LILLY LAKE USE REPORT UPDATE LR-6

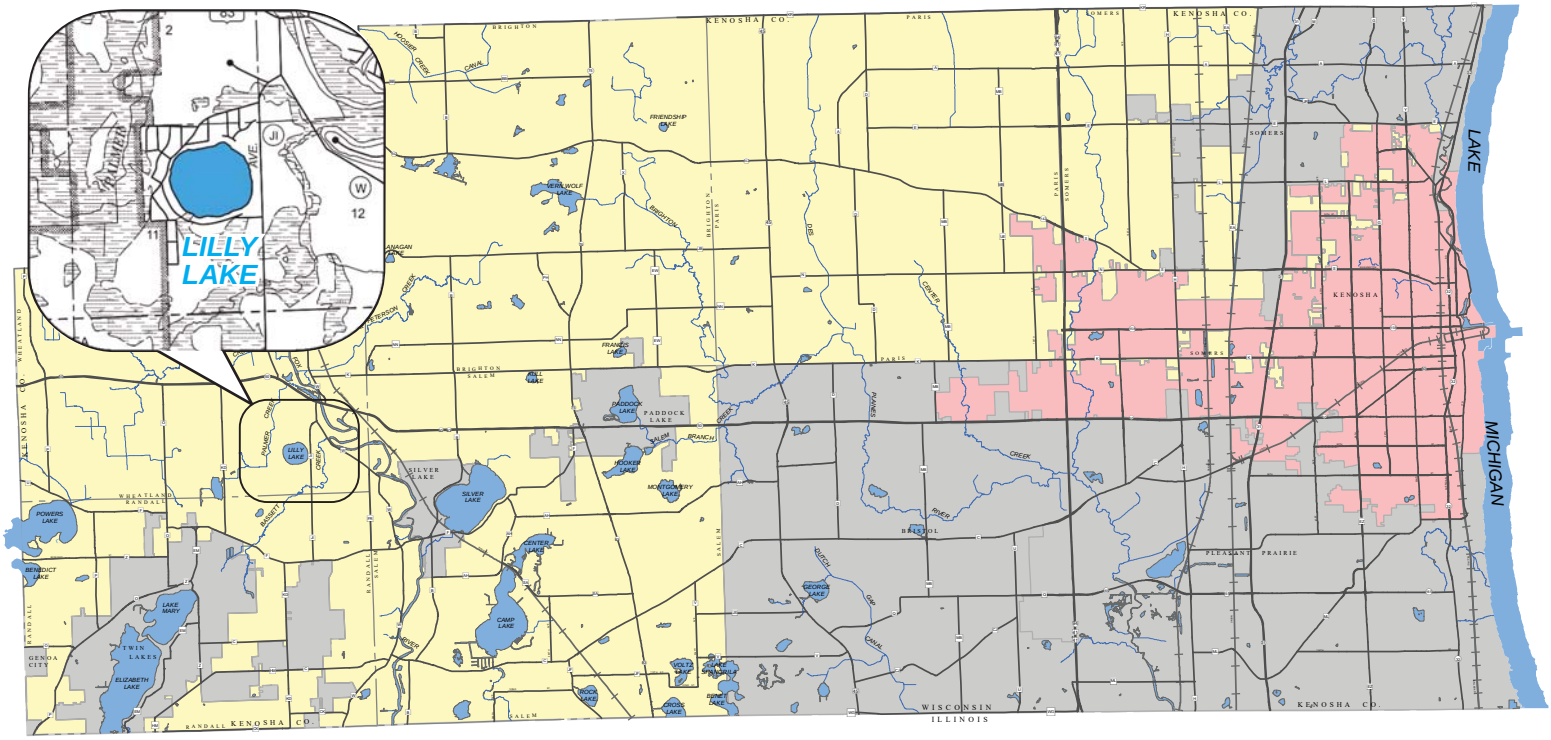
Prepared by the

Southeastern Wisconsin Regional Planning Commission

for

Kenosha County, Wisconsin

October 2017



This Lake Use Report Update is a product of the Lake and Stream Resources Classification Project for Kenosha County Wisconsin: 2017. This report is available online at co.kenosha.wi.us.

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BACKGROUND

Kenosha County's lakes are vital natural resource assets adding significant value to the aesthetic and ecological value of the County and Region. The Lakes are enjoyed by large numbers of lakeshore residents and local citizens as well as those seeking water-based recreation living in nearby urban areas such as Milwaukee, Racine, Kenosha, and Chicago. Kenosha County has 34 named Lakes ranging in size from about two to about 640 acres.[1] Of the 20 that are considered "major lakes" (i.e., lakes with a surface area of 50 acres or more), 12 lie in unincorporated or recently incorporated portions of the County. Between 1968 and 1970, the Wisconsin Department of Natural Resources (WDNR) produced a series of individual Lake Use Reports for each of the 12 named major lakes within Kenosha County. Lilly Lake was the subject of one such report.[2] This report updates the earlier Lake Use Report.

In addition to the original 1969 Lake Use Report, Lilly Lake was the subject of a number of other studies. These studies include two County-wide surface water resources reports published in 1961 and 1982 prepared by the Wisconsin Conservation Department (now the WDNR),[3,4] A consulting firm has also been retained by the Lilly Lake Protection and Rehabilitation District (LLPRD) to study water quality, the aquatic plant community, and lake management. [5,6] The Town of Wheatland maintains a website for the LLPRD (http://www.townwheatland.com/LillyLakeProt&RehabDist/PP2009.pdf). The website is used to post a wide variety of information Lake users may find interesting. In addition to the above report, Lilly Lake was also part of a 2017 lake and stream classification project developed for Kenosha County by Southeastern Regional Planning Commission (SEWRPC).[7]

INTRODUCTION

Lilly Lake is located in the Town of Wheatland, Kenosha County, Wisconsin. Despite its relatively small size, the Lake's modest fishery, good water quality, and location give it significant local economic and recreational value. The Lake provides significant value to local ecology.

PHYSICAL DESCRIPTION

Lake Characteristics

Based upon recent orthophotography, Lilly Lake has a surface area of 86 acres.[8] As shown on Map 1, Lilly Lake has a nearly circular-shaped basin with a slightly northwest-southeast orientation and a maximum depth of 22 feet. According to 1960 depth soundings published by the WDNR, Lilly Lake contains 920 acre-feet of water. Eight percent of Lilly Lake is three feet deep or less, yielding an average depth of 11 feet.[9] The Lake has normal water surface elevation of approximately 756.41 feet above National Geodetic

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[1] *Wisconsin Department of Natural Resources Publication No. PUB-FH-800 2005,* Wisconsin Lakes, 2005.

[2] *Wisconsin Department of Natural Resources (WDNR),* Lilly Lake, Kenosha County, An Inventory with Planning Recommendations, Lake Use Report No. FX-34*, Prepared by the WDNR for SEWRPC, 1969.*

[3] *Wisconsin Conservation Department,* Surface Water Resources of Kenosha County, *1961.*

[4] *Wisconsin Department of Natural Resources,* Surface Water Resources of Kenosha County*, 1982.*

[5] *The LLPRD is a Chapter 33,* Wisconsin Statutes *public inland lake protection and rehabilitation district that oversees management of Lilly Lake.*

