Long Lake and its Watershed

at a Crossroad

Involving landowners

From planting trees to counting frogs, much of what needs to be done in the Long Lake watershed relies on the involvement of its residents. Citizen action is crucial for creating and implementing public policies and local programs. You can take the first stop by contacting the LLPA and or your elected representatives to express your desire for healthy watershed. There are many opportunities to be involved with the LLPA for a multitude of projects your lake association carries out. Here are some of the global strategies the LLPA has zeroed in on:

- **Monitoring** - The LLPA will pursue ecosystem mapping and monitoring to establish baseline data for protection, education and communication of any changes to the Long Lake ecosystem in an effort to maintain Long Lake as a healthy functioning bionetwork.
- **Education/Communication** - The LLPA will pursue education and communications programs to spread the knowledge, values, and riparian eco-management skills to maintain Long Lake as a healthy, functioning part of the watershed.
- **LLPA Capacity Building** - The LLPA will develop an organizational structure to build upon its existing capacity to increase the organizations sustainability.

The Long Lake Preservation Association invites people and business from throughout the watershed to help develop and implement strategies to protect the watershed's ecosystems. Please show your support by contacting any of our board members or visit our web page at www.longlakellpa.org and click on ***Membership & Support.***

Long Lake and its Watershed

At the end of the last ice age, approximately 10,000 years ago, glaciers formed Long Lake and its watershed. Located at the headwaters of the Brill River in northwest Wisconsin, Long Lake is a unique and important natural resource featuring abundant, high quality groundwater and surface waters. Covering 3,290 acres Long Lake is the largest lake in Washburn County. It has a maximum depth of 74 feet, has about 99 miles of shoreline, and approximately 63% of the lake basin is deeper than 20 feet. It is known as one of the premier lakes in Wisconsin due to its water quality with the benefit of a large undeveloped section of shoreline being home to the Tomahawk Scout Camp. Its water comes from precipitation on the lake, groundwater springs, and surface water runoff from a 38,000-acre watershed. The lake is a headwaters region of the Red Cedar River, which is a tributary of the Chippewa and Mississippi Rivers.

Since the watershed was formed lakes in the area have gone through many changes from logging, farming and development. The full impact of humans on the land and water is still an open question but numerous changes have been observed over a relatively short time period. At Long Lake, plant and fish communities have been modified both intentionally and accidentally, and the clarity of the water has declined, all within the last 150 years.

The Long Lake watershed is at cross-roads. Testing has shown that parts of Long Lake have been transformed into eutrophic conditions with high levels of phosphorous and poor water clarity. Higher phosphorous leads to more plant growth, with adverse effects on the ecology, appearance, economic and recreational qualities of the lake.

Growth and change have been radiating at an increasing pace from nearby urban areas. Widespread, unplanned development will have impacts beyond the watershed – the rural lands in the Long Lake watershed could eventually be replaced by a more urban landscape. Unfortunately, what is lost in the process will be impossible to recover.

The popularity of the Long Lake watershed also ensures a steady stream of visitors from distant locations. These visitors can accidentally bring with them uninvited guests such as zebra mussels, Eurasian water milfoil, gypsy moths, oak wilt, and other invasive species, especially when boats and trailers are transferred from one lake to another.

While change is inevitable, specific impacts can be managed. Local actions and decisions will play a major role in shaping the watershed's future. Independent studies conducted by UW-Extension, UW-Stevens Point and the Long Lake Preservation Association (LLPA) have all found intermittent local support for enforcement of rules and regulations that protect water quality.

The LLPA needs your help and the challenge is to ensure that the changes in population, land use, and economic activities in the watershed do not seriously degrade the value of the community's natural assets. Meeting this challenge requires a widespread understanding of how the watershed functions and the threats posed by development and change. This brochure provides an overview of the quality of the natural assets of the Long Lake watershed and outlines an active approach to preserving and protecting them.

Watershed Health

Water quality is one of the best indicators of watershed health. Lakes function as collection points for runoff water from land-use activities throughout watershed. Lakes with larger watersheds are affected by a greater amount of run off than smaller lakes. While judging water quality may seem rather subjective, there are objective means of classifying lakes based on several measurable factors which influence lake productivity.

