

Long Lake Shoreland & Shallows Habitat Survey Report



Supported by:
Wisconsin Department of Natural Resources
Surface Water Planning Grant #LPL184223

Introduction

In February 2023, the Wisconsin Department of Natural Resources (WDNR) granted the Long Lake Preservation Association (LLPA) \$25,000 as part of the Long Lake Comprehensive Lake Management Plan (grant #LPL184223). To inform the goals and objectives of the comprehensive lake management plan (CLMP) and document the state of Long Lake's shoreline, the LLPA performed a Shoreland Habitat Assessment following the Lake Shoreland & Shallows Habitat Monitoring Field Protocol (WDNR, 2020).

The protocol is a comprehensive assessment of the riparian zone, bank zone, and the littoral zone. The riparian zone (35 feet inland from the water's edge) is assessed for vegetation cover, indicators of development (lawn, impervious surfaces, structures, etc.) and erosion. The bank zone (the immediate shoreline) is assessed for erosion and erosion control methods like rip rap. The littoral zone (the area of the lake where sunlight reaches the bottom) is assessed for structures like boat lifts, docks, and swim rafts, as well as the presence or absence of floating and emergent plant species. The shoreline is also photographed in a photo survey loop of the lake. Lastly, coarse woody habitat is documented and mapped.

The results of this assessment will be used to inform the goals and objectives of the 2023 Long Lake Comprehensive Lake Management Plan. This assessment will be used to provide education and outreach concerning shoreline health and management strategies and opportunities, such as Healthy Lakes best management practices. It will also be used to evaluate trends in lakeshore habitat and lake ecology in addition to informing future planning and management activities.

Volunteers were trained in the Lake Shoreland & Shallows Habitat Monitoring Field Protocol (WDNR, 2020). Over 25 volunteers were involved in this assessment; they recorded nearly 200 hours of volunteer time assessing 997 parcels. The Northland College Mary Griggs Burke Center for Freshwater Innovation was contracted to perform the coarse woody habitat assessment, and staff from the Tomahawk Boy Scout Camp assisted in the coarse woody habitat assessment as well. The LLPA thanks the many volunteers who participated in the assessment. A special 'thank you' is owed to Joe Thrasher who performed the photo survey loop of Long Lake's nearly 40 miles of shoreline.

Recommendations

The following management recommendations are a result of this assessment and should be incorporated into the Long Lake Comprehensive Lake Management Plan.

- Promote a culture of natural shorelines, viewing corridors, and emphasis on natural views. Use constant contact, the newsletter, calendars, and the annual meeting to emphasize the importance of a natural shoreline.
- Promote the implementation of Healthy Lakes projects (native plantings, rain gardens, rock infiltrations, water diversions, and fish sticks). Use the Shoreline Habitat Assessment to identify areas with potential for restoration and use constant contact to reach out to landowners who may be interested in projects based on the 2023 Social Survey results.
- Strategically place future Fish Sticks projects using the coarse woody habitat assessment results.
- Explore land conservancy options to protect sensitive shoreline areas from development. Include partnerships with landowners, Federal, state, and local agencies, nonprofit organizations, Hunt Hill, and the Tomahawk Scout Camp.
- Shift the culture around Long Lake more towards a stewardship-focused community of shoreline property owners.

General Recommendations for Shoreline Property Owners

1. Choose zero-phosphorus fertilizer
2. Properly dispose of household hazardous wastes, pet waste, lawn clippings, etc.
3. Minimize erosion
4. Inspect and maintain your septic system regularly
5. Reduce hard surfaces like rooftops and driveways
6. Plant native trees and shrubs and protect your wooded areas
7. Direct downspouts on the lawn or landscaping, not onto hard surfaces
8. Install a rain barrel
9. Build a rain garden
10. Protect or restore your shoreland buffer¹

¹ <https://dnr.wisconsin.gov/topic/ShorelandZoning/Care/explore.html>

Results

Canopy Cover

Canopy cover is an important variable in measuring the health of the riparian (shoreline) habitat. Dense, natural canopy coverage slows precipitation and reduces erosion, provides habitat for many important species, adds to the aesthetic value of the lake, and provides benefits like privacy and shade for property owners. For the purposes of this assessment, the canopy was defined as large trees at least 16 feet tall. To document this metric, volunteers imagined a bird’s eye view of the parcel to determine what percent of the parcel would be covered by canopy.

The average percent canopy cover was 67.1%, and the median percent canopy cover was 75.0%. Approximately 236 parcels were ‘natural’ with 100% canopy cover, 100% shrub and herbaceous cover, and no human structures. There were 335 parcels with over 90% canopy coverage (Figure 1). There were 650 parcels with greater than 50% canopy coverage and 347 with less than 50% canopy coverage (Figure 1). It is important to note that some parcels are only 50 feet of shoreline, and others may be 1,600 feet (Figure 2). The Tomahawk Scout Camp provides the majority of uninterrupted canopy coverage, as this property is largely undeveloped.

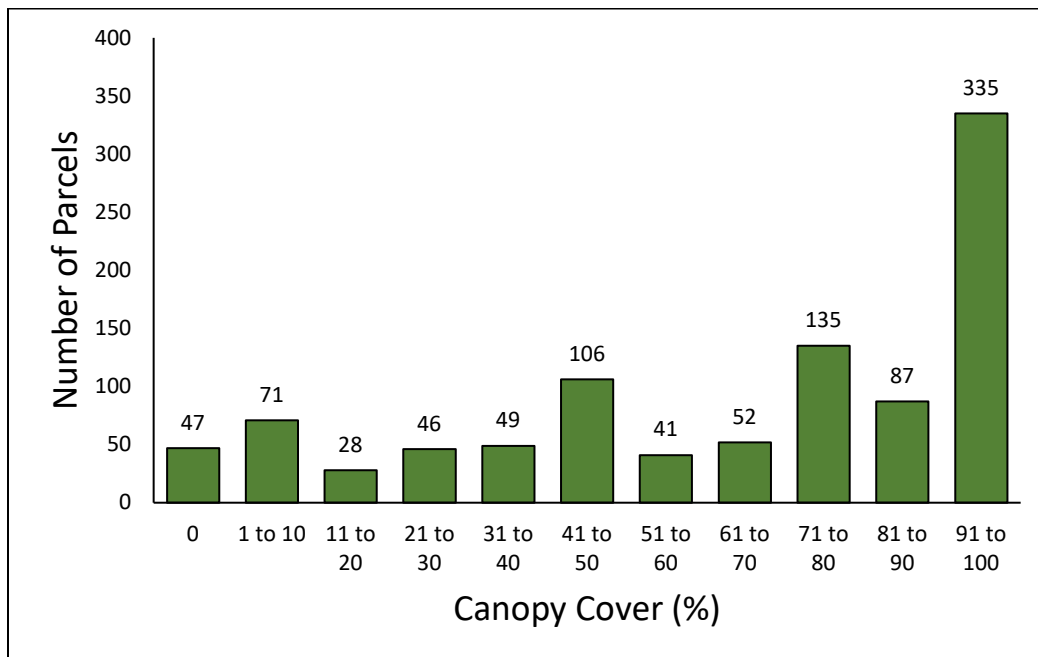


Figure 1. Long Lake Riparian Canopy Cover

The current state of Long Lake’s riparian canopy coverage is good but could be improved, as there are some areas where canopy coverage is sparse. Restoring canopy coverage can take many years while vegetation grows. Thus, it is important to preserve the current canopy coverage as well as encouraging landowners to restore native vegetation growth.