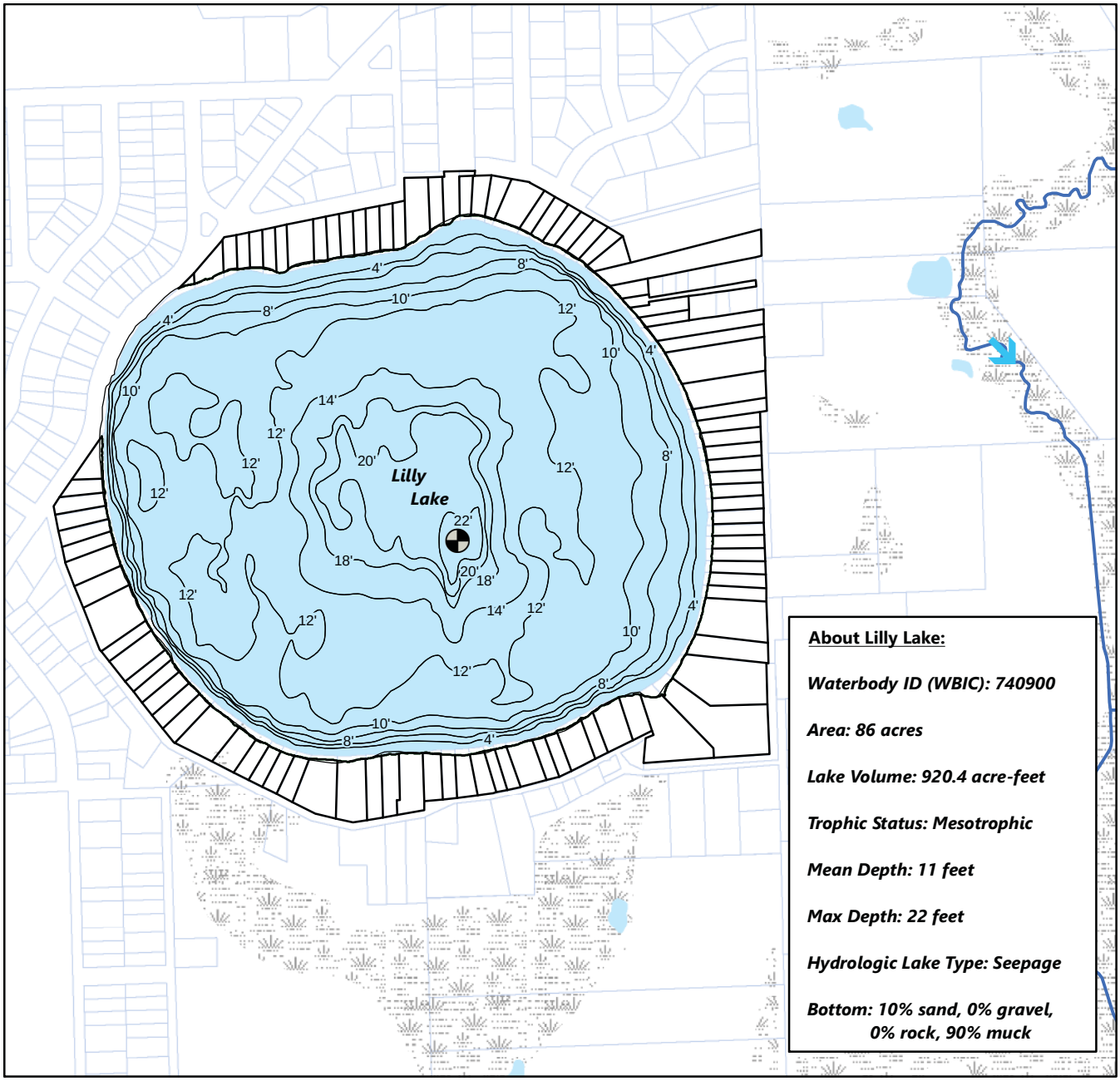
[6] *Aron and Associates,* Lilly Lake Aquatic Plant Management Plan*, September 2009* .

[7] *SEWRPC Memorandum Report No. 222,* Lake and Stream Resources Classification Project for Kenosha County, Wisconsin: 2017.

[8] *Reported lake areas commonly fluctuate over time and between documents. The apparent size of a lake depends upon the lake's water level at time of measurement, the type and condition of shoreline vegetation, and the accuracy of available tools and techniques. For example, nearly all lakes are larger when water levels are higher. Conversely, lakes can appear smaller on aerial photographs when shorelines are covered by dense tree canopy. See Table 1 for more detail.*

[9] *Wisconsin Department of Natural Resources, https://dnr.wi.gov/lakes/lakepages/LakeDetail.aspx?wbic=740900&page=facts*

Map 1
Lilly Lake



DEEP HOLE WATER QUALITY SAMPLING LOCATION

STREAM AND FLOW DIRECTION

15' WATER DEPTH CONTOUR IN FEET

RIPARIAN PARCEL BOUNDARY

PARCEL BOUNDARY

SURFACE WATER

WETLAND

N

0 300 600 Feet

Source: Wisconsin Department of Natural Resources and SEWRPC

Vertical Datum, 1929 adjustment.[10] Additional information regarding Lilly Lake's hydrology and morphometry is summarized in Table 1.

According to WDNR records, Lilly Lake's bottom sediments are composed almost entirely of muck. A dredging project was conducted on Lilly Lake by the LLPRD, WDNR, and the U.S. Environmental Protection Agency between 1978 and 1979. The purpose of the dredging project was to increase water depth in order to reduce vegetative growth, prevent winter kill, and increase recreational usability. The project removed 895,000 cubic yards of largely organic sediment, increasing the maximum depth from six feet to 22 feet.

Hydrology

Based upon its depth and the topography of surrounding lands, WDNR classifies Lilly Lake as a deep seepage lake. Such lakes depend primarily on watershed runoff, and/or precipitation as their primary water sources. These lakes do not have an inlet or outlet and only occasionally overflow. Water levels often fluctuate seasonally due to their dependence on water for precipitation and groundwater from their immediate watershed. Water temperature profiles measured since 2012 indicate Lilly Lake does not stratify during summer.[11] Seepage lakes are the most common type of lake in Wisconsin. The WDNR uses these parameters to set water quality goals for the Lake.

Watershed Characteristics and Land Use

Lilly Lake's 47-acre watershed is very small, mostly limited to the shoreline lots surrounding the Lake. A lake's watershed is the physical area from which surface-water runoff can drain to a lake. Lilly Lake has a very small-sized watershed for its size, with a watershed to lake area ratio of 0.5:1. Lakes with ratios above 10:1 tend to develop water-quality problems.[12] Lakes with large watersheds are comparatively more vulnerable to human disturbance.

Table 1
Hydrology and Morphometry of Lilly Lake

Parameter	Measurement
Size	
Lake Surface Area[a]	86 acres
Watershed Area[b]	47 acres
Lake Volume	920 acre-feet
Residence Time[c]	Unknown
Shape	
Length	0.8 miles
Width	0.4 mile
Shoreline Length	1.3 miles
Shoreline Development Factor[d]	1.3
General Lake Orientation	NW-SE
Depth	
Maximum Depth	22 feet
Mean Depth	11 feet
Area under 3 feet	8 percent
Area over 15 Feet	26 percent

[a] *Surface lake surface area used in this study was believed by SEWRPC to best represent the present ordinary high water mark open water area of the Lake. It generally includes connected channels and sparsely vegetated marsh, and therefore tends toward the larger side of published values. Various sources have reported Lilly Lake's surface area to be as low as 84 acres and as high as 86 acres. Reported lake surface area varies widely by source and over time. Some of the reasons why this may happen include water elevation changes, differences in vegetation over the years, inclusion or exclusion of fringing marsh, and inclusion or exclusion of channels leading off the main body of the lake or actual changes in the lake shoreline over the 60-year period of record.*

[b] *Excludes Lilly Lake.*

[c] *Residence time is estimated as the time period required for a volume of water equivalent to the volume of the lake to enter the lake during years of normal precipitation.*

[d] *Shoreline development factor is the ratio of the shoreline length to the circumference of a circular lake of the same area. Closer to a value of 1.0, the more circular a lake is.*

Source: Wisconsin Department of Natural Resources, U.S. Geological Survey, Aron and Associates, Inc., and SEWRPC.

According to topographic maps, shoreline land slopes are steepest along the north and south shores. Moderate sloping is found along the west and south shorelines and relatively level land abuts the east side of the Lake.