Productivity, Eutrophication and Water Quality. Measuring **productivity** is a way to summarize the level of biological life in a lake. Scientists study both primary producers such as aquatic plants as well as consumers such as fish, birds, and humans. Lake scientists can classify lakes based on their overall productivity. **Eutrophication** is the process of nutrient accumulation in a water body by natural or human influences. In general, if a lake is subject to eutrophication, its productivity is increasing. As nutrient levels increase, water quality commonly decreases. When a lake becomes too eutrophic, the algae levels can increase dramatically with serious consequences for the ecology and aesthetics of the lake water quality.

Lakes are given one of three general classifications:

- **Oligotrophic** refers to a nutrient poor, low productivity lake
- **Eutrophic** is a label given to a very productive lake with high nutrient levels
- **Mesotrophic** lakes are those in between these two extremes.

The **Productivity** of Long Lake is determined by measuring four different factors: the Secchi disc depth, total phosphorous levels, chlorophyll levels and dissolved oxygen depletion rates. LLPA volunteers measure Secchi depths and oxygen levels at six sites, and water samples are collected for phosphorus and chlorophyll testing at two of those sites, several times per summer.

A **Secchi disc** measures water transparency. The black and white disc is lowered in the water until it disappears. A decline in transparency indicates more algae growth and higher productivity, with lower water quality. In 2019, Long Lake Secchi depths averaged from six to ten feet, (six feet north end upper basin and ten feet in lower basin) although significantly greater depths have been observed in periods of dry weather when runoff is reduced.

It is obvious from past testing data that there can be significant variation in water clarity from year to year, and there is consistently greater water clarity in the lower basin (everything south of the Narrows), but there are no glaringly obvious trend lines in either basin. In 2019 both basins were very near their ten year average.

Phosphorus is a key nutrient for plant growth in lakes. Increased phosphorus from erosion and runoff is guaranteed to increase algae and plant growth. Excess aquatic plant and algae growth can lead to low oxygen situations in lakes, harming fish, obstructing navigation, and degrading the appearance of the lake. This situation can occur when phosphorus levels exceed 20 parts per billion. In recent years the phosphorus levels in the upper basin have slightly exceeded that, but have remained under 20 in the lower basin.

The level of **chlorophyll** in lake water is an indication of the amount of algae present. Some algae is to be expected, and is desirable in that it adds to the amount of oxygen present through photosynthesis. But excessive algae causes aesthetic problems such as foul odor and formation of scum, detracting from the pleasures of lake living. Recent testing show chlorophyll levels in the upper basin to be slightly higher than the average for this area, and significantly lower in the lower basin.

Dissolved oxygen is measured using water sampling equipment that calculates the actual amount of oxygen in the water at different depths. Dissolved oxygen represents the amount of microscopic air bubbles that are diffused into the water. This is the oxygen that fish breathe through their gills. Water can run out of oxygen when organic matter decomposes. This happens primarily near the bottom of the lake, where the oxygen cannot be replenished by the atmosphere.

Oxygen depletion occurs every summer. The exact rate at which the oxygen depletes accurately indicates lake productivity, better than the Secchi disc readings and phosphorous samples. To determine this rate, oxygen levels must be recorded at all depths of the lake throughout the season. A highly productive lake will have a large accumulation of organic matter, and oxygen will quickly deplete from the lake bottom. An **oligotrophic** lake, on the other hand, will maintain oxygen levels at deeper depths later into the summer. During mid to late summer there is little oxygen in the deeper parts of Long Lake. Currently Long Lake is designated **Eutrophic** in the north end and **Mesotrophic** in the south end.

Watershed Issues

While the Long Lake watershed is in good health overall, not all the news is good. Changes driven by the area's popularity are combining to place pressure on the watershed's natural resources. As more and more tourists, recreational homeowners and retirees come to the watershed, more stress is placed on the very natural systems that make the area so attractive. Addressing these issues requires a delicate balance between the wants and desires of the people in the watershed and the capacity and integrity of the watershed's natural resources.