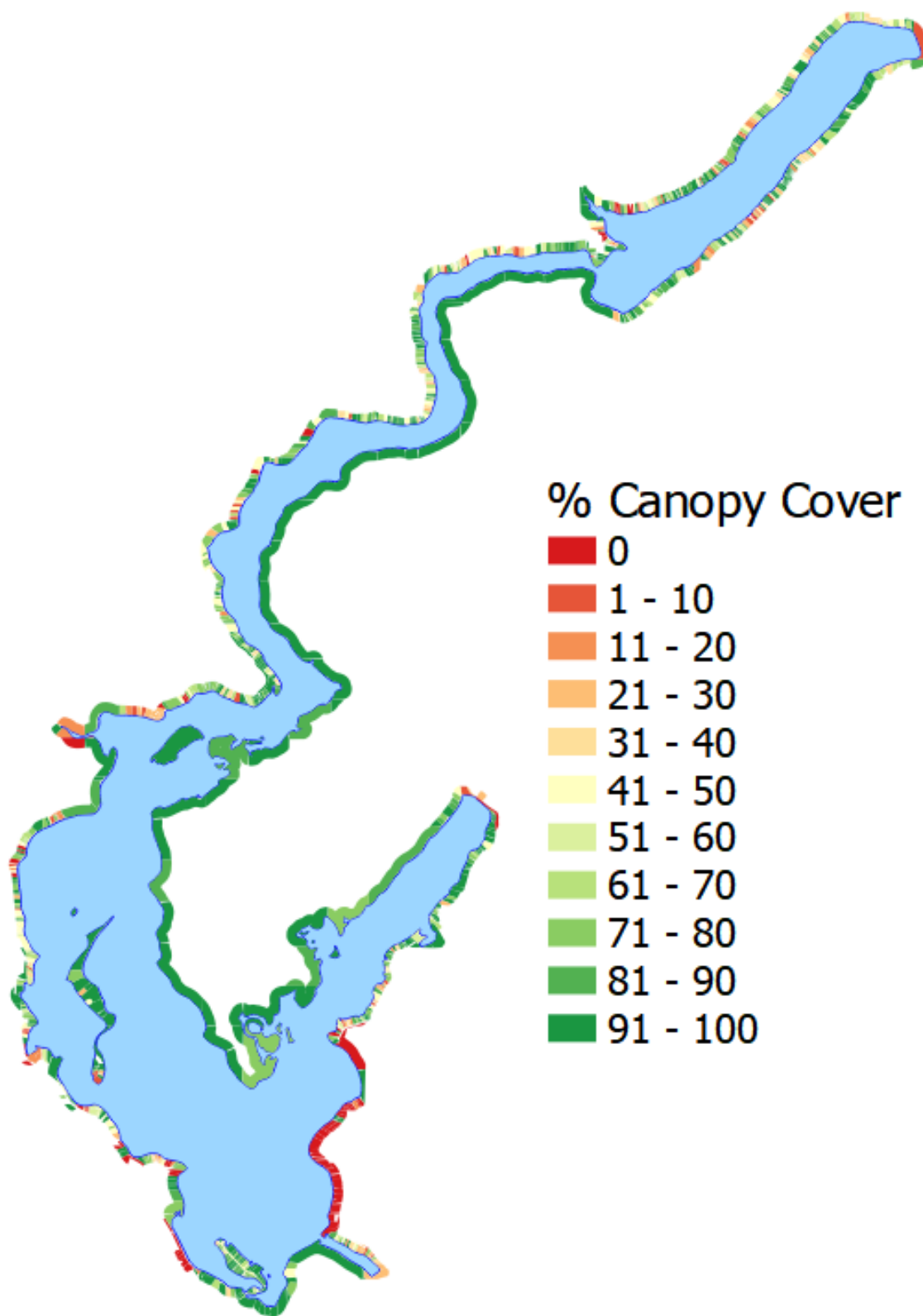


Figure 2. Long Lake Riparian Canopy Cover Parcel Map

Shrub and Herbaceous Cover

Shrub and herbaceous cover is another important variable in measuring the health of the riparian habitat. Dense, natural vegetation slows precipitation and reduces erosion, provides habitat for many important species, adds to the aesthetic value of the lake, and provides benefits like privacy and added beauty for property owners. For the purposes of this assessment, the shrub and herbaceous layer was defined as woody plants less than 16 feet tall and herbaceous plants (grasses and forbs).

The average shrub and herbaceous cover for parcels was 60.9%, and the median percent canopy cover was 75.0%. There were 327 parcels with over 90% shrub and herbaceous coverage (Figure 3). There were 575 parcels with greater than 50% shrub and herbaceous coverage and 422 with less than 50% shrub and herbaceous coverage (Figure 3). There are areas where shrub and herbaceous coverage is naturally sparse under a dense canopy (Figure 4). However, even these areas may benefit from native plant restoration efforts.

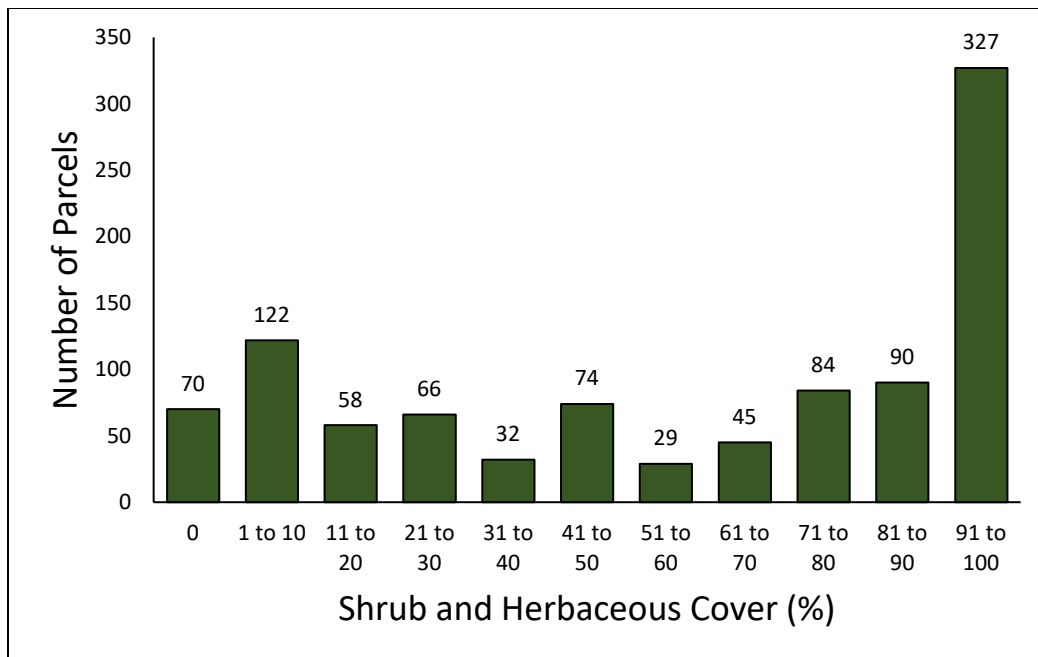


Figure 3. Long Lake Riparian Shrub and Herbaceous Cover

The current state of Long Lake’s riparian shrub and herbaceous coverage is good but could be improved, as there are some areas where coverage is sparse or has been replaced with manicured lawn. Preserving the current shrub and herbaceous coverage as well as encouraging landowners to restore native vegetation growth should be a priority. There may be opportunities using the Healthy Lakes² grant program to facilitate native plantings.