Moderate land development has occurred around Lilly Lake since of the previous lake use report was issued (see Figures 1 and 2). Map 2 and Table 2 show the 2010 land uses in the Lilly Lake watershed. Urban uses occupy over 95 percent of the watershed with medium-density, single-family residential areas accounting for nearly 80 percent of land use. Open lands are the largest rural land use and comprise approximately

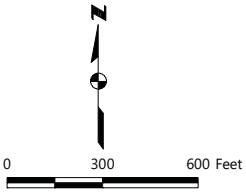
[10] *Wisconsin Department of Natural Resources, https://dnr.wi.gov/lakes/maps/DNR/0740900a.pdf*

[11] *Wisconsin Department of Natural Resources, https://dnr.wi.gov/lakes/waterquality/Station.aspx?id=303126*

[12] *Uttormark, Paul D. and Mark L. Hutchins, 1978,* Input Output Models as Decision Criteria for Lake Restoration, University of Wisconsin-Madison, Wisconsin Water Resources Center, *Technical Report No. 78-03, pg. 61.*

Figure 1
1970 Aerial Photograph of Lilly Lake

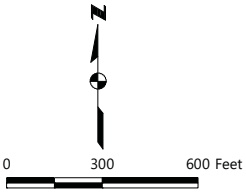
Date of Photography: 1970



Source: SEWRPC

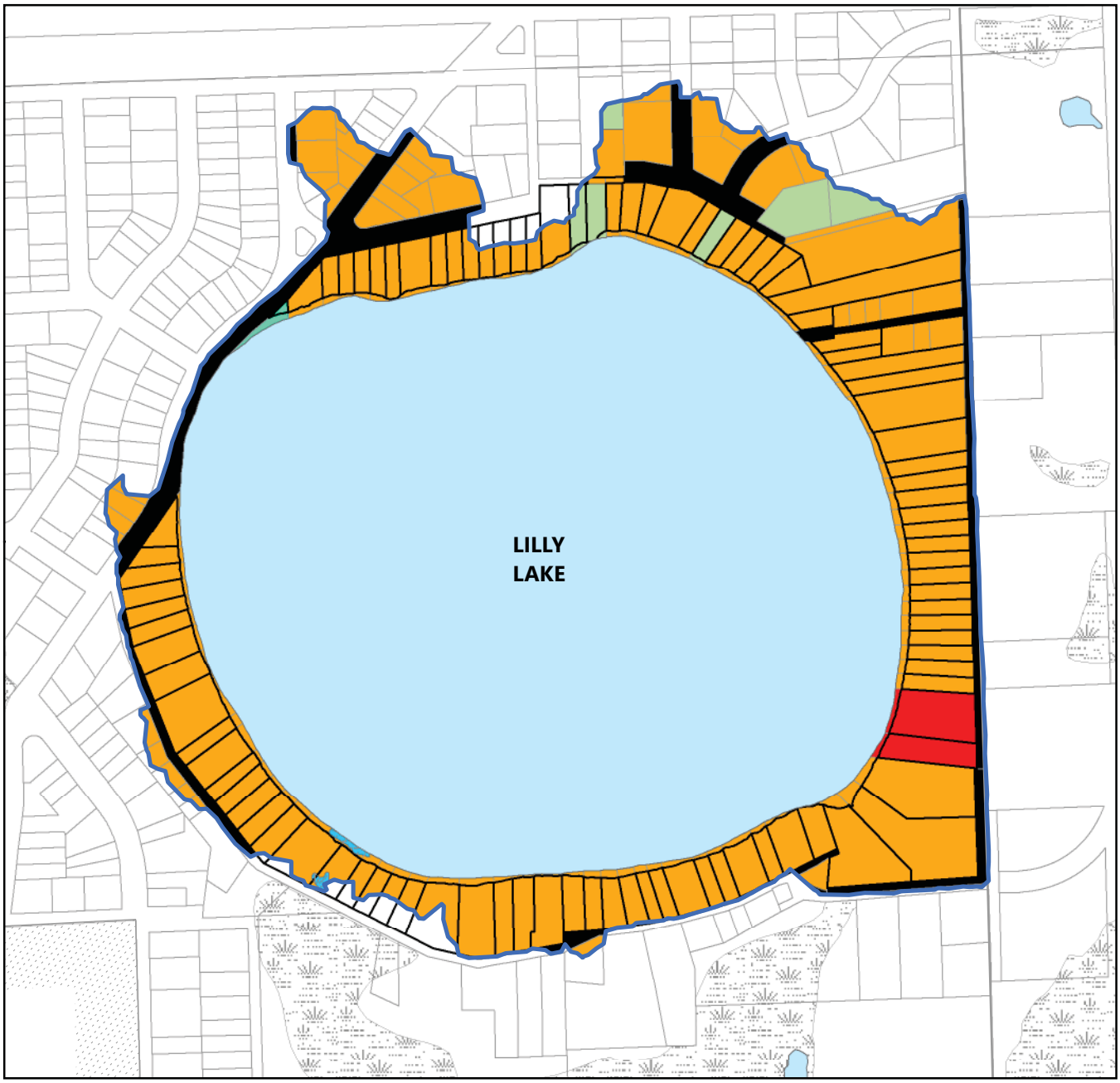
Figure 2
2015 Orthophotograph of Lilly Lake

Date of Photography: 2015



Source: SEWRPC

Map 2
2010 Land Use Within the Lilly Lake Watershed



- LOW DENSITY RESIDENTIAL
- MEDIUM DENSITY RESIDENTIAL
- MULTI-FAMILY RESIDENTIAL
- COMMERCIAL
- INDUSTRIAL
- TRANSPORTATION, COMMUNICATIONS, AND UTILITIES
- STREETS AND HIGHWAYS
- GOVERNMENT AND INSTITUTIONAL
- AGRICULTURAL
- OTHER OPEN LANDS
- RECREATION
- WETLANDS
- WOODLANDS
- SURFACE WATER
- WATERSHED BOUNDARY

N

0 250 500 Feet

Source: SEWRPC

Table 2
Existing and Planned Land Use Within the Lilly Lake Watershed: 2010 and 2035

Land Use Categories [a]	2010		2035		Change: 2010-2035	
	Acres	Percent of Total	Acres	Percent of Total	Acres	Percent
Urban						
Residential						
Single-Family, Suburban Density	--	--	--	--	--	--
Single-Family, Low Density	--	--	3.8	7.8	3.8	--
Single-Family, Medium Density	38.8	78.9	35.0	71.1	-3.8	-9.8
Single-Family, High Density	--	--	--	--	--	--
Multi-Family	--	--	--	--	--	--
Commercial	1.5	3.0	1.5	3.0	0	0
Industrial	--	--	--	--	--	--
Governmental and Institutional	--	--	--	--	--	--
Transportation, Communication, and Utilities	6.9	14.0	6.9	14.0	0	0
Recreational	0.1	0.2	0.1	0.2	0	0
Subtotal	47.3	96.1	47.3	96.1	0	0
Rural						
Agricultural	--	--	--	--	--	--
Other Open Lands	1.8	3.7	1.8	3.7	0	0
Wetlands	0.1	0.2	0.1	0.2	0	0
Woodlands	--	--	--	--	--	--
Water [b]	--	--	--	--	--	--
Extractive	--	--	--	--	--	--
Landfill	--	--	--	--	--	--
Subtotal	1.9	3.9	1.9	3.9	0	0
Total	49.2	100.0	49.2	100.0	0	--

Note: This land use summary table includes internally drained areas. Internally drained areas do not contribute surface-water runoff to the Lake and are therefore not included in the Lake's watershed area listed in Table 1.

[a] *Parking included in associated use.*

[b] *Excludes Lilly Lake*

Source: SEWRPC

4 percent of the watershed. Wetlands comprise less than half a percent of the watershed. There are currently two commercial parcels within the watershed. Projected 2035 land use (Table 2) indicates minimal changes within the Lilly Lake watershed. Current projections indicate that approximately 10 percent of the medium-density, single-family housing will be converted to low-density, single-family housing.