Shoreland development.
More development near the shore of lakes and rivers means more runoff. Also, habitat loss due to development affects the natural ecology of the lake and the land.

Polluted runoff.
The problem of polluted runoff isn't limited to shoreland development. Roads, construction sites and agricultural operations throughout the watershed can degrade water resources.

Invasive species.
The popularity of the Long Lake watershed ensures a steady stream of visitors and watercraft from distant locations. These visitors can accidentally bring with them uninvited guests such as zebra mussels, Eurasian water milfoil, gypsy moths, oak wilt and other invasive, exotic species. Curly leaf pondweed has been present in the lake for several years. Unfortunately, zebra mussels were discovered only 45 minutes away from Long Lake in the McKenzie Lake system and is the first lake in the 12-county northwest region to report a zebra mussel infestation.

Healthy, growing forests.
The volume of standing timber is greater today than any time since the great timber harvests of the late 19th century. Compared to open or developed land, these forested areas reduce the amount of run off to Long Lake and local wetlands and streams.

Slowed wetland loss.
Wetland protection rules, incentives for wetland restoration, and a slowed agricultural economy have combined to reduce the amount of wetlands lost each year.

Healthy wildlife and habitat.
The plant and animal communities and their associated habitats are flourishing in the long lake watershed. Eagles, ospreys, loons and sandhill cranes are common around the lakes while deer, bear and otter share the land with an occasional coyote, fox or timber wolf.

Public and institutional ownership of critical lands. Much of the watershed is in public ownership as county forest. Another 3,000 acres of forest and open space and 12 miles of sparsely developed shoreline can be found at the Tomahawk Scout Reservation on Long Lake's shores.



Strategies for Protecting the Watershed

The challenge facing those concerned with the area's future is to develop proactive, preventative strategies to maintain and enhance the health of the watershed. Future problems can be avoided through planning, consistent enforcement of regulations, and the timely implementation of key natural resource actions.

Protecting and restoring Shoreland areas. There are hundreds of shoreland areas on Long Lake and throughout the watershed that could benefit from restoration plantings of trees, shrubs and plant cover. Replacing grassy yards with a more natural plant cover not only improves habitat, it also slows and reduces the amount of nutrients that run off to streams and lakes.

Minimizing impervious surfaces.
As development occurs in the watershed, the total amount and velocity of rainwater and snowmelt directed to water bodies grows. Placing a reasonable limit on the amount of impervious surface created by development is a straightforward way to address this threat to the watershed's resources.

Maintaining Forest health and slow fragmentation. The vast wooded areas in the watershed are a key factor in the high quality of surface and groundwater enjoyed by residents and visitors. Detailed strategies for managing forest health and slowing further forest fragmentation are needed to ensure the long-term role of these lands.

Protecting and restoring wetlands.
Like forests, the wetlands in the watershed help to slow, absorb and filter the runoff that moves across the landscape. In addition to protecting the remaining wetlands, there are also numerous opportunities to restore wetlands that have been drained or degraded.