² <https://healthylakeswi.com/>

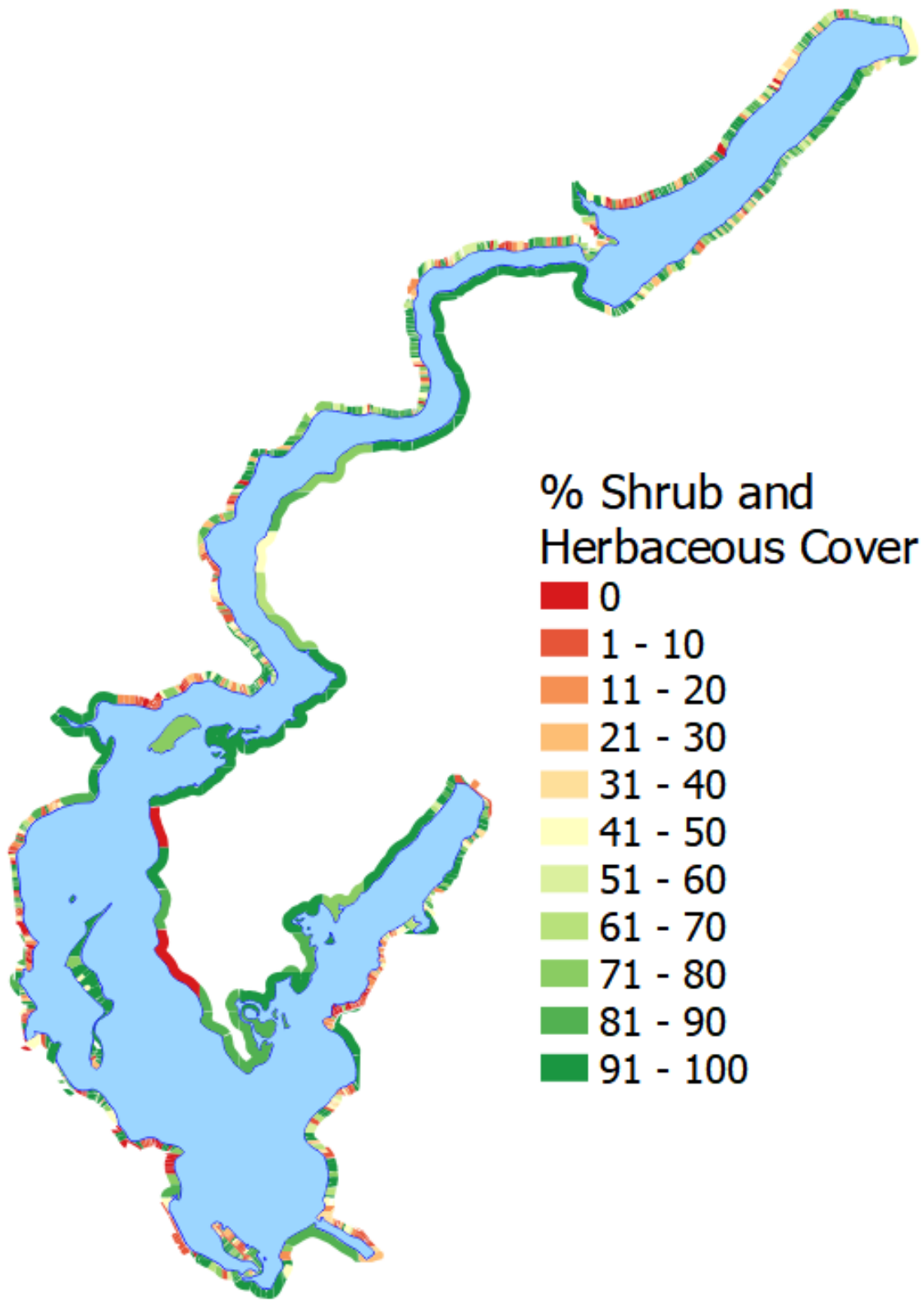


Figure 4. Long Lake Riparian Shrub and Herbaceous Cover Parcel Map

Impervious Surface

Impervious surfaces include driveways, rooftops, and other hard surfaces where precipitation cannot soak into the ground. These surfaces decrease the ability of the shoreland area to serve its natural functions. Removing trees and native plants eliminates the food sources and shelter on which wildlife depend, and water can no longer soak into the ground, which increases stormwater runoff that carries pollutants to lakes and streams. A decline in water quality often lowers property values and overall enjoyment of lakes.

The average impervious surface cover for parcels was 7.4%, and the median percent canopy cover was 0.0%. There were 851 parcels with less than 10% impervious surface coverage and 146 parcels with more than 10% impervious surface cover (Figure 5).

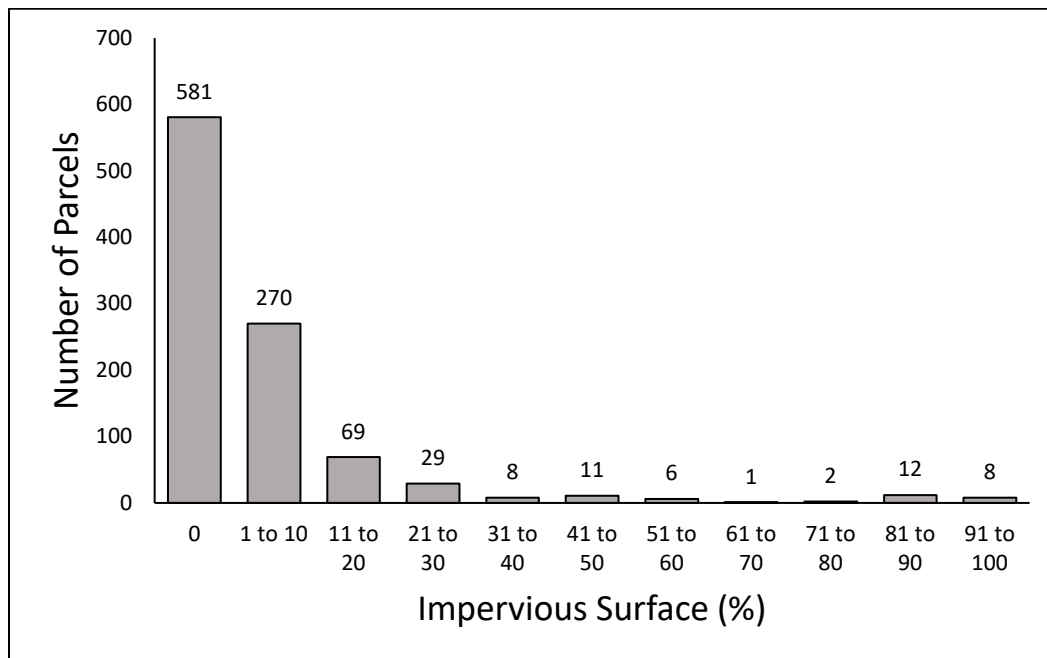


Figure 5. Long Lake Riparian Impervious Surface Cover

While impervious surface cover in Long Lake's riparian area is relatively low, the cumulative impact over time may be detrimental to Long Lake's water quality, habitat, ecological integrity, and potentially property values³. There may be opportunities using the Healthy Lakes grant program to facilitate native plantings, rock infiltration systems, runoff diversions, and rain gardens to replace impervious surfaces.

³ [chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www3.uwsp.edu/cnr-ap/clue/Documents/Water/ImperviousSurfaces2013.pdf](https://www3.uwsp.edu/cnr-ap/clue/Documents/Water/ImperviousSurfaces2013.pdf)