WATER QUALITY

The WDNR re-evaluated Lilly Lake's water quality as part of the recent impairment listing cycle and found that the Lake's water quality clearly meets State thresholds for recreation as well as fish and aquatic life uses.[13]

Historical water quality gives insight into changes that may be occurring within the Lake and its watershed. By comparing data and evaluating trends, causes for change may be identified and management actions can be taken to help protect the Lake. Historically, only limited water quality data was collected at Lilly Lake, starting with a few baseline measurements taken by the WDNR in 1966. Since 2002, Lilly Lake residents have participated in the University of Wisconsin (UWEX) Citizen Lake Monitoring Network (CLMN) under which

[13] *Wisconsin Department of Natural Resources, Lilly Lake, Kenosha County website, "conditions" https://dnr.wi.gov/water/waterDetail.aspx?wbic=740900*

Figure 3
Measuring Water Clarity with a Secchi Disk

Source: www. burnsville.org and SEWRPC

citizen volunteers measure lake water quality parameters such as water clarity, phosphorus concentrations, and dissolved oxygen levels. CLMN is an extremely useful program to provide long-term water quality data. Water quality data is compiled and is available on the WDNR Lakes page.[14]

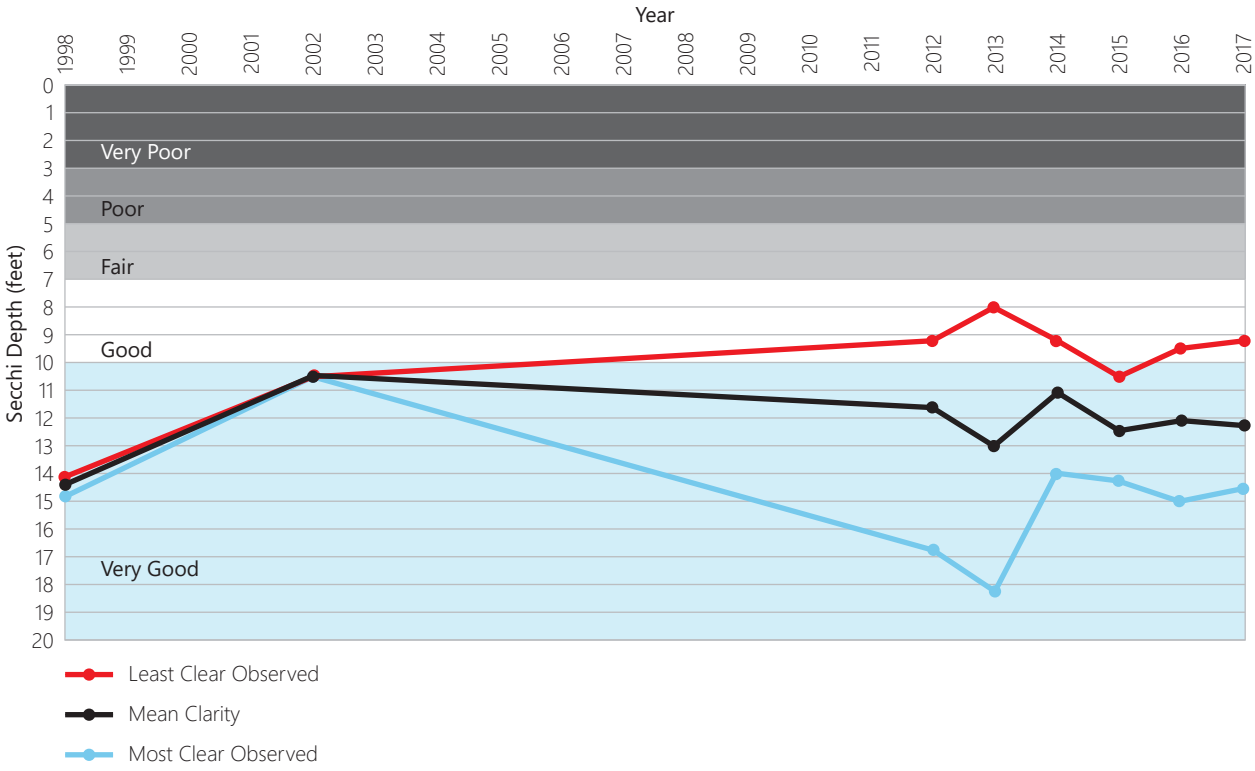
Water clarity is a commonly used and easily understood surrogate for perceived water quality. Many people equate "clear" water with "clean" water. While this is not always true, methods have been developed to allow lake water clarity to be compared and contrasted. Water clarity is measured with a Secchi disk (Figure 3). "Secchi depth" is the distance below the water surface that a Secchi disk can be seen under carefully prescribed conditions. Secchi depth has been occasionally measured in the Lake and the results over time are summarized graphically in Figure 4. On average, water clarity has been very good, with Secchi depth readings averaging around 12 feet. Water clarity has also been estimated from satellite imagery,[15] averaging 9.2 feet in 2016, which generally agrees with values actually measured on the Lake. Based upon the available information, Lilly Lake's water clarity is good to very good and has not changed significantly since monitoring began.

Lake trophic state index (TSI) is calculated using physical and chemical indicators of lake nutrient enrichment. Lakes with low numeric scores (i.e., less than 40) generally have clear water of excellent quality and are termed oligotrophic. Lakes with TSI values between 50 and 60 are termed eutrophic and have limited water clarity, fewer algal species, overly-abundant aquatic plant growth, and deep areas that are commonly devoid of oxygen during summer. Mesotrophic lakes (TSI values between 40 and 50) have conditions intermediate

[14] *Water quality data and other information about Lilly Lake can be found at the WDNR Lakes page: http://dnr.wi.gov/lakes/LakePages/LakeDetail.aspx?wbic=740900.*

[15] *Environmental Remote Sensing Center data and information about the program can be found at Lakesat.org.*

Figure 4
Summer (June Through August) Secchi Depth Ranges for Lilly Lake



Source: Wisconsin Department of Natural Resources and SEWRPC

between oligotrophic and eutrophic lakes, while hypereutrophic lakes (TSI values above 70) commonly can experience algal blooms, poor water clarity, and, in extreme cases, summer fish kills. Hypereutrophic conditions rarely occur in nature and are generally associated with human activity.

Lilly Lake's TSI values are plotted over time in Figure 5. As can be seen from this graphic, TSI values based upon Secchi depth and chlorophyll-*a* concentrations fall mostly within the meso-eutrophic range, while phosphorus TSI values have been more in the eutrophic range.

NATURAL RESOURCES

Aquatic Plants

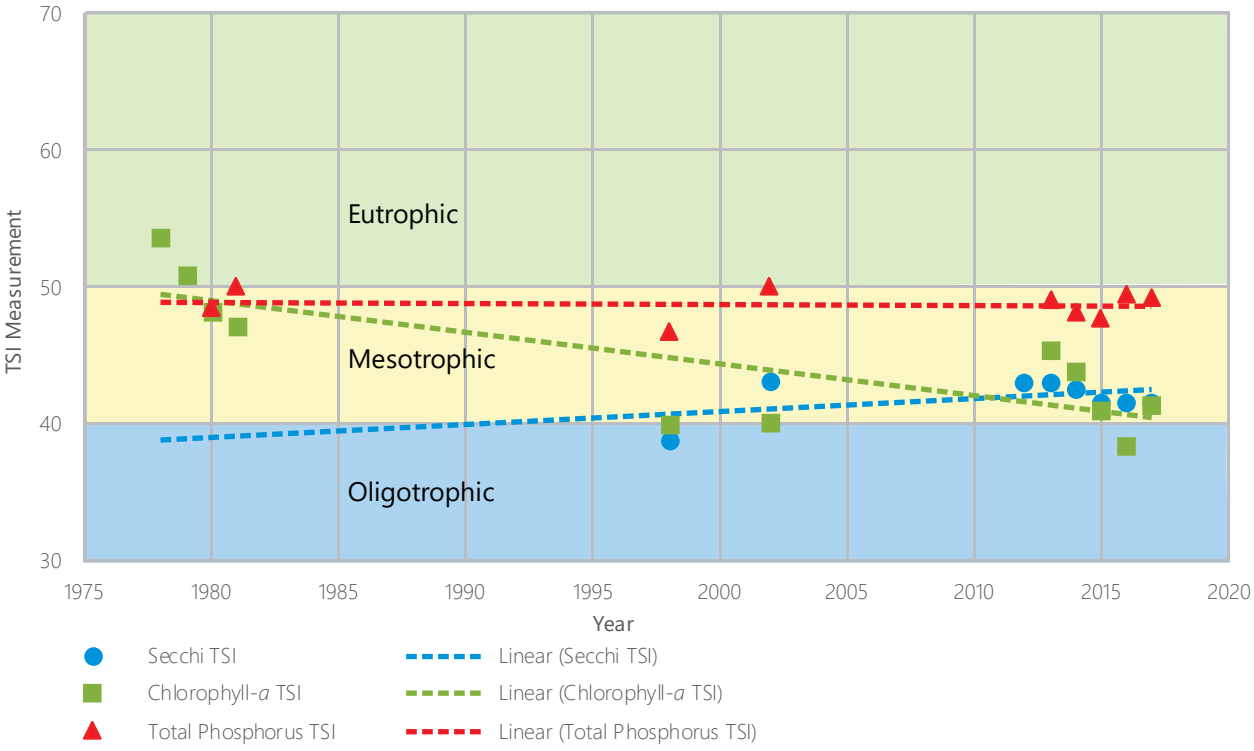
Lilly Lake's aquatic plant community was examined during August 1967 and July 2008. The 1967 survey was less detailed than the subsequent survey. Table 3 lists the frequency of occurrence of plant species noted in these studies.

