POWERS LAKE USE REPORT UPDATE LR-8

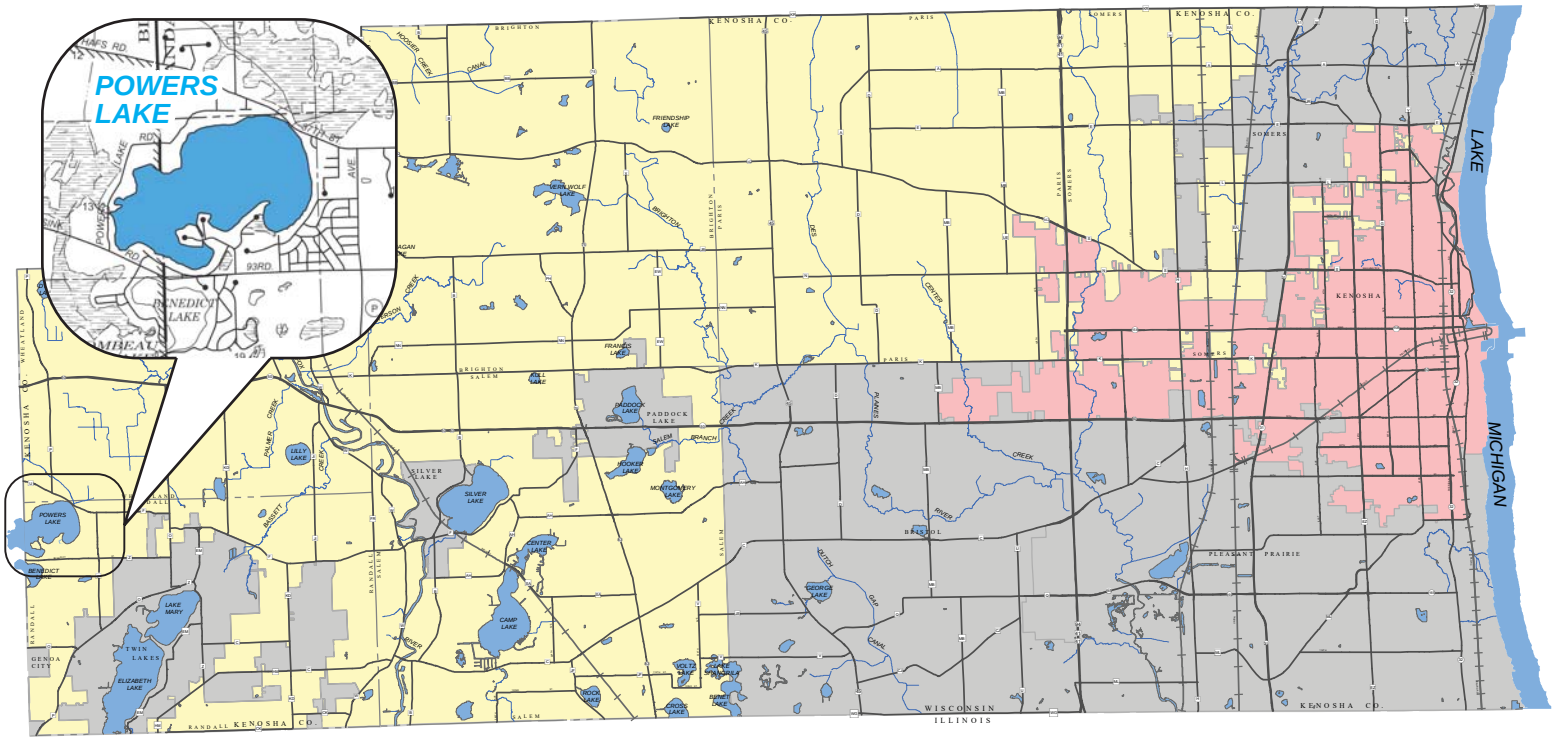
Prepared by the

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. Powers 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, Powers Lake was the subject of a lake management plan developed by the Southeastern Wisconsin Regional Planning Commission (SEWRPC) in 1991 for the Powers Lake Management District and a lake protection plan developed by SEWRPC in 2011 for the District of Powers Lake (DoPL), a Chapter 33, *Wisconsin Statutes* public inland lake protection and rehabilitation district that oversees management of Powers Lake.[3,4]The DoPL maintains a website (www.districtofpowerslake.com). The website is used to post a wide variety of information Lake users may find interesting. In addition to the above reports, Powers Lake was also part of a 2017 lake and stream classification project developed for Kenosha County by Southeastern Regional Planning Commission (SEWRPC).[5]

INTRODUCTION

Powers Lake is located in the Town of Randall, Kenosha County, and the Village of Bloomfield, Walworth County, Wisconsin. The Lake's size, fishery, natural beauty, and location give it significant local economic and recreational value. In addition, its healthy and relatively diverse aquatic plant community provide noteworthy fish and wildlife habitat. The Lake provides significant value to local ecology.

PHYSICAL DESCRIPTION

Lake Characteristics

Based upon recent orthophotography, Powers Lake has a surface area of 458 acres.[6] As shown on Map 1, Powers Lake has a slightly elongated basin with a northeast-southwest orientation and a maximum depth of 33 feet. According to 1967 (revised from 1960) depth soundings published by the WDNR, Powers Lake contains 7,453 acre-feet of water. Ten percent of Powers Lake is three feet deep or less, yielding an average depth of 16 feet.[7] The Lake has normal water surface elevation of approximately 830.6 feet above sea level.[8] Additional information regarding Powers Lake's hydrology and morphometry is summarized in Table 1.

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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), Powers Lake, Kenosha County,* An Inventory with Planning Recommendations, Lake Use Report No. FX-13*, Prepared by the WDNR for SEWRPC, 1969.*

[3] *SEWRPC Community Assistance Planning Report No. 196,* A Management Plan for Powers Lake, Kenosha and Walworth Counties, Wisconsin*, November 1991.*

[4] *SEWRPC Memorandum Report No. 193,* A Lake Protection Plan for Powers Lake, Kenosha and Walworth Counties, Wisconsin*, November 2011.*