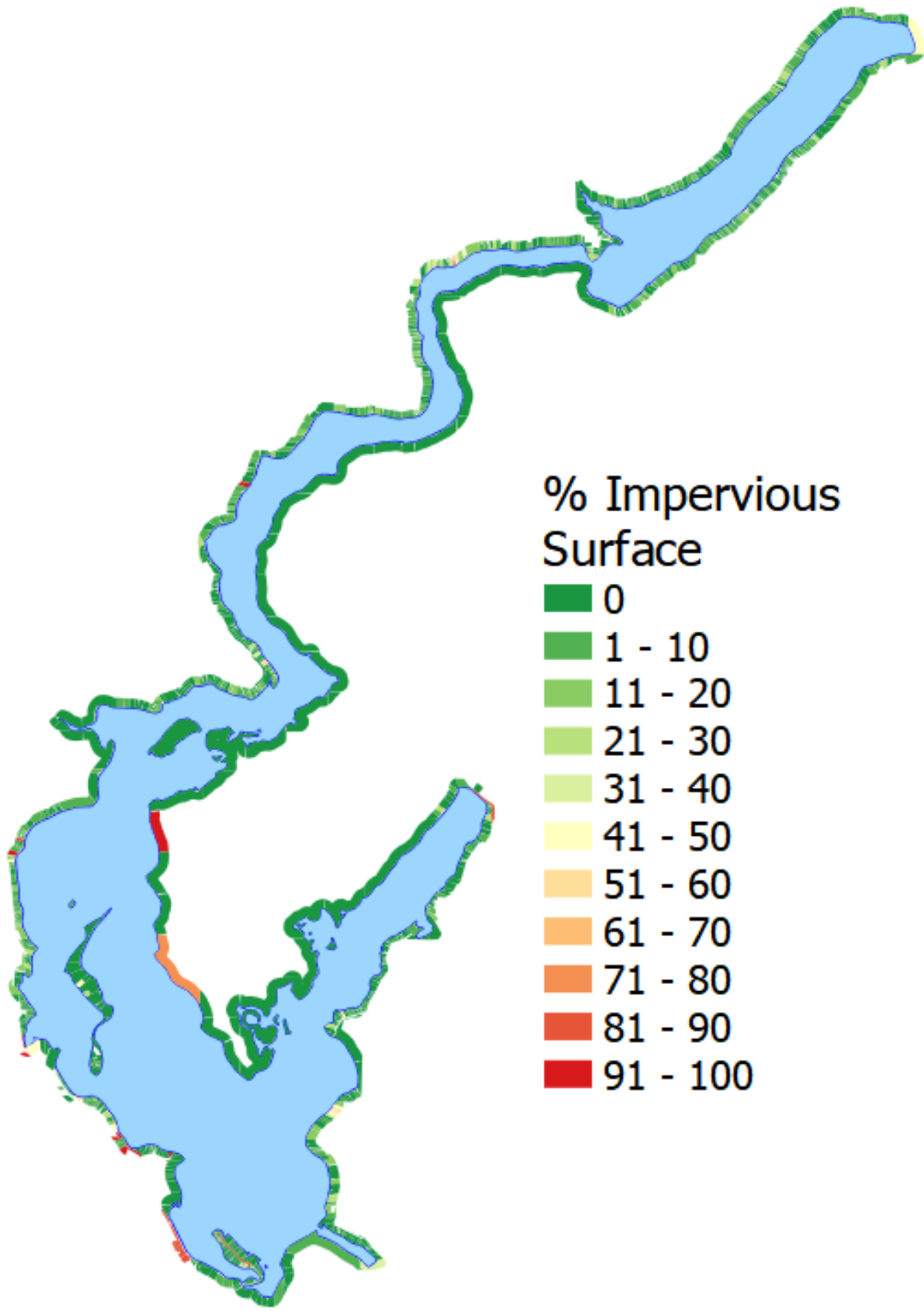


Figure 6. Long Lake Riparian Impervious Surface Parcel Map

Manicured Lawn

Manicured lawn includes all lawn areas that are regularly maintained. Much like impervious surfaces, lawns decrease the ability of the shoreland area to serve its natural functions. Replacing diverse native vegetation with manicured lawn essentially creates a habitat desert that can no longer support a diverse host of wildlife⁴. Additionally, stormwater runoff that can carry pollutants and nutrient sources (like lawn fertilizer, pet waste, lawn clippings, goose feces, etc.) can flow directly into the lake without being mitigated by vegetation like on an undeveloped shoreline. Manicured lawns are often an attractant for waterfowl because it is an easy and open food source with nowhere for predators to hide.

The average impervious surface cover for parcels was 28.4%, and the median percent canopy cover was 0.0%. There were 554 parcels with less than 10% manicured lawn coverage and 442 parcels with more than 10% manicured lawn cover (Figure 7). Manicured lawn and shrub and herbaceous cover are inversely related – where there is more lawn, there is less native vegetation (Figure 8).

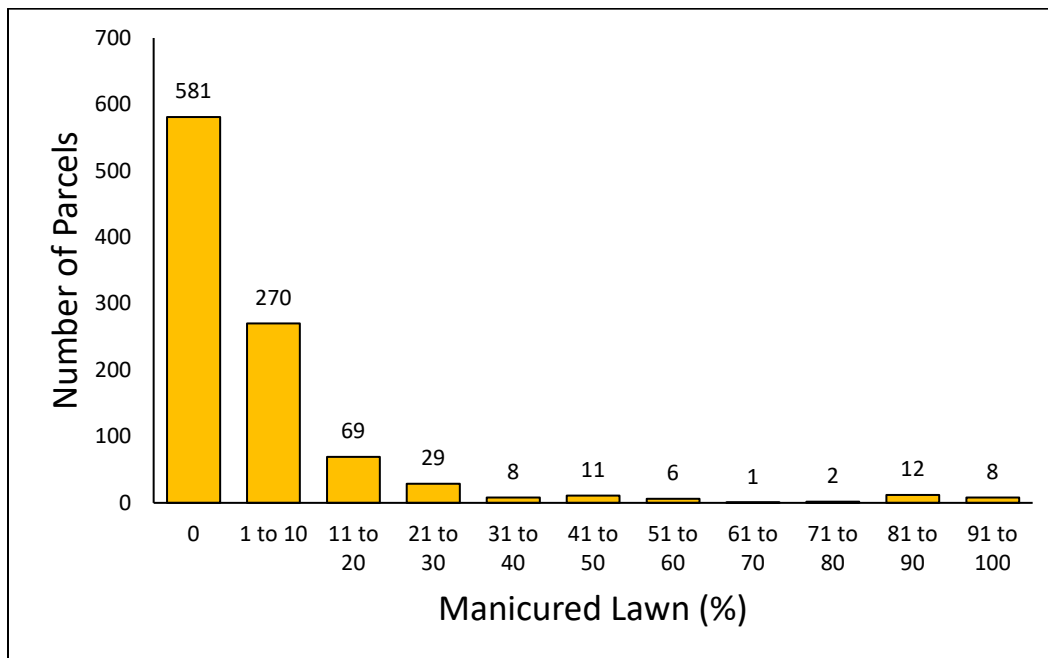


Figure 7. Long Lake Riparian Manicured Lawn Cover

⁴ [chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www3.uwsp.edu/cnr-ap/UWEXLakes/Documents/ecology/shoreland/county/protecting_your_waterfront_investment.pdf](https://www3.uwsp.edu/cnr-ap/UWEXLakes/Documents/ecology/shoreland/county/protecting_your_waterfront_investment.pdf)

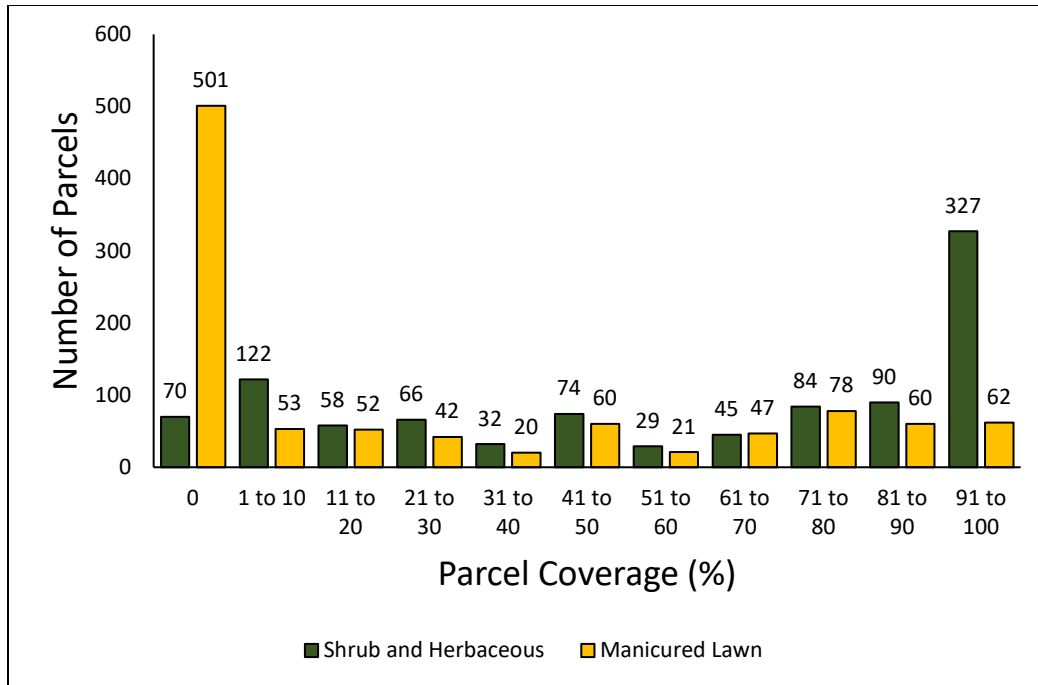


Figure 8. Relationship of Shrub and Herbaceous to Manicured Lawn Coverage

Manicured lawns around Long Lake are a great example of where the LLPA could leverage educational opportunities and the Healthy Lakes program to develop and foster a culture of stewardship-focused shoreline property owners. There may be opportunities using the Healthy Lakes grant program to facilitate native plantings, rock infiltration systems, runoff diversions, and rain gardens to replace the expanses of manicured lawn.