The 1967 survey reported that large-leaf pondweed (*Potamogeton amplifolius*) was the most dominant species, followed by waterweed (*Elodea canadensis*) and bushy pondweed (*Najas flexilis*); all three are native species. Overall, eight native aquatic plant species were found that year. The 2008 survey indicated that the invasive Eurasian water milfoil (*Myriophyllum spicatum*) was the most dominant species, followed by white-stem pondweed (*Potamogeton praelongus*) and Robbin's pondweed (*Potamogeton robbinsii*). A total of thirteen native aquatic plant species were observed and documented within Lilly Lake in 2008. Native species provide a variety of benefits, including food for wildfowl and fish, and shelter for fingerling fish such as trout, bluegill, and bass. All of the plants found were species commonly observed in lakes within the Region.

Aquatic Invasive Species

The terms "nonnative" and "invasive" are often confused and incorrectly assumed to be synonymous. Nonnative (sometimes also referred to as "exotic") is an overarching term describing living organisms

Figure 5
Summer (June Through August) Annual Average Trophic State Indices (TSI) for Lilly Lake



Note: June-August data of each year was averaged to produce the resultant values.

Source: Wisconsin Department of Natural Resources and SEWRPC

introduced to new areas beyond their native range with intentional or unintentional human help. Nonnative species may not necessarily harm ecological function or human use values in their new environments. Invasive species are the subset of nonnative species that damage the ecological health of their new environments and/or are commonly considered nuisances to human use values. In summary, invasive species are non-native but not all non-native species are invasive.

*Eurasian Water Milfoil (*Myriophyllum spicatum*) and Eurasian/Northern Water Milfoil Hybrids*

EWM, one of eight milfoil species found in Wisconsin, is the only milfoil species known to be exotic/nonnative (see Figure 6). This plant can grow profusely in nutrient-rich lakes impeding boating and recreational use. Because of this management concern, EWM is actively managed by mechanical and chemical means in many Southeastern Wisconsin lakes. In recent years, EWM/native northern milfoil hydrids have been observed in some Wisconsin lakes. These hybrids pose a difficult management problem: not only do hybrids grow quickly like EWM, but hybrids appear to be more tolerant to aquatic herbicides such as 2, 4-D and Endothall that are commonly used to manage EWM.[16] Both EWM and EWM/native milfoil hybrids have been identified in Lilly Lake. The presence of invasive milfoil species is a management concern.

*Curly-leaf Pondweed (*Potamogeton crispus*)*

Curly-leaf pondweed (see Figure 7) is a plant that thrives in cool water and exhibits an early-season growth cycle that helps give it a competitive advantage over native plants. However, curly-leaf pondweed begins to die off during the summer when lake water temperatures start to peak. Therefore, it is not normally considered a nuisance during summer months. Furthermore, curly-leaf pondweed was not found in the 2008 survey, though it is listed as present in Lilly Lake by the WDNR.

[16] *T. Groves, P. Hausler, and P. Tyning, Water Resources Group, Progressive AE,* Hybrid Milfoil: Management Implications and Challenges*, The Michigan Riparian, Winter 2015.*

Table 3
Lilly Lake Aquatic Plant Surveys: 1967 and 2008

Aquatic Plant Species	1967 (Abundance)[a]	2008 (Frequency of Occurrence)[b]
Emergent Plants		
Scirpus validus (soft stem bulrush)	Sparse along SW shore	--
Typha spp. (cattails)	Sparse along SW shore	--
Submerged Plants		
Ceratophyllum demersum (coontail)	--	0.9
Chara spp. (muskgrass)	Present[c]	26.8
Elodea canadensis (waterweed)	Moderate	--
Heteranthera dubia (water stargrass)	--	0.5
Myriophyllum sibiricum (native milfoil)	Scattered	--
Myriophyllum spicatum (Eurasian water milfoil)	--	54.9
Najas flexilis (bushy pondweed)	Moderate	12.2
Najas marina (spiny naiad)	--	1.4
Nitella spp. (stonewort)	--	1.4
Potamogeton amplifolius (large-leaf pondweed)	Heavy[d]	--[e]
Potamogeton gramineus (variable pondweed)	--	--[e]
Potamogeton illinoensis (Illinois pondweed)	--	--[f]
Potamogeton nodosus (long-leaf pondweed)	Sparse	--
Potamogeton praelongus (white-stem pondweed)	Scattered	69.5
Potamogeton robbinsii (Robbins' pondweed)	--	46.5
Potamogeton zosteriformis (flat-stem pondweed)	--	0.9
Stuckenia pectinata (Sago pondweed)	Sparse	5.6
Vallisneria americana (water celery)	--	3.8

Note: Nonnative species above are listed in red print; all other species are native. NR 107 *Wisconsin Administrative Code* high-value species are printed in green print.

[a] ***Abundance*** *was visually appraised by describing relative abundance of plants in the Lake and assigning a rating of 1 through 4 where 1=sparse, 2=scattered, 3=moderate, 4=heavy.*

[b] *The* ***frequency of occurrence*** *of a species is derived from a combination of the number of occurrences of a species and the number of sampling sites that had some kind of vegetation present; it indicates dominance of a species within a plant community.*

[c] *Described by Wisconsin Department of Natural Resources staff as the most common species near shore to a depth of five feet at that time (July 1967).*

[d] *Described by Wisconsin Department of Natural Resources staff as the most dominant plant in the Lake at that time (July 1967).*

[e] *Aquatic plant species found by Aron and Associates, Inc. staff during general survey of Lilly Lake, but not during grid-point aquatic plant survey.*

[f] *Sighted visually in 2008, but not statistically measured.*

Source: Wisconsin Department of Natural Resources, Aron and Associates, Inc., and SEWRPC

*Spiny Naiad (*Najas marina*)*

Spiny Naiad (see Figure 8) is a plant that is native to other states, including Minnesota, but was introduced in Wisconsin. Spiny naiad can grow to nuisance levels in northern Wisconsin Lakes and was added to Chapter NR 40 of the *Wisconsin Administrative Code*, for native species identification, classification and control, in 2015. The WDNR has listed spiny naiad as a concern in Lilly Lake.[17]

*Banded mystery snail (*Vivaparus georgianus*)*

Banded mystery snail (see Figure 9) is a large, olive colored snail native to the southeastern United States. It was released into the Hudson River in 1867. As a non-native, it competes for food and habitat with native

[17] *WDNR Surface Water Data Viewer (SWDV), June 2016, http://dnr.wi.gov/topic/SurfaceWater/swdv/.*

Figure 6
Eurasian Water Milfoil (*Myriophyllum spicatum*)