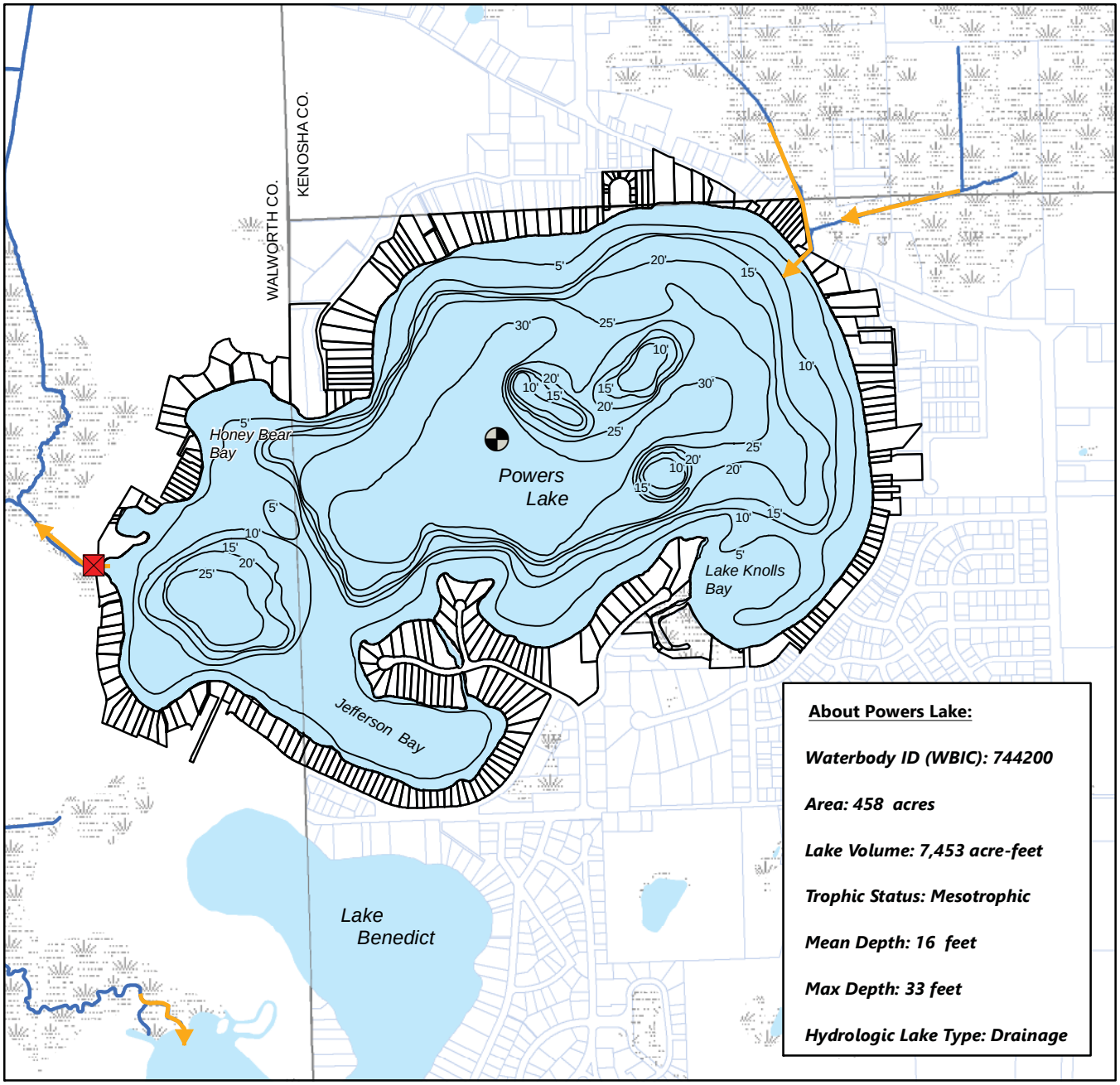
[5] *SEWRPC Memorandum Report No. 222,* Lake and Stream Resources Classification Project for Kenosha County, Wisconsin: 2017.

[6] *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.*

[7] *Wisconsin Department of Natural Resources, Lake Use Report No. FX-13,* op cit.

[8] Ibid.

Map 1
Powers Lake



LAKE OUTLET STRUCTURE

DEEP HOLE WATER QUALITY SAMPLING LOCATION

SURFACE WATER FLOW PATH

STREAM

15' WATER DEPTH CONTOUR IN FEET

RIPARIAN PARCEL BOUNDARY

PARCEL BOUNDARY

SURFACE WATER

WETLAND

N

0 690 1,380 Feet

Source: Wisconsin Department of Natural Resources and SEWRPC

According to WDNR records, about 15 percent of the Lake's littoral shelf is comprised of soft bottom sediments.[9] In Jefferson Bay and Lake Knolls Bay (see Map 1), muck and marl dominate the bottom sediments; the rest of the Lake's littoral shelf has primarily a sand and gravel bottom.[10] Marl, typically soft, flocculent material, is the dominant bottom sediment type in water deeper than five feet.

Hydrology

Based upon its depth and the topography of surrounding lands, WDNR classifies Powers Lake as a deep headwater lake. Deep headwater lakes are larger than 10 acres, are likely to thermally stratify during warm weather and have hydrologic characteristics of a drainage lake. The Lake receives about 40 percent of its water from direct precipitation onto the Lake's surface, about 25 percent from surface runoff from its surrounding watershed, and about 35 percent of its water from groundwater.[11] The WDNR uses these parameters to set water quality goals for the Lake.

As reported in the original Lake Use Report, the groundwater levels around Powers Lake are such that groundwater flows into the Lake from the west and discharges from the Lake to the east.

The surface inflow, which drains a tamarack swamp just northeast of the Lake, appears to be intermittent and poorly defined. Outflow from the Lake is regulated through means of a culvert (see Figure 1) located at the southwestern corner of the Lake. Powers Lake forms the headwaters of the East Branch of the Nippersink Creek, which flows from the Lake southerly through Tombeau Lake, thence southwesterly to its confluence with the North Branch of Nippersink Creek and eventually into the Illinois-Fox River in northern Illinois.

Table 1
Hydrology and Morphometry of Powers Lake

Parameter	Measurement
Size	
Surface Area of Lake[a]	458 acres
Watershed Area[b]	1,694 acres
Lake Volume	7,453 acre-feet
Residence Time[c]	4.2 years
Shape	
Length	1.3 mile
Width	0.8 mile
Shoreline Length	5.3 miles
Shoreline Development Factor[d]	1.77
General Lake Orientation	SW to NE
Depth	
Maximum Depth	33 feet
Mean Depth	16 feet
Area under 3 feet	17 percent
Area over 15 Feet	37 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 Powers Lake's surface area to be as low as 451 acres and as high as 459 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 Powers Lake .*

[c] *Residence time is the estimated time period required for a volume of water equivalent to the volume of the lake to enter and be discharged from the lake during years of normal precipitation. The above data is based on a more accurate delineation of the watershed boundary than that used for the 1969 Lake Use Report, which identified the residence time for Powers Lake to be approximately 6.7 years, based on seven-inch runoff from land in the watershed and 2.9 inch of precipitation retained by the Lake.*

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

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

As a result of the interplay resulting from surface waters draining from both Powers Lake and Benedict Lake into Tombeau Lake and, subsequently, being discharged through the Tombeau Lake dam, the water levels in all three lakes are often linked together, especially during high precipitation events.

[9] *The littoral zone is the shallow water area of a lake where sunlight penetrates all the way to the bottom, usually about 10-15 feet, depending on water clarity.*

[10] *WDNR Lake Use Report No. FX-13,* op. cit.

[11] Ibid.

Figure 1
Powers Lake Outflow Structure: 2009

Source: SEWRPC

Watershed Characteristics and Land Use

Powers Lake's 1,694 acre watershed lies primarily to the north and east of the Lake. A lake's watershed is the physical area from which surface-water runoff can drain to a lake. Powers Lake has a modest-sized watershed for its size, with a watershed to lake area ratio of 3.2:1. Lakes with ratios above 10:1 tend to develop water-quality problems.[12] Lakes with large watersheds are comparatively more vulnerable to human disturbance.

Significant land development has occurred around Powers Lake since the writing of the previous lake use report (see Figures 2 and 3). Continued land development can be expected in the Powers Lake watershed as shown in Table 2; Map 2 shows the 2010 land uses in the Powers Lake watershed. During 2010, rural uses accounted for over 70 percent of the total watershed area with agricultural and other open lands being the single largest rural land use at 47 percent of the watershed. Wetlands and woodlands comprised another 17 and 6 percent of rural land use, respectively. Urban uses account for about 29 percent of the watershed with low-density single-family residential areas accounting for more than half of all urban land uses. Projected 2035 land use (Table 2) indicates that about one third of all agricultural and open lands within the watershed will be converted to urban uses: mostly to single-family, low density residential areas, but also into medium-density, single family residential uses and recreational uses.