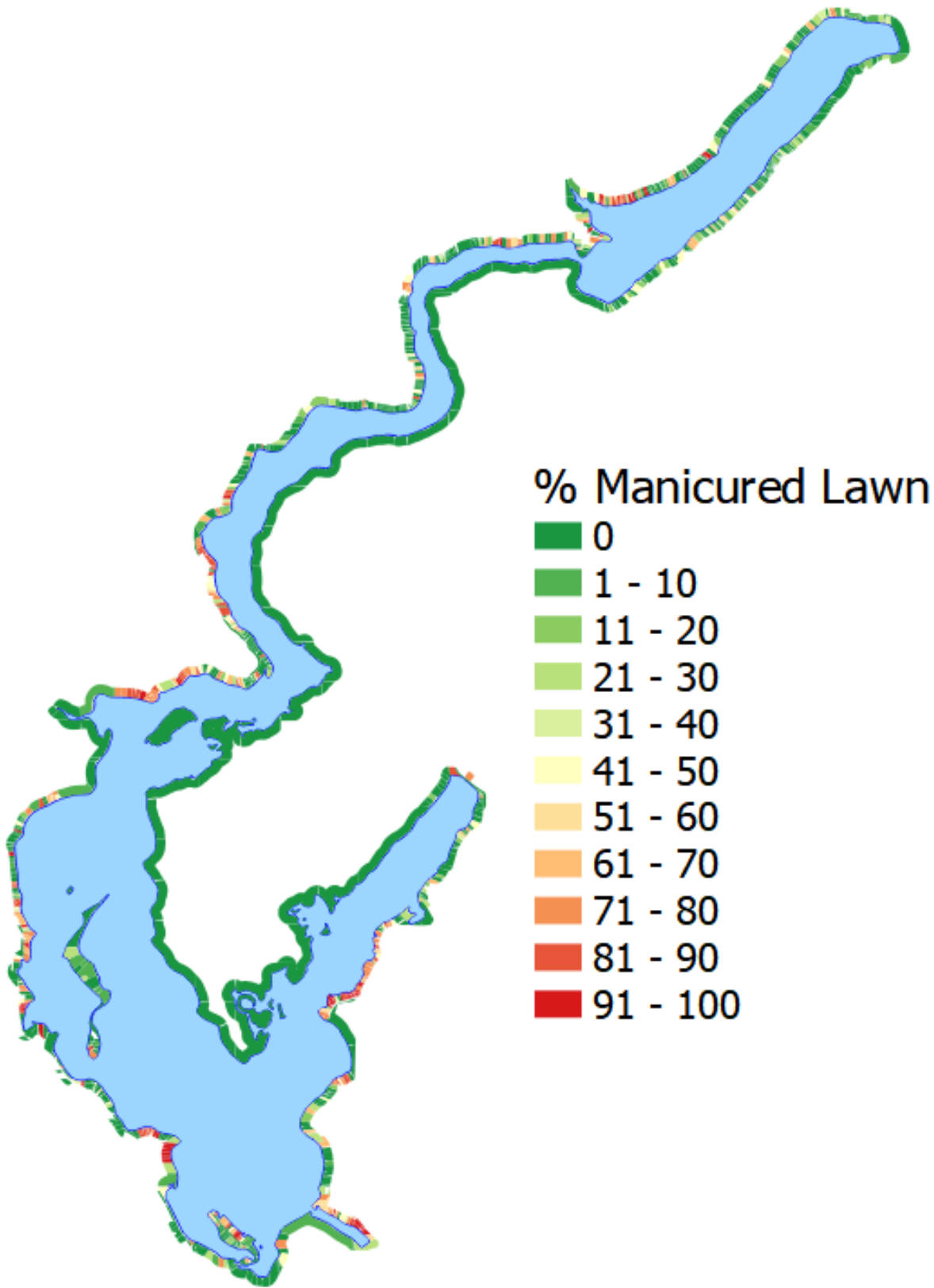


Figure 9. Long Lake Riparian Manicured Lawn Parcel Map

Agriculture

Agriculture is often attributed to much of the non-point source pollution (run-off) that can enter a waterbody. Fertilizers and soil can wash away from farm fields during rain events or snow melt and be carried into waterbodies where they can fuel algal blooms and contribute to decreasing water quality. Long Lake has very little agriculture throughout its watershed and none in its riparian area.

There were no parcels recorded with agriculture (Figure 10).

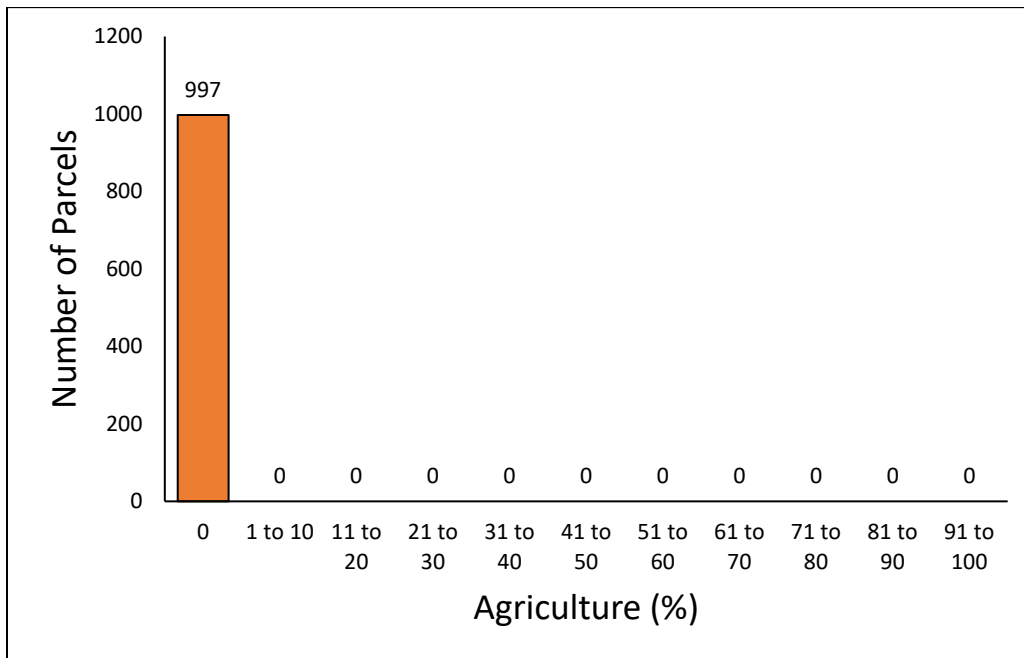


Figure 10. Long Lake Riparian Agriculture Cover

Protecting Long Lake's riparian area from agricultural use should continue to occur. There are approximately 5,100 acres of agriculture throughout the watershed (9.43%) that likely contribute up to 14.3% of Long Lake's total phosphorus load (phosphorus is often the nutrient responsible for algal blooms)⁵. As such, the LLPA should work to develop relationships with area farmers to foster a relationship that prioritizes protecting Long Lake.