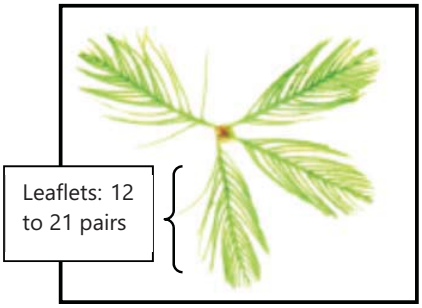
Identifying Features

- Stems spaghetti-like, often pinkish, growing long with many branches near the water surface
- Leaves with 12 to 21 pairs of leaflets
- Produces no winter buds (turions)

Eurasian water milfoil is similar to northern water milfoil (*M. sibiricum*). However, northern water milfoil has five to 12 pairs of leaflets per leaf and stouter white or pale brown stems

Ecology

- Hybridizes with native northern water milfoil, resulting in plants with intermediate characteristics
- Invasive, growing quickly, forming canopies, and getting a head-start in spring due to an ability to grow in cool water
- Grows from root stalks and stem fragments in both lakes and streams, shallow and deep; tolerates disturbed conditions
- Provides some forage to waterfowl, but supports fewer aquatic invertebrates than mixed stands of aquatic vegetation



Source: Wisconsin Department of Natural Resources and Skawinski, P. M. (2014). Aquatic Plants of the Upper Midwest: A Photographic Field Guide to Our Underwater Forests, 2nd Edition, Wausau, Wisconsin, USA: Self-Published

snails and can serve as a host for parasites that can be transmitted to fish and other wildlife. Banded mystery snails are known to invade largemouth bass nests, significantly increasing egg mortality.

Fisheries and Wildlife

The WDNR's lake page lists the Lake's northern pike (*Esox lucius*), largemouth bass (*Micropterus salmoides*), and panfish populations as "present."[18]

The WDNR conducted a fish survey on Lilly Lake in 1969.[19] Results determined that the fishery of Lilly Lake was of good quality because the Lake supported both predator and panfish populations. The survey determined that the fish community was comprised of panfish, including black crappie (*Pomoxis nigromaculatus*), bluegill (*Lepomis macrochirus*), and pumpkinseed (*Lepomis gibbosus*), and predators, including northern pike and largemouth bass. More recent WDNR boom shocker surveys were conducted in May 2002 and

[18] *dnr.wi.gov/lakes/lakepages/LakeDetail.aspx?wbic=740900.*

[19] *WDNR Lake Use Report No. FX-34,* op cit.

Figure 7
Curly-Leaf Pondweed (*Potamogeton crispus*)

Identifying Features

- Stems slightly flattened and both stem and leaf veins often somewhat pink
- Leaf margins very wavy and finely serrated
- Stipules (3.0 to 8.0 millimeters long) partially attached to leaf bases, disintegrating early in the season
- Produces pine cone-like overwintering buds (turions)

Curly-leaf pondweed may resemble clasping-leaf pondweed (*P. richardsonii*), but the leaf margins of the latter are not serrated

Ecology

- Found in lakes and streams, both shallow and deep
- Tolerant of low light and turbidity
- Disperses mainly by turions
- Adapted to cold water, growing under the ice while other plants are dormant, but dying back during mid-summer in warm waters
- Produces winter habitat, but mid-summer die-offs can degrade water quality and cause algal blooms
- Maintaining or improving water quality can help control this species, because it has a competitive advantage over native species when water clarity is poor

Source: Wisconsin Department of Natural Resources, SEWRPC, and Skawinski, P. M. (2014). Aquatic Plants of the Upper Midwest: A Photographic Field Guide to Our Underwater Forests, 2nd Edition, Wausau, Wisconsin, USA: Self-Published.

May and October of 2013. Bluegills, largemouth bass, pumpkinseeds, and yellow perch (*Perca flavescens*) were counted and measured. The majority of fish were found to be stock size with only a few of quality size. The WDNR has been rotationally stocking northern pike and largemouth bass fairly consistently since 1980.

Environmentally Significant Areas

As shown on Map 3, the south shore of Lilly Lake watershed contains a small portion of primary environmental corridor that provides an important connection between Lilly Lake (which, itself, represents 84 acres of primary environmental corridor) to 1,226 acres of primary environmental corridor comprised of natural land and mitigated wetlands south of the Lake. Many important interdependent relationships occur between living organisms and their environment in such areas. Destruction or deterioration of one natural environment element may cause deterioration and destruction among other elements. Therefore, it is important to protect, and as possible enhance, such areas.

Aesthetic Features

Lilly Lake provides a generally peaceful and natural lake setting. Much of the lakeshore is wooded which helps to conceal homes and the developed appearances of the properties that encircle the Lake. The Lake's lack of embayments or significant stretches of natural shoreline results in some lack of visual interest.

Figure 8
Spiny Naiad (*Najas marina*)

Identifying Features

- Stems stiff and spiny, often branching many times
- Leaves stiff, 1.0 to 4.0 millimeters thick, with coarse teeth along the margins and midvein on the underside

Spiny naiad is quite distinct from other naiads due to its larger, coarsely toothed leaves and the irregularly pitted surface of its fruits. Spiny naiad is presumably introduced in Wisconsin but it is considered native in other states, including Minnesota

Ecology

- Alkaline lakes, water quality ranging from good to poor
- An annual, regenerating from seed each year
- Occurs as separate male and female plants
- Capable of growing aggressively

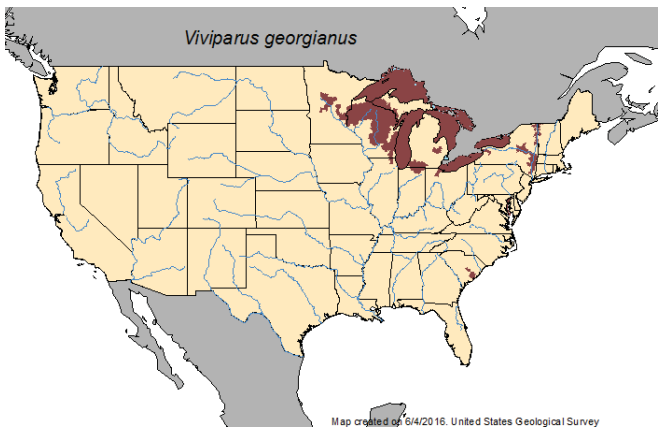
Source: Wisconsin Department of Natural Resources and Skawinski, P.M. (2014). Aquatic Plants of the Upper Midwest: A Photographic Field Guide to Out Underwater Forests, 2nd Edition, Wausau, Wisconsin, USA,: Self-Published.

Figure 9
Banded Mystery Snail (*Vivaparus georgianus*)