[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 2
1970 Aerial Photograph of Powers Lake

Date of Photography: 1970

N

0 980 1,960 Feet

Source: SEWRPC

Figure 3
2015 Orthophotograph of Powers Lake

Date of Photography: 2016

Source: SEWRPC

Table 2
Existing and Planned Land Use Within the Powers 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	271	16.0	466	27.5	195	71.9
Single-Family, Medium Density	72	4.2	88	5.2	16	22.2
Single-Family, High Density	--	--	--	--	--	--
Multi-Family	1	0.1	1	0.1	0	0
Commercial	9	0.5	7	0.4	-2	-22.2
Industrial	6	0.4	7	0.4	1	16.7
Governmental and Institutional	1	0.1	1	0.1	0	0.0
Transportation, Communication, and Utilities	102	6.0	102	6.0	0	0.0
Recreational	30	1.8	78	4.6	48	160.0
Subtotal	492	29.1	750	44.3	258	52.4
Rural						
Agricultural and Other Open Lands	798	47.1	540	31.9	-258	-32.3
Wetlands	293	17.3	293	17.3	0	0.0
Woodlands	107	6.3	107	6.3	0	0.0
Water [b]	4	0.2	4	0.2	0	0.0
Extractive	--	--	--	--	--	--
Landfill	--	--	--	--	--	--
Subtotal	1,202	70.9	944	55.7	-258	-21.5
Total	1,694	100.0	1,694	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 Powers Lake*

Source: SEWRPC

WATER QUALITY

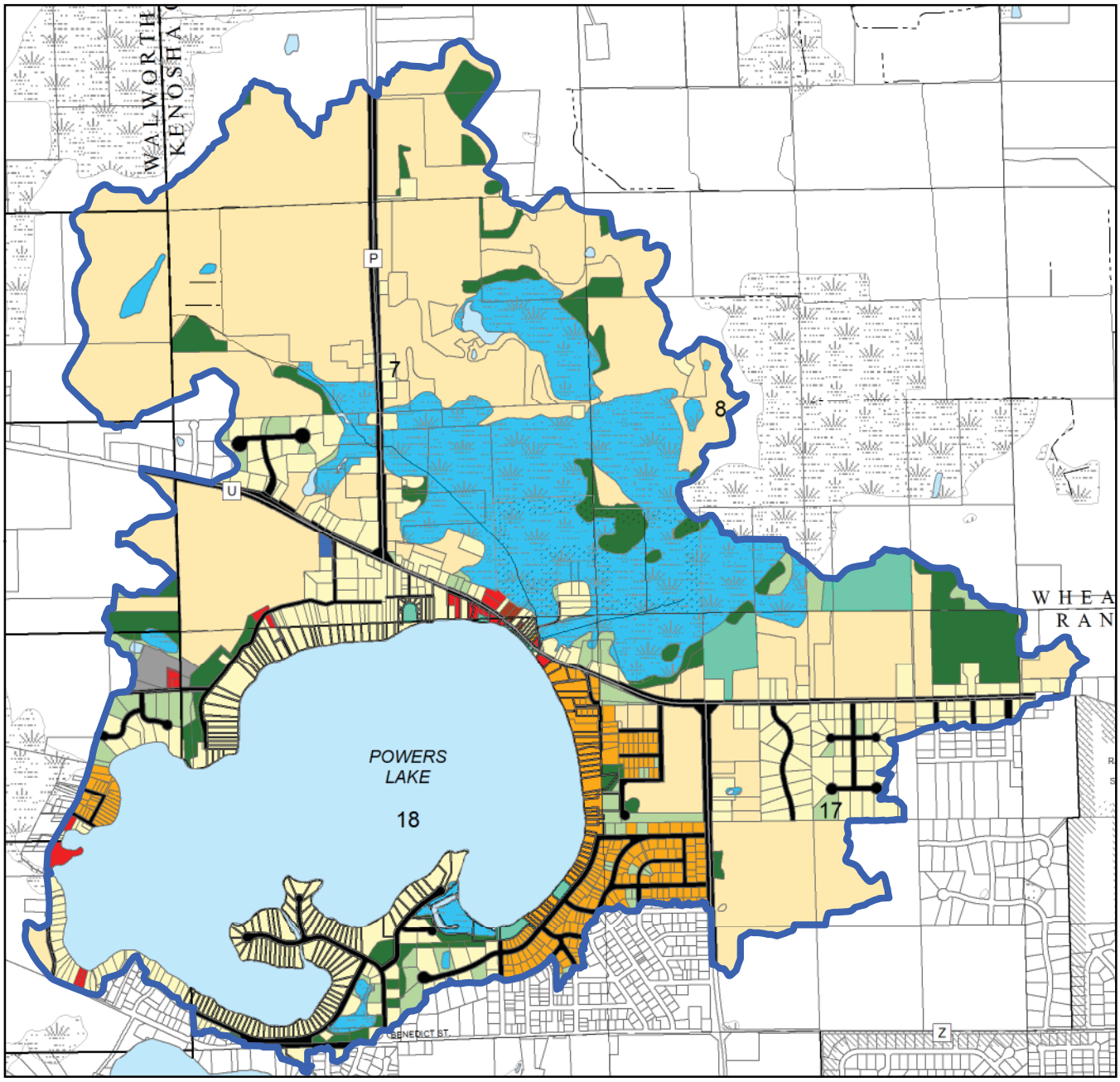
The WDNR re-evaluated Powers Lake's water quality as part of the recent impairment listing cycle and found that the Lake's water quality clearly meets State thresholds for recreation as well as fish and aquatic life uses.[13]

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 Powers Lake, starting with a few baseline measurements taken by the WDNR in 1966. From the late 1980s through 2017, Lake residents have participated in the University of Wisconsin Extension (UWEX) Citizen Lakes Monitoring Network (CLMN). Citizen volunteers measured lake water quality parameters such as water clarity, phosphorus concentrations, and dissolved oxygen concentrations. The CLMN is an extremely useful program to provide long-term water quality data. The U.S. Geological Survey has also been involved in water quality sampling and assessments since 1999. Water quality data is compiled and is available on the WDNR Lakes page.[14]

[13] *Wisconsin Department of Natural Resources, Powers Lake, Kenosha County website, "conditions" dnr.wi.gov/water/waterDetail.aspx?wbic=744200.*

[14] *Water quality data and other information about Powers Lake can be found at the WDNR Lakes page: dnr.wi.gov/lakes/LakePages/LakeDetail.aspx?wbic=744200.*

Map 2
2010 Land Use Within the Powers 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 1,000 2,000 Feet