⁵ <https://dnr-wisconsin.shinyapps.io/WaterExplorer/?stationid=663088>

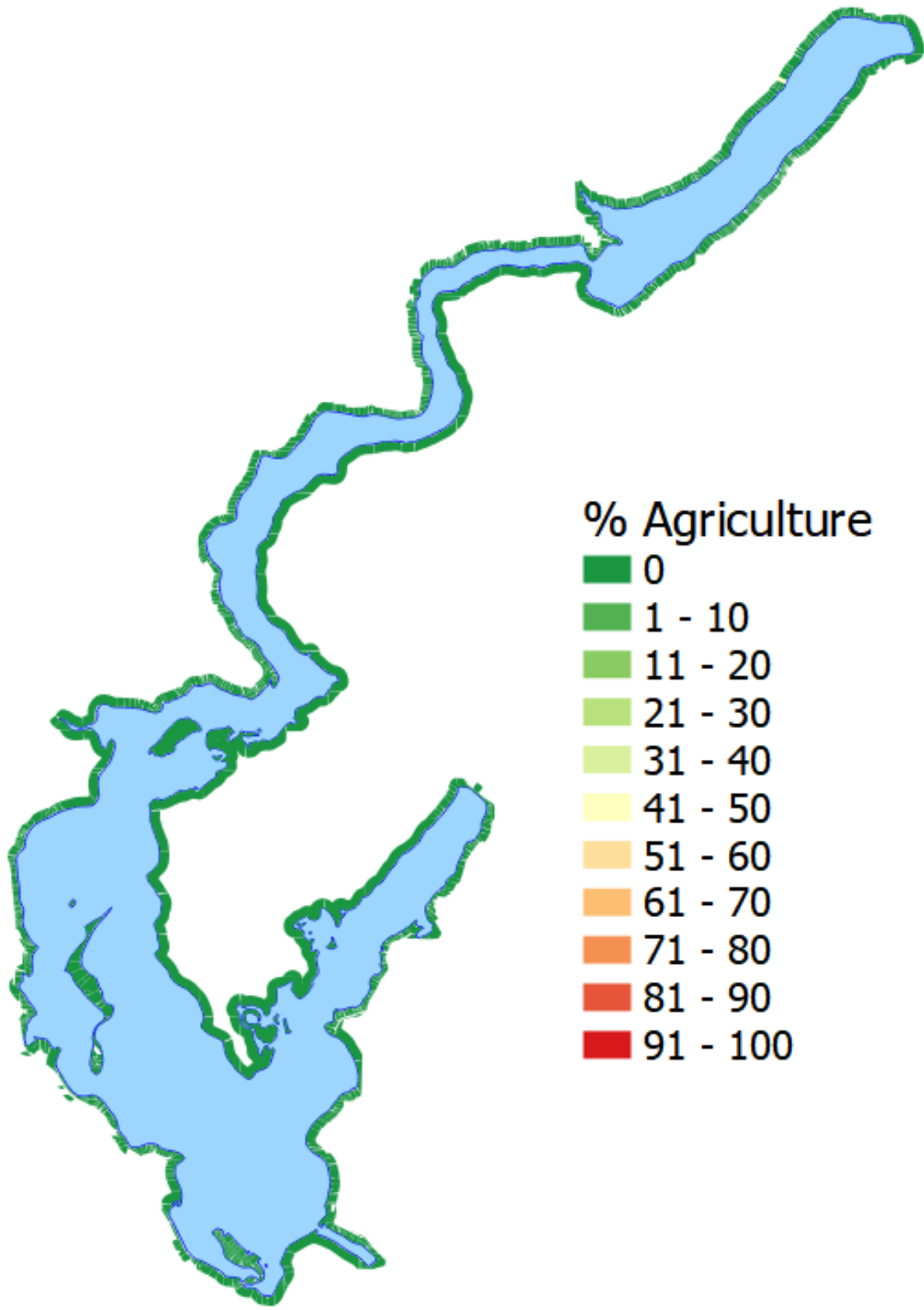


Figure 11. Long Lake Riparian Agriculture Parcel Map

Restoration Potential

Using riparian canopy cover and the percentages of herbaceous/shrub cover, impervious surfaces, manicured lawn, and agriculture as indicators of development, scores were assigned to parcels on a scale of 0-5 with 5 representing totally undeveloped shorelines and 0 representing worst case developed shorelines (Figure 12). No parcels scored below 2.5 based on these parameters. The survey showed that there are condensed areas where improvements could be made and areas where the shoreline should continue to be protected (Figure 13). These results should be combined with the results of the 2023 social survey to offer opportunities for shoreline restoration in high priority areas.

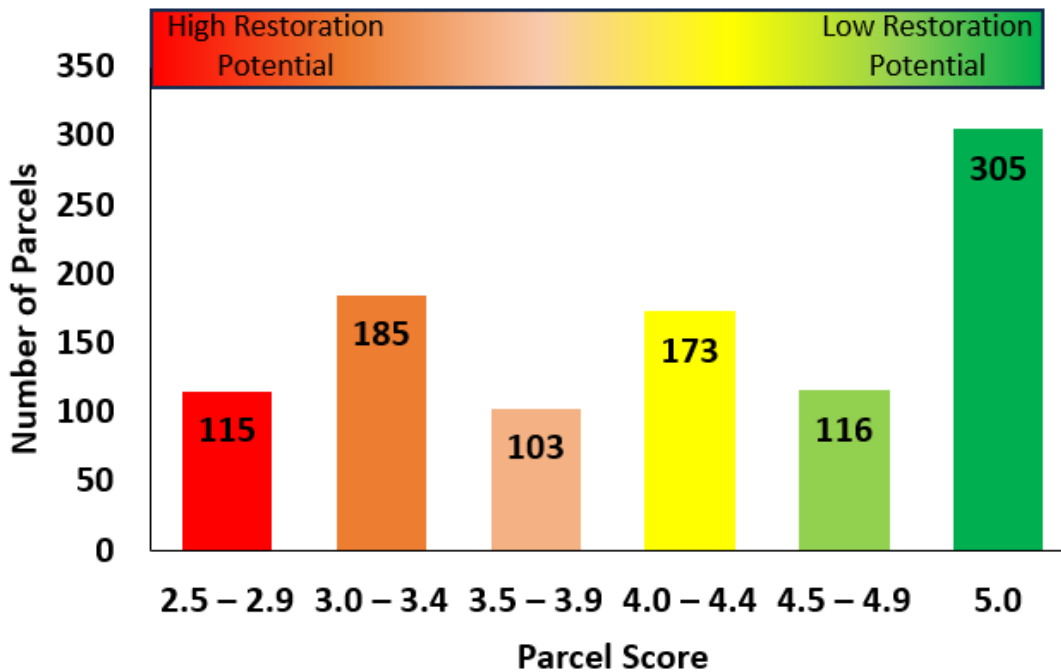


Figure 12. Long Lake Parcel Restoration Potential

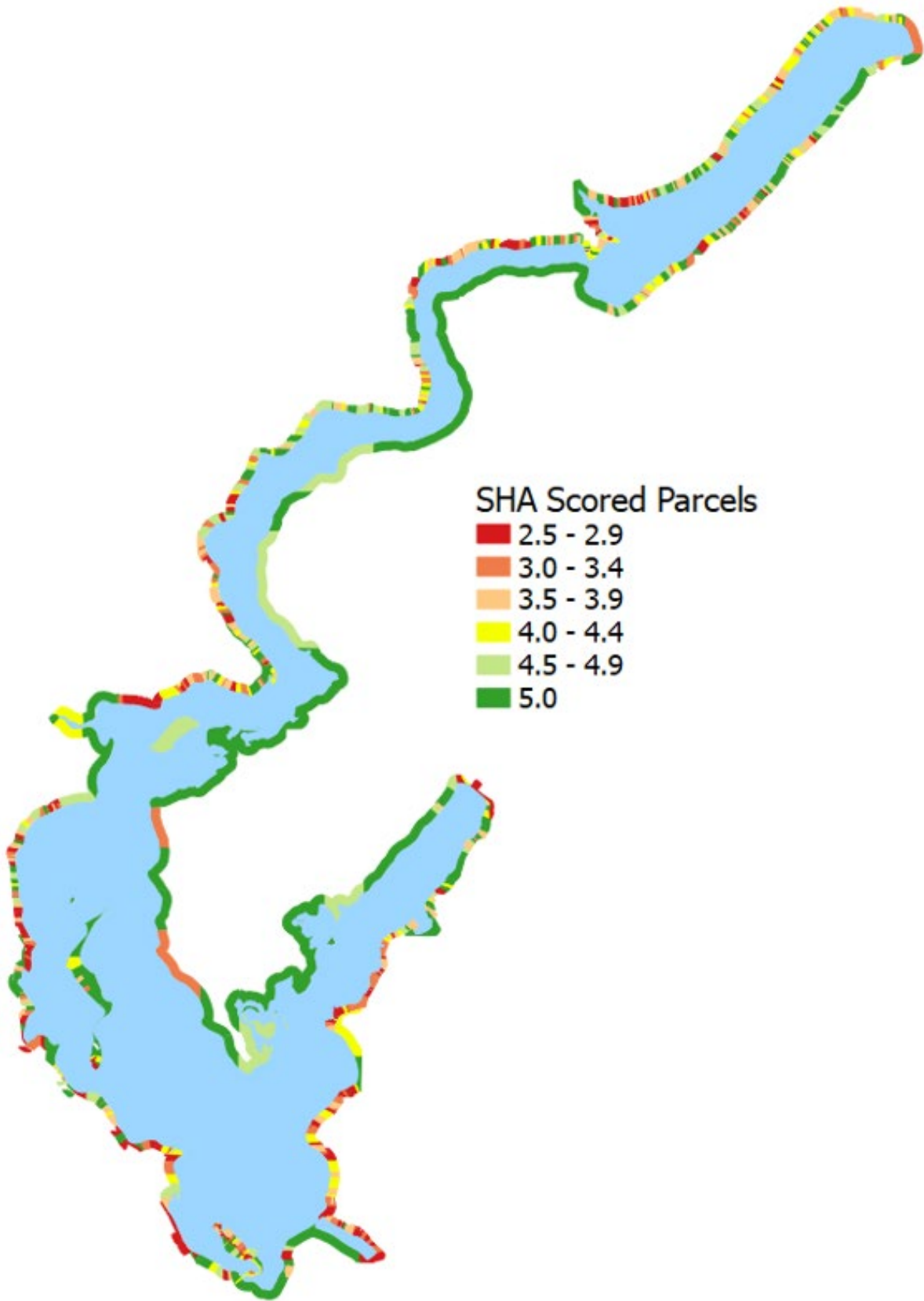


Figure 13. Long Lake Shoreline Habitat Assessment Scored Parcels

Human Structures

Human structures (buildings, boats on shore, fire pits, etc.) within the riparian area (35 from the water's edge) often indicate shoreline degradation by adding impervious surfaces, increasing run off, and contributing to habitat loss.

Long Lake has about 40 miles of shoreline and 998 parcels. The average parcel is 2.37 acres with 211 feet of shoreline. There were 172 buildings documented in the riparian area (about 1 building per 0.23 mile of shoreline). These were often boathouses or fish cleaning buildings. While often small structures, the cumulative impact of these structures can be harmful. There were 333 boats on shore. Storing boats on shore contributes to impervious surfaces that can be easily remediated by simply moving the boat away from the riparian area. There were 124 fire pits recorded in the riparian area (about 1 fire pit per 0.32 mi of shoreline).

