

# Church Pine, Round, and Big Lakes

Comprehensive Lake Management Plan

December 2021

*Sponsored by:*



*With Grant Support from:*



*Consulting Partners:*



## Advisory Committee Members

Jim Campbell

Tom Campbell

Dave Fodroczi

Beth Hartman

Ann Layton

Kel Kobernick

Mike Reiter

Jerry Tack

Warren Wasescha

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# Introduction

## Overview of Plan

This Comprehensive Lake Management Plan addresses lake water quality, habitat, and the social framework to support the long-term health of the three-lake system. The lake system includes Church Pine, Round (Wind), and Big Lake in Polk County. The plan updates a lake management plan completed in 2013. The updated lake management plan will be implemented from 2022 through 2032.

The Church Pine, Round and Big Lake Protection and Rehabilitation District (the Lake District) initiated the comprehensive lake planning process by securing a Wisconsin Department of Natural Resources (WDNR) grant (LPL173720). The grant funded the plan update including a water quality study for Big Lake (Schieffer, 2021). This report is available on the Lake District website.<sup>1</sup>

The Lake District completed an aquatic plant management plan (APM plan) for the lakes in June 2021, and it is incorporated by reference. The APM plan presents a strategy for managing aquatic plants through the year 2026 by protecting native plant populations, controlling curly-leaf pondweed, and preventing establishment of aquatic invasive species.

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<sup>1</sup> <https://bigroundpine.com>

## Institutional Framework for Planning

### Lake Management Goals

Goal I. Lake water quality is preserved and protected.

Goal II. Phosphorus and sediment inputs from watersheds are minimized.

Goal III. Our lakes provide healthy fish and wildlife habitat.

Goal IV. Our lakes are safe places to live and recreate.

Goal V. The Lake District has the capacity to build relationships, provide stable funding, operate efficiently, and encourage responsible use to manage the lakes.

### Plan Stakeholders

#### Advisory Committee

The Lake District held four meetings of the Comprehensive Lake Management Plan Advisory Committee to gather input from citizens and partner agency staff. Meetings were held in September and October 2021.

#### Property Owner Survey

A sociological survey was administered to Lake District property owners in 2012, and results are included in the 2013 plan. The property owner survey was not updated for this plan.

#### Public Review and Comment

A draft plan was made available to the public by posting on the Lake District website with notification sent to lake residents and published in the Osceola Sun in mid-November 2021. The public review period ended on December 22, 2021. No comments were received.

### Organizational Capacity

The Lake District is a special unit of government formed under Chapter 33 Wisconsin State Statutes. Property owners living within the district boundaries may be assessed fees as part of the property tax levy. A lake district is empowered to operate on its own initiative, independent of its creating entity and the state, but is subject to local ordinances and state law. Lake districts can act together with other municipalities and agencies to undertake lake protection and rehabilitation projects.

The Lake District board meets in April, June, August, and October at the Alden Town Hall. The annual meeting is held on the Saturday morning one week prior to Labor Day weekend. There is a brief board meeting following the annual meeting.



## 2013 Comprehensive Lake Management Plan

The 2013 Comprehensive Lake Management Plan included the following vision, guiding principles, and goals (quoted from the plan):

### Vision

Church Pine, Round, and Big Lake are clear lakes with ideal nutrient levels which are free of algae blooms and provide a healthy environment that supports a diversity of fish, birds, wildlife, plants, and human uses.

### Guiding Principles

- Lake management decisions are driven by what is best for the lakes according to past, present, and future data.
- Communication regarding lake management is easy to understand and concise.
- Financial decisions are made in cooperation with Lake District members.

### 2013 Lake Plan Goals

1. Reduce algae and phosphorus in the three lake system by reducing watershed runoff.
2. Evaluate the progress of lake management efforts.
3. Protect, maintain, and enhance fish habitat.
4. Increase knowledge and participation.
5. Support the goals of the Aquatic Plant Management Plan.

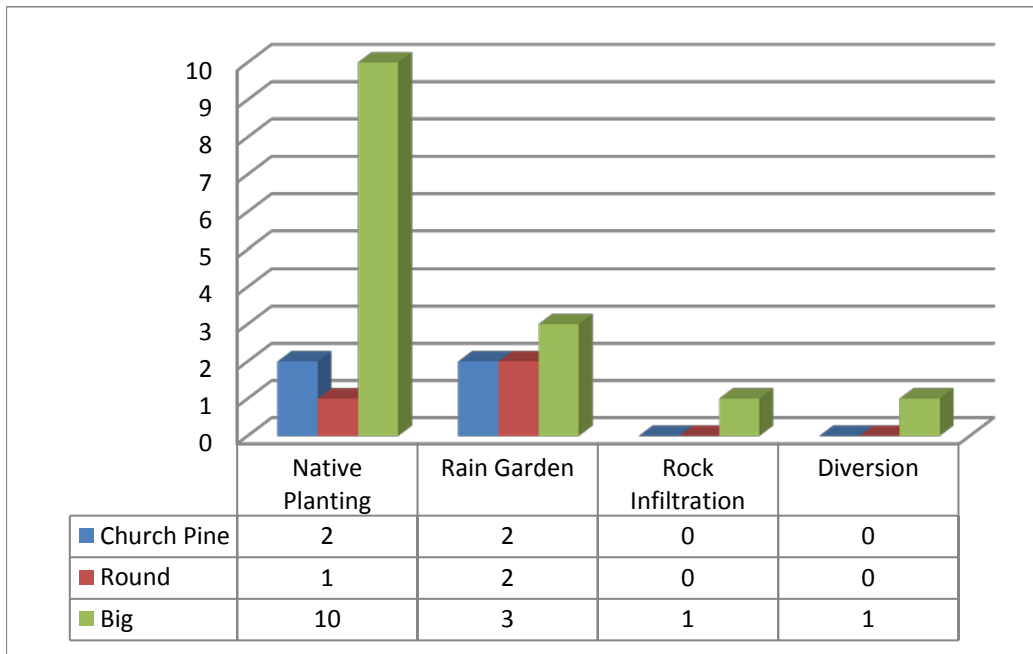
### Lake District Activities 2013 - 2021

Lake District activities in support of these goals since 2013 have included:

- Lake studies to better understand internal loading and nutrient dynamics of Big Lake
- Citizen lake water quality monitoring
- Healthy Lakes native plantings, diversions, rain gardens, and rock infiltration installations<sup>2</sup>
- *Lake Currents* newsletter
- Lake District website

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<sup>2</sup> Healthy Lakes is a Wisconsin Department of Natural Resources grant program with associated guidance for project installation.



**FIGURE 1. HEALTHY LAKES PRACTICES INSTALLED ON PROJECT LAKES 2015 TO 2021**

Additional activities related to the aquatic plant management plan included:

- Monitoring and control of curly-leaf pondweed, yellow iris, and purple loosestrife.
- Aquatic invasive species (AIS) prevention through Clean Boats, Clean Waters monitoring and education, landing cameras, and homeowner education.
- AIS rapid response monitoring and planning.

## Plan Partners and Related Ordinances, Regulations, and Plans

### Polk County Land and Water Resources Department

The Polk County Land and Water Resources Department (LWRD) enforces several county ordinances aimed at natural resource protection, provides technical assistance to other county departments, and works with lake associations, landowners, farmers, contractors, and schools regarding local conservation and education programs. The LWRD also administers various Wisconsin Department of Natural Resources (WDNR) and Department of Agriculture, Trade, and Consumer Protection (DATCP) programs at the local level.

### Wisconsin Department of Natural Resources

The Wisconsin Department of Natural Resources provides support to the Lake District for many functions including technical and financial assistance for the development of this plan and support for many programs including Citizen Lake Monitoring Network, Clean Boats, Clean Waters education, standardized inventory and monitoring methods, regulatory permitting and enforcement, and fisheries management.

### **Jurisdictional Boundaries**

The lakes and their watersheds are located in the Town of Alden (T32N R18W) and the Town of Garfield (T33N R18W) in Polk County, Wisconsin. Local ordinances and state regulations that potentially impact the lakes and watershed management are summarized in Appendix A. Polk County and town ordinances that regulate land development and uses influence the lakes by determining what actions are allowed within the watershed and directly adjacent to the lake. Wisconsin state regulations influence watershed loading by establishing standards and limits for local ordinances and regulating land uses and projects within the watershed. Management plans which are related to and support Lake District activities are also summarized in Appendix A.

## Baseline Data and Assessments

### Lakes Description

The project area is in southwestern Polk County, Wisconsin in the towns of Alden and Garfield. Project lakes include Church Pine Lake (WBIC: 2616100), Round Lake (sometimes mapped and referred to as Wind Lake) (WBIC: 2616000), and Big Lake (WBIC: 2615900). Church Pine Lake is a 107-acre lake with a maximum depth of 45 feet. Round Lake is a 38-acre lake with a maximum depth of more than 24 feet.<sup>3</sup> Big Lake is a 259-acre lake with a maximum depth of 24 feet. Development around the lakes is moderate to heavy with much of the lakeshore developed for residential use. Table 1 summarizes information about project lakes.

Water flows from Church Pine, to Round, and then to Big Lake. An unnamed tributary flows into the north end of Big Lake, and Forest Creek flows from Big Lake on its west side (although it is labeled as Horse Creek on the map in Figure 2). A dam on the outflow regulates the water levels in Big Lake at an established legal level between 95.5 and 96.5 feet. A timber dam was first constructed ¼ mile from the Big Lake outlet on this tributary in 1883.<sup>4</sup>

**TABLE 1. LAKES INFORMATION**

	Church Pine	Round (Wind)	Big
Size (acres)	107	38	259
Mean depth (feet)	23		17
Maximum depth (feet)	45	24+	24
Littoral zone depth (feet)	26.3	22.7	18.3
Average summer (July and August) secchi depth 2020 (feet)	14	11	8
Lake classification <sup>5</sup>	Deep, Headwater Drainage	Shallow, Flowage	Shallow, Lowland Drainage

A lake depth map which indicates public access locations is found on the following page as Figure 2.

<sup>3</sup> Although listed on Wisconsin DNR lake maps as 7 feet deep, the maximum depth recorded during the plant survey was in excess of 24 feet.

<sup>4</sup> [Bigroundpine.com/history](http://Bigroundpine.com/history)

<sup>5</sup> From DNR Lakes Pages, Lake Monitoring and Data.