Source: SEWRPC

Figure 4
Measuring Water Clarity with a Secchi Disk

Source: www. burnsville.org and SEWRPC

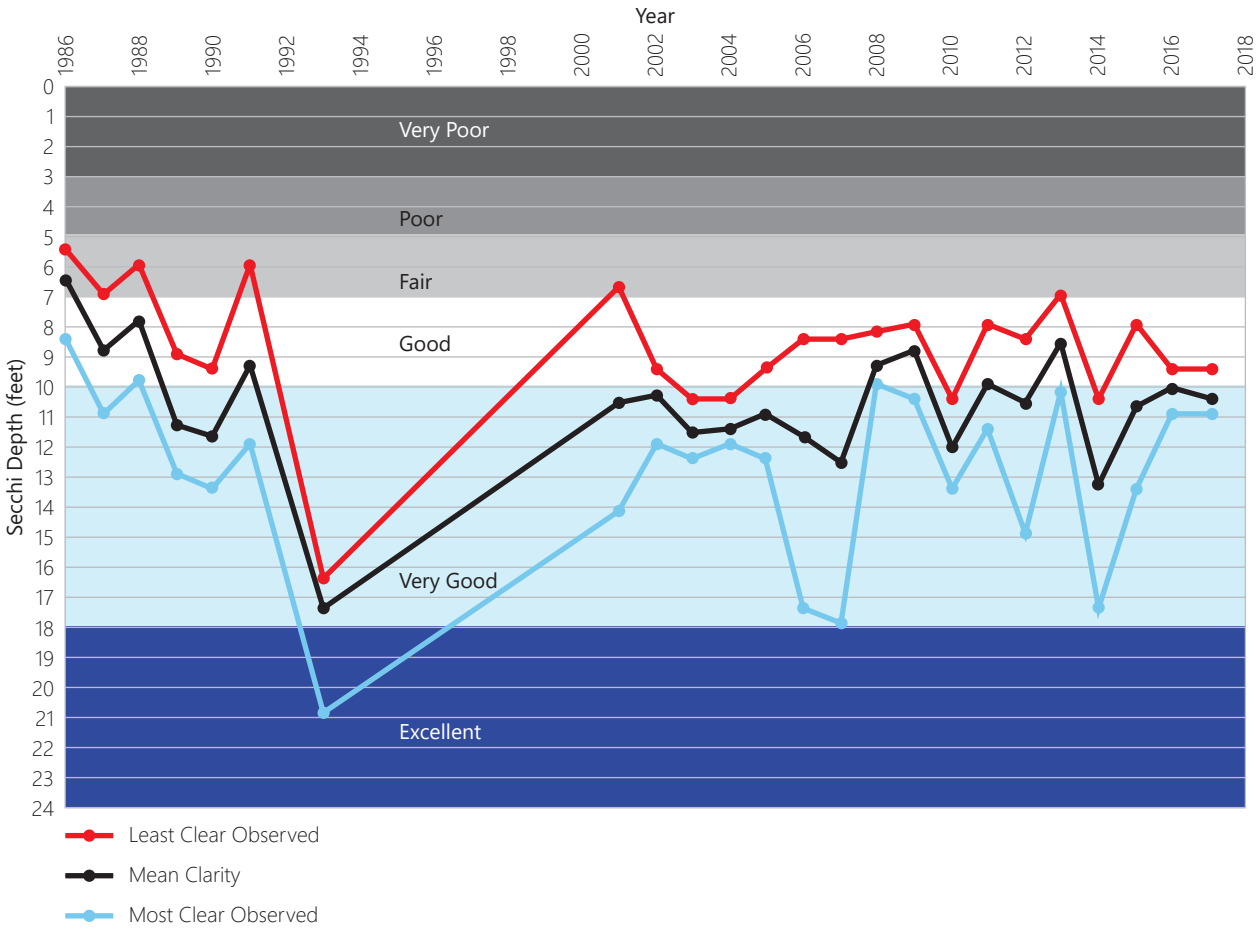
Water clarity is a commonly used and easily understood surrogate for perceived water quality. Many people equate "clear" water with "clean" water. While this is not always true, methods have been developed to allow lake water clarity to be compared and contrasted. Water clarity is measured with a Secchi disk (Figure 4). "Secchi depth" is the distance below the water surface that a Secchi disk can be seen under carefully prescribed conditions. Secchi depth has been routinely measured in the Lake and the results over time are summarized graphically in Figure 5. At the time of the original Lake Use Report, the transparency (clarity) of Powers Lake was reported to be 13.5 feet, making Powers Lake one of the clearest lakes in southeastern Wisconsin. It was felt that the clarity of the Powers Lake water was due to a combination of factors, including a general lack of fine bottom sediments, a lack of rough fishes, and low levels of spring runoff the year the measurements were taken (1966). More recent Secchi disk measurements for Powers Lake indicate a consistent clarity averaging about 10 feet, which is considered good to very good water clarity.

Water clarity has also been estimated from satellite imagery,[15] which generally agrees with values actually measured on the Lake.

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 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.

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

Figure 5
Summer (June Through August) Secchi Depth Ranges for Powers Lake



Source: Wisconsin Department of Natural Resources and SEWRPC

Powers Lake's TSI values are plotted over time in Figure 6. As can be seen from this graphic, TSI values place the Lake squarely in the mesotrophic range.

Historic data indicate that Powers Lake weakly thermally stratifies at a depth of about 28-30 feet. Consequently, with a maximum depth of 33 feet, this means that nearly the entire volume of water in the Lake would contain enough oxygen to sustain fish all year.

NATURAL RESOURCES

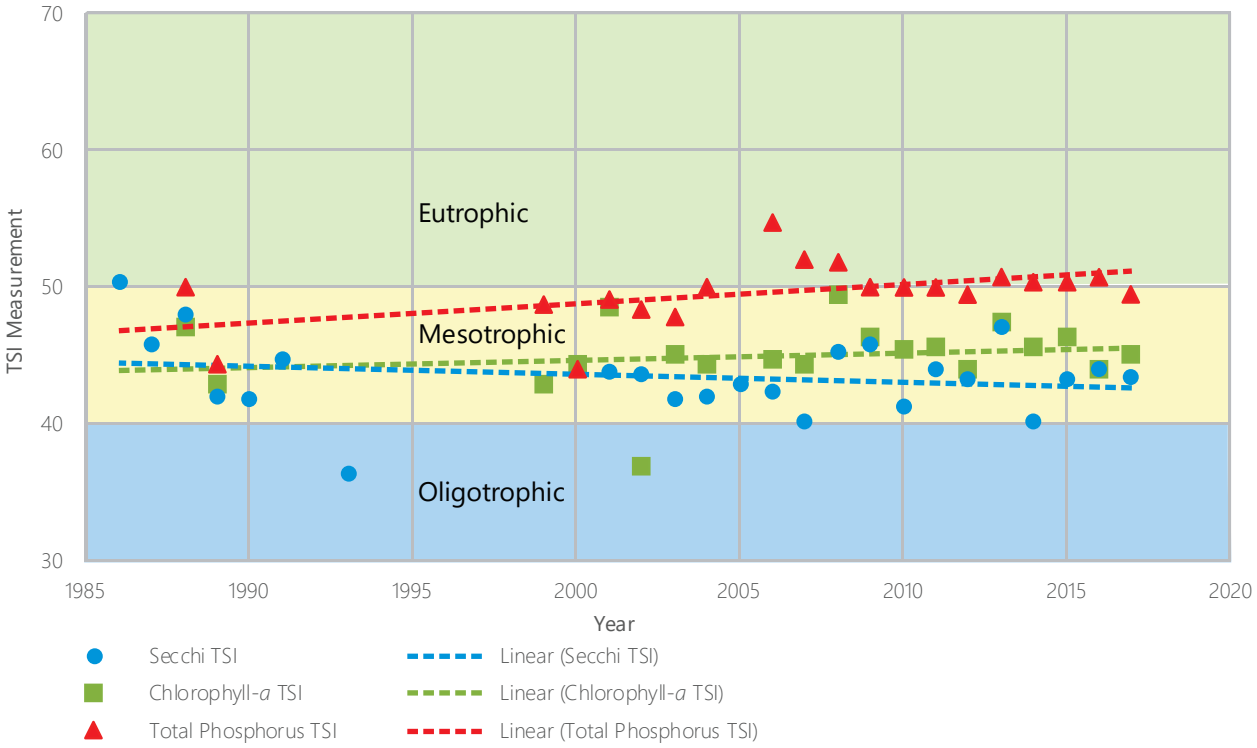
Aquatic Plants

Powers Lake's aquatic plant community has been examined numerous times since 1967 and by various entities (WDNR, SEWRPC, and private firms). Table 3 lists the frequency of occurrence of plant species noted in the most recent studies, as well as the 1967 WDNR survey.

The 2009 plant survey indicated that the aquatic plant community in Powers Lake demonstrated overall good biodiversity relative to many other lakes in southeastern Wisconsin, with 16 native species of aquatic plants being observed. The dominant species were muskgrass (*Chara* spp.) and common bladderwort (*Utricularia vulgaris*).

The surveys conducted in 2014 indicate that four species of aquatic plants were the most dominant in the lake: muskgrass, common bladderwort, coontail (*Ceratophyllum demersum*), and stoneworts (*Nitella* spp.). Overall, 17 native submerged aquatic plant species were identified during the 2014 survey. These native

Figure 6
Summer (June Through August) Annual Average Trophic State Indices (TSI) for Powers Lake



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

Source: Wisconsin Department of Natural Resources and SEWRPC

species provide a variety of benefits, including food for waterfowl 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.

Muskgrass has been the most dominant species in Powers Lake for many years. Muskgrass (see Figure 7) is a native macro algae with high ecological value and is commonly found in lakes throughout the southeast Wisconsin region. Although it lacks a true root system, muskgrass is an effective bottom sediment stabilizer, which improves water clarity, and is a favored waterfowl food source.