While moving buildings away from the shoreline can be problematic, simply moving other structures like boats farther back from the shoreline can help improve the shoreline. Overall, there are relatively few structures within the riparian area; however, many of the parcels where buildings, boathouses, and other structures are present in the riparian area are clustered together. This may influence the local habitat and water quality of the immediate area.

Within the littoral zone (the area where sunlight can reach the bottom of the lake), the survey captured the presence of human structures like piers, boat lifts, and swim rafts. There were 1,129 piers, 843 boat lifts, 73 swim rafts, 45 boathouses over the water, and 12 marinas.

Erosion Concerns

Erosion is the process of wind and water moving materials like soil and rock from one place to another; it is a common issue that threatens many waterbodies. Erosion can occur directly at the water's edge where waves can remove material, or it can happen in the riparian area (and beyond) where water is running off and carrying away the soil.

The survey found stairs/trails/roads to the lake and lawn/soil sloping to the lake were the two most prevalent runoff concerns present in the assessed parcels at 456 and 329, respectively (Table 1). With the prevalence of lawns and stairs leading to the lake, there are opportunities to remediate some of these runoff concerns with shoreline stewardship practices.

Table-1. Runoff Concerns In and Out of Riparian Zone

Runoff Concern	Present in Riparian Zone	Present Out of Riparian Zone	Present In and Out of Riparian Zone	Total
Point Source Pollution	4	1	2	7
Channelized Water Flow/Gully	23	1	12	36
Stair/Trail/Road to Lake	143	15	300	458
Lawn/Soil Sloping to Lake	80	24	225	329
Bare Soil	79	6	39	124
Sand/Silt Deposits	14	0	2	16

Modified Banks

Some property owners feel the need to armor their shoreline against erosion using various types of structures. There were 13 parcels with vertical seawall totaling approximately 495 feet (Table 2). There were 215 parcels with rip rap totaling approximately 16,789 feet – about 3.2 miles of shoreline (Table 2). Other erosion control structures like railroad ties and placed woody debris were present in 69 parcels and made up 2,997 feet of shoreline (Table 2). There were 16 documented artificial beaches at approximately 800 feet (Table 2). Lastly, there were 26 parcels with more than one foot of erosion at the shoreline (320 feet) and 9 parcels with less than one foot erosion at the shoreline (260 feet) (Table 2).

Table-2. Long Lake Modified Banks

Modified Banks	Number of Parcels	Total Feet
Vertical Sea Wall	13	495
Rip Rap	215	16,789
Other Erosion Control Structures	69	2,997
Artificial Beach	16	801
Bank erosion > 1 ft Face	26	320
Bank erosion < 1 ft Face	9	260

While necessary in some circumstances (high energy shorelines with lots of wind and waves), rip rap and other shoreline armoring methods are unnecessary and destructive. The placing of rip rap often requires a permit⁶. Remediating these areas where possible, educating shoreline property owners on the dangers of shoreline armoring, and implementing biological control structures is recommended. For example, fish sticks (see Healthy Lakes program) can be installed to protect against shoreline erosion and provide valuable habitat (Figure 14).



Figure 14. Example of Long Lake Fish Stick Project

Distribution of Floating and Emergent Aquatic Plants

Floating and emergent aquatic plants provide valuable habitat, can help improve water quality, and can mitigate shoreline erosion. Floating plants include white water lily, yellow water lily, and watershield. Emergent plants include bulrushes, cattails, pickerelweed, etc. Floating plants were documented at 436 parcels, emergent plants were documented at 223 parcels, and plant removal was documented at 21 parcels. For a more complete review of Long Lake's aquatic plant community, please review the 2022 Long Lake Warm-water Point-Intercept Macrophyte Survey Report⁷.

⁶ <https://dnr.wisconsin.gov/topic/Waterways/shoreline/shoreline.html>

⁷ <https://longlakellpa.org/resources/>

Coarse Woody Habitat

Coarse woody habitat (CWH) in the littoral or near-shore zone serves many functions within a lake ecosystem including erosion control, as a carbon source, and as a surface for algal growth which is an important food base for aquatic macroinvertebrates. The presence of CWH has also been shown to prevent suspension of sediments, thereby improving water clarity. CWH serves as important refuge, foraging, and spawning habitat for fish, aquatic invertebrates, turtles, birds, and other animals. Woody structure in lakes and ponds has been shown to be an important and preferred habitat for many fish species.

The LLPA solicited the assistance of the Mary Griggs Burke Center for Freshwater Innovation and the Tomahawk Boy Scout Camp to conduct the coarse woody habitat survey. The presence and characteristics of coarse woody habitat was documented around the shoreline of Long Lake following the Shoreland Habitat Monitoring Field Protocol. This protocol only enumerates “large wood,” defined as greater than 4 inches in diameter somewhere along its length and at least 5 feet long. Wood is counted that is between the high water level (HWL) and the 2 foot depth contour. Tree branches hanging over the water and live/dead wood standing vertically in the water and tree stumps with roots should be counted if they met the size criteria. Each piece of wood was marked using a GPS and given a series of scores. The wood was scored based on branchiness, whether or not it touches shore, and whether or not the wood was underwater.



On a lake with no development, there is an average of about 895 logs per mile of shoreline (about 1 log every 7 feet). On developed lakes, there is an average of about 92 logs per mile of shoreline (about 1 log every 63 feet). On Long Lake, there were 1,470 pieces of wood documented along the shoreline, for an average of about 138 logs per mile of shoreline (about 1 log every 38 feet). However, this distribution was not even around the lake. The Boy Scout Camp shoreline, bays, and natural areas contained the majority of the CWH, and some areas where there was likely additional CWH were difficult to access (Figure 14). Some areas of Boy Scout Camp shoreline did not have much CWH habitat, this is likely because the shoreline is high energy with lots of wind and wave action as well as a steeply sloping lake bottom (Figure 14).

Photo Survey Loop

As part of the shoreland habitat assessment, volunteers performed a photo survey loop of Long Lake in the summer of 2023. There were 2,639 georeferenced images taken of the shoreline. The entire shoreline was photographed with slightly overlapping images taken from about 50 feet from shore and perpendicular to shore. Photos did not contain identifiable images of people.