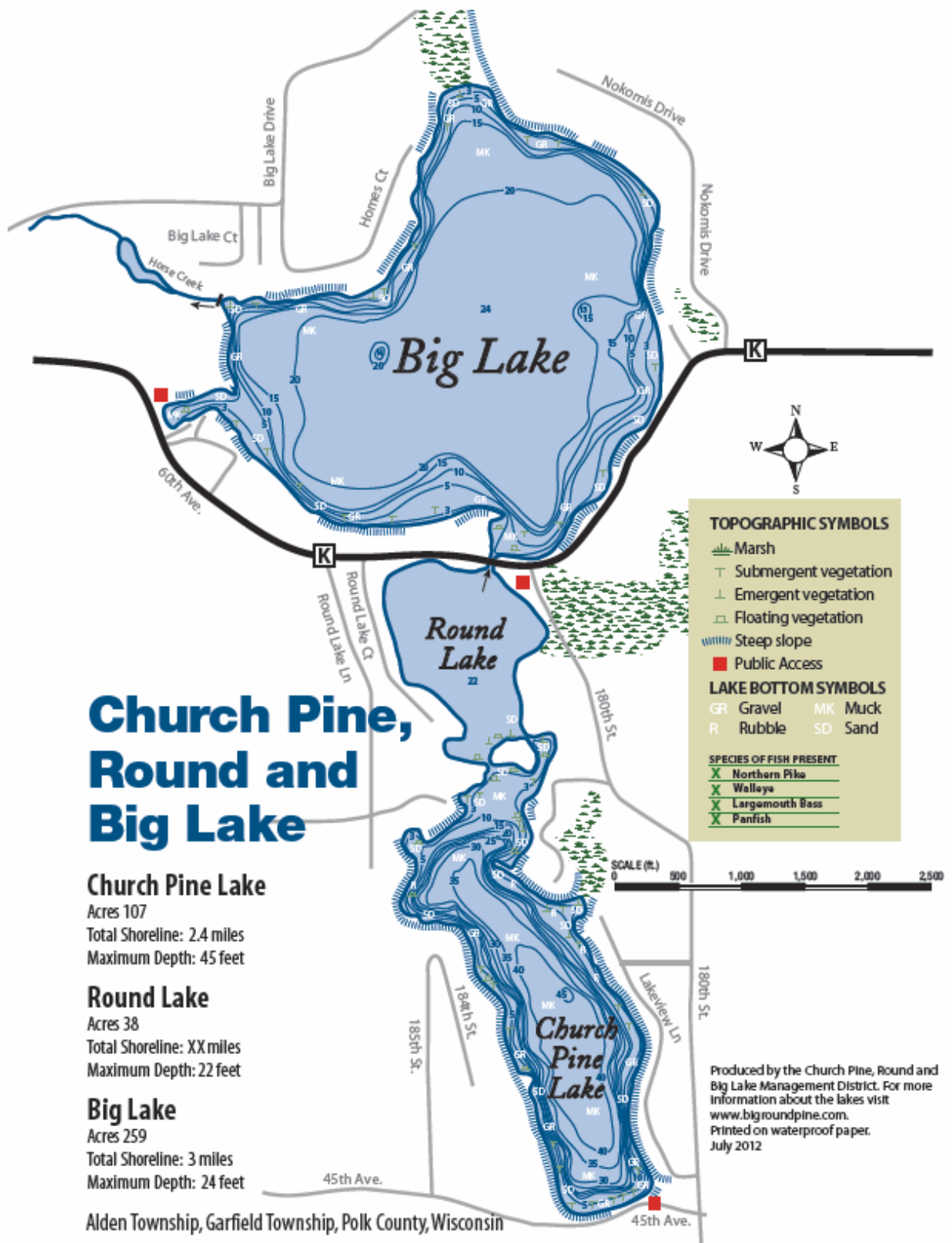


FIGURE 2. PROJECT LAKES CONTOUR AND ACCESS SITES

### Primary Human Use Areas

There are two boat landings in the project area. One is at the southern end of Big Lake along County Highway K. The second is at the southern end of Church Pine Lake. Many people use the Church Pine landing as a swimming area. There is additional parking within a block of the Church Pine boat landing at West Immanuel Lutheran Church. There are also two undeveloped town access points to the lakes. Needles Resort serves project lakes by renting cabins in a historic resort location.

Big Lake attracts around 250 anglers for an annual fishing tournament. Proceeds go toward walleye stocking.

Residential development is prevalent on the lake. Waterfront property owners and the general public use the lakes for a wide variety of activities including fishing, boating, swimming, and viewing wildlife.

### Water Quality

The Wisconsin Department of Natural Resources uses data collected by citizen volunteers and water quality studies to characterize lakes.

#### Citizen Lake Monitoring Network Results<sup>6</sup>

Lake resident volunteers have collected Secchi disc self-help monitoring data since 1986 (although not every year). Secchi depths are the most commonly collected self-help lake monitoring data reported. Secchi depths measure water clarity. The Secchi depth reported is the depth at which the black and white Secchi disk is no longer visible when it is lowered into the water. Greater Secchi depths occur with greater water clarity. Results of average July and August Secchi depth readings for each lake are shown in Figures 3 through 5. Results show that water clarity generally decreases from Church Pine Lake, to Round Lake, to Big Lake.

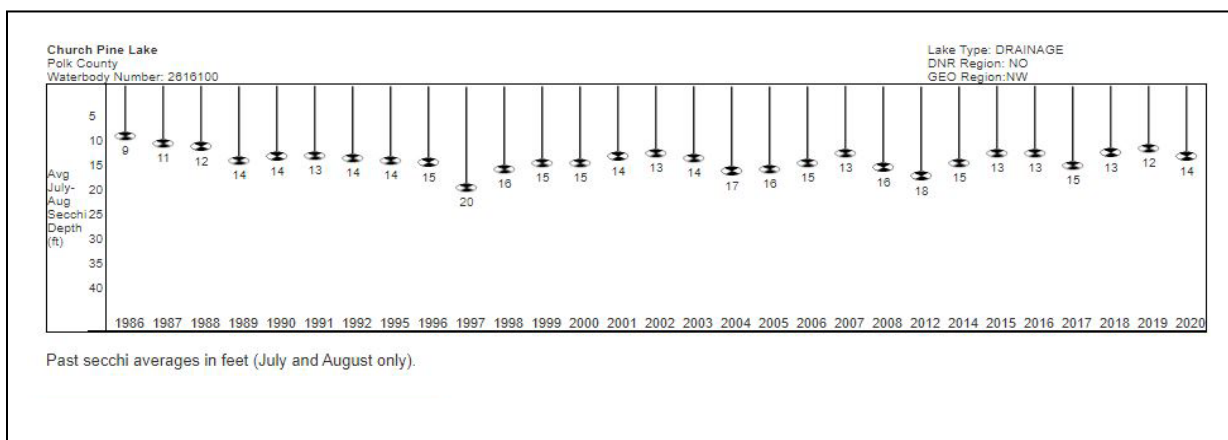
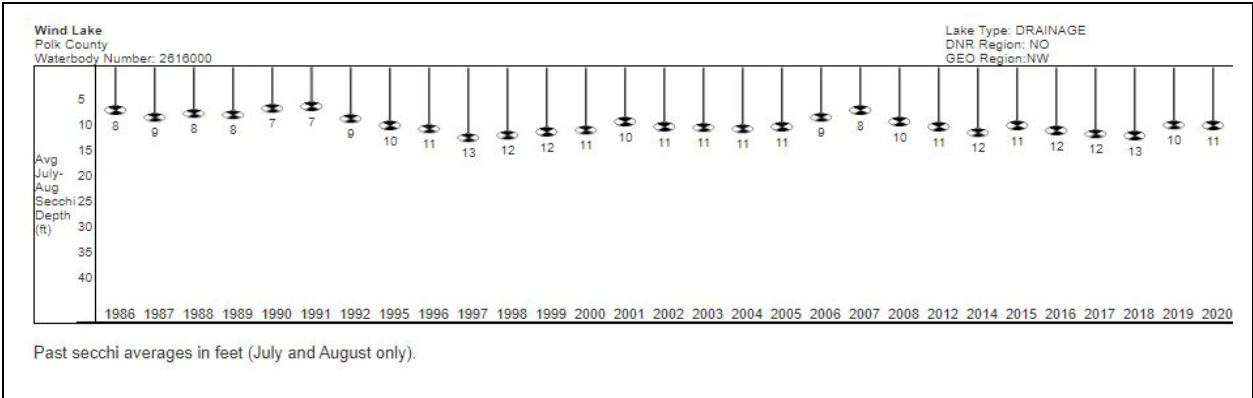
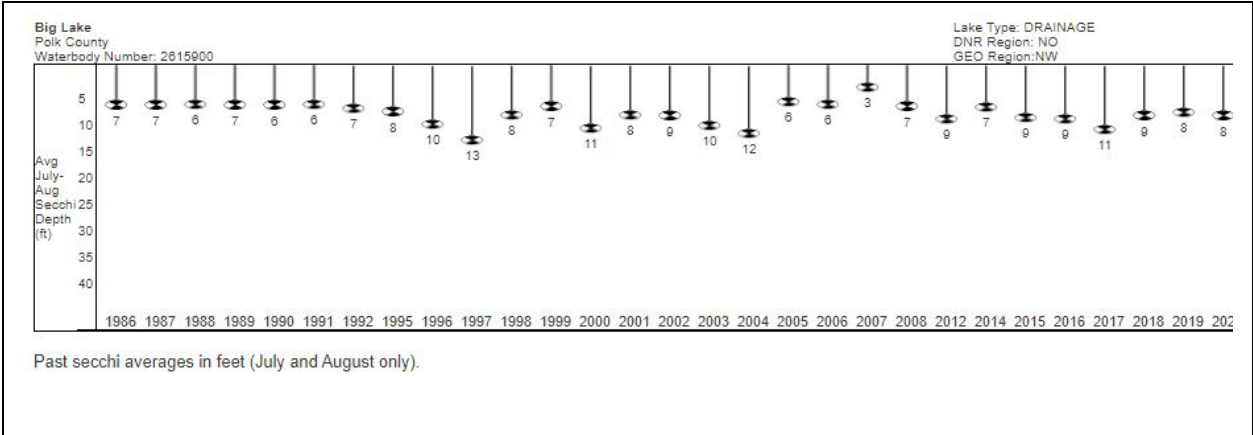


FIGURE 3 CHURCH PINE LAKE SECCHI DEPTH 1986 - 2020

<sup>6</sup> <https://dnr.wisconsin.gov/topic/lakes/clmn>



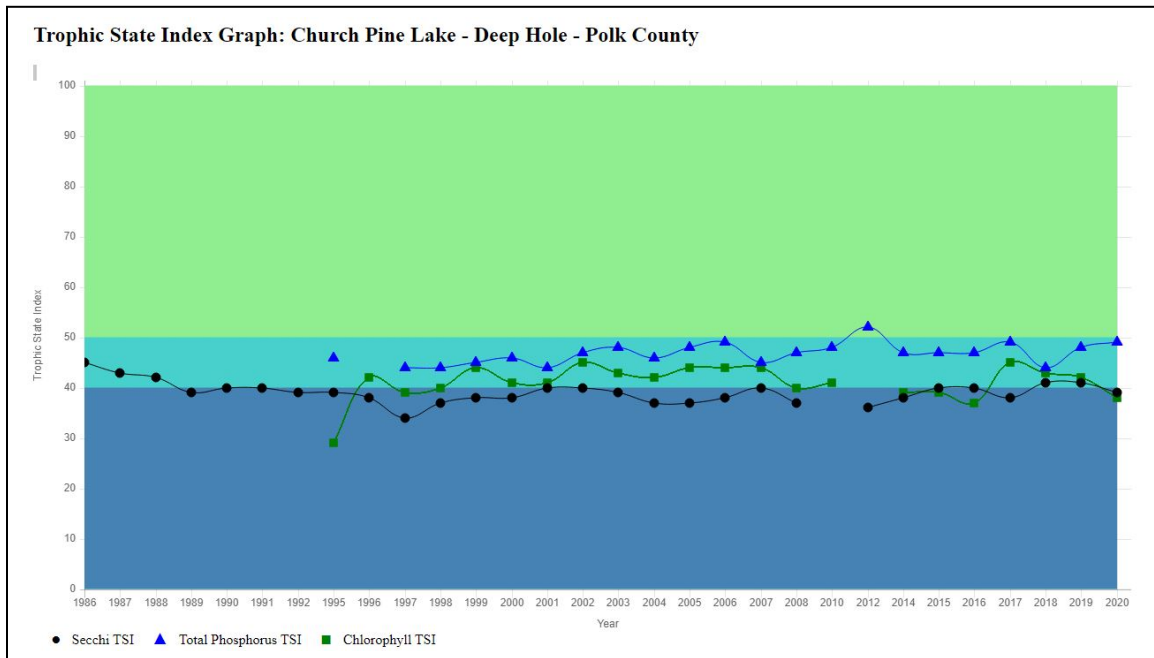
**FIGURE 4. ROUND LAKE SECCHI DEPTH 1986 - 2020**