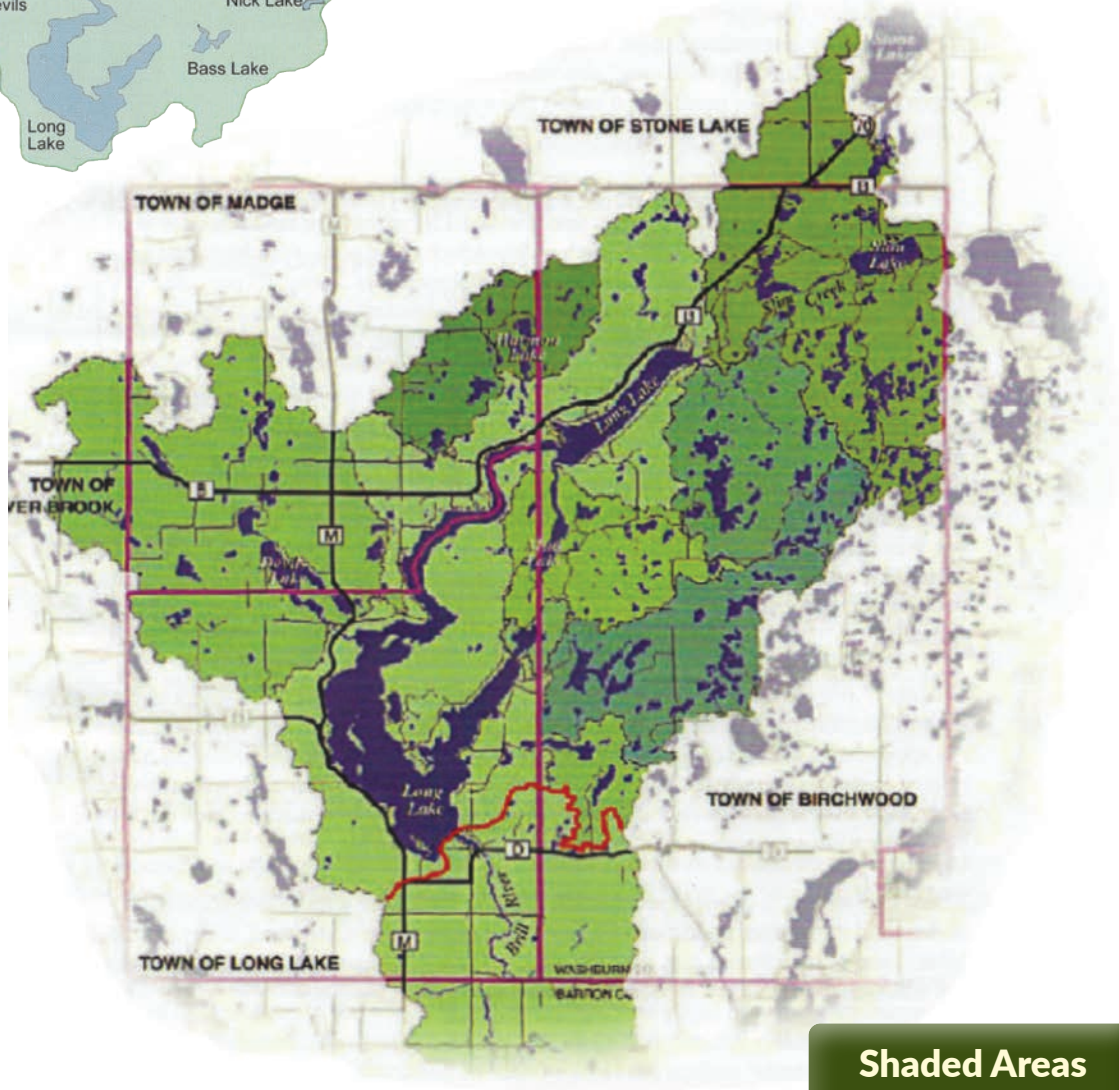
Increasing ecological monitoring.
While water quality is relatively easy to measure and record, it often serves as a final signal that something is wrong in the watershed. More work is needed to detect changes in the watershed's ecology as early as possible.

Major Lakes in the Long Lake Watershed

Lake	Surface Area* (Acres)	Mean & Maximum* Depth (Feet)	Trophic Status
Bass Lake	101	13 / 66	Oligotrophic
Big Devil Lake	166	27 / 74	Mesotrophic
Harman Lake	100	9 / 33	Mesotrophic
Lazy Island Lake	52	19 / 52	n/a
Little Devil Lake	52	14 / 34	n/a
Long Lake (upper basin)	3290	26 / 74	Eutrophic
Long Lake (lower basin)			Mesotrophic
Loyhead Lake	73	11 / 35	n/a
MacRae Lake	136	n/a - /45	Mesotrophic
Mud Lake	126	7 / 13	n/a
Nick Lake	51	21 / 79	n/a
Slim Creek Flowage	106	6 / 27	Mesotrophic
Slim Lake	210	22 / 42	Mesotrophic

**Primary data from WDNR Citizens Lake Monitoring Report web site and when unavailable there used data from the Lake-Link.com Wisconsin Lakes web site.*

Long Lake Watershed



Shaded Areas Indicate Subwatersheds