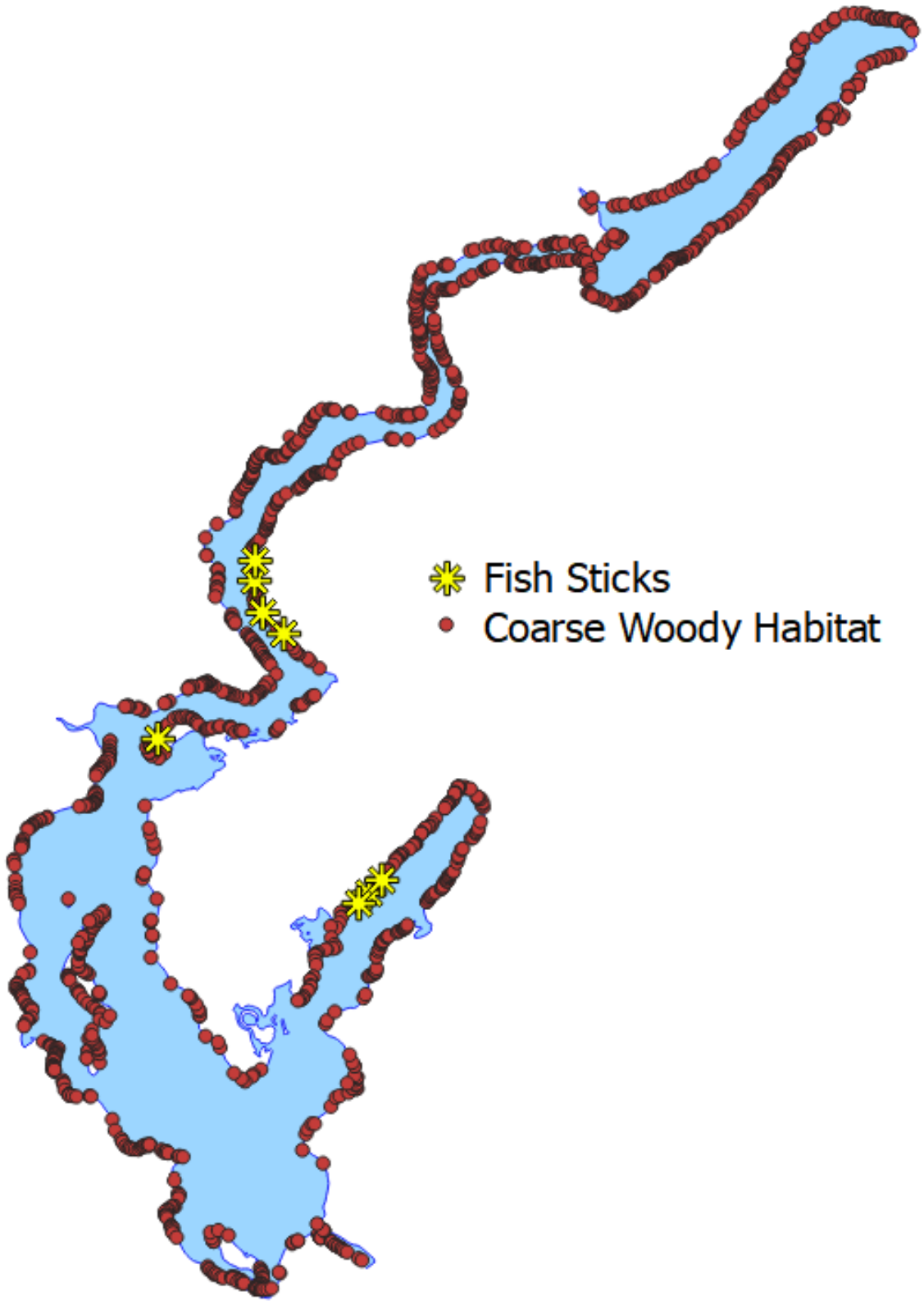


Figure 15. Long Lake Coarse Woody Habitat Map

Resources for Shoreline Property Owners

The LLPA recognizes that the results of this assessment are somewhat sensitive, as such, no parcel numbers, addresses, or names are included in this report. If readers have specific questions about their individual properties, they are encouraged to reach out to info@longlakellpa.org.

The following are links to additional resources about shoreline property value, health, and stewardship:

Choosing the Right Waterfront Property (2021)

- chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://dnr.wisconsin.gov/sites/default/files/topic/ShorelandZoning/ChoosingWaterfront_FINAL_Spreads.pdf

The Water's Edge: Helping fish and wildlife on your waterfront property (2004)

- chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://dnr.wisconsin.gov/sites/default/files/topic/ShorelandZoning/watersedge.pdf

Managing Wisconsin's Forested Shorelands - A Landowner's Guide (2001)

- chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://dnr.wisconsin.gov/sites/default/files/topic/ShorelandZoning/Wiassn1.pdf

Sensible Shoreland Lighting (2000)

- chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://dnr.wisconsin.gov/sites/default/files/topic/ShorelandZoning/shorelandlighting.pdf

Forestry Best Management Practices for Water Quality 2005)

- chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://cf-store.widencdn.net/widnr/0/0/1/00127389-407f-4c10-afe6-e90a2cd4770a.pdf?response-content-disposition=inline%3B%20filename%3D%22Wisconsins-Forestry-Best-Management-Practices-for-Water-Quality-1995-2005---FR-349-2006.pdf

Protecting Your Waterfront Investment (2012)

- chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www3.uwsp.edu/cnr-ap/clue/Documents/Water/ShorelandInvestment2013.pdf

Impervious Surfaces: How They Impact Fish, Wildlife and Waterfront Property Values (2013)

- chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www3.uwsp.edu/cnr-ap/clue/Documents/Water/ImperviousSurfaces2013.pdf

Lake Classification Fact Sheet Series. Wisconsin Lakes Partnership (1999)

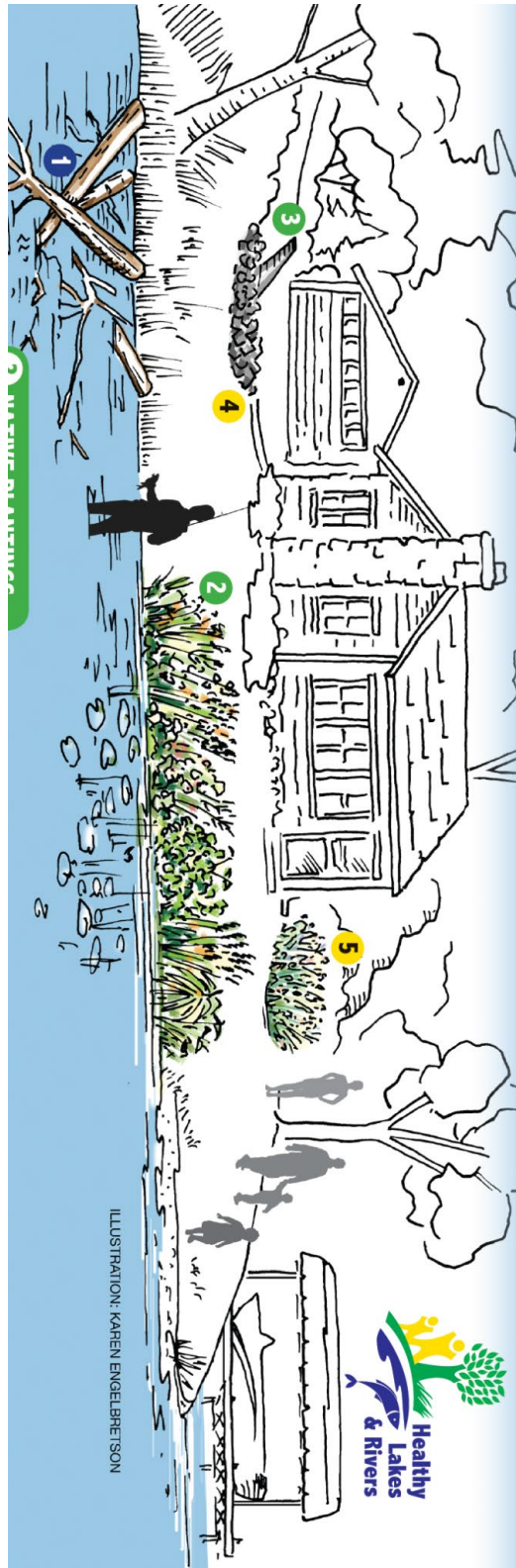
- <https://www3.uwsp.edu/cnr-ap/UWEXLakes/Pages/people/classifications.aspx>

Laws and Regulations

- <https://dnr.wisconsin.gov/topic/ShorelandZoning/Care/explore.html>

Healthy Lakes Best Management Practices

- <https://healthylakeswi.com/>



The Value of Shoreland Zoning

- <https://www.youtube.com/watch?v=7BP4alqLx-g>

SHORELAND ZONING

A house that is set back at least 75 feet from the water allows space for trees and native plants.



THE VALUE OF SHORELAND ZONING

NO SHORELAND ZONING X

A house that is close to the water does not leave space for trees and native plants that stabilize the shoreline.



When hard surfaces are built for from the shore and trees and native plants are kept in place the shoreline is naturally more stable allowing:

Clear water = High waterfront property values

More trees and native plants = Stable shorelines = Less water pollution

More fish and frogs

Less algae growth

Cloudy water = Reduced waterfront property values

Fewer trees and native plants = Eroded shorelines = More water pollution

More lawn attracts geese

Fewer frogs, fish, and fish species

Increased algae growth

Fish eggs suffocate when covered in eroded soil



CONCLUSIONS

Shoreland zoning standards make it possible to carefully develop a waterfront property, stabilize shorelines, protect the lake or river, and keep waterfront property values high.

When hard surfaces are built close to the shore and native plants are removed, the shoreline erodes into the lake or river causing:

WHAT DO SHORELAND ZONING STANDARDS ACCOMPLISH?

Stable shorelines

Clearer water = Higher property values

More food and shelter for fish and frogs

More fish and fish species

Waterfront property developed without shoreland zoning standards can cause eroded shorelines, a degraded lake or river, and reduced waterfront property values.

Complete the Shoreland Evaluation Tool to assess your waterfront property at survey.healthylakeswi.com.

CONCLUSIONS

For more information, check with your local zoning office.



Center for Land Use Education
College of Natural Resources
University of Wisconsin-Stevens Point

Design by
Melissa McEwenhus



Extension
UNIVERSITY OF WISCONSIN-MADISON

Shoreland Evaluation Tool

- <https://survey.healthylakeswi.com/>

Assess your own property with the Wisconsin Shoreland Evaluation Tool. The Shoreland Evaluation Tool walks you through questions about the physical aspects of your lake or river property, as well as how you manage it. Questions are set up by property zone - Upland, Transition, and In-Water areas. The Tool also includes a section for you to identify habitat restoration and runoff and erosion control projects that currently exist on your property. This Tool is intended for typical shoreland properties and may not be a great fit for unique properties and locations. There may also be nuanced exceptions to some of the answers; try your best to choose the response that most closely matches your property.