR approval of tasks in the comprehensive plan (allow 60 days)

Applications due May 1

DNR Targeted Runoff Management (up to 70% state share)

Small Scale: Up to \$150,000 (only land purchase and structural practices)

Large Scale: Typically \$500,000 to \$1 million (cropping practices and staffing costs also eligible)

Agricultural activities in this plan may be eligible. Projects must address state agricultural performance standards.

Application due April 15th

<i>Water quality goal. Achieve a growing season mean total phosphorus concentration of 0.65 mg/L.</i>					
Actions¹	Timeline	\$ Estimate (annually)	Vol. Hours (annually)	Responsible Parties²	Funding Sources
Participate in Expanded Self-Help Monitoring measuring total phosphorus, chlorophyll a, temperature and oxygen profiles in addition to secchi depth.	Ongoing	\$0	120	LLPRD	WDNR
Continue algal toxin measurements and algae assessment.	Ongoing	\$4,100	0	LWRD	WI Dept. of Health Centers for Disease Control
Consider conducting a sediment core study to establish a baseline of lake conditions, magnitude of changes, and progress with implementation.	TBD	\$15,000 to \$30,000 (1X)	0	LWRD	WDNR Lakes Planning Grant
SUBTOTAL WQ EVALUATION					

¹ See previous pages for action item detail. Estimates are for annual budgets once implementation begins.

²LLPRD = Long Lake Protection and Rehabilitation District

LWRD = Land and Water Resources Department

WDNR = Wisconsin Department of Natural Resources

<i>Goal 1. Minimize nutrients, sediment, and other pollutants that flow to the lake from its watershed.</i>					
<u>Objective A. Engage and support agricultural producers in reducing runoff to Long Lake.</u>					
Actions³	Timeline	\$ Estimate	Vol. Hours	Responsible Parties⁴	Funding Sources
1. Reach out to farmers through special meetings and other activities	2014-2018	\$300	40	LLPRD	Lakes Planning Grant (08/01/13)
2. Inventory crop fields to ID positive practices and potential improvements	2014	\$5,000	0	LWRD (contract)	Lakes Planning Grant (08/01/13)
3. Share information from inventory above	2015	\$100	20	LLPRD LWRD	Lakes Planning Grant (08/01/13)
4. Pay for crop field soil tests	2014	\$2,350	0	LWRD (contract)	Lakes Planning Grant (08/01/13)
5. Consider supporting recommended Best Management Practices	2015	TBD	0		
5a. further investigate sediment basin options: contact landowners, preliminary engineering	2014	\$2,000		LWRD (contract)	Lakes Planning Grant (08/01/13)
6. Consider purchasing land or easements to allow installation	2015	TBD		LLPRD	Lake Protection Grant
7. Evaluate to track improvements	2018	TBD		LLPRD LWRD	Lakes Planning Grant LLPRD
Grant writing	2013 – 2015	\$1,200		LLPRD Consultant	LLPRD

³ See previous pages for action item detail. Estimates are for annual budgets once implementation begins.

⁴LLPRD = Long Lake Protection and Rehabilitation District

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Goal 1. Minimize nutrients, sediment, and other pollutants that flow to the lake from its watershed.

Objective A. Engage and support agricultural producers in reducing runoff to Long Lake.

Actions³	Timeline	\$ Estimate	Vol. Hours	Responsible Parties⁴	Funding Sources
SUBTOTAL GOAL 1A					

Goal 1. Minimize nutrients, sediment, and other pollutants that flow to the lake from its watershed.

Objective B. At least 50 percent of Long Lake owners carry out best management practices to reduce runoff to the lake.

Goal 3. Preserve and enhance lake and shoreline fish and wildlife habitat.

Objective A. Encourage installation of residential best management practices, such as native plantings and woody habitat, which improve habitat.

Actions⁵	Timeline	\$ Estimate⁶ (annually)	Vol. Hours	Responsible Parties⁷	Funding Sources
1. Provide information about residential best management practices	2013-2018	\$200	20	LLPRD LWRD	Lakes Planning Grant (08/01/13)
2. Teach residents about best management practices 2a. workshops 2b. demonstrations and tours	2014 – 2018 2015-2018	\$200 \$200	40-80	LLPRD LWRD	Lakes Planning Grant (08/01/13)
3. Provide free design assistance to residents	2013 (5 properties) TBD	TBD		LWRD Consultant	Lakes Planning Grant (08/01/13)
4. Assemble and train volunteers for project installation	2014	\$200	80	LLPRD LWRD	Lakes Planning Grant (08/01/13)
5. Cost share project installation	2014- 2018	TBD		LWRD LLPRD Landowners	Lake Protection Grant (05/01/14)

⁵ See previous pages for action item detail.

⁶ Additional costs if staffing covered under grant (instead of or in addition to volunteer time).

⁷LLPRD = Long Lake Protection and Rehabilitation District

LWRD = Land and Water Resources Department

WDNR = Wisconsin Department of Natural Resources

Goal 1. Minimize nutrients, sediment, and other pollutants that flow to the lake from its watershed.

Objective B. At least 50 percent of Long Lake owners carry out best management practices to reduce runoff to the lake.

Goal 3. Preserve and enhance lake and shoreline fish and wildlife habitat.

Objective A. Encourage installation of residential best management practices, such as native plantings and woody habitat, which improve habitat.

Actions⁵	Timeline	\$ Estimate⁶ (annually)	Vol. Hours	Responsible Parties⁷	Funding Sources
				Landscapers	
6. Provide recognition for installation 6a. develop program 6b. Implement recognition	2013 – 2018	\$500	40	LLPRD Volunteer	Lakes Planning Grant (08/01/13)
7. Evaluate to track BMPs and determine next steps	Ongoing		20	LLPRD LWRD	Lakes Planning Grant (08/01/13)
Grant writing	Ongoing	\$1,200	10	LLPRD Consultant	LLPRD
Consultant assistance/coordination	Ongoing	?		LLPRD	Lakes Planning Grant (08/01/13)
SUBTOTAL GOAL 1B/3					

Goal 4. Lake residents and visitors understand the components of and the means to support a healthy lake.

Objective A. Lake users are aware of the potential threats from algae toxins and are notified when threats are likely present.

Objective B. Lake residents understand the rationale behind the plan actions and have enough information to make sound decisions.

Actions¹²	Timeline	\$ Estimate (annually)	Vol. Hours (annually)	Responsible Parties¹³	Funding Sources
Newsletters/letter from President	May each year	\$600	10	LLPRD LLA	LLPRD
Handout/brochures: (Plan contents, Alum, etc.) e.g., In LLA Welcome Packets	2013 2014	\$400	20	LLPRD LWRD Consultant LLA	Lakes Planning Grant (08/01/13)
Presentations: Plan seminars	2013	\$500		LLPRD TOPIC EXPERTS	Lakes Planning Grant (08/01/13)
Website upgrades	Ongoing	\$300	20	LLA LLPRD	Lakes Planning Grant (08/01/13)
Email list	Ongoing	\$0	20	LLA LLPRD	Lakes Planning Grant (08/01/13)
Articles for other publications	Ongoing	\$0	20	LLPRD LWRD Consultant	Lakes Planning Grant (08/01/13)
SUBTOTAL GOAL 4					

¹² See previous pages for action item detail.

¹³LLA = Long Lake Association, LLPRD = Long Lake Protection and Rehabilitation District, LWRD = Land and Water Resources Department, WDNR = Wisconsin Department of Natural Resources