A diverse array of native aquatic plant species is generally indicative of a healthy aquatic plant community. The substantial number of native submerged plant species in Powers Lake indicates that the Lake's native aquatic plant community is diverse and healthy. Twelve high-value species are identified under Chapter NR 107, "Aquatic Plant Management," of the *Wisconsin Administrative Code* as plants that contribute important ecosystem services to lakes; six have recently been found in Powers Lake (water celery, Sago pondweed, Illinois pondweed, clasping-leaf pondweed, horned pondweed, and white-stem pondweed. Aquatic plants have been noted to grow to depths of 27 feet below the Lake surface.[16]

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

[16] *WDNR Lake Use Report No. FX-13,* op. cit.

Table 3
Powers Lake Aquatic Plant Surveys: 1967, 2009 and 2014

Aquatic Plant Species	1967 (July)	2009 (July)	2014 (July)
Floating Plants			
Nuphar variegata (spatterdock)	Sparse around shore	--	--
Nymphaea odorata (white water lily)	Sparse around shore	--	0.9
Schoenoplectus acutus (hardstem bulrush)	--	--	0.1
Submerged Plants			
Ceratophyllum demersum (coontail)	Scattered	4.4	6.4
Chara spp. (muskgrass)	Heavy, entire basin	46.9	47.7
Elodea canadensis (waterweed)	Sparce	0.5	0.4
Heteranthera dubia (water stargrass)	--	0.7	0.9
Myriophyllum sibiricum (native milfoil)	Scattered, dense in spots	--	0.3
Myriophyllum spicatum (Eurasian water milfoil)	--	2.0	2.1
Najas flexilis (bushy pondweed)	Sparce	2.3	6.1
Najas marina (spiny naiad)	Sparce	3.1	3.6
Nitella spp. (stonewort)	Most common in deep water	--	7.2
Polygonum amphibium (water smartweed)	--	0.6	--
Potamogeton amplifolius (large-leaf pondweed)	Sparce	--	--
Potamogeton crispus (curly-leaf pondweed)	Sparce	2.7	--
*Potamogeton gramineus (*variable pondweed)	--	0.6	3.9
Potamogeton illinoensis (Illinois pondweed)	Scattered	5.3	0.1
Potamogeton natans (floating-leaf pondweed)	Scattered	0.1	0.4
Potamogeton praelongus (white-stem pondweed)	Scattered	--	0.3
Potamogeton pusillus (small pondweed)	--	1.3	--
Potamogeton richardsonii (clasping-leaf pondweed)	--	1.9	1.2
*Potamogeton zosteriformis (*flat-stem pondweed)	Scattered	2.6	1.6
Ranunculus longirostris (white water crowfoot)	--	2.1	--
*Stuckenia pectinata (*Sago pondweed)	Moderate density	5.6	2.4
Utricularia vulgaris (bladderwort)	Sparce	16.1	9.9
Vallisneria americana (water celery)	Scattered	5.9	3.4
Zannichellia palustris (horned pondweed)	--	--	0.7

Note: 2009 and 2014 data is for Frequency of Occurrence. 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 provides an indication of the dominance of a species within a community.

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.

Source: Wisconsin Department of Natural Resources, Aron and Associates, Inc., 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 8). 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. At the time of the 2009 survey, Eurasian water milfoil was observed in numerous locations around the Lake basin, mostly in depths of 10 feet or less. Since the time of the 2009 survey, the abundance of this species in Powers Lake has not increased significantly as the District of Powers Lake continues to pursue aggressive and comprehensive management techniques to control this species.

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

Figure 7
Muskgrasses (Chara spp.)

Identifying Features

- Leaf-like, ridged side branches develop in whorls of six or more
- Often encrusted with calcium carbonate, which appears white upon drying (see photo on left, below)
- Yellow reproductive structures develop along the whorled branches in summer
- Emits a garlic-like odor when crushed

Stoneworts (*Nitella* spp.) are similar large algae, but their branches are smooth rather than ridged and more delicate

Ecology

- Found in shallow or deep water over marl or silt, often growing in large colonies in hard water
- Overwinters as rhizoids (cells modified to act as roots) or fragments
- Stabilizes bottom sediments, often among the first species to colonize open areas
- Food for waterfowl and excellent habitat for small fish

Source: Wisconsin Department of Natural Resources, 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, Vic Ramey and University of Florida, and Roberta Hill and Maine Volunteer Lake Monitoring Program

appear to be more tolerant to aquatic herbicides such as 2, 4-D and Endothall that are commonly used to manage EWM.[17] Both EWM and EWM/native milfoil hybrids have been identified in Powers Lake.

Curly-leaf Pondweed (Potamogeton crispus)

Curly-leaf pondweed (see Figure 9) is a plant that thrives in cool water 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.

Curly-leaf pondweed was not recorded as present during the 1967 survey. The plant was observed, but only at three locations, during the 2009 survey. By the time of the 2014 survey, this species was not found at all.

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

Figure 8
Eurasian Water Milfoil (*Myriophyllum spicatum*)

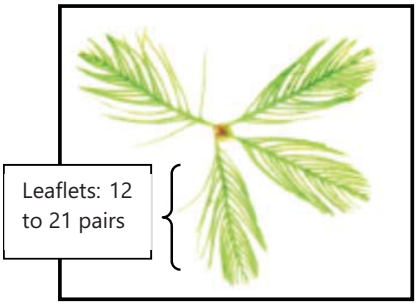
Identifying Features

- 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

*Zebra Mussel (*Dreissena polymorpha*)*

In addition to the above described invasive plant species, the WDNR lists the invasive animal species zebra mussel (*Dreissena polymorpha*) as being present in Powers Lake. This nonnative species of shellfish (see Figure 10) can negatively impact native benthic organism populations and can disrupt aquatic food chains by removing significant amounts of bacteria and smaller phytoplankton which serve as food for a variety of other aquatic organisms, including larval and juvenile fishes and many forms of zooplankton. The mussels also can cause a significant increase in water clarity that can fuel nuisance algae and aquatic plant growth.

*Banded Mystery Snail (*Vivaparus georgianus*) and Chinese Mystery Snail (*Bellamya chinensis or Cipangoludina chinensis*)*

The WDNR also lists the banded mystery snail and Chinese mystery snail (see Figure 11) as two nonnative species found in Powers Lake. These large, olive-colored snails are called "mystery" snails because they give birth to fully developed snails that, as a result, suddenly, or mysteriously, appear in a lake. Both snails can, like the zebra mussel, form copious aggregations. The Chinese mystery snail is documented in China (its country of origin) as transmitting human intestinal flukes, although there have not been any such documented cases in the United States, as yet; they also carry certain parasites common to native mussels. Banded mystery snails, historically native primarily to the Mississippi River southward from Illinois, can invade nests of largemouth bass where they can cause mortality in bass embryos.

Figure 9
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.

Low populations of two other non-native invasive species are found in limited areas of the Lake: spiny naiad (*Najas marina*) and common reed (*Phragmites australis*).

Fisheries and Wildlife

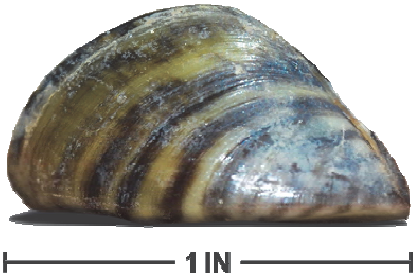
Currently, the WDNR identifies largemouth bass (*Micropterus salmoides*) as "abundant" in Powers Lake, with northern pike (*Esox lucius*), walleye (*Sander vitreus*), and panfish all listed as "common," and smallmouth bass (*Micropterus dolomieu*) listed as "present."[18] Also present in Powers Lake are the lake chubsucker (*Erimyzon sucetta*), a State-designated special-concern species, and the pugnose shiner (*Notropis anogenus*), a State-designated threatened species (see Figure 12).