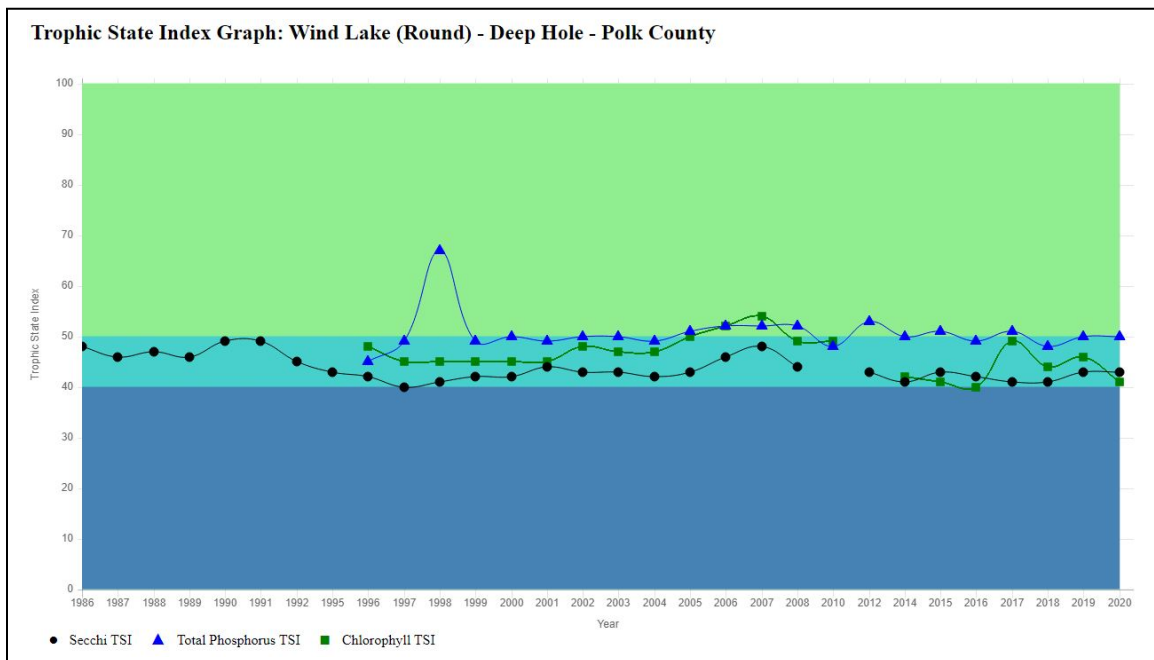
**FIGURE 5. BIG LAKE SECCHI DEPTH 1986 - 2020**

## Trophic State

Trophic state describes the productivity of a lake. Lakes with more nutrients are more productive. The least productive lakes are oligotrophic lakes. The most productive lakes are referred to as eutrophic. Those in the middle are called mesotrophic. If a watershed with little runoff and phosphorus sources surrounds a lake, the water will tend to have low phosphorus levels. Church Pine Lake is mesotrophic and Round (Wind) and Big Lake are mesotrophic to eutrophic.

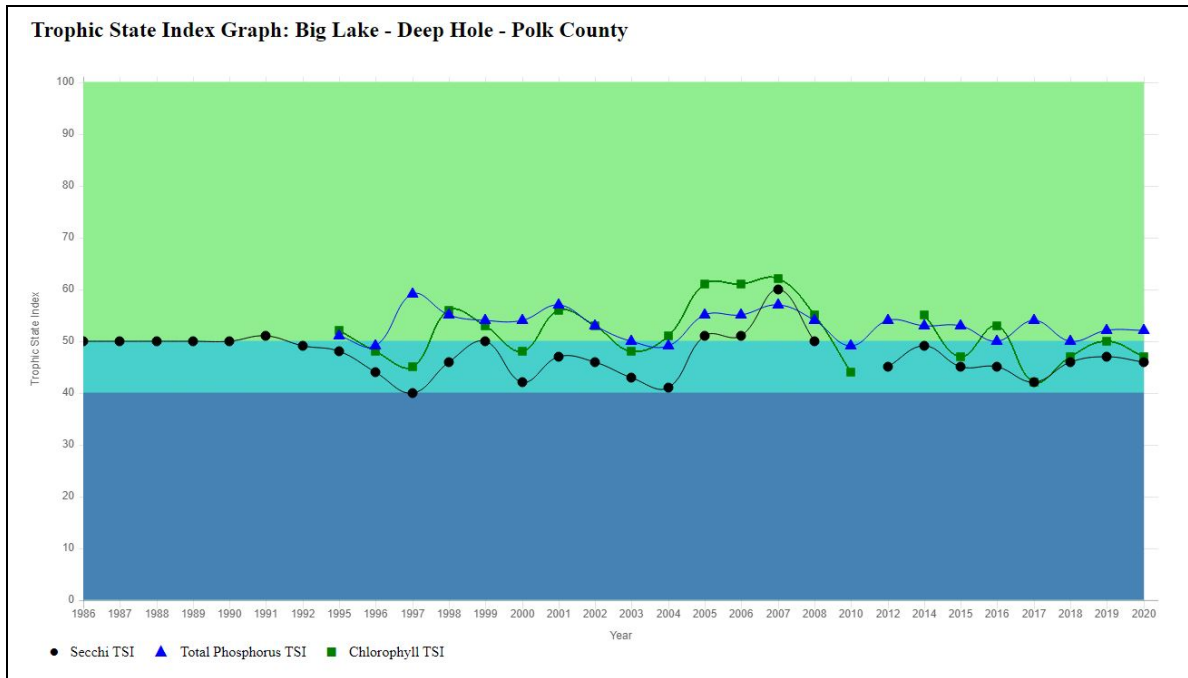


**FIGURE 6. CHURCH PINE LAKE TROPHIC STATE 1986 TO 2020**



**FIGURE 7. ROUND LAKE TROPHIC STATE 1986 TO 2020**





**FIGURE 8. BIG LAKE TROPHIC STATE INDEX 1986 TO 2020**

### Wisconsin Water Quality Standards<sup>7</sup>

WDNR uses four levels of biological conditions to represent placement in the overall water quality continuum:

- *Excellent*—Waters are considered to be fully supporting their assessed designated uses.
- *Good or Fair*—Waters are considered to be supporting their assessed designated uses.
- *Poor*—Waters may not support assessed designated use(s) but have insufficient information for a decision at the impairment assessment level.

Listing thresholds and detailed methodology for assessment and analysis are included in WisCALM (Wisconsin Consolidated and Assessment Listing Methodology). Based on this methodology, the Wisconsin Department of Natural Resources publishes a list of waters considered impaired, as required by the federal Clean Water Act, every two years. Impaired waters are those that do not meet water quality standards and may not support fishing, swimming, recreating or public health and welfare. A water body is considered healthy when it supports:

- healthy aquatic animal and plant communities,
- safe human recreation like swimming, and
- safe fish consumption.

If any of these are not supported, then the water is considered impaired (Wisconsin Department of Natural Resources, 2021).

<sup>7</sup> <https://dnr.wi.gov/water/waterDetail.aspx?key=16455>

**Church Pine Lake**

Church Pine Lake was assessed during the 2016 listing cycle; chlorophyll sample data were clearly below WisCALM (Wisconsin Consolidated and Assessment Listing Methodology) listing thresholds for Recreation use and Fish and Aquatic Life use. Chlorides were clearly below WisCALM chronic and acute listing criteria for Fish and Aquatic Life use.



**FIGURE 9. CHURCH PINE LAKE CONDITIONS**

**Round Lake**

Round Lake was assessed during the 2016 listing cycle; total phosphorus sample data were clearly below 2016 WisCALM listing thresholds for Recreation use and Fish and Aquatic Life use. Chlorophyll sample data were clearly below Fish and Aquatic Life use listing thresholds and did not exceed Recreation use listing thresholds. This water was also assessed for chlorides and sample data were clearly below 2016 WisCALM chronic and acute listing criteria for Fish and Aquatic Life use. This lake is meeting these designated uses and is not considered impaired.

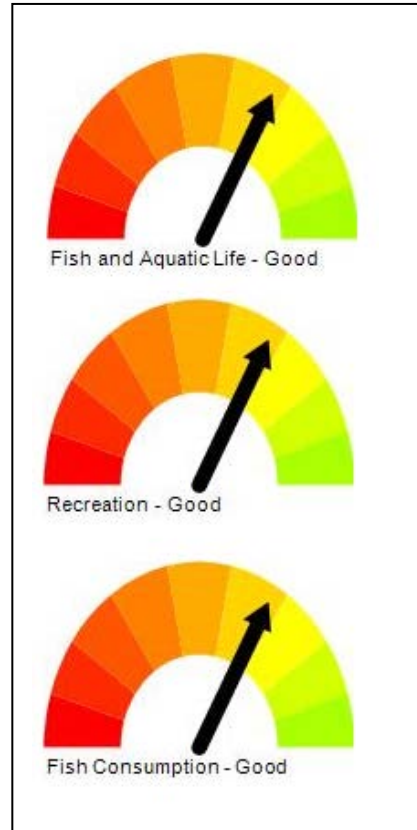


**FIGURE 10. ROUND LAKE CONDITIONS**

**Big Lake**

Big Lake (WBIC 2615900) was placed on the impaired waters list for excess algal growth in 2014. The 2018 assessments showed continued excess algal growth; new chlorophyll-a sample data exceeded the 2018 WisCALM listing thresholds for the Recreation use. Total phosphorus data were clearly below the Recreation use and Fish and Aquatic Life use listing thresholds.

**However, with evaluation of sample data collected over the past five years, Big Lake is proposed for removal from the Impaired Waters List based on the new chlorophyll-a data.** Comparison to the criterion of <30% days above 20 ug/L involves calculating an 80% confidence interval (CI) around the median. All three values, the median, lower CI, and upper CI need to be below the criterion to “clearly meet.” In the 2014 cycle all three values were above 30%, resulting in its addition to the list. In the 2022 cycle all three values were below 30%.<sup>8</sup>



**FIGURE 11. BIG LAKE CONDITIONS**

<sup>8</sup> Beranek, Ashley, Wisconsin Department of Natural Resources, email communication, July 19, 2021.

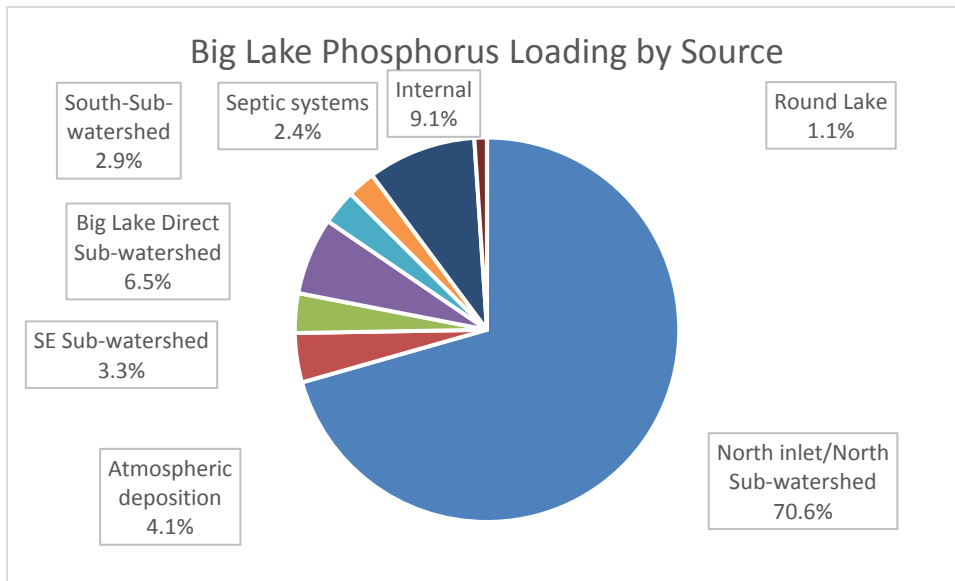
### **Big Lake Water Quality Study**

Because of water quality concerns in Big Lake, including its presence on the impaired waters list, the lake was the focus of a water quality study conducted in 2020 and 2021. The study focused on phosphorus. The total nitrogen to total phosphorus ratio for Church Pine, Round, and Big Lake indicated a phosphorus-limited state (Polk County LWRD, November 2013). Therefore, phosphorus is the limiting nutrient which determines the amounts of algae growth.