-Olive shell with red bands parallel to the whorl of the shell, up to 1 ¾ inches

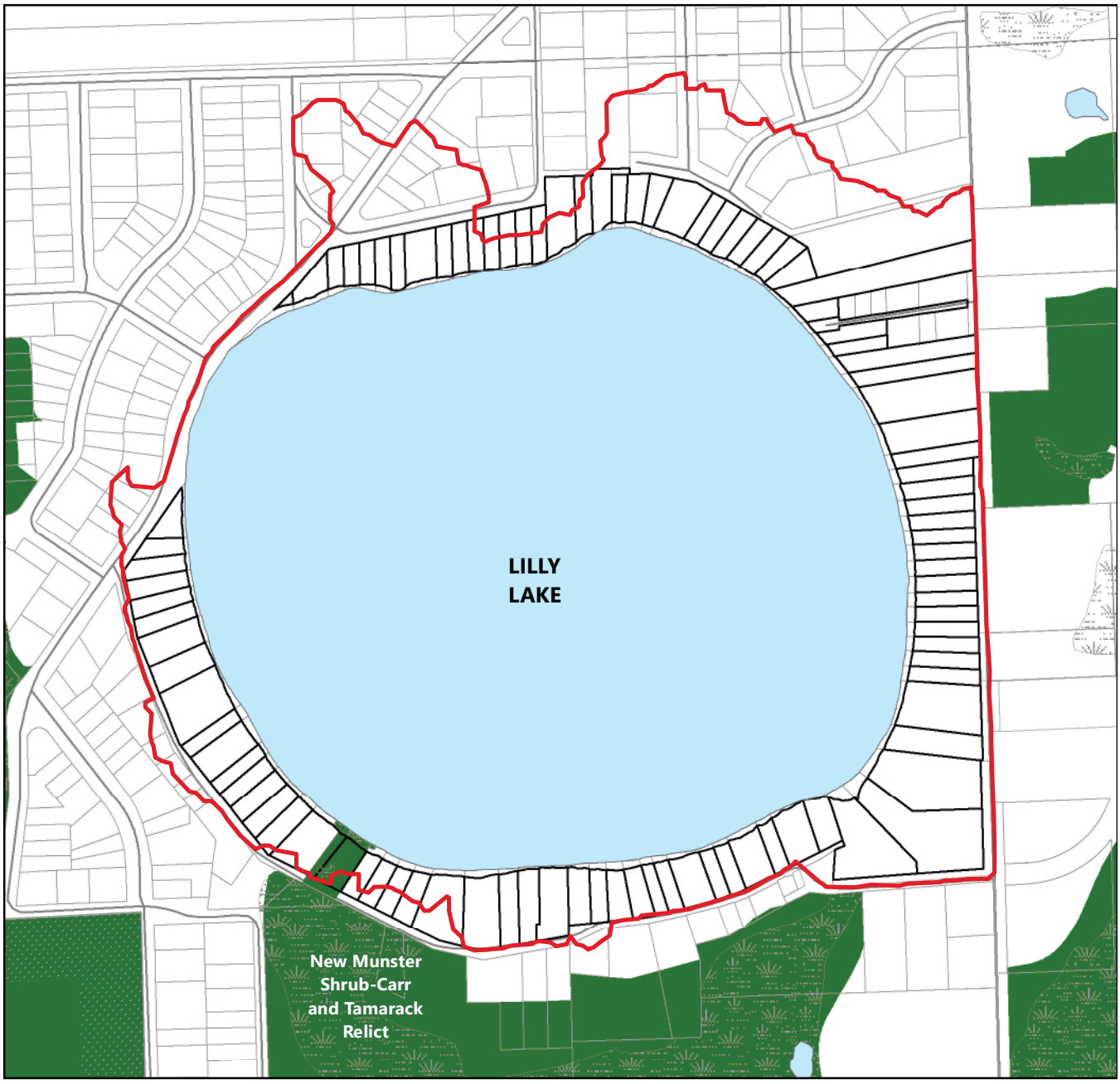
-Most likely spread through aquarium dumping and bilge transfer

-Born fully formed, seeming to appear mysteriously



Source: Minnesota Department of Natural Resources, University of Wisconsin Sea Grant Institute, Minnesota Sea Grant, U.S. Geological Survey, and SEWRPC

Map 3
Environmentally Significant Areas Within the Lilly Lake Watershed



SURFACE WATER

WATERSHED BOUNDARY

PRIMARY ENVIRONMENTAL CORRIDORS

SECONDARY ENVIRONMENTAL CORRIDORS

ISOLATED NATURAL RESOURCE AREA

WETLANDS

N

0 250 500 Feet

Source: SEWRPC

Figure 10
Typical Summer Activities on Lilly Lake

Source: SEWRPC

LAKE USE

Recreational Use

Aerial boat counts were conducted by the WDNR around 1967. Their results indicated that pleasure boating was the primary recreational boating use along with some fishing activity. During the summer of 2014 and winter of 2015, SEWRPC staff conducted a recreational survey to document public lake use. Like the 1967 survey, pleasure cruising was a common boat use. However, skiing and tubing were slightly more common. Power boats were in the highest use and high-speed use was not uncommon. Pontoon boats had the second highest use and personal watercraft, kayaks, canoes, and wind boarding were observed (see Figure 10). The following activities were also observed: swimming, fishing, and use of park land. Ice fishing was observed in the winter (Figure 11).

Public Access

Lilly Lake has one public boat ramp. Therefore, the WDNR deems the Lake to have adequate public recreational boating access pursuant to standards set forth in Chapter NR 1 of the *Wisconsin Administrative Code*. The public access site is on the north shore of the Lake (Map 4). It includes two car-trailer parking sites on 76th St, four car parking spaces on Lilly Lake Road, a pier, and a swimming beach.

Cottages and Homesites

According to recent records 96 lakefront lots abut Lilly Lake. Lot sizes average 0.3 acre and range from a minimum of 0.15 acre to a maximum of 1.4 acres.[20] The population and number of households in Lilly Lake's watershed area is projected to not significantly increase by 2035 (Table 4).

EXISTING PROTECTIVE MEASURES

Sewage Disposal

At present, all riparian residential lands in the Lilly Lake watershed are served by private onsite wastewater treatment systems. Such systems need to be conscientiously maintained and inspected to ensure operation compliant with County and or local ordinances.

[20] *SEWRPC Memorandum Report No. 222,* op.cit.

Figure 11
Typical Winter Activities on Lilly Lake

Source: SEWRPC

Shoreline Protection and Erosion Control

Over 90 percent of Lilly Lake's shoreline is unprotected by either man-made or natural structures (see Map 5). An example of unprotected shorelines is where riparian owners mow lawn to the water's edge. Shoreline protection can include vegetative buffer, bulkhead, or riprap. Evidence of erosion was visible at 35 sites along the Lake shore during a survey conducted by SEWRPC staff in August 2014.[21] Soil erosion can be aesthetically unappealing and often carries high nutrient loads directly into the Lake causing which can cause decreased water quality, excess plant growth, and algal blooms.

Table 4
Population and Households in the Lilly Lake Watershed: 1960-2035

Year	Population	Households
1960	62	23
1970	191	43
1980	325	106
1990	296	104
2000	241	100
2010	222	101
Planned 2035	233	102