Fish stocking has occurred periodically in Powers Lake, as shown in Table 4. At the time of the 2011 Commission report, Powers Lake was being managed by the WDNR for largemouth bass, northern pike, and panfish. Northern pike and walleye were being stocked to provide additional angling opportunities and to supplement natural reproduction. A fish survey conducted by the WDNR during 2000 documented a fairly large and diverse number of fish species, including largemouth bass, northern pike, walleye, smallmouth bass, lake chubsucker, bluegill (*Lepomis macrochirus*), pumpkinseed (*Lepomis gibbosus*), rock bass (*Ambloplites* rupestris), yellow perch (*Perca flavescens*), black crappie (*Pomoxis nigromaculatus*), green sunfish (*Lepomis* cyanellus), grass pickerel (*Esox americanus vermiculatus*), bowfin (*Amia calva*), longnose gar

[18] *dnr.wi.gov/lakes/lakepages/LakeDetail.aspx?wbic=744200.*

Figure 10
Zebra Mussels (*Dreissena polymorpha*)

- Shell has distinct dark stripes
- Hitches rides to lakes on boats and in water buckets
- Infestations are often followed by abnormally clear waters



Source: Wisconsin Department of Natural Resources, Vic Ramey, University of Florida, Minnesota Sea Grant, Ohio Sea Grant, Texasinvasives.org, and SEWRPC

(*Lepisosteus* osseus), yellow bullhead (*Ameiurus natalis*), common carp (*Cyprinus carpio*), brook silverside (*Labidesthes sicculus*), and spottail shiner (*Notropis hudsonius*).[19] More recent WDNR boom shocker surveys conducted in May 2013 and October 2015 focused on gamefish and confirmed the presence of quality size walleye, bluegill, largemouth bass, and a small population of northern pike.

Figure 11
Invasive Chinese (left) and Banded (right) Mystery Snail Species

Source: Minnesota Department of Natural Resources and SEWRPC

As a result of the shoreline development of the Lake, most of the wildlife remaining and around the Lake's shorelands currently can be expected to be composed of urban-tolerant species. Smaller animals (e.g. mice, shrews, voles, ground squirrels, etc.) and migratory waterfowl could be found in the lakeshore areas. Muskrats, squirrels, and cottontail rabbits are likely to be abundant and widely distributed in the immediate riparian areas. Larger mammals, such as white-tail deer, fox and coyote, are most likely confined to larger wooded areas and open meadows still in existence in the watershed. The non-migratory species of Canada goose, prevalent throughout southeastern Wisconsin, continue to be present in abundance.

The original lake use report developed by the WDNR reported that the intensively developed shoreline and large levels of recreational activity have been a deterrent to the use of Powers Lake by migrating waterfowl that would attract hunters. The lack of a wet marshland adjacent to the shore and the limited habitat offered by the wetland located northeast of the Lake provide limited habitat for wildlife that would attract trappers. Wildlife observing is also limited by the combination of intensely developed shoreland areas and lack of habitat. There are no more recent data to suggest otherwise.

Environmentally Significant Areas

The Powers Lake watershed contains environmentally significant areas. These areas generally represent the best remaining natural resource areas in the Lake's watershed. Many important interdependent relationships occur between living organisms and their environment in such areas. Destruction or deterioration of any one

[19] *Electronic mail communication from Douglas Welch, WDNR staff, to Michael A. Borst, SEWRPC staff, dated January 22, 2010.*

Figure 12
Special Concern and Threatened Fish Species in Powers Lake

Lake Chubsucker
Special Concern

Pugnose Shiner
Threatened

Source: Wisconsin Department of Natural Resources and SEWRPC

element of a natural environment may unravel the value and stability of the overall resource. Therefore, it is important to protect such areas.

As shown on Map 3, primary environmental corridor areas occupy nearly 823 acres of land (including 400 acres of wetlands and woodlands) and water area (including the Lake itself) in the Lake's watershed area, much of it in close proximity to the Lake. Preserving these areas is critically important to maintaining the ecological integrity of the Lake. Some of the woodland and wetland areas to the east and to the northeast of the Lake are among the 85 acres designated as isolated natural resource areas in the Lake's direct tributary area.

Table 4
Fish Stocking in Powers Lake

Species	Year	Number
Northern Pike	2004	400
	2012	903
	2014	918
	2016	993
Smallmouth Bass	2000	900
	2002	600
Walleye	2001	1,000
	2003	800
	2005	23,022
	2010	16,065
	2011	16,065
	2013	16,065
	2017	8,303

Source: Wisconsin Department of Natural Resources

Powers Lake Tamarack Relict abuts the northeast corner of Powers Lake. This 152-acre wetland complex of marsh, sedge meadow, shrub-carr, and relict tamaracks classified as an area of local significance.

Powers Lake is considered an aquatic area of local significance, important to the overall health of aquatic plants and animals.

Aesthetic Features

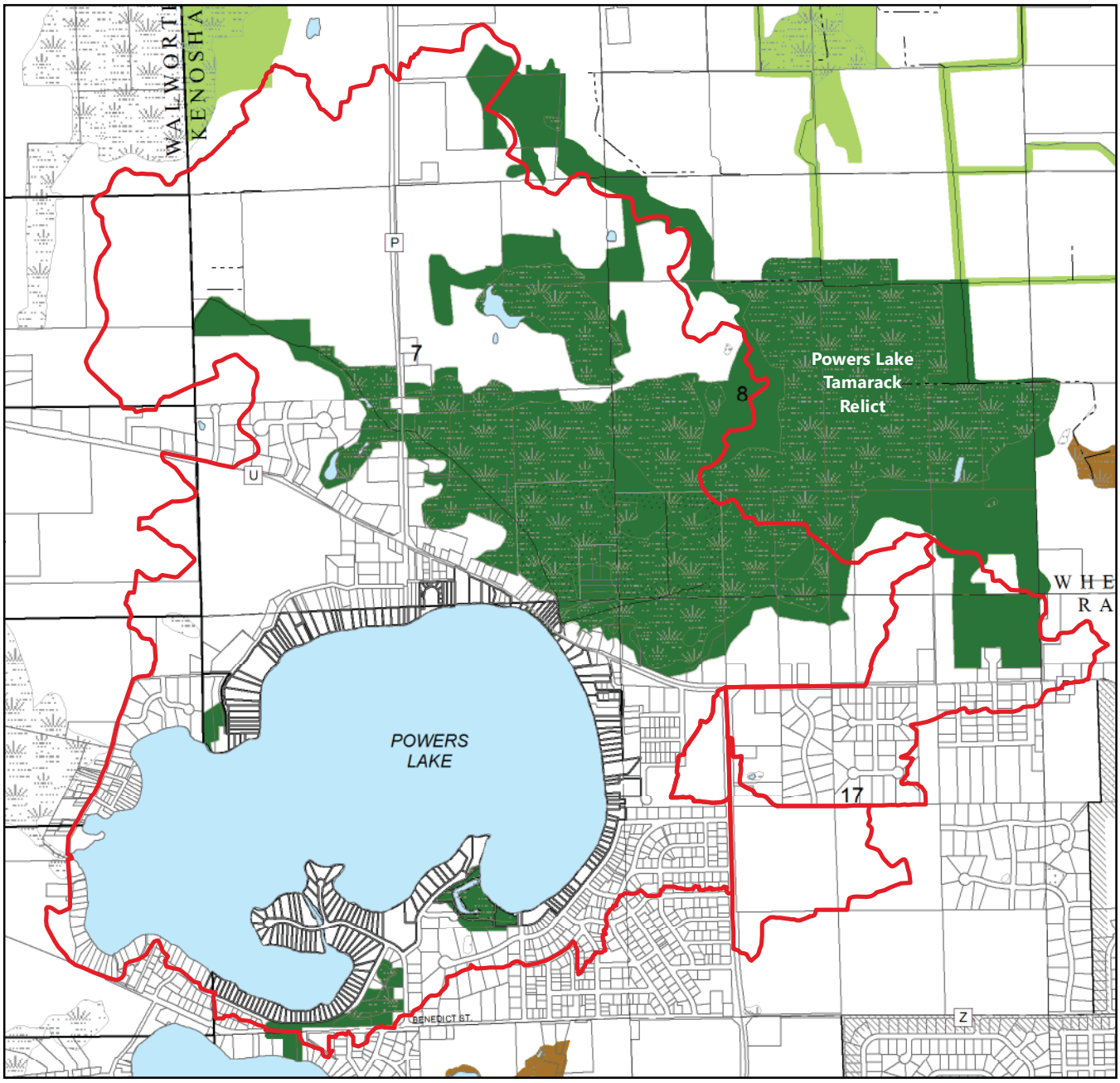
As described in the original 1969 Lake Use Report, the principle aesthetic features of Powers Lake included its clear water, its areas of high wooded shoreline with its bays and beaches, and the vistas of open stretches of water being buffeted by winds. Those features considered to detract from the beauty of the Lake included its highly developed shoreline, especially in the lowland shore areas, its general lack of unaltered (natural) shoreline, and its lack of clear approaches to nearby wetlands.