Data were collected and analyzed to evaluate sediment release of phosphorus, determine if phosphorus released from bottom sediments reaches upper lake layers where algae can grow, and evaluate other sources of phosphorus to the lake (Schieffer, 2021). Previous studies (2016 – 2018) on sediment release of phosphorus (also known as internal phosphorus load) were inconclusive. A description of study methods and results are included in the report. This report used data from an analysis of lake sediments conducted by UW-Stout (James, 2021) and analysis of watershed land use and runoff flow by the Polk County Land and Water Resources Department (Sorensen C. , 2021).

### ***Big Lake Phosphorus Load***

Figure 12 illustrates estimated 2020 Big Lake phosphorus load. The largest source of phosphorus in the lake is the unnamed tributary on the north end of the lake, referred to as the north inlet.



**FIGURE 12. BIG LAKE PHOSPHORUS LOAD 2020**

### ***Internal Load***

The data revealed that the release rate from anoxic (without oxygen) sediment is  $5.65 \text{ mg/m}^2$  per day. Considering the period and extent of anoxic conditions, the estimated sediment release from May-Sept 2020 in Big Lake was 190.2 kg. However, in-lake phosphorus concentrations suggest that partial lake mixing likely occurred in early September and approximately 30 kg of phosphorus was released into the epilimnion (upper lake layer) at that time. This internal load accounted for about 9% of the total estimated phosphorus load in 2020. Full lake mixing did not occur until October following the growing season. The internal load may vary from year to year depending upon when the lake partially or fully mixes.

### ***North Inlet***

The north inlet, which drains the northern sub-watershed, was the largest contributor of phosphorus into Big Lake in 2020 (70.6% of the total load). With limited historical data from the inlet, comparison from past years was not possible. The measured phosphorus load from the north inlet is higher than loading estimated using export coefficients from the land cover types in the north sub-watershed. The phosphorus concentration was high in the tributary even during low flow periods. The sources of high phosphorus concentration are unknown. Evaluation of north inlet phosphorus sources and potential phosphorus mitigation options are recommended.

The source of phosphorus in the north inlet could be one or a combination of the following:

1. high groundwater phosphorus concentration which could be natural and/or due to human activity;
2. accumulated organics in wetlands discharging phosphorus; or
3. a concentrated source of phosphorus (e.g., manure or fertilizer) that is leaching into the tributary.

Identifying the source of phosphorus will help to understand if phosphorus mitigation measures are possible.

### ***Lake Model Results***

The lake model Bathtub incorporated tributary phosphorus and flow monitoring, internal load estimates, and phosphorus load based on land use to predict in-lake phosphorus concentrations. Predicted in-lake concentrations were compared with actual data, and the model inputs were adjusted to balance the results and produce a good model fit.

A phosphorus load analysis using the model predicted that reductions in phosphorus from the entire watershed and only the north sub-watershed would result in reduced phosphorus concentration and reduced chlorophyll-a concentration. Chlorophyll-a concentration represents algae growth in the lake. Eliminating the internal load of 30 kg predicted very little change in the lake phosphorus concentration.

#### **Big Lake Water Quality Study Highlights:**

- The anoxic sediment release rate of phosphorus was 5.65 g/m<sup>2</sup> per day.
- This equates to 190 kg released in summer 2020.
- Only 30 kg of this phosphorus mixed into the upper layer where algae can grow.
- The north inlet (which drains the largest watershed area) was the largest contributor of phosphorus into Big Lake (70.6% of load).
- The source of the high phosphorus concentration in the north inlet is unknown.
- Further knowledge of these sources would be necessary to develop management recommendations.
- A 20% reduction in external source phosphorus loading is predicted to decrease lake phosphorus concentration from 24.5 µg/L to 22.0 µg/L and chlorophyll-a concentration from 7.7 µg/L to 6.5 µg/L.
- Eliminating the 30 kg internal load is predicted to lower phosphorus concentration by about 1.4 µg/L and chlorophyll-a by 0.5 µg/L.

## Watershed

Project lakes are located within the Horse Lake-Horse Creek Watershed (HUC070300050804). This watershed is ranked second in a list of 42 watersheds prioritized in the Polk County Land and Water Resources Plan. The LWRD mapped land cover for all sub-watersheds and provided a detailed analysis of water flow for the Big Lake sub-watershed. The sub-watersheds for Round and Church Pine Lakes total 1,973 acres. The Big Lake sub-watershed is 2,409 acres. All are part of the larger Horse Creek Watershed.

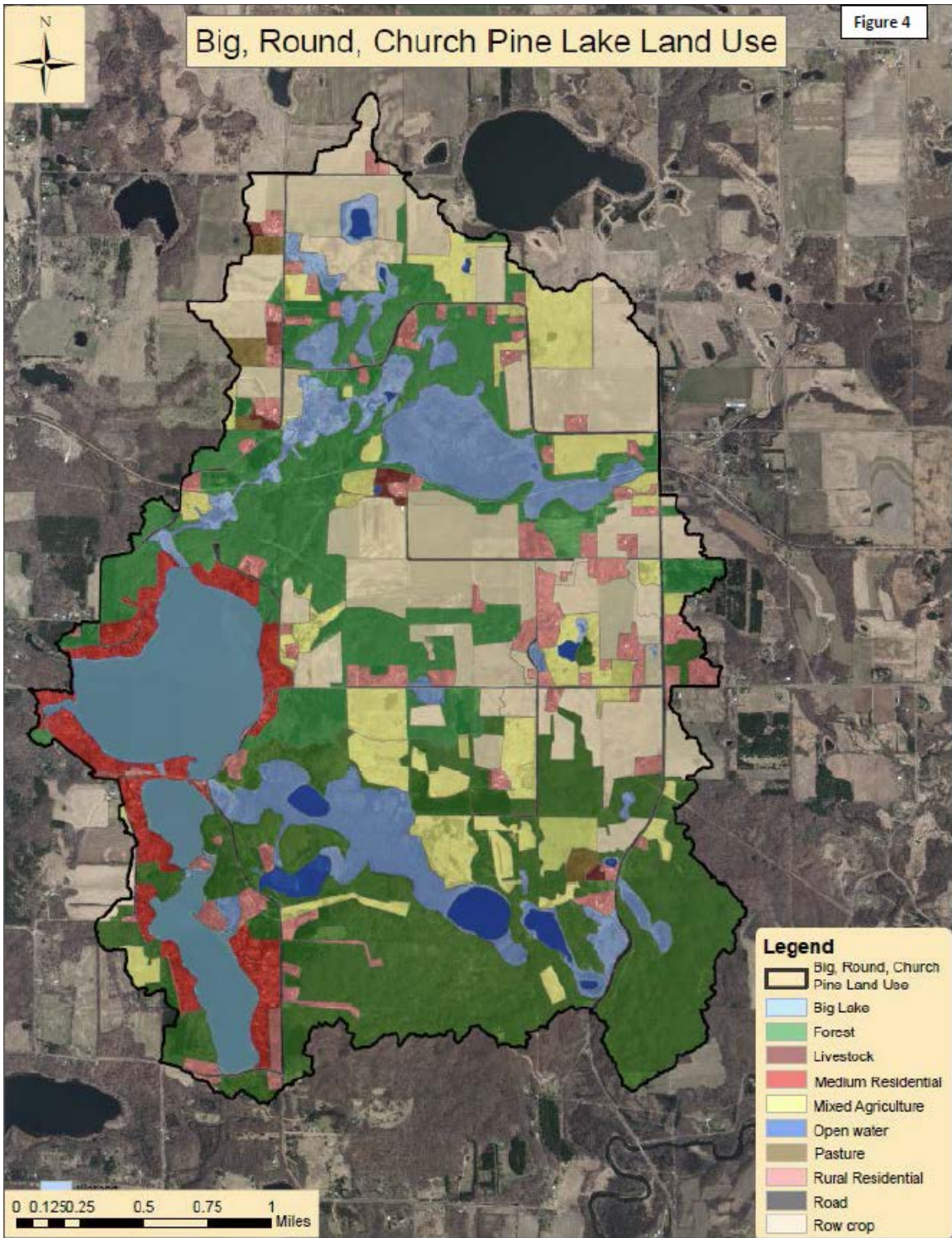
The Big Lake sub-watershed was delineated using ArcMap spatial analyst hydrologic tools and 2015 LIDAR data. Land cover for all sub-watersheds was determined using Polk County's spring 2015 high resolution aerial photo. The most common land use in the Big Lake sub-watershed is row crops (29%), followed by forest (27%). The tables below summarize the land use area in acres and percentage of total sub-watershed acres (Sorensen, 2021).

**TABLE 2. BIG LAKE SUB-WATERSHED LAND USE**

Land Use	Acres	Acres
Row Crop	693	29%
Forest	656	27%
Wetland	283	12%
Big Lake	253	11%
Mixed Agriculture	208	9%
Rural Residential	123	5%
Medium Residential	104	4%
Road	45	2%
Pasture	19	1%
Livestock	16	1%
Open Water	9	0%

**TABLE 3. ROUND AND CHURCH PINE LAKES SUB-WATERSHEDS LAND USE**

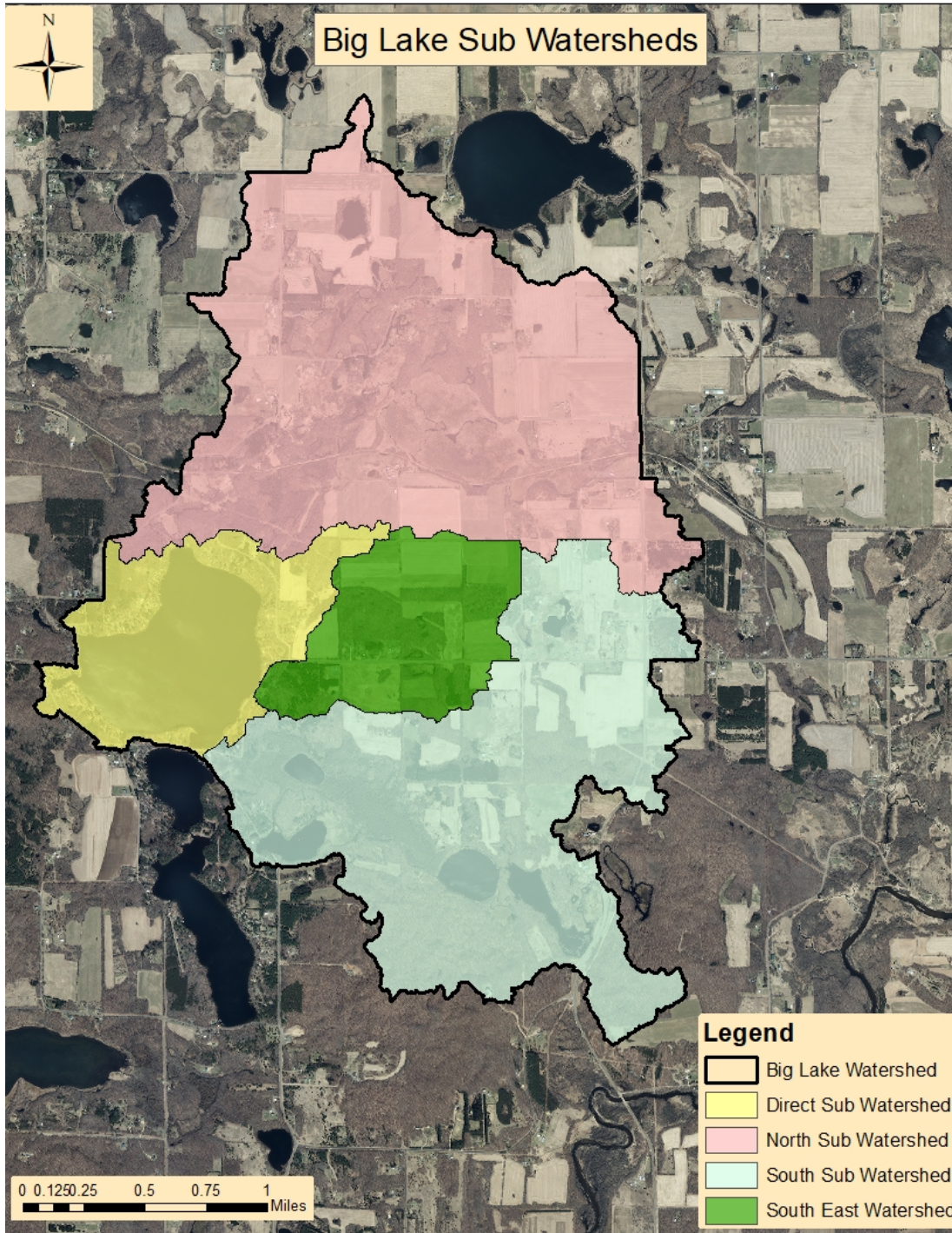
Land Use	Acres	Acres
Forest	917	46%
Mixed Agriculture	212	11%
Wetland	196	10%
Row Crop	184	9%
Rural Residential	139	7%
Round, Church Pine Lakes	134	7%
Medium Residential	82	4%
Open water	65	3%
Road	34	2%
Pasture	8	0%
Livestock	2	0%



**FIGURE 13. PROJECT LAKES WATERSHED LAND USE (POLK COUNTY, 2020)**



The Big Lake watershed was delineated into four sub-watersheds: the north sub-watershed, direct sub-watershed, south sub-watershed, and the southeast sub-watershed. The flow and phosphorus concentration data from the north inlet were used to calculate phosphorus loading for the north sub-watershed. Land cover/use was used to estimate phosphorus loading from the other sub-watersheds.