Source: U.S. Bureau of Census and SEWRPC

Land Use Regulations

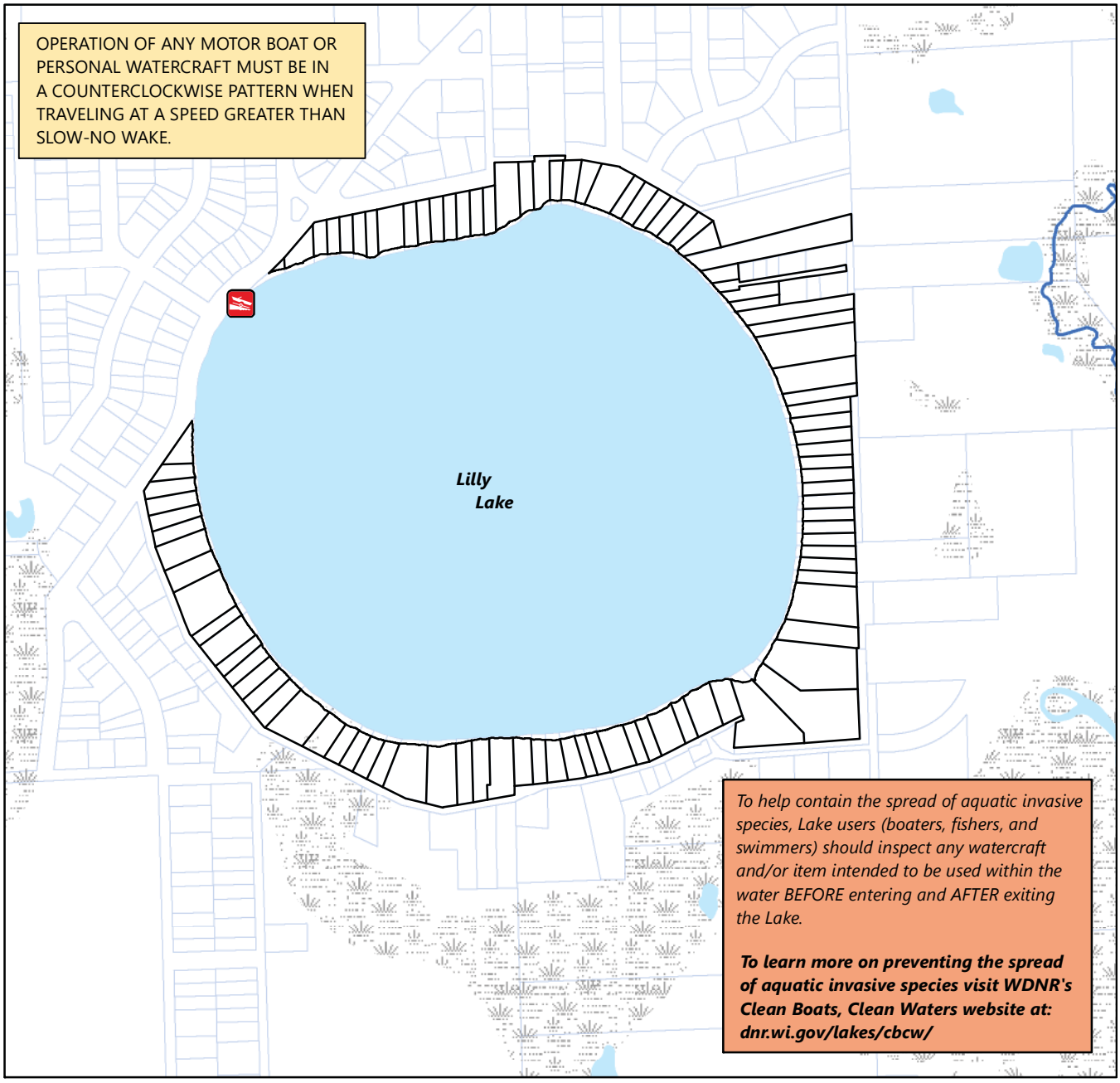
Comprehensive zoning ordinances are one of the most important tools available to local units of government for assuring prudent use of lands within their area of jurisdiction. Lilly Lake and its watershed are subject to ordinances and regulations developed or adopted by the Town of Wheatland and Kenosha County. The Town of Wheatland has adopted the Kenosha County ordinances for both general and special-purpose zoning (see Table 5).

Water Use Regulations

Motor boat use on Lilly Lake is subject to a Code of Ordinances for the Town of Wheatland. The ordinance state that a boat traveling at a speed greater than slow-no-wake must operate in a counter clockwise direction, unless a ski exhibition, show, competition event, or rehearsal therefor is authorized and permitted by the Town Board. In addition, the Town of Wheatland adopted ordinances from Chapter 30 of the *Wisconsin Statutes* that apply to persons, boats, watercraft, and objects upon, in, and under the waters of Lilly Lake within the jurisdiction of the Town, and that limit the times during which boats may operate on Lilly Lake. The ordinance also allows for the enactment and enforcement of boating restrictions and limitations.

[21] Ibid..

Map 4
Recreational Use on Lilly Lake



Map ID	Description	Facilities							
		Boat Ramp	Fee	Car-trailer Parking	Pier	Swim Beach	Picnic Area	Shelter	Playground
	Town of Wheatland	Yes	Yes	Yes, limited	Yes	Yes	Yes	No	No

PARCEL BOUNDARY ALONG SHORELINE
SURFACE WATER
WETLAND
STREAM

N

0 300 600 Feet

Source: Wisconsin Department of Natural Resources and SEWRPC

Note: For additional lake information or boating regulations go to:
dnr.wi.gov/lakes/lakepages/Results.aspx

Map 5
Shoreline Survey of Lilly Lake: 2014

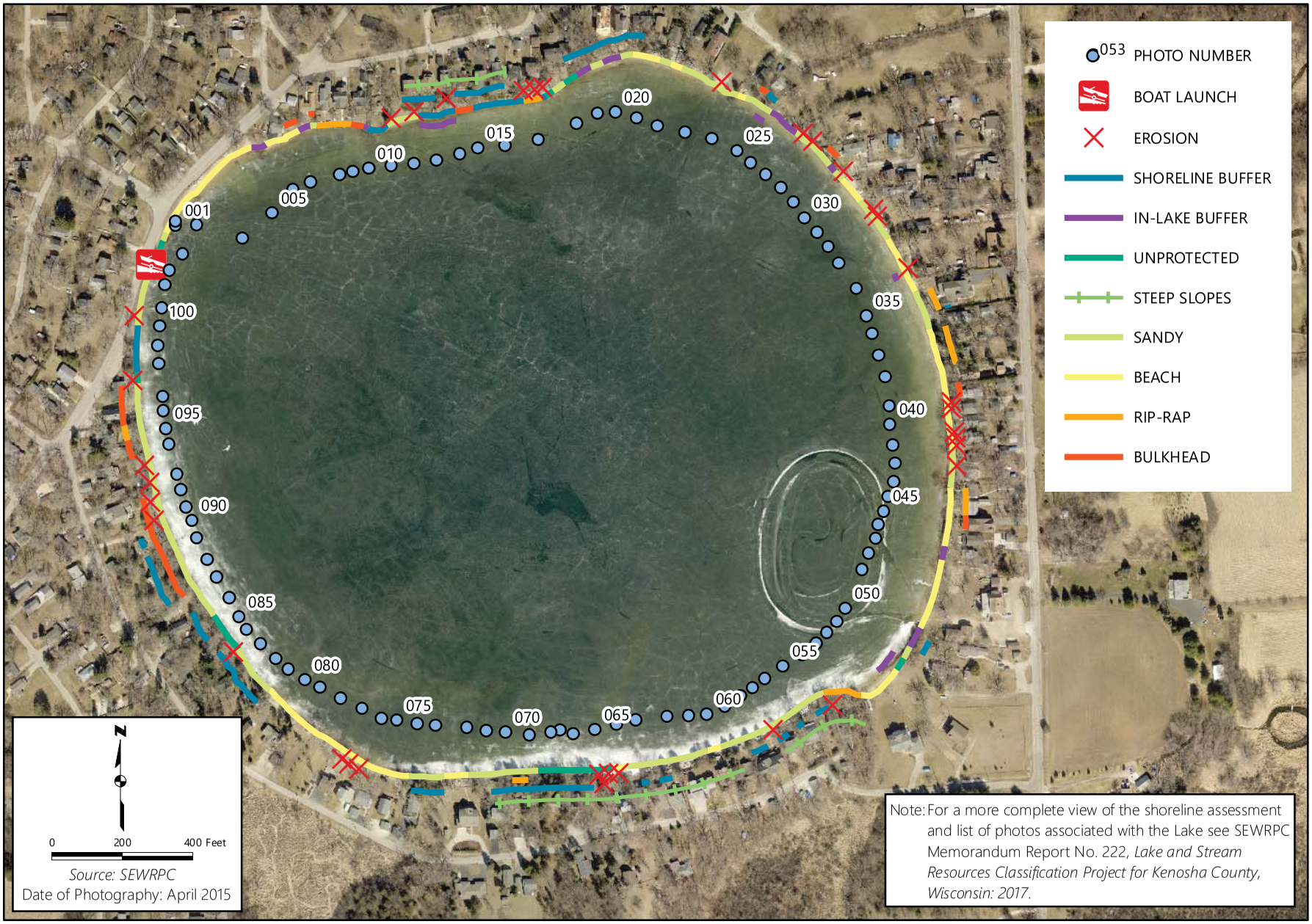


Table 5
Land Use Regulations Within the Lilly Lake Watershed in Kenosha County by Civil Division: 2016

Type of Ordinance	Community	
	Kenosha County	Town of Wheatland
General Zoning	Adopted	Regulated under County ordinance
Floodplain Zoning	Adopted	Regulated under County ordinance
Shoreland Zoning	Adopted	Regulated under County ordinance
Subdivision Control	Adopted	Regulated under County ordinance
Construction Site Erosion Control and Stormwater Management	Adopted	Regulated under County ordinance

Source: SEWRPC