LAKE USE

Recreational Use

During the summer and winter of 2014, SEWRPC staff conducted recreational surveys to document public lake use. Powers Lake is a multi-purpose recreational use waterbody serving all forms of recreation. Active recreational uses include fishing, powerboating, waterskiing and tubing, canoeing, kayaking, and swimming during the summer months (Figure 13); and ice-fishing, snowmobiling, ice-skating, cross-country skiing,

Map 3
Environmentally Significant Areas Within the Powers Lake Watershed: 2015



SURFACE WATER

WATERSHED BOUNDARY

PRIMARY ENVIRONMENTAL CORRIDORS

SECONDARY ENVIRONMENTAL CORRIDORS

ISOLATED NATURAL RESOURCE AREA

WETLANDS

N

0 1,000 2,000 Feet

Source: SEWRPC

Figure 13
Typical Summer Activities on Powers Lake

Source: SEWRPC

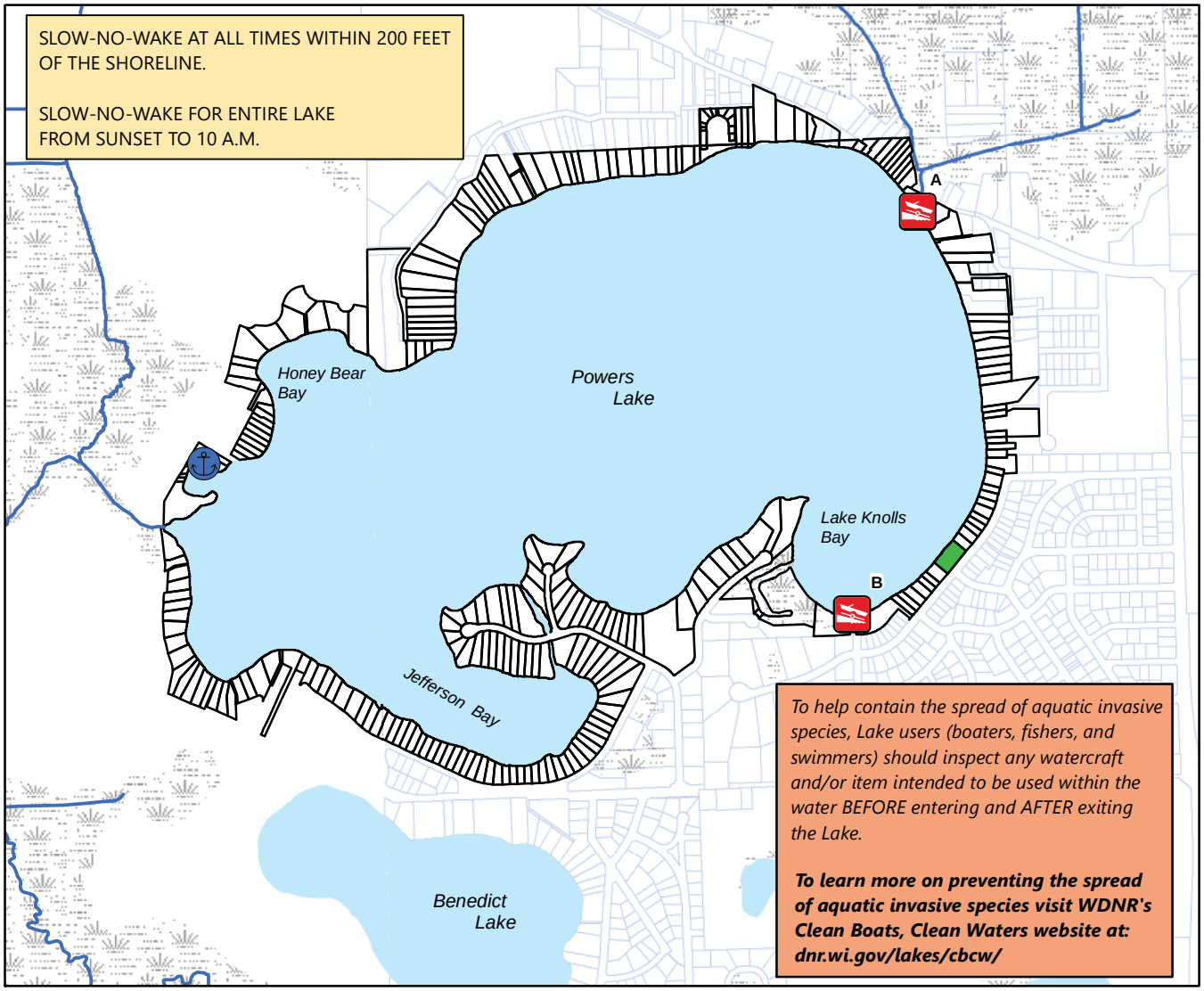
Figure 14
Typical Winter Activities on Powers Lake

Source: SEWRPC

and snowshoeing during the winter (Figure 14). Popular passive recreational uses include walking, bird watching, and picnicking. Like many of the lakes in the Region, Powers Lake experiences occasional intense recreational boating use on weekends and holidays during the summer.

The use of Powers Lake for recreational boating has historically been above the regional average. Conflicts between active power boating activities, such as water skiing, and more passive boating activities, such as fishing, are less common than would be expected for a lake the size of Powers Lake due mostly to the

Map 4
Recreational Use on Powers Lake: 2015



Map ID	Description	Facilities									
		Boat Ramp	Mooring Slips	Fee	Car-trailer Parking	Car Parking	Pier	Swim Beach	Picnic Area	Shelter	Playground
A	WDNR	Paved	None	Yes	Yes	No	No	No	N	No	No
	Lakeside Park	No	32	No	No	Yes	2	Yes	No	Yes	No
B	Bayview Park	Paved	80	Yes	No	Yes	5	No	Yes	No	Yes
	Private Livery	Gravel	None	Yes	Limited	Yes	N/A	No	No	No	No

PARCEL BOUNDARY ALONG SHORELINE
SURFACE WATER
WETLAND
STREAM

N

0 700 1,400 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

irregularity of the shoreline and the existence of shallow bars in several of the bays. Such physical attributes make the bays less appealing to high speed boaters but more attractive to fishers, thus helping to keep the two types of activities somewhat separated on the Lake.

Public Access

Public access to Powers Lake is shown on Map 4. Public boating access to Powers Lake is provided primarily through a State-owned, town-operated (Town of Randall) site at the northeastern end of the Lake along CTH F. This site provides a paved fee-required boat launch, pier, and car-trailer only parking. Another public boating access site to the Lake which provides (limited) car-trailer parking is a livery associated with a tavern/restaurant located on the western end of the Lake.