**FIGURE 14. BIG LAKE SUB-WATERSHEDS**

### ***Big Lake Phosphorus Loads by Sub-watershed***

By area, the north sub-watershed is the largest sub-watershed, followed by the south sub-watershed, southeast sub-watershed, and the direct sub-watershed respectively. The north sub-watershed is drained by the inlet that flows to Big Lake. Both the north sub-watershed and the southeast sub-watershed have a large percentage of row crop land cover. Row crop typically has higher runoff amounts and higher phosphorus concentrations (based upon export coefficients used for Wisconsin land cover) than forested areas. The direct sub-watershed has a higher percentage of medium-density residential land cover which also has higher runoff amounts and phosphorus concentrations (as compared to forested areas), largely due to more impervious surfaces associated with roofs, sidewalks, and driveways along with manicured lawns.

The water and nutrient loads from the southeast sub-watershed and the south sub-watershed are somewhat complicated. The updated evaluation shows that the southeast sub-watershed contributes runoff into Big Lake only during large rain events (10-year storm events and greater). The phosphorus loading estimate was therefore reduced for this sub-watershed.

The phosphorus load estimate from the south sub-watershed was also adjusted based upon flow information. Although this is a large sub-watershed, an extensive wetland adjacent to Big Lake holds water and likely lowers flow and phosphorus concentrations. Limited monitoring data of the flow from this wetland showed a lower total phosphorus concentration than the export coefficients would predict.

### ***Recommendations***

More data collection is needed to identify the source(s) of phosphorus into the north inlet. Chemical data including total phosphorus, soluble reactive phosphorus, and chloride sampled and analyzed monthly over several calendar years is recommended. Monitoring during the winter would establish the base flow concentration and reflect the groundwater phosphorus concentration. Quantifying flow would be necessary to calculate the phosphorus load. Groundwater analysis (well or piezometer sampling) would also be helpful to determine if the groundwater recharging the inlet (and Big Lake) is high in phosphorus. High groundwater phosphorus was found historically in the area (Muldoon, 1990).

There may be land-use practices in the north sub-watershed that are not captured by standard export coefficients. A more in-depth evaluation of specific land-use activity would help identify (or rule out) any potential significant phosphorus sources.

The remaining sub-watersheds contribute phosphorus into Big Lake, and management practices in these areas would reduce phosphorus. However, the impact would not be as profound when compared to reductions possible in the north sub-watershed.

## Shoreland

Volunteers measured shoreline land use shoreland buffer composition, and coarse woody debris on each lake in a 2012 survey. This survey pre-dated standardized WDNR methods. A shoreland survey was not completed for this management plan update.

## In Lake Habitats

### Critical Habitat Areas

Every waterbody has critical habitat—those areas that are most important to the overall health of the aquatic plants and animals. Remarkably, eighty percent of the plants and animals on the state’s endangered and threatened species list spend all or part of their life cycle within the near shore zone. As much as ninety percent of the living things in lakes and rivers are found along the shallow margins and shores. Wisconsin law mandates special protections for these critical habitats. Critical Habitat Designation is a program that recognizes those areas and maps them so that everyone knows which areas are most vulnerable to impacts from human activity. A critical habitat designation assists waterfront owners by identifying these areas, so they can design waterfront projects to protect habitat and ensure the long-term health of the lake where they live.<sup>9</sup>

### *Special Lake Designations*

The map titled *Critical Habitat Areas* shows Sensitive Areas for Big Lake and Church Pine Lake. It also indicates that Big Lake and Round Lake are classified as *Areas of Special Natural Resource Interest (ASNRI)*. The Department of Natural Resources completed Sensitive Area Designations in September of 1998.

### *Sensitive/Critical Habitat Area Recommendations*

#### General

1. Preserve/restore shoreline buffers at least 35 feet deep.
2. Limit aquatic vegetation removal to no more than 25-foot channels – hand pulling is the preferred method for management followed by harvesting and herbicide use.
3. Leave woody debris in place.
4. Prevent construction site erosion.
5. Limit rip rap for shoreline stabilization.
6. Strictly enforce zoning ordinances.
7. Control exotic species such as purple loosestrife.

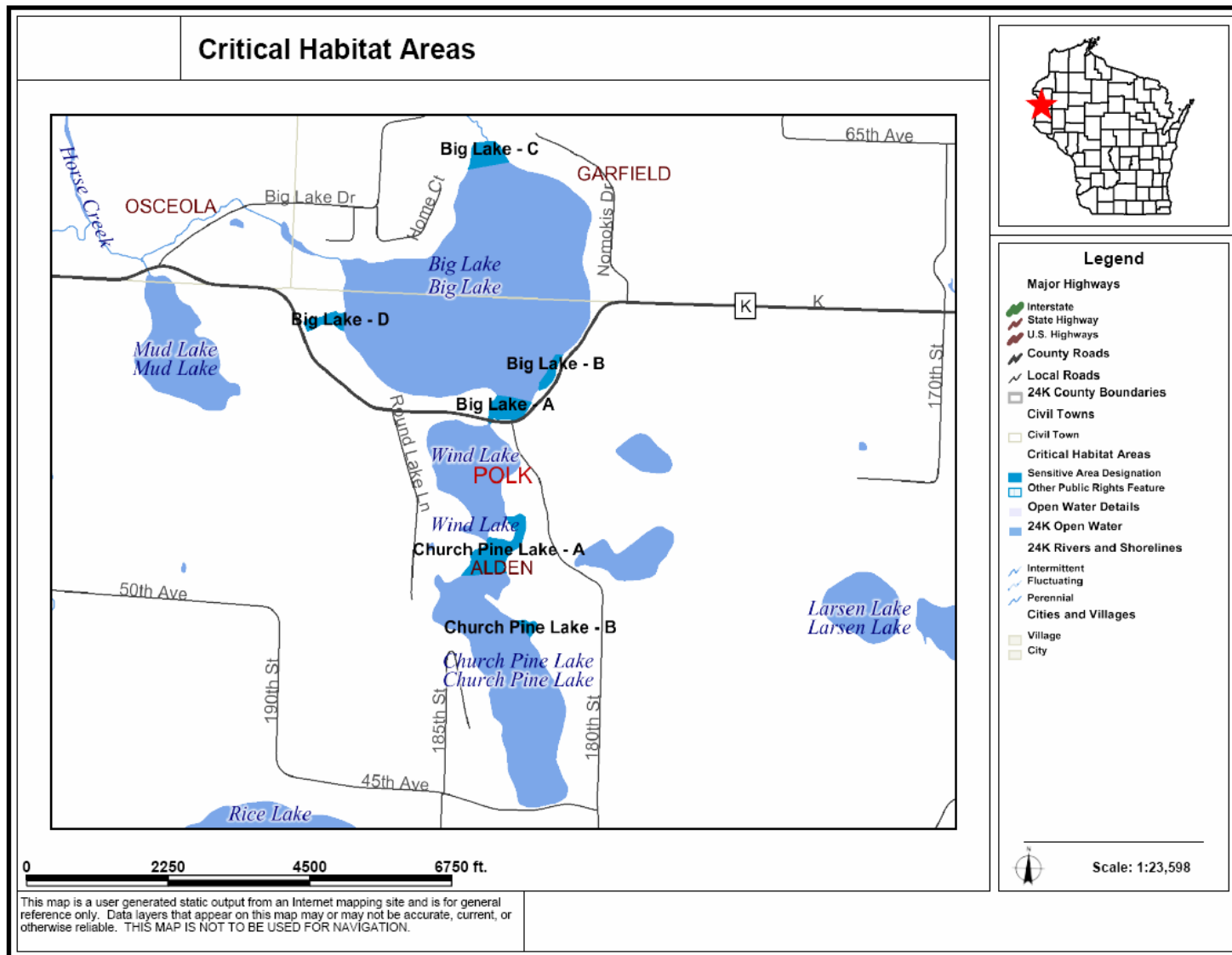
#### Church Pine

8. Use conservation easements, deed restrictions, or zoning to protect sensitive areas.

Resource values of each lake sensitive area were described in the same way: provides bass, panfish, and forage species habitat; northern spawning and nursery areas; and wildlife habitat. All major types of plants: emergent, floating, and submergent were recorded in each sensitive area.

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<sup>9</sup> <https://dnr.wi.gov/lakes/criticalhabitat/Project.aspx?project=10177864>



**FIGURE 15. SENSITIVE AREA/CRITICAL HABITAT AREA DESIGNATIONS**

## Lakes Fishery

The three-lake chain is managed as a largemouth bass, panfish (bluegill, black crappie, pumpkinseed, and yellow perch), and northern pike fishery. Large fingerling walleye (average size 8 inches) have been stocked for several years with Lake District funding. In 2021, 1,750 walleye were stocked in Big Lake and 1,000 were stocked in Church Pine Lake. In 2021, the numbers were slightly lower with 1,600 stocked in Big Lake and 900 stocked in Church Pine. Continued stocking will be necessary to maintain a walleye fishery.

The DNR stocked northern pike in Big Lake most recently in 2014, but the DNR has not stocked walleye since 1993 (Table 5). The DNR stocked northern pike in Church Pine Lake most recently in 2002 (Table 6). There are no records of DNR stocking in Round Lake.

**TABLE 4. FISH SPECIES OF PROJECT LAKES<sup>10</sup>**

Lake	Northern Pike	Walleye	Largemouth Bass	Panfish
Church Pine	P	P	C	C
Round	P	P	C	C
Big	P	P	C	P

P = Present, C = Common

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<sup>10</sup> *DNR Lakes Book*. 2009.

**TABLE 5. WISCONSIN DNR FISH STOCKING IN BIG LAKE**

Year	Species	Age Class	Number	Length (in)
2014	NORTHERN PIKE	SMALL FINGERLING	451	4.8
2012	NORTHERN PIKE	LARGE FINGERLING	500	7.7
2008	NORTHERN PIKE	LARGE FINGERLING	488	11.5
2006	NORTHERN PIKE	LARGE FINGERLING	518	8.4
2002	NORTHERN PIKE	SMALL FINGERLING	2,160	5.1
2000	NORTHERN PIKE	SMALL FINGERLING	2,071	5.4
1999	NORTHERN PIKE	LARGE FINGERLING	330	8
1998	NORTHERN PIKE	SMALL FINGERLING	1,295	4.6
1997	NORTHERN PIKE	SMALL FINGERLING	2,590	5.25
1993	NORTHERN PIKE	FINGERLING	490	4.9
1993	WALLEYE	FINGERLING	7,180	6.03
1992	WALLEYE	FINGERLING	6,500	23
1991	WALLEYE	FINGERLING	3,250	4
1989	WALLEYE	FINGERLING	6,500	5
1986	WALLEYE	FINGERLING	6,524	5
1986	WALLEYE	FRY	259,000	1
1985	NORTHERN PIKE	FINGERLING	1,296	7.33
1985	NORTHERN PIKE	FRY	259,000	1
1984	NORTHERN PIKE	FINGERLING	1,295	9
1984	NORTHERN PIKE	FRY	259,000	1
1983	NORTHERN PIKE	FRY	50,000	1
1982	NORTHERN PIKE	FRY	50,000	
1978	WALLEYE	FINGERLING	6,050	3
1976	WALLEYE	FINGERLING	12,920	3

**TABLE 6. WISCONSIN DNR FISH STOCKING IN CHURCH PINE LAKE**

Year	Species	Age Class	Number	Length (in)
2002	NORTHERN PIKE	SMALL FINGERLING	830	5.1
2000	NORTHERN PIKE	SMALL FINGERLING	835	5.4
1998	NORTHERN PIKE	SMALL FINGERLING	1,172	4.5

## Lake Management Priorities

Lake management priorities were identified by the advisory committee when they listed concerns and issues in a worksheet and discussed them at advisory committee meetings. Desired results were used to draft plan goals and objectives. A record of these results is included in meeting notes and worksheets.

## Lake Management Alternatives

The advisory committee examined current activities, barriers to their success, and new opportunities to increase effectiveness. Additional alternatives were suggested as potential means to reach plan goals and objectives. Selected actions are included in the implementation plan, and some are listed for future consideration.

The committee was asked to consider a series of questions when evaluating alternative actions presented for consideration. These same questions will be used to evaluate alternatives into the future as the plan is implemented.

### **Alternatives/Action Analysis**

- 1) Does the action lead to achieving one of the CLMP goals?
- 2) Does the action fulfill one of the CLMP objectives? If not, is the result to be obtained from the action important and does it necessitate a new plan objective?
- 3) How will the action's progress toward plan objectives be evaluated?
- 4) What alternatives are available to reaching the objective?
  - a. Is this action more likely to produce results compared with other alternatives?
  - b. Is this action more cost effective when compared with other alternatives?
  - c. Does the risk of no action outweigh the risk of uncertainty of success?
- 5) Does the Lake District have the resources available to implement the action? Volunteers? Advisors? Funding for consultants or construction?
- 6) Is grant funding available to support the action?
- 7) Who (what committee, board member) is responsible to lead the action?

## Plan Implementation

This section of the plan lists goals and objectives for lake management for the Lake District. It also presents a list of actions that will be used to reach plan goals and objectives.

**Goals** are broad statements of desired results.

**Objectives** are the measurable accomplishments toward achieving a goal.

**Actions** are the steps taken to accomplish objectives and ultimately goals.

The committee prioritized goals, objectives and actions using a ranking sheet to establish high, medium, and low priorities. Each are listed generally in priority order in the plan implementation section. **Actions that received a high priority ranking are shown in bold text.**

The Lake District board and committees will track implementation of plan actions and evaluate progress toward reaching plan goals and objectives.

## Plan Guiding Principles

Management activities are guided by best available science and adaptive management. Adaptive management is a systematic approach for improving resource management by learning from management outcomes. Adaptive management uses results of monitoring, evaluation of project activities, and updated information to modify and guide future project implementation.

### Goal I. Lake water quality is preserved and protected.

**Objective A. All project lakes meet Wisconsin standards for recreation use including swimming. These standards are more restrictive than the standards set for fish and aquatic life.**

*All three project lakes: Church Pine, Round, and Big Lake currently meet Wisconsin standards for recreation use (draft 2022 impaired waters list). However, Big Lake was previously placed on the impaired waters list for excess algal growth (2014 - 2020).*

**Objective A1. Big Lake and Round (Wind) Lake meet recreation standards for shallow lakes.**

*Total phosphorus:  $\leq 40 \mu\text{g/L}$*

*Chlorophyll-a:  $> 20 \mu\text{g/L} < 30\%$  of days*

**Objective A2. Church Pine Lake meets recreation standards for deep lakes.**

*Total phosphorus:  $\leq 30 \mu\text{g/L}$*

*Chlorophyll-a:  $> 20 \mu\text{g/L} < 5\%$  of days*

**Evaluation.** Continue volunteer WDNR Expanded Self-Help Monitoring for all project lakes. Add temperature and dissolved oxygen profiles when Secchi depth measurements are taken for Big Lake to help understand potential release of phosphorus from lake sediments.



## **Goal II. Phosphorus and sediment inputs from watersheds are minimized.**

### **WATER QUALITY AND WATERSHED ACTIONS**

**Objective A. Watershed inputs are understood and priority sources of nutrients and sediment are mitigated.**

- 1. Continue implementation of DNR Healthy Lakes projects and grants.<sup>11</sup>**
  - a. Identify and target problem areas.
  - b. Use self-evaluation tools for homeowners.
  - c. Document before and after improvements.
  - d. Share results of installations.
  - e. Get more residents involved.
- 2. Increase understanding of phosphorus and sediment loading challenges from watershed runoff.**
  - a. Monitor inputs of nutrients and sediment from the Big Lake north inlet.
  - b. Analyze watershed land use, water flow, agricultural practices, and other pollutant sources.
  - c. Evaluate runoff from the boat landings.
  - d. Estimate reductions in phosphorus from potential best management practice installations.
  - e. Prioritize installation based on cost effectiveness.
3. Provide design and installation assistance for higher-cost best management practice priorities seeking DNR Surface Water Grant funding support.

**Objective B. Construction erosion control practices and development standards are employed to prevent negative water quality impacts.**

- 1. Engage in development and enforcement of state and local shoreland, erosion control, stormwater, and land use regulations that affect project lakes.**
  - a. Attend training offered by Wisconsin Lakes and other entities.
  - b. Maintain membership in Polk County Association of Lakes and Rivers. Participate in meetings and coordinated input to regulatory agencies.
  - c. Provide input to agencies that regulate development. Seek most effective ways to communicate concerns and get constructive results.
    - i. Polk County Zoning Department
    - ii. Polk County Land and Water Resources
    - iii. Town of Alden and Town of Garfield

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<sup>11</sup> High priority actions (as ranked by the advisory committee) are shown in bold.

- d. Inform lake property owners (especially new owners) of development standards and regulations.

### **Goal III. Our lakes provide healthy fish and wildlife habitat.**

#### **HABITAT ACTIONS**

##### **Objective A. Desirable levels of game and pan fish are maintained in project lakes.**

1. Work with WDNR fisheries biologist to make sure our lakes are on schedule for fishery surveys and other activities. Share fishery survey results and recommendations.
2. Promote installation of woody habitat/fish sticks under the DNR Healthy Lakes Program and Grants. Work with WDNR fisheries biologist to determine appropriate locations for installation.

##### **Objective B. Sedimentation of near-shore habitat is prevented.**

1. Educate lake users regarding no-wake regulations.

##### **Objective C. Stocked walleye reach legal size.**

1. Continue support of fish stocking based on expert recommendations.

### **Goal IV. Our lakes are safe places to live and recreate.**

#### **SAFETY ACTIONS<sup>12</sup>**

##### **Objective A. Boaters travel at no-wake speed near shorelines and follow other rules to provide safe boating conditions.**

1. Consider options for reminding lake users of existing regulations and encouraging practices to promote safe boating including: hiring boat safety officers, installation of buoys to encourage no-wake boating, requesting Polk County Sheriff Department enforcement, etc.
2. Educate lake users regarding boating regulations.

##### **Objective B. Residents are informed if there are health concerns related to E.coli levels or algae toxins where people swim.**

1. Post E.coli and algae toxin test results at the swimming area and on the Lake District website.

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<sup>12</sup> High priority actions (as ranked by the advisory committee) are shown in bold.

## **Goal V. The Lake District has the capacity to build relationships, provide stable funding, operate efficiently, and encourage responsible use to manage the lakes.**

**Objective A. Lake residents and visitors are aware of and engaged in lake issues and Lake District activities.**

### **AUDIENCES FOR EDUCATION AND OUTREACH**

- Lake residents (full-time and part-time)
- Lake users/visitors – anglers, recreationists

### **FOCUS ON EDUCATION AND OUTREACH**

Education and outreach are critical to reaching each of the plan goals. Messages related to each goal are included below.

### **MESSAGES FOR EDUCATION AND OUTREACH**

#### Water Quality and Watershed (Goals I and II)

- a. Data on lake water quality from Citizen Lake Monitoring Network and other data sources.
- b. The impact of phosphorus on algae growth.
- c. Our efforts to reduce runoff and erosion from the shorelands and watersheds help to keep our lakes clean.
- d. Descriptions and importance of Healthy Lakes management practices to protect water quality. Explain how to participate. Share examples of installed projects.
- e. Natural shorelines protect the lakes by reducing runoff of nutrients and sediment.
- f. Know the rules before you build. There are limits to cutting vegetation near the lake. Construction site erosion practices must be followed to reduce erosion.

#### Habitat (Goal III)

- a. State regulations establish no-wake zones. These no-wake zones prevent shoreline erosion and preserve habitat.
- b. There are simple actions and steps that every shoreland owner can take to protect and improve habitat.
- c. Erosion rates from construction sites can greatly exceed erosion from farm fields. Best practices can be employed to prevent sedimentation of near shore habitat. Construction site erosion control is required for residential and commercial construction.

#### Safety (Goal IV)

- a. State regulations are established to encourage safe watercraft operation.
- b. Elevated levels of E.coli bacteria and blue-green algae toxins can pose a health risk at swimming areas. Share results of testing.

## **ACTIONS FOR EDUCATION AND OUTREACH<sup>13</sup>**

- 1. Maintain quality website.**
- 2. Develop a comprehensive email list, and send information and meeting minutes out regularly.**
3. Share Healthy Lakes demonstration sites with neighbors.
4. Work with county and state agencies to provide hands-on programming.
5. Publish newsletter twice a year and post on website.

**Objective B. The Lake District Board and Lake District Committees consist of engaged people with a variety of expertise.**

### **ACTIONS TO SUPPORT LAKE DISTRICT BOARD AND COMMITTEES**

- 1. Provide training for board and committee members.**
  - a. Nominate and pay for at least one interested board/committee member to participate in Wisconsin Lake Leader's session every other year (or as funding allows).
  - b. Support all board members and interested committee members attendance at the annual Wisconsin Lakes and Rivers Convention.
2. Develop and support a committee structure to implement the lake management plan. Recruit, train, and gather input from committee members. Committees report to the Lake District Board of Directors. Potential committee list:
  - a. Welcoming Committee—identify new owners and provide them with a basket of information on the Lake District and lake living: recent newsletters, information on how they can get involved, contact information, development standards and ordinances, boating regulations, etc.
  - b. Lake Landing Committee—address issues at the landing including CBCW, camera maintenance, kiosks, etc.
  - c. Aquatic Invasive Species Committee
  - d. Education and Outreach Committee
  - e. Lake Activities Committee
    - i. Expand the focus of lake activity beyond the summertime and into the winter months.
    - ii. Promote winter activities such as ice fishing, on-lake X-country skiing and snowshoeing, and winter walking around lakes on groomed trails.
    - iii. Organize lake clean-up programs in the spring before ice-out to remove leftover debris from ice shanties, etc.

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<sup>13</sup> High priority actions as ranked by the advisory committee are shown in bold.