Table 5
Population and Households in the Powers Lake Watershed: 1960-2035

Year	Population	Households
1960	494	117
1970	756	222
1980	882	311
1990	808	297
2000	962	355
2010	943	374
Planned 2035	1,511	587

Source: U.S. Bureau of Census and SEWRPC

Other public access sites to Powers Lake include Lakeside and Bayview Parks, both located in Lake Knolls Bay at the southeastern corner of the Lake (see Map 4). Bayview and Lakeside parks are both Town of Randall sites. Lakeside Park provides a swim beach, car-only parking, a small shelter, and seasonal rental mooring slips and onshore boat storage racks. Bayview Park has a picnic area, paved boat ramp with car-only parking, playground, and seasonal rental mooring slips and onshore boat storage racks. A fee is charged to use the boat ramp.

The WDNR deems the Lake to have adequate public recreational boating access pursuant to standards set forth in Chapter NR 1, "Natural Resources Board Policies," of the *Wisconsin Administrative Code*.

Cottages and Homesites

According to recent records, 226 lakefront lots abut Powers Lake. Lot sizes average 0.5 acre and range from less than 0.1 acre to 6.3 acres.[20] The population and number of households in Powers Lake's watershed area are projected to increase by 2035 (Table 5).

EXISTING PROTECTIVE MEASURES

Sewage Disposal

All riparian residential lands in the Powers Lake watershed are served by public sanitary sewer systems. As such, water pollution from onsite septic systems is not an ongoing concern.

Shoreline Protection and Erosion Control

The shoreline of Powers Lake is comprised of stretches of protected shoreline (either man-made or natural), as well as some areas of unprotected shoreline, such as where riparian owners mow lawn to water's edge (see Map 5). About 30 percent of the shorelines of Powers Lake remains in a natural state without manmade shoreline protective structures such as riprap or bulkhead. A few areas of shoreline erosion were found scattered around the Lake during a survey conducted by SEWRPC in August 2014.[21]

Land Use Regulations

The comprehensive zoning ordinance represents one of the most important tools available to local units of government in directing the proper use of lands within their area of jurisdiction. Powers Lake and its watershed are subject to ordinances and regulations developed jointly by the Town of Randall, Kenosha County, and Village of Bloomfield, Walworth County. Table 6 shows the general and special-purpose zoning ordinances for the civil divisions that are part of the Powers Lake watershed.

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

[21] Ibid.

Map 5
Shoreline Survey of Powers Lake: 2014

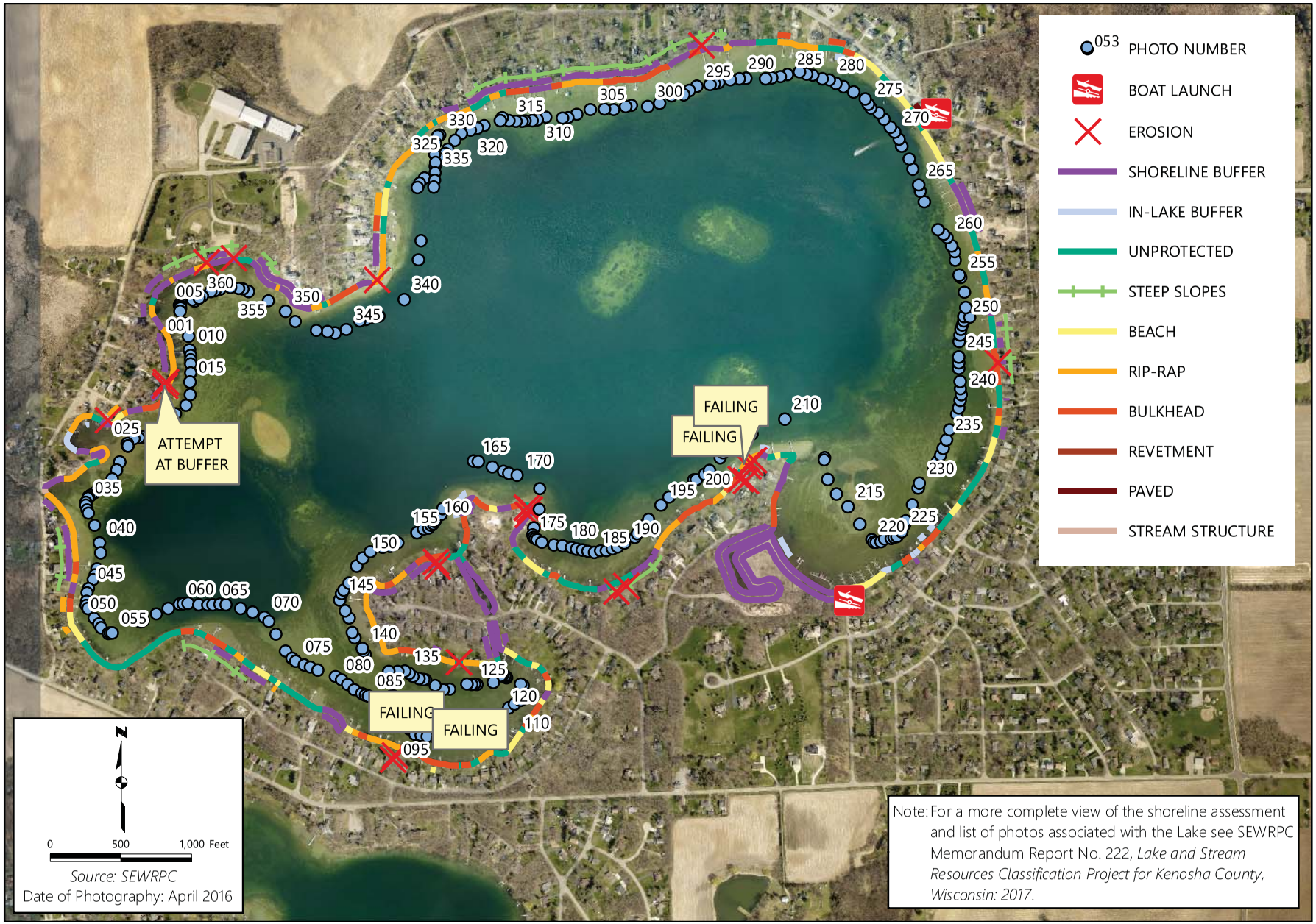


Table 6
Land Use Regulations Within Powers Lake Watershed in Kenosha and Walworth Counties by Civil Division: 2016

Type of Ordinance	Community			
	Kenosha County	Town of Randall	Walworth County	Village of Bloomfield
General Zoning	Adopted	Regulated under County ordinance	Adopted	Regulated under County ordinance
Floodplain Zoning	Adopted	Regulated under County ordinance	Adopted	Regulated under County ordinance
Shoreland Zoning	Adopted	Regulated under County ordinance	--	--[a]
Subdivision Control	Adopted[b]	Adopted[b]	Adopted	Regulated under County ordinance
Construction Site Erosion Control and Stormwater Management	Adopted	Regulated under County ordinance	Adopted[c]	Regulated under County ordinance

[a] *The Village of Bloomfield has adopted shoreland zoning regulations similar to those required for unincorporated areas under Chapter NR 115 of the* Wisconsin Administrative Code, *which are more restrictive than the shoreland regulations for villages required under Chapter NR 117 of the* Administrative Code *and Section 61.353 of the* Wisconsin Statutes.

[b] *Both the Kenosha County and Town of Randall subdivision ordinances apply within the Town of Randall. In the event of conflicting regulations, the more restrictive regulation applies.*

[c] *The Walworth County ordinance regulating erosion control and stormwater management is referred to as the County "Environment" Ordinance.*

Source: SEWRPC

Water Use Regulations

Powers Lake is subject to a Water Use Ordinance promulgated jointly by the Town of Randall, Kenosha County, and Village of Bloomfield, Walworth County, as Chapter 20 of the Town Code of Ordinances. This ordinance is consistent with Chapter 30 of the *Wisconsin Statutes* and applies to persons, boats, watercraft, and objects upon, in, and under the waters of Powers Lake within the jurisdiction of the Towns and limits the times during which boats may operate on Powers Lake. The ordinance also allows for the enactment and enforcement of boating restrictions and limitations.