**Objective C. The Lake District has effective partnerships with the Wisconsin Department of Natural Resources, Polk County, the Towns of Alden and Garfield, lake organizations, area businesses, and other organizations and agencies.**

1. Invite partners to participate in plan implementation.
  - a. Polk County Zoning Department
  - b. Polk County Land and Water Resources
  - c. Town of Alden and Town of Garfield
  - d. Horse Creek Farmer-Led Council
2. Establish and support partnerships with other lake associations and districts to share information.
3. Maintain current memberships in various lake organizations including Polk County Association of Lakes and Rivers (PCALR) and Wisconsin Lakes.

## Appendix A. Related Ordinances, Regulations and Plans

### Polk County Ordinances Affecting Lake Management<sup>14</sup>

#### ***Comprehensive Land Use Ordinance***

The Polk County Comprehensive Land Use Ordinance No. 07-19, more commonly known as the Comprehensive Zoning Ordinance, was adopted March 19, 2019 and had an effective date of April 3, 2019. Sixteen towns, including the Town of Alden, adopted the county ordinance. Three towns, including the Town of Garfield, have their own zoning ordinances. Five towns are unzoned in Polk County.

The purpose of this ordinance is to promote and protect public health, safety, and other aspects of the general welfare. Further purposes of this ordinance are to: aid in the implementation of provisions of the county comprehensive plan; promote planned and orderly land use development; protect property values and the property tax base; fix reasonable dimensional requirements to which buildings, structures, and lots shall conform; prevent overcrowding of the land; advance uses of land in accordance with its character and suitability; provide property with access to adequate sunlight and clean air; aid in protection of groundwater and surface water; preserve water quality, shorelands, and wetlands; protect the beauty of landscapes; conserve flora and fauna habitats; preserve and enhance the county's rural characteristics; protect vegetative shore cover; promote safety and efficiency in the county's road transportation system; define the duties and powers of certain county officers and administrative bodies relative to the application, administration, and enforcement of the ordinance; and prescribe penalties in the form of civic forfeitures for violations of this ordinance and to facilitate enforcement of the provisions of this ordinance by injunctive relief.

The ordinance establishes zoning districts and building regulations including lot standards, building setbacks, size, and heights, and allowed uses within each district. County maps of zoning districts are developed in cooperation with the towns. Zoning districts apply within the shoreland zoning district. Some uses within a district require a conditional use permit. The Polk County Environmental Services Committee is responsible for reviewing and holding a public hearing for conditional use permit applications.

#### ***Shoreland Protection Ordinance***

This ordinance regulates all unincorporated lands within 1000 feet of lakes, ponds, or flowages and 300 feet from rivers and streams. The Shoreland Protection Zoning Ordinance was first adopted in 1967. The most recent version of the Polk County Shoreland Protection Zoning Ordinance No. 25-21 was effective May 26, 2021.

The purpose of shoreland regulations is to ensure the proper management and development of the shoreland of all navigable lakes, ponds, flowages, rivers, and streams in the unincorporated areas of Polk County. The intent of these regulations is to further the maintenance of safe and healthful conditions;

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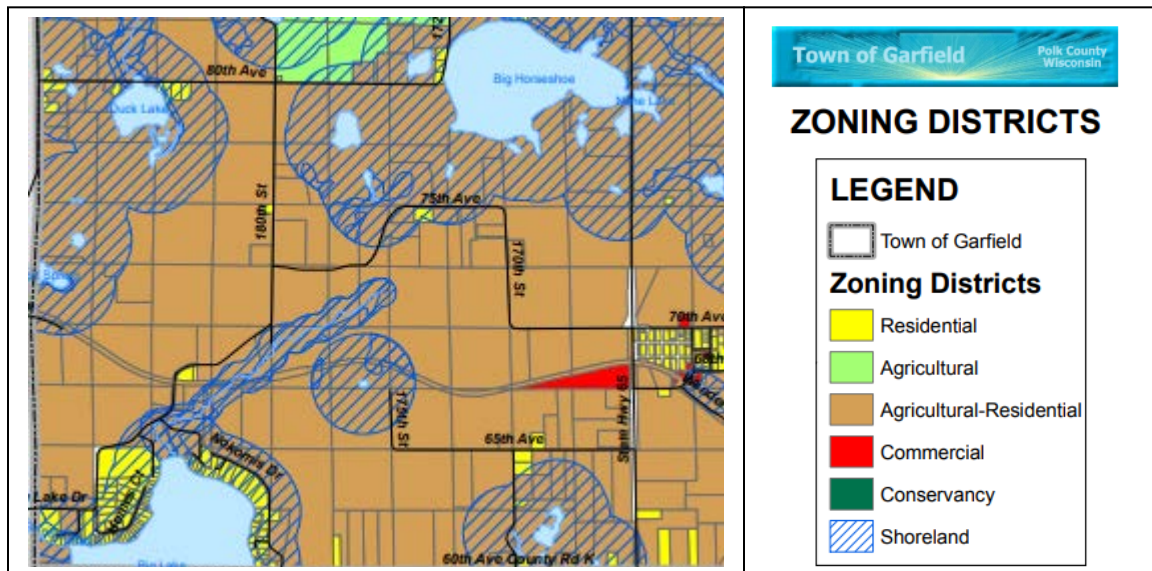
<sup>14</sup> <https://www.co.polk.wi.us/landinfoordinances>

prevent and control water pollution; protect spawning ground for fish and aquatic life; control building sites, placement of structures, and land uses; and preserve shore cover and natural beauty.

Recent changes to the shoreland zoning ordinance are generally less protective of the surface water and are consistent with updated state regulations:

- Property owners are allowed to create a viewing corridor up to 35% of their lot width (150' lot X .35=52.5' wide viewing corridor). Viewing corridor width was previously limited to 30 feet per parcel.
- Every property is allowed up to 15% impervious surface without mitigation, but mitigation is required for over 15% - 30% impervious surface.
- Each parcel can have a developed pedestrian access up to 5' in width to access the water.
- Boathouses are allowed at 10' from the ordinary high water mark, and can be up to 14' x 26'.
- Bunkhouses can be permitted with conditions.
- All structures are allowed maintenance and repair without a permit such as replacing shingles, windows, doors, and siding.
- Some nonconforming structures may be expanded.<sup>15</sup>

Overlay zoning districts are included within the shoreland zone which may allow more uses (than prior to 2020) and potential development without a requirement for a conditional use permit. Figure 16 illustrates zoning within the Town of Garfield. All land within the shoreland in zoned towns in Polk County is placed into a zoning district. Figure 17 illustrates the Polk County zoning districts surrounding the lakes. Because the Town of Garfield has its own zoning ordinance, only the zoning within the shoreland zone is shown in the Polk County map. The lots along the lakes are zoned Residential by both the Town of Garfield and Polk County. Areas further from the lake are zoned Agricultural-Residential in the Town of Garfield and are zoned Residential-Agricultural 5 in the Town of Alden (by Polk County).



**FIGURE 16. LAKES AREA ZONING, TOWN OF GARFIELD**

<sup>15</sup> Polk County, WI. Shoreland Zoning News. Downloaded June 11, 2020. <https://www.co.polk.wi.us/landinfoordinances>

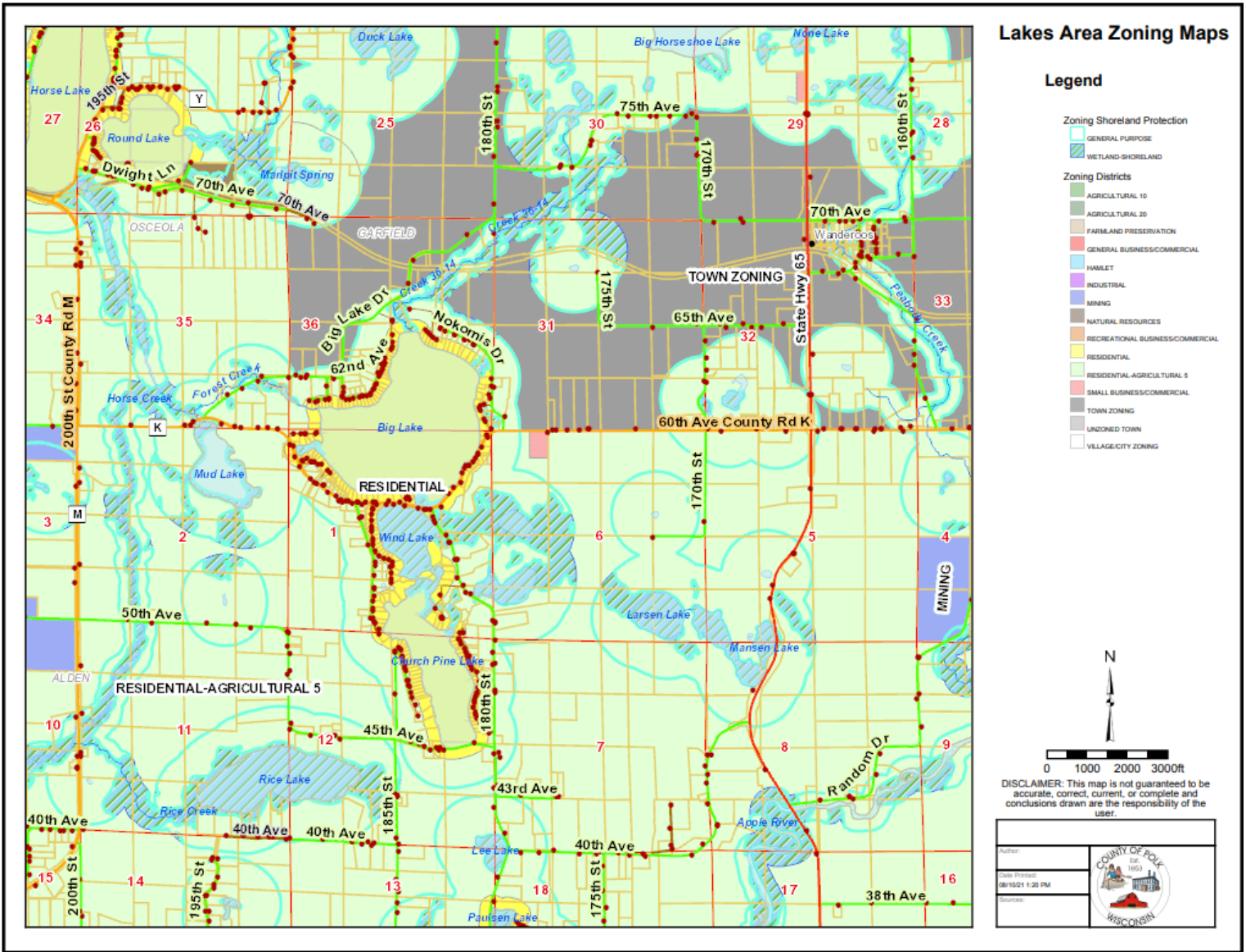


FIGURE 17. LAKES AREA ZONING DISTRICTS, POLK COUNTY ZONING



### ***Private Sewage System Ordinance***

The underlying principles of this ordinance are basic goals of environment, health, and safety accomplished by proper siting, design, installation, inspection, maintenance, and management of private on-site waste treatment systems and non-plumbing sanitary systems. The latest version of this ordinance is Ordinance No. 16-18 Private Onsite Wastewater Treatment Systems (POWTS) Ordinance effective May 30, 2018.

The last major Wisconsin septic regulation changes were in the early 2000s (SPS 383 Private Onsite Wastewater Treatment Systems). Changes in this code were generally more protective of surface and groundwater. However, the code does not retroactively apply to an existing POWTS installed prior to July 1, 2000. Many older systems (20 years or older) are “grandfathered” and do not have to meet requirements of the current code, which can be problematic.<sup>16</sup>

### ***Subdivision Ordinance – Polk County***

The purpose of this ordinance is to regulate and control subdivision development within Polk County to promote public health, safety, general welfare, water quality, and aesthetics. This purpose can be accomplished by requiring an orderly layout and use of land, providing safe access to highways, roads and streets, facilitating adequate provision of water, sewer, transportation and surface drainage systems and parks, playgrounds, and other public facilities. The latest version of this ordinance is Ordinance No. 06-19 Polk County Chapter 18 Subdivision Ordinance effective April 3, 2019.

The subdivision ordinance includes the process for subdividing land and design standards for doing so. The Polk County Environmental Services Committee reviews and holds public hearings for variance requests. Stormwater management plans and erosion and sediment control plans that meet state and federal standards are required for subdivisions, but the Environmental Services Director may waive this requirement following on-site review of a preliminary subdivision plat. The Polk County Land and Water Resources Department reviews stormwater management plans and erosion and sediment control plans. The minimum lot size for Residential and Residential Agricultural 5 is one acre. Residential Agricultural 5 has a density standard of 8 lots per 40 acres.

### ***Subdivision Ordinance – Town of Garfield***

The Town of Garfield has its own subdivision ordinance with provisions that may vary from the Polk County subdivision ordinance. Residential, unsewered lots in the Town of Garfield are a minimum of 1 acre (in a subdivision) or 2 acres (residential zoning), and Agricultural-Residential, unsewered lots are a minimum of 3 acres (zoning ordinance). The Town Plan Commission and Town Board review submittals under this ordinance. Subdivision review and approval is coordinated with Polk County.

### ***Floodplain Ordinance***

This ordinance is intended to regulate floodplain development in order to minimize the potential for damage, the expenditure of public funds for flood control projects, and interruptions to businesses or other land uses.

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<sup>16</sup> Written communication. Letter from Daniel Lefebvre, Burnett County POWTS and Zoning Specialist.

### ***Manure and Water Quality Management Ordinance<sup>17</sup>***

The purpose of this ordinance is to enhance public health, prosperity, and welfare by protecting ground and surface water resources by promoting the proper storage and management of animal waste, including the prohibitions found in NR151.08. This ordinance is administered by the Land and Water Resources Department (LWRD). The following activities are regulated under this ordinance: animal waste storage, unconfined manure piles, runoff from feedlots, and degraded pastures. The ordinance was updated April 16, 2019.

### ***Storm Water Management and Erosion Control Ordinance***

The general purpose of this ordinance is to establish regulatory requirements for land development and land-disturbing activities aimed to minimize the threats to public health, safety, welfare, and the natural resources in Polk County from construction site erosion and post-construction storm water runoff. The ordinance was updated April 16, 2019. The most significant change was to exempt agricultural uses from the ordinance. Stormwater permits are required under the ordinance for construction sites of certain minimum sizes and types, subdivisions, a certified survey map or land development resulting in more than 0.5 acres of impervious surface, or construction sites or development that the LWRD determines is likely to cause adverse impact.

### ***Nonmetallic Mining Reclamation Ordinance***

The purpose and goal of this ordinance is to ensure the effective reclamation of nonmetallic mining sites after mining operations have ceased. This ordinance adopts and implements the uniform statewide standards for nonmetallic mining reclamation required by Section 295 of Wisconsin Statute and contained in Wisconsin Administrative Code NR 135. Any proposed nonmetallic mining site (sand, gravel, or other nonmetallic minerals) is required to receive an approved reclamation permit to begin nonmetallic mining operations in Polk County. The permit also requires the development of an approved site-specific reclamation plan and the operator to post financial assurance to guarantee the completion of reclamation.

### ***Illegal Transport of Aquatic Plants and Invasive Animals Ordinance***

The purpose of this ordinance is to prevent the spread of aquatic invasive species in Polk County and surrounding waterbodies in order to protect property values and the property tax base and ensure quality recreational opportunities. It requires all plants and invasive animals be removed from a boat and trailer prior to entering a public roadway. This ordinance is administered by the Land and Water Resources Department.

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<sup>17</sup> <https://www.co.polk.wi.us/landwater>

## Related State Regulations

### ***Soil and Water Resource Management Program (ATCP 50)***

Conservation practices that farmers must follow to meet the WDNR standards of NR 151 are included in this regulation. It also guides appropriate practices and cost-share procedures for implementation of additional conservation practices.

ATCP50 codifies specific standards for the approval of the Land and Water Resource Management plans and requires counties to consult with WDNR and identify how they will assist landowners to achieve compliance with performance standards and prohibitions. Shoreland protection projects under WDNR surface water grants must be constructed in accordance with the standards specified in ATCP 50 and related referenced Natural Resources Conservation Service Standards (WDNR, 2020) .

### ***Livestock Facility Siting (ATCP 51)***

Wisconsin Statute §93.90 provides uniform regulation of the siting of livestock facilities across the state. Variations that exceed state requirements are allowed, but only if necessary to protect public health or safety. Local government must adopt requirements by ordinance prior to a siting application being filed. The conditions to exceed state standards must be based on “reasonable and scientifically defensible findings of facts, adopted by the political subdivision that clearly show the requirement is necessary to protect public health and safety.” State permitting is “one size fits all.” State policies do not account for local variations in soil conditions, geology, watershed characteristics, etc.

A siting application must be approved if it complies with ATCP 51.30. An application may be denied only if there is clear and convincing evidence that it does not comply. It may also be denied if it violates existing code, such as that for floodplains, shoreland, electrical code, etc. Counties may enact regulations of livestock operations that are consistent with and do not exceed the performance standards, prohibitions, conservation and technical standards of state law without WDNR and Wisconsin Department of Agriculture, Trade and Consumer Protection (DATCP) approval. Counties may enact operational regulations that exceed state standards, if such standards are approved by the WDNR and DATCP and are necessary to achieve water quality standards.

### ***Stormwater Discharge Permits (NR 216)***

Under subchapter III of NR 216, Wisconsin Administrative Code, a notice of intent shall be filed with the WDNR by any landowner who disturbs one or more acres of land. This disturbance can create a point source discharge of storm water from the construction site to waters of the state, and is therefore regulated by WDNR.

Agriculture is exempt from this requirement for activities such as planting, growing, cultivating and harvesting of crops for human or livestock consumption and pasturing or yarding of livestock as well as for sod farms and tree nurseries. Agriculture is not exempt from the requirement to submit a notice of intent for one or more acres of land disturbance for the construction of structures such as barns, manure storage facilities, or barnyard runoff control systems (NR 216.42(2), Wis. Adm. Code). Furthermore, construction of an agricultural building or facility must follow an erosion and sediment control plan consistent with s. NR 216.46, Wis. Adm. Code and meet the performance

standards of s. NR 151.11(6m), Wis. Adm. Code. An agricultural building or facility is not required to meet the post-construction performance standards of NR 151.121, Wis. Admin. Code.

Forestry and silvicultural practices such as tree harvesting, tree nursery operations, reforestation, tree thinning, prescribed burning and tree pest or fire control activities are also exempt from storm water permit coverage (see NR 216.42(3)).

### ***Confined Animal Feeding Operations (NR 243)***

Defines regulations governing discharge of pollutants to navigable waters of the state. In addition, NR 243 defines and governs standards associated with Confined Animal Feeding Operations (CAFOs- operations larger than 1000 animal units) and establishes permit requirements for these large scale producers (Wisconsin Pollution Discharge Elimination System Permit; WPDES Permits). These permits address the following activities:

- Manure storage,
- Runoff control systems,
- Groundwater monitoring,
- Nutrient management to include spray irrigation, and
- Compost facilities.

### ***Private Onsite Wastewater Treatment Systems (Chapter 145 WI Statutes and SPS 383)***

The following requirements are included in state regulations and local ordinance.

#### ***Maintenance Requirements***

- Holding Tanks/Advanced Treatment Systems: annual service.
- Conventional/Mound/At-grade Systems: service every three years.

#### ***Replacement***

POWTS replacement may be required with additions of bedrooms or persons on the property, or if the system is determined to be failing due to old age or improper use.

#### ***Failing POWTS***

1. The discharge of sewage into surface water or groundwater.
2. The introduction of sewage into zones of saturation which adversely affects the operation of a POWTS.
3. The discharge of sewage to a drain tile or into zones of bedrock.
4. The discharge of sewage to the surface of the ground.
5. The failure to accept sewage discharges and back up of sewage into the structure served by the POWTS.

## Management Plans

### ***Church Pine Round and Big Lakes Aquatic Plant Management Plan***

The Aquatic Plant Management Plan for Church Pine, Round, and Big Lakes presents a strategy for managing aquatic plants through the year 2026 by protecting native plant populations, controlling curly-leaf pondweed, and preventing establishment of aquatic invasive species. The plan includes data about the plant community and reviews a history of aquatic plant management. It also includes data about the plant community and reviews a history of aquatic plant management on project lakes.

#### Plan Goals

1. Prevent introduction of aquatic invasive species and pursue any new introductions aggressively.
2. Manage the population and spread of curly-leaf pondweed, yellow iris, purple loosestrife, and other invasive aquatic plants.
3. Maintain navigable routes for boating.
4. Preserve and enhance our diverse native aquatic plant community.
5. Educate and engage the public regarding aquatic plant management.

### ***Polk County Land and Water Resource Management Plan***

The Polk County Land and Water Resource Management Plan (LWRMP) describes the strategy the Land and Water Resources Department (LWRD) will employ from 2020–2029 to preserve, protect, and enhance the surface water, groundwater, land, and community resources present in the county. The goals, objectives, and activities identified in this LWRMP were developed by an advisory committee comprised of Polk County residents and partners.

The main concerns of the advisory committee were organized into four goals, which will be addressed by LWRD to protect the natural resources of Polk County for all who live, work, and play in the community, and for the intrinsic value of the resources.

#### Plan Goals

- 1) Protect and improve the water quality of lakes, rivers, and streams.
- 2) Protect and improve groundwater quality and quantity.
- 3) Sustain and enhance land resources.
- 4) Support and develop community stewardship and partnerships to improve our natural resources.

This Comprehensive Lake Management Plan aligns with these four goals as outlined in the Polk County Land and Water Resource Management Plan.

Project lakes are located within the Horse Lake-Horse Creek watershed (HUC070300050804). This watershed is ranked second in a list of 42 watersheds ranked to prioritize the work of the Polk County Land and Water Resources Department.

***Lake St. Croix Total Maximum Daily Load (TMDL) Implementation Plan, 2013***

The St. Croix Lake TMDL plan calls for a 38% reduction in the human-caused phosphorus carried to the rivers and streams of the basin, and eventually entering the St. Croix River and Lake St. Croix. The TMDL sets goals for each watershed in the basin, based on land cover and land uses practices. It also sets a cap on the amount of phosphorus that can be discharged each year by wastewater treatment plants serving communities and industries in the St. Croix Basin. Polk County's phosphorus load is 160,976 pounds of phosphorus per year, which is the largest of any county in the basin.

The project lakes watershed lies within the Apple River Basin, the sub-watershed with the highest phosphorus load and highest reduction goals. Polk County tracks annual progress toward reaching St. Croix Basin goals including projects completed within the project lakes watershed. This highlights the importance of continued diligence to reduce runoff into the lakes and the ultimate flow into the St. Croix River.

***Polk County Aquatic Invasive Species Strategic Plan, 2015-2020***

This plan provides an overview of aquatic invasive species in Polk County and includes an implementation plan to direct aquatic invasive species work.

Goal 1. Prevent the introduction, establishment, and spread of AIS in Polk County waterbodies.

Goal 2. Control populations of aquatic invasive species.

Goal 3. Monitor Polk County waterbodies for AIS and document results.

Goal 4. Provide AIS information and education in Polk County and surrounding areas.

Goal 5. Sustain the implementation of the plan.

This lake management plan is aligned with and supports the Polk County Aquatic Invasive Species Strategy Plan goals.

***Polk County Comprehensive Plan, 2009-2029***

The Polk County Comprehensive Plan presents a vision for the future of Polk County, with long-range goals, objectives, and policies for housing, transportation, utilities and community facilities, economic development, intergovernmental cooperation, land use, energy and sustainability, and agricultural, natural, and cultural resources.

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